

CAP Oral History

Pam Stevenson (Q):

I'm Pam Stevenson and we're doing an interview for the Central Arizona Project. Today is Wednesday, August 4, 2004, and we're at the SRP studios in Phoenix and I'll let you give me your full name.

Bill Plummer (A):

Full name is Nelson W. Plummer, but otherwise known as Bill.

Q: Tell us when and where you were born.

A. I was born in New England and I was reared in the state of Vermont, went to school in Vermont.

Q: And when was that?

A. I went to the University of Vermont from 1956 to 1960 and I graduated in Engineering. My first job was for the Bureau of Reclamation, Boulder City, Nevada.

Q: You don't want to tell us when you were born, you neglected to do that.

A. 1938.

Q: It's usually the woman that don't want to tell me that. You grew up in Vermont. Was it a small town?

A. I grew up on a very small farm, three miles from the nearest village which had maybe 200 people. The nearest city was 30 miles away and it had about 8,000 people. So it's very, very rural and still is.

Q: Sounds pretty though.

A: In the summer time which usually is around the 15th of July.

Q: So growing up on a farm, did you do a lot of farm chores and such?

A: Oh yes, every morning. Before I went to school and also after I got back from school at night. So farming was a busy time and particularly in the summer but all year round.

Q: What sort of chores did you have?

A: Well, I'm not sure if you are familiar with farming, the cattle are out feeding and the first thing in the morning you've got to go get the cattle, bring them in the barn, set them up, feed them, go through the milking process and do the clean up afterwards, and you do it again in the evening, same thing, every day, twice a day.

Q: You say it was a small town. What kind of school did you go to?

A: Well after about a 20 mile bus ride, this was in high school but my elementary school was in a one room school. And my first year, when I was in first grade, my two cousins and I were in first grade together and there was a total eight in the whole school. But it gradually got to, I think we had 17 by the time I went to high school. And then high school was some distance away and that was also very small. The entire high school was like 65 people all four, four grades.

Q: So when you were in school, were you a good student?

A: Yes, I was a good student. Interesting though, most all the men, boys that were in school, ended up going into farming or some sort of a trade and I really suspected that I was going to be a farmer. I belonged to a Future Farmers of America organization. I took vocational agricultural all four years. I had a physics teacher my senior year and I was very good in math and physics and chemistry and he

convinced me that I really ought to look at engineering. And that's what I applied at the university for and been one ever since.

Q: And where was the university you went to?

A: University at Vermont at Burlington on Lake Champlain.

Q: Was that big change for you to go away to college?

A: Yes it was because I was from such a small area but pretty soon you get immersed in studies, you didn't pay much attention to surroundings. You had friends and people in class and you dealt with it and it wasn't that big of a change.

Q: What did your family think about that?

A: Well, my parents were supportive. What sort of changed though is that my junior year I joined ROTC. And my father was not very happy about that because he saw that when you are in ROTC, you go to a military, and things happen in the military and you didn't want to do that. So he tried to discourage me but I didn't listen so I was commissioned a Second Lieutenant and went into the military.

Q: When did you go into the military?

A: Actually, I graduated from the university in June '60 and I went to Boulder City and then I went to the Army the following January '61. I was only in six months of active duty because at that time they had enough officers that you didn't need two-year, three-year officers. So a bunch of us were just six months. But it was interesting, I'm glad I did it. I stayed with the Army Reserve my whole life. So I am 28 years Army Reserve.

Q: And where were you stationed during your time in the military?

A: Well, when I was on active duty, I was stationed at Fort Sill, Oklahoma for training and then Fort Dix in Jersey for follow up after the training. And then in reserve duty, I went to a lot of different places, Fort Lewis, Washington; Fort Ord, California; Fort Sill, Oklahoma; Fort Hunter Liggett in California. There were several different places and they were all interesting. Army posts are quite interesting places.

Q: And so you graduated, what was your degree in?

A: Civil Engineering.

Q: What was your first job when you got out of the military?

A: Well, I went to the Bureau of Reclamation right out of school and I worked for the Bureau six months, then I went to the military, then I came back to Boulder City. And really building on what's been said before, I was in Boulder City where there really wasn't much work going on in the region. The Central Arizona Project had not been authorized, work was not – there wasn't really that much work to challenge a young engineer. So I came back from the military, I applied for jobs. And I got selected for a job in Juneau, Alaska. At that time, the Bureau had an office in Juneau, Alaska. But I had a boss at that time, a very strong willed boss, and he sort of directed me to go to Yuma instead. And so I spent five years in Yuma.

Q: Let's back up a little bit before you came to Boulder City right out of college, what was Boulder City like?

A: Oh, that was a change. I can still remember driving in my little Volkswagen without any air conditioning from Kingman to Boulder City. And I knew if there was a hell, I was in it because it was late June and it was hot. But once, I had only been there a few days, I really - in just a few days I was a desert rat. I was working outside helping people do things outside in that heat, no problem at all. And I've enjoyed it ever since, heat doesn't bother me.

Q: Were you kind of surprised when you applied with the Bureau of Reclamation, did you have any idea that you'd end up in Boulder City?

A: No, that's kind of a strange thing because nowadays people decide what they're going to do like in their junior or maybe even sophomore year. When I was in school, you really didn't decide that sort of thing until your senior year. And I went down to the placement office and started going through file drawers and the normal things like the Bureau of Public Roads in those days and the Forest Service and the Bureau of Reclamation and all these others, but I'd never heard of the Bureau of Reclamation. Never heard of it because in the east coast, you know, you deal with other types of agencies. So I just filed, in those days called a Form 57, and sent it in and the next thing I knew I got this offer from Boulder City. And I had some other offers and I said "What the heck, I've never been west." So I took the job in Boulder City.

Q: What was your first job title?

A: My title was Civil Engineer and I was working on a small construction project right adjacent to Boulder City. There's a...the original Boulder City was called McKeeverville, and it was established in 1931. And it was basically of tents when they first set it up. Then over time people built a wood structure around the tent and so you see these wooden buildings and they look like tents. And they were situated right under some high tension power lines and a few other things. So we had the job of going and moving these buildings so they were not in the right-of-way of the transmission lines, pave the streets, put in water lines and sewer lines. That was my first job. But at the same time, that wasn't a full-time job and I was assigned to a River Control Branch in which we scheduled flows down the Colorado River from Hoover Dam down to the Mexican border. So I was really doing two of them at about the same time.

Q: So that's the first time you started working with the Colorado River?

A: That's the first time.

Q: When did you know about the Colorado River and the CAP?

A: I don't know if I knew about it. I just don't recall.

Q: Did you have any time to explore up there or see any of Arizona?

A: Oh yes, I did a lot of hiking through the hills. One of the secretaries in the office had a child about four years old and I used to take him out in the desert and show him rattlesnakes and tarantulas and all of that sort thing. And he still remembers it, because I see him every once in a while. Again, the heat was not a problem like it was for some. Now when I went to work in Boulder City in 1960, I was really more or less in that region until '66 or actually '67 but a lot of people came, a lot of people came from the East Coast. A lot of people like Wisconsin and Illinois; they'd stay a few months and they'd leave, they just didn't like Boulder City. Of course, there was a little saying we had in Boulder City at that time. It was the cleanest, greenest cemetery in Nevada.

Q: Didn't you say you ended up going to Yuma?

A: Yes, the engineer in charge of river control at that time was a man named Paul Oliver, a very, very strong individual, tough, not much humor. And when I was selected for this position in Alaska, he called me in his office. I can still remember this very clearly, he says, "What's this business you going to Alaska?" and I said, "Well, there's not much going on here in Boulder City and I need some challenges, I need to do something." And he said, "How about going to Yuma?" and I said, "I wasn't aware there's any job openings in Yuma?" He said, "Not what I asked you. How would you like to go to Yuma?" And I said, "Well uh?" He said, "We'll send you on a detail." "Okay." That was the end of my trip to Alaska and the beginning of my time in Yuma. He was very persuasive.

Q: What was going on in Yuma?

A: Well, there was a lot going on in Yuma at that time. We talked about salinity earlier. The salinity was just starting the return flows from the Wellton-Mohawk Irrigation District for flowing into the river causing a big spike in the salinity being delivered to Mexico. And the Mexicans had complained and so it was all just starting. So I was involved in that. We were putting in tile drains in the Wellton-Mohawk at the same time; were starting work on Senator Wash regulating reservoir for pre-regulating the river at the south end. I was also looking at the possibility of pipelines to pump water from the Yuma Valley to the north of the river. So there's a lot. Levees, we were also building some levies in the area. So there's a lot of work going on, big office at that time and very enjoyable, very, very enjoyable tour of duty in Yuma.

Q: From Boulder City to Yuma, those are two cities that you don't think of as being desirable particularly.

A: Well, a lot of folks have that opinion of Yuma as well. But I can say, I liked Yuma then and I still do. It's a very enjoyable town. Well it's a big city now, it was small then, but it's a big city now.

Q: When did you get involved then with the Central Arizona Project plans? Those were just getting started at the end of the mid-60s, late 60s, when it got approval. Were you involved at all with any of that?

A: Only peripherally when I was in this region. We had some surveyors that were working on the Central Arizona Project that also came to Yuma to do some work. We ended up, I got to be pretty friendly with some of them so I would come over and participate with them over here a time or two but a very, very, very small amount. My first association really with Central Arizona Project was while I was in Washington because I transferred to Washington in 1968. And then almost immediately, the Central Arizona Project was a big issue. And I was working at that

time at the Office of Management and Budget (OMB). At that time, it was called Bureau of the Budget which is part of the executive offices of the President. And in that role, you end up having to look at legislation and policies and so forth, so that was really my first, first association with the CAP.

