THIRTY YEARS WITH THE METROPOLITAN WATER DISTRICT

Robert B. Diemer

Completed under the auspices
of the
Oral History Program
University of California
Los Angeles

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INTRODUCTION

Robert Bernard Diemer was born in Palmyra, Missouri on April 27, 1888. He graduated from high school at Palmyra in 1905 with plans to become a lawyer.

When Mr. Diemer entered the University of Missouri in September 1906, he settled on the career of a civil engineer. He graduated from the University of Missouri in 1911 with a B.S. in civil engineering. Upon his graduation, Mr. Diemer received an appointment from the U.S. Bureau of Reclamation as junior engineer with the North Platte Project in Nebraska. For the next fifteen years he worked on this and various irrigation projects for the Bureau in Nebraska and Wyoming, gaining experience as a designer and a supervisor of field operations.

In 1926, Mr. Diemer accepted a position with the J. G. White Engineering Corporation, which was then working on various irrigation projects for the government of Mexico. He worked on the Calles Dam Project in the state of Aguascalientes (1926), the Don Martin Dam Project at Nuevo Laredo (1927), and the Rio Mante Project near Vera Cruz (1928-29).

In July 1929, Mr. Diemer arrived in Los Angeles to accept a position with the City of Los Angeles to make estimates and designs for a then proposed aqueduct that

would bring water from the Colorado River to Southern California. In May 1930, Mr. Diemer transferred to the Metropolitan Water District when the newly formed District took over the aqueduct studies from the City of Los Angeles. Mr. Diemer was asked to work on the aqueduct for some six months but remained as a District employee until late 1961.

Construction on the Colorado River Aqueduct began on January 25, 1933. Mr. Diemer rose from the position of engineer on location to division engineer in charge of the construction of 40 miles of 16-foot-diameter tunnels on the Colorado River Aqueduct. In 1934, he advanced to the position of distribution engineer and was responsible for the location, design and construction of terminal and regulating reservoirs and 150 miles of large pipe lines and tunnels. With the completion of the aqueduct system in its initial development in 1941, he was placed in charge of the operation and maintenance of the main aqueduct and its distribution system. In 1950, he became assistant general manager and chief engineer, and on January 1, 1952, he was named to the position of general manager and chief engineer. From 1952 to the time of his retirement, Mr. Diemer directed the aqueduct expansion program that brought it to its full delivery capacity.

The American Society of Civil Engineers in 1955 selected

the Colorado River Aqueduct as one of the Seven Modern Civil Engineering Wonders of the United States.

Upon his retirement on December 31, 1961, Mr. Diemer was named by the City of Pasadena to serve as its representative on the Board of Directors of the Metropolitan Water District of Southern California. He held this position until his death on October 27, 1966.

Mr. Diemer's numerous honors and awards include Honorary Member of the American Water Works Association. In 1957, he received the Beaver Award for outstanding achievement in heavy engineering construction. He was a Life Member, later Honorary Member of the American Society of Civil Engineers. He was presented the Missouri Honor Award for distinguished service in engineering by the University of Missouri in 1960. On January 15, 1964 the Robert B. Diemer Filtration Plant near Yorba Linda, California was officially dedicated by the Metropolitan Water District.

In the following pages, which consist of a transcription of tape-recorded interviews with the UCLA Oral History Program, Mr. Diemer recalls his early life and education and the various aspects of his long career. The interviews were conducted under the auspices of the Water Resources Center at UCLA as one of a series dealing with the history of water development in California and the Southwest. Records relating to these interviews are located in the office of the UCLA Oral History Program.

INTERVIEW HISTORY

INTERVIEWER: Donald J. Schippers, Interviewer-Editor, UCLA Oral History Program. B.A., UCLA; M.A., American History, Occidental College; M.L.S., UCLA School of Library Service.

TIME AND SETTING OF INTERVIEW:

Place: Robert Diemer's residence, 2227 Lambert Drive, Pasadena, California

Dates: The interview was begun on August 25 and concluded on September 22, 1966. The interview sessions were conducted at weekly intervals.

Time of day, length of sessions, total number of recording hours: Recording sessions took place in the early afternoon and from one to two hours were recorded at each session. This manuscript represents approximately six hours of recording time.

CONDUCT OF THE INTERVIEW:

The interviewer encouraged a biographical approach within a chronological framework. After speaking of his childhood, family and educational background, the respondent was asked to discuss in more detail his career with the Metropolitan Water District and the particular projects of that agency in which he was closely involved. The respondent was particularly concerned with the accuracy of facts and figures and requested the interviewer to obtain such material which was used during the course of the interviews.

EDITING:

Editing of the verbatim transcript of the interview was completed by Winston Wutkee, Interviewer-Editor, in July 1970. The transcript was checked against the original tape recordings and edited for punctuation, paragraphing, spelling, grammar and syntax, with only slight changes as required. In so far as possible, personal and corporate names were verified. Since the respondent died a

month after the interview was conducted, it was therefore necessary to prepare the final transcript without benefit of the respondent's review. The material contained therein is in the order in which it was spoken on the tape. When the editor has added words or phrases not actually spoken by the respondent on the tape, they have been bracketed, except in the case of short connective words.

The index and introductory materials were prepared by the editor and by Bernard Galm, Superivsing Editor, UCLA Oral History Program.

SUPPORTING DOCUMENTS:

The tape recordings and the edited transcript of the interview are in the University Archives, Department of Special Collections. Use of these materials is governed by the rules regarding the use of noncurrent University records.

TAPE NUMBER: I, SIDE ONE

AUGUST 25, 1966

DIEMER: I followed engineering all my life from the time of my graduation from the University of Missouri in 1911 until my retirement in December, 1961. However, following my retirement, I continued my engineering career by representing the City of Pasadena on the Board of Directors of the Metropolitan Water District of Southern California.

I was born on April 27, 1888 in Palmyra, Missouri. That's an old city of fifteen hundred inhabitants located about twelve miles from Hannibal, Missouri, near the birthplace of Mark Twain. I went to public schools in Palmyra and graduated from high school in 1905. My father had been a Catholic and my mother was a Lutheran. My mother, who influenced my life as long as she lived, sent me to a Presbyterian Sunday school where I had perfect attendance for several years. I went to St. Louis during the World's Fair in 1904 and saw Christy Mathewson pitch. Friends who were with me at the game said, "Bob, could you hit him?" And I said, "Sure." Throughout my life baseball was one of my principal hobbies. I played on the high school team, was the captain of the team, and then later, when I went to the university, I followed it there, also.

I remember the superintendent of the Sunday school saying, "Robert is a good boy if he didn't play baseball on Sunday." It seems like now everybody's interested in baseball; I still listen to it on the radio.

At the time I graduated from high school, I had plans to be a lawyer. However, not having enough money to go to school the first year after graduation, I got a job with the C, B & Q [Chicago, Burlington and Quincy] Railroad, Palmyra Junction, where trains from Chicago and St. Louis met and followed the main line westerly to Kansas City. On the next job I noticed a bunch of engineers' surveyors change trains often. It looked like a rather soft job to me--outdoor life. So I decided to change to civil engineering. But before I went to college I had to stay out of school a year and acquire some funds. I ended up at the University of Missouri in September of 1906. I had conditions of one and a half units to make up before I was admitted. At that time Professor [Earle] Hedrick, who later became the head of UCLA's Department of Mathematics, [was teaching at the University of Missouri].

Before I'd gone to the University of Missouri, I'd worked on a cement contracting job. I was a pretty good husky boy of sixteen. I did just as much work as the older men who were there. In those days men only got $1.25 a day and I was paid 75 cents. Like a future

person in labor management, I immediately headed for a raise. I was not granted a raise, but a year and a half later I overheard the contractor make the statement, "If that kid had stayed with me he would have been a concrete finisher and he'd have been getting $2.00 a day." Maybe right there is where I missed it when I quit. I might have ended up a millionaire contractor in place of being a civil engineer.

Well, when I went to the university, the first thing I had to do was learn to study, because the boys from Kansas City and St. Louis came from large high schools. I would take mechanical drawing and get a poor grade in six plates. So I went to the dean of the college and asked him whether I had the proper ability to ever become a civil engineer, because my drafting apparently was not good enough to pass. "Well," he said to me, "you know I've had a lot of jobs, and I think I'm just about the poorest draftsman that ever was--and engineer--and I made it, and why can't you?" Well, I went back and made those six plates over and got a passing grade, and from then on I kept on in engineering.

That year I didn't have a job during vacation. I still had money enough to go the second year. I guess I went the third year. But between the junior and senior year I had to stay out another year to get additional money. I went back to the United States Reclamation Service in Nebraska where I had spent a summer at the

end of my freshman year working on a survey party. My boss at that time was a graduate of the University of Missouri who stayed with the Reclamation Service for many years, became its commissioner, and retired at the age of sixty-five. As I understand, he retired because he thought the politics were getting too heavy for him. However, he was certainly a very capable engineer.

I stayed out a year making surveys for irrigation ditches for the North Platte Project in Nebraska. I took the Civil Service Examination while I was still working there and received an appointment as a junior engineer upon my graduation from the University of Missouri in 1911. When I went back to resume my education in 1910, I had resolved that I was going to make the university baseball team. I loaded up my schedule so that in the second semester I had plenty of time to play baseball, and I made the team. I also made the Tau Beta Pi honorary fraternity based on the grades in my courses.

My contact with Dr. Hedrick at the University of Missouri was in connection with my entrance admission units. During the summer in Nebraska while on a survey party in 1907, I studied up on English history. When I returned to the university at the beginning of the second year, I took the examination and passed the entrance exam. Professor Hedrick, who was head of the mathematics department of the university and on

the admission committee said, "Well, why don't we cancel out this one," which was half of a unit in solid geometry. Another member of the committee said, "We can't do that." So I said, "What's your department?" And he said, "Well, you can take it in civics." I said, "When are you giving the examination?" He said, "Tomorrow." So I went down and took his examination on civics.

SCHIPPERS: And you passed it?

DIEMER: He said all right and passed it. That was my connection with Dr. Hedrick until I came out here in 1929 and met him later at UCLA.

Now as to the courses I took at the university: of course, they had surveying, construction, studies in hydraulics, and chemistry. After my first year's experience on survey work with the United States Bureau of Reclamation in 1907, all surveying courses I had at the university seemed like they were easy.

The thing that I have failed to do is elaborate on the influence that my mother had on me. She taught me to persevere, and when I started a job to do it, and that has been my policy throughout the years. Give the best you have and be honest no matter whether you're working with politicians or the rest of the people that you're working with.

Prior to going to the university, [I witnessed an interesting event]. My grandfather, who was an immigrant from Germany, came over at the age of seventeen and located

in Palmyra. He drank quite a bit in the early years. Finally, he took the oath of the Sons of Temperance. On his twenty-fifth anniversary he asked all the inhabitants of this small town to help him celebrate the anniversary. I think that had considerable influence upon me, too, to see a man that had drunk and then had quit drinking. Throughout the years I took a drink, but I never drank to excess, and I never permitted anybody working for me to do it. I figured a man couldn't do that and still think. As a result, most all the men in our organizations, whether they were with the Reclamation Service or with the Metropolitan Water District of Southern California or with me when I was in Mexico, [didn't drink to excess].

The University of Missouri course in civil engineering at the time that I was there was as good as any that I could have obtained. I might say that I went through the four years there at a total cost of $1100; can you beat that?

SCHIPPERS: No.

DIEMER: Well, I returned to the Reclamation Service in 1911 and spent the next fifteen years with them on the construction of irrigation works in Nebraska and Wyoming. [Before that] I had joined the masonic lodge in Columbia, Missouri in 1911 and continued this membership throughout my life. I also joined the Presbyterian church in Columbia at the time. Supporting our professors there, Dr. Luther Defoe was tops in mathematics, and Professor T.J. Rodhous

was in charge of the mechanical drawing section, and Professor Lincoln Hyde taught about bridges. In fact, practically all the professors were dedicated to the courses they were teaching. And as I have stated before, it was a good education that I got at the university. Then I returned to Nebraska, as I said, and spent fifteen years with the United States Bureau of Reclamation.

SCHIPPERS: This was after you graduated?

DIEMER: This was after my graduation in June of 1911. I was employed on the construction of irrigation works near Scottsbluff, Nebraska, on the North Platte Project. From 1914 to 1916, I was on hydrographic studies which extended from Pathfinder Reservoir, forty-five miles south of Casper, Wyoming, to Kearney, Nebraska, on the North Platte River. This was for the purpose of obtaining data in connection with the ajudication of water rights in the states of Wyoming and Nebraska.

On one of these trips it was necessary for me to make a gauging on the North Platte River at a bridge that was located on a ranch fifteen miles south of Casper. At this time I met a young lady who was running a whole ranch with her brother at the time. Her folks had homesteaded this place way back in 1888. Although I didn't get a very good reception there the first time we met, I married this girl in 1916. In addition to my mother, who had much influence over me during my early years, my wife was always helping me with any problems that came up in

our future years, which are now nearing the fiftieth anniversary. She followed me into reclamation camps and we lived there--probably at eight or ten different locations during our early years. We had three children who are now married: Helen, Betty Jane and Robert Speas Diemer. My wife's name was Mildred Speas. At the present time we have seven grandchildren: six boys and one granddaughter.

Shortly after our marriage I was placed in charge of topographic surveys of the Fort Laramie Division of the North Platte Project. Later, I was transferred to the Northport job near Bridgeport, Nebraska. I had made an earlier survey over this area in 1910. The year I was transferred there to take charge of construction was 1919. In the meantime, an engineer had made a location for a canal covering 15,000 acres on the North Fork Division. In this he had a tunnel location half a mile long. When I took over this work, I couldn't see that tunnel location; I made locations and estimates. My boss at that time was Andrew Weiss, the project manager on the North Platte Project, a United States citizen, born in Austria, and educated at the Colorado School of Mines. He couldn't see that I had a very good proposition there to change that tunnel location. So he called in Mr. Frank E. Weymouth, who was chief engineer at that time and later was my boss in Mexico and also at the Metropolitan Water District. Mr. Weymouth couldn't see it either, so they called in A.P. Davis who was then the director of the United States

Bureau of Reclamation in Washington. He came out and looked it over. He walked over the location where I had suggested making cuts and fills to replace this tunnel. I had estimated it would save $100,000 on the cost. After we walked over the location he landed up on top of the highest point where the tunnel was. He was sweating, you know. He said, "I don't see any reason why this location shouldn't be changed." As a result we saved $100,000 or more due to that change, and I, a young engineer, had attracted the attention of both Weymouth and Davis.

Well, in 1922 I was transferred to the Fort Laramie Division of the project and spent two years there on construction of the canal and irrigation system. Later, I was transferred to the Riverton Project in Wyoming. This was a project, it seemed to me, that should never have been built. The land was poor, but since the United States had received so much money from oil lands in Wyoming, the politicians had gotten appropriations through Congress to build this project. It was partially built when I landed there in 1924. In 1926, the Secretary of the Interior made an inspection trip of the project together with the two senators and one congressman from Wyoming. That night he announced that he was closing down that project because the land seemed to him to be poor and it was not an economical project.

In August of that same year, I was on vacation when

I received a telegram from Mr. Weymouth, who was now in Mexico as the chief engineer for the J.G. White Company of New York, directing the surveys and designs and construction of several irrigation projects for the Republic of Mexico. I accepted a job with Mr. Weymouth at double the salary I was receiving in the United States with all expenses paid, and I took with me two men who had worked for me in the Reclamation Service: Grant Bloodgood and Donald McCoskey. We reported to Mr. Julian Hinds, who was already at Aguascalientes in central Mexico for work on the project which Mr. Hinds was in charge of. He showed up on the project about two or three months before I reported there.

