# Nevada Test Site Oral History Project
## University of Nevada, Las Vegas

# Interview with Richard Wyman

**June 13, 2005**
**Boulder City, Nevada**

Interview Conducted By
Suzanne Becker

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**[00:00:00]** Begin Track 3, Disc 1.

**Richard Wyman:** I'm Richard Wyman. I was born in Painesville, Ohio and brought up in Ohio. I served in the Navy from Ohio. I went to college at Case Western Reserve University, and that's where I met the woman who became my wife. She was Anne Fenton, and I married her. We went to the University of Michigan then. At the University of Michigan, we got our master's degree in geology, each of us.

**Suzanne Becker:** *Both of you?*

Each of us, yes. We each did.

*Now, can I stop you for a minute and go back because geology is a pretty specific thing. You said you grew up in Painesville, Ohio?*

Yes.

*Where is that?*

Painesville is about thirty miles east of Cleveland, on the lake. And Cleveland at that time was separated from Painesville by a large distance of farms and nurseries. Today, it is more or less encompassed, that whole area, with residential houses. But in those days, it seemed further.

*What was it like growing up there?*

Wonderful. Wonderful.

*Did you develop an interest in geology there, or had you always had it?*

Well, to some extent, I did, I believe, because my father was interested in it. And this is an area that was heavily glaciated, so during the glacial age, it was covered by ice. Then afterwards,

the Great Lakes formed from the melting of the glaciers. It was an interesting place to live. And it was rural. There were farms and woodlands and wildlife all over the place, and very different from today.

*It must've been nice to grow up out there.*

It was nice.

*What kinds of things did you do?*

Well, you can fish and you can hike and you can go swimming in the lake or go swimming in the river. We played some kinds of ball that they don't do much anymore. It's called one-a-cat or work-up, baseball games they are, that don't require teams. A game will just get started and people will join it during the progress and people will leave during it. You don't see that anymore. Today, everything seems so organized.

*So this was more of a pick-up game with the neighborhood, kind of.*

Yes.

*You said your dad had an interest in geology. What did he do?*

Well, he was in insurance and real estate. He just was interested in it. But I got interested in geology actually when I took a course in college with a girl that was taking geology, and I wanted to sit next to her, [chuckling] and I discovered it was a really interesting thing.

*Who knew? And then how did you meet your wife?*

She was teaching mineralogy labs at Western Reserve and I took mineralogy and I had her for an instructor in the lab.

*OK. Interesting. So you developed an interest through the girl. And you majored in geology, as well?*

Yes. I was in civil engineering at Case Western Reserve, then geology and mining geology at the University of Michigan. Anne was a mineralogist, primarily, interested in the minerals. And later on, I followed that as a geologist in working for mining companies. I worked first for New Jersey Zinc Company in New Mexico. Then we went to Peru. Well, first we had a daughter born and she lived only a short time and died, so we thought we'd get away—we went to South America, to Peru, where I worked for Cerro de Pasco Corporation in Cerro de Pasco, Peru. High in the Andes; 14,300 feet high where we lived.

*Wow, that must've been beautiful! How long were you out there?*

Nearly three years.

*Oh, that's wonderful.*

And Anne taught the school for English-speaking children. Many of the professional people were Americans or English or Europeans or others that wanted their children to speak English, and she **[00:05:00]** taught the school for English-speaking children.

*Now, I want to back up just a minute. You and Anne met, then—*

In Ohio.

*Receiving your master's.*

Yes.

*And when did you marry?*

We were married in December 1947. We've been married fifty-seven years.

*Wow! That's terrific. And that happened in Ohio.*

Yes.

*OK, and then from there you guys moved to—*

We studied at the University of Michigan. We went to Peru. And after coming back from Peru, we lived in Arizona for a while. That's where our son Bill was born. Our son William Wyman was born in Prescott, Arizona.

*Wow, you're the second person in a week I've talked to that's lived in Prescott, Arizona.*

Is that right?

*Yeah.*

Well, it's a nice place to live.

*Yes.*

Anyhow, there I worked for New Jersey Zinc Company and—

*What sorts of things did you do?*

That was an exploration project, looking for ore deposits. Then I was hired by a uranium company, Western Gold and Uranium, Incorporated. That and its sister company, Golden Crown Mining Company. The two companies shared my salary. I was their only professional employee. It was two small companies. And we moved to St. George, Utah.

*OK. For work?*

This was for Western Gold. St. George was their main office, and also they had a mine at Silver Reef near St. George, and we developed a mine in Grand Canyon called the Orphan. The Orphan is in the Grand Canyon National Park, two miles west of El Tovar on the South Rim.

*And when you say you developed a mine, that means you—describe that process.*

There was nothing, no mine there, just an ore deposit. Obtaining the ore deposit and all of the legal ramifications were part of it, but developing the mine, this had to have an aerial tramway put in from the rim down to a thousand feet below the rim, vertically. Actually, more than that. And on the slope is where the ore deposit was discovered. It was discovered by an old man

named Daniel Hogan back in the 1890s, and it had not been developed into a mine but it was a patented mining claim; it was private property in the national park. And that's how we were able to obtain it, and that's how we were able to develop it. We later developed it by sinking a shaft 1,500 feet, which went down below the ore body, and then make a drift out to the ore body. And by this time I had left Western Gold. I didn't work for them anymore. But that in itself is a very interesting history. Morrie Castagne, the man that I hired as superintendent there, wrote a book about it.

*Really. What years were these?*

Well, we were with Western Gold from November 1953 until April 1959.

*And you were at this time in St. George, Utah.*

Yes, we lived there.

*Now, St. George is probably best known at this point for being downwind of the [Nevada] test site. Well, that's one of its claims to fame.*

Well, it's a very much larger city now than it was then. In those days, it was 5,000 people. Today, I think there are seventy-five or eighty thousand.

*Yes. Definitely bigger. What was it like living there? Were you aware of the test site?*

Of course. It's a small Mormon town. We were non-Mormons in the 1 percent that was non-Mormon.

*And how was that?*

But we survived fine and they were good people, good people to work for, work with. I had operated the mine at Silver Reef. At Silver Reef, we produced uranium and silver. And at the Orphan Mine, which we also produced at the same time. That was a uranium mine, and the **[00:10:00]** highest-grade uranium in the United States. The highest grade. Very lucrative mine.

*Sounds like it. So you had an awareness of the test site probably for several reasons.*

Oh, yes. Well, for one thing, they always let us know there was going to be an aerial test. In those days, in the 1950s, all of the tests were in the air and at the Nevada Test Site, which was something like 125 miles west of St. George.