Q: So why did you transfer to Washington?

A: I've got to back up a little bit. When I was in Yuma, the personnel officer came around looking for applicants for this brand new program that the government was sponsoring called PPBS (Planning, Programming, Budgeting, System). Brand new. Actually, it was started in the Defense Department by the "whiz kids" under McNamara. And he said somebody lost the paperwork in Washington and they needed a name in a hurry. And I said, "Well, put my name in." So a couple of months later, the same guy came in and said, "You got it!" and I said, "Got what?" I'd forgotten all about this thing. He said, "You were selected."

So there were 83 of us from all over the country, all federal agencies that went to seven different universities as a part of this program. I ended up going to Stanford. And Stanford was unique in this process because they would award master degrees to the people in these programs if they were in engineering or some technical field. The other universities like Harvard, Princeton, I can't remember the university from Maryland, there were seven of them total. So a full academic year paid for by the government, as part of the government program. It was very similar to the Sloan Program that people, you may have heard of the Sloan Program. And it was very good, and as a result of that, I made some contacts.

One of the contacts was a man that worked at the Bureau of the Budget. There was two there, but he was the one I got pretty friendly with. So I went back to Boulder City sitting there wiggling my thumbs trying to figure out what to do and he called me on the phone one day and said "Come back here, I want to talk to you." So I went back to Washington and interviewed with him, and they accepted me. That's how I got to Washington.

Q: And what was your job in Washington?

A: The actual title of the position was Budget Examiner which is kind of...it's not a good definition of the position. Because what we did, we analyzed policies, legislation, and budgets. All three. And it was quite challenging because it became almost a game that you played with the agencies that you were responsible for, because they'd come in wanting money and you had to try and find weaknesses in budgets because your job was to cut budgets. And after about three years, I had enough of that. So I left. It was an exciting job at the time.

Q: Sounds like a big change from engineering.

A: It was and actually that was the beginning of the rest of my career which was non-engineering basically. Engineering served as a good base for everything I did but I never again had an engineering slot.

Q: So when you left Washington, where did you go?

A: While I was in Washington, I had basically two jobs. When I left the OMB after three years, I went to work at the Secretary's Office of the Interior. When Rogers C.B. Morton was the Secretary of the Interior and I worked for three different Assistant Secretaries as a staff assistant. So in that position, it was better than being in budget because you had a chance to look at policies from, you know a departmental perspective. And it was uh, there were a lot of different issues that came up and a lot of them dealt with Central Arizona Project. And for example, I personally hand carried and staffed the Master Repayment Contract that was signed in 1972. Then I got involved in the EIS's, the Environmental Impact Statements, for the various features, like the regulatory storage which was the Orme Dam and so on and several others. Also, at that time, about '71 I think it was '72, maybe it was '70, the Navajo Generating Station was just in the process of being decided upon and ready to start construction. And one of the things we had to do was to evaluate the contracts of civil power.

The Bureau of Reclamation had a percentage of that plant, SRP had a percentage, and there was also some percentages for some California utilities. And we had to review those contracts. And we reviewed them and then nothing seemed to happen for a while. So one day one of the guys that I was working with, I asked what happened to those contracts. And there was a little bit of embarrassment, the California utilities just backed off and so we kind of had to re-do all these contracts because California utilities are no longer part of the ownership. But they did buy power from the plant so there was a relationship, but not as an owner. So that was one of those exciting things that happened relating to CAP.

And then we also...this was at OMB, the first construction on the CAP, other than the generating station, was Reach 11 up here in North Scottsdale. And a lot of folks asked why was that reach built first, that's in the middle of the project. Well, it was related to a flood control, it had a dike associated with it. So they decided to build that one first because it did double duty. It made the canal and also it helped prevent floods in the lower Scottsdale area.

Q: So you were still in Washington, you were involved with a lot of Arizonans?

A: Yes, absolutely.

Q: Getting back to talking about the Navajo Generating Station, can you explain a little bit more about the relationship between the Navajo Generating Station and the Central Arizona Project?

A: Well, let me go back into history. The Central Arizona Project, I'm not sure if the first year it was evaluated, but it was in the early 40s and one of the early proposals for the Central Arizona Project was to bring it via tunnel from the Grand Canyon all the way to Central Arizona. It didn't go down the river and be pumped up, it was by gravity flowing through a tunnel. And the Bridge Canyon and Marble Canyon

dams were part of that proposal. Well, as time went on and the Bridge Canyon/Marble Canyon dams became big issues in the environmental community, and as a matter of fact when I was at Stanford we had a debate one day and I was part of the debate with some Sierra Club folks on the benefits and dis-benefits of Bridge Canyon/Marble Canyon. And shortly after that, I think it was the Sierra Club came out advocating instead of the dams in the Grand Canyon as they referred to it, they now were proposing a nuclear generating station. Well it turned out to be the Navajo Generating Station as the alternative.

Now again, the reason for dams in the Grand Canyon was to provide power for sale which becomes a cash register for the Central Arizona Project. When Navajo Generating Station came in, you didn't have quite the same situation so the Bureau of Reclamation was assigned, I think it was 23 ½ percent, of the total plant. That power is reserved then for the Central Arizona Project or sold if wasn't needed entirely. That capacity can also be used for the Yuma Desalting Plant which we might want to get into later, that's in the law as well. So that's how it sort of generated all the way from the dams to the Grand Canyon to the Navajo Generating Station. That's kind of interesting, because in 1962 I went down to the Bridge Canyon Dam site and there was a box of core, rock core, laying on the surface. It had been there since the early 40s, well at that time only 20 years, but it was still laying there on the ground that the drillers had left behind.

Q: And what were they drilling?

A: Testing for the dam site, drilling holes to check the stability of the rock, and type of rock, and all of that standard procedure in building dams.

Q: So you've actually been down and seen it for yourself?

A: Yes, I've been there.

Q: That had to be kind of unusual; most of the people that probably talked about it didn't even know where it was.

A: Well, I'm sure that's correct. Actually another engineer in Boulder City, I was in Boulder City at that time, we did it on our own on a weekend. And it was kind of interesting because we were up on the rim and got there after dark and walking around and never knew where the precipice was but it snowed that night. It was in November and we were up there overnight and the next day and then came back. It's on the Hualapai Indian Reservation and the roads were terrible, you know dirt roads. But I was down there, it was an interesting place.

Q: Did you hike down from the rim?

A: The road came in from Peach Springs which is on the Hualapai Reservation and we didn't have much of a map, just some USGS (U.S. Geologic Survey) sheets and we kind of weaved our way around and then ended up at the top. And then there was a canyon just before you get to the mesa and you climb up the mesa when you get down at the canyon level, then you can wander down and go down side canyon which takes you down right into the Bridge Canyon site.

Q: So you didn't have to climb down from the rim?

A: No, no, there was like a river, a drainage that would go down to the river.

Q: You have a little bit more insight, like I said, then most people do. Couldn't find it on a map?

A: Well, we kind of did it on our own. We did the same thing at Glen Canyon. I walked the Glen Canyon Dam area three or four months to watch that dam being built. First time I was there, they just placed the first block and just watched it grow. As an engineer, you're interested in those things. It really was nice watching it being built.

Q: What did you think about the Marble Canyon site?

A: Oh, the Marble Canyon was a good site, vertical walls on both sides, perfect, perfect opportunity. But again, it got associated with the Grand Canyon. And I don't remember whether the two were always a pair or not. I don't think so but once the Bridge Canyon fell out, Marble Canyon fell out as well.

Q: You were explaining though that it was more of a cash register. It wasn't that CAP needed the power itself?

A: At that time no because at least early in the process because it was a gravity flow tunnel. Then later when it came into the pumping, I don't recall whether there was an allocation of power for pumping at Havasu or not. I don't remember. But they were commonly referred to as cash registers, which in the normal sense would be you sell power and use the money repay the project.

Q: And that was part of what the Navajo Generating Station was a compromise to not build the dams?

A: The Navajo Generating Station never was considered a cash register, not in my recollection. That is was basically to furnish the power for the pumping and any excess you had, you'd sell it. Which has provided some revenue, I know, because I from the board meetings there's quite a bit of revenue that comes from the excess power.

Q: So that power is still used from Navajo to run the pumps?

A: To CAP? Oh yes, that's I guess the only source, isn't Tom (Clark). I think it's the only source unless...

Q: What about Hoover, I thought Hoover provided...

A: No, no, Hoover, well the District has some Hoover A or B power but you don't use it for pumping.

The gentleman taping the interview made a comment but was far away from the mic and I was unable to hear him

Q: I know that would be part of the growth of the power district for SRP too. Building it, it benefited a lot of people.

A: Oh yeah, and of course SRP has managed it from day one.

Q: You mentioned something about in 1972 that you hand carried the contracts. Explain what you were talking about there.

A: Well, the way things worked at the secretary level, if there was something that needed to be done and you wanted it done right, you hand carried the paperwork. You didn't throw it in the out box and hope that it would get to where it's going to go because many times it didn't, at least in a timely way. And as I remember, and again this has been a long time ago now, but as I remember that there was some urgency to get it done. And so when that happened, somebody gets assigned the task of carrying it around and get surnames. And surname means big process in a major department like this. And then you carry it around and you give it to an assistant secretary or to a Bureau head and then you sit back and you wait for them to do it and then you carry it on to the next person.

