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BURTON CURRIE INTERVIEW

"POWER OPERATIONS AND COMMUNICATIONS: AN INTERVIEW

WITH BURTON A. CURRIE," FEBRUARY 6, 13, 20, 27, 1992

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Los Angeles Department of Water and Power

POWER SYSTEM ORAL HISTORY PROJECT

POWER OPERATIONS AND COMMUNICATIONS:

AN INTERVIEW WITH BURTON A. CURRIE

Interviewed by Thomas Connors

The Bancroft Group

Dates: February 6, 13, 20, 27, 1992

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BIOGRAPHICAL SUMMARY

BORN: November 5, 1908

EDUCATION: Los Angeles public schools
Bible Institute of Los Angeles, 1925-1927
University of California, Los Angeles, 1927-1928
Pacific States University, 1929-1931

MARRIED: 1929, two sons, six grandchildren, ten great-grandchildren

CAREER:

1929-1935 Radio engineer, Western Auto Supply

1935 Powerhouse and station operator, LADWP

1936 Transfers to Communication Section, PO&M

1942 Appointed Engineer of Communication

1947 Appointed Engineer of Communication and Inspection

1952 Appointed Engineer of Transmission, Trouble and Communication

1959-1963 Appointed Engineer of Overhead Distribution

1963-1964 Appointed Engineer of Receiving and Distributing Stations

1964 Promoted to Assistant Electrical Engineer in charge of Operation, PO&M

1965 Promoted to Electrical Engineer in charge of Operation, PO&M

1966 Appointed Assistant Chief Electrical Engineer

1972 Becomes Chief Electrical Engineer

1973 Retires

MEMBERSHIPS:

Institute of Electrical and Electronics Engineers
Electric Club of Los Angeles
Union Rescue Mission, Board of Directors
Los Angeles Chamber of Commerce

TAPE NUMBER: 1, Side A

February 6, 1992

TC: Let's start from the beginning. Could you tell me where and when you were born?

BC: I was born on a farm near Thermal, California, in 1908.

TC: Where is Thermal?

BC: Well, it's between Indio [California] and the Salton Sea. At that time, it was just a railroad stop. I might go back a little bit . . .

TC: Yes, go back a little bit. Please do.

BC: . . . and tell about my father and mother and how they got to Thermal. My father was born in Collingswood, Canada. He came to California when he was in his twenties and worked in a general mercantile store in Oxnard. The store was owned by a Mr. Gordon. During that time, my mother came with her parents, the Armstrongs, to Oxnard from Springfield, Missouri. They became close friends with the Gordons. In time, Mr. Gordon sold his store in Oxnard and opened a new general mercantile store in Thermal. He was so taken with the dry weather and farming potential that he wrote the Armstrongs that a forty-acre farm was available and recommended its purchase. My grandparents visited the property and liked what they saw. It was just like it is now--desert country--but at that time there were artesian wells which made the land valuable for farming. They just put a pipe in the ground and

water would cascade out and over the top of the pipe where it flowed to a reservoir. So they bought the farm. At the same time, Mr. Gordon asked my father to move to Thermal to help manage his new store. It was there that my father met, courted and married my mother.

My father and mother lived with her parents on the farm and it was there that I was born. I lived there for two years when we came to Los Angeles and spent most of the rest of my life in that city. However, I visited my grandparents for a month each year for several years enjoying the farm life, riding the horses, gathering eggs and swimming in the reservoir.

TC: Well, Collingswood, Canada, is that in Ontario?

BC: Yes, it's about ninety miles north of Toronto. An interesting aside on that is that one of my grandsons married a Canadian, and sometime after they were married, we were talking about roots, and it turns out that she and her family were also from Collingswood. The rest of her family, grandparents, cousins, et cetera, still live in Collingswood.

TC: They're still there. Isn't that something?

BC: So my grandson went to visit them and met several Curries in the area. They came from Scotland, and there's quite a group there in Collingswood.

TC: Distant relatives possibly.

BC: Yes, I think so.

TC: Now, did your father come out to California looking for work, or was it adventure?

BC: I wish I knew that. I never did talk with him about it. In setting up a family tree with my sister, she did a lot of writing and we have considerable information going way back, but we never did find out why he came or at what age. We understand that he finished high school, so he must have been twenty or so before he left there. By the way, he became a naturalized citizen in 1918.

TC: What line of work was he in?

BC: He was a clerk at the time he was in Thermal, and worked in the general mercantile store. Later, he took an ICS [International Correspondence Schools] course in bookkeeping and became a bookkeeper. Then, by the time I was in school, he was a salesman in a fixture/appliance store and sold fixtures, counters, seats, cash registers, to restaurants, stores, et cetera. In later years when I was in college, he bought the company; but, unfortunately, it was rather late, and when the Depression came along in 1928 and 1929, that ended the business. Then he passed away in 1933.

TC: When you moved to Los Angeles, what part of town did you move to?

BC: Well, we were in Sunnyside Heights first, and I've never been able to figure out exactly where that was. It was a subdivision with very few houses. I remember it was almost like out on the farm. Houses were perhaps two blocks apart.

The streetcar went out to what is now Gardena, and he would ride to the end of the line and then walk a mile or so to our home. But by the time I started school, we moved to Sixty-first Street, near the Sixty-first Street School, which is at Sixty-first and Figueroa Streets. All during my grammar school days, my parents wanted to live near a school for the sake of the children. I have two brothers and a sister.

TC: Where do you fall in the family?

BC: I'm the oldest. Incidentally, my brother, the oldest of the two brothers, lost his job and was two years without work during the Depression. Then he got a job with the county recorder's office as a clerk. Later I talked him into taking the assistant powerhouse and station operator's exam. When I took the examination, there was no assistant class and you had to have some knowledge of electrical theory, but as an assistant you had to know very little. So he took that and passed, and he worked for the Department [of Water and Power] for thirty-five years.

TC: Oh, did he?

BC: He retired one year after I did. He was an operator all those years and he retired as the chief operator at Receiving Station P.

TC: I wasn't aware of that. That's interesting that your brother was along with you there. Did you go to L. A. public schools, grammar school and junior high school?

BC: Yes, after three years at the Sixty-first Street School, we moved to Forty-third and Olive Streets, and the school was at Vernon and Olive, half a block away. I remember right in the middle of the first term the school burned down. I must have been a good sleeper, because all the family was awakened and ran out to see the big fire, but I slept all the way through it and didn't know about it till the next morning.

TC: Is that right? You must have had a clear conscience.

BC: I might say, too, that my mother was very interested in all of her children's education. She wanted us to get a good start, so she taught us how to read and write and do simple mathematics before we were even in kindergarten. As a result, my brother skipped one grade and I skipped two grades in school, which wound up that I was pretty young when I graduated from high school.

TC: Which high school did you go to?

BC: Franklin High School in Highland Park. I took a college preparatory course and I was rather young, so at that time UCLA was on Vermont [Avenue] and the principal suggested that because of my age and perhaps lack of maturity that I go to work or do something for a couple of years before going to UCLA. My father, back in 1916 to 1919, had gone to Biola as a nighttime student and he graduated in the first night school class. I was interested in following in his footsteps, so I thought, well, I'll just go to his school. So that's why I went to school between high school and college for two years.

TC: Oh, so you went to Biola for that period?

BC: Yes. It's called Biola now. That stands for Bible Institute of Los Angeles, and it was a certificate course in those days. Of course, now it's a fully accredited college.

TC: Oh, I see. We had a young woman working with us at the Department as a part-timer, and she was a Biola student. She was interested in the ministry. Now, was that the case then, that it prepared people for the ministry?

BC: Well, it was for anyone who wanted to obtain a greater knowledge of the Bible, and it was for Sunday school teachers and also missionaries. I know several who went from there to UCLA and graduated and then went on to seminary and became missionaries and preachers.

TC: I see. This young lady that worked for us was interested in missionary work, so that's a continuity there. Well, when I interview people who grew up in Los Angeles, I like to try to derive a picture of what Los Angeles really looked like in those days. I've seen pictures where the subdivisions are all beginning to spread out and different areas are being annexed for various reasons, mainly, I suppose to hook into the water system. What kinds of activities or what sorts of boyhood activities did you engage in? Was it the typical things like baseball?

BC: My brother was a great baseball and basketball player, the athletic type, but frankly I went in more for sedentary type of activities. I became a Boy Scout, and the Boy Scout

Handbook told how to put together a radio, so that started me in my life's work, although I didn't realize it at the time. But on the way home from school one day I found a five-dollar bill, and with that I was able to buy a crystal and a headset, and I made the coupler and condensers and all the rest that is necessary to put together a crystal set. At that time, the only voice broadcast in the area was the telephone circuit between San Pedro and Catalina, so I could listen to that. Later on, of course, the broadcasting stations came in one by one. When vacuum tubes came along, I bought some vacuum tubes. I put together radios for the family. I built a loudspeaker set with an automobile battery to provide the power. I put it on the rug underneath the table. When we moved, there was no rug there. (chuckling) The battery acid had eaten up the rug. Anyway, that was my great interest and I followed through on that. After college I went to work for Western Auto Supply in the radio department because I had the experience.

TC: What were the specific duties of that, and what were the circumstances of hiring in there? Did you just go and apply or was it something . . .

BC: Well, my brother, before he went to work for the County-- before he was laid off, in fact--he worked for Western Auto Supply as a swamper. That is, a branch store would order materials, and it was the job of the swamper to go through the warehouse, pick out these materials, and put them in boxes for

shipment to the store. So he got me a job there as a swamper. Then, after about six months, a German radio man retired and went back to Germany--this was in 1929--and so I applied for his job and they gave it to me.

So I went to work as a radio technician, but I soon found out that I did not know as much as I thought I did about all of the ins and outs of radios. So I went to what is now known as Pacific States University to night school. I was working nine hours a day, with an hour for lunch and an hour each way on the streetcar to Eagle Rock where my wife and I lived, and then went to night school after that. And it was six days a week, by the way, so I put in some long weeks for several years. Anyway, I graduated and got my certificate.

TC: What was the course of study?

BC: It was radio engineering.

TC: You say it's Pacific States now, what was it called then?

BC: California Radio College. They changed the name in 1935, and they now grant bachelor of science degrees.

TC: Well, I sort of jumped a topic there, let's go back to a picture of Los Angeles.

BC: Well, when I was young, occasionally we'd take a drive out through San Fernando Valley and Susanna Pass, and except for a small area around Van Nuys, it was all farming country. You could buy a lot for \$300, and \$300 was a lot of money in those days when I was making \$25 a week with Western Auto. In fact, my salary was cut to \$23.50 when the Depression came along.

But when the NRA [National Recovery Administration] reduced working hours from forty-eight hours to forty, for a while our hours were cut. Then they allowed stores to go back to forty-eight hours, and so did I. As I said, we lived in Eagle Rock, a bedroom community with many city employees. After World War II, a large lemon orchard in northeast Eagle Rock was subdivided and we bought a house in 1950 and built a house where we lived until 1970 when we moved to Westlake Village. There was no longer room for expansion, and as the houses in communities like Eagle Rock and Highland Park aged, these districts became multi-racial and the more affluent homeowners moved to newer areas such as to San Fernando Valley.

TC: How about the Hollywood mystique? Growing up in the East, you tend to think of Los Angeles as only Hollywood. Of course, moving out here I realized that Hollywood is a little corner of it.

BC: Well, really, Hollywood is just a name. It's only a corner of Los Angeles, you go through there and you don't see anything like [what] is shown in the media. It's just hype. I had a brother-in-law who worked for MGM for many years, and they and some of the other studios kept people busy. I went to the studios and that was interesting, but outside the studios, Hollywood as a city wasn't anything to see.

TC: You mentioned the Depression. You said that your father was hurt, or essentially wiped out, I guess, by it.

BC: The Depression wiped him out. Well, he had made big money when he was owner of the store, and I was driving a Cadillac and he had a Cadillac and things were going great. Well, he lost everything, and all he had left was the house. He got a job as a bookkeeper. It was difficult on that salary to keep things going, and it affected his health and he died. He was a good man, a capable man, but instead of investing in real estate he invested in stocks. Back in the twenties, people made a lot of money and they invested in what is now known as blue sky stocks. He bought Julian Oil. You've probably never heard of Julian, but he was selling oil stock all over the country. When the Depression came along, they found out that he hadn't invested in land or equipment, he just pocketed the money from the sale of stock. Well, a lot of these people committed suicide, but he escaped to China and lived out the rest of his life there. They never did bring him back to justice.

My father invested in coin-controlled lockers. In the Depression, people didn't travel, so what do you use coin-controlled lockers for, also blowout-less tubes. These inventions were before their day. Then for a while he invested in dishwashing machines for restaurants--he had been in the restaurant supply business--and that was before they invented the domestic machines. It was a good machine, but restaurants were going broke, they weren't about to buy dishwashers, and help was so cheap you could hire all you

wanted for twenty-five cents an hour. So that was the situation.

And it's interesting because now I think the situation in Los Angeles is much worse than it was then: people living in cardboard boxes and homeless because they have no job, no money, and rents are so high. In those days, you never saw anything like that. Rent was low and there was no Social Security, no net to keep people going, but somehow or other they were able to survive. I know my mother and two brothers and sister, after my father passed away in 1933, none of them were working, a couple of them were still in school. I helped them out a little bit, but fortunately the home was paid for and taxes were low. They just got by doing odd jobs and you didn't see people flooding the streets. Of course, the population then was much less than it is now and people didn't come from all over to Los Angeles to get the goodies.

As far as I'm concerned, the Depression was not really meaningful for this reason: I did not lose a day's work from the time I started in 1928 until I retired. They've been giving me a good retirement since. Although the pay was very low, \$25 a week, you could buy an automobile for \$200 or \$300, and gasoline was twenty-two or twenty-three cents a gallon if you went to the right places, and you could buy a bunch of carrots for a penny. My wife told me years later that when I gave her my paycheck every week she put it in boxes, in budgeting it, she said she would allow fifteen cents a day for

meat. Now, you wouldn't get very far with fifteen cents a day nowadays. And carfare, we lived about four blocks beyond the five-cent fare where it changed in Eagle Rock to a ten-cent fare. So I'd get off at the end of the five-cent fare and walk to save the nickel. But I wouldn't do that now. (chuckling) Anyway, we did not require much to live. Our activities were principally in the church, and that's free, just going to church, with their evening activities and Sunday activities. We'd eat out generally on Sunday. We could eat at Clifton's Cafeteria on Hill Street between Sixth and Seventh Streets, where you could get a complete dinner for twenty-five or thirty-five cents, or all you can eat for fifty cents. Occasionally, we'd buy a fifty-cent all you can eat. They had a big fountain there. At the foot of the fountain was ice cream--probably it was ice milk--and vats of it, and that was free. So, after your dinner, you could get free ice cream.

TC: Going back a little bit to education, in high school did you take radio engineering kinds of courses or drafting or anything like that?

BC: I took the college preparatory course. I had three years of math, three years of English, and I had history, which was an abomination. (chuckling)

TC: Why was that?

BC: Trying to remember all of the dates. Remembering dates is not easy for me. And then science courses: biology, physics, chemistry. I had four years of that.

TC: So your radio activity was pretty much your hobby?

BC: A hobby at that time. It wasn't till after I got married that it became a vocation.

TC: Well, at the radio college, what kinds of courses did you take?

BC: It was straight radio theory and practice as well as math. They had equipment so you could build and test radios. Well, I had done that before so that was easy, so I was their honor student, I guess you might say.

TC: There was a recent program on public television on the radio pioneers, [Edwin Howard] Armstrong and David Sarnoff, and Lee DeForest. Were you aware of what these men were doing or what the great radio inventors and pioneers were doing?

BC: Oh, yes. Many of them were still living when I started.

TC: It seemed like every couple of weeks something new was happening. You know, to go from a situation where you couldn't listen to the radio in a group--you had to use earphones--and then to move to . . .

BC: They did not have loudspeakers until the audio tube was invented. Many of these so-called great scientists and inventors were not highly educated men, they were experimenters. I'd delve into developing different types of radios. While I was working at Western Auto, I became a ham

radio operator and my call letter was W6CHJ. I built my own transmitter and receivers. Incidentally, that instigated my first contact with the Department of Water and Power. I heard that you could get a 2200-volt instrument transformer from their salvage warehouse really cheap. Actually, the Department's system was 4400 volts, but the transformers were double-wound. By reconnecting the windings in parallel instead of in series, actually, you could get 2200 volts. I should note that later the system voltage was increased and the standard primary voltage became 4800 volts.

TAPE NUMBER: 1, Side B

February 6, 1992

BC: So I went to the salvage yard and picked up a beautiful transformer on a marble base and used that for the high voltage for my transmitter. Every time I'd push the key, the lights in the house would go down a little bit. (laughter) But, anyway, I corresponded with Japan many times. The first time I turned it on, I had not yet had the time to string an antenna on my roof, but I just laid a wire out on the hedge outside by the back porch where I had installed the equipment. I keyed CQ, and the first one to come back was a close friend of mine who had gone to Biola with me. So, anyway, it wasn't too long after that though that our first baby came along, and I sold all of my transmitters and receivers for enough money to buy a washing machine. Anyway, that helped my wife.

But I went on and developed a receiver, a two-circuit, tuned radio frequency receiver, and it looked nice, and I thought, well, this is something new and different. So I took pictures of it and wrote an article and submitted it to Radio Craft and they published it and I got \$25 for it. That was a whole week's wages. Later on, when working for [Ivan L.] Bateman, some years after going to work for him, Walter Matney, the chief radio operator, came across this magazine and took it into Bateman. "Look here, Burton Currie is an author." (chuckling) That was interesting for me, too.

TC: Well, at Western Auto Supply, what was it to begin with? Was it a warehouse? They would supply anything having to do with automotive needs?

BC: Right, it was a warehouse. They had their main store at Eleventh and Grand, and the back of the building and the upper floors were all warehouse to ship supplies to the stores throughout the West Coast, and on the roof was a penthouse where we had our radio repair shop. Western Auto sold their own brand, Western Air Patrol radios, and they would ship them out. And when sold, if they had trouble the branches would send them back to the warehouse and I would repair them. We had about five technicians.

Later on, Western Auto Supply obtained a franchise with Motorola, which was the first time on the West Coast for Motorola, and we sold their car radios. So some of the technicians were busy installing and repairing the car radios. I was a specialist and began doing work for special needs. For instance, Culver City wanted radios where they could hear the police broadcast. Instead of buying a special police receiver, they could buy a Motorola, have it modified and it would be much cheaper. So I did that kind of work. Then, along the line, Bateman, who was the communication engineer for the Department . . .

TC: That would be Ivan Bateman?

BC: Yes, Ivan L. Bateman. Well, Bateman graduated from SC [USC, University of Southern California] in electrical engineering,

and then he went to Western Electric back East and worked there a couple years. Then Roy Martindale, who was the head of the Operating Division, and the Communication Section was a part of the Operating Division, he had known Bateman through his church--I believe they belonged to the Church of Christ--so he asked Bateman, who had this experience now in addition to a college degree, to come back and take over the communication work of the Department. So Bateman came back.

In the meantime, Glenn [M.] Green graduated from UCLA in physics. At that time, UCLA [University of California, Los Angeles] did not have a course in electrical engineering--you had to go to Berkeley for that--but you could take physics. Well, he graduated with a physics major and he also went back to Western Electric. His wife didn't like New York at all, and after two years he asked Bateman if he could come back and work for him. So Bateman hired him and he was Bateman's assistant. Bateman at that time supervised the telephone operators, the radio telegraph operators, and the telephone and teletype equipment repairmen.

TC: Just on a technical point, why does the Power System need all this communications activity?

BC: Well, without communications they'd be dead in the water. There are several reasons, one is voice communication. The telephone operators, of course, handle the telephone equipment, answering calls from the public and between stations in the Department. Then, between Los Angeles and the

distributing stations--that would be the load dispatcher in the distributing stations and also the generating stations and Independence, [California], the headquarters for the Water [System in the Owens Valley], and Boulder [City, Nevada] they needed voice communication for control of the power supply and distribution.

In addition, when I became the communication engineer--and we're jumping ahead a little bit--we had need for better cable circuitry between distributing stations, generating stations, receiving stations, for control and alarm systems. In other words, if a line were to be knocked down by a car and grounded, the line circuit breakers would open. Without control, why, it would open all the breakers back to the generating station, so you needed to just control that one section and open that one line. So, by having cable circuits between all of the stations, relay equipment could be operated so that when one line went out, a voltage would go on the circuit to stop all of the other lines from relaying. This is done in milliseconds of time, of course, and one way to control it was that the nearest station would go first and then it would take a little time before the relay would operate on the next line, and so on.

Well, they rented circuits from the telephone company, but between two stations, many only six or eight blocks apart, the telephone company would route the circuit to a central station, and from there to another central station and back.

They used 22-gauge wire, which is quite small, and the voltage drop in that wire was such that it was difficult to get the control equipment to work. So we installed our own cable using larger gauge wire and strung it on our own poles and in our own underground circuits. We had our own cable splicers, our own cable men climbing poles, our own underground cable men, so that the section built up gradually over the years. Radio was used between Los Angeles and Independence in case the telephone line that Bateman built in his early days because it was cheaper than renting a Bell System phone line, and if that should go out, why, radio would back it up. They used Morse Code, and we had to have radio telegraph operators, so all of the men working in those offices were licensed radio telegraph operators. They used teletype between commercial offices mainly, and they also used it when they constructed the Boulder line to provide a means of ordering material. Every night the lines would be busy and then there would be a stack of papers in the morning of what they needed in the way of supplies for the following day's work. I have a story about that, but that comes later.

TC: Okay. Last week when we had a preliminary interview, you were telling me about how you hired in at DWP in the first place. I'd like to get that story.

BC: Well, to me that's an interesting story. I don't know how interesting it would be for an historian and posterity. I worked on special projects at Western Auto, and one I worked

on was when Green and Bateman decided that when Boulder Dam was in operation that they would have voice carrier over the transmission line for dispatching. They would need, if they could get it to work, a receiver in a car so that a patrolman patrolling the line within 1,000 foot of the transmission line could pick up this carrier and be called for service, be notified of a break, et cetera.

TC: So this is carrier current?

BC: Carrier current.

TC: And it's parallel or within . . .

BC: It's radio, only it's low-frequency and it's put onto the transmission line through a capacitor and travels over the line. Because it's low frequency, it doesn't radiate for miles like a radio station, and it attenuates rather rapidly; but, generally, with a sensitive receiver you could pick it up within 1,000 feet of the line. For trial before Boulder was operational, they put a carrier transmitter on a distribution line, which has a lot of low impedance circuits on it, and they had great difficulty getting it to work. They tried Philco car receivers, who built a special radio for them, and they had two others. Green had heard about my work at Western Auto through some friend who had their radio repaired there, so he came over and brought a couple of their experimental radios, saying, "We can't do anything with these. Philco has given up and they won't even repair them anymore and we need to continue our experiments with the transmitter on top of

Sub[station] 15. So I fixed the receivers for him and told him I'd be glad to help them.

