

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

**Interview with**  
**Lewis Miller**

**September 14, 2005**  
**Las Vegas, Nevada**

Interview Conducted By  
Suzanne Becker

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Produced by:

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## Interview with Lewis Miller

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## Interview with Lewis Miller

September 14, 2005 in Las Vegas, NV

Conducted by Suzanne Becker

[00:00:00] Begin Track 2, Disc 1.

**Lewis Miller:** My name is Lewis G. Miller. I was born in Los Angeles, California March 8, 1931. My mother and dad were with me at the time, of course, and my mother was born in Los Angeles and my dad was born in New York. I spent my early years, most of the time, in California, although I traveled to Florida and New York a couple of times before I was ten years old.

*To visit or to live?*

My dad was a type of person that liked to roam around. And in fact my dad, who moved here in June of 1941, had opportunities to buy a lot of property that is now worth millions.

*Moved here to Las Vegas?*

To Las Vegas.

*And did you move to Las Vegas then also?*

I moved to Las Vegas also. We lived in Burbank, California that the time.

*OK, so you moved from Burbank to Las Vegas.*

In June of '41.

*And you were just a kid still.*

I was ten years old at the time.

*So how was that?*

Well, it was a novel experience. For one thing, we moved here because I had a lot of problems with, well, I wouldn't call it asthma but breathing problems and they said the desert would be

good for me. My dad had an opportunity to manage a guest ranch out in Paradise Valley, which that ranch was located where the University of Nevada now sits in Las Vegas.

*That used to be a ranch?*

That was a ranch at one time. It was dirt road from the corner of Main and Fifth Street, which is now Las Vegas Boulevard. From there on out it was dirt road all the way to the ranch. In fact, let's see, right there, that one little picture [showing photograph] is my dad and my mother. I'm swimming in a pool, that's where I learned to swim, at the Bar W Ranch. See right in the middle there? My dad with a western hat?

*Oh, yeah, look at that. Dad posing in his western hat.*

And he ran that ranch. That is just to the east of where UNLV [University of Nevada, Las Vegas] sits, on the other side of Maryland Parkway, which there was nothing else out there at that time.

*Unbelievable. So what was that like then? I assume you got to spend a lot of time out in the area.*

Oh, a lot of time, out in the desert and rode horses. The ranch was a guest ranch owned by a man named Murray Wollman, and it was called the Bar W. Murray Wollman and his wife Agnes Wahlman owned the Wollman Hotel on the corner of Fourth [Street] and Fremont [Street], and then also this ranch out in the valley.

My dad did not have good health and passed away Christmas Eve of '46. So my mother did not work before that and went to work at the Flamingo [Hotel and Casino] as a food checker. Well, I should say she worked at the old original El Rancho Vegas [Hotel and Casino] and then went to the Flamingo, and had one very interesting experience. Had Howard Hughes come down and hug her. But that was the days of [Benjamin] Bugsy Siegel and all the good stuff, and she knew all of those people.

*What were your folks' names?*

Miller. My dad's name is the same as mine, Lewis G. Miller. My mother was Martha Mary Miller. My mother lived until she was ninety years old, so she had a long life history.

*Just curious, did you have siblings?*

No. I was the only child. And I went to grammar school here, Fifth Street Grammar School.

From there I moved over to Las Vegas High School, Class of '49. In fact I'm going to a reunion here Saturday.

**[00:05:00]** After I graduated out of high school, I went to work for about a month at a sheet metal organization that was doing all of the air conditioning units at Nellis Air Force Base at that time. Working out in the sun, I said there's got to be a better way to go, so I asked a good friend of mine, Jack Clark which is that gentleman up there in my Navy picture [showing photograph] if he'd like to join the [U.S.] Navy and he said sure, let's do it. So we joined the Navy.

*So you guys were friends and decided that—*

Oh, yeah. In fact Jack Clark is a very good friend of Jim Rogers, and in realty with him, in fact. Jack and I graduated out of high school and so forth. We went all through school.

But upon joining the Navy, I qualified for electronics school; I was sent to [Naval Station] Treasure Island up at San Francisco for one year of electronics school. During that period of time, of course, the Korean conflict started, so I got out of school, asked to go aboard a destroyer, and was assigned to a destroyer escort, the USS *Wiseman* (DE-667), and sent over to Japan to pick up the ship, which was over in Korea. From Yokosuka, Japan went by train through Hiroshima and Nagasaki to Sasebo and caught my ship in Sasebo and then spent the next couple of years in the waters of Korea and Japan. And was extended because of the Korean conflict; got out of the Navy the end of March in '53.

*And where were you stationed? Where were you at this time when you got out of the Navy?*

I left the ship in again Yokosuka, Japan and took a troop ship back to Seattle, Washington, where I was discharged.

After I arrived in Vegas, first thing I did was take the mustering-out money and buy a car. Then I needed to pay for it, so I went for a job. I went to work for Frontier Radio and TV. This was right at the start of television coming to Vegas. So I spent approximately three years at Frontier Radio and TV. While there, I also obtained my radio-telephone license first-and-second-class.

*What did you do for them?*

Television repair, two-way radio repair, installation, that type of thing. Excuse me a second [pause]. At the Frontier, one of the men working there was a friend of a gentleman out at the Nevada Test Site [NTS] and said that they were looking for technicians out at the test site. So I went up there, I drove up to the test site—which was an experience at that time, sixty-five miles, it was a two-lane road, the Widowmaker they called it as it was going—and went to the administration building at Mercury. They said fine, you're hired. I was the twelfth person in the Communications Department. Well, that was in August that I went up there. I went up on a Friday and they said come to work on Monday, so August 20, 1956 I went and started my first day of work at the test site.