Q: And what was this contract that you were carrying?

A: This was the Master Repayment Contract between the government and the Central Arizona Water Conservation District. That is the principle contract. It's been modified at least once since then. Actually, a major overhaul, but '72 was the first one.

A little history in that if I can interrupt a little bit, one of the reasons why, and this came up earlier in your questions, why there's a Master Contract and why there's a Central Arizona Water Conservation District. The original scheme was for the Bureau to contract with every individual user. That was going to be a massive number of contracts. And some people in the Bureau wanted to do that and for reasons that it just puts more control in them because they're managing all these contracts. But a decision was made at the secretarial level that was not going to happen. They are going to force the state to come up with the entity that would be the contracting entity and that is how it went to the Central Arizona Water Conservation District.

Q: And that's why it came up later?

A: Well, I'm not sure it came up later. That's why I raised that question earlier, who signed that contract. I don't remember who signed it for the district. The district must've been in place because the Bureau had a rule. Ever since I've been with the Bureau, a rule that before you start building a project, you have to have somebody sign that's going to repay the project. So the district must have been in place in '72. I just don't remember who signed it.

Q: Who was appointed to the Board in '71?

A: Okay, I think Rose Mofford was in '71. I think she was on that original Board.

Q: The original Board in '71. So that was probably, pretty much before that it was just the Central Arizona Project Association?

A: Which was a lobby group.

Q: Right and the Central Arizona Water Conservation District became the legal name of the group?

A: The Bureau's rule on the repayment is that it has to be a government entity because it has to undergo the assessed taxes. That's the rule; you have to have the ability to assess taxes. If you didn't have that ability, then it wasn't a true contracting entity.

Q: So that's how it sort of came about as opposed to, you said that they were going to have contracts with individuals that were with other water districts not individual farmers?

A: Yeah, similar to what's over in the Yuma area. The Bureau has a contract with Yuma Mesa Irrigation District, Yuma Irrigation District, the Yuma County Water Users, contracts with all of these people. And that's the way we intended here. A man named Langley was the Head of Division of USBR that handled that. And Langley was an extremely bright and very efficient person and he liked to deal with a lot of districts. And he was really promoting individual contracts with districts. But it was going to be big, too big a problem. It would've been a disaster in my view.

Q: So this was the contract that was between the CAWCD and the U.S...

A: And the Secretary, the Secretary yes. I believe Morton signed that directly.

Q: And you hand carried it for signatures?

A: Right.

Q: And that was not a very usual thing?

A: No, not at all. Can we have a break here? Tom is signaling.

Q: Anything else about your Washington role, your recent job, before we come back to Arizona?

A: Okay, my role there initially was in the policy, a lot of policy. So I handled issues covering the whole western United States, actually the whole U.S., but mostly western U.S. I was actively involved in negotiating a contract at the Grand Coulee Power Plant. Grand Coulee was being expanded to a third power plant, massive increase in capacity. The contract was working and Bonneville Power Administration said we need that power as soon as we can get it. We're willing to pay extra if we can accelerate the contract. So I was involved in the negotiating of the contract to accelerate that contract by, I don't know, six months or a year somewhere in that area. So that's probably a lot of money for the Bonneville Power Administration. A lot of issues of the environment, at one point I was one of the official reviewers of the Environmental Impact Statements. Not for detail on the environment, but looking at alternatives. My issue was policy, so I would look at alternatives. And one of them, which was kind of interesting because the act was passed January 1, 1970, and I remember the very first EIS that came out of the Bureau of Reclamation. It was on Auburn Dam in California, which was never built. I think it was 21 pages long. And Ellis Armstrong was Commissioner of Reclamation at that time and it was my duty to tell him that it wasn't going to cut it. He was very defensive about this 21 page document which was the EIS for Auburn Dam which was a massive structure. This was a major, major project.

But things went on from there, and I worked very closely with an Environmental Coordinator for the Department of the Interior. A name that has not come up yet, but also worked here at CAP, Bruce Blanchard. And he was in that job for many years and he grew up with the Central Arizona Project. But he eventually got this job as the Environmental Coordinator for the whole Department of Interior. And I worked with him closely on a lot of these EISs. A lot of my work at Interior was with the Bureau of Land Management. At that time, a very significant number of rights-of-way requests for transmission lines, and all kinds of things and one of my jobs was to process those. And a lot of those were not very fun. Working with the Bureau and water was a lot more fun than those land deals. But those were, and there were a lot of issues I can't begin to go in to a lot them. One I will, picking up on these asides here, one day I got a call from the Under Secretary of the Interior.

His name was Whittaker. He had been in the White House as counsel. And his secretary called me up and said, "There are a bunch of people coming in to meet with him, did I know what they wanted to talk about." Here I am on the opposite side of the building two blocks away, and I said, "Well I don't know but I think I know." And she said, "Would you prepare a briefing statement for the Undersecretary?" And so I banged out a briefing statement and took it up to him and came back to my office. Let's say the meeting was set for 11:00 a.m. and about ten after 11:00, I got this call from the Under Secretary he said, "Come on up I want to talk to you."

So I went down the corridor two blocks again, the opposite end of the building. And he wanted me to brief him verbally which I did. And I said, "This is what I think they want and this is what the policy of the department is and has been." And so he said, "Well, I guess we better go in." And it's like 20 after 11:00. He kept this people cooling their heels for 20 minutes. So I started to leave and he says, "No, you're coming with me."

So I go in this conference room, and it's kind of a narrow room and there's like 12 or 15 people from California. It was precisely the group I thought it was going to be. And so Whittaker came in and sat down and he proceeded to tell them why he couldn't give them what they wanted and they hadn't asked for it yet. And these guys looked at me because they knew very well where that all came from see. And so they were so flustered that they asked anyway. And then he repeated himself and gave them another reason why they couldn't have what they wanted but I was not very comfortable there for a while.

Q: What was it that they wanted?

A: I don't remember something in California that they wanted. The departmental policy was not to do it. It was really quite amusing.

Q: Tell me about your leaving Washington then? What your next career move was.

A: I left in '74, early in the summer in '74. I'd been in Washington what six months I mean six and a half years. In Washington, you process paper. You get involved in these issues. And I am kind of a ground person, seeing something get built. So Gil Stamm was Commissioner of Reclamation at that time, and I went to Gil and I said, "Look I'm ready to come back to the Bureau. I want to get out where I can do something."

And so we talked about that for a while and I ended up being Assistant Regional Director in Denver. There was a regional office there at that time. I went there in the fall of '74 and worked there until June I guess of '78. But I worked on quite a few projects in eastern Colorado, Wyoming, Nebraska, and Kansas mainly, a little bit in New Mexico, but mostly in those areas. Had some interesting issues there on power lines and dams.

Q: You got away from the Colorado River for a while?

A: Only to a limited extent because that region has two transmountain diversions that take Colorado River water from the west slope to the east slope. That was a Colorado Big Thompson project that comes in to the Loveland, Ft. Collins area from the west side. And the other one is down near Pueblo and it comes in from the west side near Aspen and goes through the mountains and a tunnel and it comes out in the Arkansas River near Pueblo. So we were involved with the Colorado River but from a standpoint of transmountain diversions.

Q: So where did you go from Denver?

A: That's an interesting story in itself in that I was involved in a team effort that had representatives from every region in the Bureau to look at the alignment of regions. Because there was a feeling that projects were being constructed and the demand for projects was going down and maybe we should take a look at realignment. So I was on the team from Denver. And we came up with some recommendations but about that time the job of Regional Director opened in Salt

Lake City. I was kind of afraid that being on that team, that maybe I would be viewed as having an inside track or something to this job, I didn't apply for it. And Keith Higginson was Commissioner at that time and he was interested in having more than just a couple people apply for it. And he talked me into applying for the job and I ended up getting the job. So I then moved to Salt Lake as Regional Director and now I was looking at all the projects in western Colorado and Utah and southern Wyoming and that was all Colorado River basin, upper Colorado River basin.

Q: So were you kind of following the progress of the Central Arizona Project indirectly then?

A: Very indirectly, I obviously didn't have time to do it very much because I had a lot of work going on up there. Obviously when you're...even though I was upper basin and CAP is lower basin there were a lot of meetings back and forth that you need to coordinate and communicate issues. And one of the things I got faced with right away in Salt Lake, was I learned that we had like four or five different estimates for streamflow run off in the Colorado River. Well you can't manage when you've got four different forecasts out there. So we sat down and figured out a way to combine them into a forecast center, in which there would be one forecast that everybody could agree to which helped simplify things a lot. But a lot of meetings between the upper basin and lower basin, we'd meet in either Boulder City or meet in Las Vegas or you'd meet in Salt Lake and just a lot of meetings. So we kept up from that stand point plus Glen Canyon is inner related operationally with Hoover Dam. And so everything we did was related.

Q: So Glen Canyon came into Utah area?

A: Glen Canyon is upper basin so it was my responsibility when I was Regional Director there. As a matter of fact, it was under my watch that we filled the reservoir for the first time. And there is a really interesting story there because Congressman Wayne Aspinall was Chairman of the House of Interior and Insular

Affairs Committee for many, many years. A very, very powerful man and most people didn't call him Mr. Aspinall or Wayne or Congressman it was The Chairman. He was always The Chairman. Right after we filled, it was in June 1980 the dam was full. I had the Project Manager from Grand Junction to bring Mr. Aspinall, The Chairman, down to Glen Canyon because he was the father of the Colorado River Storage Project that passed in 1956. So he brought him down and one of the things that you do at a project, you got gates, certain types of radial gates. You never let water go over the top because it can damage them. So as the water comes up in the reservoir, you raise the gates so water goes underneath. Well, there was another issue I won't get involved in, but it was essential to the upper basin that Glen Canyon fill. It was absolutely essential from a monetary standpoint. And at that point in time, the only evidence that we had, that it was filled was a recorder in the power plant. It has a little ink pen that showed 3700 elevation, that's full. Well, I'm always a little bit of a cynic and always want to be safe. So I decided to have the guys drop the gates so the water goes over the top, take a photograph. You can't mess with a photograph.