The project had been planned with a dam to be named after President Plutarco Calles. It had been located at the lower end of a deep canyon. Before we got through with that project it didn't look like the same one that had been planned when Mr. Hinds reported there. The dam was moved to the upper end of the canyon where it was about one-fifth the size of the one that had been located at the lower end of the canyon, and it had sufficient storage capacity to provide for the lands which were to be irrigated from this reservoir. There was nothing done there whatever, except in connection with this dam. We surveyed the land. It was not sectionalized like in this country, so we laid out a system of two kilometers by three kilometers. In that area they called everything

by kilometers, and the metric system was used. In place of acres they had hectares.

Well, I stayed on this project for three months. We got along very well with the Mexicans; we had peons for labor. We'd transport them sometimes to the work on Monday morning and back to their homes on Saturday afternoon. The Mexican engineers were all young engineers, educated at the University of Mexico in engineering or at some universities in the United States. We always found them very cooperative and eager to learn. Oftentimes, we did not understand Spanish. We had our own little dictionaries and we tried to learn it as fast as we could. But they would make excuses because they could not understand English. We explained to them that we were in their country, so it was up to us to learn their language; and we tried to help them learn English.

I remember well that we were running reconnaissance lines; I had Bloodgood on one of the parties running an instrument. I was out in front with the little party. Where they had been running a reconnaissance line of two or three kilometers a day, we got sixteen kilometers one day, or ten miles. I can still remember some of the peons who were cutting away through that brush complaining that we were overworking them. Well, I think all we did was try to set an example for them. Before I left Mexico three months later, or left that project, the Mexican engineers were doing almost half as much as we were doing,

showing that the example had been set and they were improving. I went there in September and stayed there until the end of December.

Next, I was transferred up to the Rio Salado Project near the Texas border and the Rio Grande River. They were building a dam and making a study of the Rio Salado. Mr. Andrew Weiss, who had been my boss on the North Platte Project, was the project engineer. I stayed there three months and was then sent down to the Rio Mante Project, which was about seventy-five miles out of Tampico to the northwest in the state of Tamaulipas. It was there that President Calles wanted to make the California-Mexico Project.

It was in the tropics. The rainy seasons came on in June, and you got anywhere from eighteen to fifty inches of rainfall within a couple of months. We had to stay in camp unless we went out on horseback. We had two drag lines digging a canal from the dam site which was located about three miles below the nacimiento [source] of this river, the Rio Mante. As I recall, the flow in flood stage got up to about 10,000 second-feet, and the ordinary flow was something like four hundred or five hundred second-feet. Well, anyway, we built a project to irrigate 50,000 acres on two sides of this river. President Calles came up there on several trips. I also remember that it was during the stage when his successor

would be selected by a vote, and the three candidates met violent death at one time or another, whether it was at a party or whether they were hunted down by federal troops. We never could tell whether the troops or the employees we were working with in the daytime were rebels at night. But they did have a revolution in March of 1929. Mr. Weymouth had come up to our project there, and the design work was done by our local force. We had seven or eight Mexican engineers, and I had an American assistant. Mr. Hinds had three American assistants up on his project, and Mr. Weiss had, I think, about three out there. But, anyway, on all of these projects we got wonderful cooperation from the Mexican engineers.

The revolution came about the same time that Weymouth left Mexico. He was in charge of all the engineering on these five projects. The general management of the projects and the construction work was under the direction of a general manager who was also in Mexico. But Mr. Weymouth was responsible for the selection of engineers and for designing the work on the various projects. When I first landed in Mexico in September of 1926, he gave me a list of all the engineers on the various projects in the Reclamation Service. He said, "We need so many engineers on these other projects. Pick out somebody that you can recommend." So I did. Well, a short time later, the Secretary of the Interior asked the J.G. White Company in New York to instruct their engineer in Mexico not to

draw any more of his staff from the Bureau of Reclamation, that he was kind of disorganized. As a result, the Reclamation Service increased the salaries of practically all their engineers on the force. Well, anyway, Mr. Weymouth left on the last train that went out of Mexico in March of 1929, because of the revolution. He left all of us fellows down there. My wife's father said, "Why don't you get Bob to get out of there?" She said, "Well, I'm keeping his insurance paid up." (She was living in San Antonio at the time.) "So whenever he decides to come out, he'll come out."

About that time I got something, but I didn't know what was the matter. I had terrific headaches, and I figured it must be smoking. I wasn't a very heavy smoker, but I quit smoking and the headaches persisted. We had a camp doctor and he said it was probably dismal; well, that was malaria. He gave me some shots--everything was shots--and for three days I had a 105 degree fever. As a result--our project work was partly completed--I tendered my resignation and left there the last of April in 1929. I can say that that was one of the best jobs I ever had.

When I told Mr. Weymouth along in 1928 that I'd received a letter from the Denver office of the Bureau of Reclamation asking me if I didn't want to come back if they offered me another job, he said, "I can't afford to come back. I don't see why you can." So I wrote them

and thanked them and told them that I wasn't coming back. But when I finally got malaria, I thought it would probably be best for me to get out; I resigned in April. In June, I received a telegram from Mr. Weymouth asking me if I would consider a job, if the city council of Los Angeles would approve it, for me to be employed by the Los Angeles Department of Water and Power in connection with estimates and designs for the Colorado River Aqueduct. The job might be as long as six months. That was the beginning of my connection with the Colorado River Aqueduct. We arrived in Los Angeles on July 8. (Check the records; you'll find that on that date there was an earthquake.) Oh, I can still remember when I started here, and here I am thirty-six years later; it was quite a long six months.

In connection with the Mexican projects, Mr. Hinds was on the Aguascalientes Project. They built the dam according to his design at the upper end of the canyon. There were no available rainfall records or runoff records, and we had made an estimate of how much runoff would be in this canyon. They found that the estimate was too high, so they put in a diversion line on another creek, Pabellon Creek, over into this reservoir. And I cannot say whether that was sufficient to furnish enough water to fill the reservoir. Then at the Don Martin Project, where Mr. Weiss was in charge, they have had water there to go over the spillway. I can't give the capacity of that reservoir; but it was a real large reservoir. I do

not know what success they've had so far with irrigation there. But I do know that on the Rio Mante Project, which was a smaller project than the Don Martin Project, that they cleared the land and put in sugar cane; that was a wonderful place for sugar cane. On their private ditches there, they had some sugar cane when we were there.

I failed to mention that at the nacimiento of this Rio Mante Project--that's the birthplace of the river--the water just came out of limestone hills there. When we made an investigation of another project on the Rio Comandante, we found that the water had come down from cliffs and all, and it would go into a big sump and go down under that mountain there and come out in the river below. But that project was considered not feasible because of the limestone formation. If you put in a reservoir somewhere, there might be another big hole that would drain it out. Then there was another river that we investigated, the Rio Carillo. That also had a nacimiento like the Rio Mante, and I understand that the Mexican government later built a project over that using their water. The rivers both rose from these enormous springs. Where the water came from, God only knows; I don't know. That was the beginning of the irrigation development in Mexico. Later, when I was in California, I went down with one of our contractors. They had plans to put in the management in Mexico City to do construction work, and they wanted me to go down as manager. Well, we missed the bid on a long

tunnel over around Puebla, Mexico, and the contractor that got it later had the government turn it into a cost-plus project.

SCHIPPERS: They made it.

DIEMER: They made it all right, but we lost the bid by $70,000, and I think a lot of the development in Mexico started right there when Mr. Weymouth was there with the Irrigation Commission. There was also a Mexican commission where they had representatives that would be on the project, but they would not direct any of the work. All they'd do was make the report to the commission of Mexico.

I might say that Mr. Weymouth and the men that he took down and put in charge of each project numbered not more than four Americans on any project. However, the general manager recruited the drag line operators from the United States and had a superintendent on each project who reported to the general manager in Mexico City. I can say that the cooperation between the engineers and the construction men was as good as could be expected. I wouldn't say that either one had authority over the other, except that the engineers would draw the designs, and the construction force had to follow out what was designed. Sometimes there was some friction, but as a rule I would say the cooperation was very good. The work that was done was just as good a work as was done in the United States. The only thing was you didn't have all American labor, like on the drag line; you had the operator and

the oiler.

One time, on the Rio Mante Project, we heard an alarm, "Fuego, fuego!" There'd been a fire. One of our drag lines--we only had two there--had caught fire, and the operator was a young American. He said the casings had backfired and set the thing on fire. About three days later, one of the engineers came to me and said, "Will you talk to Ron?" That was the oiler. He was a Mexican oiler. He couldn't speak any English, and this engineer acted as an interpreter. Well, we found out that the operator was not telling the truth. And the super manager was an ex-United States Army colonel about sixty-five years old. I told him this story and he called this operator in, and the operator told him the same story, and he said, "Blondy, you know you're lying." "Oh, what do you know?" So he told him, "You weren't the only guy on that machine." So Blondy had to fess up to it, that he lied. He went to another project and he was caught not telling the truth over there, too. But as a rule, the operators that went down there were very efficient, and as far as I'm concerned, the Mexican government got a good deal from the J.G. White people who were handling it from our end. We were paid in American money and got all of our money in the United States. Well, I think it was one of the best jobs I ever had--the cooperation and the way Mr. Weymouth came up here. He brought Hinds up here

and he brought [Clayburn C.] Elder up here. Larry was the cost accountant down there over all the projects. Bond was another one that he brought up here. He brought all the head engineers he had, practically.

SCHIPPERS: Did you work in contact with Elder and Hinds and the rest?

DIEMER: I was with Hinds for three months. That was all. Then I was with Mr. Weiss for three months, and then I was in charge of this project down by Tampico for two years. The only one I had any contact with was Mr. Weymouth's office, and he only made three trips up there in two years.

SCHIPPERS: So you really didn't get to know him there, particularly.

DIEMER: Yes, I got to know him then, too. He had been in contact with me over this work on the North Platte Project when I made that suggested tunnel change. I might say that after I got here [Los Angeles] only twice did he ever get out of sorts, and I lined him up. He won one and I won one.

So far as the attitude of the Mexican government was concerned, President Calles was the one that started this. Before we went down there, there were four or five American engineers on these various projects. The man that I had succeeded had been with the Reclamation Service when, for some reason or another, they needed a change; and we got the work done down there. The one that Mr. Weiss was

on was one of the largest. He had wonderful success with the Mexican people, because he stayed after all the rest of us pulled out and became a consultant to the Mexican government. He died in the 1950's down there; he was eighty-six years old or something like that. He had one of the largest funerals I ever heard of in Mexico, of about four thousand people. He figured they were people, and we all figured they were people.

When I left Hind's place in December of 1926, Bloodgood was there with me. He was the one that later became chief engineer. He came to my room and he said, "There's a bunch of fellows out here who want to see you." We had about eighty or ninety peons there; and to me that was one of the most trying experiences I ever had--to think that those poor guys wanted to shake hands to say good-by. That is the way we treated those guys. After I got up here in California, one of the foremen--they call them cabos there--asked for help. He could read and write; there was only five percent of our group that could read or write. He sent me a message from Mexicali to see if I could help him get in to the United States--poor devil. That was ten years or so later. Well, as far as I was concerned, Mexico was one of the greatest assignments I had. Of course, I didn't have my family with me. They lived at Casper, Wyoming, for the first year, then in Laredo, and in San Antonio. San Antonio was a swell place

to live, nice people and all; but first they thought we were northerners.

So far as politics in Mexico were concerned, our engineers were all very loyal. The peons that did the work cooperated with every American that I can recall. They lacked experience, and at first they could soldier on the job, kill all the time if you worked eight hours. But we got to the point where we were cutting paths through the jungles to make survey runs. We gave them so much a day to do, and they'd get it done by noon, and then they were free and on their own. And it seemed to be a good system. I can't say anything about my Mexican experience, except that I look back on it as one of the most pleasant I ever had. I still have some friends down there that have done well as engineers and contractors.

One of the boys whose father was a general under Porfirio Diáz said, "If Papa was alive now, I could be somebody in Mexico." Well, about twenty years later, I met him here in Los Angeles. He was one of the successful contractors in Mexico, and I said, "If Papa had been alive, how well would you have done? You did well on your own." And most of those boys did do well. One of our contractors here in the United States who did some of our work on the aqueduct did well. During the Second World War, he got into road construction down in Mexico. I came to find out that his silent partner was one of the boys that I had on the Rio Mante Project, and he now is

very wealthy; so you can just figure with all your politics and everything, it's who you know in Mexico just as bad as here.

Regarding my years of service with the United States Bureau of Reclamation, I can say that when I was employed by the Reclamation Service, Mr. Weymouth was one of the younger supervising engineers in the service. As I recall, A.P. Davis was the chief engineer. I met him occasionally, but in those days the policy of the Reclamation Service was to get as much work done as possible for the money spent. On these projects where I was in Nebraska and Wyoming, the district first started out doing this work by portioning the hand contract on the earth work. The district didn't do any earth work until we started on the North Fork Division on a large cut where we purchased a drag line and did this work ourselves; and then later it all went to contract. But on this project where we were doing these works for 18,000 acres (I think the original estimate was [18,000], now its 10,000 because of lands that were eliminated because of soil condition) the structures were put in and designed on the project.

At one time we sent in a request to construct certain works. I remember the chief engineer's office which is located in Denver. And I have a letter that says, "The construction of the structures that you are referring to is approved, but not the design." In other words, we were

not designing according to some of the theories that we should be to eliminate loss of head and stuff like that. But I still have a very lucrative farm in Nebraska that I've had for fifty years, and I see some of these structures we put in, and they're still functioning after fifty years; so I don't think I have any regrets over the reprimand given by the chief engineer. But as a whole, the engineers of the bureau were able then--the only thing is that occasionally we'd have a politician move in and ask for certain additions to the project where the lands might have been questionable in that program.

But, recently, on the North Platte Project in Wyoming, above Casper, there was a dam built so that the water from one of the reservoirs could be used for the development of power; and they could use more water than was needed downstream. This lower dam was put in to retain a portion of that water and to let it out gradually. [Interior] Secretary Stewart Udall made a statement that the North Platte Project with the Seminole Dam, which had been built in the 1940's--or something like that--is the best. It's above the Pathfinder Dam and it's got about a million acre-feet of storage. Then they've got the Kortes Dam as a power structure. The Pathfinder Dam was completed in 1909 and it had a million acre-feet of storage. Since then they've put in a power plant below the Pathfinder Dam and they dump the water into the Alcova Lake, which I think has about 180,000 acre-feet of storage. And then

this reef dam was put in. Down the river below Casper some 120 miles is the Glendo Dam. That's got a large storage, and they've got a power plant there. And then there's Guernsey Dam, which was constructed when I was still with the Reclamation Service in the 1920's, and the power plant there. Stewart Udall said within the last two years that that's the best developed river in the whole United States.