*Now I'm just curious at this point, I'd say you're pretty close to a native of Las Vegas.*

Pretty close, yeah.

*And coming back after the war, and were you aware of the test site being out there and, you know, were you kind of following along with the development of this—?*

Oh, yes. We used to watch the atmospheric explosions whenever they had them.

*Oh, sure. So you'd seen those prior to working up at the test site.*

Oh, yeah.

So upon going to work there, of course the first thing they did was put me in for a Q-clearance. That I went through very quickly; in thirty days I had my Q-clearance.

**[00:10:00]** Then an opportunity arose whereby the next test series, which was going to be called [Operation] Plumbbob in 1957, they were going to try a new method of doing atmospheric testing that would be less expensive than steel towers. That would be using balloons to raise the device cab up into the air at various heights; five hundred, seven-hundred-and-fifty feet, or fifteen hundred feet, and detonate the device at that location, being held by a tethered balloon. Sandia Corporation [later National Laboratories] in Albuquerque was doing the experimental work on the balloon platforms that were to be used. They had contacted Reynolds Electric [Reynolds Electrical and Engineering Company, REECo] through the AEC [Atomic Energy Commission] about getting support for their program. Being as I had had radar and sonar and various types of work in the Navy, the department manager, Ken Bean of the communications for Reynolds, asked me if I would like to be on that team. I said yes, I would. First thing they did was we're going to fly you back to Boston to attend a Raytheon school on microwave. And I said OK.

Anyway, went back there, met one of the Sandia engineers in Boston; at Waltham actually where the school was. We attended a two-week Raytheon course in microwave. The idea of the microwave system was to be able to use video cameras, which were very new at that time—they were not anything like they are now—to observe the balloon both from a vertical position and a horizontal position; to be able to spot it when it was raised with the event cab to location before the detonation.



So having completed that school in the fall of '56, came back to the test site and continued work there. I might say that while I was at the test site, before I went into the balloon program, I had the opportunity, or one of my functions, was to take care and maintain weather stations located at the test site; which is now where the nuclear dump is proposed to be, where the nuclear reactor test motor was. It involved going out in the mornings about twice a week and making a loop of about sixty-five or seventy miles through desert with a four-by-four to these remote towers that would record weather information—wind speed, rainfall if any, wind direction, and all of that—so that they had an idea of the whole area, of the wind patterns and so forth.

*Right. And that's to get the conditions—*

Right.

*Make sure we're shooting in optimal conditions.*

Yes, it helps before the actual test events to show what the wind patterns were and so forth, because before every event there is always a weather briefing. They have to know what the wind is going to be and all conditions, clouds, rain, atmospheric conditions before a shot takes place.

*Now I don't want to interrupt you too much but I'm just curious because you're out on this pretty important and impressive—you know the test site at that time, well, it remained—but this is a big deal, this is brand-new, this is science at its peak, we've never done this before. And you're out there and you're twenty-five years old or so, and I'm just wondering, if you recall at all, what that experience was like.*

It was a very unique experience. In fact I felt very privileged because I was closely associated [00:15:00] with several high-ranking people in Sandia Corporation; Ph.D.s. We would sit in meetings and discuss what we were going to do on this balloon platform system. You see, we

tested it. They put in winch bunkers—Area 7 was the very first site used at NTS—and we did our tests there. Another interesting thing, this is jumping ahead a bit, but the first successful balloon test we had was with an actual device. Several before that had had failures, so we learned from those failures.

*And that's something I want to go back to, but go ahead.*

Well anyway, we did the tests. We would take the balloons which were shipped to us, Sandia came out of course, the crew from Sandia. Let's see, there was about four or five people from Sandia and about six people from REECo.

*And just so I can get sort of an accurate picture, when we're saying "balloons" I'm assuming we're talking about rather large kind of—*

Yes, large, fifty to seventy-five-foot-in-diameter balloons.

*OK. I've seen the pictures but—*

Yeah, I've got a bunch of pictures someplace of them. I don't know where they are but I have a bunch. Wait just a minute. Hang on just a second. I might have—[pause]—it involved the seventy-five-foot balloons. Well, there's two—I should say there's also a smaller balloon, I think the smaller balloon was fifty foot—which would lift different amounts of weight, depending upon the device to be tested. There was a cab underneath the balloon. What was involved with the balloons, the balloon consisted—I'll get back a little bit—of a nylon shroud, and inside the shroud was a polyethylene liner that was filled with helium. We used a pad that was developed at BJY, if you're familiar with BJY. OK, it's about ten miles from CP One [control point one] at the junction of the road to Area 51, Area 7, and Area 12. On this pad there were winches and tie-downs and so forth. The nylon shroud would be laid out. The people involved with the balloon, which was myself, would take the polyethylene liner and go inside the nylon shroud and string

the polyethylene liner inside, come out to the—well, it was a hole like a porthole in the bottom of the balloon, and then the helium gas would be fed to the balloon with tie-down ropes being used to hold it as it came up. When it reached its full inflation, a lowboy trailer with a twenty-thousand-pound cement block on it—or ten-ton, I should say—would come alongside and the balloon would be transferred from the tie-down winches to the lowboy, which would transport the balloon to the ground zero area in [Area] 7, at this time, for the test.