Now it was very clear that it went over the top which means that it was filled. But The Chairman came down and he's standing there, and he's a short fellow, he put his hand on my shoulder and he said, "Bill you know this Colorado Storage River Project, Glen Canyon Dam, we've been studying this project a long time, the Bureau's done all these studies, we've had hearings in Phoenix and Salt Lake City and Washington," he said, "then we went through the process of committee hearings in Washington and the mark ups and we finally authorized it and I helped get appropriations for Glen Canyon Dam." He said, "You know, in all those years I knew this reservoir would never fill." And there it was, water going over the top.

Q: And that was what year?

A: 1980, June 22, 1980.

Q: And you were still up in Utah?

A: Utah I was in Salt Lake, yeah.

Q: When did you come back down to the lower region?

A: That was in the fall of '81 and building upon what we said earlier about people coming from California to Arizona. A certain Wes Steiner was very upset when he learned that I was going to be moving from Salt Lake City to Boulder City because upper basin was the enemy. California is the enemy but also upper basin is the enemy. But we took care of that pretty quickly. It didn't become a problem but he was concerned for a while.

Q: What was your new job in 1981?

A: Well, I was the Regional Director in Boulder City. Now what happened in 1981, for the lower basin and that is the first time it ever happened that a person moved from the upper basin to the lower basin. You just didn't do it.

Q: Why did you do it?

A: Well, I'm getting to that. In 1981, James Watt became the Secretary of the Interior. And he liked to have people move around. So it was a big old musical chairs and I was one of them. The guy, the Regional Director from Amarillo was supposed to go down to Billings and the one from Billings go to Boise and I was supposed to go to Amarillo first. And I was down there on a house hunting trip and I got a call from the Commission that said, "Change, you're going to Boulder City." So I finally ended up in Boulder City while I was on a house hunting trip to Amarillo. And let's see, the person that was in Denver was supposed to go to Sacramento and he quit. He didn't want to go. And the guy already in Sacramento ended up in Denver. So it was a big musical chairs. Everybody moved.

Q: So how did you feel about going to Boulder City?

A: I didn't want to leave Salt Lake City. I really liked it in Salt Lake. Salt Lake is a beautiful place and loved, programs were just getting going. I really improved the budgeting process. But Boulder City was where I started too so I was coming home. It was good. I enjoyed it.

Q: What were the big issues then in Boulder City, years ago in Boulder City when you got there?

A: Well, some of those we discussed before the Yuma Desalting Plant was a major issue. Primarily because the plant was under construction, actually just starting, but there was big issue with the membranes for this reverse osmosis plant. We had 80% being built in San Diego by one firm and 20% by a firm in Santa Barbara. And they weren't the same in some compatibility and some issues of costs – that was a problem. We were just getting through a test facility in Yuma where we were testing various types of processes and decisions had been made there. And then of course CAP was just really starting to get going great guns. The budget process was such that we weren't really getting enough money at that time. And the Southern Nevada Water Project was coming in big to take additional water out of Lake Mead into Las Vegas. And then there was some planning projects, one of them being a major power project called Lake Mead/Golf Spring Canyon. Those four elements really, really took a lot of time.

Q: You were back working with the CAP and that was really the first time you got back involved?

A: Yeah, and that was day to day.

Q: And it was nearly, it was well under way in the construction and almost completed in some areas wasn't it?

A: No, well all the canals are within reaches, so some reaches were done and a lot of them were not. But we developed like two things on CAP that I think really helped

in the long run. One, and I picked this up in Salt Lake, is that in the Bureau of Reclamation the way budgeting is handled everybody goes into the Congress with budgets for various projects. Congress, very, very amicable about this; yeah we'll give you that money but when you get down to the bottom line, they subtract a bunch of money out. So that has to be reallocated now so not everybody gets what they want.

But invariability in regions, they'll have problems with rights-of-way or environmental issues so they have money left over. Well no one wants to end the year with the money in the bank, so they are calling around trying to get rid of this money. Well, I had a policy of going to the Research Center, Interior Research Center and I said I want you to have these contracts on the shelf just in the event we can find some extra money somewhere we'll implement them. On CAP, we were able to spend more money than we were allocated every single year just because we were ready and other regions just had money left over and we used it.

The other thing was on the non-Indian distribution system. It had a ceiling, a cost ceiling, as I recall of \$300 million. Already we were up over \$500 million for the cost. Well you are not supposed to start something if you know you are above the cost ceiling. So I set up a team to see what was really causing the problem. The problem was we were using standards in the Bureau that were applicable all over the Bureau including Montana, Wyoming, and every place else. So we had a team and Bob Farr's name came up a little earlier. Bob Farr was on that team representing people in Arizona and he came up and looked at SRP, primarily SRP, to come up with a different standard because in the desert you do not have freezing and thawing so you don't have the same kinds of problem. So we came up with a different set of standards which brought the total cost down to \$300 million. So they were able to proceed. But that was something that was never done before in the Bureau and it was due to the people in Arizona that were on that team that helped move that along.

Q: You started to talk about the salinity issue; can we talk about that here?

A: Yeah, the 1.5 million af that Mexico's entitled to as a result of a 1944 treaty. And they were getting more than that almost every year because there really wasn't any storage at that time, other than Lake Mead. Then beginning in 1963 when Glen Canyon started filling now you start getting a little shortage of water. Well, with the water now coming down to almost precisely to 1.5 million af, at the same time the salinity channel coming out of the Wellton-Mohawk main conveyance channel out of the irrigation district, starting hitting the river, and immediately there was a big spike in the salinity entering Mexico. Well, they couldn't use it because it was too salty. And that led to a lot of studies to try to solve it. And eventually in 1972 President Nixon appointed Hubert Brownell to try to solve it, to come up with a permanent and definitive solution. The President of Mexico at that time was Echeverria, I'm not sure I'm saying that right, he's in the news lately too. He's in trouble. I forgot what his problem was, but he's got a problem. He was President of Mexico at that time and so they worked at this program but another little insight on the location, well they looked at a lot of options. And there was an organization called The Committee of 14, two representatives from each of the seven basin states. Wes Steiner and Tom Choules from Yuma were the two from Arizona and all the other states had them. The basin states were very concerned that this water from Wellton-Mohawk if it was wasted to Mexico it'd be charged against Arizona. If it wasn't charged against Arizona, it would be charged against the whole basin. And that would be a problem because you're losing water. So the solution, to make a long story short, the solution came to be the desalting plant. Well, where do you put the desalting plant? Guys like Langley, Mr. Langley who I was referring to earlier, wanted it in a different place because it would be more flexible. Brownell decided to put it down where it is, which is very close to the northerly international boundary with Mexico. And someone asked Brownell and I was in the room, I heard it. So we are at the Department of State at a meeting and somebody else blurted out, "Why did you pick that site?" And he said, "We put it there so the Mexicans standing on Mexican soil can see it." And that's where it is. If a Mexican is standing on Morelos Dam, he can see it easily.

Q: Not a good engineering reason.

A: No, state department didn't do things on an engineering basis or a budget basis. They could care less what it cost. The Department of Interior actually opposed it for a while because of costs. They could see the budget just being busted all over the place for that plant. And it is, it has cost \$450 million.

Q: How come it's not being used?

A: Well, the operating costs are somewhere between \$25 and \$30 million just for operation and most of that is electricity.

Q: A year?

A: A year, most of that is electricity. As a matter of fact in 1982 or 1983, I made two trips to Mexico City to try and buy power from the Mexican Government who operates a big geothermal plant south of Mexicali and make a lot of excess capacity so I was trying to find maybe a cheaper source rather to go to Arizona Public Service or somebody. And we couldn't get anything done, couldn't do it. So as a result because of those high costs, the Bureau started looking at other options like fallowing land in the Yuma area and there's been some other options.

Right now, as I understand, unless it's changed in the last couple of weeks, the Bureau is on a fast track to try and bring that plant to a point that if they flip the switch, it'll likely start and they're guessing two years. And at the same time, they are doing what they call a dual track system of trying to fallow some land but they've run into some problems there as well. I anticipate that within, I would say within three years, I think that plant will be operating at least one-third capacity. Now maybe even more because I also represent some people in Southern Yuma County, some are in San Luis, and we just finished a study on regionalization of water supply. And one of the options I asked the consultant to do was to take water out of the desalting plant to serve the people in those communities, plus

some communities in outlying areas, you know, a little county area. It's going to be more expensive, but it's a good alternative and I think eventually they may will look at that as an option.

Q: Explain to people who don't know, what would the plant actually do?

A: Well the way it's designed, it takes water from this channel. It comes from the Wellton-Mohawk Irrigation Drainage District which is fairly high in salinity. It comes in through an area where it's called pre-treatment. They add chemicals so it will react properly with what they call membranes. Now a membrane, water enters these membranes under pretty high pressure, that's a big issue these days and I think the pressure down there is 200 or 250 pounds per square inch. There are membranes now that operate on like 60 pounds. That means the higher pressure the more power so if you can reduce the pressure, you reduce the power requirements. So it's forced through these membranes which removes the salt. Then when it comes out, it's very, very low in salt content, maybe like 50 parts per million. Well you don't want to dump 50 parts to million in the river, so you blend it back with some of the water that you didn't treat so the average amount then comes up to what you need for delivery of water to Mexico. That's how that works, that maybe confusing.