*So fairly close.*

Well, "close" depends upon what you think is close. A hundred and twenty-five miles isn't close for most things. Anyhow, they would tell us there's going to be this test at a certain time. Usually it was just about before daybreak, early in the morning. So there were a lot of tests but in the early ones, we used to watch them. We would go up on the Red Hill, which is north of St. George. There's a red cliff, if you remember. Up on top of that, you had a clear view to the west, and at the particular instant, you would see the light. You would not see a fireball or anything like that, but it would light the sky up to the zenith. You could look up and you're looking at light. And you don't hear anything yet. Just the light. OK, then we would hop in the car and drive down, back to St. George. At that time, we had an apartment in a house with some other people. We would put on a pot of coffee, and by the time the coffee was done and we poured the coffee, you would hear the noise. It was about fifteen minutes or eighteen minutes later, but it was enough later that you had time to go down and put on a pot of coffee, and then you'd hear the noise. And shortly thereafter you would feel the shock. Sometimes you'd feel the shock earlier, too, depending upon where it was, but the shock comes through the earth and the noise comes through the air. So then it's a long ways away. These were always shot during a time when there was not much wind, so there was not much [that] ever got to St. George, regardless of what anybody says. If the wind is blowing five miles an hour, and it's blowing directly towards St. George, 125 miles, it's going to take a long time for the fallout to get there. It

disperses all the time. It's completely dispersed, by the time it gets that far. There's not much. However, we could pick it up with a Geiger counter. When it comes down, we could— since I was in the uranium business, we had a Geiger counter, and I would put it in the back yard and we could tell when the fallout started. But it was kind of interesting.

*What did you think about that? I mean first of all, you actually got to witness an atmospheric test which—*

For ten years.

*Which not a lot of people—*

For ten years.

*What was that like? What did you think about that?*

Well, this was for our national defense, and we certainly supported it. A lot of people in St. George worked over there, and I eventually went to work over there.

*Were you ever concerned about the fallout, especially picking it up on the Geiger counter?*

No. By the time it gets there, it's so little, it was not even in a rank with the ore that we mined. It was not as radioactive in any way as the ore that we mined. And also it has a very short half-life. The half-life is—the radiation never really ends, it just keeps reducing by 50 percent over a period. So anyhow, short half-life material.

*That's interesting, too, the ore that—working with uranium is also fairly—*

It's much, much more radioactive than this.

**[00:15:00]** *Right. What were your thoughts about that? Were you ever concerned?*

Probably not. We tried to keep clean and not get any ore into our food or into our mouth, and to keep your hands clean and your body clean. Later on, we worried about it more than we did at the time.

*More in a hindsight kind of way?*

Yes.

*How long were you in St. George?*

We lived there until May 1963.

*So approximately—*

Ten years.

*Ten years. OK. And at what point did you end up at the test site?*

I went there to the test site—oh, first off, after I quit Western Gold, I quit Western Gold in about April 1959, I started my own exploration mining company called Intermountain Exploration Company. We looked for porphyry copper deposits, lead and zinc, gold and silver. We didn't look for uranium. And we found some interesting prospects, but we were underfinanced, so it couldn't pay me a salary. So eventually I had to get another job.

Well, in about August 1961, the Russians fired a series of ten aerial shots—back up a minute. In 1958, there was a moratorium declared on atomic testing. Nobody did any after that. And the Russians were supposed to honor that and we honored it. But they didn't live up to their part of the agreement. In August 1961, maybe July and August, they shot ten in the atmosphere. Those ten very large ones in the atmosphere indicated they had to have been preparing for years. One of them was the largest ever shot in the atmosphere, fifty megatons. That's fifty *thousand* kilotons, fifty *million*—OK. So the thing is, these were shot, then the United States woke up. And the president then was President [John F.] Kennedy, and he resumed the testing at the test site. So we heard the test site was resuming.

At that time I had been a mine superintendent at the Silver Reef and at the Orphan, and I had had the experience of developing two mines. So I figured I had some experience that was

valuable to them, besides which I was a geologist and I was a surveyor. Anyhow, I went over to the Nevada Test Site looking for a job. And I first went to Holmes and Narver. Holmes and Narver was the architect-engineer. They did the design work for tunnels. And they said they didn't have anything but they said REECo did. That's Reynolds Electric[al and Engineering Company] and to go see Don McGregor. Don McGregor was the tunnel manager for REECo, and he was up to his ears in hiring people and work. He was just overworked. And I showed up there looking for work. He had two telephones going and a line of people waiting to see him. I said, If you hire me, I can take a lot of this work off your hands. I said, I can handle these people coming in, I can handle these phone calls. I can relieve you of a lot of this work. He said, Can you start now? And I said, No, I can't. I said, I came over here and I don't have any clothes or anything to stay overnight. And I said I would have to—

*You'd driven from St. George?*

Yeah, I'd have to go back home. Anyhow, he hired me that way.

*So you just showed up and—*

That's a lot different than the way you have to go today, isn't it?

*It sure is.*

**[00:20:00]** Anyhow, he hired me. And what he had in mind [was] that I would be the construction superintendent for the tunnel for a big shot that was coming up called Marshmallow. I can show you more about Marshmallow, tell you more. But he showed me a picture of a pipe arrangement and he said, Could you build a thing like that? I said, Of course. [Chuckling] And full of confidence. Anyhow, that's what I ended up doing.

But in the meantime, they were having a lot of problems of supply. They were running tunnels and they lacked a supply of rail. The tunnel rails, forty-pound rail, forty pounds to the

yard. Mainline rails are ninety pounds to the yard, so that's too heavy for the tunnels. The bull gang that lays the track wouldn't be able to lift the rail, so it has to be the forty-pound. Lighter than that's not able to support the train; heavier than that, the men can't work it. So forty-pound rail is what they needed. And he had not been able to get any because in order to have some rolled, it was like a year before you could get delivery. We wanted it now. The Russians just fired these ten big ones. So he said, Find me some rail. So anyhow, I went over to Colorado and I made some phone calls, found a place where they had just torn up a railroad that went to a small town up in Colorado, and it was forty-pound rail and they had it stacked in their yard.

*In Denver?*

In Denver, yes. And so I said, We'll take it. I thought I had the authority to say that because of the way he talked to me. I said, We'll take it, I was glad to see it, and to start loading it up. I said, We need it now, and we do need it now.

Then I called him up and I said, Well, I got your rail. [Chuckling]

And he said, You what?

I said, I bought it.

[And he said], You didn't have the authority to buy it.

I said, There are three truckloads out on the road right now.

Anyhow—he said we had to have bids.

[And I said], But there's nobody else has it.

[And he said], Well, that makes it easier to get the bids, doesn't it?

So anyhow, we bought that rail. I also bought fan line the same way. It came from the Eisenhower Tunnel, which is the highway tunnel that goes under the Loveland Pass.

*Through the mountain, right?*

Yeah. So that was my first experience with buying stuff for the test site. This was in October that I hired on, October 1961.

*And with REECo.*

With REECo, yes. And by December, you see, it's winter now and I started the Marshmallow tunnel, holed it off. Marshmallow was a vacuum-pipe shot simulating in outer space. This was an outer-space shot to know the effect of an atomic blast on many kinds of materials and on other missiles. So this is the beginning of the antimissile series, which is still controversial today.