*So this is a pretty good production, getting it ready.*

Oh, it was a very, very big production. You also had to be very careful of winds and everything else because high winds would be very disastrous for you.

*How long did that particular part of the preparation take, for you guys to get everything set up and ready to go?*

Usually probably a day ahead to get everything set up and then a day to do the actual inflation and transport it to location.

At the location, of course, and there was a lot of development done on this, there were winch shelters, triangular-patterned. Let's see, they were out one thousand feet. About a thousand feet, yes. And in fact, at the Desert Research [Institute], at the memorial, at the museum [Atomic Testing Museum], the woman upstairs has a drawing that was made by one of the engineering firms of the balloon layout showing the winch shelters and how they were spread out.

Anyway, there's cables laid there, too, and also involved in this, all the cables that were brought in to hold the device cab and to keep it in place, were tested. Even though they were [00:20:00] tested by the factory, we learned again from our earlier mistakes. We would pretest. If they were tested to fifteen thousand pounds, we'd test them to twenty. Because, again, this is

backtracking a little bit, when we were doing the initial tests we had a couple of cases where cables popped. The fittings on the end popped off. We had a case where the bolt sheared because it wasn't a special specification bolt.

*And which tests were these?*

These were the primary tests to test the balloon with a shot cab with lead bricks in it for weight, preliminary to see how the control system—because once the balloon was transferred to the shot cab at ground zero and hooked to the main cable that would let it raise up, you would go back to CP, the control point, and in there, there was a console with two video monitors. They would take the cameras—there was one in the main winch shelter and one camera at ground zero looking up—and you'd have the two pictures of the balloon and you'd have this control panel that had all the winch functions on it, raising and lowering the winch cable. The winches were elevator winches, they were huge. And on this panel you'd raise the main winch, which would allow it to go up, and you'd let the guy winches out as it went up to keep the tension the same. There were tension monitors on it. All of the electronics and all of the remote was all part of our job, our part of the crew, and no one else touched it except the balloon crew. The gauges on the console would monitor the pounds of tension on each guy and on the main cable and it also checked the footage as it went up. When it got, let's say, to a prescribed height of five hundred foot, you would then tighten the guy cables down to hold it in a steady position.

One of the big concerns from the diagnostic side of the picture, of the laboratories, was being able to take readings from the explosion. If they didn't get all the data they needed from the explosion, it was worthless to have the explosion. So that consisted of not only cameras supplied by EG&G [Edgerton, Germeshausen, and Grier] but a lot of other sensing equipment that was in various bunkers around the area, and it all was aimed at a certain location above

ground zero. With the tower, it was very simple. The tower went straight up. You knew where it was. This was a balloon that you could move with the guy cables.

So that was the purpose. On a test run before a shot, we'd run the balloon up with an empty cab, mark a spot where it was, surveyors would verify that location. We would—and we developed this too—by the vidicon and the camera, marking a spot on the vidicon so it wouldn't change on the screen, and then locate that spot on the screen. When it went up with the actual shot cab, the person operating the console would take the balloon to that location, turn to the test director and say, *It's on the spot*, and he would give the go-ahead for the countdown. And that was basically it. Now the only people that ever operated the balloon console for an actual shot were two or three of the Sandia people: one a Ph.D., another engineer, and myself. I was one of the few.

I had the opportunity—when they stopped nuclear testing in November of 1958, I believe it was, [Operation] Hardtack Phase II, OK, they wanted to get off the most nuclear events they could on the last day before the moratorium. They decided on using three balloon shots, in Area 7, Area 9, and Frenchman Flat. And they had one problem, because we'd been working eighteen to twenty hours a day, of how they were going to be able to be in condition for it. Because, only two or three people had operated the console to do this. First, we rigged up a method of changing the cables between the areas so the balloon console could be switched to whatever area **[00:25:00]** and checked out. I was fortunate to be chosen to do the one in Area 7, which was unusual because I was a REECo contractor employee, not a Sandia Corporation or a laboratory [employee]. It was a LASL [Los Alamos Scientific, now National Laboratory] shot and the test director, Bob [Robert] Campbell was asked if he thought it was OK if I had that shot. He said, *Yeah, let's give her a whirl*. And so I did the Area 7 shot which involved, of course,

overseeing the whole operation of getting the balloon filled, down to ground zero, arming party, checking everything out, going back to CP, putting it in spot, and telling the test director we're OK. I felt good about that.

*I bet that was exciting.*

Yes. And then Russ Frame had the other one and Jerry Larson had the other one.

*Now I have a couple of questions because you mentioned the moratorium and Hardtack and I'm wondering, that last balloon shot, did it go?*

Yes. All three went. In the last twenty-four-hour period, all three went.

*OK. And since we're talking about the moratorium, I'm just wondering what your memories—because it seems that there was a shift. We switched from the atmospheric testing and then to underground, and there was a period in there that there was a lull. And I'm just wondering if you have any memories of what it was like, since you were so intricately involved prior to that moratorium.*

Well, I'll say this. It was something like when I first went to work at the test site, I think Reynolds had about two hundred employees. They used to vary their work force between two to four hundred and six or eight thousand, depending on a test series, because every test series would run for, let's say, six to eight months. They would hire all of these people to come in and build towers and do all sorts of different things, housing, feeding, a vast amount of work was involved. And Reynolds was the prime support contractor, so their work force would jump up tremendously for maybe ten months, and then drop back down. When they went into the moratorium, the work force—I think we had some hundred-and-twenty technical people working at Reynolds at the time in the radio communications shop, and that dropped down to about thirty.