Q: Except why wouldn't you want to put the 50 parts to million in the river?

A: Cause you don't need to. The treaty requires certain levels of salinity and the objective is to meet that not anything better, not anything worse. That's what the Bureau's objective is.

Q: So you couldn't put it in because it's too good.

A: Yeah, and actually it's a...if you only drink 50 parts to million, you remember it because it's flat. It doesn't taste good at all. You need about 500 parts to a million in my view to make it taste good.

Q: So it's not really treating water directly from the river?

A: No, no it could eventually but it's really treating the water out of the canal. Now what we're looking at now, I say we everybody that's involved including CAWCD, is to take some well water, drainage water, from Yuma Valley which is not only less in salinity which would reduce cost but because it's coming from the ground. You don't need this pre-treatment which is expensive. You can just run it right into the membranes. And that is what the Bureau is looking at right now. Is a way to really bring the cost down to where there would no longer be this big objection to running the plant because of cost.

Q: Isn't that kind of wasting groundwater?

A: Oh no, we need to pump it. The groundwater is so close to the surface. Septic tanks aren't working and the ground kind of bounces around. You really need to lower it and it's coming from irrigation return flows again, it's return flow. So we're pumping. As a matter of fact, I mentioned earlier my first job in Yuma was to lay out a plan for drainage water from Yuma Valley. It eventually got built, in I think the early 70's, and they've been pumping water ever since.

Q: And you look at Yuma and don't think of them having too much water where the problem was.

A: Well actually there's a lot of folks in Central Arizona that think there is too much water over there because those were the best priorities. You know, if a river goes into a severe shortage, the last ones to be cut off from water supply are the districts over in Yuma because their contracts date way back. And they are a priority 3 where CAP is a priority 4 which means they are going to be cut off first. So there's been two incidents where water has been transferred from the irrigation districts in Yuma. One is through the Ak-Chin water settlement and the other one was for the Salt River-Pima. Ak-Chin came out of the Yuma Mesa division and the

Salt River-Pima came out of Wellton-Mohawk so they transferred that water over to the Indian tribes.

Q: What priority does the Mexican's have?

A: You'd probably call that 1 or 2 because of this treaty.

Q: Pretty high up?

A: Yeah, but if there is a shortage in "prorate," Mexico has to take a "prorate" also. And the "prorate" goes down by categories again. In other words, Category 4 would be "prorated" until you run out of 4 then you get into 3, you prorate 3 and so on. But the Mexican that's by treaty. As a matter fact, they are allowed 1.5 million af by treaty, but they can go as high as 1.8 in surplus years. And there's been quite a number of times, matter of fact in 1983, I was Regional Director at that time. We had high water on the river. We met with the Mexicans about every month on our operations and I still remember the day when we told them we going to have to up the "que" and the amount of water being released down through Yuma area up to 30,000 cfs and I can see these Adam's apples jumping up and down around the table and little glances back and forth and they proceeded to tell me their levees would only hold 18. And so it worked okay because what happens in a flood, it doesn't just flow on the surface it picks up part of the bed of the river and they worked 24 hours a day on those banks. They never lost a bank. They went through the whole cycle all summer and didn't lose it. But we had to work closely with them, you know. Like I said we met with them every month in Yuma.

Q: That was one of the things I wanted to ask you about was the floods in 1982, you were in charge at that point.

A: Very exciting times, very exciting.

Q: Hard for people today to imagine that.

A: There are people who say boy if we had another '83 we would be alright. You know it would take about three '83s to fill all these reservoirs. It really would at least two years. It was a very exciting time. The problem came out because of the way the rules were at that time. And they're still almost the same way. We've made some modifications. For example, beginning January 1 at that time, we had a forecast from the forecast center of how much the stream flow was going to be and it was around normal. Well, when it's normal you have a process, what we call a rule curve process how we operate. February 1 it's actually I think a little less than normal and March I think it bounced up a little bit, by April 1 it was still in normal range. Then on May 1, actually late April early May, it snowed to beat dickens, in the upper basin. I mean it really snowed hard. Then a week or two later, temperature went sky high, had warm rains and it just all came off at one time. There is just no way you could prepare for it. People asked me later, "Why didn't you release the water early?" You didn't know you're going to get this and Steve Reynolds who was a water czar in New Mexico at that time he told me, "If you would've released early, I would've sued you." And I know he would have won because there was a rule. And you got to follow the rules.

Now there was one rule we violated in 1983. On August 1 at Hoover at Lake Mead, the rule is you are supposed to have 1.5 million af of space for summer storms. Corp of Engineers are responsible for flood control and there was a Colonel Taylor at Los Angeles District at that time. I called him up and said, "Look we're about ready to go to 60,000 cfs from Hoover which is really going to flood those people out in Bullhead City and Parker." I said, "Let's get together and talk and see if we can impinge on this 1.5 million. Because if we use some of that space and we get a big summer storm, we're going to be flooding people." Well, it'll flood anyway so if we use this space, we can keep our flows down to 45,000. And he agreed and we did and of course it didn't rain and we came out okay. But history was with us, because the only time, 1922 I believe it was there was over

a million of that came in from summer storms. But that was the only time. So the odds were with us. That's one chance we took.

Q: *(1:01:35 on the tape – can't hear her response to the above event)*

A: Well, there were a number of houses that had sunken living rooms along the Parker strip and they ended up having indoor swimming pools.

A: Can I follow up on the desalting.

Q: Sure

A: The desalting plant did operate for about six months, I believe it was '93 and mainly that was to sort of test it. It was at one-third capacity. And then because there was some high water about that time, there was no need to run it otherwise it's a waste of money so they shut it down and it's been shut down ever since.

Q: But it is ready go?

A: No it's not ready now. It'll be another couple years. They have what they refer to as design efficiencies and I keep asking the question, how can we just find out about design efficiencies ten years later, but that's the issue.

Q: But there are still people there working on it?

A: Oh yes, yes and the Bureau office, the Yuma Office is in the same building. That was one of those, like we were saying earlier a lot of little things came up for decisions and the Bureau is in old needy building on the Marine Corp Air Station. And they of course didn't want the Bureau there. There was kind of a security problem and the Project Manager at that time in Yuma suggested that we put the office at the desalting plant. And that's what we did. And it made a lot of sense. When the Yuma office was large, we had about 250 – 300 people there and I think

they are down to maybe 50 or 60. So the desalting plant worked out to be a good alternative.

Q: Why was it so large at one time?

A: We had all that work going on. We had a lot of construction, many, many contracts, and a very large maintenance force. And a lot of the maintenance was on facilities that served more than one district. Well in 1981, we signed an agreement where these, a bunch of these districts got together and decided to do the maintenance themselves without the Bureau. And that happened in '81 and it's been going on ever since and working very successfully. Because of that, the Bureau cut back big time.

Q: Let's talk a little bit more when you were the Director for the Lower Colorado Region in Boulder City again, what were some of the other things, CAP was about to really go on line and...

A: Yeah, we had a lot of contracts, construction contracts. Andy Dolyniuk was the Construction Engineer at that time. I can recall awarding a contract to a contractor named Ball, Ball and Brassmer. And I can remember that this is the umpteenth contract awarded to this contractor. It was maybe 12 or 13 contracts to this one contractor. And they were a good contractor. They did good work in my opinion. But there was a lot of work going on. And a matter of fact, we did that Reach 11 which was in the early 70's and of course it was finished when I came on board. But we had the contracts for canals over near the pumping plants on the west end of the system, plus we were going south to Apache Junction down through Pinal County. We were going all the way. As a matter of fact, we had the Environmental Impact Statement hearing on the Tucson aqueduct while I was Regional Director. So there was a lot of work going on at that time. And then we delivered water to the Harquahala Irrigation District in May 22, as I found out, 1985 that was the first water delivery of CAP. And the irrigation

district guys were out there whipping the old siphon tubes and getting it going. It was really fun to watch.

Q: There was a big ceremony for that wasn't there?

A: It was big for the farmers. The biggest ceremony, I don't think it came up earlier, but was held at the CAWCD Headquarters. It was when the water first came to Phoenix. That was another big ceremony. The Secretary of Interior was there and I forgot who else. But it was a pretty big event.

Q: I have a poster from '85 that shows the water arriving.

A: Was that the one in Phoenix or the one in Harquahala?

Q: I'm not sure. '85 it says on the poster.

A: I think the one into Phoenix came in I believe the fall of '85. It wasn't too much later as I recall.

Q: I think I got it because I was with the news department at Channel 10.

A: Yeah, I don't remember you. The one reporter that I had a lot of contact with is still with Channel 3. The fellow that's on in the mornings, I forgot his name now. He was out in the field in those days.

Q: Dan Davis?

A: Yeah, Dan Davis. He had given me a lot of time usually at the airport. He'd catch me just coming or just going.

Q: Did you do anything with Burt Kennedy with Channel 10? He did a whole documentary on water back in the 70's.

A: No, no, I don't remember.

Man filming the interview is speaking.

He spent time with Rich Johnson because I was working with Burt Kennedy at that time. Rich and Wes Steiner he did a lot with those two guys.

Q: Bruce is the water guy. He knew water.