Well, it wasn't long after that before Mr. Galvin, the president of the Motorola Corporation, came to Western Auto, who was selling a lot of their radios. He had heard about this carrier application and he wanted to see it, so we phoned Bateman, made arrangements to meet Bateman and Green with my boss at Western Auto, Ted Boles. So I went with Boles and Galvin and met with Bateman and Green at Sub 15. We climbed a vertical ladder thirty feet up from the second floor onto the roof, and there was a penthouse there where they had this transmitter. So we saw it, but that was my one and only contact with Galvin and my first contact with Bateman. I had worked with Green before. So that's how I knew about the Department's communications system. That was my only visit, the only time I'd ever seen the inside of a substation. Well, here is how I got into the work, and this is rather a long story. I don't know how much you want to tape.

TC: Fine, I want it all.

BC: Well, this is the most interesting part of my life. (chuckling) As time goes by, you know, work becomes more routine, but in those days it was very exciting. I took an examination in 1933 for police radio technician. I had just graduated from Pacific States and I had taken the examination that was given by the Dealers Association in Los Angeles and I passed with the highest grade they had ever given. I got an

A-plus on it and my boss Ted Boles congratulated me and I thought that was nice, so maybe I can pass this examination. So I took the examination, written and oral, and passed number two. Well, in the Depression there were very few hires, and as a result of that, for the two-year life of that list, they only hired the number one man part-time, so I did not get the job.

With that experience in mind, I took another examination and it came about like this: A close friend of mine at church was going to medical school to become a medical doctor. During summer vacations he worked for DWP as a station operator-emergency appointment. In those days, the Civil Service Department under previous mayors was rather lax and they did not follow up on requirements to keep examinations current for all the lists where there'd be a hire. If they did not have a list, then the Department could make a six-month emergency appointment. Within that six months, the examination should be given and that would be the end of it. But Civil Service wasn't doing that.

Anyway, in the Powerhouse and Station Operator Group, they had a need for a number of station operators to go in training for the opening of Boulder Dam in 1936. So, in 1934, they had an examination and I took it, upon the recommendation of my friend. I passed number 112. Well, with my experience of number two never being called, I tore the notice up and told my wife, "Well, that was a waste of time," although it

was interesting. A year and a half later, my wife called me at work at three o'clock on a Friday afternoon. She said, "You have a call here. It says you must report in two days." Well, I wasn't going to take a chance of losing out on Saturday and Sunday. (chuckling) So I dashed home and thought, well, gee, I look terrible. I grabbed a haircut on the way home. By the time I got a haircut, went home, changed my clothes, got dressed for an interview and got down there, the office was closed. But there was a girl in the personnel office who said, "You go up and see Roy Martindale--he's the head of the division--and talk to him. Because we have instructions to send all interviewees to him," rather than Herbert [H.] Cox, who was the head of the Operating subdivision or group--section they call it now.

By that time, it was after working hours and I went up and talked for over an hour with Martindale. He was a very good man and I knew him all through the years until I became Assistant Chief Electrical Engineer. He kept telling everybody, "Currie is my man. I made him." (chuckling) Well, Civil Service never makes anybody. But, anyway, as I said before, he was active in the Christian church, I believe it was, along with Bateman, and he carried a Bible on his desk, and I talked with him a little bit about these things. He said, "Well, I'll tell you, we're in need of men for the summer." Now, this was in May, and he said, "We can put you on now through the summer." I said, "Well, look, I've got a

permanent job. I can't afford to take a chance and get laid off on the basis that the following spring you'd rehire for Boulder Dam." He said, "Well, you look like a good man. I'll find you a job. I'll personally promise you that if you get laid off in September after the summer vacations, I'll get you an emergency job as a gardener." And that paid almost as much as a powerhouse and station operator, \$110 a month. After six months you went to \$135. Well, \$110 a month was about what I was making at the time, \$135 sounded like a millionaire's salary. I could get a better car, I could get a better home with \$135. Anyway, I said, "Well, I'll take it." So he said, "Well, you come down next Monday and see Herbert Cox." Now, I'll go in briefly to the reason why Martindale was doing the interviewing. I don't know if this is for posterity, but . . .

TC: Well, it is, absolutely.

BC: Back in those days--prior to my days--Ezra Scattergood was the General Manager and he was the one who developed the Power System, designed all of the generating stations, the substations and so on. He was a great person.

TC: A great man.

BC: I met him a number of times. When I was there, he was doing consulting, he was a consultant. I went to his home and fixed his radio a time or two. He lived out on Adams Boulevard in one of those great big homes, and so did Pepperdine, the owner and developer of Western Auto, and I went to his home several

times--to fix their radios, not as a guest. But, anyway, Scattergood was quite a dominant personality, aggressive, and he kept things pretty much under his thumb.

The Department was small in those days. It was like a big family. When I went to work there, it was not like it is now. Everybody knew everybody else. They had Christmas parties by division and I got to meet everybody in the Operating Division. Then they had picnics every year, and these things were great for morale.

Well, Roy Martindale was an easygoing person in charge of the Operating Division. He got along well with Scattergood, did whatever Scattergood told him. At that time, there was a Distribution Division, which included the overhead and underground distribution design and construction section with [Carl] Heinze at its head. It was a very large division and they were building up rapidly. I think it was in 1922 they took over the Edison Company holdings. We had Edison power in Eagle Rock and we were turned over to the Department of Water and Power and we got a new meter, the rates dropped and the costs dropped, which made me happy. Anyway, there were several other supervisors who were looking to Heinze for leadership. I don't know what the underlying cause was. Perhaps Heinze figured, well, Ezra is going to retire one of these days and I'm going to take over as General Manager. He got a little outspoken and there was friction, and so Scattergood didn't fire him, he just eliminated the position.

There was no more Engineer of Distribution, so he was out of work. He became a consulting engineer and I met him later when I joined the Electric Club.

TC: What was Heinze's first name? Was it Carl?

BC: Carl Heinze, you've heard about him?

TC: Oh, yes, of course.

BC: Anyway, what happened was they eliminated the position and they put Distribution under Martindale and they split it up into Overhead Distribution and Underground Distribution. They put Cox, who was in charge of the receiving and distributing stations, and who had aligned with Heinze, in a straightjacket under Martindale, so that Martindale did all the hiring to make sure that things were kept clean and pure. So that was the reason for this interview by Martindale. Well, anyway, he said, "You come down Monday, go to Cox and he'll sign you up."

So I went down there early Monday morning and talked to Cox. He said, "You understand now that you're so far down the list, this is just temporary employment for the summer and then we let you go." I said, "No, I don't understand that at all. I talked with Martindale Friday night," and he jumped. I said, "He said that he would see that I was carried through one way or another until you hire more operators in the spring for training and the opening of the Boulder Power Plant." So he said, "I make no promises," and I said, "Well, I don't want the job then. I've got a permanent job now. I'm not taking the chance of being out of work for four or five months." I

said, "Why don't you call Martindale?" So he picked up the phone, and I don't know what they said, but he came back and said, "Well, you can have the job and Martindale says that he'll take care of you. That's his responsibility, not mine." Very abrupt. Later on, I found out he was a nice man, but he didn't like being told how to run his business.

TC: The first impression, yes.

BC: My impression of him was very poor. The other thing I found out that Green and Bateman and most of the operators told me was that [with] Cox you had to be a Mason in order to advance. I said, "Well, I don't believe that. It's Civil Service and I'm not going to join the Masons." So, anyway, I found out that it was not true, but I signed up and I did work at Sub 5 where they had rotating machinery. It was a rotating condensing unit to provide capacity into the distribution system to make up for the inductance of the distribution lines. My job was to check the condensing machine, sweep the floor, read the meters, and to turn on the street lights in the evening and turn them off in the morning. At that time, it was a dangerous job because they had coils that swung up and down with a counterbalancing weight which kept them centered so that the current was constant at 6.6 amps. If a number of street lights burned out, why, it would be too much current because of the lowered resistance, so a coil would raise a little ways to reduce the current to the required 6.6 amperes. So, when you turned this apparatus on, you had to

release the coil, swing it all the way open, stand by, and throw the big switch and watch to make sure it came down and settled quickly. Well, they exploded once in a while. Fortunately, I was never around when one exploded. There were a number of accidents while I was still an operator. One experience that I heard about concerned the head of Station Maintenance who was an odd individual--smart but not too practical, they told me. He was telling some of his maintenance people, "Now, when you get on top of these switches to clean them, you want to stay away from the adjoining busbar because they are very dangerous. You can get within six inches of one and it will flash over, see?" And he pointed to it, and he got too close and it flashed over and knocked him off the ladder to the floor. I've never forgotten that. But they had a number of men killed that climbed on transformers or switches without grounding them and they were killed.

TC: Well, did you need any sort of training for what you were assigned to do?

BC: Principally by word of mouth. I worked in two-man stations, and they had a senior operator and I was a junior operator, and he told me what to do and did what training was necessary. Also, they had a training program by books that were put out by Ernie [Ernest P.] Bryant, who was the teacher. He was another one of those that were aligned with Cox, so they demoted him from Assistant Chief Operator to schoolteacher.

He overcame that later on and he was my boss for a while. So, anyway, Ernie Bryant wrote these lessons and I would work through the lessons. It took about a year, and I learned all of the functions necessary to operate. I worked at Station 5 for two weeks on the day shift, which was wonderful. I could hardly believe, after working so hard, so many hours, so many days a week, that I only had to work five days a week and all I had to do was sweep when I came on the shift, take a reading once every half hour and sit there and read magazines. It was unbelievable. But I'll tell you, after a year of that, you get so sick of it that you want to get out of it and do something else.

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BC: Well, I worked for two weeks on the day shift, but then they assigned me to the graveyard and the bubble broke. I worked on the graveyard for five weeks, and I couldn't . . .

TC: Graveyard being the night shift?

BC: Yes, from 11:00 P.M. to 7:00 A.M. There was very little activity but you didn't dare put your head down on the desk, because if you didn't call in to the load dispatcher every half hour . . . I don't think the readings were all that important. I think they were just checking to make sure that the operator was awake. (chuckling) Anyway, I couldn't sleep when I'd get home, and it got so that I couldn't stay awake on the job and couldn't stay awake driving home. I'd drive halfway home from DS 5, which was at Fifth and Mateo, and I'd have to stop and pinch myself and get out of the car and walk a couple of steps to get awake enough to get home. I was about ready to quit and go back to Western Auto, because they told me anytime I wanted to I could come back to work there. But, fortunately, they transferred me after five weeks of graveyard to Sub 4 at Slauson and Figueroa, where I worked for a few months on the P.M. shift, and that was fine.

TC: That would have been from, say, one o'clock to eleven o'clock, or something like that?

BC: The P.M. shift was from 3:00 P.M. to 11:00 P.M., and that meant that I had my mornings free. Incidentally, now, speaking about graveyard, my brother worked graveyard all of his life. He wouldn't work anything else but graveyard. He was a night person and I was a day person. I get up real early but I couldn't stay awake nights.

Anyway, I worked the P.M. shift there. I had worked there a few months when [H. S.] Benham, the chief operator of the B system, including Sub 4 and about a dozen other distributing stations in this system, came over. I remember him sitting on the rail and swinging his feet and saying, "Currie, how would you like to go to [Receiving Station] B and work the P.M. shift?" I said, "Well, I'll do anything to make sure I don't have to work another graveyard. What do you have in mind?" He said, "Well, I was talking to Glenn Green. I told him my radio didn't work and he said, 'You've got a man working for you that's an expert, so he'll take care of all your radios.' So if you'll come out and take care of the radios and work the P.M. shift, we'll train you in the work," because it was a lot more work at B than in the substation. So I went to work for Benham and that worked out real well. I enjoyed the work and I was never laid off.

Sometime later I received a call from the Station Maintenance Chief, the head of Station Maintenance--I spoke about him a while ago. Mr. [A. B.] Jones, the head of the Station Maintenance, who had charge of all the generating and

receiving and distributing stations maintenance. The work consisted primarily of overhauling station switches and transformers. They also overhauled pole transformers for distribution. He came out to Station B one afternoon and said, "I heard that you are a radio man and are familiar with carrier current devices. When they activate the Boulder Transmission Line, I have been given charge of the carrier control circuit,"--it was built by Westinghouse--and he said, "I would like for you to go to work for me and it will be pretty quick now because the equipment has come in and we need to test it and install it, and you'll be in charge of carrier maintenance. But it's not a full-time job, you'll work with the electrical mechanics to overhaul the switches." I didn't care much for that, but I said, "Well . . ." Oh, then he said also, "That will be a higher-paying job than the electrical mechanics." They got \$185, which was the scale then, and the foremen got \$225. "You'll soon work up to make \$225." Well, I wanted to be financially independent, too, so I said, "Well, Bateman had told me to stand by, that he was going to use me for the installation and maintenance of the Boulder powerline carrier for communications. But I haven't heard anything from him, and it's been a long time, and I don't know when and if I'll ever get that job. I'll go to work for you."

Well, that was a rash decision, I was just too anxious to get out of operating into a higher-paid job, I guess. But I got to thinking it over and I decided, well, I'll go down and

talk to Martindale. So I went down after hours and talked with him for an hour and a half. He rambled about this, that and the other thing, but I got two things out of the conversation that I remember: one, is that he did not think that the job with Jones, carrier maintenance, would pay any more than a communication man. "It's the same kind of work, why should it pay more? So his commitment to you probably was not a commitment. That's subject to my recommendation and approval." The other thing that I got out of the conversation was: "That may be a longtime commitment and you should not get into something for the money, you should get into it because you like the work, you're capable of handling it, and you'll be interested in doing it." I said, "Well, you've helped me make up my mind. I don't have much interest in Jones' job or working for him. I like Bateman and I'd like to work for him."

There was a fellow at Station B, a new man that came in who had worked on some carrier equipment in a small way at some other utility. So I called Jones and told him that I could not work for him, I felt that I should go to work for Bateman and stay in the communications end of it. But in order for him to get a man, I could recommend this operator who had carrier equipment experience. Jones was real unhappy, kind of mad, but I think he got over it because this other man turned out to be pretty good; it worked for him and we were friends after that.

So, in time, Bateman called and I went down and he said, "I want you to come work for me and I'll arrange for the transfer." So I went to work for him as a powerhouse and station operator. The Civil Service again had not called the examinations for the men who had been working in communication. For example, Glenn Green was still a power station operator and he had been working for Bateman for several years. So I worked for him, and before I get into the work I was doing, should I jump ahead and go into the Civil Service procedure, or just as it comes?

TC: No, that's good. That's good, go through that and we'll get that out of the way.

BC: Yes, it's in my mind. I worked for Bateman for several years, and we'll talk about the work that I did, but there was a telephone man who had worked for General Telephone for many years, an older person, Bert Anderson, who worked for Bateman and who had gone with Bateman to the city hall on loan for six months to work with them on the proposal to develop a communications system for them, as he had done for the Department, have their own communications equipment and stop paying rent to the telephone company. Well, it was a good proposal but it did not fly because the telephone company raised so much objection. They said, "We will not tie your system into our public system." Well, there's no way that would work. But Bert Anderson, being a telephone man, had gotten into the DWP in the Civil Service class of electrical

repairman, which was closer to what he was doing than anything else.

So an examination came up for electrical repairman and electrical mechanic, so Bateman said, "Take those examinations and that would be better for you, and I won't have so much of a problem with Civil Service if they ever question why you're working in communications as a power station operator." So Civil Service gave these examinations. Green and I took it. I had never repaired a motor in my life and I wound up number one. Just before the examination, because of dishonesty in the Civil Service--I believe it was under [John C.] Shaw and his regime--they got a new mayor and he threw out the whole Civil Service and hired all new men, Ph.Ds., paid them \$75 a month, and they were theoretical men, not practical men. I was high in theory so I knew what the books said, so I could answer the questions, and these practical men who didn't know that much about books did not do so well. They were real unhappy, but I told them, "Well, look fellas, I don't know your business, I admit that, and I took this examination to be appointed as an electrical repairman or electrical mechanic in the Communication Section. I'll never take your job, so why worry about it?" And they were satisfied. So Bateman appointed me electrical repairman. Green turned out to be number one as an electrical mechanic, but Bateman thought he should keep him in the same class. He came out number twelve or so as an electrical repairman, so he got down to him

because they had to hire a number of electrical repairmen to replace those who had been working without classification. So, as time went on, Civil Service finally caught up to the need for a communication series, and in 1942 there were other examinations and we were appointed. There had been many changes in organization and that was a requirement, but I'll go into that later.

Anyway, when I went to work for Bateman, he said, "Well, the first thing you do is to help install the telephone carrier equipment which will be delivered next week. So I want you to go with the Western Electric engineer to Boulder City and stay there for the several weeks it will take to install it, and Green will go to Station B at this end. The other two terminals will go to Victorville Switching Station and Silver Lake Switching Station, the intermediate stations on the Boulder line." So, on last-minute notice, I went to Boulder and stayed in a hotel there.

The Department was going to operate the entire plant for all of the other entities, including Pasadena, Burbank, Glendale and the Southern California Edison Company. So the operators were living in houses originally built for the construction workers and they were not being used when they moved them in there. But I had to go to the Boulder City Hotel. This was a two-story building, a nice hotel but without air conditioning. Well, I went there in the summer on many occasions, and I couldn't go to bed until one or two

o'clock in the morning because it was so hot. Windows open, it was steaming hot, so it was not the best of circumstances.

I stayed there two weeks and we installed the carrier equipment. The Western Electric man had mechanics do the work and we checked out everything they were doing and then tested it. I was in on the testing, so I got a good foundation on how it operated. Westinghouse submitted a lower bid for their system, which was higher power, but it was the standard AM, amplitude modulation transmitter-receiver, similar to the AM stations here today. But this was a special Western Electric design. The carrier was single sideband carrier suppressed. When you did not talk, there was no carrier on the line. When you talked, only the single sideband went out, so all of the power was in the sideband. You reinserted at the receiving stations a carrier, and then you had communication. What it meant was that you had to keep that sideband absolutely on center frequency, otherwise you get a warble and the voice communication would be gibberish. So it was a special system, and by using that system the noise component was way down compared to the AM system. Bateman persuaded management to purchase the more expensive Western Electric system, and it turned out to be very fortunate because after we got that installed and working Bateman asked me to develop a receiver for the patrol cars. These were sorely needed because as soon as the Boulder Transmission Line went into service the patrolmen at Boulder, Receiving Station B, and also at the

switching stations, Victorville and Silver Lake, had to stand by at the stations or at telephones along the line, so that in case of a powerline outage they could be called immediately.

Well, this was a waste of time to have some of the men patrolling and some of the men standing by at the stations, so development of the car receivers received a high priority. If they worked we could save a tremendous amount of money. So I decided we'd start out with the latest model of the Motorola car radio. I ordered some coils, condensers, et cetera, necessary to convert the standard broadcast receiver to the 90 kilocycle powerline carrier frequency. Then I developed an oscillator to reinsert the carrier into the car receivers, which included a dial that the patrolmen could adjust in case it went off frequency a little bit. (Because it's hard to keep a receiver stable in a car where the temperature varies from 30 degrees to 150 degrees.) So it took me about three weeks to get all the equipment, install it, and make the modifications necessary to get it working.

In the meantime, I worked with a mechanical genius, who was an assistant to Bert Anderson, the man's name was Paul Anderson, and he designed the box for me to install the auxiliary carrier equipment. The box was installed on the radio cover and made electrical connections by means of banana plugs to permit removal of the cover for maintenance. The box held the oscillator components which generated a constant carrier to feed into the receiver. I installed an adjusting

screw on top of the box to permit adjustment of the signal input. I also put the aforementioned dial on the front of the cover.

The day I installed the first receiver in a patrol car Bateman wanted to try it out, even before I had time to install an antenna. We went out to Euclid Avenue and drove up the hill to the transmission line. We could hear an excellent conversation by the Load Dispatcher loud and clear, at a distance of 1,200 feet from the Boulder Line. Needless to say, Bateman was elated.

This was the prototype for additional receivers, which worked so well and saved so much patrolmen's time and money that my reputation was made.

TC: Where were you at the time? Physically, where was your workshop or lab?

BC: Well, that's interesting, too. Bateman did not have a shop for his men, but the teletype repairman who had to have space worked in the basement at Second and Broadway, 207 South Broadway, and I had to have a room with a counter so that I could work on these receivers and I had to have some equipment. So I went out and bought all the equipment, ordered the parts for these receivers, and they took a room from a records center next to the elevator on Hill Street, and it was about ten foot square, very small. It wasn't large enough for an office, but it had a window in it so I could see out, and I installed all the equipment necessary to set it up

for converting these receivers. Then, as time went on, they needed more and more. We bought more receivers and we eventually wound up with sixty of them. We even used them around town for lines between receiving stations, also on the transmission line to the Gorge Plant in Inyo County.

Anyway, I worked there, and then as we needed more and my time was needed for other projects, why, Milton [I.] Ravich, who later became superintendent of the communication shops, came up to assist me. He was a radio telegraph operator, and he came to this little office and I showed him how, and after building several of them, I turned the whole job over to him. In order to stabilize, because a receiver normally is not very stable, and having to add considerable capacity to the variable capacity that was in the receiver, the capacitors that I bought, even though they were supposed to be zero shift, changed capacity and changed frequency in time and it was not very good. So I built a heat box about two-foot square and I put the receivers in there. Then, with the lamp in the box, I'd heat it up from low temperature to high temperature.

I would check the capacity of condensers that I would buy, as to the capability of maintaining a steady capacity, and I found out that buying special negative temperature-coefficient condensers I could counterbalance the positive change with heat of the rest of the circuits on the receiver and I could keep the frequency quite constant with very few

changes manually by the patrolmen with the dial in front. They'd set it once when they start out, maybe once an hour later, and then it would do for the rest of the day. So that was one of the things that I worked on, and turned that over to Ravich.

TC: You're in the Operating Division now, right?

BC: In the Communication Sections in the Operating Division working for Bateman, who reported to Martindale.

TC: Okay, we're talking about 1936 or 1937?

BC: Nineteen thirty-six was when I went to work for Bateman and went to Hoover Dam to install the carrier.

I also got into telephone work. After getting the Boulder Transmission Line carrier into service, why, it was necessary to have also our own office communication. During the time of constructing Boulder Dam, Bateman had built a single-pair telephone line from Los Angeles to Boulder, Nevada. Before I came to work for him, he had ordered three-channel single sideband carrier suppressed telephone, equipment from a concern in Dallas, Texas. So, after working on the car receivers, he said, "You know, we have to make tests on this telephone equipment to make sure it meets our specifications, and it will take about a week of tests or more. Will you go to Dallas and make these tests for me?" So I did that and I went by train.

TC: Was that the first time out of state?

BC: That was the first time out of state, other than going to Las Vegas and Boulder Dam, so it was quite an experience. We worked in the daytime and then in the evening they took me to restaurants and so forth.

TC: Would that have been the southern route, you'd go through Phoenix and then across Arizona and New Mexico or something like that?

BC: It goes south of Phoenix. Actually, you go through El Centro, El Paso, Albuquerque, Tucson, across the plains of west Texas to Dallas. So that was quite an experience. I found that the equipment wasn't all that great, that there was a lot of side talk, so I had them reverse the audio frequencies to the other sideband, and also to change some of the frequencies that they were using. We finally got the crosstalk down to a negligible point. They also used real cheap panels and I told them to change the panels. If our men saw that, they would think that they were buying from China. So, anyway, by the time I got through and sent curves of all of the channels to Bateman and assured him the talking tests were satisfactory . . . In fact, I finished all the curves and I hadn't heard from Bateman in a couple days, so I sent him a telegram: "I'm sending the curves. All is satisfactory. I can't see anything else to do, so I'm coming home." Immediately, a telegram came back: "Stay there till I tell you to come back." (laughter) So he had a couple of other tests and he wanted me to stay around until it was packed and ready for

shipment, to make sure that everything was okay and all the changes I had requested were done. So, anyway, that was a very good experience and enlightening in more ways than one. So that introduced me to telephone work.