If, at the time the North Platte Project was laid out and the Pathfinder Dam was built with a million acre-feet, they hadn't built that and put the land under irrigation in Nebraska where the land is flat (There must be altogether five hundred thousand acres, maybe more, down in Nebraska that receive supplemental water if not primary water from this reservoir), the North Platte River water wouldn't have been used yet. That's what they're facing right now in connection with bringing water from the Columbia River. If they'd waited and let Colorado and Wyoming use that [North Platte] water, it wouldn't have been used yet; I'm bringing that point out. They got together through studies of the early studies that I made in 1914 and 1915, making the measurements on the river of canal routes and creek flows into the river which Conklin used in his studies of the North Platte River way back in the 1920's. They're talking about this 170 million acre-feet which is going into the ocean

now from the Columbia. I think the same policies used here [North Platte River] and for the present bill that's in Congress for bringing 8.5 million acre-feet over into Lake Mead could be used for the Columbia River. That's my point. And Secretary Udall says himself that the North Platte was the best harnessed river in the whole of the United States.

SCHIPPERS: So the bureau really knew what it was doing.

DIEMER: Yes, well, somebody did. That's a wonderful valley now, all down there. It's the best irrigated project I've ever seen. That project put my kids through school--I mean that land we've got down there which we bought several years before water ever got on it.

SCHIPPERS: What kind of man was A.P. Davis?

DIEMER: A.P. Davis was on our consulting board here on the Colorado Aqueduct Project. It was one of the last consulting boards we had. I, of course, had met him in the Bureau of Reclamation when he was commissioner and Mr. Weymouth was chief engineer. Then, later, he came up here and took charge of the East Bay at Oakland. He was one of the nicest men I ever met. We were never at odds outside of him making that decision on that project I had on the North Platte regarding the tunnel location. I was riding one time with him on the Colorado River Aqueduct. We had a board of review at that time going out over it. We were out near Earp, California, because we'd been on the desert right along at a station there.

One of the board members said, "I don't see why any engineer would want to work out in a place like this." And he didn't get very far because A.P. Davis picked it up. He had been in on the start of the United States Bureau of Reclamation, which was in 1902, and he said, "Well, I don't see anything wrong if you build houses so people can live. Sure, they're not in the cities all the time, but how are you going to build this 240-mile aqueduct if you don't have people live out here, to lay it out and study it and do design works. It can be done in the city, probably, but all the rest of the work, supervising, construction, and all has to be done by the people living out here. Why, I remember when Weymouth was on the Yellowstone Project as a young engineer just starting out. He and his wife lived up there on the Yellowstone; it was wild. You know where Yellowstone Park is now. There's a lot of rugged country in there yet." He was that kind of a man. He was a sympathetic man, and he was capable and had his feet on the ground, and Weymouth did, too.

TAPE NUMBER: I, SIDE TWO

AUGUST 25, 1966

DIEMER: Just before I left Mexico, Rudolfo Calles, son of the president, came over to our camp and said, "Mr. Diemer, why do you leave Mexico?" I said, "Well, I've been down here almost three years and I've got a family in the United States; I ought to get back." He said, "Well, if it's money you need, we'll give you more money. If it's land you crave, we'll give you land." I said, "No, Rudolfo, none of that at all." Well, he gave me one of these great big serapes that covers the bed; so I came out of there with that, anyway.

During my stay in Mexico, excepting the first years when I was down in Aguascalientes, my family was in Casper, Wyoming, and then they moved to Laredo, Texas. My brother-in-law and his wife and my sister came down with them and they got a location. I didn't get up there at the time. A few days later, I came up and my son who was only three years old grabbed his mother's leg when I walked in the house and said, "Who's that man?" So that's the penalty you pay for going away from home. But if it hadn't been for her I couldn't have done it. She wanted me to leave reclamation work because we didn't know where we'd end up, and it looked like a good opportunity, and it was a turning point in my career. There's no question about it, because with the Reclamation Service, on the big jobs, those men

generally are transferred; but sometimes proper recognition isn't given. Some of the men don't know their job.

TAPE NUMBER: II, SIDE ONE

AUGUST 31, 1966

SCHIPPERS: Since last time, you reflected on some of the experiences that you had when you were a youngster. One of them you were just telling me about has to do with your first job after you were in high school.

DIEMER: That concerns my job, which was the first job I had, with the C,B & Q Railroad, Palmyra Junction. I was assistant agent. The agent was the boss and he was a telegraph operator. He offered to teach me telegraphy if I cared to make a donation toward his son later. I said, "No, I don't care to become a telegraph operator." I had seen these boys here on survey parties going through here, and I decided to take up civil engineering at the university that fall. Well, one of my duties was to pull the truck out and transfer the baggage from the truck to the baggage cars of the passenger trains that passed through the junction point. One morning I pulled the truck out. It was loaded with milk going west to Kansas City. A freight train came through which wanted to get on the main line headed to Kansas City. The brakeman opened the switch up ahead, and I highballed to give them the signal that I would close the switch after they'd passed through it. I'd forgotten that I'd pulled the truck out on the platform between the tracks, the one on which the train was and the other track on the right which was not occupied.

As I grabbed the grab iron on the freight car, I hit the truck and it was knocked down between the platform and the rails on which the train was passing. How I ever got out of that without losing an arm or leg, God only knows, for which I was very thankful. It taught me a lesson: always tend to your business. I had forgotten that I had pulled out the truck. Fortunately, I wasn't hurt. That was one lesson that I valued all through my later life.

SCHIPPERS: You also were telling me about Goose Egg Spring.

DIEMER: Yes, that's right. That spring was about ten miles south of Casper, where my wife's folks homesteaded--I think it was, in 1888. This spring runs fourteen second-feet of water or about 6,000 gallons a minute. They developed their ranch and built an irrigation ditch. Their neighbors joined in the construction of the ditch. They siphoned the water across the North Platte River to lands lying on the east side of the river. Later in life, my wife and her sister became owners of the ranch. During my father-in-law's life, he ran a sheep ranch and a cattle ranch, about twenty-five hundred head of sheep and a couple hundred head of cattle each year. He was strictly a pioneer. We often read stories where some of the old-time settlers never spent a night at home for fear somebody would [invade their] home, because oftentimes, the cattle rustlers were out and they didn't want to be caught at home. Well, he always was at home; he was that type of man--one of the high-class citizens of Wyoming.

My wife and her sister became owners of the place during the early 1950's. The state had been trying to get permission to put in a rearing station for the raising of trout for several years. After the girls got control of the ranch, we made arrangements with the state whereby it would acquire twenty-five acres of land for the purpose of raising trout to be distributed throughout the streams of the state. This turned into a real industry, and at the present time they have a hatchery there. By the way, the whole installation is named the Dan Speas Rearing Station, because we figured if anything came out of this it should be the keeping of his name before the public. At the present time they are breeding about five million trout a year at this hatchery and rearing station.

SCHIPPERS: Well, what you didn't tell me is how this figured in with your work on the North Platte Project, that this was the way you met your wife.

DIEMER: Oh, yes. I forgot to mention that on my first trip out of Casper to Pathfinder Dam, which was the main storage dam for the North Platte Project, it was necessary for me to take a stage out of Casper. They had lunch at a wayside station, halfway, at Alcova, Wyoming, which was about thirty-five miles out of Casper. I had been told by others who had been up to Pathfinder Dam that the family at this wayside station always offered any reclamation employee a drink. They always would pull a jug out of the

stove or somewhere and offer the visitor a drink. Well, that came to pass all right, but I didn't take the drink. The proprietor said, "If you're going to measure water in all these creeks around and the canals coming out of the river, when you get down here to this Goose Egg Spring and the Speas Bridge, you want to watch out for that old man down there; he's got four daughters and he don't let anybody hang around." That was my warning regarding the Speas family. Well, the next morning the only way for me to get to Pathfinder Dam was to ride a saddle horse up about six miles, tie him to the mailbox, and then walk over to the dam another six miles. Since I was a young engineer getting started, I sure wanted to see this dam, because it was one of the largest the reclamation had built. It had a storage of over a million acre-feet, was over two hundred feet high, and was a masonry dam. I think this covers my experience in connection with measuring the waters of the North Platte, which I followed for three years before being transferred to survey work in Wyoming on the North Platte Project.

SCHIPPERS: Before we go on to your work on the Colorado River Aqueduct, I wanted to ask you about the projects in Mexico. In particular, I wanted you to describe the scope of your jurisdiction in the design and in the supervision of employees and the decision making at the various sites you worked on.

DIEMER: At the first project that I worked on in Mexico, the Presa Calles Project at Aguascalientes, Mr. Julian Hinds, who had also been in the Reclamation Service for a number of years, was the project engineer. He was in charge of all the design and all the operations on the project. I was in charge of all the surveys with the exception of the dam, which I've already mentioned. It had originally been placed at the lower end of the canyon by another engineer. When Mr. Hinds took over the responsibility of the whole project, surveys were made to indicate that the dam should have been at the upper end of the canyon. In fact, the dam which he had designed had about one-fifth the amount of concrete in it that they had wanted at the lower end of the canyon. I was in charge of the initial surveys outlining where the project was.

I might say that we went there and there'd been little work done on the location of the dam. The project was somewhere out there. Nobody knew where it was or where the canals would run. Well, that was our business, to lay down the preliminary lines and to locate where the lands were that might be irrigated from this system. I spent four months there. At that time I had Grant Bloodgood, who later became director of reclamation, and Don McCoskey, who was a Nebraska University man--Bloodgood was also. Then I was transferred in December.

I was transferred to the Don Martin Dam Project which is south of Laredo, Texas. While on the project with Mr.

Hinds, we had peons that were getting about a peso and a half a day doing the labor work. The engineers, with the exception of Mr. Hinds and two other men and myself, were all Mexican engineers. Although they were mostly inexperienced, they were rather valuable assistants on the surveys. They cooperated, I would say, one hundred percent, and it was a most pleasant job. However, I wanted to get nearer the border because my family was still in Casper, Wyoming. So I arranged for a transfer to the Don Martin Project which was in the charge of my old boss, Andrew Weiss.

At that time, some work had been done on the road that was planned between a station on the Mexican railroad to the Don Martin damsite. I observed the map showing where this road had been located, and since I was in charge of all surveys, I asked for permission to check a location which would eliminate about ten miles of line. Mr. Weiss gave his permission, and after we had surveyed this land and found that it was feasible--no hazards or anything, more economical, and a shorter haul--I made an inspection with Mr. Weiss on this trip. He looked the road over, and since the Mexicans had located the road, he thought it'd probably be better not to raise the question about the location of that road the way I had it, even though it was ten miles shorter and there was a lot of material to be hauled out to that damsite. So I told him that since we had to give a thirty-day notice before we were going to

leave, it might be well for me to give my resignation, because I couldn't see working anywhere if economy wasn't the watchword. The road was built on the location which I had selected. The general manager of the office was in Mexico City and later said to me, "Diemer, how the heck did you ever find that route out?" I said, "Well, the shortest distance between two points is a straight line, and so we just looked into it."

Well, then about in March of 1927, I received a wire from Mr. Weymouth, who was in charge of all the engineering work on all the projects, asking me if I would consider transferring to the Rio Mante Project, northwest of Tampico, to take charge of the project. I spent two years on this project, which covered 50,000 acres. It was in an area that was practically all jungle land, but very dry when it was dry; and then when it rained it was practically impossible to go anywhere except on horseback. President Calles and some generals were interested in this project and wanted [the land] to bloom like the state of California. That was his work. It was a good job. I had responsibility for the design, the planning, everything, except the direct construction which was under the superintendent who reported to the general manager in Mexico City. Then revolution came along in March of 1929.

I had had terrific headaches for sometime. Although I wasn't a heavy smoker, I quit smoking at that time, and I

haven't smoked since. But apparently it wasn't the smoking that was causing the headaches; it was malaria. I'd been in Mexico almost two years and nine months all told. I never had any sign of malaria, although a lot of people on this project had it. I had a 105 degree fever for three days, so it must have been pretty bad. I left Mexico in the latter part of April.

Sometime in June, I received a telegram from Mr. Weymouth--who had gone to Los Angeles, connected with their Department of Water and Power--to take charge of the surveys and the estimates on the Colorado River Aqueduct. He described the job and said it'd probably be six months before he got approval from the city council of Los Angeles since I was not a resident of the state. I accepted the offer, and my family and I landed in Los Angeles on July 8, 1929, when they had an earthquake. I went to Mr. Hinds' office to report; he had preceded me to Los Angeles and was in charge of design. His secretary asked me, "Did you feel the earthquake this morning?" I said, "No, I guess I was on a streetcar." "Well," she said, "I could see the city hall sway." While I was sitting there with her, I heard--this was in the Los Angeles Department of Water and Power--one of the engineers go to the telephone in the other room and say, "Well, there's another damn guy who's come from Mexico this morning." That was my welcome to the Los Angeles Department of Water and Power.

SCHIPPERS: I wanted to ask you a question about Mr. Weymouth. Do you know why he decided to leave the United States Reclamation Bureau and go to work for the Los Angeles Department of Water and Power?

DIEMER: Why he left Mexico?

SCHIPPERS: He also left the Reclamation Service, I assumed, didn't he?

DIEMER: No, he wasn't with the Reclamation Service then; he was with the Mexican Commission of Irrigation.

SCHIPPERS: I see.

DIEMER: And he was the chief engineer. The J.G. White Company had this contract with Mexico to make these surveys and to design these various projects.

SCHIPPERS: I see.

DIEMER: So in reality we were employees of the J.G. White Company of New York, but we were working for the Mexican Commission of Irrigation.

SCHIPPERS: Well, then, when did he leave Mexico?

DIEMER: He left Mexico in March of 1929. I think he left the Bureau of Reclamation along about 1924.

SCHIPPERS: I see.

DIEMER: For two years he was with a company in Philadelphia. I've forgotten what the name of that was. I think his name was on the company.

SCHIPPERS: I see, so he was free-lancing.

DIEMER: Oh, yes. He was out of reclamation; there was

politics. I might say that R.F. Walters succeeded Mr. Weymouth as chief engineer when he left. And A.P. Davis had been director of reclamation. He later became the head of the East Bay District at Oakland, and then he was on one of our consulting boards down here in 1931, I think it was. I was with the Reclamation Service in Nebraska when A.P. Davis came through with the next director of reclamation. He came through on the North Platte Project, and none of us knew when Mr. Davis was being pushed out. It was strictly politics, and I think Weymouth went for the same reason.

SCHIPPERS: So when you went to Mexico, that also was the end of your work with the Reclamation Bureau?

DIEMER: That's right.

SCHIPPERS: And why did you leave?

DIEMER: Well, the reason I left was because I got a better offer. Oh, I think I told you in there somewhere, that Hubert Work, Secretary of the Interior, had been to our project in the spring of 1926. He had the two senators and one congressman from Wyoming. They were making a review of this project. And I had always felt that that project didn't have enough good land to warrant construction of this project. But, of course, being just a young engineer on the job, his opinion isn't worth anything. So we just went on and did the work, whatever there was to do, building canals. I was in charge of an earth-fill dam

there that they built. Mr. Work came there in the spring, and one night at a dinner at the hotel, which I didn't attend, he announced to the Riverton, Wyoming people that he was closing up that project, that it wasn't worth building. We stayed there until the last of July to clean up and then I was on vacation. I got a telegram from Mr. Weymouth offering me double what I was getting with the Reclamation Service. Although I'd been working fifteen years, I couldn't see any reason why I shouldn't leave. And as my wife said, it was the best thing we ever did, even if we were going to be living together only every three months, or something like that. And if it hadn't been for taking that step I would never have gotten in touch with this job at all. Because from that project--I think I have mentioned before--Mr. Weymouth brought Julian Hinds and Clayburn C. Elder and [J.M.] Luney, their chief accountant, and Bond came along later, and myself. I guess that was the size of it. Then I wired him and accepted the job out here, and as I said, we landed here on July 8, 1929.