A: Well there was one other one, Cassidy, Casserly, Jack Casserly was with the Republic. We had a few dealings. He's a different kind of guy.

Man filming the interview speaking:

He's real different. He ended up writing a book on Goldwater.

A: Yeah, then he got in trouble.

Man filming the interview speaking:

Yes he did.

A: We had a situation in Salt Lake City on the Weber Basin Project which is just north of Salt Lake where the water delivery comes through tunnels, I mean canals, and then it goes into siphons under these washes. And what had happened all of a sudden one day we found out that someone was building a house right on this right-of-way, right upon on this "buea" just before the pipeline's buried. See, you don't know it's there. But if you ever had to come in and repair that pipeline, when you do the cut slopes, it'd take the house. Boy, we sent the lawyers up and we found out the title company had made a mistake and it was really the title company's fault, but they don't like to pay even though they make a problem. So one day a TV crew came in my office and wanted to talk to me about this issue. So we met in my office, very cordial, very cordial, as I explained everything to them. So he says, "Well ready for the interview, let's do it outside." Wind was blowing, hair's blowing all over the place, he stuck the microphone in front of my

mouth and says, "Why are you kicking those poor people off that land?" I almost but didn't. That was probably the worst time I got snookered in an interview and I was not happy about that. I didn't interview that person ever again.

Q: That reputation will go away...

A: It ended up they changed the house a little bit and basically left it there. And the title company is pretty powerful there I guess.

Q: If they ever have to repair the...

A: Yeah, I don't want to be around when they cut that pipe out, boy, there will be some and particularly if it's wet, the angle is even worse.

Q: Speaking of quotes here, I had one that somebody gave me about you saying "Your managerial skills were recognized as instrumental in re-establishing and maintaining the construction schedule of the entire Central Arizona Project."

A: Wow.

Q: That was 1984 that someone said that. How were you involved in doing that?

A: Well, assuming that it's true, the one thing that I mentioned earlier of having specifications on the shelf and that's part of management because the Engineering Research Center that prepared all of the designs and specifications, they'd go to the budget. And if you didn't budget something, they wouldn't design it. And so I had to go and lean on them hard to do that so we'd be ready so if any extra money came in, we'd be able to spend it on contracts. But I think that was probably one of the most. We had, I mentioned earlier the non-Indian distribution system and the problem with the cost ceiling. Now, I kind of went over that in a hurry. We didn't follow Bureau standards, we changed them. Well that wasn't all that easy to do but we ended up, the Chief of the ENR Center, which

does all designs and specs and sets standards, had an acting person in the position, the Chief of Planning was there, and myself, and we met in a bar in Denver and we cut the deal to change those standards for CAP. That is how we did it because I had the right mix of people to do it. There are some people who worked at the ENR Center before and said you'd never get it done but that happened with the right mix of people to do it.

Q: Tell me how you wanted to change it.

A: Well, the Bureau has standards and the standards have to be something that will last in every situation in the Bureau of Reclamation. And freezing and thawing weather really affects concretes and structures, so you end up having to put thicker concrete, different types of structures in Montana and Wyoming then you have to do in Arizona. So what I attempted to do was to say well in Arizona we're not worried about freezing and thawing. So why don't we go over and look at the SRP and these other districts, find out what they do, how it lasts, what kind of maintenance and see if we can't modify our standards. And I had this team set up of Arizona folks and they came back with a recommendation which I thought was reasonable and we followed through and did it. It reduced the cost, I mean dramatically. Because all you have to do is lower some concrete levels and I think one of them had to do with drop structures. Drop structures are where the canal comes in and it drops straight down. These are expensive structures, but if you put a slope in them, you save a lot of money and that was one of the changes. It got all the changes now, which there are quite a number of them.

Q: Did you make the changes just for Arizona?

A: That's all I cared about and that's all I did. Whether anybody else picked up, I don't know. It would have been okay in Southern California, Imperial Valley. Probably not very many other places though, even Nevada would be tough because you get freezing water over in Nevada. But it was interesting, so I'm pleased to hear...but like it's been said before, you work as a team. If you don't

have a good team, it's not going to work. And I've always believed eyeball to eyeball management. That is, if you got problems, you need to sit down and you discuss it and there is no such thing as a stupid question. The only stupid question is the one you don't ask. And you just collectively work through an issue and come to a conclusion. And it takes good people. And there are a lot of folks in every organization that think well the boss wants to hear this so we'll just tell him this. That is not what you want. That doesn't give you good decisions.

Q: How long did you stay as the Director of the Lower Colorado Region?

A: Until the fall of '85 and I left the Bureau and came to Phoenix. That was my second trip to Arizona. Worked for a consulting firm for three years and then I was fortunate that Governor Mofford selected me to be the Director of the Department of Water Resources which I did for job three years and I left that job and I've been an independent consultant ever since.

Q: What was going on at the Department of Water Resources when you took over?

A: Well, the Groundwater Code of 1980 set forth some very strict regulations, or actually law, and then you had to develop regulations from this law. When Wes Steiner took over, of course the 1980 Groundwater Act is also the act that set up the department and set up the director. The first management plan was prepared through supervision by Wes Steiner to the Phoenix AMA, Tucson AMA, Pinal AMA, and the Prescott AMA. Well, when I was there we were doing the second management plan and that one had to be much tougher because the direction and the whole objective of law is to keep cranking down on water use. It got so to where I think we were going too far in some areas, particularly the agricultural area because people were saying 80, 85, 90 percent efficiency. Anybody who's been around agricultural knows you just cannot get those kinds of efficiencies. So I was having difficulties within my organization because they were pushing for high efficiencies without having been out on a farm or irrigation to know how that works. If you can get 65 or 70, you're doing pretty good in most areas.

Now if you go to drip irrigation or sprinkler irrigation, you can get a little bit better efficiencies but it also costs you a lot more. At the same time, we were doing a golf course, dairies, and those were big issues because in dairies where I grew up, you milked in the morning and milked in the evening. Well around here they milk four, five, six times a day and every time you milk, it creates a need for more water because cows drink a lot of water. And you have to spray them, clean them off. So we had special rules for dairies and special rules for golf courses. And the golf courses were set up in such a way that you allowed them so much water based on the size of the course. Now if they wanted to put it all in, in the month of June that was fine, but they wouldn't have any water for the rest of the year. So they had to allot the water over a period of a year.

At the same time, we had the recharge law that was mentioned earlier. Where you bring water in, generally surface water and recharge, but there were some opportunities to do something that had happened in California a number of years ago, called indirect recharge. So at the department, we pushed the bill to allow indirect recharge here. And it was fought by a lot of people, John Mawhinney who was the Majority Leader from Tucson at that time, he saw the benefits in it and with his help we got the bill passed. Now the way that works, farmers have the right to pump groundwater for irrigation. So the way this recharge works is that somebody buys some CAP water, brings it to the irrigation district so they don't have to pump, the water left in the ground becomes a credit now through the entity that buys the CAP water. So it's almost like a transfer or an exchange. But it's a way, it's a win-win situation. And the CAWCD has done quite a bit of that under their recharge program. They've also done a lot of surface direct recharge but the indirect has started and started big. And we got a lot of water in the ground through that indirect recharge, sometimes called in-lieu recharge. But California first did that back in, I think, the 70's sometime. We weren't planting new ground necessarily.

Q: So you really were dealing kind of with the revisions of the groundwater?

A: Oh there were revisions every year because you fine tune it. But basically the management plans which covered these elements I'm talking about, we kind of set up a program to conduct rural water planning. And it didn't get far and now they're trying to do it again. We just never had enough money to kind of help the rural areas because DWR at that point in time was focusing almost entirely on the cities. There really wasn't much effort. Safety of dams is also a responsibility of DWR under the Groundwater Code. And that's a pretty tough one. We had some tough people, if we had one person that built a dam and he didn't build it right or the wrong place or something, we go down and tear it out. As a matter fact, I think Wes actually took one of them out and that's not very popular but when you don't follow the rules sometimes that happens. So it's a combination of the Groundwater Act that requires the management plans with all the requirements for the golf courses, and conservation plans and so on, the safety of dams, the rural water planning, and then there is one other one that's been kind of a sore spot for a lot of people called "adjudication."

The Gila River adjudication has been going on now for, it seems like it was 20 years when I was director, so it must be 30 years and it still isn't done. And it's caused some uncertainty because some wells that are close to the river, you're not sure if that is river water or well water and so you got uncertainty. It's kind of funny because the hearing, I guess his title is judge of adjudication, actually worked for me at DWR in the Adjudication Division so he's really moved up and now he's kind of in charge. Hopefully that will get resolved but like I said it's been around many, many, many years. And that is true of any state; there is no adjudication process anywhere that goes quickly. It just doesn't happen.

Q: Indian water rights, did you get involved with that?

A: Yeah, going back to the water allocations again on the Central Arizona Project, they went through several cycles. I'm trying to think of the first Secretary that did. I think it was the Secretary from Wyoming, I can't see his name right now, and then Andrus, Cecil Andrus, came in from Idaho and he changed it. The Indian

allocation was around 309,000 and some change as I recall. Now there was a controversy over that because there were certain people that said that 309,000 is in inviolate it's for Indians. My position, I was there during the early days of the allocation, my position was that it was not inviolate. What it was, was a sum total of each reservation. Now it became important in the case of Ak-Chin because when they brought water in from the Colorado River, it reduced their need for CAP water. That water, in my view, should have gone back into the pool. And certain people, lawyers in particular, were upsetting the Indians tribes says no, no that goes to some other Indian tribes. Now, the 309,000 was not a set number that just happened to be the addition of all the pieces. And because of all these more recent events and so the Indians getting 47% that issue has gone away, it's no longer an issue. But one other, call it another side, in December of 1980 there was an increase in the water allocations and Wes Steiner was going to sue to stop it. On the day he was going to sue, the night before literally at midnight, the representatives from the Secretary of the Interior came out and they signed all the Indian contracts except one at midnight. I don't think he ever did – Tom do you remember? I don't think he sued.