Then I worked with Bert Anderson on telephone lines and then we also bought some telephone line repeaters for the switching stations and we had to work on those. So there was enough work on the telephone line and the powerline carriers that Glenn Green and I made the circuit about once a month for several years, spending a week, going all the way to Boulder Dam and checking not only the station equipment but also checking the car receivers that I had installed.

Down through the years, I gave talks on our powerline carrier and radios in cars. I gave a talk about 1940 to the California Municipal Utilities Association annual convention, which was held in Riverside. [Samuel B.] Morris was there and I noticed him taking notes while I was talking. I rode down with [Floyd] Goss and Bateman. Floyd Goss, who was in Overhead Distribution at the time, had worked on the Boulder transmission line. I guess you're familiar with the Goss balls he developed.

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TC: . . . Floyd Goss, yes. A very interesting man.

BC: Yes.

TC: I wish I had had the opportunity to interview him. The Goss balls had to do with . . .

BC: Transmission lines. When they sway in the wind, they get to vibrating, and the Goss balls reduced the vibration. But in time, the transmission line . . . You've seen the conductor, I suppose. It's in segments, and they had graphite in these segments so that as they twist, why, they would reduce the sway and vibration. But in time the graphite worked out and it became just a solid conductor, and the Goss balls eventually were replaced with conventional vibration dampers. You could have bought Goss balls awfully cheap there for a while.

But he was a very good engineer and he was a specialist. He graduated from SC, specializing in transmission, so after the Boulder transmission line was built he was appointed senior engineer in charge of the Overhead Distribution Section and he worked there for a long time. He and I--I never felt that I was in competition with anything he was doing because he was in the electrical engineering business and I was in communication. Even later when I went into electrical

engineering, when I would make suggestions to have our people do things . . .

For instance, there was a need for a transmission line patrol manual, and they asked me to see that the patrol manual was written and distributed to all the men so those new men that came in could use it for training. So I employed a man as an assistant, an electrical engineer, when I was Senior Electrical Engineer, a man by the name of Laurence [H.] York, and he and I developed that. He did the writing and I made the assignments and he worked out in the field. It took six months to develop that, and it's still in the archives someplace. So, when we attended a meeting in Goss' office with our superintendents and his superintendent--I think Herb [W.] Kinch was his superintendent at the time and [Douglas V.] Lowther was my superintendent--and we were going to write this book and I said, "Well, Lowther will be the secretary." Goss spoke up and said, "Now, look here, just because you're chairman of the meeting doesn't mean you're going to make all the assignments and I'm not going to have an important part in this." That was just his way of saying, "You're in competition with me for a promotion. I want to make sure that I come first."

TC: Well, it's a personality trait.

BC: Anyway, for a long time there was a little bit of that attitude. We got along, except that I had the feeling that he didn't want me to get along too well. But there came the

time--and I'll put this in because it's part of the subject--when I was Principal Engineer and had been moved around in the Division and he had been moved around and we both had a lot of experience. [Theodore M.] Blakeslee had appointed Carl Kist as his assistant because Carl was familiar with the kind of problems we had, particularly water levels at Boulder and how that should be administered. So, anyway, Carl Kist was his assistant. But Goss and I felt that he should have somebody in line to take over his job, because Carl retired while he was assistant and he was retained as assistant and yet he wasn't in line for promotion because he had retired. So we went to Blakeslee and said we thought that Carl should be replaced by someone in line to learn his position and learn the work as Assistant Head of the Operating Division. So he said he would consider it. I got along fine with Blakeslee. He talked with me later confidentially and said, "Well, I think we should make a change here, and you and Goss are the only ones experienced." I said, "Well, wait a minute. Goss is senior, he came to work for the Department [before I did]. He has been an electrical engineer longer and he was appointed a senior before I was. He should get the job and I'll be glad to be his assistant when the time comes."

So I went down and talked to Goss and told him that I had recommended him. Well, from then on he was a changed person. He did everything he could for me, and when he did move up to be head of the Operating Division he made me his assistant,

and when he moved up to be Assistant Chief, he made me the head, and he recommended me as the Chief Electrical Engineer for the Power System when he retired. So we became very good friends, and I helped him in a lot of decisions he made when he was Chief, because that's a lonely position.

TC: I'll bet, yes.

BC: The only problem is he kept me after hours for these private discussions and back home supper was getting cold.

TC: But we got off on the subject of Goss, interestingly. I'm glad we did. He was a very competitive man, I understand, and an interesting personality.

BC: He was.

TC: But you started to mention where you had gone out with Goss to Riverside to the California . . .

BC: California Municipal Utilities Association, CMUA they call it.

TC: CMUA, right. You were going to give a talk there.

BC: Yes, well, I gave a talk there on the Department's two-way radio dispatching system and recommendations to the utilities to get in the radio business. As I say, Morris took notes and he talked to me afterwards about it and thought that it was very good, and several other people wrote letters. So I wrote an article along that line to the American Public Power Association, and they published it in their Public Power magazine.

TC: Public Power magazine, yes.

BC: I had closer ties with the APPA later when we talk about radio frequency allocations.

TC: I think we should end this pretty soon, but could you just give me some more discussion of Scattergood? He's just such a fascinating man.

BC: As I say, I was down at the bottom of the ladder and he was at the top.

TC: Sure.

BC: At that time, I had no contact with him except, as I said, when I went to his home and fixed his radio, and what people told me had happened before I had come.

TC: Well, he became Advisory Engineer in the late thirties, and he was Advisory Engineer until 1947 when he died.

BC: Yes, he was there, but we reported through channels to the General Manager, and my contacts were all with the General Manager. I had no contact with Scattergood at all. I read a lot about him, and books have been written about him.

TC: Well, actually, there's no full-length biography of Scattergood and there really should be.

BC: You have the book on Mulholland, I'm sure . . . I don't think I have it anymore. I gave it to somebody to read, and you know how it is. Telling about the early days of the Department and the fight over water rights and so on, and Scattergood's part in the electrical end of it.

TC: Well, tell me, in terms of growing up in Los Angeles, what had been your sense of what the Department was all about? For

instance, I have asked other men who didn't come from Los Angeles if the Department's reputation preceded the man's coming to join the Department. And in some cases, somebody may have heard about it or not, but hadn't really formed a real opinion. Whereas the Angelinos, like Larry Schneider and Howard King really knew and were aware of what the Department stood for. In retrospect they said that they knew that it was an important municipal organization.

BC: Well, I did, too. Back then, even before the 1928 disaster when the St. Francis Dam collapsed, why, I knew that the Department was supplying power and that Eagle Rock, where I lived for many years, was taking Edison power. I knew that there was a difference in the way they operated--one was private and one was public--and I felt that public power was a good thing. I was told when I considered going to work for the Department, long before I took the Civil Service examination, that you're a technical man, you're an engineering type. You should be working for an engineering organization as an engineer rather than as an engineer in a sales organization. You'll never get anywhere there, you've got to look around. So I investigated the Department of Water and Power. I had a relative of sorts who worked as a supervisor for the Southern California Gas Company. I thought even that would be better, and so I went out and talked to him about employment. He said, "Well, finish college before you come here." My father-in-law was a foreman for the Evening

Herald, before they combined with the Examiner. He was a printer, you know, in the Typographical Union and he told me how wonderful it was, the work was steady, he made \$225 a month, and I thought, boy, I could live the rest of my life on that. So I went down and talked to the supervisor in charge of printing. Let's see, this must have been when I was still in college. It must have been 1927 or early 1928. He said, "Look, you're in college. There's no reason why you should quit college. It would be absolutely ridiculous to leave college to come to work as a printer. It's a laboring man's job. My son graduated and he went to work for Wall Street. He's making a lot of money as an educated man and he doesn't have to work with his hands, and it doesn't take brains to be a printer." So he said, "I'm not going to hire you. That would be the wrong thing to do." That was the best advice I ever got.

TC: Right, yes. Your life may have been very . . . Well, we wouldn't be here right now, I'm sure. Very interesting.

BC: So, anyway, in 1928 when the St. Francis Dam failed, I was still in school and I was going with my wife before we were married. On a Sunday afternoon, we took a ride past the farms in the San Fernando Valley up San Francisquito Canyon to the site, past those great big chunks of concrete sitting downstream.

TC: Oh, sure, the terrible devastation.

BC: And you could see the water line on the canyon walls where the water washed out all the vegetation in the canyon, killed so many people downstream.

TC: I guess it went west or almost . . . Towards Ventura.

BC: Yes, it went south a ways, then in a westerly direction to the ocean, through Piru and other towns.

TC: Yes, through Santa Paula and then down, and just wiped out homes and was terrible.

BC: Yes, it was terrible. So, anyway, I thought at the time, well, gee, what kind of a Department is that? But then I read quite a bit about it and decided that had nothing to do with the Power System. So that didn't discourage me.

TC: Well, in fact, Mulholland, of course, you would have been aware of who William Mulholland was, obviously, growing up. He was a dominating personality, I think, in the city. From what I've read, and there's nothing definitive about this, but he really felt he died believing that that dam was dynamited. I know that the commission, that the Board and the investigative group said it was poorly constructed and that's what happened. Do you remember any of this debate?

BC: There was some discussion of it, but I did not know that Mulholland believed that. I thought that he admitted after it happened . . . He had gone out there, as I remember it, to look at it when they said there was some water seeping around through the dirt underneath the dam, or on the side.

TC: Right.

BC: And he said, "It's safe for the time being. We'll investigate it further later." Then, after it went out, he said, "I should have done more at the time, and so I take full responsibility."

TAPE NUMBER: 3, Side A

February 13, 1992

TC: Why don't you start. You've been thinking about what we've been talking about and you wanted to go ahead with some of your own thoughts and your own notes. Why don't you just do that. I think we're at around 1939 here chronologically.

BC: Well, I'd like to talk about the powerline carrier again. Let me start by talking about the most hazardous experience of my life, which occurred in 1938. The occasion was the tuning of the powerline carrier wave traps at Victorville Switching Station. The traps had never been tuned since their installation, so Bateman decided that this should be done.

I should explain that a wave trap consists of a coil of heavy copper cable mounted on a drum with a tunable capacitor connected across the coil. The trap is inserted in series with the transmission line and offers practically no resistance to the flow of 60-cycle power, but when tuned, by varying the capacitance across the coil, it presents a very high impedance to the 90 kc carrier. The trap is placed in the line ahead of the station bus, which would absorb much of the carrier energy, particularly when the line to that bus is grounded.

One evening Bateman and I went to Victorville while Glenn Green went to Silver Lake. After waiting until midnight to take the lines out of service, we sent the patrolman up the

eighty-foot-high steel structure to strap a ladder from the horizontal catwalk down the insulator string to the wave trap. When this was done, I took a meter and wrenches with a safety belt strapped around my waist and started up the vertical structure, holding onto steel spikes installed in the steel. The climb wasn't bad, although I paused twice to rest, but then after walking out on the catwalk I almost panicked as I looked down the ladder to the ground eighty feet below with nothing in between. However, spurred on by Bateman, standing safely on the ground below and by the patrolman waiting at the bottom of the ladder, I slowly crawled down. When I reached the bottom, the patrolman buckled my belt to the ladder and told me to "let go of the ladder and swing out, the belt will support you so you can work with both hands." No way! I held on to the ladder with one hand while I helped the patrolman install the meter with the other. With the carrier turned on at Boulder, we adjusted the capacitor to register maximum current on the meter. After showing the patrolman how to tune the remaining traps, I unbuckled my belt, climbed the ladder, walked over the catwalk to the tower and descended to terra firma.

The patrolman finished tuning all the traps at Victorville by 4:00 A.M., but it was almost daybreak before we heard from Green. We found out he wouldn't climb the tower so they used a boatswain's chair to pull him up to the trap. I

didn't blame him one bit. This was an exhilarating experience but one that I would never repeat in this life.

Later in 1939, Glenn Green designed and constructed powerline carrier sets. They were operated by gas-driven generators to provide telephone service between stations--that would be Boulder, Silver Lake, Victorville, and L. A.--where telephone lines were not readily available. There were six of them altogether. The carrier signal was transmitted to the powerline conductor by insulating the ground wires for about a half a mile and operating them as you would an antenna, capacitatively coupled to the line conductors. Under certain line conditions, however, the signals from the two stations between Boulder and Silver Lake--that would be the farthest away--were too weak to provide satisfactory communications to the dispatchers in Los Angeles. In 1940, I developed the idea of a two-way high-power carrier repeater, designed the circuit and equipment, then constructed and installed them at Silver Lake and Victorville. They solved the problem and worked well for the rest of the life of the Boulder carrier system.

Then, during the construction of the Third Circuit between Boulder and RSE [Receiving Station E], a construction headquarters was maintained at Victorville. The telephone line between Boulder and Los Angeles was used to provide a teletype circuit between Boulder, the Victorville construction office, and L. A. However, due to the length of the line and inherent high inductance circuits, the teletype circuit had to

be terminated at Victorville, which required two teletype machines, one at the end of the L. A. circuit and the other connected to the Boulder circuit. To provide personnel to operate the machines twenty-four hours a day, seven days a week, required seven radio telegraph operators. The communications telephone supervisor--that would be Bert Anderson--conceived the idea of designing and constructing a teletype repeater. However, upon installation at Victorville it would not work. After giving the matter some thought, I came up with a new form of repeater which we built on a breadboard, and in the L. A. office it worked fine. The teletype specialist . . .

TC: Just one point of information. What is it that a repeater does?

BC: It takes the signal from one end and relays it by means of relays to the other line, so that it repeats the signal. In effect, you have one circuit that's terminated at Victorville and the start of a new circuit.

TC: Oh, okay, I get it.

BC: The teletype specialist--that would be Allardice--and I took the repeater to Victorville after work one day and spent all night installing, testing, and adjusting the new device. By the time the day shift came to work, the teletype system was working straight through from Boulder to Los Angeles with only one machine at Victorville. When Bateman arrived for work that morning, he went directly to the teletype office and

watched the machine working perfectly. Needless to say, he was very well pleased. Some of the Victorville operators were laid off, since there was no further need to duplicate the messages from Boulder to L. A.

In late 1939, Glenn Green, a captain in the army reserves, was called up for a one-year training program. Shortly after returning to the Department, World War II broke out and he was recalled to active duty and was given the rank of major working in Washington, D.C. until 1945 when he returned a second time to DWP, retiring as a full colonel.

In 1942, Civil Service finally caught up with its backlog and reclassified all the communication personnel. Examinations were given in communication that included communication electrician, communication electrician foreman, communication engineer, teletype repairman, telephone electrician, etc. I took three of these examinations, communication electrician, communication electrician foreman, and communication engineer, and passed number one on all three. Strangely enough, one of the load dispatchers complained to Civil Service on the basis that no one could be both a good technician and a good engineer. (chuckling) I had no problem. I was given the appointment to communication engineer, assuming the responsibility under Bateman for design, construction, operation and maintenance of the entire Department of Water and Power's communication facilities. In

1944, there was a reorganization which resulted in Mr. Bateman being given the Distribution Section.

TC: This is a reorganization of the Power System?

BC: Just the Operating Division.

TC: Oh, the Operating Division, okay.

BC: There were two sub-groups which had been reporting to him and they were reassigned. One, the Range Repair Section was given to the Transmission Section Head and the other, Inspection on Customers' Premises, was given to me. At that time also, Bradley Cozzens replaced Bateman as my supervisor. The Inspection on Customers' Premises Group was a small section of about twenty men, but the problems were all out of proportion to its size. The section handled all requests from the public for meter and service installations. They also developed the Department's rules and regulations for such installations. During the war, there were few new construction projects, so their work was limited primarily to moves and rearrangements.

TC: Moves and rearrangements of what?

BC: Reconstruction of houses, additions of rooms which required a reinstallation and a new location for the service entrance. After the war, as construction boomed, one question by the customers related to service from which overhead pole. The Overhead Design Section claimed responsibility for specifying the pole, alleging they were the only ones who would know whether or not a particular line would be rebuilt in the future. When they complained to Bateman that the Operating

Division was giving out this information, Bateman stated that the first one on the job would provide the answer, to save time and manpower. Since most jobs related to service entrance facilities, our men were giving out the pole information. It seems like a small problem, but it ballooned through the years and hard feelings developed.

TC: Hard feelings between whom?

BC: The Overhead Design Section, which was in the Design and Construction Division, and Customer's Inspection Group in the Operating Division.

At a later time--this is not chronological, but carrying through what happened to this group--Art [Arthur L.] Williams, Head of the Overhead Distribution in Design and Construction Division, and Ted Blakeslee my supervisor, sat down with me on several occasions and tried to work out a compromise, but I could not agree to anything that would increase the cost, and nothing came of it. However, after Goss became Chief Electrical Engineer, and I was Assistant Chief Electrical Engineer, the complaints increased and it became so that the contractors would contact both groups and then pick the decision best suited to them. This was bad for the Department and, in the long run, our customers. We talked over the possible solutions many times, and finally we decided the Operating Division should stick to operation and maintenance, that is, essentially, existing services and moves, et cetera, and the Design and Construction Division would handle all new

services. To accomplish this would mean reducing O and M personnel and increase D and C personnel, who used pole spotters, that is, ex-line foremen. This also meant new job descriptions and new Civil Service examinations and appointments. To help develop the split in duties and write up organization charts, DDR's, and work with Civil Service on the examinations, we assigned our office engineer in our executive office to the task. He did an excellent job, taking over six months full-time for the work. After examinations were given and appointments made, the work progressed under the new assignments quite smoothly, but some of the Operating Division personnel were so unhappy with the decision that they took early retirement, even though in some cases the pay was higher in the new classification.

Now back to 1946. There was a complete reorganization of the Power Operating and Maintenance Division. This Division had grown tremendously through the war years and new job descriptions and examinations were needed to adequately cover the increased responsibilities. As a result of the studies, examinations and appointments, the major section head positions were reclassified to Principal Electrical Engineers, and Ernest P. Bryant became my new supervisor. In addition, the positions held by Floyd Goss in charge of Overhead Distribution and John Kelly of Underground Distribution were reclassified from Electrical Engineers to Senior Electrical Engineers. Later, from the same Civil Service list, I was

given a Senior Electrical Engineer service rating, with no change in title or duties.

During these years, there was another development which involved both time and travel. The Federal Communications Commission called for a meeting of radio business executives in Chicago, Illinois, on January 19 and 20, 1944, to assess the need for dividing the available radio spectrum into blocks of frequencies for use by commercial radio, television, police and fire radio, as well as other services, including the utilities. The meeting was organized into thirteen panels for study and recommendation. The utilities, including water, power and gas, were assigned to Panel 13. As a result of this meeting, the utilities representatives organized Committee 4 of the Radio Technical Planning Board. It would be interesting to note that at this meeting, attended by Edison Electric Institute [EEI] and electric utility executives, that I was the only public power and water utility representative.

On a walk to the washroom during a morning break, I overheard the EEI representative tell Mr. Dondanville, our host at Chicago Commonwealth and the elected chairman of the committee, that EEI could not participate in any meetings with a municipal power representative as an equal voting member. Mr. Dondanville gave a good answer and later told the whole group that the FCC had called this group together to provide information from all of the utilities to assist them in allocation of frequencies for utility use and that unless all

types of utilities, except for the U. S. government utilities such as TVA, cooperated in the recommendations that there would be no recognition as the frequencies assigned would be used by all without regard to type of ownership.

Study assignments were made and I was asked to write all possible utilities to obtain some idea of post-war use of radio. We made these contacts and presented the results to the FCC, after which assignments to all branches of radio were formalized. It then became necessary to organize the country in regional committees with chairmen and frequency assignment subcommittees in each to handle all requests in each area for specific frequency assignments as required by the FCC. These regional committees reported to a newly formed National Committee for Utilities Radio [NCUR], of which I was a member. I organized the southwest region of the United States committees and was the committee chairman and frequency coordinating chairman of this committee for many years with annual trips to various locations in the East, including Chicago, New York, Washington, D.C., Buffalo, et cetera, as frequency coordinating chairman of NCUR. I appreciated this work as it enabled me to become acquainted with and to learn much from national leaders from the radio industry. I also chaired meetings of the American Public Power Association to advise utilities of the advantages and opportunities for the use of radio and their operations. I wrote several articles regarding radio and this work for Public Power magazine and

Electrical West magazine. Incidentally, I was appointed by the APPA directors to represent APPA at all of these meetings.

TC: Well, I have, in fact, in my notes one of those articles in which you talked about FM radio trouble dispatching.

BC: Oh, yes, that was in the Department's magazine.

TC: Yes, that was in 1944, I believe, or 1946. But in talking about this application of FM, you harked back to when it was instituted in 1943. So it would have been during wartime that this FM approach was taken. Can you describe some of that, what that meant. FM was new, it was an innovation, I guess, at the time.

BC: I am not clear as to those dates. Now, I said 1943 previously, but I looked it up yesterday and the invitations were issued in 1943 but the actual meetings were, as I stated, in January of 1944. Ice and snow on the streets was very uncommon for me and I slipped around trying to go get a return plane ticket. I was able to go by plane to Chicago all right, but trying to get a ticket to return, I had to make daily trips to the airplane office, and it was several blocks from the hotel and the ice had built up on the sidewalks. Well, anyway, 1944. FM had been developed by [Edwin Howard] Armstrong many years previously, but there was no practical use of it, basically.

TC: Well, why was that? You know, it seems so prevalent now.

BC: Well, FM had to be developed for broadcasting use, and there would be no development and spending of money until there were

receivers available, so the receiving industry had to be geared up. And as far as the utilities' use of FM, there were no frequencies available. The only thing available before the war up to that time--until all the allocations were made about 1946--were experimental. We did have a radio from Los Angeles to Owens Valley going back many, many years, and that's why we had radio telegraph operators located in Los Angeles and Owens Valley and later expanded to Boulder. But at that time, there were no FM frequencies, no FM radios when that came along. When the frequencies became available, we applied for frequencies.

The major frequencies for the utilities and fire and police are located between television channels 6 and 7. TV channels between 1 and 6 are in the low frequency spectrum, and then there's the high frequency spectrum for TV channels 7 through 13, and between those there's a whole spectrum of frequencies. The utilities were given two sets of frequencies in that band, i.e. 30-40 mc band and the 160-170 mc band, and as soon as the frequencies were available the manufacturers started making receivers.

We started out with six FM transmitters and receivers, installing them in cars used by trouble men. We bought a transmitter and put it in the load dispatcher's building with a very high antenna, with the tower being used for the low frequency radio telegraph system and a whip antenna on top for the mobile radio system.

TC: I'll show this to you and we can cite it for the transcript. This is called "Trouble Dispatching by Radio at Los Angeles," by Burton Currie. It was in Public Power, November 1946.

BC: Oh, yes. I don't have a copy of that.

TC: Well, you should have that then. Yes, it's a very well-written article, and you discuss some of these matters.

BC: Well, there's no picture here of the antenna.

TC: No.

BC: There was a similar article, probably shorter than this, in the Department's magazine.

TC: Oh, The Intake.