TAPE NUMBER: II, SIDE TWO

SEPTEMBER 2, 1966

SCHIPPERS: You were going to explain some of the events in the formation of the Metropolitan Water District of Southern California just prior to the time you came to work here in Los Angeles. Also, you were going to describe how things were when you went to work.

DIEMER: Well, I'd like to say that when I arrived in Los Angeles on July 8, 1929, I had little knowledge of the Colorado River Project. The Metropolitan Water District had been formed in Pasadena, California, on December 29, 1928, when the board of directors from eleven cities in Southern California held its first meeting. The District was formed in accordance with the Metropolitan Water District Act which had been passed, as I recall, in 1928. It's often been referred to as the thirteen cities of the Metropolitan Water District. However, at the initial meeting there were eleven cities. Later, San Bernardino and Colton withdrew, and four other cities annexed to the District before the bond issue was voted upon on September 29, 1931; the four cities that annexed to the District were Long Beach, Fullerton, Compton, and Torrance, making up the thirteen cities in addition to the original nine that remained in the District.

At the time I arrived, the District was making the

estimates for the Los Angeles Department of Water and Power who had initiated this project and started investigation work, as I recall, in 1925, making topographic surveys extending all the way from Bridge Canyon into the Los Angeles metropolitan area. The city had voted a bond issue of 2.5 million dollars to pay for this work which consisted of topographical surveys, road building, and miscellaneous items in connection with the investigation. However, this 2.5 million dollars was repaid to the city after the Metropolitan Water District had voted a bond issue of 220 million dollars on September 29, 1931.

My first work with the Department of Water and Power was in connection with the estimates of various routes from the Colorado River to Southern California. As I recall, there were estimates made on fifty-four different routes from Bridge Canyon above Lake Mead all the way south to Rio Salado, as I recall, a coast route coming through the mountains from Mexico and up the west coast. A board of review (comprised of Thaddeus Merriman, head of the Water Department of New York City; A.J. Wiley, a very prominent dam engineer from Boise, Idaho; and Richard Lyman, consulting engineer from Salt Lake City) was employed by our board to review the plans of the general manager.

I'd like to say that the general manager was Mr. Weymouth, who was my overall boss in Mexico prior to my coming here. My immediate superior was Mr. Julian Hinds,

chief design engineer, formerly with the Reclamation Service and with the J.G. White Company in Mexico on the Mexican projects. J.B. Bond was construction engineer. He also had been to Mexico and, prior to that, was with the Reclamation Service. I worked for the first six months over in the office in Los Angeles in connection with the estimates on these various lines from the Colorado River. In the early part of January, 1930, most of these estimating groups were sent into the field to make surveys of some of the most important lines.

I might say that just prior to this, in December of 1929, I made a trip with the general manager and chief designing engineer, Mr. Hinds, and with the board of review. We all went up to the Boulder damsite and we looked over the routes that had been studied. One of the sidelights on this trip was that Mr. Lyman, who was a Mormon, didn't like smoking. The boys in the cars all the way would be smoking it up. So one night when we were in Las Vegas, he bought some of these real large cigars. He gave them to the fellows that'd been riding in his car and he said, "I hope you fellows now will remember that I don't like smoking." Well, they did just the opposite. When they got started again, they all four lit up these big foot-long cigars; and then he started to tell about the other fellows taking his liberty. He didn't think he was in the minority, but they sure gave him the works.

I mentioned about the groups going out to help on the survey work. There had been groups of surveyors out over the line, employees of the Department of Water and Power. But since the studies had indicated several routes that should be studied in the field, we sent out these additional men from the office. As I recall, when we first went out on the sixth of January, there were fifteen inches of snow at Searchlight, Nevada, where some of our survey operations were established. I remember, too, that Searchlight was at about twenty-six hundred feet of elevation. As we went out from that point, down to an elevation of fifteen hundred feet, we had snow, but after thirteen hundred feet it was all dry. This was the prime time to work in the desert because of low temperatures and good working conditions, whereas in the summertime it got up to 120 degrees.

We worked until about May, and then we moved through different campsites. The geodetic work and the drilling work were done under other surveyors. Our headquarters was at Beaumont, California, where the Department of Water and Power had a temporary office, I think, extending from 1925 up to today. After we returned from the field, we worked on the estimates. On this first survey work, I was in charge of the crews investigating routes from the Boulder Dam and Bulls Head sites. The Parker Dam route was investigated by other members of the organization.

SCHIPPERS: What was the camp life like? Was there a lot of excitement in the planning and in the investigation? Was there good cooperation?

DIEMER: Well, I might say in connection with the surveys and all the work that was done while we were still Los Angeles Department of Water employees, that we got wonderful cooperation from all of the employees that had been there for a number of years and also from all the people connected with the various types of work for drawing and geodetic surveys and such. When the Metropolitan Water District of Southern California took over the operations of the Metropolitan Water District surveys, which occurred on May 1, 1930, some of the men that had been with the Department of Water and Power for a number of years transferred over to the Metropolitan Water District forces. I had two men that I remember quite well that were in on my surveys. Richard Stephens, [Jr.], who stayed with the District during construction until 1938 when the portion of work which he was on was completed, is now vice-president of the Arundel Corporation of Baltimore, Maryland; and Harris V. Crawshaw, who ran our surveys and later was my office engineer when I was general manager, is still with the District as an administrative engineer.

SCHIPPERS: You stated that before you went any further you would like to give a résumé of your career in terms of promotions from the time you started to the time you

left the District and your present situation.

DIEMER: Well, I'd like to mention that because I may overlook it as I go along just talking. As I said, I went to work on July 8, 1929. On May 1, 1930, the Metropolitan Water District took over the work from the Los Angeles Department of Water and Power. We operated with a separate headquarters in Los Angeles at Third Street and Broadway. At that time, I was engaged in the location of the Parker route. During the latter part of 1931, after the bond issue had been passed, the plans for construction were put in operation, and I was placed in charge of Division 4, north of Indio, which covered about sixty-five miles of aqueduct. Included were forty miles of sixteen-foot diameter tunnel, the greater portion of which was a project built by Metropolitan Water District forces and not by contract. In August of 1934, I was transferred into the Los Angeles office to take charge of the design and construction of the distribution system extending from the end of the aqueduct into the general storage area at Lake Mathews. Later, when the aqueduct was completed in 1941, I was placed in charge of the complete aqueduct system, with the exception of the pumping plants and the power lines. My job also included the operation of the distribution system.

In 1950, I was made assistant general manager reporting to the general manager and chief engineer, Julian Hinds.

On December 31, 1951, Mr. Hinds retired, and I succeeded him as general manager and chief engineer and held this position until I retired on December 31, 1961. At that time, I was three years and eight months past the mandatory retirement age of seventy. But at that time engineers were hard to get and the board got an act through the legislature permitting the District to hire engineers who were over seventy years of age until the completion of their work or until December 31, 1961. Upon my retirement, I was appointed by the City of Pasadena to represent the city on the District board. I have maintained this position up to the present time.

In November of 1930, Mr. Weymouth made his report to the board of review regarding the essence of the various routes. And on December 19, the board of review made a report to the board of directors regarding the findings of Mr. Weymouth's report, and they concurred on the selection of the Parker route to be the one to take water from the Colorado River into Southern California. One of the things that they mentioned in their report was that there had been some talk about the size of the aqueduct. The board of review report is dated December 19, 1930. It concurred with the general manager's recommendation that the Parker route be accepted to bring Colorado River water into Southern California. The report stated that the aqueduct should have a full capacity of 1500 second-feet of water.

The initial construction of tunnels, covered conduits, and open canals was to be for a full capacity of 1500 second-feet. Initial capacity of other parts of the aqueduct would be 800 second-feet.

Upon receipt of this report and the approval by the board, the engineering forces turned to the design and location of the Parker route. I was in charge of the location from Parker into Lake Mathews. The aqueduct was finally built. It was built to full capacity for the tunnels, covered conduits, and canals. Three 200-second-foot pumps were put in at the different plants. The aqueduct, as originally built, was not set up for 800 second-feet; if any mistake was made in the design of the aqueduct, initially, this was one. In my estimation, an additional pump and an additional delivery line should have been put in, so that we could have used the full capacity of all the siphons. This way the siphons were built for half capacity of 800 second-feet and a pumping capacity of only 600 second-feet. At that time it would not have required too much money, but it was considered necessary for several years, anyway, to build it with just the three pumps.

As I said, after the work went to construction following the passage of the bond issue on September 29, 1931, by a five-to-one majority, I was placed on construction in charge of Division 4. In this capacity we had charge of about twenty headings [which were driven] by the District

forces and by the contract forces. The three tunnels on the upper end of the division (the Hayfield Tunnel, one of the two of the Mecca Pass tunnels--by the way, there were four tunnels--and the Cottonwood Tunnel) were all under contract. The other tunnels were being done by District forces.

SCHIPPERS: Before you go on to discuss that aspect, would you say there was any question that this was the best route of the available routes that were put up?

DIEMER: So far as I know there wasn't any question because I wasn't in on the discussion. All you would get from me would be my opinion.

SCHIPPERS: Well, that's fine; what were some of the opinions at the time?

DIEMER: Well, at the time, there wasn't any opinion. The cost of the Parker route was the lowest.

SCHIPPERS: And, therefore, that became the decisive issue.

DIEMER: That was the decisive issue in so far as the delivery of water to the terminal reservoir was concerned. It was probably as short as any of them--242 miles. I think there were about ninety miles of tunnel.

There was one time before the board of review got a hold of it that we had four pumping plants. By the way, the design of the pumping plants were all under the chief electrical engineer, J.M. Gaylord, who was also with the District from the start and followed through until his

retirement in 1950. At one time, we had four pump lifts. When borings were made on various tunnels out by Granite Pass, twenty miles west of Rice--Granite Pass Tunnel, if I recall, was about ten miles long--they found some water in it. How much water, I don't know. But, anyway, it was decided to carry the canal along to the north and to put in a new pumping plant, a third pumping plant there, which made a total of five. That required the relocation of the aqueduct from that point on westerly to the Hayfield lift. That was one of the changes that was made in the location due to the water being in that tunnel site.

SCHIPPERS: You do agree, however, that the selection of this route was the best possible?

DIEMER: Yes, I would say that the amount of lift was a favorable part of this route, even though it required pumping the water more than 1600 feet. In connection with the construction of Boulder Dam, before Boulder Dam was authorized, the District had signed a contract whereby they got thirty-six percent of all the power from Boulder Dam at a very low figure. (I don't have that figure.) And that was sufficient to pump two-thirds of the water that the District would take through the Parker route with their pump lifts for the 1600 feet. That was one of the principal things. If we had not had that power, and would have had to pay the high price for power, it wouldn't have been so favorable. The other thing the board of review considered was that this route was all in the state of

California, and there would be no taxes to pay, which would have been necessary if part of the line was in Nevada or Arizona. With the exception of the Coachella tunnels north of Indio which totaled eighteen miles and the San Jacinto Tunnel through the San Jacinto Mountains which was thirteen miles, all of the tunnels were more or less short tunnels and could be constructed in four or five years.

The geological reports which had been submitted to the manager and to the board of review were all favorable to the Parker route. The route coming from Black Canyon would have passed under Lucerne Valley, which was a long tunnel, about a fifty-mile tunnel, and with overlying water basins; they were afraid of that being a very expensive construction. The geologist had said that most of the tunnels on the Parker route would not have had much water and that even went for, as I recall, the San Jacinto Tunnel. However, during construction, they intercepted flows of water that totaled more than eighty second-feet or 40,000 gallons a minute.

SCHIPPERS: Although there was good accord with Mr. Weymouth's recommendation, there also must have been some critics of the route. Do you remember what the tenor of the criticism was?

DIEMER: Well, I'd like to say that after the route had been selected, there was criticism from some engineers. I can't say whether the Los Angeles Chamber of Commerce en-

dorsed these opinions or not; but they advocated that the aqueduct be built for half the capacity in place of full capacity. And they also had a reference in the report that the engineer twenty-five years from then, which would have made it in the middle fifties, would be able then to determine where he should go for the additional water. I happened to be the engineer and the general manager at the end of the twenty-five years, and I can say that the District built the aqueduct, with the exception of only putting in three pumps at the pumping plants, so that everything was going in accordance with the needs of Southern California.

I might say that when the first water came in 1941, there was much concern as to where we would get additional lands to put the water on. The first water that came in 1941 to some of the cities was delivered free. There was lots of criticism from some of the users about the taste of the Colorado River water. However, as the years rolled on the drought got worse, World War II had finished up, a lot of soldiers came to California to live, and the population burst out all over. It was demonstrated that the District must get busy and bring in the additional water which the aqueduct was to serve. As I said before, the aqueduct was built originally for 600 second-feet. The canals, tunnels, and covered conduits were for 1605 second-feet. That was based on 1500 second-feet plus a shut-

down seven percent of the time. In fact, since the aqueduct was not built to full capacity, it has never been shut down seven percent of the time.

The water got here just in time; the agencies that were not in the District at the time of the completion of the aqueduct joined the District. Several of the agencies which were pumping from underground found the water table lowering so fast that they finally came into the District. And at the end of 1961, as I recall, there were about 4500 square miles within the District with about 110 cities, whereas, in the beginning in 1928 there were eleven cities and 640 square miles.

SCHIPPERS: In effect, everyone felt that it was a wise choice, and every one in the department stood solidly behind Weymouth in the decision?

DIEMER: Well, I would say this, that the decision was probably made by some of the employees that reported to Weymouth, and Weymouth would sit down and discuss these things, and that's the way you come to a decision. There was no opposition to that suggestion at the time it was made, even from outside as I recall. But they were all concerned after a few years of operation. I might say that after the aqueduct distribution system went into operation and World War II started, General [George] Patton called the office for a conference regarding getting water out of the aqueduct for his troops which he intended to bring in.

This would have been April of 1942. He came into the office and said he'd like to get water out of the aqueduct within a week. At that time, the aqueduct was not in operation. We had water at Lake Mathews. We didn't need to pump any, and there was no take-off between the river and Lake Mathews. He told us where he wanted to put the camp out by Shavers Summit, about halfway between Indio and Desert Center. We told him that we would put in a concrete wall inside the aqueduct below one of our long siphons, so he could use that siphon as a reservoir from time to time when we were not pumping; there would always be water in that siphon. Within a week's time we got our concrete wall in, we started our pump and got the water there, and the troops started coming in. I saw him a week or so after they arrived there and he said, "Everything's going fine; if there's any part of this aqueduct you want kept off limits, we will put up signs there." And we had wonderful cooperation with all the troops; there were over a million troops training in that vicinity in 1942 and 1943. And the aqueduct served the purpose in connection with the war, because we were not running even one pump at any time.

SCHIPPERS: Now that you've had a chance to refamiliarize yourself with the final report of the engineering board of review that was submitted December 19, 1930, after all these years, what do you think of it as a report? Was it a good one and was it a thorough one?

DIEMER: Well, I would say that the report was a good report. There are some things in there that were not done like I mentioned. They said to put in an aqueduct of 850-second-foot capacity. When it was constructed, we constructed three pumps in five different plants. There would be two pumps pumping all the time and one standby; but I think in place of putting in just the three, we should have put in four pumps, or maybe even five, and have one of them as a standby, so that all the time we could at least utilize the half-capacity siphons which we had. There were twenty-two miles of siphons; they were put in at half capacity. The remainder of the aqueduct was all built to full capacity.