*OK, so there was quite a—*

Quite a layoff. And then we went into other work. I did the offsite communications for many years. And also—in fact, I have one, right up there [showing photograph? Document?]*—*they had some testing using balloons. At that same time, there were some ideas, being as the spherical balloons had worked, but there was one problem with spherical balloons. If wind came up, they were very prone to taking undue stress and moving because they caused a wind blockage. So Sandia Corporation worked toward developing shaped balloons, like a dirigible, the same as the ones that fly over the ball games and everything like that. And those, because of the way they are built, will turn into the wind if they're anchored and they also have some lift from their tail assembly. So this was two plus factors. And we experimented with those types of balloons. Also there was a proposal made that should there ever be a resumption of atmospheric testing in the Pacific, high-level, they could use these balloons to go up to like ten thousand feet. They even made up a whole book—Sandia made up a book; it's in the National Archives—of what this would involve and the crew that would do it.

*So it was laid out.*

Yes. And I was one of the ones on that crew, too.

**[00:30:00]** But anyway, later on in [Operation] Roller Coaster, which was up at the Tonopah Test Range [TTR], where they brought in the military and the British and they had troops that were going to—they were going to simulate troops getting radioactive exposure. So they wanted a balloon that could measure the controlled radioactive release. They used a shaped balloon that would support a net across the dry lake out there with blinds across with all measuring devices to see the radiation exposure.

Roller Coaster was a very interesting program. I got called back to work on that. I was at a project up in Fallon [Nevada]; project Shoal, putting in the communication systems. Sandia

Corporation was asked to do this, and this was the time that EG&G had taken over the balloon program. And for this program they had these shaped balloons up there, they had a lot of problems on getting them up in position and so forth. They'd lost a couple. I had a call up in Fallon that said, Can you come down here, drop that project for about a week, get some of the old crew that you had, and go up to Tonopah and see if we can get this thing going with Sandia? They'd like to have you. So I flew back down to Vegas, the crew met me with a government car at the airport, we drove up that night to Tonopah, and the next week we went out and did the thing, put the balloon up and so forth.

*So it was successful.*

Oh, yes, it was successful. But that was also interesting. I mean I felt good about it.

*Interesting in how?*

Interesting in it was a completely different environment. There were no nuclear devices involved. There were many, many troops. We were using Army six-by trucks for stringing out the guy wires and stuff like this. We lost one balloon that flew across the dry lake, broke loose and ruptured and came down. We went and got that, took it back to the old airport outside of Tonopah, laid it out, repaired it, put it back together, and did it again. But things like that. So it was a different environment entirely.

*So just a different way of working. And so am I correct in that your career there spanned through 1992?*

Through 1992; thirty-five-and-a-half years. I had a heart attack in '91. The doctor said it was from stress. I worked another year and I said that's it; I said thirty-five-and-a-half years was enough.

*So I know there are different things, but I'm wondering if you could sort of talk about what a typical day for you was like when you were getting ready to—*



With the balloons?

*Well, yeah, with the balloons, and then—*

Because the balloon thing was completely different than the regular radio shop operation. We were a separate little group on loan to Sandia. The only thing we called in was our time to the boss. I mean like sometimes we would go home at one in the afternoon, while everybody was still working. And other times we would be working around the clock.

*OK, so it really varied.*

It varied. It varied. It all depended upon the schedule, the weather, what was proposed, what shots were coming up, and so on and so forth.

*And during that period, were you staying out at the test site?*

I always lived here in Vegas, but I did spend some time [there]. I had a room out there and quite often I'd stay out there overnight or something. On long days we'd stay over.

Well, I guess it was a lot different than it is nowadays. Of course, going to the test site when I first went there, on the Widowmaker. There was no buses, you rode carpools, and at that time everybody smoked, and you can imagine six people in a car doing eighty-five miles an hour and everybody smoking. And of course on Friday evenings coming in, still doing eight-five miles an hour with a six-pack of beer and smoking is very nice. Very interesting. I've seen a couple of very good friends die out there; rollovers and so forth. Then they got the bus system in the early sixties going and that made quite a change to the operation, much nicer. [00:35:00] But it was a long day when you lived in town because you'd get on the bus at six in the morning, get home at six at night, so it was a twelve-hour day. And my routine would be of course reporting to the radio shop normally, except when I was on the balloon crew, and then it was strictly reporting to the Sandia compound.

*Now with the radio shop, what types of things were you working on?*

Two-way radio systems, basically. Radio repeaters. Some microwave systems. Most of my career was supporting offsite operations when I had the opportunity, like project Shoal in northern Nevada; project Dribble in Hattiesburg [Mississippi]; project, oh, the one down in Carlsbad [New Mexico], Gnome; Amchitka, Alaska. Well, let's see, I've got deals all over—project Rulison. That was another one in Colorado. That was another opportunity I had, again, I guess because I was fairly versatile—well, well-versed in various electronic things such as cameras, microwave, radar, two-way radio, and so forth. So the offsite projects like Rulison, which was a project where, outside of the AEC but using a laboratory device, they were going to try to bust up oil shale to get oil. It was CER [Geonuclear Corp.]—Continental Oil, EG&G and Reynolds—on a more-or-less corporate side rather than the government side [that] were doing this with guidance from the laboratories and the AEC, to watch over it to make sure everything was adhered to. Rulison was a *very* interesting project up in Grand Junction [Colorado] area, just north of Grand Junction about sixty miles. It was a device by Los Alamos. I put in the video system there that I borrowed from Livermore labs. The test director for that project was Bob Campbell from Los Alamos. I was in the shot trailer when they had the shot and all the news media were there. I was on I think it was NBC or CBS *World News*. My mother said, Gee, I saw you coming out of the shot trailer. In those days you came out of the shot trailer and you had a bottle of champagne to celebrate because everything was successful. And we dealt with hippies: some of the Rulison certificates show the hippies. I've got one up there. I don't know where it is. No, there's one with the hippies [showing certificate].