Anyhow, I successfully completed the construction of that and the pipe two months early. And this was unheard of out there.

*Really. Now, how long did that all take you?*

It was from December to May.

*OK, and that was still two months early.*

Yeah. So that was detonated and it was a very successful experiment.

*What all goes into completing a tunnel? Was that different than starting the mines, some of the mining work that you had done before?*

A mine is intended to dig ore out of the ground to sell commercially. A tunnel is aimed at making some purpose other than mining. In this case, to go underground to a place where you want to detonate this thing, and also to make a large enough tunnel so that you included all this **[00:25:00]** pipe, an array that they had, and also to include thousands of miles of coaxial cable for their experimental use. So the purpose is entirely different. The method of mining the tunnel is very similar because you drill, blast, muck, drill, blast…. You drill it with compressed-air drills, you load the holes with explosives, you blast it, and that advances—it breaks up the rock, and then you muck it out. You dig it up with what's called a mucker, and a mucker has a big

front end shovel and it pulls the muck back and puts it into ore cars and then they—this is how you advance it. Drill, blast, muck. Then they bring the ventilation line forward, the rail track forward, and the air line and water line forward. And it's all on a cycle. So you just keep on doing that till you're done.

*Now, how far underground was this particular tunnel?*

Well, it was about 3,000 feet from the portal when you portal in, but it was vertically maybe 800 feet, something like that.

*OK. That's still significant. Now, you said Marshmallow was a successful shot?*

Yes, successful in that it did not blow out the portal, it didn't blow up the experiments, and they got the data that they were looking for. What that data is, I haven't really any idea. It wasn't my business. You see, the security is on a basis of need to know. I didn't need to know those things, so I didn't know those things and I wasn't introduced to them. But I was introduced to the scientists and all. If you'll hold this a minute, I'll show you a couple of things in the other room.

*Sure. OK.(showed pictures of science and tech teams].*

**[00:26:54]** End Track 3, Disc 1.

**[00:00:00]** Begin Track 4, Disc 1.

*OK. So Marshmallow. Now, what year was that in?*

It was shot in 1962. And then I worked on some others. Pile Driver was getting started then. Pile Driver is an underground construction experiment to see what kind of underground structures would be developed to resist a direct atomic attack. It was something like our NORAD [North American Air Defense Command] underground facility in Colorado, where if the enemy, any enemy were to hit it with an atomic bomb, we would want to have it structurally safe. And that was what we were testing, about 200 of these individual structures underground.

But I decided about that time that I wanted to do other things, so I left the test site and I went with the Sunshine Mining Company. Sunshine Mining Company is a silver-mining company up in Idaho. They used me as a mining engineer for developing a new, improved ventilation system. And then I was superintendent of tunnel construction for them at the Exchequer Dam in California. On the construction of a new dam in California called the Exchequer, and I was the tunnel and gate shaft superintendent.

But Mr. McGregor was having trouble with Pile Driver. Pile Driver was being started and it was way over budget and underperforming. It was going at half the speed it should—the construction was—and costing twice as much money. And I had done very well with Marshmallow, and he wanted me to come back to the test site and do Pile Driver. So I quit Sunshine Mining and I came back to the test site, and moved to Boulder City at that time.

*What year was this?*

Well, ’64, but I arrived in Boulder City on January 1, 1965. So ’65. In ’65, then, I took over Pile Driver in a way other than what you might think. The man that was doing the construction on Pile Driver was Glenn Clayton and he is a very capable miner and mine operator, but he did not have any experience with this kind of thing. It had to have a new kind of planning because all of these structures had to be built in concentric arcs at particular distances from the place they were going to install a known atomic bomb in order to test these structures. And they had to be done in such a way that you could do the excavation and do the various kinds of structures without getting in the way of one another. Consequently, it wasn’t the kind of a thing you could do if you just came to work in the morning and decided well, you’re going to do this or you’re going to do that. It had to be very carefully planned in order to have the logistics proper to move the

particular structural materials to the right places at the right time. It had to have a detailed plan, something Mr. Clayton had never done, but I had done.

So first off, I wanted to know why it was taking so long. It turns out that people in the Department of Defense [DoD], various generals and admirals and colonels and so on, liked to visit the test site, and they liked to come out there because they could go to Las Vegas. So here they are. He's running a tour, essentially, of Pile Driver, and these people, uniformed officers, show up underground. They are holding up construction. They're in the way. Maybe they think it's interesting to them, but they're stopping the men from doing the work. Everything had to go through that one shaft, all the material, all the men, all the ventilation, the water and concrete, and visitors. The first thing I did was to talk to DoD about not having visitors come into there, and they cooperated 100 percent. I said we could **[00:05:00]** set up a Saturday when there were very few people working; have some of them come down then and just put some men on to take them underground, but we—

*During the regular work day—*

Saturday wasn't at that time. Earlier on, they were all work days. But anyhow, that worked. That helped a lot. And then I met with a man named Asa Morrison who was an expert with using the computer for planning. He and I and Glenn Clayton spent dozens of evenings—we would spend at the test site our evenings making this plan for the development of Pile Driver. Huge sheets of paper would be all around this room and the next room. And this was all put on computer cards, IBM [International Business Machine] cards in those days, and then the progress was monitored every day so that we knew what materials were going to go to which of those sections. So now we had a plan, and the plan was followed, and it was completed. No more time was lost, it was back up onto schedule, and no more money was lost. And that was my second big one at the test

site. They made me assistant manager of operations in charge of mining. Mr. [Harold] Cunningham did, promoted me. So that's what I was until I quit the test site.

*When did you leave the test site?*

It was in 1969, in June. I left there to go to teach at UNLV [University of Nevada, Las Vegas] in the fall of 1969.

*What did you teach at UNLV?*

I taught civil engineering and some geology courses. My wife Anne was already there, teaching. She'd been there since 1966.

*Wow. So you guys have seen some changes on that campus, as well as in the Las Vegas area.*

Well, yes, I think there were a hundred faculty then, eighty to a hundred faculty.

*Combined.*

Total. And now there are that many in engineering.

*Right. And how long were you at UNLV?*

Twenty-three years, and then I retired from there. I do consulting for various things.

*Good. Now, just going back to some things that you did at the test site, I guess first I'm curious when you got out to the test site, what did you think of it?*

I don't understand what you mean.

*Well, I guess you were already familiar with the test site, but I'm wondering what your impressions were. Was it what you had expected or—*

Yes, it was pretty much what I expected. I was familiar with the desert, familiar with the Nevada culture, and I knew people that had worked there.

*OK, so you were familiar.*

And I knew about the testing itself, the aerial testing. They didn't go back to aerial testing, so even though I think there was one aerial test later on, the aerial testing essentially was ended in 1958. Beyond that, there was practically none. There was none while I was out there.