Q: Which one did he not sign?

A: Gila River, they didn't want to sign. And their problem at Gila River was as a part of their allocation they had to take a lot of effluent. And they really weren't too anxious to do that. Now part of this new settlement they will get some effluent but they didn't want it back then. I personally met with them many, many times trying to resolve that conflict and never could resolve it. And it's still not resolved and here it is over 20 years, over 25 years later.

Q: So you were at the Department of Water Resources until '91.

A: '91.

Q: Since then, you said you became a consultant?

A: Independent consultant, I represent a number of entities in Arizona some in California, not at the moment though. And I have made many, many trips to South and Southeast Asia and to Eastern Europe working for Royal Bank. So it's been varied, very interesting, and very fun. I've really enjoyed it. I just got back in May from two months in India, Northern India. And that was interesting. They kind of wonder over there why they don't get things done, but they come to work at 11 a.m. and go home at 5:30 and they have a fairly significant lunch period. It's kind of hard to get a lot done.

Q: These are some general questions I have about primarily with the Central Arizona Project that you were involved with for so long, what were some of the biggest challenges that was faced in making the Central Arizona Project a reality?

A: Well you'd have to look at it in pieces, there's not one single thing. Eagles, eagles are an issue. We had eagle problems at Pleasant, Waddell Dam, Lake Pleasant and at Cliff Dam back when it was in the process. And I met with Fish and Wildlife Service a number of times and we resolved the one at Waddell Dam pretty quickly. But the one at Cliff never did get resolved and of course, and eventually it got dropped from the whole plan.

Q: How are eagles a problem?

A: Well, Fish and Wildlife people don't want other people hanging around eagles. So at Lake Pleasant, there's a place where they'd nest and they'd come back to the same nest. So during the nesting time, they'd cordon off that area so people can't go in that area which is not a very large area. It's not a big deal in my opinion and I worked out a deal with the Fish and Wildlife Service. We gave them some money to do eagle studies and we arranged to do this other and it worked. But the one at Cliff, that was a bigger problem. I don't remember the details but that one was not so easily resolved, plus I think there were a lot of Tom's friends, Caroline Butler and Frank Welch, who made a lot of stink. Fish & Wildlife listen to those people once in a while.

Let's see, what else for challenges. There were some people; at least one congressional person I think felt that way, that we were not spending money fast enough. And I tried to meet with him and convince him, that you could only go so fast on these. Things get in the road and there are the logistics that you have to worry about. I felt that by having that extra money that I was able to get on an annual basis, we were going just about as fast as we can go. Now Eldon Rudd came out many times and he also brought the Head of the Appropriations Committee at that time. A guy from Alabama can't see his name right now. But I took him on many trips many times over the CAP. Eldon was a big supporter and of course, he was on the Appropriations Committee so that helped. But we were talking a little earlier about delegation, Kolbe didn't really get involved that much except one day I went down there to brief him. I only had about ten minutes to brief him on an issue of the Tucson Aqueduct. And after we got done, we went on and he met with the press. And I mean he just cited back chapter and verse just like, he did a heck of a job. I couldn't believe with just a ten or fifteen minute briefing, he had such a good handle on it and he really did a good job.

And of course Udall, DeConcini, Goldwater, their staff, I worked with their staffs just continuously on it. It was a good relationship. I don't think there was a difficult one to work with at all. Steiger was gone, one thing I didn't mention earlier. I was in the gallery of the House of Representatives when the CAP was passed. And I didn't even realize that it passed, they did one of those funny little deals they do in legislative action. Everybody was clapping and I just what happened. But Steiger got up and spoke and John Rhodes and Mo Udall, the three we had at that time.

Q: One of the things that's been mentioned to me and we didn't talk about it today was how the congressional, the congress people from Arizona suddenly were feeling non-partisan when it came to CAP.

A: Absolutely, absolutely. And I worked with a lot of those folks on a lot of projects around the west. And I don't know another situation where everybody hung

together for the good of the state. It was really pleasant to watch. On other things they may vote different on, but on CAP they were together. Moe Udall was something else. Good bunch of guys, they really were.

Q: You were starting to say something else.

A: I don't remember what it was. Oh, I was trying to think of some other challenges there were; like I said there was nothing big. I agree with Tom that generally speaking, we had a lot of good people working on this project. We solved these issues, and none of them were really dramatic things that would stop the project. They were just bumps in the road. Boy, that happens everywhere. And when they show up, face it, fix it, and go on.

Q: That's pretty amazing since it is really is an engineering feat bringing water 300 hundred miles through mountains.

A: But who was it that said that you do one step at a time, these canal reaches one step at a time. If you stop and look at the whole picture, \$400 billion that's pretty massive, but when you look at it in pieces, you know it's just tracks all down the road.

Q: Even when you have to go seven miles through a mountain.

A: I wasn't around when that tunnel was built. I've not been in it. But I've been in a bunch of tunnels in the upper basin and I've been on one side of the wall when the old mole came through. I was right there. And we had some big problems with the tunnels up there. We had one where the mole kept getting stuck. We had to finally dig a hole and bury it and bring another one in. Because you can't bring it back out very easy. We had another one where the material kept swelling and squeezing the mole. So you'd go in for a ways and you'd back off and then you'd drill a pattern of holes and grout it and then you bring the thing in and go about 50 or 60 feet and back off and do it again. We were making big progress, like

maybe 300 or 400 feet a week. Normally, you should make 300 or 400 feet a shift. But again those are bumps in the road. You hit them, and then you try to fix them, and then you go on.

Q: What in relation to the Central Arizona Project was the accomplishment that you're the proudest of?

A: Well, I guess to answer I would have to again not put it on one single thing but the overall team effort of everybody working together to solve issues as they come up. Don't treat them as a major problem, really managing the project from a from a construction standpoint. And other than that, I think was bringing the District in early. I think that was a very significant step. Traditionally in the Bureau, the project is completed, and turned over to the district, just one day it's Bureau and next day it's district. In this case here, we decided to let the District staff up as project reaches were done. And so by the time that the project is done, it's essentially all being done by the District. So you have a transition. We did the same thing in Hoover. That way when we turned Hoover over to the Bureau, it's the opposite there, do it on a gradual basis. Don't do it in one fell swoop because you'll have big time growing pains. So I think those are the sorts of things that we did from a management standpoint that I think enhanced the overall efficiency of the project and probably helped it get completed quicker too. Because personnel is always a problem in the federal government, you never get enough bodies to do work so by having the District staff up the O&M that helped a lot on that standpoint.

Q: Was there anything, looking back, you might have done differently or designed differently?

A: I think about my career, the projects I've worked on, the places I've been. You never know what would have happened if you done something different. And I've been very satisfied with my career. I was asked that question by an unfriendly reporter from the Tucson, one of those Tucson papers down there, who was not

one of my favorite people. I left the Bureau and he thought I would open up and give all this scoop and I looked him right in the eye and said, "I don't regret a single thing I've done," and that was the end of the interview. And I do feel that way very strongly. There's always the little things that have happened over time but I think overall, I don't think I would've done things differently. I enjoyed the career I've had. I'm still having fun in the water business.

Q: Sounds like you're not retired yet. Were there some surprises for you regarding the Central Arizona Project, things that worked out differently or different today than you expected?

A: Well it depends on where you start. It appeared that the dams at the Grand Canyon so to speak, were going to be built. If they hadn't been, it would've worked fine. They were narrow canyons not much of operation lots of power potential. I wouldn't call that necessarily a surprise but it certainly didn't turn out the way a lot of folks thought it was going to. And even building the plant, if there's anything I would say should've been done different I would have put that plant, the Navajo Generating Station, further away so that you don't see that big plant up on the bluff when you're sitting at Wahweap Lodge. I think it should have been further away from the canyon. I really do. But again, that's just a visual thing. That has nothing to do with efficiency or objective of a plant just has to do with visual effect. The Orme Dam Plan 6 thing, I guess I probably would've thought that it was going to turn out differently. I remember the day when the delegation got together with some of the users in a room; I think it was at the Valley Bank Building, I believe it was. Media was dis-invited and I believe all but one of the delegation was there to explain the deal they cut to eliminate Plan 6. Tom were you there at that meeting? Yeah. And that was, I got invited kind of I wasn't involved in this stuff very much; I got invited to it though. That was kind of a surprise. They caved on that and I'm not quite sure of all the reasons for it, but they did.

Q: Do you think it was for the best that it wasn't built?

A: I don't have a strong opinion either way. There certainly would be a lot of advantages to having some more reservoirs although you read articles in the paper. Letters to the editor about this one guy in particular who does this every once in a while about all this evaporation at Lake Powell, well it's the cost of doing business. I mean that's what evaporation is but still the same reservoirs are usually helpful, some of them leak and they are not useful, but most of them are. But the other side of the coin is then there had to be some deal cut to give the cities the water they intended to get through Plan 6. So that ends up affecting some other people, I'm not sure how I don't recall; it has some effect on other folks.