*Oh, yeah, look at that. In terms of protesting and—*

Against it. Protesting, yes. And they also had another event outside of Meeker, Colorado, same type of thing.

Oh, that's another—again, on offsite projects I had the opportunity. I was working for Reynolds and this was in the seventies. I was on loan quite a bit, on loan to Los Alamos quite a bit, too. But this one was a call from Washington, D.C. because some of the men from Reynolds went on with the AEC and went back to Washington at headquarters. They had a program going down in Louisiana and they wanted to see if they could get communications. They called back through channels to Reynolds and said, *Do you think Lew, because I had done projects in many other places, could meet with us in Baton Rouge?* And they said sure. I mean they asked me and I said, *Yeah, I'll be happy to.* So I flew back to Baton Rouge and met with the people from DOE [Department of Energy]. It was the SPRO program, Strategic Petroleum Reserve Operation, where they were going to put oil in cavities of salt. And so I went. The headquarters was going to be in New Orleans and three main sites to start with were near Plaquemine, Louisiana; near St. Charles at Cameron; and one down by Gulfport; and another one down by St. James; and one over by Lafayette, [00:40:00] where they had salt domes. Well, some were old mined-out salt domes by—what's the big salt manufacturer? I can't think of it right now.

*The actual salt manufacturer? Morton?*

Yes, they make salt for water softeners and all that. I can't even think of the name of it right now, but anyway they had a big mine outside of Lafayette and it was abandoned. This would be an ideal place to try to put oil in. What they would do is put water in there and put oil in. The oil would push the water out and fill it up. And so they had to have communications to all these locations. The one by Plaquemine was another big salt dome they drilled into, and the one at

Cameron. And the one at Cameron took oil off of the Inter-coastal Waterway. I ran a microwave system from there over to the site. But I spent quite a while putting in communications, coordinating with the phone companies there to get the communications, and coordinating the two-way radio systems. So that was an interesting part of my life.

*How long were you out in Louisiana doing that kind of thing?*

Oh, probably, off and on, six months to a year, I guess, off and on.

*So you did quite a bit of traveling.*

Oh, yeah.

*Were you married at all?*

Several times. Three times. In fact my first wife, who was with me when I went to the test site, who has passed on—I'm taking my oldest daughter to my reunion that's coming up Saturday, she lives here in Vegas. My present wife, the one that had the stroke, was at the wedding of my first wife. So she's long-time Vegas, too.

*So you've known her quite some time.*

Yes.

*And how was that with the extensive traveling and being gone? Was that difficult in terms of having your family here?*

Well, [I] didn't realize it at the time but it put a lot of pressure on and created a lot of things that I guess could've been better.

Cannikin, too, was a very interesting—

*Talk about that a little bit.*

Cannikin, that was on the island of Amchitka, which is in the Aleutian chain. Uninhabited island. They had one event there. Reynolds was not involved at all. Holmes and Narver was involved.

They had quite a few problems. And they wanted to do another event, a major event. The Cannikin event itself, which was a megaton device and a missile, and the whole missile was to go down the shaft that they built. They asked Reynolds if they would support that and Reynolds said yes, they would, both in the drilling and so forth. And they asked me about communications and they said OK, so I did. It meant flying up to Alaska and catching Reeves Aleutian Airways, a charter plane that went to Amchitka because Amchitka was not a stop.

*Right. Now how was that?*

Amchitka was a very interesting island, not bitter cold but it's never nice. I think the mean temperature is around 37 degrees or something like that year-round. It gets down to maybe 20 in the winter and a couple of times it's reached 60 in the summer. You probably only see the sun maybe two months out of the year. A lot of fog, a lot of wind. You have the Bering Sea at the north and the Pacific at the south. The island is about—oh, gosh darn, this is going back a while; I went there in the seventies. The island is fairly narrow, two or three miles at the widest part, and thirty miles long or so.

*So not big.*

Not big. It's west of Adak and had a landing strip. Part of the communications responsibilities were running the airfield, which had TACAN [Tactical Air Navigation] and radar [00:45:00] for ground-control approach. Air traffic controllers; two of the people that worked for me were air traffic controllers. They ran the airport more or less, brought the charter flights in and out that brought all the workers in and out. The men would work for two months and get a month off and work for two months and get a month off. The living conditions were, let's say, less than good.

*What types of accommodations were set up?*

There were barracks. Barracks were set up. Oh, they were adequate and everything but I mean it got very—well, when you worked long days and all you could do at night was play cards or listen to music—they even set up a little radio station on the island. In fact the man who ran the radio station, Bob Lewis, is with the AEC back in Washington. Not the AEC now. But the men would get pretty tired, pretty stressed out because again like nothing to do except work.