Then another thing they referred to in that report was that the Parker route had the advantage of having a reservoir. It had the Hayfield Reservoir, which was a natural lake site, although they call it the Hayfield Reservoir. It didn't need a dam to be built. It was just a natural sump. When they first started the pumps for several months, they just pumped the water into the Hayfield Reservoir. They never got it over two and one-half feet deep because the soil was all porous, and for that reason it has never served as part of the aqueduct system. The water now comes through to the Hayfield pumping plant and is pumped up to the elevation of 1807 feet, and from there it runs by gravity into Lake Mathews. As

far as I know, that was about the only thing that wasn't done according to the report; that report was a good report.

SCHIPPERS: What about the men who served as the board of review?

DIEMER: Well, in regard to those three men, I would say they were tops in their profession. A.J. Wiley, the dam consultant, was on most of the dams for the Reclamation Service and on a lot of private dams. Thaddeus Merriman was head of the New York City Water Department. His father was one of the top mathematic professors--I don't recall whether he was at Cornell or where. Richard Lyman helped lay out Salt Lake City. He was a very capable engineer, too.

SCHIPPERS: In effect, you're describing a top-quality project from beginning to end, aren't you?

DIEMER: Well, that's what I would say it was. And I will say this, after all the years that I've been connected with it, I can't say that there's any part of it that hasn't served without a great deal of men and maintenance.

SCHIPPERS: You also wanted to make mention of another report that was prepared and submitted by Mr. Weymouth on July 13, 1931, entitled, "A Summary of the Metropolitan Water District Aqueduct Situation."

DIEMER: Oh, yes. That report was issued before the bond issue came before the voters on September 29, 1931. It contained a lot of information in connection with the

water situation in California. I would like to call special attention to a statement which he made in that report regarding the ground water basin. He called attention to the fact that California had these ground water basins which had been piling up over the ages, and that now the various agencies [cities] were pumping from the underground from many wells. And I think that he said there was an area of 350 square miles where artesian flow had been going on for years. And now these were becoming less and less, and he admonished the people of Southern California to try to protect their underground basins and not let sea water flow in to destroy them.

This report passed unnoticed as far as the people of Southern California were concerned. We came in with the water in 1941, and for a number of years there was a very small use of the water. Then, when the drought came on, Orange County finally came in during 1951. Very little annexation to the District was made prior to 1948, when the West Basin Municipal Water District was annexed to the main district. They began to see the intrusion of sea water into their underground basin. In 1951, Orange County Municipal Water District annexed to the main district and the Central Basin Municipal Water District came in during 1954. With these three large areas in the District it became possible to start to replenish these various underground basins.

The work was started principally in Orange County under Howard W. Crooke of the Orange County Municipal Water District. Up to date, I don't have the total quantity of how much water has been sold to replace the underground basins' water. It had become so bad that, in the west basin area several years ago, the state put in a test section of a mile. They put in wells about 500 feet apart, and then they pumped the water down and injected it into the underground and built up a cone to resist the flow of the sea water toward the underground basins. And now they're completing or have completed two more sections. I don't know what they're called. One of them is eleven miles. As I understand it, since these injection wells have been in operation, there's been one shutdown of the operation of the pumps. Just a short shutdown of less than a day caused the sea water to come back in, and it took them several days to catch up with the cone that had been built up by the injection wells. So, Mr. Weymouth's warning way back there in 1931 did not have much attention given to it. But now all these areas are in the District and are trying to replenish their wells while water is available.

SCHIPPERS: We are now going to return to your work on the aqueduct as it developed.

DIEMER: I stated before that in the latter part of 1931, I became division engineer in charge of construction on Division 4, both contract and force account work in which

we had over forty miles of tunnel. The District had seven camps in which they had built dormitories and mess houses, where the work was done on the basis of three shifts a day. In connection with the present racial problems, I might say that the District had two mess houses in which all the help were Negroes, and we had very satisfactory service in those two camps. The different crews seemed to work on a competitive basis to see who was making the best record. The wages then were about what they get per hour now. Can you beat that? It was $3.20 per day for labor, and their rate now is about that or a little more for an hour. One of the men that was with me in charge of one of the contracts had been with the Department of Water and Power in 1926 and was carried over into this work. He's now chief engineer of the District, Henry J. Mills.

The District force account work saved the District considerable money over what it would have cost if it had been contract work, because a lot of the tunnels, when studied by the geologists, were not supposed to require any timbering. Well, practically all of the thirty-four miles that the District built required timbering. We saved several million dollars by doing the work by force account. The District's policy in the construction of this work by force account was severely criticized by all the contractors. On this section of tunnel there were no occasions when the work was difficult; the only thing we had to do was to

use good safety methods. I might say in connection with the District force account, that even now the District sometimes is involved in silicosis cases where the party claims that he worked for the District at a certain time way back there thirty years ago or more and developed silicosis. As a result, he'd take a claim to the Industrial Action Commission and be awarded so much. The District has been forced to pay some part of their total disability.

Since this work was done during the Depression days, there was a large labor market of inexperienced men. As a result, a lot of people came out and got a job to work on the tunnels. I might say, too, that the District employment office in Los Angeles scrutinized the applicants; they were residents, and if they did not live in one of the eleven cities of the District, they were not given employment. However, the District forces in time all became very experienced, and good progress was made on both the driving and the lining of the tunnels. These tunnels were sixteen feet in diameter and were all concrete-lined. There weren't any unlined tunnels on any section of the whole aqueduct.

One of my responsibilities as division engineer was to be in charge of all the supervision of the construction of the works within that division. The designs were made in the Los Angeles office. The superintendent of construction reported to the general manager in Los Angeles and plotted out the plans, grades, and lines that his surveyors

established. Good cooperation was had between the construction forces and the engineers. J.L. Burkholder, a former engineer with the United States Bureau of Reclamation, who had worked under Mr. Weymouth in the early twenties, was the assistant general manager. As I said, there was good cooperation and harmony between the two different organizations--the engineers and the private contractors. There were five different tunnels which were being constructed by separate contractors who had bid on these various jobs. We also had good cooperation with these contractors. In these cases, we were the sole representatives of the District on the job--that is, the engineers that were working under my direction.

Our camps did not have facilities for the families of the workers to live in camp. The men drove back and forth at the end of the week or during the shutdown periods. But one night at one of the tunnels a bunch of girls showed up at the portal of the tunnel and told the motorman there that one of the tunnel shifters had said, "Come on up and come on into the tunnel; they'll bring you in." Well, the tradition goes with tunnel building that no woman should ever enter a tunnel because that way the devil gets scared and he rushes right up to the place where the men are working and some mishap or something happens. Well, to the surprise of all the miners and all, here came the motorman with several girls on the main car; so they

had dinner with the men there that night in town. That was it; then they went back to their homes. But as far as I know, no trouble happened at the base. If the devil got scared, he enjoyed the girls being there. [laughter]

About the problems that were encountered: there weren't any problems that hadn't been expected. The rock in all cases was good. Only one thing wasn't expected. The geological reports had said that we probably wouldn't be using too much timber on some of those tunnels, whereas, we used practically one hundred percent timber support. Wherever that happened, when you figure only five percent support, then your actual cost runs considerably above the estimated cost. Actual costs ran higher in some cases just due to the geological reports. It was rather funny, you know, what happened with the San Jacinto Tunnel, which I had nothing to do with, where the contractor went broke. The geologist said there'd be a little water. Well, when you get as much water as eighty second-feet running out you've got a lot. They had two shafts and two end portals. In other words, they had six headings and all of them had water. And when you had water you had a lot of pumping to do; and it's a very expensive job. As I recall, the contractor on that job had bid about $10,000,000 and the job cost about $22,000,000. The District had to take the work over and force account that job. Now, that job in these days would probably cost $100,000,000--prices

the way they are now. And I would say they did a good job on all of that portion. I had nothing to do with the San Jacinto Tunnel. That was completed four years after I left the aqueduct. I'd like to reiterate again that the whole aqueduct survey and construction is fully covered in the first report that was made by the Metropolitan Water District of Southern California.

SCHIPPERS: This was published in 1939.

DIEMER: Yes, it was the first annual report covering all activities of the District up to June 30, 1938. That is very full so far as the District's activities are concerned--when things were begun and ended. Then, following that, every year a report is issued for the fiscal year. Report Number One covers up to the aqueduct. And then every year a report has been issued for the fiscal year. My last report was issued over the fiscal year 1960 and 1961, Report Number Twenty-three. I think these reports give a very good account of the District's activities since the District was formed.

When I went into the Los Angeles office in September of 1934 to take charge of the design location, and construction of the distribution system, including the terminal reservoir at Lake Mathews, I found that the design of Lake Mathews had been made by Mr. Hinds who was in charge of all design work. And when I went in, I was to report direct to the general manager, Mr. Weymouth. By

the way, I have overlooked one thing that I should have brought in earlier. When I first came here, Mr. Weymouth had a chief of construction, Mr. James Munn, who had been with him in the United States Bureau of Reclamation. He had been in charge of construction on the East Bay Aqueduct, and he offered valuable assistance in all designs or general information so far as tunnels, excavation work, and concrete were concerned. I worked very closely with him when I got into the distribution system work.

The board of review, regarding the terminal storage, had stated that we should have between 100,000 and 300,000 acre-feet of terminal storage. By the time I arrived in Los Angeles, the design was for 60,000 acre-feet, and then, later, to raise the dams to whatever height desired. I made an analysis and figured that with the two pumps along the aqueduct and crossing the three earthquake faults--Mission Creek, San Andreas and the San Jacinto faults--that it would be a good policy to have not less than 100,000 acre-feet, which had been suggested by the board of review. So we made estimates and obtained the approval of the general manager of the board to initially construct Lake Mathews to hold 100,000 acre-feet.

At the time I arrived, the District was in the midst of a condemnation suit to acquire the right-of-way necessary for Lake Mathews. And since this area was in Riverside County, no part of which was in our District, the condemnation suit was held in Riverside County. The District

paid some exorbitant prices for right-of-way which was condemned. We learned a very valuable lesson in connection with the right-of-way due to the manner in which we acquired the Lake Mathews right-of-way. In all the right-of-way that had to be acquired for the distribution system throughout the District, only two more condemnation cases were carried out. In other words, the District had the land appraised sometimes by two appraisers, and if we couldn't reach a satisfactory price with the owner, we kept negotiating until we finally acquired it, because we figured the expense of litigation was too much to add to the cost of the necessary property.

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SCHIPPERS: You were going to continue with the story of Lake Mathews.

DIEMER: Well, when I took over the duties of the distribution engineer, including the design, location, and construction of the distribution system to serve the thirteen cities in the District at this time, Lake Mathews was the terminal reservoir of the aqueduct. This, too, was included in the area for which I was to design and construct the works. The end of the aqueduct was Valverde Tunnel, which discharged into Lake Mathews. The area required for the storage reservoir covered approximately 8,000 acres, all under private ownership. The District first attempted to acquire this right-of-way by negotiations, but were unable to acquire the greater portion of the area; so the procurement of the right-of-way was done by condemnation. The court proceedings were all held in Riverside County. I should have stated that Lake Mathews originally was called the Cajalco Reservoir, located about ten miles from the city of Riverside.

The cost of this right-of-way by condemnation was excessive, and from this the District learned a very important lesson in acquiring right-of-way on the distribution system. Appraisals were made of all portions. There was a top and a low appraisal. The right-of-way agent, in

procuring the right-of-way, tried to negotiate the purchase of the right-of-way within the appraisals. If this was impossible, he tried to obtain a figure from the owner and then get board approval, either for the price which the owner had specified or permission to try to acquire at a price above the appraised price. This policy resulted in much better feeling with the people [who owned land] through which our pipeline passed. Only two condemnation cases were necessary in the next twenty years in connection with acquiring right-of-way for the initial distribution system or the expansion of the system.

The board of review report made in December of 1930 recommended that terminal storage should be provided, varying from 100,000 to 300,000 acre-feet, in order to satisfactorily serve the cities in the District; as I have already stated, the design of Lake Mathews had originally been made to provide 60,000 acre-feet of storage prior to the time I took office. In accordance with the recommendation of the board of review, I recommended and the board approved the initial construction to provide 100,000 acre-feet of storage, with the possibility of increasing this to 225,000 acre-feet. Right-of-way for the larger reservoir was provided in the condemnation proceedings. It was necessary to design and locate and construct our large pipeline from Lake Mathews heading northward to Rialto and then westerly to La Verne where a softening and fil-

tration plant was located. This line was about thirty-six miles long and had a capacity of 750 second-feet, which was about one-half of the capacity of the aqueduct.

In the board of review report no mention had been made that the water should be softened and treated. However, it was the District staff's recommendation to the board that the water be filtered and softened, because the water coming from the Colorado River contained much silt before it reached Lake Havasu, the lake formed by the construction of the Parker Dam. However, in their report they mentioned diversion works with settling basins located below the intake of the aqueduct from Lake Havasu. But it was not necessary to construct these settling basins, for above the first lift from the river there was a small reservoir formed by the construction of the Gene Dam. Then above the next lift on the aqueduct, Copper Basin Reservoir was formed by the construction of the Copper Basin Dam. This seemed to take care of all the silt that was coming from the river. However, in connection with the distribution system, it was decided that all water before being delivered for domestic use should be filtered. Because of the hardness of the Colorado River water, the water should be softened to a hardness not to exceed 125 or 150 parts per million of hardness.

In the initial plans on the distribution system, it was decided to construct a plant at La Verne with a capacity

of a 100,000,000 gallons daily. Priority was given to the location of this plant because at that time there were only three cities in Orange County in the District and ten in Los Angeles County. The Upper Feeder from Lake Mathews to the plant had a capacity of 750 second-feet. The distance from Lake Mathews to the softening plant was thirty-six miles, and from the plant to Eagle Rock and Pasadena was about thirty miles. The capacity of this line was 510 second-feet. From this point westward to Santa Monica, the line had a capacity of 125 second-feet at Glendale, and then reduced to about 35 second-feet at its terminal in Santa Monica. From Eagle Rock south to Long Beach our line had a capacity, initially, of about 350 second-feet, diminishing gradually to about 60 second-feet at the Palos Verdes Reservoir located westerly of Long Beach at an elevation in the Palos Verdes Hills of about 350 feet above sea level.

At the time this line was being considered for construction, the board was very hesitant about building a reservoir in these hills, but finally agreed to a 1000-acre-foot reservoir. Later this was increased to 1100 acre-feet. This was a reservoir built in the hills with a Gunite lining and an earth-fill dam. This line terminating in the Palos Verdes Reservoir, at various points between Eagle Rock and its terminal, had connections to the water systems of Los Angeles, Compton, Torrance and Long Beach. Later, this same line served water for the

Upper San Gabriel System which came into the District almost thirty years later.

To serve the Orange County cities of Anaheim, Fullerton, and Santa Ana, a line was built south to the hills east of Brea, where a small reservoir was built. As I recall it's got a 200-acre-foot capacity. It went from there on to Santa Ana. This same line was extended from Santa Ana to the Corona del Mar Reservoir when the Coastal Municipal Water District came into the main district in 1942. Since materials were scarce at this time because of the Second World War, it was necessary for the District to acquire a pipeline from Pasadena which had been built from the Morris Reservoir into Pasadena in 1933. To dig up this line and install it at the lower end of the Orange County Feeder to serve the coastal district, it was necessary to obtain the permission from Washington for the use of this material for this purpose.