BC: The Intake, and it shows the antenna and so forth. Well, see, when they transmit they transmit on a frequency of 39.66 megacycles and they receive on a separate frequency, so there'd be no interference between the two on 37.82. These are the frequencies used in the L. A. Basin area. Later on, we obtained permission to operate in the 160 megacycle band for use in Owens Valley. The higher the frequency, the more the line of sight of operation. Also, it reflects better, so that on these frequencies in the 30 to 40 megacycle band, the range is farther generally. But when you get between the buildings downtown or in tunnels, or you get in some of the canyons like Stone Canyon, it goes over the top and you can't hear it. In the 160 megacycle band, it is reflected on the canyon walls back and forth, it is reflected through tunnels and between buildings downtown, and in most cases works even

better. At first, in making the allocations, nobody wanted the 160 frequency, and those frequencies were not used at all by most utilities, they went down into the lower band. But as they developed more and better equipment, why, more and more of the new stations going on-line were in the higher frequency band. Especially for small cities, it provided a much better service than the medium frequency band. But that's what it was all about.

TC: Well, you were given authority to go ahead and develop this then by . . . Who would that have been at the time?

BC: Well, as you know, in making any capital expenditures over \$5,000, you had to draw up an authorization for approval by Bateman, Martindale, and the General Manager. This would go right up the line, so . . .

TC: To the Board [of Water and Power Commissioners] finally, I suppose.

BC: Yes, we would write letters explaining what it would do. But in preparation for that, we had given a number of talks about the value of radio. I remember when Sam [Samuel B.] Morris came to the Department--I don't remember the year, but this was before we had permission to use any of these--and Bateman got up in a meeting in a hotel--we had dinner--with all of the executives of the Department of Water and Power to meet Mr. Morris. So each of the executives were asked to stand and introduce himself and tell about his work so Morris could get an idea of who they were and what they did. Bateman got up,

and it was very embarrassing for me. Instead of talking about what he did, he talked about what I had been doing and all of the developments. So that was quite an interesting meeting.

But at that meeting they also asked me, "Do you think we'll ever get to mobile communications?" I said, "Well, we're working on that now, and Mr. Morris will be seeing an authorization in the future for purchase and installation of the main transmitter and car receivers, and we feel it would be a very good operating tool for the dispatchers." When you dispatch a man to a job by telephone, it may take an hour or so to reach him before you can get him to the job site. But with radio, someone calls in and they can dispatch him immediately. Depending upon the seriousness and what other items he has on his log, they can go immediately. Was there a story in The Intake article someone who didn't think it was our trouble man because they got there so soon?

TC: No, there was one about an airplane crash up along the Aqueduct line.

BC: Oh, there was a story about . . . This is a true story, by the way. A lady called in saying her power was out, so they got on the radio and sent the trouble dispatcher to that address, and he happened to be within a block of it cruising by. He went over there and the lady slammed the door in his face and called the Department and wanted to know how she would know whether this was a Department representative,

because she had just called. How could the man get there that quick? (laughter)

TC: That's great.

BC: I don't know how often that happens, but anyway that was one of the stories. Then they asked me, "There's talk of walkie-talkies. Do you think the Department will ever use walkie-talkie?" I told them, "Well, I'm sure they would. It is a very handy repeater when they're not able to use their car radios." I did not think on the spur of the moment of the possible uses, but later they used them, for instance, for stringing conductors where they had a man in the middle between the cars at either end. They might be stringing two or three blocks and the men could not see the hand signals. By using the walkie-talkies they could communicate. Then also, in pulling underground, one man in the basement of a building, he could hear a man outside or he could direct a man, "We're ready to go," and so forth. So that was interesting, that meeting.

TC: Were other utilities investigating the same sort of uses of radio?

BC: The larger utilities were. The Edison Company and the County Flood Control had the same type of radio system that we had before the war: radio telegraph and radio telephone on the lower frequencies below the AM broadcast band. As soon as we got into this, and after contacting all of the utilities, it was not long before the Edison Company developed their own

system and installed radios in a large number of cars as well as fixed station radios between stations. In time almost every utility in this area installed their own mobile radio dispatching system.

TAPE NUMBER: 3, Side B

February 13, 1992

TC: Well, we were talking about wartime. You were mentioning wartime and the various things you were doing. What was the overall situation at the Department during wartime? I suppose a good portion of the work force had been drafted or had enlisted. Was it a noticeable reduction in the work force during that time?

BC: Not in my section. However, soon after they started the war a number of engineers left the Department to go into defense work. Because one of the Board members . . . And have you heard this from others?

TC: No.

BC: Well, one of the Board members lost a son in the service, and so he came down hard on the Department and refused to consider any raises. So, for a couple of years without raises, and everybody else getting raises, why, a number of engineers left. But there came a time when the union decided even though at that time it was a family type organization, with the union cooperating with management regarding raises and benefits which were given on a mutually agreed upon basis. People joining the union were told they would never strike, but they would be providing representation to management of whatever the union then voted on. But it got so bad that Local 18 [IBEW, International Brotherhood of Electrical

Workers], headed by [E. P.] Taylor, called a strike on the vote of the union. So that was a very bad time for many of us.

As a supervisor, I was in charge of the Wright Street Communication Headquarters, and I had a car that I drove home and back, a Department car, and I picked up three of the men on the way who lived between my home and the Department. As we entered the alley to get to our headquarters in the rear, which was an abandoned fire department station with a loft where they used to keep hay for the horses . . . It was used by the Frequency Change, and when they were through, why, we expanded our operations and moved from the Second and Broadway Building to 1347 Wright Street. We had, I guess, fifteen men in Communication, and there were about twenty men in the Customers' Premises section upstairs. My office was upstairs between the two. Then, when we came to work that morning and had to cross a picket line walking up and down in the alley, I as a supervisor and not a union member, had no problem, but they certainly heckled these men with me. I asked them if they wanted to get out or wanted to go, and they said, "Oh, go ahead. We're not interested in this." Well, those fellows really got mad at us at the time. So I went over to the union office and picked up a pass, which I have here, allowing me to pass picket lines without any problem. But as a result of this strike, the union pulled men out of distributing stations

and receiving stations, and they were operated by supervisors, also the linemen went out on strike.

Well, it so happened that one of these unusual storms came up and it hit the entire city of Los Angeles, where lightning was hitting the lines, knocking them out. The union members then would not go in to restore service, so the city was losing power. The Board caved in and granted I think it was a 5 percent raise. Well, many of them said that it should have been a 10 percent raise, a 5 percent increase was a slap in the face, particularly after a ten days' pay loss. In fact, the Civil Service had said if they don't go back to work within ten days they'd lose their seniority and start all over again. But I think it was just under ten days that the men went back to work, so that did not occur. But they finally decided, under pressure from Civil Service, they'd better go back to work and see if they could negotiate for more. Well, as it turned out, the Board was more receptive through the years, and the Department kept up with cost of living increases every year, and it was good for all of us.

TC: That strike, I believe, was in 1944. You know, it's funny, most unions had taken a no-strike pledge for the war effort. I think back East the mine workers went out on occasion, John L. Lewis' union. But the IBEW at Los Angeles Department of Water and Power was one of the other unions that went out during the war.

BC: Well, they didn't feel it was necessary. We've always gotten along well with management, hand in glove. There's another factor in this that I did not mention and that was that after a couple days' strike the army took over.

TC: The army, right.

BC: Yes, they came in and they had a man sitting in the General Manager's office. That was quite a time.

TC: Right. But what did the army do? I mean, they weren't capable of running the power stations.

BC: Oh, no. As far as I know, it was just one general from the army that sat with the General Manager. He worked with the Board, and, finally, with Civil Service. He convinced the Board that they were going to be in trouble and be taken over by the Army Corp [of Engineers] if they did not listen to reason.

TC: Okay, so it never got to that point, I see.

BC: So it didn't get to the point where they took over the operations.

TC: No, I was picturing troops coming along and taking over, but it didn't get to that point.

BC: No, it didn't get to that point. I'm a little hazy, that's been a long time ago.

TC: Oh, yes, but it's funny, you don't read a lot about it. In fact, Howard King said that he read about it when he was in the Pacific during the war. He was in the navy, and the newspaper, perhaps Stars and Stripes or one of the newspapers

that he was able to get, carried a story about it. He said it made him very angry that here guys like himself and his friends were doing what they had to do and he thought it was completely unfair for these guys to take advantage of the circumstances by going out on strike. So it did have repercussions.

Well, let's talk about some of your career steps. In 1946, you became Engineer of Communication and Inspection. And you've mentioned some of that, but let's talk about what that meant. Now, was that a Civil Service upgrade, or was that part of a reorganization, or was that a promotion?

BC: In 1944, I had been given the change of title from Communication Engineer to Engineer of Communication and Inspection. Then, in 1946, some months after Goss and Kelly received their appointments as Senior Engineers, I was picked up from the same list and was given the Civil Service appointment of Senior Electrical Engineer. That's when I broke into the electrical engineering series and there was no change in title.

TC: Okay. Now, to talk about that for a minute, you were a Communication Engineer, a Radio Engineer, and you ultimately were considered an Electrical Engineer. Did you have to take course work or get some sort of certification for electrical engineering?

BC: Yes, to qualify for the examination, you had to have a "Professional Electrical Engineer's Certificate," issued by

the State of California. I still have it on the wall in my study.

TC: Okay, yes.

BC: At that time, fortunately for me, the licensing requirement had just been instituted, and there was a grandfather's clause which allowed for a short time those who had had engineering experience to get one by application, describing their experience with references. But prior to that time, in the early forties, I decided that Communication Engineer was great, but to remain in that job the rest of my working life would not be all that interesting. So I started studying on my own. I got books and I went to night school, took a course, one course, and I'd go to the library.

TC: What night school?

BC: It was USC, where they had a course in mathematics and engineering. Bateman and Green went to the same course. Anyway, as I say, I studied diligently through the years. I mentioned a while ago that I passed number one in Communication Electrician, then Foreman and Engineer, and I'll tell you one reason for it. Not only experience, I'd had more experience in radios going back to 1929, twelve years, but, also, I had studied through the years--not just schooling. For instance, I took a two-week vacation--my family lost out on a vacation that year--just before the examination. I went to the public library and I went to the Department's library, and I had dozens of books and I went through them and I made

written notes in books of everything that you could possibly ask a question about. (chuckling) And this all related to radio and communications of all sorts, telephone.

For several years before I became Communications Engineer, I worked with Bert Anderson, who was an ex-telephone man, as I mentioned previously. He taught me telephone maintenance, telephone design. Allardice was a teletype expert for many years before he came to the Department. He was the one man who handled all the teletype maintenance. A very nice fellow, and I worked with him closely on teletype maintenance, too, to know what it was all about. So, by the time the examination came, why, I was all primed and did well. Then, when it came to the Senior Engineer's examination, why, I did pretty much the same thing. I got the Electrical Engineer's handbook and all of the books I could find on electrical engineering. I even went to the Department library; and I noticed that a number of their engineering books had been taken out by Civil Service. I figured, well, they must have taken a question out of this. I studied those books, along with all the others, but I could never relate any questions in those books to anything they asked. But I worked hard after hours. So, by dint of experience and study, I was able to pass the examination, and from experience alone I was able to get the certificate from the State of California, the electrical engineer's certificate.

TC: Well, okay, following the war, your work was in Communication and Inspection. Now, that's inspection of the system in general or the distribution?

BC: No, the inspection on customers' premises. The Department, starting from the beginning, generates the power, or buys the power, whatever the case may be, and it goes to receiving stations around the Los Angeles area, and from there to distributing stations. Then it goes out over 34 kv lines between distributing stations. Some of the larger factories and commercial buildings obtain their power directly from these 34 kv lines. At the stations the power is transformed to 4800 volts and fed by primaries at this voltage to residences and small commercial establishments. Transformers tap this 4800 volt circuit to provide 240-120 volt service either by means of underground cable into the premises or by service drop from the pole. Perhaps one transformer will serve a couple dozen houses by means of the low-voltage wires to each house. So that when it gets to the house, in an overhead service, for instance, then the customer provides a service entrance box, with breakers and whatever, and the Department has to inspect that because our facilities terminate at the box. Then it goes through the meter and hence to the customer's breakers and circuits. So we inspect from the pole, the service, to the entrance facility. That may be a clamp on the edge of the building, and the general rule is you receive service from the nearest unobstructed

pole, without crossing a neighbor's property, to that location.

Well, sometimes that would be hard to locate where you might be in trouble. Sometimes they had to string a wire in the middle and run it off of a guy wire. So these men would go out on request of the customer and would tell the customer, "Here's what we'll do. We'll serve from this pole, and you put your entrance facility there and run your conduit over and put your meter here, so many feet up from the ground, so many feet from the first contact," and that was their main work. Well, when they over-built, somebody would build a porch and leave the meter inside. That's not according to the rules, so a meter reader in the Commercial Division would see that and then he'd report it to our men and they'd go out and work with the customer to tell him what he'd have to do to move it outside. That's the kind of work they did. The problems I mentioned before were when they told a customer what pole he'd come from. They did not get involved too much with underground because underground was a separate situation, where the customer had to build conduits from his box in the building underground out to a location where the Department could pick it up underground.

TC: Would underground have been downtown at that point?

BC: The Engineering Office, where they would keep all the drawings and they could determine wherever they would serve from, what they'd have to build to make service available, was downtown.

But they had regional offices in the districts or in the commercial offices where a customer could get some information, or we could check downtown and give him an answer and start working on it. Some of the pole spotters were located out in West L. A. and some were located in Van Nuys.

TC: You were also in charge of the operators, the telephone operators at the headquarters, right?

BC: We had twenty-five women. I don't know if I should say this under today's conditions, those twenty-five women were more trouble than the fifty or more men that I had, particularly because they had a supervisor that I inherited, Bessie Taylor. She is long gone now. I liked her personally because she had such wide experience and she knew all the answers and she did what I told her to. But she had to take an examination along with the rest of us, and when I was made Communication Engineer, she came out number two on the Chief Telephone Operator's list. I had had trouble with her working with the girls, and problems with the girls, so that I did not call for an interview right away. I was debating in my mind whether I should really replace her with somebody more congenial who could work better with the girls. But Nellie Russell, the woman in the personnel office, said, "Mr. Currie, we know the problem with Bessie Taylor, but after all these years she has been with the Department as Chief Operator, you wouldn't think of demoting her, would you?" So I said, "Well, no, I guess not. Go ahead and send out the certification." So, anyway,

I did appoint her. Sometimes I wondered. (chuckling) But little things, like she would stand behind the girls and breathe down their necks if they didn't do everything exactly according to what she told them. For instance, one of the rules she had was between calls you had to fold your hands and place them on the counter, telephone desk, ready to make a quick connection. You couldn't put them down in your lap. So she was quite domineering.

TC: Yes, she sounds like it.

BC: And the girls resented this. The other thing is, she was of one religion, and they told me that she picked girls on the basis of their religion, and those who were of a different religion were ostracized. I could never prove this because I wasn't that close to her and the girls. But it was that sort of thing. Everybody was happy when she retired. The new girl who was appointed, who had been her assistant, all the rest of the time I was there did an excellent job. But I was no longer directly in charge, so I did not have that advantage.

But, anyway, that was the situation. We had these telephone operators and they handled all the calls. We did not have the direct-dial system, of course, and the telephone company had a man in the relay office on the next floor maintaining the relays and going over them continuously. I worked with him for a while getting on to what we would do in case he wasn't there, blown fuses, how we could replace them.

I might go back a little, not to make this too long, but you keep bringing up questions that bring back memories.

TC: Well, good, that's the idea of this.

BC: Before I came to work for Bateman, he said, "Well, now, this is a ridiculous waste of money to pay the telephone company for these outlying switchboards." We had one in Independence at that time, and we owned that and operated it, and then we rented a switchboard at Van Nuys. As the Van Nuys traffic grew, why, the telephone bill was horrendous. So he bought telephone cable and had the linemen install this cable on power poles and some underground between the Second and Broadway office and Van Nuys office. But the telephone company wouldn't let him connect it. He bought a switchboard and installed it, but the telephone company said, "We have rules, no interconnection between private facilities and the Bell System." They said that if there was trouble, how would our serviceman know where the trouble is, whether it's in their equipment or in our equipment or in their cable. They used 22-gauge, we used a larger size, 19-gauge conductors, and it was all paper-wrapped. Well, if you had a hole in the lead due to corrosion in underground facilities or electrolysis, or a spike from whatever cause in the overhead, why, water gets in and then you have a short in the telephone cable. So we had our own telephone cable men and continuously monitored all of the cables. We got more and more as the years went by and became quite expert at locating the trouble. Many is the

night I went out in the early days with Bert Anderson and climbed a pole and opened up the jumpers in the box and measured to see which way the fault was so that we could narrow it down.

Anyway, be that as it may, the telephone company refused. Well, one night Bateman and Anderson took their soldering irons and went to the telephone company switchboard mainframe and ran jumpers from this cable from Van Nuys--I think about 101 pair--and tied it into the telephone company's system, and he took it off the telephone company switchboard and tied it to the Department's switchboard in Van Nuys, and the next morning we were in business. They complained but it remained that way to this day. Now there's no problem. There are private systems all over the country.

TC: With the operators, the women had to field complaints, I suppose, or answer questions. Was their job to just connect the person who was calling to whomever could answer that question? Or was it up to them, to some degree, to answer the question?

BC: All they did was to receive a call, find out who they wanted to talk to, and ring that party and see if they'd pick up the connection. If the connection was busy, they would ask the customer, "Do you want to wait or call back?" Now, one of the difficulties was we had a trouble dispatcher's office in the Power System, and that was over at Boylston [Street]. A new Communication Maintenance headquarters building was also

constructed at Boylston Street, and as far as I know they're still there. Has this been gone into by anyone? The trouble dispatcher's office had a diagram of all the lines in the city on floor to ceiling boards extending around two rooms. They had the high-voltage board in one room and the low-voltage board in the other, and calls coming in from customers were handled by the low-voltage board dispatchers, and that had to go through the switchboard. Well, when you had a lot of trouble, the switchboard, both the trouble dispatchers and then back up in the main telephone room were flooded with calls. Years later, when they were able to get direct-line telephones, why, [trouble] dispatchers had their own phones and did not go through the telephone operators. When they had rainstorms like we have had in the last three days, the telephone operators were extremely busy and there were a lot of unhappy customers having to wait for service. They didn't have automatic tapes to put on or digital dialing.

TC: Yes, right.

BC: So, anyway, the trouble dispatchers--and I'd say the load dispatchers, also . . . Have you ever been in their building?

TC: No, I haven't.

BC: They've moved out in the Valley someplace, but they had an adjoining room. You walked down the hall from the entrance . . . It was a locked entrance, you had to identify yourself by telephone to get in. As you walked in, the trouble dispatchers were on the north side and the load dispatchers

were on the south side in another large room with a hallway between.

The load dispatchers had a line diagram of every line between stations. And whenever they took a line out you had to call the load dispatcher and say, "I want a clearance on the line between DS 33 and DS 34 to work on it." So the dispatcher would go to the board and show that those lines were out of service by putting plugs in that line to indicate to all the trouble dispatchers that the line was out of service. He would ask the station to open up the breakers and ground it, and as soon as that was done, then he would give a clearance to the patrolman or lineman, whoever, so that they could work on that line. In addition to the station grounds, the patrolman had to throw a ground wire over the conductors and ground it themselves so that they could make sure that it was safe to work on it. The trouble dispatchers had a chief dispatcher, an assistant chief, and then senior dispatchers, and they had a very good group and they were very well trained and were very efficient in their work.

TAPE NUMBER: 4, Side A

February 13, 1992

TC: Well, we're in this period of the late forties, 1947, 1948, and your work as Engineer of Communication and Inspection. Now, let's see, I don't have the actual year-by-year, blow-by-blow description, but I have certain key dates when some changes came in or innovations were implemented. In 1951, for instance, a microwave radio system was put into operation. Do you recall that?

BC: Yes, I have an article in The Intake about it.

TC: Yes, this is The Intake for August 1951, and there is a picture of you on the top of the building. Let me just cite that on the tape here. It's called "First Microwave System Installed."

BC: What shall we talk about?

TC: Well, what were the mechanics? Briefly, why a microwave system? What was good about it? Why was it that it was thought about and then purchased and put into operation?

BC: The Seal Beach Steam Plant was purchased and taken over from the L. A. Gas & Electric Corporation in 1937, and we built a transmission line to receive power from the steam plant. On this transmission line right-of-way we installed a telephone line. Well, about 1951 . . . Is there a date on this?

TC: Yes, it's 1951.

BC: About 1951, the telephone line had to be removed because they rearranged the power transmission line. It was no longer feasible to maintain a telephone line, which you could imagine would be pretty hot from induced electricity from an operating power line. So we set about to find a microwave. In those days, microwave was very new and there was a big argument as to the best type of microwave. The carrier system for the microwave--that is, the electronic frequencies on which it operated--operated point to point by line of sight, so that we used so-called dishes. You're familiar with that? But the modulation, there's AM, there's FM, and in this case we concluded our best operation, particularly since it was going to be used for control as well as for telephone, was to use a pulse-time modulation. By repeating pulses continuously at a very high rate, we obtained five channels of telephone communication and two signalling circuits. We installed this equipment and it worked very successfully.

I remember the day we put it in, we installed the antenna on the roof at 207 South Broadway, and ran the coaxial down the building and into the radio telegraph office. No, I'm sorry, we ran it into the telephone room and installed this equipment, two panels, in the telephone office. From there, the cabling was taken down to the telegraph office where it could be operated from there, and then we also connected it into the telephone line so the operators could use it as well. Well, we turned it on at both ends and we could just barely

hear them. It didn't work at all. So we worked a couple of days on that, and one of the men finally found out that the antenna connection in the telephone office terminal had become disconnected inside the coaxial, so that there was no connection. What we actually heard was from about a one-inch piece of wire. So that made us feel good. If we could get that much signal with one inch of antenna, we ought to do pretty good with a dish on top of the roof. Of course, when it was repaired and connected, why, it did work very good for years until . . . I don't know when they took it out of service.

TC: Well, it was when Seal Beach was decommissioned.

BC: It was decommissioned and taken out. They leveled it and sold the property, didn't they?

TC: They did, yes. Yes, that's all gone. So it was strictly for Seal Beach?

BC: Oh, yes.

TC: There would be no necessity for establishing some sort of microwave radio contact then with other generation points because I guess you had contact already through various other means.

BC: Eventually, and I'm not sure whether we had one at Seal Beach. We did have radio contact between major generating stations and receiving stations. It may have been just decommissioned before that, I'm not sure.

TC: Okay. Well, we're in the fifties now. In 1952, according to my notes--and sometimes there's a year difference in the way different biographical sources will report--but you become Engineer of Transmission, Trouble and Communication.

BC: Yes, in 1952 I took the Principal Electrical Engineer's examination and from the resultant list I was given responsibility for the Transmission, Trouble and Street Lighting Section as well as the Communication and Inspection Section.

TC: Okay.

BC: Now, I mentioned, too, that my supervisor in 1946 was Ernie Bryant. I do not believe I mentioned that in 1944 Bateman was reassigned in the Operating Division. Did I mention Bateman?

TC: Yes, and you mentioned that Bradley Cozzens became your supervisor. But I had a question as to where Bateman went.