*And you mentioned they were long working days. Again, out there, what was a typical day for you guys?*

Well, a ten-hour day would be typical. Twelve hours was quite often. And food, yes, they had good food and everything like that. The island was—

*That is the one thing I've heard about Amchitka is the food was very good.*

Oh, yeah. Well, that was the only thing—you had to have something. But it's a long flight back to Anchorage [Alaska] and then from there back to the States. A real long flight. It's about a twelve-hundred-mile flight.

And let's see, one of the interesting things, I guess, was going back on one of the reentry projects after it was all closed down; nobody on the island. They wanted to go back out and again check the ground zero site for radiation and so forth. So I went along to set up a satellite communication. There was about fifteen or twenty of us went back to the island. Big rats and everything else. We had to put our jackets on the door openings in the dorms so we could keep the rats out to sleep at night. All we had was C-rations and stuff while we were there. We were only there about a week.

*Now, I was just wondering if you were out on the island for the duration.*

No, I was very fortunate. I flew out there and spent a couple of days, maybe a week and then come back, because I had very good people working under me. I should say with me.

*Typically how many people worked under you?*

It would vary all over. When I was offsite communications, maybe four or five people. Up there at Amchitka, thirty, forty.

*So it basically depended on the project?*

It depended on the project.

*I guess one thing that I am curious about, you mentioned having to entertain yourselves at night out at Amchitka and it just made me wonder, particularly when you're spending so much time out at the test site with the balloon shots and other things, what you guys did to entertain yourselves or how you spent some of that off time.*

Well, they had a little beer hall up there. We'd always go over and drink beer. We did—of course that's later on—brought television to the test site. In fact the initial television we brought to the test site was using some of the balloon microwave equipment. We took that, took it up to Angel's Peak, picked up a signal, transmitted it to the test site, and distributed it. That's starting; right now it's a full-blown operation. But that was basically it. Most of the time you'd be commuting back and forth. You wouldn't stay out there that much, unless some of the single guys on the crew would stay out there because it was advantageous for them.

*So a lot of driving.*

Yes, a lot of driving, a lot of moving back and forth.

Let's see, I was trying to think, there are so many things. So many. Yes, I was involved in a very interesting program on loan to Los Alamos on an atmospheric program they [00:50:00] were doing, looking for the polar cusp; a geophysical program. How I got involved with this was because of my work with satellite two-way radio systems. On the looking for the polar cusp, Los Alamos would fly or have rockets shot into the air that would drop metallic chaff. The rockets

were almost semi-orbital. The chaff would follow the magnetic lines of the Earth and come in at the cusp, rotate around the pole.

*What years were approximately the time frame?*

Oh, boy, this is in the seventies and some of the eighties; early eighties. But this involved going up to Fairbanks [Alaska], down to Hawaii, and back here to the States, back to Los Alamos.

Again, a lot of travel. I had a lot of opportunity at that time because of my satellite work of dealing with the NASA [National Aeronautics and Space Administration] back in Washington that controlled all the satellite operations. And in fact I even went back there a couple of times and visited the location. But used the very first satellite, ATS-1, an experimental satellite—and this was in the seventies—which was a VHF [very high frequency] two-way radio satellite in a geophysical orbit over the Equator. And it was mainly put in to see if they could get communications to these remote Alaskan villages that had no communications. So this looked like an ideal satellite to keep track of the tracking aircraft that flew from, let's say, Elmendorf Air Force Base all the way down to New Zealand tracking these rockets and so forth. And they even had a satellite radio and [would] be able to talk through the satellite back to the command post. We had a command post in Fairbanks at Fort Wainwright at one time for one particular experiment. Then we had another one at Mount Haleakala over in Maui in Hawaii. We had a satellite station up there. And we had one right down on the main island at Honolulu right by Hickam [Air Force Base].

*So you've been all over.*

Had a wonderful opportunity to travel all over the place. The Hattiesburg project, that was back in '61. This was right after the atmospheric testing where they wanted to run a Vela Uniform program which would detect nuclear devices being shot. They wanted to shoot a device, again in



a salt dome, to see if the salt would dampen the shock wave of the device to reduce detection. So we did that outside of Hattiesburg by Purvis, Mississippi. That was interesting. We set up communications for that, too. And, oh, I guess I could go on and on, on the different ones.

*In your estimation, do you have any idea approximately how many various projects or shots that you've been involved with?*

Well, all of the balloon shots, every one of the balloon shots, and almost all the offsite events: Shoal, Rulison, Hattiesburg. Nothing in the Pacific, but everything that was other than the Pacific. Central Nevada.

*So quite a few.*

Right. And I think I can say this, that probably one of the—there's not many people that have been to just about every place on the test site that there is as far as the forward areas, the different [00:55:00] areas: Area 12, the tunnels, Piute Mesa, all of the area where the repository is now, which used to be the, what did they call it, the testing program for—boy, I'm telling you, I'm losing it bad. Prior to the nuclear repository, they had the nuclear propulsion for space flight, NRDS, the Nuclear Rocket and Development Station.

*Not up in Tonopah, was it?*

No, it was out in Area 25, around in there. It is all the work that went on where the nuclear repository is now. In fact I have been all over that area, the top of that nuclear repository and everything out there on communications.

*You know I think one thing that people don't always realize is exactly how big the Nevada Test Site actually is.*

Very big.

*Were you aware of how big it was when you first got out there? What were your impressions?*

Well, my first impression when I went to apply for a job and I got in my little old 1955 Ford car and headed out the road, I thought I was never going to get there. I kept driving. I went through Indian Springs, went through Cactus Springs, and I'm still driving.