*What areas were you in?*

Like Area 16, Area 15. Pile Driver was in Area 15. Marshmallow was in Area 16. The miners' camp is Area 12, so many of the tunnel shots were in Area 12. They are usually in Area 12. Marshmallow and Gum Drop were in 16. Hard Hat and Pile Driver were in Area 15, and Tiny Tot. Tiny Tot was another interesting one.

**[00:10:00]** Well, for one thing, let's see some of the programs they have out there. Mainly there are two kinds of atomic tests. There are weapons tests and weapons effects tests. The weapons tests are testing that might be used in war. The weapons effects tests are testing what an atomic weapon will do to our own infrastructure or weapons or whatever. So with the weapons effects tests, they always use a known bomb, a five-kiloton or a one-kiloton, that they already know how it'll behave. They're not testing new bombs. With the weapons tests, they do test new bombs. But there also is another third kind is the peaceful uses, Plowshare. Plowshare I was very interested in. So you have the weapons tests, the weapons effects test, the Plowshare tests, and then another called Vela Uniform.

*What's that?*

It's how to hide a test from your enemy. How to conduct an atomic test so that they wouldn't know about it.

*And that's called—*

Vela Uniform. However, as far as I know, we were always able to detect our own tests, so consequently we would always be able to detect their tests.

*Right. And that's done by measuring vibrations or seismic energy in the—*

Yes, this sort of thing. Tiny Tot what I mentioned was an open sphere and they put the test in the middle of the sphere, so it's not coupled to the ground. It's just like an aerial shot underground. So it does not put out the same kind of vibrations as any other test. How these came out, I don't know. I was never privileged to know.

*So essentially you built the tunnels for them.*

Yes.

*And I think you described it earlier but what was a typical day like when you were constructing the tunnels?*

Typical day?

*Yeah, what—for the most parts.*

Well, during the construction, I first lived out at the test site and came home on weekends. Then later on, I lived in Boulder City and commuted daily. That's ninety miles to the test site. And with the daily commute, I would drive into Las Vegas and catch the bus. Later on, the buses came all the way to Boulder City, but at first, most of the time, I just drove into Las Vegas and catch the bus, and then ride out there. And on the ride out there, in the evening coming back, I would prepare for teaching a course at UNLV and do the work on the bus. And then I taught at UNLV at night courses while I was working at the test site. And that's how I got my job there.

But you get out there in the morning, you go through the main gate, you show your badge—there's a badge check on everybody. Women, you know, change their hair, their appearance, and dye their hair, wear a wig; but if the woman doesn't look like her picture, she gets off the bus now—right now—goes in, and then she has to identify herself in whatever way

and get a new badge. They don't let them go in with a badge that doesn't look like them. Or a man either, but men just don't usually do that.

*Right. So if somebody had gotten their hair done or colored or something like that, it's a new badge.*

New hairdo, maybe, yeah.

*Interesting.*

Yeah. The badge must look like the person.

*Right.*

And then you have on your badge some numbers and holes and things. Those tell where you can go and what kind of information you can be privileged to. So the numbers on my badge, I had the number of the badge itself, which is my number, and then I had some numbers that indicated construction, some numbers that indicated what areas on the test site, physical areas like 15 or 16 **[00:15:00]** or 12 or 5. Area 5 had mining activity. Area 3.

We did another kind of mining on the test site besides these tunnels. It's what we called stovepipe mining. A very large-diameter hole, it might be a mile deep, we'd mine a cavity off the bottom of the hole. People down there mined this cavity off the bottom of the hole. Then there's a test in there. It would be lined with special concrete and special instrumentation, and it's maybe a mile below the surface at the bottom of the large-diameter drill hole.

One of the things that was developed at the test site was the large-hole drilling. REECo was a pioneer in drilling large-diameter holes as much as ten feet in diameter and thousands of feet deep.

*Yeah. We were out there and saw some of those drill bits. They were the size of a Volkswagen.*

This is a technological first for REECo. And now the shafts are drilled all over. But they didn't at first. They did it out there.

So we had those shots that were on the bottom of—a cavity that was mined in the bottom of a deep hole, that kind of mining. And then in Area 5 and in Area 3, there were other configurations of shafts and tunnels. We had usually about five different tunneling or shaft-sinking operations going at any one time. So it was a pretty big job.

*And it sounds like long days?*

Yes. Yes, it's a long day. That was one of the reasons I left. I was getting kind of tired of the long, long day. You get up in the morning and, well, you're at the test site at eight to start work. You see, that's ninety miles, so you're leaving about 6:30 at the very latest from Las Vegas, which means like—

*And you had to get there.*

Yeah, and you have to get up first and get dressed and have something to eat and go. And then coming back, it's the other way. You get done out there at 4:30 and you catch the bus and you hit Las Vegas about six, or 5:30, Boulder City at six or 6:30. That's your day, more than thirteen hours. So one of the reasons I left there was the long hours. And also at the time that I left, it looked to me like the thing was winding down.

*The program.*

Yes.

*Why? Why did you think that?*

Well, it seemed that there were fewer shots anticipated, and it did wind down, you see, it finally did wind down. And when any kind of an outfit is going down, it's not good for the people that

are there. It's harder to get a promotion, harder to get a raise, you wonder who's going to go next, and things like that. And so it was about time that I did something else.

*But you spent a lot of time out there. You stayed up there for a period of time.*

Oh, yeah, long years, yes.

*How was that? Having a family here—*

Well, actually from St. George that's really, really bad because a seven-day week is the same as a 100-day week; it doesn't ever stop. A six-day week, you get a day off. A seven-day week, there's no day off.

*And you were working seven days when you were up there.*

Yes. And stayed in Mercury, a dormitory in Mercury. It was conventional sort of living, but you're away from home, you're away from your family, it's lonely. But a busy life.

*Very, it sounds like. Now, I'm curious, as shots got closer or on days of shots or on the days leading up to the shots, were there any different or special preparations or procedures that you had to go through?*

Well, not unless I was involved in it. If you're not involved in it, it's all a matter of just staying **[00:20:00]** away from those places. And roadblocks and things like that, anybody would be a fool to try to counter that kind of thing. They're certainly crazy. But no, if you're involved in it, then it's like day and night, into the night. And especially in the button-up, when you're getting ready to shoot it. There are all kinds of things that happen. The construction is unconventional. There are things that are built that nobody else built before. So that means that the job superintendent has to assign us to somebody.

And the Nevada Test Site has been a strong union stronghold. There are about fifteen different unions, and those unions each have a separate contract. At the time I was there, they

made a big effort to get the contracts all to run at the same time so that they expired at the same time. And they succeeded in doing that. Prior to that, they would have a strike of one union and the others. With fifteen different unions, you're subject to a strike almost any old time because somebody's contract is ending. But they got them all to be at the same time, and that worked out much better. And we didn't have what I would call any real labor grief out there. There were a few strikes, but peaceful. You always got some hothead that's going to throw an egg or something, but mostly peaceful.