The District had acquired the Morris Reservoir from the City of Pasadena [by contract in 1932]. It was a reservoir built in San Gabriel Canyon in 1934, with a capacity of approximately 40,000 acre-feet, and a concrete dam. After the District acquired the reservoir, Pasadena had no use for this pipeline, so it was removed and moved to the Orange County site. I might say that this welded, steel pipeline had been protected on the interior with an enamel-lined coating, and on the exterior by a coating

of asphalt to prevent corrosion. When it was removed from the ground, we observed that this coating had not been satisfactory; tree roots had penetrated the coating and the pipe had started to corrode. I make mention of this because, later, in connection with the design of our pipeline, I will say something about the coatings both inside and outside of the pipes that were used by the District.

I'll just mention the pipeline leading from Morris Reservoir to Pasadena. In 1932, after Pasadena transferred title to the Morris Dam and Reservoir, the District had no right to any water that came down the San Gabriel Canyon. Pasadena had a filing on their water, but it was not transferred to the District, and the District plans provided for a pumping plant from the Upper Feeder into Morris Reservoir. This plant was never built.

The United States Corps of Engineers of the Navy, in 1942, established some experimental works on Lake Mathews and paid the District an annual fee--I think it was $50,000 a year--for the use of the lake for certain undersea experiments that the Navy was carrying on at this site. This contract was still in force in 1965. With the many years of drought that have prevailed throughout Southern California in the last twenty-five years, I might say that Pasadena made a good deal to transfer its bond obligations incurred during the construction of this dam to the District. The District has never made any use of the reservoir, and

could not without the installation of a pumping plant to pump the water from the Upper Feeder into the reservoir.

In connection with the construction of the pipeline of the distribution system, the line from Lake Mathews to the La Verne softening and filtration plant was approximately twelve feet in diameter. Ten miles of this line was a welded steel line; it crossed the Santa Ana River under a pressure head of about 400 feet. At the time the design was being made, the legal department, because of the litigation over water rights on the Santa Ana River and other rivers in Southern California, requested that this pipeline not be put down under the riverbed. So at this point the pipeline was carried across the river on a steel bridge, so as not to interfere with the flow of the river. All work on the distribution system was done by contract.

During the construction of the bridge and the sinking of one of the piers on the north side of the river, the bed rock was on a pinnacle on the bottom of the river. The soundings had been made on this pinnacle, but when the excavation was made for this pier, it was noted that the rock was much shattered. So orders were given to the contractor to lower the footing of this pier something like twenty-five feet at the cost of an additional $10,000. In 1938, when we had a flood on the Santa Ana, which ran about 100,000 second-feet, this bridge was one of three

on that river that was not damaged during the flood. In other words, if we had continued as the pier was designed, we may have had trouble on that bridge. This is just one of the sidelights.

Well, then part of the pipe where the head was less than 100 feet was pre-cast concrete pipe. At the beginning of our aqueduct work, when I was still on Division 4 of the aqueduct, test sections were built to determine the best methods for concrete mixes, placing the concrete, and curing the concrete. This was done on both the siphon sections which were built in place, and also along the section at Little Morongo Canyon where the District awarded the contract to the United Concrete Pipe Company for building pre-cast pipe sections of sixteen feet in length and twelve feet in diameter. It had been hoped that from this work the siphons on the aqueduct could be built by using pre-cast concrete pipe with a steel, lock-joint assembly. However, the results on this siphon did not prove satisfactory for contractors to bid on pre-cast concrete pipe. So all sections of the siphons on the first installation of the aqueduct, which covered about twenty-three miles, were built to half capacity. These were all built in place as monolithic sections. However, when work was started on the distribution system, the information that we had obtained on the aqueduct at the Little Morongo siphon was incorporated in our specifications, and bids

were requested for pre-cast concrete pipe in twelve-foot sections, where the head had less than 100 feet of pressure.

At first, only two bidders were interested in building this type of pipe for the distribution system. But on the second and third advertisement for another section near Ontario, California, another contractor entered the field and made the bids more competitive. This contractor also became a bidder on additional work that the District had on this large diameter pipe. This pipe extended to a point westerly to Eagle Rock, although it was not twelve feet in diameter. As I recall, it was ten feet in diameter from La Verne to Eagle Rock. Then, on the smaller welded steel pipe and the concrete pipe, other contractors became interested and bid on all of our construction work.

During the last two or three years, the federal government has made charges that our pipe companies were involved in conspiracies to keep the prices up. However, if there was any conspiracy during the early stages of the construction of the aqueduct or distribution system, during the later stages when I was general manager and chief engineer, I could never feel that there was any conspiracy among the contractors over any of our contracts. The bids seemed to be satisfactory. We got a good job and the water got in here on time to meet the increasing demands.

In connection with the steel pipe that was used and the design of the distribution system, the first large

pipe, ten feet in diameter, which crossed the Santa Ana River, had coal tar enamel on the interior of the pipe. Prior to advertising this pipe, a group of some of the contractors of the District staff made a trip to Boulder Dam to observe the application of coal tar enamel to the interior of the big pipes leading to the turbines at the fire plant. This job was done by daubbing.

In connection with the application of the enamel to the steel, it might be mentioned that this was all put on by hand, daubbed on with brushes by hand. It was a very rough surface, and the District had observed that some of the companies that furnished the enamel suggested that the enamel be applied by spinning the pipe and feeding the enamel from a trough while the pipe was being spun. So on this ten-mile section of pipe, the District required that the enamel be applied by spinning the pipe, and a sub-contractor on a part of the pipe asked that it be all right to daub. Well, we informed him that since the prime contractor was spinning, he had to spin also, which he did. The exterior of the pipe crossing the bridge was painted, but the portion that was buried in the ground had a Gunite coating of a half an inch over the outside of the pipe. This Gunite coating had a wire mesh to furnish strength to the Gunite so it wouldn't crack off. This pipe has been recently examined on the interior after twenty-seven years of use and no flaws have been found in

this coal tar enamel. That is, I would say, a wonderful record.

Now, so far as the smaller pipe is concerned, we advertised both for coal tar enamel and a coating of cement mortar on the interior. At the time the first section was advertised on the distribution system for steel pipe to be installed in the ground, a New York firm had requested opportunity to bid on the installation of this coal tar enamel on the pipe interior after it had been installed in the ground. However, we didn't get a satisfactory bid when the bids were opened, and the District chose to have cement mortar lining applied to these pipe sections by spinning, the same as the coal tar enamel was applied. This, too, down through the years, has been very satisfactory. Whenever the pipe has been excavated, on the exterior no corrosion was noted through the Gunite coating, and on the interior the mortar lining was in good condition and no rust marks were shown on the interior of the pipe. I mention this because at the time we adopted it, I made a trip to Northern California where they had just started installing this mortar lining, and I observed what they were doing there, and we followed it; it was the first pipe of this kind put down in Southern California.

SCHIPPERS: It's apparent that a great deal of care was taken for the durability of the system, and that even though there was a cost factor always pressuring you from behind, that in the planning, nobody stinted unnecessarily.

Now, what would you ascribe this great care to? Where did that spirit come from?

DIEMER: It came from the organization.

SCHIPPERS: From the organization.

DIEMER: It sure as the devil didn't come from any outfit like a bunch of promoters that we've got on the board and all that. I'm not going to throw any rocks at the board, but some of them are wheeler-dealers. If they can get enough votes to be in the majority, that's what everything's decided on. They generally went along with the staff. I'll say that we had quite a staff. Mr. Weymouth wasn't one of these guys that would throw it around, and Hinds wouldn't, and we tried to get the best value for the dollar; that was the whole thing.

SCHIPPERS: So you would say then that during the original construction period the engineers headed by Weymouth were really the dominant factor and that the board did not interfere or exercise undue control?

DIEMER: Oh, I would say that a thousand times.

SCHIPPERS: When do you think that this may have started to change?

DIEMER: Who said it did?

SCHIPPERS: Has it ever?

DIEMER: No, I say, who said it did?

SCHIPPERS: No, but has it ever changed?

DIEMER: Oh, they've got a different way now than we used

to have. When we got through with the construction we cut way down on personnel. A lot of guys now are trying to build a tower over there where our office is to take care of the administrative staff that'll be here in 1970. My point is, if they need it in 1970, build it in 1970. They don't need it now because the next three years will be the heaviest years on construction; they wouldn't much more than get that darn thing built before that. I've been against it, but whether they'll do it or not, I don't know.

SCHIPPERS: Would you say then that during this original period of construction it was simply because of the size of the project that the engineering crew really was the most prominent factor in the District?

DIEMER: No, I wouldn't say that it was just engineering. Gosh, the controller doesn't come under the chief engineer.

SCHIPPERS: No.

DIEMER: And legal doesn't either.

SCHIPPERS: No.

DIEMER: There was wonderful cooperation from all of them. We had J.M. Luney as the controller. He had been with the Bureau of Reclamation like the rest of us guys. He could clamp down if he saw something that didn't look right; he sure let them have it. As far as I was concerned, I didn't have anything against the legal department.

SCHIPPERS: But it is your opinion that it was a very clean operation and that it was kept so because of the responsible

attitude of the men in the organization?

DIEMER: Well, I would say that is correct. I don't know what happens in others. Maybe they think that everything's all right. I don't know what I would want to say there.

At the time of delivery of water to Southern California in June of 1941, the total cost of the aqueduct and distribution system was approximately 182 million dollars, which was 38 million dollars less than the bond issue had provided. However, this cost also included the cost for the softening and filtration plant in La Verne, which was not included in the original estimate. The aqueduct was 242 miles long, consisting of ninety-two miles of sixteen-foot diameter, concrete-lined tunnels, sixty-two miles of concrete-lined canals, fifty-four miles of concrete-covered conduits, twenty-three miles of half-capacity concrete siphons, seven miles of full-capacity siphons, and miscellaneous delivery lines and unlined canal leading into Lake Mathews, making a total of 242 miles. In addition to the aqueduct structures there were 156 miles of pipelines and tunnels on the distribution system. There was a total of sixteen miles of tunnel, four miles of which were under the streets of Pasadena. These tunnels were ten feet in diameter. The line as built provided for the delivery of approximately half capacity of the aqueduct.

At the time the first estimates were made of the initial and ultimate capacity for the construction of the

aqueduct, the initial construction would cost approximately $220,000,000, and to complete that to full capacity would cost another $68,000,000. The system as completed and put in operation in 1941 cost $182,000,000. Much consideration was given to the method of obtaining funds to complete the aqueduct to full capacity when necessary. However, during the years preceeding the completion of the aqueduct, the rainfall for most years was below normal. When the aqueduct was put into operation, very little additional demand was made for water from the Colorado River. The areas in the basins--Santa Ana and San Gabriel--continued to pump from the underground. The first inquiry regarding the water or terms for annexing to the Metropolitan Water District of Southern California was made for an area along the coast including Laguna Beach. This area was finally annexed to the District in 1942.

During the war, there was considerable industrial activity in San Diego County. San Diego had a special appropriation out of the Colorado River, amounting to 155 second-feet. The government in approving some of the contracts for agencies in San Diego reviewed the water situation in San Diego County. It found that most of the reservoirs in the county which were owned by the City of San Diego had a combined capacity of about 400,000 acre-feet. The government demanded that San Diego seek another source of water other than their own local supplies for

their reservoirs. So San Diego made an inquiry of the Metropolitan Water District regarding annexation. And the San Diego County Water Authority was formed and was annexed to our District on December 17, 1946. At the time of annexation, our District agreed with San Diego that delivery of the water would be made about six miles south of the Riverside-San Diego County line. Since the Colorado River Aqueduct was not being operated at full time, in connection with the design and construction of the San Diego Aqueduct, work was done by the United States Navy. The design provided for our connection to be at the south side of the San Jacinto Tunnel. The first two miles of line was designed for full capacity to a small reservoir located near the town of Hemet. This reservoir had a capacity of 1500 acre-feet. From this point south, the design provided for only a half-capacity aqueduct, about 100-second-feet capacity. The reservoir was necessary because the Metropolitan Water District could not warrant continual operation of the pumps on the aqueduct.

Efforts were made by the staff to obtain from the Navy consent to construct this reservoir about four miles farther to the south, for the reason that just south of the reservoir which was built the pipeline was in thirty feet of cut. The aqueduct had hardly been completed and put in operation before it was found necessary to construct the second barrel of the aqueduct south from the reservoir. Considerable saving would have been obtained if the reser-

voir had been constructed, as suggested by the Metropolitan Water District, about four miles south of its present location. Considerable money could have been saved if the Navy could have been induced to move the reservoir south of this large cut, and also to build full capacity to San Diego initially in place of putting it off about five years. The growth in San Diego was about the same as it was in all of Southern California. In 1958, the District built another line to San Diego with 250-second-foot capacity with which they could draw about twenty percent of the full aqueduct capacity. This was for their area for agricultural, industrial, and domestic uses.

The money for this San Diego development was furnished by the government and [was to be repaid] by the San Diego Water Authority and the Metropolitan Water District. I might mention, too, that upon the completion of the aqueduct, we were very apprehensive as to where the money would come from to complete the aqueduct to full capacity. After the annexation of San Diego, which agency had been given a contract payable in thirty years at no interest in thirty annual payments, the District changed its annexation policy. It became based on a thirty-year payment, amortized at three percent, which later was increased to four percent.

The annexations through to 1961 had a total back tax charge. By back taxes we mean that a new area coming

into the District would pick up a charge known as the back tax charge. It was based on what they would have paid if they had come into the District at the same time the other cities came into the District in December, 1929, figuring all taxes from that date up to date, amortized at three or four percent interest. This fund totaled at one time $187,000,000. In 1956, the board passed a new bond issue known as the "W bonds" in which they could sell these bonds up to a total amount of half of the back taxes which were due from new annexations. At the time that the aqueduct was completed in 1941, the total cost of the aqueduct and distribution system was approximately $182,000,000. At the completion of work, upon my retirement in December of 1961, the total cost was over $400,000,000. The funds for the additional work were about $220,000,000--that is, funds spent for additional work after the aqueduct had been completed in 1941. Some $38,000,000 were still due from the original bond issue. There was a tax levy of five cents per hundred dollars every year for construction, which provided some of the funds. And $77,000,000 were obtained from the sale of the W bonds. Other funds came from payment of annexation charges and water sales.

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DIEMER: In connection with the distribution system, the filtration and softening plant at La Verne was not contemplated at the time the board of review made their report in 1930. The water from the Colorado River, before Hoover Dam was constructed, was very muddy; and in connection with the All American Canal, the government had put in some filter beds to filter out the silt. It was considered highly probable that the District would have to provide filter beds at a point on the river from whence the water was pumped into the aqueduct. However, with the construction of the Gene Dam and the Copper Basin Dam, it was not considered necessary--especially after Parker Dam had been constructed--because the water that was pumped into the aqueduct was very clear and had very little if any silt at that point. However, with sixty-five miles of canal on the main aqueduct, and with Lake Mathews having an initial storage of approximately 100,000 acre-feet, it was decided to construct a filtration plant and a softening plant to reduce the hardness of the water from approximately 350 parts per million to about 125 parts per million.

A filtration and softening plant was located in La Verne at which point the Orange County Feeder running south to serve the three Orange County cities took off of

the Upper Feeder; and the Upper Feeder continued westerly to Pasadena with a capacity of 510 second-feet. And the Middle Feeder was to be constructed later with a capacity of 250 second-feet. I want to emphasize that the original estimate of $220,000,000 on the bond issue did not consider the construction of a filtration plant. This was an additional expense which was incurred when the aqueduct and distribution system were constructed. The plant was located at this point because the Orange County Feeder proceeded south from the treatment plant and the Upper Feeder and the Middle Feeder proceeded westerly from this point.