*And of course at the time Las Vegas wasn't nearly to the edge where it is now.*

No, you were out of town when you were at, let's see, like Vegas Drive or something. You were heading out of town. But I did get up there, and then turning into the test site and going in there and seeing it, and of course Mercury gave you no idea that you go over Gate 200 and out to the forward area and twenty miles to CP-1, another fifteen miles is Area 12, and another twenty miles is Piute Mesa. But anyway, Piute Mesa didn't even exist at that time. And [I] never realized there was so much, and especially when they first assigned me to go out on this weather tower maintenance, and you went out about ten miles on a two-lane asphalt road and then it went to dirt, and you went to dirt for the next forty-five to fifty miles. That was all again up through areas that didn't even really exist at the time, but it was part of the test site property. And so no, it was very amazing to me. I did that too in August, September which is a very hot time and boy, I was miserable out there. The same I might say with the balloons, when we used to do the balloons in the summertime. Plumbbob. You get inside the nylon shroud putting that polyethylene liner and it would be about 105-or-10 [degrees] on the pad, it would be 130-or-40 inside, just like inside of a car, just no air at all because the nylon would not let air go through it. The nylon was a very finely-woven nylon because it had to have strength, and so there's no air whatsoever. And also you had to be very careful, and they used to laugh about that, filling the balloons with helium. If you get too much helium, then you start talking funny. It changes your vocal cords. But also you can die because you don't even know it.

*Right. I mean how did you guys do that, particularly when it's so hot in there? Did you work just shorter hours, did you take more breaks, or did just push on through?*

No, we took a lot of water and we would go out there on the—we didn't have a lot of women out there at the time, so we'd just stripped down to our shorts and go inside, go in, in stockinged feet and shorts, and sweat like heck, and then come out and drink a lot of water. Of course the filling process was fairly involved. You had these big huge helium trailers and it took [01:00:00] anywhere from five to ten trailers, depending upon the size of the balloon. They would line up and you'd have to have all these ropes tying and holding the balloon down. You'd have to let the ropes out—and this was all done manually—and the crew would be all standing at these ties and letting it out. You had to be careful that as you filled it, the polyethylene liner would line up inside so it wouldn't have folds in it or anything that would cause it to tear.

*Right. Wow, very meticulous process.*

And the same with the winches and putting the cables up. Well, in fact I wrote to—there's a man that I've been corresponding with, Dick Keller who was in communications—

*Oh, yeah.*

You know Dick?

*He's somebody that I hope to be able to talk to.*

OK, good, because I've got a lot of correspondence right on my computer from him.

*He's working on writing out his experiences.*

Yes, he is. He's writing the *whole* thing. He's writing the whole thing and I've been giving him some information. But we used to work with Dick, and in fact someplace I got a magazine that came out, I think it was in '91, or '92, the forty year celebration of the test site. One of the pages shows a picture of a basketball team back in the late fifties and Dick Keller's in the picture and

I'm in the picture. Well, there's about five or six or seven of us from Communications in this picture.

*So you guys had teams, intramural sports kind of thing?*

Oh, yeah, we did that. But Dick's probably got the picture. I don't know, I had it someplace, I was going to show it to you, but I don't know where it is.

But anyway, let's see, I was mentioning Dick Keller.

*Well, working out, preparing the balloon—*

Oh, yeah, that's the other interesting thing. Because of the equipment and preparing the balloon and laying the cable and everything, there was one thing I talked to Dick about and he'll probably mention it in his deal. They had one event in Area 7, and at that time we had some—you have to excuse me, I've got allergies.

*Oh, yes, I understand.*

But it always was the idea of Sandia who controlled the balloon operation, Dr. Jerry Larson, the balloon crew would do all of the work, laying out the signal cable, the main cables that held the balloon, and so forth; the signal cable which actually sent the shot signals up and so on. And there was a time when the electricians complained at the test site, construction electricians, that they should be doing that signal cable laying-out. So OK, we'll let you do it. And they did. They laid out the signal cable. It was an Area 7 shot. The balloon went to altitude. I was up at the control room at the time. Just before it reached the altitude it was to go to, and I'm not sure if this was seven hundred and fifty or five hundred feet, the main signal cable popped. There was not enough laid out. Which was one of the reasons Jerry always wanted us to do it, because he wanted to make sure of the amount. But anyway, at that same time, the camera looking up through, which was located ten foot underground, up through a tube and a three-inch special

treated glass lens at the top, someone in the control room said, *Look, there's a face.* And oh my God, that caused a hell of a stir. What was a face doing there? Some airman from Indian Springs Air Base had gone in a Jeep or whatever way up in the north end of the range and come over in the back side, into the test site. It had been all swept before the shot. No one there. And come there and saw the balloon and stared up at it and didn't know it was an active shot. If the cable hadn't have broken, never would've seen him. Never would've found them.

*Wow. So they would've been—*

Disintegrated.

*What shot was this?*

I can't remember the shot. But it was Area 7 in 1957. And anyway, after that happened and they found out, it was lucky that the fact that the electricians had laid out [01:05:00] the cable too short and it snapped, which is the reason the shot didn't go. And when the arming party went back down to disarm the device, then they saw these airmen there, of course. They caused quite a bit of trouble. But from that time forward, the electricians never had a word to say about laying out the cable, because the laboratory was upset that the shot—they were happy the shot didn't go because of what it did, it saved the people, but they were unhappy about the cable.