Oh, what I was going to say of these different constructions, the construction superintendent will have to assign this new job to somebody. The rule was, at the test site, that he can pick who does it. Say he picks that your union does this and these are the men that are assigned to do it. Some of these other people might not like that, but they can't strike. What they have to do is to complain in their union, and they'll settle it somewhere else. And if there's somebody gets some extra pay, that's all right, but there's no strike. I thought that worked pretty well.

*That probably saved you a lot of grief.*

Oh, it saves everybody grief because the job has to go on. You can't stop and take it to Washington to find out what labor union is going to do some little piece of work. So it worked out quite well, I thought.

*Were you part of a union?*

No, no, I was always a superintendent or manager of some kind.

*So you weren't the miner.*

No. I hired those people. And in the ranks of the union, they have stewards. The steward, his job is to interpret the contract for the union members. If they think something is wrong, they should

talk to the steward. The steward knows the contract and understands it and he would explain it to them. And if he knows of anything wrong, he talks to the superintendent. So it works out anyhow. It's a big organization. At the time I was there, 12,000 people worked out there.

*I think that was pretty much at the height of it, going into the peak of it. Do you remember any protesters that were out there?*

Oh, nobody pays any attention to them. What good would they do? I'll tell you what I think about the protesters. I think they made a mistake by letting them go so easily. I think they should've—this is my opinion, not anything official—I think they should've taken the first ones out there and taken them up to Tonopah. Tonopah's the county seat of Nye County and it's more than 100 miles from the test site to Tonopah by highway. As a matter of fact, it's probably 130. OK, take them up there and put them before the justice of the peace, fine them $50.00, and say you're free now to go home. And there they are in Tonopah and every day there's a bus going **[00:25:00]** north and every day there's a bus going south. What are they going to do? I'll tell you, it would've ended the protests because most of them don't feel that strongly about anything. They just like to get their names in the paper and their pictures in the paper. They're useless. But if they had done that early, it would've cut the number of protesters down to very, very little.

*I think they did, from time to time, take a handful of them up to Tonopah.*

Well, if they did, it wasn't—

*But probably not en masse.*

It wasn't in time to cut it off.

*Yeah. Yeah. Yeah, I guess I'm just curious if you remembered any major events. Have you ever had a run-in with them?*

No.

*No?*

No.

*So a couple of questions. Going back a little bit, you mentioned, as far as the uranium mining went, at the time you didn't really think about health risks [and] that it wasn't until later that you started to think about that.*

When you started to read about some of these things.

*Yes. Is that when got you to thinking about it, [when] you started reading about it?*

Yes. I didn't suffer any ill effects that I know of.

*At the time when you were working with the actual materials and starting the mines, was there any literature available or did anybody mention anything?*

There might have been something available, but it wasn't obvious.

*Were you ever concerned being out at the test site that there was any form of exposure to anything?*

It was more obvious out there that you were—they were more careful, much more careful. You have REECo RADSAFE [Radiological Safety]. These are the people that had radiation safety, and they provided all the clothes and everything. You see, you had alpha, beta, and gamma radiation. The alpha is a particle, so it sits on you and that radiation can cause a problem because the particle is sitting there. Gamma radiation, on the other hand, is like light. So when it's gone, it's gone. And the beta is more like the gamma, except it's weaker; a piece of paper will shield it. So the alpha is the one that probably causes the most trouble because it isn't that it's so radioactive; it's because it's a particle that sits maybe in your skin or—

*Right, and it stays on you.*

Yeah. You can wash it off.

*So what kind of precautions did you guys take?*

Not much of any. You mean in the uranium mining?

*In the uranium mining and also once you got out to the test site. You mentioned that they were more tuned in to safety out there.*

But if you're in a radiation area, then you wear the proper clothes and mask and boots—rubber booties over your shoes—and gloves. And this is if you're in a radiation area, but most of it is not that. Most of the test site is just rural construction. Nothing radioactive to hurt you. We did re-entry in the tunnels. Then you dress up. They shoot the bomb and then a few hours later they've got all their readings and they know that it's done. Then we would go in and recover certain experiments that were passive, that were left there in order—you see, most of the experiments they would read on coaxial cables, they would read some reading in a trailer somewhere. These are all electronic signals. But some experiments are passive. That is, they would put a piece of metal in there, mounted in a certain way, and it receives a certain dose of radiation. Then they recover that metal and see what happened to it, that passive test. So they had some passive tests. Those were recovered, after the shot, by people going in. And **[00:30:00]** then we also mined back. At Marshmallow, we mined back to ground zero—made another tunnel back to go to ground zero. And that was the first time we used anything to protect people, that I know of. In Area 12, they would let people go in there and get exposed to the radiation. You carry a dosimeter and you have a film badge, and when you had too much radiation, more than they—if you get up to a certain level, then they won't let you work there anymore. It's read every day. And a re-entry is read immediately. But every day, if you're working in a radioactive area.

In Marshmallow, when we went in, we did something different for the re-entry tunnel. What they had done up at Area 12 was to just mine back. Well, as you mine back, you come to places where fissures have been opened during the shot and radon gas and other gases are coming out of those fissures. And that exposes people to radiation. In order to stop that, what we did was very interesting. We used what's now called shotcrete; then we called it gunite. And just spray the heading, blast your heading, and then go in and spray gunite all over it.

*And that would stop the gases from coming through.*

And it saves the men from getting burned out. They call it "burned out." They're not burned out, they're not hurt at all, but they have just been exposed to so much radiation that they don't want them to work in there anymore.

*Did you ever receive any levels of exposure that you know of?*

Well, yeah, I was exposed out there, but not dangerously. Not dangerous. They have a record of it.

*You do.*

They have a record of your film badge for every day you worked there. And they have it on the dosimeters; those measure a short dose, you see. If you're in there for two minutes, they'd know how much you got.

*Going back to St. George, this is sort of along the same lines, there's a lot of folks that argue now that St. George had a lot of exposure. You don't—*

I think that a lot of it is false, and I'm going to say—there are people—it also divided the town quite a bit.

*What was the general feeling like?*

Because they were solicited that if you have anything the matter with you, file a claim. If your nose runs, file a claim. If your eyesight is failing, file a claim. It doesn't matter what. None of these things were caused by fallout or anything else. They're just the same thing as if it had never happened. And so a lot of people filed claims that are known to be false. There's just nothing there. And also when they were collecting these claims, they were not careful to see if the person lived there during that period. We lived there ten years during that entire period and we have no problem, neither my wife nor I nor our son. They make it sound as though it was killing off people. I don't know of a single person who died. Not one. There are people that have cancer. I had prostate cancer myself. Prostate cancer comes from the male hormone; it doesn't come from fallout. And other people have things like this, you see. I just thought it was disgraceful the way they were soliciting people, if you have anything the matter with you, sign up, there's going to be a claim for you. And they didn't get that across. The act of Congress actually gives money to people that have any damage, but it has to be the kind that is caused by radiation.