SCHIPPERS: What is the name of that plant?

DIEMER: This plant was subsequently named in memory of Mr. Frank E. Weymouth, the personnel manager and chief engineer who served the District from May, 1930 to July 22, 1941, when he passed away. He had planned to retire July 30, 1941. Mr. Julian Hinds, assistant chief engineer, succeeded him as the general manager and chief engineer and served as such until December 31, 1951.

In connection with the operation of the aqueduct, I am going to mention the area and the population and the assessed valuation of the District as it was formed in December of 1928, upon completion of the aqueduct and the delivery of the first water in June of 1941, at the time that Mr. Hinds took over the duties of the general manager in 1941, when I succeeded him on January 1, 1952, and

then when I retired on December 31, 1961. With this date one can observe the growth of the Metropolitan Water District extending from the day it was organized until my retirement in 1961.*

I've already mentioned that the aqueduct features, such as the tunnels, covered conduits, and the canals, were built to full capacity, and that about twenty-two miles of siphon were built to half capacity; about six more miles of siphon were built to full capacity. The aqueduct was 242 miles long. At the time the aqueduct and distribution system were completed in 1941, the cost of the project to date was approximately $182,000,000, leaving $38,000,000 from the $220,000,000 bond issue for future construction.

At that time there were five pumping plants. Three pumps were installed in each plant, leaving six to be installed later. In 1941, when the District first started delivering water, approximately 900 acre-feet of water was delivered to the District cities. The following year, about 16,000 acre-feet were delivered. The capacity of one pump was about 167,000 acre-feet annually, and not until 1951 was it necessary to use two pumps to supply the needs. We had some heavy rainfall in 1938 and in one or two other years prior to 1951, and as a result very few annexations to the District were made. The first was the

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*See page 92 for the exact figures.

coastal area in 1942. I've already mentioned about the annexation of the San Diego County Water Authority in 1946. And then the West Basin District, which had been relying upon its underground basins for water, was next in 1948. And several areas were annexed in 1951, including Orange County.

SCHIPPERS: Right, and Chino, the eastern district.

DIEMER: Orange County was also in 1951. The Central Basin District, which was relying on its underground basins for water, came in during 1954. It became apparent with these increased annexations that the District must immediately construct its additional facilities to bring the aqueduct up to its full capacity, and this program was started in 1952. At the time the estimate was made to bring the aqueduct and distribution system up to full capacity in the thirties, it was estimated that upon completion of the facilities in 1941, it would require approximately an additional $67,000,000 to bring the aqueduct up to full capacity. The work was authorized by the board of directors to proceed to bring the aqueduct up to full capacity beginning in 1952, and this was followed through to completion in 1961 at a total cost, including the initial construction, of approximately $400,000,000. This was approximately three times what it would have cost if it had been constructed initially, twenty years earlier.

The principal units which were constructed during

this period were the installation of the six additional pumps at the pumping plants, the delivery lines from the plant into the aqueduct section, and the installation of twenty-two miles of half-capacity siphons which were pre-cast, concrete pipe which paralleled the first siphons installed. I might say that the first barrel was monolithic and was constructed in place. The pre-cast pipe was constructed at plants along the aqueduct and hauled as many as 100 miles from the plants where the pipe was cast to the point where it was to be placed in the aqueduct. This construction was done by one of the large pipe companies in Southern California. They invented a pipe-facing machine called a pipemobile. After the pipe had been delivered to the site, it was picked up by this pipemobile, conveyed into the trench, and placed without the use of heavy cranes. This company was sorely criticized for bidding on this job, because it took away the installation of the pipe and the excavation of the site. But they did very satisfactory work and the District was very fortunate that the pre-cast pipe was installed by an experienced contractor.

In addition to the aqueduct structures, Lake Mathews was enlarged from 100,000 acre-feet to 182,000 acre-feet. It had originally been planned to raise Lake Mathews to a 225,000-acre-foot capacity, but with the annexation of several areas of Orange County and Los Angeles County,

where replenishment of the underground basins could be accomplished by the addition of new facilities on the distribution system, it was decided to construct Lake Mathews to the 182,000-acre-foot capacity. I might say that the District was very fortunate in the personnel it had on the construction of the original capacity and also on the subsequent construction. Mr. R.B. Ward, an engineer with many years of experience with the Bureau of Reclamation, was in charge of all the construction of Lake Mathews, and he had some very valuable assistants in performing the very important services of excavation.

The leakage from Lake Mathews has been a very small amount. It is picked up on the lower side of the dike, which is about a mile and a half long, and transported over into the Upper Feeder. The leakage on the dam proper was practically nothing. Frank T. Crowe, who was the general superintendent at Hoover Dam during its construction and later was in charge of Shasta Dam, passed by during the construction of Lake Mathews. He noticed the very careful preparation for the foundation, and he made the statement that he never saw a dam constructed with more care and with such good workmanship.

The principal lines on the distribution system that were constructed during this expansion program were the Middle Feeder taking off of the Upper Feeder below the Weymouth purification plant, and the construction of the

Lower Feeder with a capacity of 750 second-feet from Lake Mathews southerly into Orange County and thence westerly to Los Angeles County. A 200-million-gallon filtration plant was also constructed on this line. Later, upon my retirement from the District, it was named the Robert B. Diemer Filtration Plant. The Weymouth plant at La Verne also was increased--probably to a 400-million-gallon plant. The softening unit was not completed until the latter part of 1965.

SCHIPPERS: The Diemer plant was expanded; it now seems to be in a crucial position as far as the development of the desalinization effort is concerned.

DIEMER: Yes. The District entered into a contract just recently with the United States Government whereby the government will pay us $72 million in connection with the construction of a nuclear, electrical, and desalinization plant located in Orange County on a man-made island to be constructed off the coast near Bolsa Chica State Park. This island will be about forty acres in area, and the water that would be developed from desalinization of the sea water would be pumped up to the Diemer plant, where it would be blended with water that comes through that plant. The initial installation would be for a 50-million-gallon plant daily, with the possibility of increasing it to 150 million gallons. The District's participation in the development of this plant is more than

$100,000,000. I don't have it exactly. The plant is probably to be completed in 1972 when the water from the California Aqueduct should be available to Southern California.

SCHIPPERS: What do you think of the practicality of the desalinization effort?

DIEMER: Well, I might say that the Bechtel Company made some studies on this and the District paid a portion of the cost. The government also paid a portion of the cost. In their report, they figured that with the nuclear power and the combination of the power plants of the Department of Water and Power of Los Angeles, the San Diego Power and Light Company, and the Edison Company participating in the cost of the power plant, the cost of water desalinated and available for domestic use at the plant would be twenty-two cents per 1000 gallons. This compares with prices of water in smaller plants of $1.00 per 1000 gallons.

About fifteen years ago I visited the Dutch island of Aruba off the coast of Venezuela. At that time they were using their excess steam in connection with their desalinization plant, and they figured it was a small plant. They figured it was costing $500 per acre-foot for their water, which they were obtaining from the ocean. At the same time, the doctors said that the water that they were getting then was not the proper kind of water for human consumption. As a result, when we were there, the tankers that went off to

New York hauling oil and gasoline came back loaded with water for the domestic consumption of employees of the refinery on Aruba.

However, the study has gone forward during the years, and now one of the principal things that I noticed from the design is that the water will be blended with some other water, so I don't think there'd be any question about the water for domestic use. It will be interesting to see how near this plant comes to twenty-two cents per 1000 gallons.

In connection with this desalinization question, I'm very familiar with what was going on so far as our board was concerned. Upon my retirement as general manager and chief engineer, the board of directors of the City of Pasadena (where I live) appointed me to fill a vacancy on the board representing the city. I felt this was quite an honor because Pasadena was one of the first cities that joined in the forming of the District. There was considerable discussion on our board regarding joining in on the construction of this desalinization plant; some members felt that if the government wanted to obtain the technology for its own use and also for the use of our government in connection with construction of large desalinization plants in other parts of the country, Southern California should not be contributing so much to the initial cost, which will probably exceed $100 million. However, it's

my opinion that with such a large movement of population to Southern California, no one knows where the next water hole might be, and with the ocean all along the coast here, it might be just the source that we may need in the future years.

SCHIPPERS: You were going to resume the narrative before we start talking about desalinization.

DIEMER: I mentioned about the expansion program, why it became necessary to construct the additional facilities to bring in more water. In 1941, when the water was first brought in, the District had thirteen cities, an area of 626 square miles, an assessed valuation of about $2 billion, and a population of about 2 million people. At that time, the first year of operation, there was only about 950 acre-feet of water pumped. The following year there was 15,000 acre-feet. In 1953, the area would be 1500 square miles, the population 3,400,000, and the assessed valuation was $5.4 billion. In 1961, the area was about 4400 square miles, the assessed valuation about $14 billion, and the population was 7.5 million. At the present time (1966) the population is over 9.5 million people and the assessed valuation is close to $20 billion. The water that was pumped in 1952 was about 167,000 acre-feet, which is a trifle more than one pump can pump continually throughout the year. In 1957, we were pumping about 540,000 acre-feet, and in 1961 we

were pumping approximately a million acre-feet annually; so the District did not get the expansion program in any too soon.

I would like to say something else at this point. The United States Government has started some suits against pipe contractors for conspiracy in violation of the anti-trust law. Just recently, the board awarded a contract for some valves. Only one bid was received. The bidder was a contractor who had furnished some valves for the District during our early construction. The valves were very satisfactory, and even though it was the only bid received, the board awarded the work to this contractor. I might say that here is an example where manufacturers might get together and say, "You bid this one, we'll bid the next one." Well, maybe their shop is full of orders and they couldn't bid. Now, the point has been raised by the government and by some 300 other public works bodies that the pipe contractors, five of whom furnished pipe and helped build the aqueduct even during the early years of construction, violated anti-trust laws. If there was any conspiracy on any part of our job, I never knew it. These contractors all did a wonderful job in furnishing the pipe and helping the District, even making suggestions as to the specifications. We got the aqueduct completed in time to deliver the water when it was most needed. I can't see where any of them would be guilty, especially in connection

with District work, of any conspiracy in violation of the anti-trust laws.

In 1954, the American Society of Civil Engineers made a study of the engineering projects of the United States and awarded plaques to seven different projects which have been classified as the seven engineering wonders of the United States. One of these was the Colorado River Aqueduct. The plaque was presented in 1955 and is fully described in the magazine of the civil engineering society, dated November, 1955.

SCHIPPERS: How do you feel about that award?

DIEMER: I'm very proud of this award and to have been connected with a project such as this, because when one has spent thirty-seven years of his life in connection with this project, from the time it was conceived until the time it was completed, it gives one a lot of satisfaction to know that it has been of such value to the many people in Southern California and the many that are yet to come.

SCHIPPERS: What was the Metropolitan Water District's reaction to it? The men you worked with.

DIEMER: You mean so far as this award is concerned?

SCHIPPERS: Yes.

DIEMER: Well, they were all proud of it, because the American Society of Civil Engineers has a membership of over 50,000 members. And I might say here that in 1963 I

was awarded the Honorary Membership Award. There were only three awards at that time. The honorary membership has a total of about fifty. Mr. Weymouth had first been awarded this award, and Mr. Hinds was awarded it, and I certainly felt proud to be included in the honorary membership along with my bosses. I might also add that my boss on the Reclamation Service and in Mexico, Andrew Weiss, was also an honorary member of the American Society of Civil Engineers. In addition to this honor, I had also received the Honorary Member Award from the American Water Works Association. I had been awarded the Beaver Award for leadership in heavy construction in Southern California in the year 1957.

I would be remiss in the discussion of my life work if I did not mention some of the men I have been in contact with, both working for and working with during my career. The first one I should mention was my boss on the reclamation project, Harry W. Bashore, who was also a Missouri University graduate. He worked practically all his life for the United States Bureau of Reclamation and finally ended up as director of reclamation with offices in Washington. I think he retired before the mandatory age limit arrived. As far as I know he is at the present time in good health; he still looks back with much satisfaction on his career, various parts of which were in connection with the developing of irrigation projects.

Then, too, I'd like to mention Mr. Andrew Weiss, who was a project manager on the North Platte Project where I worked for a number of years. He was a naturalized citizen having come to this country from Austria. After about twenty years with the Reclamation Service, he went to Mexico and was engaged in construction of irrigation works from 1926 to his death, which I think was sometime in the fifties.

Of course, I've mentioned Mr. Weymouth and my connection with him, Mr. A.P. Davis (also a director of reclamation), and Mr. Julian Hinds who I was connected with in Mexico and also for many years with the Metropolitan Water District. I also mention Mr. William Mulholland who retired from his position as chief engineer and general manager of the Los Angeles Water Department, I think, in 1929. I made several trips over the Colorado River Aqueduct location with him and enjoyed the benefit of his experience and suggestions. Then there was Mr. James Munn who was superintendent of construction for the District and who helped us on our estimates. He had been also employed by the Bureau of Reclamation and the East Bay Municipal District at Oakland. There was Jim Gaylord, chief electrical engineer of the Metropolitan Water District, who helped us in the location of the pumping plant and the electrical space. He was assistant general manager up until about 1950 after the aqueduct went into operation.

Then there was his assistant, Mr. Willard Rockwell, who later became the chief electrical engineer when I was general manager. He, too, had his part in the design, operation, and maintenance of the District's vast pumping system and transmission line. In connection with the surveys on the aqueduct, I was reporting to Mr. J.B. Bond who, after the construction work was finished in 1938, went to South America and spent many years in construction there.

On the surveys I had several assistants who later were in charge of important jobs on the aqueduct: Mr. George Baker, who later became city engineer of Long Beach; Mr. Henry Mills, who was my assistant also on the construction work on Division 4 and on the distribution system, who is now chief engineer of the Metropolitan Water District, and who will I hope in February succeed Mr. Robert A. Skinner as general manager and chief engineer. Then there was our office manager, Richard Stephens [Jr.], who is now vice-president of the Arundel Company; Harris Crawshaw, who was my office engineer later when I was general manager, who passed away September 7 of this year after spending some thirty-five years on the Colorado River Aqueduct in location, construction, and operation. There are many more that I might mention; but I might say this, that all of these employees were loyal. I never had any trouble with any of them. I demanded a day's work for

a day's pay, and without any exception all of these men were loyal to the District and to all of us.

I've just returned from a Kiwanis Club meeting where I was a guest, and I heard a panel on "What's Wrong at Berkeley?" When it got through, several of the people that heard these remarks didn't know whether everything was straightened out at Berkeley or not. And it recalled to me an incident that happened when I was playing on the University of Missouri baseball team. We'd gone to Ames, Iowa to play Iowa State College. The first day some of the boys lost some of their valuables that they had in the locker. So the next day the coach, Chester L. Byrd, said, "Give me all of what you got left and I'll put it in this little satchel and I'll take it out on the field and when we get back we'll distribute your valuables to you." Finally, he came to my Tau Beta Pi pin which was in his satchel, and he said, "Well, outside of athletes it looks like we've got a scholar in the group; who does this belong to?" Well, I appreciated the remarks he'd made, and down through the years, I valued his counsel. He was a baseball coach who everybody loved. He tried to be of some value in the information that he gave out to all the boys. There's very little in life that we pay attention to at times; but sometimes things like this happen. Another thing I'd like to say is that we oftentimes pass up until tomorrow something that should be done today, like being

kind to a friend or a person in need or something like that, and then the next day you learn that they're no longer with us. This is just a little thought that I'm leaving; but it's something that I think we all overlook.