BC: Well, Bateman became Distribution Engineer over Underground and Overhead, and also he was more or less assistant to Martindale. So the position he had, which included the two small sections previously mentioned, as well as Transmission, Trouble and Street Lighting, was turned over to Bradley Cozzens. I was with Bradley Cozzens about a year and a half, until 1946, when Principal Electrical Engineer examinations were given and appointments made. At that time, I reported to Bryant, and that remained until 1952 when I was made a Principal Engineer. But I might say that Bryant was a generation man with considerable experience in working in the

hydro power stations. When I reported to Blakeslee as Principal Electrical Engineer in 1952, Bryant was transferred to the Generation Section. I think he replaced A. C. Wingo, who had come from Boulder Power Plant to head up the section.

Anyway, what I started to say is that through those years, from 1946 to 1952, I normally reported to Bryant, but Mr. Blakeslee came in as Head of the Operating Division, and we had so many problems that he was more familiar with than Bryant that I went to Blakeslee on them, so I had dual reporting, actually. I don't remember very much about Bryant. I guess I really didn't work very closely with him, even though nominally he was the head of the section.

TC: Okay, so you did become Engineer of Transmission, Trouble and Communication around 1952?

BC: Yes.

TC: Was that a redefined position?

BC: No, Mr. Bryant had assumed the position in 1946, when they reorganized the Operating Division and they developed the new classes of Principal Electrical Engineer for the major section heads. So he held the position, Bryant held the position, and I moved right in to take over the same duties.

TC: Well, what would those duties have been?

BC: Well, in addition to all of the duties that I had previously, as supervisor of the Communication and Inspection Section, which position was assumed by Glenn Green as Senior Electrical Engineer. The responsibility for supervision of the

Transmission, Trouble and Street Light Section was added. Mack Keany was General Superintendent of the section at the time. The section was responsible for the maintenance of all the Power System's transmission lines from Boulder and Owens Valley to Los Angeles, also the belt lines interconnecting all the receiving stations. The Electrical Trouble group handled all the distribution line trouble in the Los Angeles area except for the outlying areas of Van Nuys, West Los Angeles, and San Pedro. The street light group handled all the maintenance of street lights in the same area.

Mack Keany worked very closely with me, and I spent a lot of time going out in the field with him, at least in the early years, to learn the business. As time went by I found out that his main concern was related to encroachments on the transmission lines' rights-of-way, regardless of its nature. His transmission superintendent, Benard Chambers, was a very strong personality and had strong feelings along the same line, so I ran into a lot of static on that. People would come in and say, "I own the land which you are using for your lines. Why can't I use it? I want to park my car on it," or, "I want to develop a garden on it," or, "I want to be able to drive down that transmission line." So Keany said no, and his superintendent said no. So we stayed with that for a while. But finally I decided that the people who owned these lines, owned the right-of-way under those lines, which generally was

a part of their residential property, should have some use of their property.

The situation was that when the property was purchased originally before the line was built, why, the assessment was made on the basis of 10 percent to the property owner and we would pay 90 percent of the assessed value at the time of purchase. Well, those lines were purchased many years before, before the property became valuable, so that the 10 percent use represented quite a bit money-wise. So I got them to agree to apply for and receive a permit for the use of the easement property they owned for a garden. So if somebody asked a patrolman for a right to use the land, he would say, "Write to the Land Division." This was a little cumbersome, but they would write to the Land Division. The Land Division would send the request to me and I would check it out with Keany and we would specify the square footage. We put in the land use agreement that upon the conclusion of gardening, when the plants died that they would remove all of the debris, the old plants, and keep it weeded. So then it would come back to me, I'd sign it, Land Division would sign it and send it to the man and he'd go ahead with his garden. And a copy would go to Keany so that his men would know which ones had a certificate. So a lot of the land was developed that way.

But as time went by, you can imagine what happened after a couple of years. A lot of the land was encumbered with sticks and wire fences, fencing in a piece of the land, and

dead stalks, and they did not follow through and clean it up. So the patrolmen were extremely unhappy. They felt that they should keep the land free of all obstructions, so if the line fell down they could get in there with their equipment and work without wire fences in the way and not have to clean it up before they repaired the line. In addition, they did not want cars on the right-of-way as they would obstruct access, also if they had a fire and the tires caught fire, the flames and smoke could get into the line wires. If the fire was large enough and the flames actually touch the conductors, the ionized air would allow the high voltage to flash through to ground. So we had a lot of trouble trying to maintain that policy, and people were giving us a lot of static about no cars, no use.

So we asked the Legal Division . . . At that time it was under Gilmore Tillman. He assigned Omar Lloyd to work with us, and it developed for ten or fifteen years he was spending full-time in the Transmission Section handling these cases. I had to go to court on several occasions and testify as to the effects of fire in land use. In cases where they actually sued us for the use of that land, and we won every case. Lloyd was a specialist and he knew all the laws applicable, spent full-time on it, and the customer would go to a corner store lawyer and he would not have time, with limited funds available to look at all applicable cases. Although we did win all those cases, I never did feel really comfortable with

non-use. The Edison Company allowed commercial use of their rights-of-way. The nurseries were allowed to plant on the land as long as they left a space through the middle for a road wide enough for a large truck to get through.

Several years later, Keany died and William Beaton took his place; and through the years he was just as strict as Keany. After I retired I heard that they did relax somewhat; but how far they've gone, I've never followed through to find out. But that occupied a lot of my time, writing letters in response to complaints of customers explaining our policy. Many times I had to go out in the field to view the situation, and occasionally talk to a landowner.

TC: Well, it's a delicate situation because you have to explain something technical and legal to someone who . . .

BC: That no customer is ready to accept. I remember a fraternity brother owned a piece of land, a part of which was on our right-of-way to Receiving Station E in the Valley. He rented the property to an automobile repair shop, and when the available space was full of cars, he'd park some of them on our right-of-way. Well, the patrolmen complained, so I received a call one day from this friend and he said, "Look here, you're not going to keep me off of my land. I own that land. I don't care what you say and I don't care about your rules." He said, "That is illegal. It's taking land without benefit of compensation and I'm going to court." I said, "Oh, wait a minute. I'll talk with the men and I'll go out and

look at it and we'll work with the service station and see if we can't solve this some way." I went out and we wrote up an agreement with him that he would provide more space off the right-of-way in return for which we allowed him to drive back and forth on our right-of-way. Also, if there was encroachment by one of his cars, he would see that it was taken off within a reasonable period of time and that sort of thing. So we satisfied the owner. I received complaints once in a while that they weren't abiding by the agreement, they were parking a lot of cars there for a long time, but it never did escalate to the point where our people took him to court.

There was another element in Transmission Line Maintenance. In the Street Light Section, we had a series of studies made. We were told by the manufacturers that if we replaced street lights on the basis of once every 2,000 hours, the average life of the bulbs, then it would save money. What we had been doing was every time somebody would report a street light out, we'd send a patrolman out and he would replace it. At that time, we were using radios, so they'd get a call from the customers through the trouble dispatcher's office and go directly and replace it. So we experimented both in the test labs and in the field with installing long-life, constant-current bulb that would go for 2,000 hours with few burnouts and then we'd go through and replace them all at once. That's what we finally did, but it took some years before we went to that system of changing the street lights.

TC: Well, street lighting was one of the responsibilities of the Department?

BC: Well, street lights and fixtures installed on our own poles were our responsibility, and the replacement of lights in what they called electroliers--or ornamentals--which consists of a concrete standard with an ornamental globe on top. The electric service to that was our responsibility, also the replacement of the lights and the washing of the globes. However, the installation of the ornamental system is under the control of the Board of Public Works. They would receive a request from a developer: "We're going to develop this tract. Must I have ornamentals or are the Department-installed overhead lights satisfactory?" If the Department's overhead system is satisfactory, they would give us an order for the installation and we'd install an extension arm on the appropriate pole with a light fixture at the end. The installation and its maintenance is our responsibility. However, if an ornamental light is required, the developer must pay for the installation by the City or its contractor.

TC: I see. So it was a sort of cooperative effort then?

BC: Yes, on ornamentals.

TAPE NUMBER: 5, Side A

February 20, 1992

TC: You again have some notes that you would like to start from, so I think that's a good idea. Why don't you go ahead and start.

BC: Early in my administration of the Transmission and Trouble Section, there was considerable controversy as to the best type of 34.5 kv insulators to be used in the Los Angeles area. Most areas throughout the country received sufficient rain throughout the year to keep insulators clean. But due to the low rainfall in this area, dust collects on the insulators, and then on a wet, foggy night the insulator will flash over, taking the circuit out of service.

There are basically two common types of distribution insulators: the post and the skirt. The post has uniform ribs circling a ceramic post, the leakage current has to ride up and over the encircling ribs. The other insulator is larger in diameter and has a skirt which extends out and over the flat bottom of the insulator, leaving a dry area between the pin and the outer skirt. In spite of the arguments pro and con--I had lobbyists pressing for sales--I tried them both and could notice little if any difference. Under extreme conditions, they both flashed over.

To combat this problem on both the 34.5 kv distribution and the high voltage transmission line string insulators, the

General Plant Division developed a ladder truck similar to a fire truck, with a ladder which could be raised to permit a lineman in a bucket to direct a stream of high-pressure water at an insulator or string of insulators and wash them free from dust and other contamination. We tested the trucks for electrical safety and found that the nozzles should be grounded when washing high-voltage line circuits. Also, for the 34.5 kv circuits, we found that some hydrant water was sufficiently low in resistance, that currents hazardous to the operator could result, so that as a safety precaution a water testing device was used to determine resistance before filling the truck tanks.

The 34.5 kv lines were originally designed to deliver power from the receiving stations to the distributing stations. However, because of increasing load on the 4800-volt primary circuits, it became apparent that it was not economical to serve large customers at this voltage. Not only were the line losses high, but also the primary circuits were becoming so loaded that it was rapidly becoming impracticable to keep building new ones. To serve some of the larger customers, a few industrial stations, i.e., that is, 34.5 kv feed, were constructed. Through the years, it became apparent that this was the way to go and more and more industrial stations were installed. This placed a premium on 34.5 kv circuit reliability.

In addition to washing the insulators, it was necessary to have switches to sectionalize the lines at intermediate points so that a bad section could be switched out and the rest of the line remain operable. In many cases, the line was open in the middle and normally fed from each end. In cases such as this, after isolating a bad section, the open line in the middle could be switched to energize the line from the other end and still maintain service.

The opening and closing of the line was done by closing switches known as pole-top switches. These had an interesting history. Many years ago, a small insulator company, the KPF Company, presented an idea for a line switch to the Department and the Edison Company. The idea envisioned a cross-arm-mounted switch with three moveable blades which could be jointly operated from the ground by means of a long wooden rod attached to a handle at the bottom and to the moveable blades of the switch. When closed, the blades were inserted into clips to provide a through circuit. The Department and the Edison Company liked the idea and saw the need for such a switch. Through years of design changes based upon actual field operating experience, the switch became invaluable to the operation of our distribution system. As industrial stations were added, the use of the switches was expanded to include one for each station to open the station for work or in case of trouble.

As with most inventions, competition developed. One day, I received a bid considerably lower than that for the KPF switch. We bought a few, but the superintendents did not like them. Even though they looked and operated somewhat similar to the KPF switch, they felt they had not been tried in the crucible of experience. In addition, I did not like the idea of someone coming along, picking up a good idea and copying the general construction without going through the years of development and undercutting a good supplier. I therefore sent both the KPF and the new switch to the testing laboratory for extensive and exhaustive tests. I watched the test engineer close the switches into a dead short across the test transformer. Examination of the switches, upon conclusion of the test, showed deep pits in the copper blades and clips of the new switch, which did not occur in the KPF. From that time on, we had no trouble in acquiring only the KPF switch.

TC: Where was the testing lab?

BC: That's down on 1630 North Main Street.

TC: Okay, it was the Power System testing lab?

BC: That's right, and the same location as the Power System warehouse as well as Station Maintenance.

Another innovation which occurred while I was in the section was the development of hot sticks, which permitted specially-trained Trouble men to replace defective insulators without taking a 34.5 kv line out of service. A manufacturer's representative called on Stanley [G.] Pann,

Design & Construction engineer who specialized in studying special equipment for transmission and distribution. Pan and I discussed the possible use of hot sticks with the superintendent and they agreed to their use. We bought a complete set, and after factory training, the specialists became quite adept at using the new tools. Later, hot sticks were also acquired for changing insulators and other work on the high-voltage transmission lines. I should add that the sticks were very heavy and a very strong man was required for this use. I could hardly lift them. (chuckling)

There was another innovation which Pan presented, and that was a 34.5 kv insulator which could be mounted horizontally on a pole to eliminate the usual cross-arm. In these cases, three horizontal insulators were mounted vertically on a pole to provide a compact installation for a single-circuit line. We recommended this to the Overhead Section, who installed some for trial. They were found to be excellent for service, they were easy to install and maintain, and were then specified by D & C design engineers for use in all cases where only a single circuit was required, particularly in alleys where sidearm space was nonexistent.

TC: Okay, a couple of things. When you were washing the insulators, how was this done? Was this done with a hose? Was the line hot while you were doing it?

BC: Oh, yes.

TC: Was it energized?

BC: The line was hot and the tank and pump on the truck forced the water at high velocity through a nozzle held by the lineman standing in a bucket at the top of a ladder, and he pointed it at the insulator, starting at the bottom. If you'd start at the top, the dust on the insulators would roll down and they'd possibly short-circuit. So they'd start at the bottom and clean upwards on each of the insulators. Of course, if the 34.5 kv line was in a parkway, some water would shoot onto lawns and cars parked at the curb. But this was not a major problem. When I lived in Eagle Rock, we had a 34.5 kv line across the street from our home, and they worked at night so as not to disturb the people as much, and less traffic. When the washing truck came through, you'd hear this pumping of the water, a very loud noise, and spraying of the water. You could tell when they were there.

TC: You got a new headquarters for the Transmission, Trouble and Communication Section, also. That would have been in 1954 or 1955, I believe.

BC: That was the construction of the Boylston headquarters on Boylston Street between Temple and Beverly Boulevard. It included the Trouble Section, and also across the hall on the south side of the building the load dispatchers, and in the back of the building was the Communication Section, who moved out of 1347 Ninth Street. It was very satisfactory.

TC: All right, I think that covers the section on Transmission, Trouble and Communication. If you want to go ahead to the next note section, that'd be very good.

BC: In 1959, Mr. Blakeslee, the Division head, transferred the sections heads in a round robin of assignments for the purpose of training. I was given the responsibility for the Overhead Distribution Section. At that time, Douglas Lowther was the general superintendent. The primary responsibility of this section was to construct overhead facilities to meet the rapidly growing load and service areas. There were nine district headquarters located around the city. Each district had a district superintendent with construction crews consisting of line foremen, linemen, and line helpers. Upon request of the Trouble Section, in cases of emergency, such as during times of heavy wind, rainstorms, as occurred in the 1992 storm, and earthquakes, as in the Sylmar quake of February 1971 . . . You weren't here at that time.

TC: I wasn't here, no. Sylmar.

BC: Well, that was very interesting. I was just getting out of bed in this house when the house shook, and I got out of bed quite quick, I can tell you.

The line crews were directed by the Trouble dispatchers to assist the Trouble men in restoring service. It should be noted that the transmission patrolmen and the Trouble Section trouble men are in the same Civil Service class and are recruited from the Overhead District Line class. I should

say, too, that in addition to the Trouble headquarters at Boylston Street, under the supervision of the Transmission and Trouble Section were satellite offices in San Pedro, West Los Angeles, and Van Nuys, under the supervision of the Overhead Distribution Section, to handle those local trouble calls. Trouble men and superintendents are assigned to work out of these offices. The design of line extensions and new circuits, both primary and 34.5 kv, was the responsibility of the Overhead Design Section of the Design and Construction Division. Every job required a new authorization, and these were sent to me before going to the general superintendent's office.

It became apparent that a large percentage of new authorizations involved the rapidly growing northwest area of San Fernando Valley. I asked Mr. Lowther to make a tally of all the crews being sent from the southwest Valley headquarters in Canoga Park, the central Valley area and Van Nuys, and the east Valley and Sepulveda, as to miles traveled and time spent en route to the northwest Valley area. We analyzed the resulting figures and calculated the transfer of crews from these three existing districts would result in cost savings much greater than the cost of building a new district. We prepared an authorization and submitted letters to management showing the cost savings and obtained permission to construct and activate the Tenth Overhead District, which was done.

In addition, the Underground Distribution Section made their own study and determined that a west Valley district headquarters was needed. However, the expense of land in Canoga Park was such that we agreed to share the reduced needs of our headquarters in that area, and over the objection of Overhead personnel, the Underground did move onto the property with separate offices and warehouses. Although somewhat crowded, the combined headquarters operation operated satisfactorily, at least for all the time I was in charge.

TC: Okay, let me just ask about . . . I mentioned this, I think, last time. There was a program to change Overhead to Underground, which, in some cities--and it happened in Los Angeles, too--had to do with sort of an aesthetic movement among certain civic-minded groups. Now, did you have anything to do with responding to that call?

BC: No, the responsibility for determining an overhead line installation or underground line installation was that of the Design Sections in the Design and Construction Division. There was a great deal of discussion, but there was not too much activity in that environmental issue when I was there. We were not environmentally motivated as we are now. We generally attempted to go the least expensive route. However, as new developments occurred in the Valley, a good many of them, because the City required it or the property owners were willing to pay the difference, did go underground. That was particularly true of the 34.5 kv lines. If a property owners'

association wanted us to bury the 34.5 kv lines in their alley underground, we would do it, but only if they paid for it. As a result, not much of that occurred.

TC: Yes, right. All right, why don't you speak from your next section. Now this is, I guess, from the period of 1963 we're talking now.

BC: That's right. In 1963, I transferred to the Receiving and Distributing Station Section. Supervision of the operators in these stations was handled by a Chief Operator and his assistant who reported to me. In addition, the Load Dispatchers, supervised by a Chief Dispatcher and his assistant, also reported to me. The most interesting aspect of the load dispatching work was the daily review of the Load Dispatcher's report and schedule of operations. At eight o'clock every weekday morning, the chief and his assistant came to my office to develop an operation summary of the previous day's activities, including such things as kilowatt hours generated, kilowatt hour peak for the day, major lines and generators out of service, general maintenance progress, and any unusual happenstance. Sometimes this was a new all-time peak. Major outages due to fire, earthquake, storm, or equipment failure were noted. After filling out the report form, a secretary typed the report and delivered it to the Division head, with copies to the General Manager, Chief and Assistant Chief Electrical Engineers, and to the Publicity Division for their information.

The next item of business was to forecast the peak and average loads for the day and to determine how these loads would be met, that is, what generators would be used and the loading of each. Also, how much if any power, and from whom we might have to purchase to meet the load requirements.

Another item to be considered is a review of generator availability. The Station Maintenance Section has the responsibility for overhauling each and every generator about once in every five to seven years. They gave us a list of generators which should be taken out of service for overhaul each year, and we fit the individual generators into an overhaul schedule. A Station Maintenance Superintendent usually attended meetings when the schedule was developed and from time to time as changes were necessitated; also, to advise us as to progress on generator overhaul or any problems they might encounter. As pointed out earlier, the Load Dispatcher's Office was in the same building on Boylston Street as the Transmission Trouble Offices. We've covered that.

The chief and his assistant occupied glass-enclosed offices where they could watch the dispatchers and the board. The board is a semi-circular false wall with all generating stations, receiving and distributing stations shown, connected by lines. Red and green plugs were used to show the open or closed condition of switches. In addition, numerous meters and recording devices showing various operating conditions

were incorporated on the board. Telemetry circuits from various stations provided automatic indication of operation, including automatic substations where no operators were assigned. The Boulder Line switches had automatic indication by means of power line carrier to [Receiving Station] B, thence by cable to the Load Dispatcher's Office.

The Load Dispatcher's Office is the nerve center of the Power Operating System. Linemen and station maintenance personnel must receive a clearance before any work can be done on a line, switch, or transformer. All such clearances are issued by the load dispatcher to the affected station operator, thence to the linemen or other personnel. All the generator loading is determined from hour to hour by the load dispatchers. There are system ties to the municipalities of Burbank, Pasadena and Glendale to permit delivery of contracted energy from Hoover Power Plant. Control of power to these and occasionally for purchase of power from them is under the control of the load dispatcher.

TC: Okay, well, tell me more about that. With the Hoover contracts, I know that Glendale, Pasadena, Riverside, and Anaheim participate in receiving Hoover powers. But it actually arrives at DWP facilities and then is, at that point, sent over to them.

BC: As it goes through our . . .

TC: Well, Glendale and Pasadena, anyway.

BC: . . . distribution system, and we have a 34.5 kv line tie between our system and theirs. The power is not great, so it could be handled on a 34.5 kv line. The Department operates the generators at Hoover, not only for the Department and the municipalities, but the Edison Company and the other entities who take power. The transmission line to Los Angeles carried their power, and the charges were based upon the cost of electricity from the federal government by direct contract between those utilities and the government and by transmission costs, including costs of kilowatt hours lost due to the transmission of energy over our conductors.

TC: Okay, now, just going back a minute, you said that you ended up in Overhead Distribution because of a desire on the part of management to move people around and to bolster up their experience, so it was sort of a management training move. Was that the same with your move to Receiving and Distributing Stations?

BC: The same idea, and it was a very good idea. If I had not moved around and received more experience in other sections, I wouldn't have known enough about the operation of the Department to really qualify for advancement. Blakeslee had this in mind when he did this, and it was a very smart move.

TC: Okay, so in 1964, you became assistant to the head of Operating.

BC: Yes, Floyd Goss was in charge of the Operating Division and he appointed me his assistant. I retained general supervision of

the sections I had previously supervised and Floyd generally handled the Generation Section and the clerical office. He spent a great deal of time with WEST and the Malibu Nuclear Project early on.

TC: WEST being . . . Was it WEST Associates you're talking about?

BC: WEST Associates. And later on the Western Systems Coordinating Council, WSCC.

TC: WSCC and WEST.

BC: He was very active in that organization. That took time that enabled me to be of more assistance to him. In fact, when he retired, for several years he was employed by WSCC to manage their office and make the rounds of all of the western states' utilities, and did a very good job in handling the coordination of their transmission systems and the interrelated purchases of capacity.

After being in this position only nine months, Mr. Goss moved up to become Assistant Chief Electrical Engineer, and in 1965 I assumed responsibility for the Operating Division. It was during this time that I was invited to attend a nuclear seminar in Pittsburgh, Pennsylvania. This was a most interesting and instructive comprehensive course on equipment for nuclear power generation. I came away 100 percent sold on the Westinghouse enclosed heat exchanger system of generation, both as to safety and cost. The dates were October 18 to 29, 1965.

I still believe this country eventually must go to some form of nuclear power generation. Natural resources are rapidly dwindling, including both oil and coal. The only answer for the future is to continue research and development of nuclear power, including safe disposal of waste products and education of the public as to its safety and benefits.

TC: How is it that you were sent off to this seminar? Were others in Operating sent to this seminar?

BC: When I went, a senior engineer from the Design and Construction Division also attended. His name and title at the time escapes me, but at a later time I believe two other engineers attended. It was very worthwhile.

TC: Now others, for instance, [Eugen] Gene Koffmann earlier on went to Oak Ridge [School of Reactor Technology] to a long-term kind of training, and I think others, Mel Frankel for one, may have gone off to one of these programs. What was your interaction with them? They were the nuclear guys, I guess, but in your position you had to know what it was all about, I take it.