*Yeah, they've got a fairly specific list these days.*

They don't give runny noses $50,000. Cataracts on your eye, you don't get $100,000.

*Right. So you say the town was divided over this issue.*

Yes. That's because there are people that knew that other people were cheating. Think of **[00:35:00]** this. If you thought your neighbor was putting in a false claim in order to try to get $100,000, what would your opinion be of that neighbor? And, well, I know on—we sat here and watched some of that stuff on CBS, filmed in St. George. This is on the television—national television—here's a person that we happen to know, and he said his father died of cancer, his mother died of cancer, his sister died of cancer. And the announcer [says], Oh, my goodness

gracious, this must've been terrible. What he didn't say is his mother died of cancer back in 1935. His father died of cancer in 1940. His sister lived in Washington, D.C. and died of cancer. None of them were exposed to fallout. The announcer did not ask if they ever lived in St. George or when. And this kind of thing went on, and it just makes you sick.

*Do you think there's a certain bias or human interest element that people pick up on this and—*

Oh, yes. Sure.

*Has the attitude changed, do you think—*

Oh, yes, today they're much more fearful of radiation than they ever were during the time—and I heard – this is another thing – of men that I know, these people—

*[Interview was interrupted at this point by someone at the front door]*

*OK.*

**[00:36:42]** End Track 4, Disc 1.

**[00:00:00]** Begin Track 5, Disc 1.

*[Recording resumes mid sentence]*

*— the perceptions of the test site and Downwinders and—*

Yes. OK. I'm going to tell you one of the things. These people I know, and it disgusts me the things that they say. This person that I knew quite well, he said, We heard the bomb. You don't hear the bomb for about twenty minutes. We heard the bomb. And then he said, A little while later, I looked up and there was this pink cloud going over. I'll tell you more about that. And he said, Then I felt this itching from the fallout.

*And that's not how it happens?*

The insidious thing is you feel *nothing* from the fallout, you feel *nothing* from radiation, even intense radiation, you don't feel a single thing. Nothing. You don't get an itch from fallout. The

cloud, a pink cloud? Why would a cloud be pink? It must have been sunset or sunrise. There was no cloud in the sky when they had their aerial tests. If there was a cloud that came from the blast, it's a dust cloud and it dissipates. And there was no cloud visible when the fallout comes. You look up and it's clear sky. No cloud whatsoever. No pink cloud. And no itching. And it would be many, many hours later, usually a day or two later that you—

*That that would happen after the test?*

Yes. And here's a friend of mine saying these lies. And I knew that they were lies, or may have been in his imagination. But there's no pink cloud at all. No pink cloud anywhere except at sunrise or sunset. And those dust clouds are not pink.

*So it's more of a, like you said, a dust cloud than an actual cloud that we would see.*

Well, the dust cloud, it would be from the atomic blast, or the smoke that comes—

*Now, did those go over the city at all or had they dissipated by the time they got there?*

Those are dissipated by the time they get there. Yep. You try to find any cloud that'll go for 125 miles and hang together. They don't. A big storm, that a different thing. Far different.

*Right.*

Also one of the things that they did at the test site I should tell you about is the animal experiments. There was a woman named Mary Mayes,. She was a biologist and she may still be alive. I don't know. But she was in charge of these things. They had experiments on animals at the test site. They had the Mouse House, the dog pound, the pig farm, the sheep herd, the cattle herd, and the dairy farm. All those kinds of animals. And they fed them and they exposed them to radiation, in order to see what the effects were. Genetic effects they looked for. That's why they had the Mouse House, because they'd get many generations in a hurry. The pig farm they had because the pig is physiologically similar to a person, if you believe that. And so if they

exposed pigs to radiation, it was more similar to what they would do if a person was exposed. The dogs, they used thoroughbred dogs, and that was so that they would know if—he's a larger thing than a mouse, you see, and if anything showed up in generations, they would know that it was the result of the radiation. They couldn't use a mongrel, for example, because they don't know what its ancestors were.

*So they used purebred dogs and then they would continue to breed these dogs and then look for any effects that may go generationally.*

Yes. And they would give away the puppies. At the test site, they had a thing, the *NTS News*. We called it the Nuts News. And they gave away the puppies. They wouldn't give you the papers, even though it was purebred, because if something showed up five generations later, they don't want to be sued. But you can have the puppy.

*Right. So you take the puppy.*

Yeah. They were perfectly good. They didn't have any bad effects.

*And so with the sheep and the cattle, they would graze on the land?*

Yes.

*And then they would check to see if there was any ingestion of—*

**[00:05:00]** They would see what happened. And then they gave them feed. There was one they called Big Sam, I think, and had a hole in his side so they could put stuff directly in his stomach. They had visitors to the test site that could come and see all this stuff.

*Wow. So there's quite a discrepancy, then, between what some people think and what other people think [of things that went on at the test site]*

Yes. Yes. As a matter of fact, there are people who think there's nothing but weapons testing out there, and like I said, there's the weapons testing, there's the weapons effects tests, the peaceful uses, and the Vela Uniform. Plus these animal experiments.

*So there was a lot going on out there.*

Yes. And then part of the test site was called NRDS [Nuclear Rocket and Development Station]. That's where they developed the atomic rocket. The idea was to send a rocket to Mars. And that was developed and it was very successful. Then they shut it down. Also, the Plowshare experiment on mining was very successful. That is, in the Pile Driver—this was a follow-on to Pile Driver. Pile Driver was where we tested the structures. They used a fifty-kiloton bomb and it was placed at a certain place. This is a known device. They knew what its yield would be, and this was all calculated. It made a chimney. The bomb goes off and it makes a cavity. That cavity collapses, and then as it collapses it makes a chimney that goes all the way up to where—sometimes all the way to the surface. OK, that chimney would be like mining an ore body. After Pile Driver we went in there, and I was in charge of it, we went through that chimney, and at first we're all suited up for the radiation. There wasn't any radiation. Nothing. We went right through it, out the other side. *No radiation.*

*So your badges didn't pick up anything?*

You could work underground. We no longer had to use these clothes. Work underground in your regular clothes.

*Wow. I'm going to stop you right here because I want to change the disc real quick.*

**[00:07:49]** End Track 5, Disc 1.

**[00:00:00]** Begin Track 2, Disc 2.

*OK, so from Pile Driver, from that experience, you discovered that you could be underground without the protective clothing.*

Yes. Also, the previous one to that was called Hard Hat. It was similar, only much smaller, and that was the same kind of thing. But nobody's ever used the atomic bomb for mining. The idea was to use it for mining low-grade ore because it's cheap. You can break an awful lot of rock with a low cost. Never been done. But also, as I say, some of the other Plowshare ones, they were named after kinds of cars, like Sedan. OK, Sedan crater—you've been out to the test site?