TAPE NUMBER: IV, SIDE ONE

SEPTEMBER 22, 1966

DIEMER: When we concluded the last interview, I was mentioning some of the staff that had been with me down through the years, and I think I overlooked two or three whom I would like to mention at this time. Mr. Skinner, who succeeded me in 1961 as general manager and chief engineer, had been in charge of most of the design when I was general manager and chief engineer. He has been with the District since 1933. At the time he was selected as general manager and chief engineer, the board was considering bringing another engineer from out of the District to take this position. I figured that if Mr. Skinner wasn't capable of handling the position, then I was not a good administrator in this position, because he had oftentimes carried on the work when I was absent. He was fully qualified to take the position. I was very happy when the board announced that he would succeed me.

Then there was another man in the District, who had been my office engineer. He had also rendered very valuable service during this time and from 1930 until the end of the first construction period, when we went into the construction of federal camps in northern California. After a five-year absence he returned to the District. However, at a retirement party for one of our engineers who had been a design engineer in charge of all our designs for

about fifteen years, Mr. Harris Crawshaw, whom I am speaking of, got up to say a few words regarding all of us and those retiring. He keeled over and passed away. This was a great loss to the District, because even though he was sixty-three, he had filled a very important position and was contemplating staying on two or three years more after Mr. Skinner's retirement. And then another who had been very capable in the performance of duties was my secretary, Miss Agnes Dunning. She was my secretary from 1934 until my retirement in 1961; and then she retired in 1963. Just a couple of days ago, I received notice that she, too, had had a heart attack and passed away.

I'd like also to say that I had wonderful cooperation with members of the board throughout my career with the Metropolitan Water District. Such men as Mr. [W.P.] Whitsett, Mr. [John G.] Bullock, Mr. [V.H.] Rossetti, Mr. [John H.] Ramboz, Will Cook, Mr. [Joseph] Jensen, Warren Butler, and others who I could name, all gave many hours of their time to the matters of the District. The board since 1951 at least, when I became general manager, handled the matters of the District by referring them to six separate committees. These committees would discuss the problem, recommend its approval to the board, and then at the regular board meeting, which was usually held on the second Tuesday of each month, the board approved or disapproved.

I might say that during my period as general manager

and chief engineer, practically everything that was submitted to the board was approved. However, one matter which referred to the East Branch of the California Aqueduct was not considered by the board. It was held in committee.

At the time of my retirement date according to state law, when I reached the age of seventy, the board got approval from the state legislature to extend the mandatory date of retirement from seventy years [1958] to December 31, 1961. This permitted the employment of quite a few engineers who had already reached the mandatory retirement date. I'd like to say, too, at this time that the new law approved by the legislature did not permit me to engage in the studies or any transactions in connection with water from the Feather River. This duty was taken up by the assistant chief of engineering, Mr. Skinner, who handled it throughout the period from my extension date in April, 1958, to December 31, 1961.

I'd like to say something about this letter which was submitted to the board in 1960 regarding delivery of water to the Metropolitan Water District. I had made a recommendation that the first delivery of water be made from the East Branch Aqueduct with the terminal in the Perris Reservoir. My reason for this was that the Metropolitan Water District had an aqueduct coming from the Colorado River with a capacity of 1605 second-feet into Lake

Mathews in Riverside County. From Lake Mathews there were two principal feeders: the Upper and the Lower Feeder, each with a capacity of 750 second-feet. After the aqueduct was constructed, San Diego came into the District. The District, in accordance with requirements of the United States Navy who had demanded that San Diego get additional water supply and join the Metropolitan Water District, approved plans for a branch aqueduct from the Colorado River Aqueduct at the outlet of the San Jacinto Tunnel for a capacity of 200 second-feet. Then, later, when the District was carrying on an expansion program in the middle fifties, a line was built to furnish water for San Diego and the southern part of Riverside County. This aqueduct had initially sixteen miles of canal with an initial capacity of 1000 second-feet. The Eastern Municipal District also took out water from the aqueduct below the San Jacinto Tunnel.

The way I had it figured was, with the Colorado River Aqueduct having a capacity of 1605 second-feet, with the main connection from the aqueduct having a 200-second-foot connection to San Diego plus a 1000-second-foot canal for San Diego and Riverside County, and with the Upper and Lower feeders going out of Lake Mathews with capacities of 750 second-feet each, then the water from the north should come into the Perris Reservoir. The Supreme Court was at that time considering the Ari-

zona-California water case which ultimately resulted in a decision that would have brought about a water shortage. California might have been reduced to a little over 500 second-feet of water from the Colorado River. In this case, the East Branch would serve water at the upper end of these feeders and would be of more utility than if the water initially was brought in through the Metropolitan Water District from the West Branch Aqueduct; however, I did not oppose the West Branch.

As it turned out, the state in their contract with the District will be required to deliver 60,000 acre-feet monthly to the District from the East Branch for a total of 545,000 acre-feet annually. Originally, there was 1,500,000 acre-feet to be delivered from the West Branch. After the Supreme Court rendered their decision regarding the California-Arizona suit, California stood a chance to lose part of its water from the Colorado River. The District contracted with the state for an additional 500,000 acre-feet of water to be delivered in the West Branch. And the board subsequently passed the resolution that no water from the East Branch would be required before the year 1985. I think this action will be rescinded some time in the near future, but as of this date it still stands that the Metropolitan Water District will not require any water until 1985.

SCHIPPERS: Could you answer why the board objected to the East Branch?

DIEMER: I say it was political, but I'm not going to get into that.

SCHIPPERS: What about the objections on the basis that it was not a sound move because of the geological formations that it had to pass through?

DIEMER: I still think that the reason was political more than that, even though the one that was opposing the East Branch claimed that it was because of the geological formations, because the Colorado Aqueduct crosses the San Andreas Fault and the San Jacinto Fault and the Mission Creek Fault. In the twenty-five years of operation the only place that any movement has been observed is on one of the siphons near White Canyon where one of the joints on the pipe opened up, and also on the four-mile siphon crossing the Santa Ana River where there was a movement that caused movement of the pipe about six inches in 600 feet. However, the leakage was not over a second-foot and a half from this leak.

[Concerning delivery of water to District agencies,] San Diego came into the District in 1946 and started receiving water through the aqueduct which was completed in 1947. Since that time San Diego, up to June 3, 1965, has taken 2,266,000 acre-feet. The total amount of water that the District has delivered up to June 30, 1965, is 9,600,000 acre-feet. During this period, San Diego has taken more than twenty percent of all the water that

has been delivered by the District. During the period from 1941 to 1965 Los Angeles has received about 825,000 acre-feet, showing that San Diego has received two and a half times as much as Los Angeles throughout the period. There has always been in Los Angeles County much criticism of the amount of water that San Diego was using. However, during all this period no hardships were felt by any member of the District, even though San Diego was taking more water than they would be entitled to.

At the same time, the total amount that's been delivered to Orange County Municipal Water District was about 1,600,000; and to central basin and west basin over 1,000,000 acre-feet. A good portion of this water in both Orange County and in the central and west basin was used for spreading to replenish the underground basin. At the time that the general manager issued his report on the water situation in California in 1931, he admonished the users of water from the underground basins to be careful in the use of water from these basins, because it was the most valuable reservoir capacity in Southern California.

Large overdrafts from the underground continued from the west basin, comprising the cities along the west coast in Los Angeles County and Orange County. This area came in during 1948, and Orange County came into the District in 1951, and the central basin came in in 1954. These three districts practically included all of

the areas that were pumping from the underground. After these districts came into the District, the recharging of the underground basins was commenced by spreading in areas where the ground water basins were filled, as I recall, up to about, in some basins, as much as four feet per acre where the water was spread daily. Along the west coast of Los Angeles County where sea water had started into the underground basins, the state started an experiment of mile sections.

Seven or eight years ago the state started an injection program along the coast in the vicinity of Redondo Beach, putting wells down 500 feet apart and putting in a couple second-feet in each well and injecting it into the underground. They found that by building up a cone of two or three feet they could keep the sea water from intruding into the basin. Well, now an eleven-mile strip of wells has been installed in the last few years and they are using about fifty second-feet of water in these wells that's being injected into the underground. And this has proved successful in holding back the water from the sea.

The drawing down of the underground basin by pumping in Orange County and Los Angeles County on the Santa Ana, the San Gabriel, and the Los Angeles rivers could have been avoided if these areas had joined the District earlier and used the water from the aqueduct. During the

period from 1940 to 1956, only 2,200,000 acre-feet were taken from the Colorado River for Southern California. One pump operating continuously could have pumped 146,000 acre-feet of water annually. If these areas had been in the District and even had used the water direct from the aqueduct for replenishing the underground, the depletion of the underground basins could have been avoided; because from 1942 to 1956 almost 6,000,000 acre-feet of water could have been delivered. The total amount that has been delivered as of June 30, 1965, was 9,600,000 acre-feet. At the present time, everything is being done to supply the various agencies in the District that have underground basins so that the water can be spread or injected to preserve these basins. The price of the water at the present time is $17.00 per acre-foot. When the water from the north is received here and used for replenishing, it will cost much more.

I don't think that I've covered the expansion of the District so far as the distribution system is concerned. The expansion consisted of enlarging Lake Mathews from 100,000 to 182,000 acre-feet and the construction of the Lower Feeder which has the same capacity of 750 second-feet as the Upper Feeder. This feeder extends westerly, passing south of Corona and crossing the Santa Ana River through a siphon which was

put at a depth of about forty-five feet below the channel of the river, and thence westerly to a treatment plant near Yorba Linda, with the Lower Feeder being extended on westerly to the vicinity of Long Beach. The second Orange County feeder was also constructed from this Lower Feeder from the treatment plant south to the vicinity of Costa Mesa.

At the time the Orange County Municipal Water District was annexed to our District, the terms of annexation required that the area should build its own distribution system. However, at the time the Orange County Feeder was built, only a partial capacity to serve Santa Ana, Fullerton, and Anaheim and coastal areas was provided in this feeder. So in connection with the construction of this second Orange County feeder, the District contributed about $7 million toward the total construction cost of $22 million, the remainder of the funds being provided by the Orange County Municipal Water District.

The expansion program also included the doubling of the capacity of the Weymouth treatment plant at La Verne, both in filtration and in softening, and also provided for the construction of a 200,000,000-gallon filtration plant near Yorba Linda. On my retirement in December of 1961, a testimonial dinner was held in Los Angeles, attended by about 500 people at which time the

board announced that this filtration plant would be named the Robert B. Diemer Treatment Plant. I rather like the inscription which was put on the plaque that was erected inside of the building in January of 1964.
SCHIPPERS: I'll read it. "Under his outstanding leadership, the Colorado River Aqueduct System was completed to its full designed capacity of one billion gallons of water a day. The people of Southern California will be forever indebted to him for his great skills as an engineer and administrator and his wholehearted dedication to his heavy responsibilities in bringing additional water to this semi-arid area."
DIEMER: At the time of the dinner in December, 1961, the board of directors of the City of Pasadena attended and announced that they had appointed me to the District board to represent the City of Pasadena on the board. Mr. Morris Jones, the occupant of this position, had moved to La Jolla. He had spent many years with the Pasadena Water Department. Since that time I have attended all the board meetings, from 1962 on through to the present time. I do not intend to discuss anything that happened on the board because the board has a membership of about forty-five members. Many things came up before the board, and I would say that for a gathering as large as that the meetings were very harmonious.

In closing this interview, I would like to say again I must pay tribute to my wife who down through the years--we've been together fifty years, thirty-seven of which were spent on the aqueduct--followed me all over the aqueduct. She knows all the principal places. She has always backed me up in whatever decisions I had to make. That also goes for when I went to Mexico in 1926. If it hadn't been for her, I would never have gone to Mexico, because she figured that we'd done probably all we could have done in the Bureau of Reclamation. And it was a good move even though it meant that I was in Mexico three years and got home about once every three months to our home in San Antonio, Texas. The work in the Reclamation Service was very interesting and the people were fine people. The work in Mexico was also very interesting; I met a lot of fine people. And the work in California on the Colorado Aqueduct was most interesting, and the project itself speaks for what kind of work our men in the District did. I think that's about all I have got to say.

SCHIPPERS: You wanted to mention something about the annual reports.

DIEMER: There are many things that I have omitted in these interviews about the Metropolitan Water District, but I can refer anyone desiring information regarding the District to use the annual reports which were started

in 1938 and which are issued annually by the general manager's office and staff. I think if there's any question unanswered in there, I wouldn't know what it would be; and so many people have had connections with the District that the works which have been constructed speak for themselves. I'd like to say that there's been very little maintenance work in the twenty-five years that the aqueduct has been in operation.

I do not see that any improvement could have been made, although recently some of our board members have said, "Why didn't you do this? Why didn't you set the treatment plant over Lake Mathews?" Well, at the time the District was designed and completed in 1941, we only had 642 square-miles, and at that time, everyone wondered where we were going to get additional area to use all this water. So in my judgment everything that was done, was done for the best of the District, and that goes for feeder lines, treatment plants, and the capacity of the aqueduct as originally built; and I think Southern California was very fortunate to have a staff of engineers like Mr. Weymouth started with here in 1930.

SCHIPPERS: Do you think you've made it perfectly clear now about Los Angeles having to carry the burden?

DIEMER: That was the pitch I was trying to bring out. Did I say that San Diego got about 2,000,000 acre-feet

of water and Los Angeles only got 800,000?

SCHIPPERS: Yes.

DIEMER: The total taxes received by the Metropolitan Water District from 1929 to June, 1965: Los Angeles County $408,000,000; Orange County $39,000,000; San Diego County $41,000,000; Riverside $10,000,000; San Bernardino $8,000,000; Ventura $2,000,000; about $511,000,000 all told. Of this, $211,000,000 is for the city of Los Angeles. It will be noted that the total amount of water delivered has been about 9,600,000 acre-feet of which San Diego received 2,200,000 acre-feet, or better than twenty percent. Los Angeles County has paid $408,000,000 and San Diego has paid $41,000,000. In other words, they pay about ten percent on the taxes and use more than twenty percent of the water.

I've mentioned my wife and the great help she extended me throughout the years. I think the first twenty years we had twenty different homes: Wyoming, Nebraska, Texas, and California. When we first came to California every place they asked, "Do you have any children?" Finally, we got located over in West Los Angeles and spent a year there. Then our two youngsters made the front pages of the Los Angeles Herald because of the fellow that had thrown a bunch of ammonia on some dogs and put the eyes out of one of them. As a result, we moved to Beaumont where we'd be closer to

work. And then this fellow who was an ex-policeman from Chicago was brought to trial, and our two youngsters had to testify that they saw him throw the ammonia on the dogs. As a result, he got a year sentence in jail and $1000 fine, so our youngsters made the headlines long before their dad did.

I'd like to say, though, that we had three children, all of whom are graduates of Pomona College. We have seven grandchildren--six grandsons and one granddaughter. My first daughter lost her husband. He was a major in the Air Force in China; she had one son by him. After five years she married and has another son by her present husband. I have a son who wouldn't follow me around on the construction work but who has for the last seventeen years been engaged in engineering work, so I guess I was a poor instructor so far as he was concerned. But as far as I can understand he's doing all right. The other daughter is living up north and she's a secretary for Lockheed, where she worked during the war.

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