BC: That was the advantage of this seminar, so that I could discuss the matter intelligently with Koffmann, who headed up the group, and Frankel, who later came to our executive office as our advisor and to work with the Chief Electrical Engineer. Floyd Goss was the principal Operating witness in the many trials and confrontations with opposition, primarily in connection with Malibu--I guess you heard this from Koffmann--

where they had to dig ditches to try and determine whether the displaced earth was 10,000 years old or 10,000,000 years old. You could get as many geologists to testify to one position as you could get to the other, depending upon which side hired them. I was not impressed with the scientific statements made by these geologists.

TC: Well, did you attend the hearings?

BC: No, Floyd Goss attended all these and I carried on in his absence, so I can't give you too much about the nuclear progress in those days.

TC: After Malibu, the Bolsa Island Project was launched, and that was the nuclear power plant and desalination plant on an island just south of . . . I think it was Hermosa Beach or down in that direction. What was your memory of that project? I've gotten some indication that the Department really was not wild about the idea. I mean, on paper it looks good, but people wondered about the economics of it.

BC: Well, this is one that we did not get into. Design and Construction, I believe Eugen Koffmann handled the work and they made engineering plans and drawings, but it really did not get off the ground and did not spill over into our division.

TC: Okay, so there was a separation then.

BC: As I remember it, it was not a really serious practical effort.

TC: Yes, I got the feeling that it was coming from the federal government, and somebody in the federal government was really enthusiastic about it, but the people who were out there in the trenches, as it were, had a different point of view. Well, in general, here you're the head of Power Operating and Maintenance. What are the general tasks that you have in that position? Do you involve yourself, say, with resource planning at all, or is it strictly what's up and running, making sure that that is . . .

BC: System planning was done by our research group in the Operating Division. The System Development Division was not formed until after Goss became Chief Electrical Engineer. He liked the work that was done by this group, headed by Howard [R.] King, who was brought over from Design and Construction Division as a Senior Electrical Engineer. That group started out by taking the readings made every half hour or hour of all of the substation and receiving stations and drawing curves, and all by manual labor. It took a lot of men and a lot of work. Bradley Cozzens was one of the early section heads working in that planning group. And from the data that was developed and the curves, they could plan how much growth there was and anticipate how much capacity we would need in future years. Then the Design and Construction Division could formulate plans for new generating stations, et cetera.

TC: In that period that we're talking about here, 1964, 1965, and just prior to 1966, there were quite a few major power

projects in the works: Malibu, of course, we talked about, the Intertie was another one. Did Power Operating and Maintenance have anything to do with the Intertie at that point? I realize it was planning.

BC: No, that was designed by Design and Construction Division and they supervised the construction. Until it was turned over to the Operating Division, we had nothing to do with it.

TC: Then it gets turned over, I see. I guess this would be the same with plans for the Gulf Pacific Pipeline, something that never got off the ground.

BC: That was spearheaded by Bateman, and he worked very hard on it. Unfortunately, the courts decided against us, but it was very unfortunate because we certainly could have used that gas line to provide cleaner fuel for our generating plants in the Los Angeles area.

TC: It was a pipeline that would come from Texas all the way to Los Angeles and be directly fed into the needs of the Department?

BC: Well, it was Department and Edison Company, a joint project.

TC: The opposition came from the Southern California Gas . . . ?

BC: Well, the [Southern California] Gas Company would lose a lot of revenue if we did not buy gas from them. Their contention was that in the winter they need the gas for heating of homes, so they build up the load in their pipeline and keep it quite full. But in the summer, there's very little use for gas for that purpose. So, by using the pipeline in the summer when

the pipelines were not loaded, they could furnish the gas to us. The decision was that the most economical plan should be adopted and we should not be allowed to build our own plant, that's a duplication of facilities. But as it turned out, the gas company load built up and they did not have enough gas for our use, and then we had to burn oil and then it became an environmental issue. That could have been avoided if we had won the case. Bateman was very disappointed.

TC: Well, that raises another issue: the Air Quality Management District, which at that point in the sixties was called the Air Pollution Control District or Board, came down with their Rule 62, which said that . . . you can correct me. It governed what you could burn, whether you should burn oil or gas, depending on the air quality. Did the PO & M have to deal with that?

BC: Yes, that was a responsibility of PO & M. I remember that annually we had to get permits for one year, and occasionally we could get a waiver of the rules because of special conditions. I remember going over to their office and speaking before their board to obtain the certificates and the permits and plead for the waivers.

One of the duties of the Electrical Engineer in charge of Operation was to represent the contracting utilities on the Hoover Integration Committee. The other member of the committee was Ed Lundberg, Regional Director for the U.S. Bureau of Reclamation. The meetings were held in Boulder

City, Nevada, after the spring runoff to formalize the coming year's water flow, by months, and integrating this flow with the power generated at Boulder for the participating utilities. Prior to the meeting, Bureau engineers calculated the water flow, including the minimum amount to be released to meet downstream contractual obligation and telephoned this information to Operating Engineering engineers. With this information, the Department engineers contacted Edison Company, Burbank, Glendale, and Pasadena engineers to advise the power available to them and determine how they would like to receive their contractual power on a daily basis, i.e., the amount of base energy versus peaking energy. This information was integrated with the Department's needs, which usually meant taking the maximum possible amount for meeting peaking requirements. The information was translated to charts and graphs which we took to Boulder City to the Integration Committee meeting for confirmation and adoption. The resulting Agreement was used by the Load Dispatchers for scheduling of Boulder generation for the ensuing year.

TC: We mentioned WEST Associates, and I'd like to . . .

BC: I had nothing to do with them. Goss said, "I'll take care of that and you take care of the daily operations," and that's the way it went.

TC: Okay, so let's move on. So, in 1966, you became Assistant Chief Electrical Engineer.

BC: That's right. In 1966, Blakeslee retired, and Goss was named Chief Electrical Engineer and Assistant Manager. He appointed me as his assistant in charge of the Operating and General Sales Divisions. Mr. Glenn Green was promoted from assistant to head the Operating Division. You may have had it from other sources, and I'm not sure this should go on the record, but for many, many years, the General Manager had an Assistant General Manager, someone who could take his place in his absence. Mr. Bateman was Assistant General Manager for many years, and I believe Art Williams was the Chief Electrical Engineer, and Bradley Cozzens Assistant Chief Electrical Engineer. It was decided when Bateman retired that they should abolish--I think Sam Nelson did this--abolish the Assistant General Manager position because it wasn't needed that often, and the General Manager did not leave that often. So they gave the titles of Assistant Manager to the Power System Head, and the Water System Head, and they increased the number of Assistant Chief Electrical Engineers from one to two. I should mention too that when Blakeslee replaced Williams upon his retirement that Cozzens was transferred to the General Manager's Office as Assistant to the General Manager to handle Power System paperwork.

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BC: In addition to the routine work associated with the supervision of the two divisions, Goss from time to time gave me special assignments. One of the first of these was in connection with the edict of Bateman to reduce the Power System personnel by 5 percent in order to meet budget restraints. Have you heard of this before?

TC: Go ahead, no.

BC: Goss asked for a study and recommendation he could give to Bateman and the Board to meet the request in the most equitable manner. I made the study, checking workloads, priorities, and general need, and assigning a percentage to each division by section, produced the number of employees to be reduced in each. The total number equaled the requested 5 percent, but by section it varied, from 2 percent in those sections whose workload was critical to the Power System operation, up to 10 percent for the entire General Sales Division. I can't say that we saved 5 percent of the total budget in dollars because of the Civil Service seniority rules.

This was a burden on Civil Service, too, as they had to develop a layoff list for practically all classes. These lists showed seniority bumping lines, which meant that a senior lineman was given a lineman's job when bumped, and the

bumped lineman took a helper's job, so that in most cases only the lower paid employees were actually laid off.

During this time, the Department was offered ownership in the coal-fired Mohave Generating Station by the Southern California Edison Company.

TC: Let me ask you one thing before we get into Mohave. What was the response, say on the part of the union, the IBEW, towards this layoff program?

BC: We had no problem. They understood that was a management requirement because of budgetary restraints, and we never heard anything from them. They just wanted us to be fair in the layoff so that we wouldn't use this as an excuse to drop those that we were unhappy with.

TC: Okay.

BC: I'll repeat here. During this time, the Department was offered ownership in the coal-fired Mohave Generating Plant by the Southern California Edison Company. The planning group in System Development Division, headed by Peter [G.] Lowery, made a study which showed for the years involved that ownership of a 200 megawatt capacity would meet our requirements. Goss and I had long since dropped our public versus private power inhibitions and so had management of the Edison Company, at least as far as the Department was concerned.

However, as soon as the Design and Construction engineers heard of the plan, they strenuously objected through the Engineers and Architects Association, EAA, saying it would

decimate the Design section of trained engineers, loss of operating control, et cetera. Their recommendation was to add another large gas- and oil-fired generator at Scattergood [Steam Plant]. The contentions were carried to the Board, which did not want to be caught in the middle and asked us to attempt to resolve the matter amicably.

The EAA employed Mr. Bateman, then retired, to represent them in the matter. In discussions with him, he suggested that an APPA [American Public Power Association] related consulting firm in Kansas City, Kansas, be given the contract to study the overall economics of the two plans. We agreed and I met with the consultants hired at the suggestion of Bateman. I gave them all the information they requested concerning our existing generating system and anticipated future loads furnished by Lowery. It turned out that this assignment was much larger than anything they had done, and they developed analyses which contained errors based upon improper bases. I asked the consultants to sit down with Lowery, who quite patiently pointed out their errors; and with this information a new analysis was made which showed the Mohave plan to be the least costly overall than the Scattergood expansion plan. Did Lowery tell you about this?

TC: No, that's one of the things we . . .

BC: Yes, well, I sure pushed him to straighten them out. If we couldn't get the consultants to come up with the right answers, why, my goose was cooked. (chuckling)

TC: Yes, I can see.

BC: The Board accepted the consultants' recommendation and the Department entered into an agreement with the Edison Company for ownership of the 200 megawatts of capacity. It should be noted that the coal for this plant came from the Black Mesa area of Arizona. Water was available at that location, so the Edison Company decided to use a slurry pipeline to transport the coal to the Mohave station located on the Colorado River. In order to move the coal through the pipeline, compression stations were used at several locations along the line. When put into operation, these stations required excessive maintenance due to the cavitation of the compressor blades by the coal. In addition, separating the coal from the water turned out to be much more difficult than anticipated. In spite of these difficulties in earlier years, the plant has provided fairly reliable capacity and energy to our system.

TC: Now, a technical point. With the coal slurry, coal is pulverized, then mixed with water, and then by pressure pumped?

BC: Pumped, yes, pressure pumps.

TC: And then dried?

BC: And then dried.

TC: How long does it take for this drying to take place?

BC: Well, that was one of the problems, the drying process. Heating and pumping it through the heaters, that took longer than anticipated because of the huge volume, and they had

trouble with the drying system. The whole slurry pipeline concept sounded good, and there had been only one built in the United States prior to that time. It was a short line, and if they had problems we did not hear about it, so they went that way but never again.

TC: So who was responsible for building the slurry pipeline?

BC: The Edison Company handles all of their construction through Bechtel Corporation.

TC: Bechtel, okay. So that when the pulverized coal dust is returned to that dry state and it's used to fire the plant, now it's very different, I suppose, from solid coal being shoveled into a furnace or something. It must just ignite instantaneously.

BC: I have seen the plant but I'm not familiar with their operation. We bought the capacity and we received the energy and we were told by Edison Company as to the progress and the problems. It wasn't our plant and I didn't get into the details of operation.

TC: Okay, why don't you continue with your thoughts there.

BC: Another interesting and productive assignment, which lasted over five years, involved the Department's participation in the Navajo Power Project. Circa 1968--and I have no record of when I started this, no letters, but it was about 1968--Goss was invited to attend a presentation by the Salt River Project of Mesa, Arizona, of a grandiose plan which envisioned one or more generating plants in Arizona using available river water

and coal from the Black Mesa Plateau. Goss correctly anticipated that this could be a long-term, time-consuming project, and so asked me to attend the meeting as the Department's representative. I attended the presentation, made principally by Les Alexander, Chief Electrical Engineer for Salt River Project. Other utility representatives were present, including Southern California Edison Company, Bureau of Reclamation, without whose cooperation no project could be developed, as well as representatives from various other utilities in Nevada, New Mexico, and Arizona.

The plans for a very large amount of generating capacity were not in great detail, but the representatives, working with the Arizona Public Service Company of Phoenix, had spent a great deal of time and money in making a feasibility study, including discussions with Mr. McDonald, Chief of the Tribal Council in Window Rock, Arizona, obtaining their promised cooperation. They also investigated the necessary water supply and had chosen two sites, one at Four Corners, where the Edison Company had a plant, and the other near Page, Arizona, using water from Lake Powell. Environmental issues were not as big an issue at that time as they became as the project proceeded.

Using a blackboard, Mr. Alexander questioned each representative as to interest, noting on the board the kilowatts of capacity each utility might consider. I told him about 600 megawatts. As a result of the interest displayed,

a management committee of representatives was formed, as well as study groups. I attended the management committee meetings, which were held about once a month in the various utility headquarters' offices, hotels, and at one time a three-day meeting at a dude ranch in Arizona. Each representative brought a lawyer to the meetings. In our case, Ralph [G.] Wesson, Assistant Deputy City Attorney for Water and Power, worked with me as well as on several subcommittees. I should note that his input was invaluable, as our charter and political restraints were a handicap. The only other utility so encumbered was the U. S. Bureau of Reclamation, who could make no major decision without the approval of their Washington, D.C. office, which always took time. Their official representative was Ed [E. A.] Lundberg, regional director, but he attended only those meetings held in Boulder City, Nevada, and his chief electrical engineer, Byron Miller, was the actual working member. The Edison Company was represented by William R. Gould, in charge of electrical engineering, and their lawyer Howard Allen, both of whom later became presidents of that company. Alexander chaired all the meetings, and his company was the lead for the project, with his attorney Jack Pfister present as an active member. Incidentally, Alexander retired at the same time I did and Pfister replaced him as Chief Electrical Engineer in 1973. The Nevada Power Company was represented by John Gibbs, Vice President for Power. His attorney was active but I can't

remember his name. The Arizona Public Service Company was represented by Russ Hulse, and the Tucson Gas and Electric Company was represented on the committee by N. Lovell. Other representatives in the early years dropped off, as will be covered later.

As the meetings progressed, it became evident that Edison Company wanted to build and control a proposed plant at their Four Corners site. By the same token, Arizona Public Service and Salt River Project preferred the proposed site near Page. Discussions related to the size and number of generators at each location, and a maximum total of four 750-megawatt units at each location, was discussed. Transmission line possibilities were also discussed. Concurrently, Salt River and Arizona Public Service engineers and lawyers were going regularly to Window Rock to hammer out an agreement for the purchase of coal. I remember the frustration of these men when they told of sitting all day, listening to the council discuss the tribal matters, and not having a chance to discuss the matter of our coal agreement until late at night. The room was filled with smoke, too.

It took several years to negotiate the agreement, which contained many clauses which proved to be detrimental to the project. For example, we were required to train and employ local Navajo Indians in the construction of the plant, as well as the later operation there. This was very costly and time-consuming. Most of the Indians had never learned how to work.

For example, they were supposed to be on shift at 8:00 A.M., and many times would show up between 10:00 to 12:00 P.M., often drunk.

TC: Was the Indian government making these stipulations? And was our federal government bolstering their claims?

BC: The Navajo tribe, as you know, is an independent nation. But since the government has a measure of control by treaty, they have a full-time representative living at the location. He attended the meetings, but, in addition, they had outside paid consultants to represent their interest. The government, as far as I could determine, really did not interfere. It was between the Indians and their consultant that insisted upon some of these things, which turned out to be quite detrimental. The consultant acted primarily to determine the terms of the contract, whether it related to how the coal would be mined and the cost of the coal through the years ahead, using escalation clauses based upon cost of living and other considerations, which was very well handled, as far as they were concerned.

As time went by, it became evident that the need for such a tremendous amount of power could not be justified. Who would buy and pay for the additional unneeded capacity? This matter came to a head at a meeting with Bureau of Reclamation executives in their Washington, D.C. offices. The Bureau stated that they were required by law to give preference to governmental entities. Howard Allen vehemently objected and

tried to get me to say the Department would buy all unused capacity. This was so far afield that I rejected the notion out of hand. Soon after this meeting, which closed without any conclusions, the Edison Company announced that it was withdrawing from the consortium. Although they gave some reasons for their action, I am firmly convinced that one major reason was their belief that any agreement with the government would compromise their ability to control their future.

After the withdrawal of the Edison Company, Alexander called a meeting of the remaining representatives, and at that meeting there was dismay, resignation, and discouragement. How could any project of the proposed magnitude be handled by the relatively smaller utilities of Arizona, Nevada, and the Bureau? After a full day's discussion, I advised that the Department would be interested in going ahead on a smaller scale at a single location, preferably Page, Arizona. We added up the capacity requirements of those willing to proceed, and determined that three 750-megawatt units at Page would satisfy all known capacity needs. At that time, we dropped our required capacity to the 477 megawatts which we eventually contracted for. The six utilities previously mentioned agreed to go ahead. All other utilities, including New Mexico, dropped out. The management committee continued to meet and adopted the name of Navajo Project Coordinating Committee. The committee instructed Salt River Project to

proceed with engineering plans and obtain bids for major equipment.

TC: Okay, let me jump in here. By this time, Edison is gone, and who else has dropped out?

BC: New Mexico.

TC: New Mexico, but you still have, obviously, Salt River . . .

BC: Six utilities.

TC: Okay, I just wanted to clarify who has dropped out by this time.

BC: Also, they were advised to consult with Bechtel and Fluor to obtain their bids and other information related to construction of the plant. I might mention here that Salt River Project, although a semi-governmental agency, did not have a charter or other restraints, regarding bids, that we had. So they obtained bids but they did not necessarily recommend to the committee the lowest bid. We were able to purchase the best equipment, and this was quite an advantage.

TC: Could you explain something about our charter and political restraints?

BC: Well, basically the charter requires that we purchase the lowest bid, unless we can show a valid reason for not doing so. If the bid meets specifications in every way, you have to take the lowest bid. As I mentioned before, this competitor to KPF Switch, we had to buy his switch even though we did not want it. We had to prove by test that it did not meet our specifications.

TC: I see, okay.

BC: At a later meeting, consideration of bids submitted for the construction was given and it was unanimously agreed to award the contract to Bechtel Corporation.

While the engineering proceeded, subcommittees were formed to assist the coordinating committee in working out the multitudinous details of such a large project. As time went by, the agreements made by the coordinating committee were passed along to a committee formed for the purpose of developing a participation agreement. This eventually became a good-sized volume and was sent around to the participating utilities for ratification. In the Department's case, the Board signed the agreement and sent it to the council, which also approved it, as did Mayor [Sam] Yorty. Another committee handled the specifications for engineering, including the steam turbine generators. A very active committee was formed to coordinate the planned transmission lines. It turned out that the most knowledgeable transmission design engineer was Chris [Christian H.] Prior, Transmission Planning Engineer in System Development Division headed by King. There was considerable discussion by the coordinating committee of transmission lines, location, size, destination, et cetera. I took Prior with me to many of these meetings and was pleased to observe the deference the committee members gave to him.

The final transmission system design to Boulder Dam provided for two 500-kv lines from the plant west through

Arizona, then a turn north into Utah, thence almost due south to Hoover Power Plant, where the Bureau of Reclamation constructed switch racks to terminate the lines and distribute the received power. Included to provide capacitive reactance for the line were several capacitor stations. Nevada Power and the U.S. Bureau of Reclamation accepted delivery at the government's Boulder City yard, while the Department's power was transmitted via one of the 287-kv lines to RSB [Receiving Station B], which had been rebuilt to handle 500 kv. It was rebuilt for this purpose at that time.

TC: I see, okay.

BC: One of the studies considered the method of carrying coal from Black Mesa to the plant. At a meeting in Arizona, a presentation was made of costs, comparing renting versus purchasing a railroad system. A bid from Morris and Knudsen, who also bid for the Green Line in Los Angeles recently, to furnish electric locomotives and coal cars was most satisfactory, and the ownership alternative was determined to be the most economical over the long haul. This meant a great deal of up-front capital would be required over and above all previous estimates for cost of the plant and transmission lines. A definite answer was required that same day, so I left the morning meeting, called Goss out of a pre-Board meeting, and gave him the information and cost figures. He took it up with the Board and they gave approval for the

additional capital outlay and he advised me of their action that same afternoon. So that is the way we proceeded.

TC: So you bought a railroad.

BC: A railroad, yes. The tracks, the coal cars, the electric locomotives with overhead electric service, and a terminating facility, pick-up facilities at Black Mesa and unloading docks/facilities at the plant.

TC: And that's still in operation, I take it?

BC: Yes, and has been very satisfactory.

TC: So the idea for a slurry from Black Mesa was shot down, I take it?

BC: After the experience with the Edison Company, we had no intention of using slurry pipeline.

TC: Okay, so railroad was the choice?

BC: Right. Environmental concerns regarding the stack emissions caused us to consider various plans for controlling these. When the coal is burned, ash and sulfur dioxide is emitted. Electrostatic precipitators were designed to be installed as an integral part of the plant to remove the ash particulates. A joint project by participants in the Mohave and Navajo Generating Stations was developed to conduct a comprehensive scrubber pilot program at Mohave to test removal of sulfur dioxide under varying conditions using different reagents. When completed, some years down the line, the program should indicate the type of scrubber to be installed at both Mohave and Navajo. The design of the plant also included a very high

stack for each of the three units to disperse flue gases at a high altitude and so minimize ash falling over the plant itself and nearby Lake Powell. Another environmental requirement was that the penstocks into Lake Powell should not be visible from the lake. This required installing them in the ground to one side of the lake into the lake below the lowest water level.

Another decision in connection with the operating agreement related to maintenance of the 500-kv line from Hoover to Page. The Nevada Power Company had little experience in high-voltage transmission line maintenance, but Gibbs felt he would be in trouble politically if he did not maintain the line, at least in Nevada. I agreed to their handling the maintenance and that our transmission line and maintenance people would advise as to equipment needed, also to train them for the initial operating period.

During the construction of the plant, I accepted an offer by Bechtel to use two of their planes to transport our Board members to Page for a boat ride on Lake Powell and to see the plant. The trip was very instructive and included a flight over the Black Mesa coal fields.

I should mention that environmentalists were also concerned over the appearance of the land after it was strip-mined of its coal. This problem was solved by a cut-and-cover operation which involved piling the cover dirt to one side while exposing the coal underground. After removing the coal,

the displaced dirt was bulldozed back into the hole and leveled and planted. I have seen pictures of the strip mining bulldozers. They were . . . how can I describe them? They were as big as a large house. Electrically operated, they used electricity because it was available. Anyway, that was a very satisfactory operation.

In 1972, Floyd Goss retired. That's our next point.

TC: Okay, well, let me ask a thing or two to round this off, as it were. How about environmental opposition to the plant at Page? Did you run into that at the time?

BC: No, Page was just a very small place. Well, it wasn't a town even, a resort area for people who operated a restaurant and had boats on the lake. I visited the plant, and I'll cover that in the next discussion. They liked the idea of the plant. They wanted visitors, and it was an attraction that might bring more people to the area, so they were happy. There was no problem there.