*Yes.*

Did you see the Sedan crater?

*Yes.*

OK, that was deliberately to see how much muck could be moved with a certain size of device. I saw that.

*You did.*

Yeah, I watched it when it went off, from the Marshmallow tunnel. I was standing there on the dump and watched the whole thing. The Sedan test, it came up like a mound, and then it just broke and it went under this huge dust cloud. It was probably ten or twelve miles high. They said in the Las Vegas paper it was more than 1,500 feet high. That's a third of a mile. It was probably ten miles.

*So they underestimated it a little bit.*

Anyhow, there was a coyote that was caught in the thing and came running out from under the dust cloud. They tried to catch him. I think they finally did. They wanted to catch him and see how his exposure was.

*Makes sense. Boy! So that must have been pretty impressive to see.*

Yeah, it was.

*That crater is huge.*

Yes. The idea was originally they were going to excavate a new Panama Canal.

*Yeah, I remember hearing that.*

Well, maybe they will some day, but—

*But it stayed hot for too long, is that what it was? No?*

No. No, I don't know. I think it's mostly [that] so many people are so afraid of using any radioactive material for anything. They're psyched out. And it's all by propaganda because in the times when we were actually doing it, nobody seemed too afraid. A lot of these so-called ill effects were not there. I bet you can't find—I'd really like to know how many people in St. George ever suffered anything at all, and I think it's very, very few, if any.

*Do you think it's possible anybody could've suffered more from the fallout?*

I don't know. I don't know. I don't know of anybody that did. I don't know of anybody in St. George that did, and we knew a lot of people in St. George, and Hurricane, and Leeds, and Enterprise.

*That whole area.*

Yes. Whole area. And I don't believe this was anything. It's a nothing. But it's a propaganda victory for the antinuclear people, and a lot of people—at least some people collected some money. And like I said, that really bothered many people because they knew that these were frauds.

*Right. It's an interesting debate, and it still goes on.*

Well, as I say, I was very upset about this, and I have been. Our son was there all ten years, and they talked about it killing children, and not one single child that I ever heard of had any problem

at all with it. They said they had abnormal thyroid glands. Well, when they said [that] in the newspaper, I contacted the Public Health people and I said, You're making some statistics on this. Did you ask any of the people you're making – this is quite a few years after – did you ask them if they ever lived in St. George during the testing?

[And they said], No, we don't ask that.

[And I said], Why not?

And they said, Because it would distort our sample.

**[00:05:00]** No, I said, it's distorting your sample not to ask that. Some of these people never lived in St. George during the fallout years, yet they're claiming they got cancer and things like that.

*Right. Yes, that would be important to know.*

Terribly important. You're saying this town was exposed to radiation of a fatal sort and you have people that move in there five years later and say they've picked up something.

*But was there not a shot several years later that vented and—*

Oh, Baneberry?

*Right, that ended up going that direction?*

There were a lot of them that vented over the years.

*Wouldn't that cause them to go into—*

No, that was a very little bit that would vent there because compared to an aerial explosion, that was a pimple. It would be nothing.

*Right. And there's nothing before that they had miscalculated and ended up going heavier toward St. George than they had anticipated?*

They had lots of aerial tests. I don't know how many. You might have that somewhere. [100 atmospheric tests at the NTS]

*Yes.*

But they were all done on the same sort of a basis, that they would try to—they would do it at a time when the wind was not that way. The wind would be to the northeast, so it would avoid that. And also when there isn't much wind. And if something went out of kilter, it's confined to the test site or very little beyond. Beyond the test site, there isn't anything but desert most of the time anyhow. You can drive—have you been up driving to Ely or driving to Reno?

*Yeah, toward the lake. There's nothing.*

It's a good experience.

*Yeah. Make sure you got plenty of gas. It's all definitely part of the history, though,[this] huge debate.*

Yes.

*So is it an experience that—a positive experience working there or—*

Definitely. Definitely. A lot of the same people argue against Yucca Mountain, too, and that's a lot of stuff similar.

*Yes. Same continuation of the topic, I guess. As a geologist, you must have some thoughts on that.*

Oh, Yucca Mountain? Yes, I was involved in it originally.

*Really.*

Yes. In 1978, under the Carter administration, I was hired, along with a number of other people, to do some consulting on the site. We were looking at sites in the State of Nevada that were already contaminated so that you wouldn't be contaminating a fresh place. And that was perfect. Also, in those days they didn't care if it was in the water table or not, but this was very good because it's about 1,400 feet above the water table, so there's practically no chance at all of

contaminating any water. And that was one of the ideal things about it. Also, it has zeolite tuffs, and zeolites are a series of minerals that will absorb ions out of solution, so it's like protecting the water a second time. Plus, you can put in engineered barriers, and then put the waste into containers that are not only watertight but will not corrode easily. These are like stainless steel, only heavy. Have you ever seen a stainless steel pan that corroded?

*Not to my knowledge.*

They don't. I have stainless steel pans here that we've had since we were married fifty-seven years ago, and they're just as good now as they were then.

*Right, so it doesn't corrode.*

This stuff will be in those, and then it's 1,400 feet above the water table, and it's protected by layers of rock and zeolitized tuff. I don't think that you could find a better site.

*Really. So you think some of the anxiety surrounding the potential of seepage into the ground and the ground water is—*

**[00:10:00]** False. False. If anything does get into the ground water, just think of this: it would be a very long time, say thousands of years later, the radioactivity has gone down to almost nothing. The half-lifes take it to nothing. Most of the material that's in these fuel rods is insoluble anyhow. It's not going to go into the water *ever*, and if it did, the radioactivity was very small, and then it has a path to follow. If it gets in there, how's it ever going to get to where anybody's going to drink that water? From the Yucca Mountain, they have a pretty good map of the ground water movement. It goes towards Death Valley. Forty thousand years later, it'll get to Death Valley. It's been fifty thousand years en route. How much radioactive would that be? And the whole history of mankind on the surface of the Earth is not anywhere like fifty thousand years. So I think it's totally a bunch of poppycock. That's my personal opinion.

*And the debate continues on that, too.*

Yes, but it's political, see? It's political. And it's people that don't want the radioactive material going through their town. So they put a route up north, and they oppose that too, don't they?

*It cuts through some of those ranches up there.*

The ranchers don't object. The objections are here in Las Vegas. It's interesting.

*You've been part of these debates, these huge debates that have been a part of Las Vegas history, both for the test site and now at Yucca Mountain.*

Yes. There wasn't ever any debate about the test site.

*Well, I guess the debate being whether it's hazardous or not, whether there's—*

But the debate, any debate about it has not been a debate. It's been people coming in *much*, much later. There hasn't been—when was the last test at the test site?

*Underground? It was '92?*

I think so. Thirteen years ago.

*You think there's a possibility they're going to reactivate the test site?*

I don't know. That depends upon our other enemies in the world, I think. Russia's no longer an enemy, so I don't believe—unless China turned out to be one.