The Roosevelt Dam that was an interesting thing and there was a difference of opinion between SRP and the Bureau under the Safety of Dams Program on whether to build a brand new Roosevelt Dam downstream or rehabilitate and fix the old one. Jack Pfister was General Manager of SRP at that time and we met and decided to hire an unbiased entity to come in and evaluate it and the evaluation was to rehabilitate the old one so that is what we did.

Q: Did you ever think when you moved to Arizona that you would see it become the large state it has become?

A: I don't think so. I'm not sure how much thought I gave to it. I have lived in quite a few different places. I just sort of moved in and lived there and really didn't pay a lot of attention to what's going on. But I think the 1990's were a surprise. It's just hard to imagine how fast we grew in the 1990's. I remember the first time I came to Phoenix I think the sign said 255,000 people or something like that, this is in 1960; I think it was a little more than that. But now...

Q: I know that Ed Hallenbeck even mentioned when we were building the CAP canals out in Mesa, it was all desert out that way and now there are houses right up by the canal.

A: Yep, there sure are. That's where a lot of that that subsidence we were talking about earlier started. Right there I guess just beyond the Salt River as it goes through Apache Junction and down into Pinal County. That's the area we had the most subsidence and that is caused by the pumping of water, not by the canal of course, by pumping. We had some interesting cases there, I guess Dess Chappelle was Assistant Project Manager for USBR, Tom mentioned him earlier, he really knew what was going on, he really did. One day he came to me and says, "You know that Salt Gila Aqueduct is designed for 1800 cubic feet per second," he says, "with all that agriculture down there it really ought to be bigger." So he suggested we go to I think 2350 or something like that. We did we change it and went to 2350 but still there's a bottleneck at 2350. Bob Edmonston, who headed Bookman-Edmonston consulting firm, I don't know how many times I heard him say it, "you never build a canal too big, never build one too big."

But there was an incident over in Apache Junction where there were two contractors working in the same area Ball Ball Brassmer for the Bureau building the canal. And then there was a contractor for Soil Conservation Services, someone building a little cross drainage structure. Well there was a little bit of a canal there and they plugged it because they didn't want this minor water getting in their way. Then it rained like a son of a gun. It just flooded trailers and everything all over the place because they plugged that canal. Well guess where these people went. They complained to Representative John McCain at that time and Grant Woods was on his staff at that time and had an office over in Mesa. The National Water Resource Association had their annual meeting in Phoenix that year and I got a call from Grant Woods saying we want to talk to you about this problem in Apache Junction. So I briefed him on it and McCain says, "Why do we just cancel the contract?" I said, "Well that's pretty hard to do" and he said, "Well what if we said that they cannot have any more contracts?" I said, "Well that's blacklisting and there are kind of rules for that" and we talked about it a bit and he says, "Well don't be surprised at what I'm going to say." So I got up to leave and he says "No, you can sit right here." So I sat beside him and these people came in from the two contractors and their lawyers, and their insurers, and he started asking them what

they're going to do. And they started "waffling" all over the place; I mean it was obvious they didn't want to do anything. And John McCain says, "Well gentlemen, I'm heading back to Washington this Sunday evening and the first thing I'm going to do Monday morning is introduce a bill in Congress that's going to prohibit any federal contracts to both of you contractors until this mess is cleaned up." And all the sudden the attitude in that room changed, you couldn't believe. Well we can do this and we can do that. Solved it right there.

Q: Good story, kind of an idle threat, but it worked.

A: They didn't know, he knew but they didn't know.

Q: It would be a lot harder though to build those canals today with all the growth in Scottsdale and all the...

A: Oh, I'm not sure you'd ever get it done. You might have to build a pipeline, I don't know how you'd do it even through North Scottsdale there wasn't anything. As a matter of fact, that area around West World there was nothing in there and the first, what we call '8972' Public Law 8972 which is a Federal Water Project Recreation Act. The Bureau signed the contract for the use of that land at West World and I signed it with Herb Drinkwater when he was the Mayor of Scottsdale. And that contract is still going on, and they're thinking about putting Rawhide there I noticed. So it was just nothing along that route, nothing at all. The closest thing was Frank Lloyd Wright's operation, Taliesin. I think that was the closest thing that came through, all the way through there.

Q: How do you see Arizona's water resources today?

A: They're short. We need more water. I really believe we ought to be able to do some cloud seeding up in the Colorado Rockies. I really do because no matter what we do, drought or no drought, we're in a perpetual drought in Arizona. When I was Director of DWR, I set up a team to try to define what a drought is. We

couldn't do it. Now the Governor has a task force on drought and they've come up with about 15 definitions they've lifted from a lot of different places, but they really don't really apply here. We're in a perpetual drought. The question and what I told the Drought Task Force is that at least on the river to a certain extent in Central Arizona, we don't care that the weather is here. We care what it is in Western Colorado, that's what counts in Western Colorado. Because if it snows like crazy there, even if it's dry as a bone here, we're going to get water. The reverse is also true. So it's going to be tough and if we keep going and going on the basis of what Tom was saying about building permits. There's only one place that I've ever been around where actually building permits were stopped and it was because of sewage treatment capacity problem in Virginia. And they physically stopped issuing permits, but it doesn't usually happen. And with our storage and I mean with even our current storage about 50%, we're still good for another four or five years. And I was talking with the City Manager of Page yesterday on the phone and we're trying to build a different pumping plant because they get theirs out of Glen Canyon Dam and we're afraid if a pipe breaks, they just don't have any water. So he called me and said, "I was thinking if this breaks, we're in tough shape." And I said, "Well, that's what we're working on."

So I've been doing a lot of the coordination trying to get all the things lined up to build a new pumping plant. But even there, the question is where the pumps start. Where do you do it? I mean if this reservoir is going to keep going down, eventually there's going to be a point where you're going to be sucking air. Just like Southern Nevada was going to be if they didn't put another hose in, which is what they're doing now. But it's a...Even though as a general rule in the West, you say agriculture is the holding pattern. It's the ace in the hole for water supply from municipalities because so much water is used for agriculture. But there is an impact when you do that. In Yuma, 50% of the economy is on agricultural, not so here, but certainly is in Yuma. You can say agricultural will do this but at some point, they're not going to be able to grow any crops. They would be relying on imported crops, like imported oil. Oil price jumped again today, so you probably have two dollar a gallon gasoline coming back again. We need to look at

another source, and to me the only source you got is – actually two. Cloud seeding which has some issues and the other is desalting. Tom mentioned about maybe a nuclear power down in the Gulf of California. I've maintained for many years now and one day it'll happen. Nevada has 300,000 af of water, allocation. They need more. My view is and what's going to end up is they, Nevada, is going to build a desalting plant in California at the ocean, give that water to Metropolitan and Metropolitan will leave some water in the river for Nevada. And under the rules, the Law of the River, they can do that. It'll work. It requires some agreements but they can do it. You can do the same thing with Mexico although it'd be tougher because you got a treaty.

Going on what Tom is saying, if you go with the desalting plant in the Gulf of California, serve drinking water to Mexicali, sign the lease, all those communities around there and then reduce the 1.5 million to a lesser number. That's going to be a lot tougher to do because that's a treaty, but the other it's within the Law of the River you can do it. And it'll happen and you might even see some Arizona folks getting involved in something like this before it's all over. The rules are tight but they are also flexible. But there flexible only because only if everybody agrees to it, you can't just say we're going to do this. You got to get people to agree. And right now Nevada's coming up with strange ideas and people aren't going to agree with it and so they don't get any solutions.

Q: And people said too that we'll be buying our water from the Indians.

A: Well, you know that was brought up earlier to. The concern is one of the reasons why the Indians got such big allocation is that they can lease it and they get permission to lease by congressional authority. No Indian tribe can sell water off the reservation. There is a law called the Non-Intercourse Law and they cannot go off the reservation but if it's authorized by Congress they can. But only CAP water can go off the reservation. Not any other water rights they have. My view has been that many of the Indians are looking for money to build things. And they get that money by leasing the water off the reservation. Well in Arizona, we really

ought to be concerned about water, wet water. If it's money, let's take our money one way and keep the water the other. Well what we are doing is allocating it and then you have 100 year contracts. What's going to happen at the end of 100 years? I'm not going to be around but there's going to be some people that are and we don't know what's going happen. Some of those issues should have been sorted out, I think, earlier and if money was the real issue then we should have focused on money as opposed to water.

Q: What advice do you have for the people who are running the CAP today?

A: I think things are going along just right. We got the Larry Dozier's that we talked about and people like that. John Newman, other people at the CAP. The Bureau is pretty much out of the picture. It's just the District that's running it. I sure don't have any problem the way they are operating.

Q: What advice do you have for young people today that are starting their careers and trying to decide what to do with their lives?

A: Well thinking back to my college days. We had a lot of people start engineering. I don't remember the exact numbers but there was like 85 or 90 Freshman Civil Engineers. Four years later, six of us graduated. Most of them ended up in the Business School and became known at our college as "The School for Flunk out Engineers." But there are a lot fewer people, I believe entering engineering now. I'm not quite sure why but I think any advice I might give is don't make up your mind too early, be flexible. There are a whole lot of folks that think they want to do something and then when they get in to it say I don't really want to do this. So try to be more flexible. Take courses that kind of grab you a little bit so you aren't so focused in one area because you may not like that area. Know there are some that do that and then just continue to go to school the rest of their lives. I went to college with one of those guys. I don't think he ever graduated. He just kept going to school. But a lot of us can't do that. You have to earn a living at some point. I

think the most important thing is be flexible and sort of take the opportunities when they come. Don't have a fixed mind.

--- End of Interview ---