TC: Okay, just on the question of these meetings you attended. There were major issues being discussed, and you had to make decisions at that point, I would gather. You were given the authority, I take it, to use your best judgment.

BC: Yes, we developed a budget. It was detailed, the cost of every piece of equipment and the construction cost estimate was given by Bechtel, so this was taken to the Board and approved. So I could approve decisions as to equipment, change of equipment, recommended by Alexander and his

engineers because it came within the budget, and I had no problem. The only item that I really called Los Angeles to get approval for was this railroad. I remember the figure of \$75 million. I think that was the cost of the entire project and not our cost, which would be only about 21 percent of that.

TC: Okay, I see.

BC: Of course, I took notes at these meetings, and when I returned I gave a memo to Goss of what happened. There were so many meetings, and at each meeting you made relatively few decisions, so that it was easy for him to keep up.

TC: Okay, continue with what you have.

BC: In 1972, Goss retired and I was appointed by the Board to replace him as Chief Electrical Engineer and Assistant Manager. On up through the engineering series, including the Assistant Chief Electrical Engineer, was by Civil Service examination. The Chief Electrical Engineer, the Controller, Chief of the Water System, and the General Manager were by Board appointment. Very soon thereafter, Mr. Robert [V.] Phillips, General Manager, went on a month's vacation to Europe. He issued a bulletin naming me as Acting General Manager during his absence.

During his absence, the EAA [Engineers & Architects Association] called for picketing of the Department's headquarters building each noon to demand a raise in pay for all engineers. When they came to me, I told them they were

ridiculous to think that I would make any recommendation for a pay increase in Phillips' absence; however, I would study the prevailing rate figures they gave me and would make a recommendation to Phillips based upon the results of my study. I promised them there would be a personal investigation unrelated to Salary Standards' findings, who had consistently turned them down. It took me five months to obtain all the data I felt I needed to make a recommendation, and I conveyed this to Bob Phillips.

Basically, what I found was that the Assistant and Senior Assistant Engineers had a higher starting and average salary than those in industry, particularly the Edison Company. Also, the Associate and Senior Associate Engineers were at an equal to or higher level than the Edison Company. I could not find any jobs in the private work place, including the Edison Company, comparable with our Senior and Principal Engineers. Some similar jobs were much lower and some much higher. Ours were pretty well fixed and in a narrow range, but in private industry you get what they wanted to pay you. I made a chart showing the median Assistant, Senior Assistant, Associate, Senior Associate, and the Senior and Principal Engineers' pay. The projection looked very good and was in an almost straight line. However, the Engineer class, which is the first level of supervision, fell somewhat below the line. I felt the engineers had a good case for a raise at this level and so recommended to Mr. Phillips. He was impressed, called the

head of Salary Standards to the meeting in his office, and I explained to him what I had found. I almost fell out of my chair when he agreed I was right and that one class in both the Water and Power Systems should receive a raise. Mr. Phillips ordered him to draw up the papers. It was not long before the IBEW Local 18 heard that the engineers at the first level of supervision were going to get a raise, and they vigorously opposed any such action unless they, too, could get a raise. They talked to Councilman Lindsay, who said he would go to the Board meeting and oppose the raise. However, on the day the Board considered the engineers' raise, Lindsay did not show, but sent his field secretary who spoke at the meeting in objection to the action. However, after listening to Mr. Phillips' presentation, backed up by Salary Standards and myself, the Board approved the raise. I might add that the engineers were very happy, and at my retirement party a delegation of men from EAA thanked me profusely for listening to them.

Another interesting development occurred late in 1972, when a recommendation was transmitted to the Board for approval of an award to GE [General Electric] for 500 kv transformers to be installed at RSB in connection with the rebuilding of the Boulder Transmission Line to 500 kv. At the pre-Board meeting was a sales representative from the English Electric Company, who made a strong statement about the rejecting his lower bid for the transformers. He said his

transformers had recently been delivered to Quebec Power Authority and were operating very satisfactorily. I pointed out to the Board, however, that his bid was for a 350-kv transformer and so did not meet specifications. The English Electric representative came back with, "We're talking words here and I'm talking money." I could see that it would do no good to argue and that the Board was a little confused, so I asked that the matter be held over to the next Board meeting.

On the morning of the next Board meeting, I called the Chief Engineer of English Electric in London and asked him if his 350 auto-transformer would give satisfactory service on a 500-kv line. He said, "Anybody that would tell you anyone's 350-kv transformer could ever be used on a 500-kv line would have to have a hole in his head." I then called the Chief of Operations for Quebec Power Authority and asked him how satisfactory the English Electric transformers were operating, and he laughed and said, "I wish I knew. I haven't seen them yet. Factory tests showed problems, and because of problems shipment had been delayed. I understand they're on the high seas being shipped now."

That morning, I related to the Board verbatim what I had been told, and they really understood what was going on. The Board members took turns in denouncing the English Electric rep--I'll never forget this--making him admit he had lied. Later, in the open Board meeting, one Board member made the rep come to the front of the room and admit publicly that he

had lied about his company's transformers. How embarrassing. We never heard from English Electric Company again.

Just before I retired, I received voluminous copies of contracts from the Salt River Project, which spelled out in greater detail all the considerations contained in the earlier participation agreement. After approval by our Board, I went with Ralph Wesson to the City Council meeting where they were to be considered. This turned out to be one of my darker days. After advising the Council that these contracts were an extension and clarification of the earlier agreement that they had already approved, on the basis of which we had gone ahead with the construction of the plant and transmission lines substantially as described in the former agreement.

The Sierra Club officers and members were present and it soon became evident that they had talked with the councilmen in opposition to the contracts before the meeting. Councilman Edelman spoke for one-half hour on the arrogance of the Department forging ahead without any consideration of environmental issues. He spoke of the rape of Black Mesa. He said that no city should be allowed to export its pollution to someone else's backyard. I wondered at the time if he really meant that. The one explicit charge he made was that after advising the Sierra Club I would consider changing the transmission line route to avoid crossing a sensitive, pristine canyon, that I did nothing. Actually, the club president had talked to me, made his objections known, and

demanded a transmission line reroute north around the canyon and at a distance of over fifty miles. I told him I would investigate the possibility and advise. I called Lawrence Schneider, in charge of line construction, and advised him of the request. He said he would check with the Bureau of Land Management, but he pointed out that his crews were only a mile or so from the canyon. Also, he would build the towers back from the edge, so that if anyone ever hiked into that canyon they would not see the towers but only the conductors. Schneider called back shortly after our conversation. He advised that the Bureau chief told him in no uncertain terms that the crossing location was not picked out by us but was picked out by them, saying that we had nothing to do with it and that it was located where it would stay. I conveyed this to the Sierra Club and told them that it was out of our hands. By the time the Council considered the matter, the line was built, with conductors spanning the canyon. This may have added fuel to the flames, but nothing was said about our discussion of the matter. In any case, I figured Edelman was grandstanding and that my best position was to say nothing in rebuttal; particularly, I didn't want to call him a liar. Anyway, the other councilmen were not listening, but talking and joking among themselves, and I hoped to get their votes but failed. After the Council meeting, several asked me if they could see the plant in person in order to better understand what they were voting for. They were very

sympathetic. I think if the Sierra Club members hadn't been there en masse that they would have approved the contracts. It was entirely political.

TAPE NUMBER: 6, Side A

February 20, 1992

BC: I told the Councilmen that we would arrange such visits, which was done by James Mulloy, my successor, after I retired. As soon as I returned to my office after the meeting, I called Alexander and told him we had some political difficulties but eventually the contracts would be approved by the Council. During the interim period, the committee could accept our guarantee to continue operating under the terms of the original agreement approved by the council and terms of the definitive contracts on the basis of Board approval. He later wrote me a letter confirming that this was satisfactory to them.

My last item of interest was in connection with the System Development plans for a nuclear plant in Wasco in the San Joaquin Valley. Since this was in PG&E [Pacific Gas and Electric] service territory, Bob Phillips and I decided we should talk with the president of PG&E to forestall opposition. We flew to San Francisco and met with the president. I was greatly surprised at his attitude towards the Department. It seemed to me that all he knew about the Department was the rape of Owens Valley, and he didn't want to have any part of that in his valley.

Phillips carefully and patiently explained the real story behind the Owens Valley water supply system and succeeded in

calming him down to the point he was willing to talk about a Wasco nuclear power plant, pointing out that we would be using agricultural waste water and that there would be no local distribution of power. We even invited him to consider joining us in the cooperative development of the plant. We parted on semi-cordial terms. A short time later I retired, on the same day that Mayor-Elect Tom Bradley assumed office.

TC: Let me ask you a couple of questions on that section, and then we may as well finish it for today. You were talking about the Engineers and Architects Association.

BC: In connection with the pay raise?

TC: In connection with the pay raise. Just as background, who would be a member of EAA?

BC: Practically all of the engineers at the Electrical Engineer level and below, and most of the Senior Electrical Engineers. Goss and I talked to the Principal Engineers and suggested it was not prudent that the Principal Engineers be members, but those who had already joined did not drop out. We did not know the names of those who were members at the Principal level, and we assumed that all the rest of the engineers were members.

TC: Had you been a member of EAA?

BC: No.

TC: Ever?

BC: No, not in the Local either. I was at the supervisor level when it was developed and I did not think it prudent for

supervisors to be in a primarily pay-raise, union-type of organization.

TC: Is it a voluntary membership?

BC: Yes.

TC: There's no closed shop sort of idea where you have to be in the union?

BC: No, but if you were an Assistant Engineer right out of college working for the Department, and your boss, an Associate Engineer or an Electrical Engineer, they were all members, and you saw a notice posted on the board: "There'll be a meeting of the EAA next Tuesday after work. Come and join us," and your boss says, "Are you going to come?" obviously, you would be encouraged to join. But you didn't have to. There may have been a few that held out because it wasn't for them.

TC: A sort of peer pressure that exudes a force.

BC: Right.

TC: Going further back, just a thought that I had that I'd like to take up now, if it's even relevant. System Development was formed in 1967, and certain planning functions of PO & M and Design and Construction were combined into this new organization. Did you have any talks with Goss on that? Do you know of anything relating to the origin of the idea in Goss' mind?

BC: It was in the Operating Division that that planning had gone on, and it really was a management decision to make in connection with the recommendations by that group. He had

worked with the group in the Operating Division, so that when he went into the Power Executive Office, he felt that planning was more related to management decision making than to Operating Division operating matters, and that was the background.

It was a very good decision because the head of the group, Howard King, was there on the same floor in adjacent offices. I went to his office and spent a lot of time there discussing projects they were working on to keep current and also to assist me in the work on the Navajo Project Coordinating Committee. I met with their people and I found them to be very reliable and trustworthy. When they told me something . . . For instance, on this recommendation for the purchase of power in the Mohave plant, when [Pete] Lowery told me, "That's a good deal," I didn't question him. He had been proven so trustworthy that I believed him and told Goss that I and our group agree this is the way to go. So, when the EAA opposed the project, Goss asked me to work with Lowery to make a study to prove what he had said. So Lowery and I worked long and hard on that.

Well, I think that answers the question as to why it was brought up close to the Power Executive Office. We could keep a close check on the work they were doing, make assignments, and get quick answers to our questions. The only problem that Goss saw well after it was in operation--and this is no criticism--was that the planning group was so reliable and

trustworthy that they did not want to put out any information that they could not back up with facts and figures. So, when they were asked a question and we did not get an immediate answer, or within a week or a month, then it became a problem for Goss. But I think they were right in taking whatever time they needed to make a study to really give a thoroughly researched answer.

I might insert here another duty as Assistant Chief Electrical Engineer. In the mid-sixties the U.S. government had developed a plan by the Federal Power Commission to take over power utilities in time of war or major disaster, to assure a continuous supply of power to high priority industries such as defense plants. To accomplish this, the government would require a reliable source of communication in case of failure of the commercial telephone system. The Federal Communications Commission was requested to develop a communication plan which would allow interconnected utilities to communicate with each other in emergency situations. The FCC asked a group of electric utility executives to serve on what was called the National Industry Advisory Committee. A retired army officer with an office in Washington, D.C., was appointed to chair the committee. I was recruited to serve on the committee, representing the southern California, Nevada, and Arizona area. After a lengthy background check, I was issued a security clearance! A meeting of the committee was held in Washington, D.C., to explain the purpose and method to

be used to develop the requested emergency communication plan. The actual work was done by each member for his particular area over a period of several years. The resultant tabulation of equipment in place and required to accomplish the specific results were sent to Washington, D.C., and a manual was compiled from the regional reports and recommendations for FCC use and dissemination.

TAPE NUMBER: 7, Side A

February 27, 1992

TC: I had a few questions that came to mind in reviewing the tape from last session, just a few very minor points, that I'd like to ask now just to clear them up. This is regarding the Navajo Project. You mentioned that there were subcommittees that were formed. You were the main representative to the management committee.

BC: Yes.

TC: And then there were these subcommittees that were formed. Now, were you involved in those subcommittees, or did you pick out men from your Division to take those positions?

BC: Each of the management members asked those who were involved in the type of work that was required to serve on a subcommittee. Now, Howard King, we put him on the participation agreement subcommittee. We put Ralph Wesson on that and some of the other subcommittees. Chris Prior was assigned to the transmission subcommittee. Then there was an operating subcommittee and an engineering subcommittee. As an example of committee operation, the Salt River Project and Bechtel engineers worked closely together in the development of engineering plans for construction of the plant. When questions arose, the project engineer could settle the majority in-house with the approval of Alexander. However, when major matters were considered or alternate solutions

proposed, those items went to the appropriate subcommittee and resolved there with decision carried back to Alexander. However, the larger or more controversial matters were carried to the Management Committee by the subcommittee chairman for final decisions.

TC: Okay. You mentioned in the last session various aspects of working with Edison, and it occurred to me as I was listening to that tape and reviewing it and thinking about what you were saying, did it ever happen that Edison tried to woo engineers away from publicly-owned groups like DWP? That occurred to me as we were talking about pay scales for engineers at DWP, and you had done some research and study into comparative pay scales.

BC: Well, the original problem with pay occurred at the beginning of the war and up until the time of the strike, and a few, very few, engineers went to the utilities like the Edison Company. But most of them were leaving for the defense industry. A lot of them went down to San Diego. Then, later on when we made the study, by that time the Department's scale generally was higher than Edison. And at the higher levels, of course, they promote from within, as we do, so that any transfers would be at the lowest levels, generally.

TC: Yes, entry, right.

BC: Entry level.

TC: The last question I had had to do with the San Joaquin Project, the nuclear project that was . . .

BC: Near Wasco.

TC: . . . near Wasco, California. You visited the president of PG&E [John Bonner]. I was wondering, and you mentioned this last time, if he really didn't know anything about what the Department was doing.

BC: If he knew it, he didn't reveal it. (chuckling) He was antagonistic when we were in there, and the minute we sat down, he said, "Well, you've come up here to talk about a nuclear plant in our territory, and you fellows seem to think that you can just do anything." Then he went on and talked about the rape of Owens Valley, and it was quite interesting in the fact that he did not want us there. But he calmed down.

TC: I suppose he was fearful. I mean, you had to quell his fears that this wasn't to generate power for sale in that area.

BC: That's right, that we would not distribute the power locally.

TC: So that would have been his initial hostility.

BC: I had another visit with Harry Allen, chairman of the Nevada Power Company. He called one time in connection with a plant in Nevada. Did I give you this information?

TC: No.

BC: They talked with us about a coal-fired plant using Black Mesa coal. They had contracts for railroad and transportation of coal. I went out to the plant, and it was a small plant but they thought that they could build another one, a larger one, and they wanted us to participate. So Allen called me one day

and asked me if I'd come to lunch with him. So I flew to Las Vegas, where he took me to one of their elite golf club luncheons and he proposed the plan, but he came up with something that was quite radical. He said, "Politically speaking we would have difficulty in selling you permanently a piece of the plant. But what we would like to do is, if we build a large plant, we can't use all that power for many years. So, if you would lay off at the end of five years, six, ten, fifteen years, we'd buy it back from you, so that at the end of twenty years we'd have all the plant. Then we could sell this to our political bodies." So I told him, "Well, it's very interesting. I don't know just how that could be handled, but I'll talk with our controller and see what we come up with." So, when I got back to the office a few days later, I developed the information and talked with Bill Sachau, our controller, and he said, "There's no way we could do that. When we buy something, it's ours permanently. We can sell it only if we have no further use, and you can't say that you have no further use of this power." So I called Allen and told him this and told him that if we could buy even a small part of the power, or if we had a contract with them to purchase capacity and lay off, but that would be extremely expensive capacity for handling, say, half of the cost of building the plant. So that was the end of it, as far as I was concerned. A month later, I retired.

TC: Was that what has been called the Allen Project? There were two projects in Nevada, Allen and Warner, Warner Valley Electric System . . .

BC: I believe I've heard of the Allen Project, but I couldn't be sure that that's what he was talking about because it hadn't even gotten a name yet. It was just an idea when he talked to me. He was trying to find somebody that would participate with them. Now, I think that they came up with the idea later of selling us a portion of the plant and we'd keep it. But after I left, I heard no more about it.

TC: Well, one of the things we wanted to go over this time was what we could call your extracurricular activities, I suppose, industry-related although not necessarily Department-related activity, as well as your association with the Union Rescue Mission downtown. So what would you like to start talking about first?

BC: Well, how about the American Public Power Association and its affiliate, the California Municipal Utilities Association?

TC: Okay.

BC: The APPA, or American Public Power Association, was founded in the early twenties. It is a trade organization to assist public utilities in legal, engineering, and public relations concerns. They disseminate information regarding government regulations, they attend congressional hearings on matters affecting public utilities, and in the early days they helped to combat opposition of private utilities. Back in the

twenties and early thirties, anytime a city as it grew determined they would like to get into the public power business, why, the private utilities would spend a lot of money to prevent them from voting such a system into existence. They had a nationally famous man as their attorney, who knew most of the congressmen and staff and he was very helpful. His name was Northcutt Ely, General Counsel. Have you heard of the name before?

TC: Mike Ely, yes. Yes, Northcutt Ely, he's still around.

BC: He is? Well, he was there and I met him and talked with him back in my early days. He must be an awfully old man by now.

TC: I think he's in his nineties, I would say.

BC: Very sharp. I know before I came into the Communication Section, at about the time I came into the Communication Section, Bateman had contacted him through APPA for help in regard to licensing of our radiotelegraph system. So I heard about him at that time. He attended annual conferences and spoke on legal matters and was a very, very capable attorney.

TC: He was involved in setting up the contracts for original Hoover power in the 1936 period. He was involved in that from the time that Ray Lyman Wilbur, the Secretary of the Interior, was involved in the Colorado River Compact.

BC: Isn't that amazing that one person could span so many years?

TC: It's incredible, yes.

BC: That's sixty years. He must have been twenty-five when he started.

TC: He was a kid, yes. Yes, he's an amazing guy.

BC: Well, those utilities eligible for membership in the APPA include state-, county-, and city-owned utilities, public utility districts, and REA's. The utilities join on a voluntary basis, paying annual dues based upon kilowatt capacity: the larger the utility, the more the dues. The board of directors consists generally of member utility general managers. William Peterson and Robert Phillips both served on the board. Utility management and engineering personnel participate on a voluntary basis. A conference is held once a year to conduct association business, including the election of officers. Outstanding speakers are also presented and workshops are held by the various committees. In 1948, Carlton Nau, then general manager of APPA, appointed me as the APPA official representative to NCUR [National Committee for Utilities Radio]. Other trade associations with representatives to NCUR were Edison Electric Institute and American Water Works Association. This related to hearings before the Federal Communication Commission. In the early 1950s, Alex Radin succeeded Mr. Nau as general manager. I don't know if he's still the general manager or not. Do you know?

TC: He's not. He retired and it's a man named Larry Hobart now, I believe.

BC: Alex Radin was a very congenial person. I got well acquainted with him. He appointed me to chair the Communications

Committee of the Engineering and Operations Section, and I contributed to that work for many years. Through the years, I became very well acquainted with him through conferences, workshops, and correspondence.

I particularly remember an incident which occurred while my wife and I had stopped in San Juan, Puerto Rico, at the Hilton Hotel en route to St. Thomas to board a ship for a cruise through the Panama Canal. After dinner one evening, we went for a stroll, and on the lawn were about fifty men seated in folding chairs and a speaker in front. I heard something said about electricity, so I walked over a little closer and here was Alex Radin sitting alone in a back seat. So I shook hands with him and he left the meeting and we stepped to one side and talked. It seems that he was getting ready to speak to the group. The principal speaker turned up sick the day before the meeting. It was a meeting of the Southeast Utilities of the United States, a seminar, so he came down to the meeting to take the place of the speaker and speak to the group for several of the sessions. I thought that was quite a coincidence.

The host was the Puerto Rico Water and Power Resources Authority, and they are also very active. In fact, Bateman was president of the APPA when they held their meeting in Puerto Rico. I did not attend, but I talked to Bateman afterwards and he said, "Well, we had a very good conference, interesting speakers." But the one thing I do remember is

that cat burglars got in through open windows of our delegates' hotel and stole jewelry that was left in the open. In addition to APPA, affiliated with them are state public utility organizations such as the California Municipal Utilities Association, commonly referred to as CMUA. I attended most of their annual conferences and gave talks at those held in Riverside in 1948, in Pasadena in 1964, in Palo Alto in 1957. There was one held in Oxnard in 1973--I think they are held in May of every year--and my wife and I attended. We sat at a table in the audience. But just before they started, Bateman came down and asked my wife and I to take his place and his wife's place at the head table. Well, I refused; I thought this was an unusual request. I said, "You're more important than I am." He was retired at that time, by the way. He said, "No, we want you to sit up there." Well, I had no idea what was going to happen. But, anyway, during the meeting they made a presentation because of my retirement and participation in CMUA through the years.

TC: How nice.

BC: That was nice.

TC: Well, would the APPA--just to summarize what it does--would you call it a lobbying group for publicly-owned utility organizations? Is that it? They're headquartered in Washington, and presumably, you know, they're there to jump in

. . .

BC: I would say that lobbying is an important facet of the organization. It's a trade organization, and that's what trade organizations are for; but as far as I was concerned, the lobbying days were primarily in the early days. Municipals are so strong now that I haven't heard anything for many years on opposition or attempts to buy them out, and so it primarily has become a meeting place for management, executives, engineers, to disseminate information, become informed on what's going on in the rest of the country.

TC: All right, let's go on, if that covers what you wanted to say about APPA.

BC: Okay.

TC: The other organization, which really in this series of oral history interviews we don't have anything on, is the Electric Club of Los Angeles. I know that you were active with them for a long time and I'd like to get some sense of what the Electric Club was all about, who was in it, and what did they do. I think you've got some notes there.

BC: Yes, I was active in it, it was a very interesting organization. It's more like a service club, like Rotary Club, than APPA, which is a trade organization. It was founded in 1922, and I got that from this one here, which talks about a fifty-year anniversary.

TC: Oh, interesting. Let me just cite this on the tape so that it's clear what we're talking about. It's a newsletter of the Electric Club of Los Angeles. It's called "Sparks." This

particular issue is December 11, 1972, and it's commemorating the fiftieth year of the organization. Mr. Currie is featured on the front page here.