*Yes, occasionally you hear the rumblings of rumor but who knows?*

I don't believe they're going to reactivate the test site at any time. They might use it for something. For example, all these atomic warheads that Russia has and the U.S. has have to be dismantled. And they should be dismantled and then the material made into nuclear fuel rods to make electricity. They could put a plant out there that would do that, and it would be very productive, I think.

*Good alternative source of energy.*

Have you made a trip to the test site?

*Yes.*

Where did you go?

*We went—boy—*

You went to Sedan crater.

*We went to Sedan.*

You went to Area 12?

*We did.*

There's a cafeteria there. You might've eaten there.

*It wasn't open when we were there, but we looked in by the Steakhouse. And we went out to where the railroad beams are and where the bank vault is and the house and—*

Oh, those are the aerial tests that they had.

*Right, right, around in there. We went up to Frenchman Flats, maybe?*

Frenchman Flat?

*Yes. And where the dry lake bed is?*

Yeah. That's the one at Yucca Lake. There's another one.

*Yeah. It's really quite a beautiful piece of land. I guess from a geological perspective, that must've been interesting.*

Well, yes, it was selected by the government in 1950. Let's see, who was president in 1950? **[00:15:00]** [Harry S.] Truman. Truman was president. And the reason for selecting the test site there is that [there are] not many mineral deposits. It's pretty much barren. There are a few mineral deposits, a little mercury and one tungsten mine. Also, it's very isolated. It was very isolated. Las Vegas was a small city then of about 8,000 people, eight or ten, and a long ways

from the test site. That's 100 miles, essentially. So to have this desert tract, this practically weakly mineralized if at all and isolated from populations, that was why it was selected. People came later.

*Right. Seems like, too, with the buildup of the—as the test site became not more populated but more people worked out there, Las Vegas was simultaneously growing.*

Yes. Yes, Las Vegas has continued to grow phenomenally. Exponentially. It's beyond belief.

*Yes. So any other thoughts, maybe things that we didn't talk about that you think are important to this particular piece of history and what you did?*

Well, these other activities, those were important. I think I mentioned other activities of the test site. I can't think of anything right now. I think we covered everything, one way or another.

*Now, how was that transitioning, going from being out at the test site and having such long days and working under the conditions that you did to being out at the university?*

Oh, that was very pleasant, getting home at night all the time and having an evening. So it was very good. I enjoyed the work at the university. This was an up-and-coming thing, too. The university was growing rapidly and we both took part in its growth. Anne was the first woman in the science college, to teach.

*Yes, I was going to say, 1966 is pretty early.*

Yes. And she taught there for twenty-nine years.

*That's amazing. Good place to be?*

Yeah.

*Well, it sounds like it was quite a ride.*

Yeah.

*I certainly appreciate your time, taking the time to talk with us.*

Sure. If you think of any other questions you want to ask me, you can, whenever you want to. If you want to ask me at a different time, after you look this all over—

*OK. Yeah, if something pops into mind, I probably will give you a call.*

OK.

*Well, I guess one thing I am curious about, it sounds like you did the time line and the budgeting for the building of these tunnels. Were involved with that, or keeping an eye on the budget?*

Oh, yes, you have your budget.

*What does something like that cost? What—*

Oh, today the dollar is so different.

*Then, what were the average—*

Well, I'm going to say it would be about a tenth of what it would be today. That's because of the inflation more than anything. Our dollar isn't worth what it was. So people get ten times as much money, the workman gets ten times as much money, things cost ten times as much. Today it would be probably a billion, if they were doing the same things. So yes, it's a lot of money. Big money into Las Vegas, big money into Nevada. REECo was the largest employer in the state in those days. Probably Steve Wynn is today, from what I hear. But REECo was very big.

*Yes, obviously contributed hugely to the test site and the growth of the city.*

**[00:20:00]** Yes. I was always surprised that Indian Springs didn't grow more. Indian Springs was so close and, well, the people out in Indian Springs worked at the test site, most of them, but I was surprise that the town didn't grow more.

*Yeah, you would think it might. It's still very small.*

Yes. I even lost some money there. I didn't lose money but I went in with some people to buy some land there, which we sold. But I thought it would really become a prosperous little town.

*Really. And you would think it would, being right there. The test site was a big—could be a big employer. And it's really not that far outside of Las Vegas.*

No, from the test site to Indian Springs, you get there in fifteen minutes. It's a lot better than commuting an hour, isn't it?

*Oh, yes. Absolutely. Did you spend a lot of time there?*

In Indian? No.

*Yes. Or just passing through.*

I had friends that lived over there. Frank Solaegui was one. He was a tunnel superintendent out at the site. I didn't mention who all these people were, but I think you probably have lists of them, don't you?

*We've got some of them. I know we've talked to Frank Solaegui.*

One you won't find because he's dead is George Zerfoss. George Zerfoss was a tunnel superintendent. He also worked with me on Marshmallow. He helped direct the traffic for the pipe layout. He was a Boulder City man, too. He's gone. You have to catch these people before they age out. I'm seventy-eight.

*Well, I mean that's part of the goal of the project is to talk to—to capture this piece of history that there really has been so little done concerning the Nevada Test Site.*

You should talk to Troy Wade.

*We have.*

Harold Cunningham.

*Yes, got him, too.*

He's over in New Mexico now. You got him on the list?

*Yeah.*

He was my boss.

*Really.*

Don McGregor you can't get because he's dead. But there's still a lot of them alive. Get some while you can.

*Are you in touch with any folks?*

Well, some of those people that are in the Nevada Test Site Historical Society. And Bill Flangas. You got him? Bill Flangas?

*Yes.*

Yeah, most of those that are still alive I know.

*Now, I'm just curious, what made you come to Boulder City as opposed to Las Vegas?*

I liked the atmosphere in Boulder City better than I did, and I had a son. Our son was in junior high and I didn't want him going to high school in Las Vegas. At that time, it seemed to me that it was better in Boulder City. And I think it was a good decision on that score, but it was a lot longer commute. Boulder City's a nice little town.

*I love Boulder City. It seems like it's more along the lines of the type of city that you grew up in.*

Yes.

*And so a little bit different style of living, quality of life.*

Yeah. It is, that's true.

*Where does your son live now?*

In Yelm, Washington.

*Where's that?*

Near Olympia, Washington.

*OK. Pretty up there, too.*

Yeah. Rainy. The opposite of here.

*Had to get away from the sun.*

Yeah, that's where he is, and two grandsons.

*Oh, nice.*

They were down here a while back. They come down a couple times a year.

*Great. Well, again, I certainly thank you. I appreciate you taking the time.*

You're welcome. And I really think if you go over this, you'll think of some other questions, so be sure and ask me.

*I will. And similarly, if anything comes to mind that maybe you think we didn't discuss or we missed, please let me know.*

OK.

**[00:24:48]** End Track 2, Disc 2.

[End of interview]