BC: I was a speaker, and Bill [William] Sells was the chairman. As I said, it was founded in 1922 by executives of all the major electric utilities in the greater Los Angeles area. The purpose was to provide a forum to discuss items of interest so that managers could be informed as to what other utilities are doing. In addition to utility executives, about one-half of the membership is composed of manufacturers' representatives who participate in advising the industry as to the latest developments in their respective fields. The meetings were held at the Biltmore Hotel every Monday from noon to 1:30, opening with a lunch paid for by each individual in attendance. I was sponsored for membership in 1942 by Bateman. At the time, Roy Martindale was president. Later, Bateman became president, and after him came Blakeslee.

During his term of office, about 1962, Blakeslee appointed me as chairman of the Ladies' Day Committee. This event was usually held on or near Valentine's Day, with wives and secretaries in attendance. On that occasion, I was able to get a travel agent, Joy Colton of Joy Travel, the wife of one of the manufacturers' representatives to the Department, to arrange a Hawaiian Day promotion, which included a Hawaiian lunch, hula dancers, singers, and a band flown over from Honolulu courtesy of United Airlines for this occasion, and,

also, wall decorations by Matson Steamship Lines. My wife, incidentally, made all the table decorations. It was by far the largest-attended affair ever held by the Electric Club.

TC: So you would have different types of representatives from . . . For instance, here's another issue of "Sparks" for February 1965, and you've got William Gould speaking. Bill Gould at the time was vice president of the Edison Company, Southern California Edison. So you had representatives from the major utilities. Would people, like representatives from Pasadena and Glendale, for instance, go to these meetings?

BC: Yes, they were very active. Al Capone chaired a meeting, I remember. He was with Burbank.

TC: So it was a chance for people related to the industry in many different ways to come together and to get to know each other.

BC: Informal, semi-social, semi-business. You'd be surprised how much business takes place around the table. For instance, I spoke of Colton, the manufacturers' representative. He attended a good many of these meetings and I became very well acquainted with him. There was a lot of competition for hardware, nuts and bolts, connectors, but he held the business and his company for twenty years and he was able to provide information as to why his were better than the competition. And we bought an awful lot of connectors for the distribution lines.

TC: So, as you said, it was almost a chamber of commerce for the electrical utility industries.

BC: That's right.

TC: Very interesting. Okay, now, those are a couple of the industry-related organizations. Could you tell me about the Union Rescue Mission, how you got involved in that and what your involvement has been?

BC: Through the years, I have served on several boards, including the Church of the Open Door Board, Hindustan Bible Institute and Seminary of Madras [HBI], India, and the Union Rescue Mission of Los Angeles boards. I was drafted for the HBI board after visiting the school in Madras in 1961 on an around-the-world trip sponsored by the Department's Employees' Association. In 1957, I joined the Union Rescue Mission board and served for thirty-two years, the last twenty-two years of which I was president. Upon retirement from the board in 1989, I was made president emeritus, and with the chairman emeritus who retired at the same time, we attend quarterly dinner meetings to be kept up to date on developments, give advice, et cetera.

The Mission is the largest of its kind in America, founded 100 years ago by Lyman Stewart, a wildcat oil man and founder of Union Oil Company. The Mission was located on Main Street, where City Hall is now located. When the City bought that site, the present property was purchased at 220 South Main Street. The City has been very unhappy with having the Mission located in the civic center and so recently bought the land for \$6.5 million in a contract requiring the Mission to

acquire a new site within ten years. A fund-raising campaign has just been completed, which will permit the construction of a new and much larger headquarters building on property recently purchased at Sixth and Maple Streets for a total estimated cost of \$29 million.

Let me describe some of the services provided the homeless, the poor, and those addicted to alcohol and drugs. In the main building, 2,700 meals a day are served and shelter provided for 825 men each night. A restoration program for men is also maintained at this location. These men live and work at the Mission. The program also includes classes, which teach the men how to overcome by the enabling power of Jesus Christ. A high percentage are restored to normal society life. One example is a recent graduate who has been appointed by Governor [Pete] Wilson as Assistant Director of the California Drug Program. The UCLA Nursing School provides primary health care for indigents on the premises. Other programs include an Hispanic ministry, homes for families, a ranch in San Diego County for inner-city children, and a camp near Yosemite National Park for young men ages eighteen to twenty-four. In 1974, I made a request of the Donors' Welfare Plan of the Department for support of the Mission, and they responded then and have been contributing to the Mission ever since. When I started, the operating budget was \$250,000 a year. It now exceeds \$8 million a year.

In 1989, I was asked to attend a celebration luncheon meeting of the DWP--Donors Welfare Plan--and speak about Mission work, which I did. Another incident involving the Department was in 1965. An article concerning my reelection to the board was printed in the Los Angeles Times. The Department's media representative, Bob Lee, called this to the attention of the Board at a pre-Board meeting, suggesting that this was very good publicity for the Department. The Board members all expressed their congratulations.

I'd like to talk about Bob Lee a second. There's a little history involved here. Right after World War II, the Department received a great deal of adverse publicity, particularly from the Los Angeles Times. About once a month, I would say, there was an article that was quite objectionable, and this went on for years. They had very little to say that was good about the Department. The Public Relations Division worked on it but they didn't get anywhere.

TC: What would have been the motivation?

BC: I don't know. Bob Lee might tell you, but I'm not sure what happened. Anyway, the Public Relations management met and found Bob Lee, who was a well-known, very kind and congenial newspaper journalist, who knew all of the newspaper personnel, the Examiner, Times, and Green Sheet, which is now The Daily News in the San Fernando Valley. He was well-known and liked, and he was employed by the Department as their media representative. So, in a short time, he turned the whole

situation around. He was able to stop articles that were adverse to the Department, and he was able to develop news items which he fed to the newspapers of positive value. They were happy to print it because they were able to get professionally-written news items free. So he had a good background and he retired just before I did, went out to live where Bateman lived in Leisure World, Laguna Hills.

TC: Well, getting back to the Mission, what was your initial contact with it? Why did you get involved with it in the first place?

BC: In spite of tax supported government programs for the poor and disadvantaged, there were many thousands who for one reason or another fell through the "safety net." I had long felt that the private sector should do its part to care for these unfortunate people. I had contributed money to several charitable organizations who provided assistance to the needy. However, I was asked by a friend, who was a board member of the Union Rescue Mission in downtown Los Angeles, to attend a board meeting, observe the work, and consider joining the board. I did, and came to the conclusion that I should do more for the homeless and helpless than just contributing money. Little did I dream when I joined the board how long and deeply involved I would become.

TC: What year was that?

BC: In May of 1957.

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TC: So tell me about going to India. That was an around-the-world trip?

BC: Yes, my wife and I thought that such a trip would be enjoyable and at the same time give us a lifetime of pleasurable memories. The trip was organized by the Employees Association of the Department. In their weekly magazine they announced a tour to Europe and a tour around the world. So we discussed it and I said, "Well, look, it will cost \$1,200 each to go to Europe, but for \$1,600 each we can go around the world." So we signed up.

We flew to Honolulu, Hawaii, where we met the tour group of thirty people. After a short get-acquainted party, the group flew on a BOAC plane to Tokyo, Japan. We spent a whole week there, under the auspices of the Japan Tourist Bureau, who furnished hotels, transportation, and English-speaking guides. In Tokyo we visited many Buddhist temples, the Imperial Palace, the Ginza Shopping District, a typical Japanese home, where we sat on the floor for tea and rice cookies. I should mention that it was spring and the country was beautifully green with cherry blossoms everywhere. We next went to Kyoto, the art center of Japan, where we visited Nijo Castle, with centuries-old paintings on gold foil screens. Just outside of the city was the Golden Pavilion set

in the middle of a lake with a typical Japanese Garden around it. Then on to Nara. The most interesting scene was Nara Park, with numerous wild deer roaming at will. The path has lighted, stone lanterns on either side. Just outside of town was a huge bronze statue of Buddha over fifty feet high and contained in the largest wooden building in the world. We also visited the industrial city of Osaka with numerous palaces, parks and temples. Japan is most interesting. Have you ever been there?

TC: No, I have not been to Japan.

BC: Our next flight was to Hong Kong Where East meets West. We bought a jade ring and two tailor-made suits. One of the most impressive sights was Tiger Balm Gardens where statues of animals of all kinds and descriptions were scattered throughout the garden--a veritable Disneyland of Hong Kong. We visited Victoria Peak, and Aberdeen where over 100,000 Chinese live in small boats in the bay.

We next flew to Bangkok, Thailand. Bangkok means, "City of Angels." It is also known as the Venice of the East, as canals, or khlongs, crisscross the city, with homes on both sides built down to the water's edge so that people step from their homes directly into a boat, the only means of transportation. We took a motorized launch tour of several khlongs. We saw children swimming naked in the water, men bathing, and women washing clothes. At the same time, there were dead animals floating past our launch. The khlongs were

very busy, filled with boats of every description. Sampans filled with food, clothing, utensils and beverages were selling their wares in the Floating Market to occupants of other boats in the khlong. A visit to the Royal Palace complex was most interesting. Built by kings over the centuries was the king's residence, his harem, a library, government buildings and numerous temples, called wats. Standing in front of the largest wat were twenty-foot-high grotesque but colorful statues holding huge clubs to guard against demons. We visited the Temple of the Emerald Buddha which housed a huge statue of Buddha carved out of a single piece of jade. We also saw the Temple of the Reclining Buddha, showing him as he appeared just before dying and ready to enter nirvana.

From Bangkok we flew to Delhi, India. My most vivid memory of this country was the unspeakable poverty of the people. Beggars were everywhere and the dirt and filth along with the abominable heat left us exhausted. We visited the Red Fort in Old Delhi and the thirteenth-century Qutb Minar, or minaret, the highest and oldest in the country. The original city was built by the Hindus with numerous temples. However, in 750 A.D. the Muslims conquered the country and built their own mosques and mutilated all the idols in the original temples, as they believed in only one god. I might mention that the Nohinoor Diamond, now in the Queen of England's crown, came from the throne of the palace in the Red

Fort. We next traveled to Agra where we saw the Taj Majal, one of the seven wonders of the world. Inside the structure we saw two caskets inlaid with sapphires, diamonds, rubies and jade.

Our next stop was in Madras. We visited more temples, saw several funeral processions, the very high lighthouse in the marina with a beach 250 feet wide and many miles long. We also had an opportunity to visit the Hindustan Bible Institute and Seminary. As a result of this visit, I joined their U.S. board and served as vice chairman for eight or nine years.

TC: It was a Bible institute in India?

BC: In Madras.

TC: Madras has a good-sized Christian population, comparatively speaking; of course, Christians being quite a minority in India.

BC: Comparatively speaking. I understand only 1 or 2 percent claim to be any part of the Christian religion. The president of the institute was a Hindu, but along the way he became a Christian, and he came to this country and went to BIOLA for three years. It was here that I first met him and his family. He later went to a seminary and then back to India where he started his school.

From Madras we flew to Colombo, Ceylon. We stayed in a delightful old English-built hotel on the Indian Ocean, beautiful but hot without air conditioning. We toured the country, saw elephants working, also statues of lions

everywhere. It seems that two-thirds of the population are Singalese, which means lion-hearted. There were many tropical birds throughout the island.

Our next stop was Cairo, Egypt. In spite of the many beggars and extreme poverty, we enjoyed the visit, primarily because of its antiquity and place in history. We toured the City of the Dead, the Egyptian Museum, with its many mummies and relics, including King Tut's gold beds, chairs, and animals. We also went outside the city to visit the Sphinx and Pyramids of Giza, where we went for a camel ride, interesting but uncomfortable.

From Cairo we flew to Jerusalem, Jordan. We stayed in a residence in Jericho. The next day we visited the ruins of the old walls of Jericho which had fallen down, Elisha's Well, and the Mount of Temptation. In Jerusalem we walked the Via Dolorosa Way, visited the Holy Sepulchre and the Garden Tomb. We went into the Dome of the Rock and Solomon's stables under the Mosque. Other interesting sights were Hezekiah's Tunnel and the Pool of Bethesda. We went outside the city walls to visit the Garden of Gethsemene and up to the top of the Mount of Olives. We next went to Bethlehem to visit the Church of the Nativity and the cave under the church where Jesus was said to have been born. On a side trip we went to the Dead Sea and to Bethany where we saw Lazarus' Tomb and the home of Mary and Martha.

From Jerusalem we flew to Beirut, Lebanon, where we stayed in a beautiful modern hotel overlooking the Mediterranean Sea. We toured the city and visited Biblos in Northern Lebanon.

The next day we said goodbye to the many friends we had made on the trip as they left to return to Los Angeles. However, my wife and I, with Horace Kelley, an engineer with the Operating Engineering Group, and his wife, enplaned for the trip to Athens, Greece. The Kelley's continued their flight to Germany to pick up a car they had purchased to drive around Europe. We, however, stayed in Athens for several days to see the sights of antiquity, including the Parthenon and associated ruins, Bacchus Theatre, where we saw an old Grecian play, and Mars Hill. We made side trips to Old Corinth, where we saw Apollo's Temple and the Judgment Seat, and to Delphi where the Oracles prophesied.

Our next stop was Rome, Italy. We visited the Colosseum, the Borghese Garden, where we saw Bernini's "David" and Raphael's "Magdalene." Also visited were the Pantheon, St. Peter's Basilica, and a portion of the 800-mile-long Catacombs.

We flew to Zurich, Switzerland, where we took a train to Lucerne by the lake. The city is beautiful, framed by a lake on one side and the snow-covered Alps on the other. We certainly enjoyed the Swiss food, particularly the chocolates and pastries. We participated in the Swiss singing and

yodeling. One day we went for a walk and ran into Horace and his wife, and the next day they took us for an enjoyable ride in their new Volkswagen to Interlaken.

Leaving Lucerne we went to Paris, France. We cruised the Seine, seeing all the famous riverside sights, including the Notre Dame Cathedral, the Alexander Bridge and the Statue of Liberty. We rode the elevator to the top of the Eiffel Tower to get a great view of the city. We also saw the Place Concorde and Arch of Triumph.

Our last visit was to London, England. We saw the Changing of the Guards, Buckingham Palace, Trafalgar Square, Victoria Monument, the Houses of Parliament with Big Ben on top, Westminster Abbey, St. James and Hyde Parks, and the Queen Mother's Palace.

We left London in a pouring rainstorm and flew to New York and home. It was a great experience, and we entertained friends on many occasions with the slides and movies taken on the trip.

TC: How long a trip was it?

BC: Well, a thirty-day tour for the \$1,600 each and then we added two weeks in Europe on our own.

TC: Were you able to learn anything about the power industries in those various countries?

BC: Not on that trip, but we did take a cruise to New Zealand once, and we stopped off at Auckland and then took a land tour of one week where the New Zealand Travel Authority provided a

car and driver. I wouldn't drive there, they drive on the wrong side of the road and this is very difficult. So we visited all the resort areas on the North New Zealand Island. We also went to the thermal generating plant and talked to the general manager. He showed us the steam fields and what they were doing.

They have large generating units quite a distance from the thermal fields, and as the steam . . . They had drilled holes in the ground and put pipes in. The steam comes up these pipes and then it runs through chambers where they attempt to take some of the contaminants out of the steam. And the roar as that comes out of the ground is so tremendous, it was deafening. You had to wear earplugs. But they told us that it's not exactly free because the contaminants in this steam, particularly sulfur, cavitate the blades and the runners and they have to be overhauled so often that it's quite costly. The operating expense is high even though the steam is free. So, anyway, on that trip we did get to visit something new and different.

TC: Speaking of topics like geothermal energy, in your period there as upper management of the Power System, I know that assignments were given to various people to look into some of these things and to develop positions on what the Power System should pursue. For instance, geothermal, there was a certain amount of study around that. Pete Lowery told me about some of this . . . using methane gas, the natural byproduct of

landfills, to use as a fuel. Were you particularly involved in any of these aspects?

BC: I know that studies were made by System Planning, and I was told of these studies. But nothing was developed to the point where it came to management in a form where we could actually budget. But Edison--or was it PG&E--they had a development in northern California, and Pete Lowery kept up with what they were doing and the results. But I did not get very involved in that.

TC: Well, what did you think of those alternative fuel and alternative generation schemes? For instance, solar, wind power, geothermal.

BC: Geothermal was discussed, they talked about some down in Mexico or some spots in the Imperial Valley just north of the Mexican border and were small plants, but after my experience in New Zealand, I really was not enthused about its capability for providing the kilowatts of generation we need. Now, as far as wind power, we have some property down in Palm Springs, and there are certainly a lot of windmills down there. That's a going thing right now, but that was not really seriously considered when I was there. As far as solar, they talked about it, but nothing really was developed. That was the reason for System Planning to look at all of these alternates and determine what is feasible, practical, and then recommend those plans, and they kept up with it. Some of them were so far out that it was not a budgetary requirement.

TC: Well, we've covered, I think, your entire career in the Department in these several interviews we've had. When you did retire, are there normal . . . For the Chief Electrical and upper management, are there "retirement rituals"? What happens? I mean, is there a retirement dinner or something that they offer you?

BC: Well, the usual ritual, as you call it, was to give an evening dinner with several hundred employees present and speeches and a retirement book, but Goss decided that this was not necessary and time-consuming. It was a problem for employees to attend one more management retirement. There were so many of them that he said, "I'm not going to have any part of it." So he just had an office party and invited the upper management to attend. Since I retired five months early, I decided I should do the same and we had an office retirement.

TC: I have just one more area. I thought you might want to mention that your sons became engineers.

BC: Yes, I have two sons. The oldest boy went to college three years and then he was drafted. When he came up for draft, he joined the army for two years during the Korean War. After that period he went back to college, but he wanted to get married; and with the time it would take to get his engineering degree, he decided to go to Pacific States University and he was able to get his degree in one year. So, from there, he went to Northrup [Corporation] and worked five years. Then he had an opportunity to get an advancement and

go to Rockwell [International] as a supervisor in their quality control, and he's been there ever since. He's still working there as a supervisor.

TC: What's his name?

BC: That's David. And my youngest son, Warren, he went to Glendale State College for two years and then went to USC for two years. Then, after he went to work, he continued night school, and in three years obtained his master's degree at USC. I should add that after going to Glendale and then transferring to USC, he got straight A's for his last two years. He was elected to the engineering honor societies, Eta Kappa Nu and Tau Beta Chi. After his experience at Glendale, after the first semester at USC, he said, "You know, I could do this work at SC with my eyes closed." They were so much more comprehensive and required so much more of a student at Glendale to get the grades than they do at SC. He was also chairman of the combined American Institute of Electrical Engineers and the Institute of Radio Engineers Club at USC.

Once a semester they had utility industry representatives who were member of the AIEE [American Institute of Electrical Engineers] to attend, and Warren was chairman and that was an opportunity for him to meet Goss and Cozzens, who were active in the AIEE at the time we were there. As a result of that presentation, his last semester he had offers from about ten different organizations to go to work. He had worked during his summers while at SC and the state college at Glendale as

a draftsman for the Department. He took the examination and received a temporary appointment. But he said, "After that experience, I think I'd rather go for private industry." The drafting room--this is not meant to be critical--it was supervised by a man who was hypercritical. He would come and stand behind Warren for a half an hour, he said, breathing down his neck, just watching him, and walk away and not say anything. He said, "If they have a man like that for a supervisor, I don't want to have any part of it." Fortunately, he went with Hughes [Aircraft], and has been there thirty-five years. He has advanced through the years where now he is a director, Director of Planning and Development. It's a position, I assume, something like King had. He looks into the future. What does the armed forces need? And he goes to Washington, D.C. often. Last Sunday afternoon, he flew to Washington, held two meetings with the army and flew back Monday night. He has enough Frequent Flyer coupons to travel around the world. He's planning to go to New Zealand with his wife next January, which is their summer.

TC: That's good.

BC: Anyway, he does planning for them and he makes a very good salary. He is now fifty-six and he plans to retire in about three years. He may retire earlier if they decide to cut back on their employees and offer them a bonus like they did three years ago, where he could get about \$80,000 a year for

retirement. I told him if he could pay off his house he would be able to live well on \$80,000 a year. Well, anyway, that tells you about my sons. David's son has a master's degree from Long Beach State, and he went to work for Rockwell and he also is in quality control and has been there ten years and has a good reputation.

TC: So you could say engineering runs in the family, I guess.
(chuckling)

BC: Well, there are four of us. I have two children and six grandchildren and ten great-grandchildren, so we have a large family. Keeps us busy.

TC: A large family, yes. Well, I don't have anything else to ask. I think I have covered all my question areas, and all the specific kinds of insights I was looking for I think I've found. I just wanted to thank you on tape here for these sessions. It's been truly edifying, believe me. You have explained a lot of the areas, especially communications areas, that I had no understanding of.

BC: Communication is certainly important to the operation of any utility, or any other organization.

TC: It sure is.

BC: If the telephones go out, you're out of business.

TC: That's right. So thank you. Is there anything that we haven't touched on?

BC: No, I would say that as an interviewer you're very astute and you've covered everything I can think of. The only parting

remark would be that I certainly enjoyed working for the Department and with the Department personnel. They had some very good men. I made lifelong friends. I still see some who have not passed on.

TC: Yes, it's a remarkable community of competence, innovation, creativity, really. I think the people that I have interviewed and people I intend to interview, it's just a remarkable group of men.

BC: I recommend anyone that is considering alternative employment to work for the Department. This is kind of late to be saying this, but remember I told you I worked for Western Auto Supply as a radio technician. Pepperdine started the organization and his wife was active in it and his wife's brother, Mr. Baker, was the general manager. All the Bakers were managers of all the outlying district headquarters. I soon found out working there that it's not what you know it's who you know. Besides, I was not a salesman, so I decided early on that I was going to get out of this business and into something more technical.

I told you about the Department and the Gas Company. I did not mention the telephone company. That time when I was considering a change, the two principal organizations I had in mind were Pacific Bell and the Department of Water and Power. I wanted to get into an organization with the knowledge that it's not who you know, it's what you know. I felt that a person could get into the Department of Water and Power

through Civil Service, where you could take an examination and be promoted on the basis of knowledge and experience and not whose relative you are. This is extremely important, as far as I'm concerned. If I had gone with the telephone company, I'd probably still be a phone installer someplace.
(chuckling)

TC: Well, you made the right decision.

BC: Anyway, it turned out to be to my advantage. When I started in, I was not an electrical power man. Mr. Bateman was very helpful and very friendly and gave me an opportunity to learn as I went along. All of the supervisors, Cozzens and Blakeslee and Goss, showed an interest in me as well as in what I could do, and this was very important to me.

One highlight of our social life here was about five years after I retired we had Mr. and Mrs. Bateman, Mr. and Mrs. Goss, Mr. and Mrs. Cozzens, and there was a technician that worked with me in Communication, his name was Paul Anderson, and his wife, over here and we showed them movies of our five Caribbean cruises all combined into one with sound, and I played the organ for them and we had a very enjoyable social evening. As they were leaving, I told them the purpose of this meeting was to thank them for their help and assistance, and I did not expect the responses that they gave. In essence, they said, "Well, you did it on your own." But without their help, I could not have done it.

But all the way through, people in the Department were so friendly and helpful, and the engineers are first-class. There's no one in any utility who can beat the engineers of the Department.

TC: That's it. Well, thank you.

END OF INTERVIEW