*A stroke of luck, I guess, but, you know.*

Yeah, but a technical error. So that was an interesting—and you don't hear much about that, and you won't hear anything about it because that was something they just didn't say anything about.

*I just need to stop right here to make a pause.*

[01:05:55] End Track 2, Disc 1

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

This is also, I think, very interesting as far as I'm concerned. After the atmospheric testing stopped, after the moratorium, we had all of this microwave and camera equipment. And at that time, I went into doing the offsite work. I was offsite supervisor. The offsite radio system covered the state of Nevada for what was then the PHS, [U.S.] Public Health Service, now EPA [Environmental Protection Agency]. The people would go around to all of these ranches and everything in northern Nevada and the towns and everything, and this is how they communicated back, by a two-way radio system, Net-12.

*Right, and the EPA was going around just to sort of monitor people's—*

Yeah, and see what the fallout was and so on, and then set out the fallout collectors, too. But the Net-12 system covered the state of Nevada, most of the state, and maintaining that system was something that I became in charge of, and Larry Winter, my very good friend for a long, long time, I worked with him at Frontier Radio when I first got out of the service. In fact, he got out of the [U.S.] Air Force just right after I got out of the Navy. But anyway, we were on offsite and doing other things in between. And we used to always, because of our association directly with the testing, we were always out at CP-1 and talking to the timing-and-firing group and the test directors and all those people. We wanted to see if we could do something, and here again I go back to Bob Campbell from Los Alamos because I tried this with him first. He had a gauge, an underground shot in Area 3 that he wanted to look at, a vacuum gauge that was connected to an underground shot way down, I don't know how many hundred feet, eight hundred feet or whatever. So we were going to try using one of the old balloon cameras with a Raytheon microwave and shoot the picture of the gauge back to CP so he could see if the vacuum actually occurred in the shot when the shot went off. Well, it wasn't too successful because the shot was

delayed, the sun came up, and when we pointed the camera, it looked right in the sun and it blanked it out. Didn't hurt the shot, they went ahead with the shot, but that idea had merit.

So they started doing the tunnel shots in Area 12. And the problem there was from CP-1 you couldn't see the tunnels. It's up around the curve. All the rest you could see. So hey, what about we use a camera and the microwave? OK, give it a whirl, guys, you've got the equipment. So Larry and I went out there, set up a camera on E Tunnel, set up a microwave with a little generator up on the road above E Tunnel, shot the signal down to one of the wind shelters in Area 9, and there relayed it back to CP, because we still had the microwave between those locations. And we put a monitor in the control room and here the people in the control room could see the tunnel portal. Hot darn tweedy.

*That must've been a pretty good feeling.*

That was the first video experience for the control point looking at a shot in Area 12, I should say again an actual shot in Area 12, using a video system. And of course we always wanted to have a joke at that time. We wanted to take a picture we had recorded of people coming in and out of the tunnel, and right before shot time we wanted to impose that picture into the control room, but we didn't do it. We thought they'd laugh like hell with a countdown and people walking in and out. But anyway, we didn't. It was an idea we had.

From that point, you know what has developed with looking at underground shots with video. They have choppers, everything else now to carry cameras over, and so that developed from the—we were the very first one that they ever did it.

*That's amazing. That's actually a question, one of the questions I have is, it seems like you've [00:05:00] worked on so much communication technology, whether it be video or radio. Is there any of that stuff that you were working on or that was used at the test site that you now see has*

*sort of worked its way into what we do, how we live, things that we do? Because it seems like a lot of that technology was forward for the time.*

Way back in the early days a lot of the—I even had an opportunity but didn't follow it through, and I should've, of using video in casinos to look at tables. And so that's one thing that I think has developed. Again, a lot of this, the video platforms and everything, like football games and everything, you have blimps fly over and they take these shots, some of these stabilized platforms, a lot of this was done and tried at the test site at one time or another. There was all sorts of different video platforms that they've used for the choppers to keep a steady picture and so on. So a lot of this is blended into somewhat as today's—

*Right. It just seems like there's so much coming out of that.*

I would say a lot. Well, that was another thing, too. On project Shoal [looking at the wall]—where's project Shoal? It's up there.

*On the end there.*

OK, Plumbbob's right behind the globe there.

*Oh, yeah.*

On project Shoal, [I] went up on that project and the event site was out, let's see, about, thirty-five, forty miles from Fallon, Nevada in a granite range. This is again one of the projects where they wanted to try a shot in a different type of medium to see if it could be muffled or anything. And this was in a range, like I say, east of Fallon thirty miles, thirty-five miles. They didn't have any method out there of telephone communications. I put the radio system in. They contacted a couple of the big communications companies, oh, I don't know, I can't be sure, I wouldn't want to use this, I wouldn't want to say the names, but these companies came back with quotes of



anywheres from three hundred to five hundred thousand to put telephone communications in. The AEC didn't have a lot of money at that time with the shots for those types.

And so one of the men asked me, Do you think you could do something if you had some microwave?

And I said, Well, maybe.

And he says, Well, I've got some microwave that's available from the Pacific.

Motorola microwave. They brought it in, a telephone microwave.

So I went up, and when you talk to Dick Keller he'll mention a man by the name of Ken Yeager too. Ken Yeager went with me. We went up to Fallon and used some of the old balloon microwave and went out to the site where we put up a tower, put the microwave transmitter up there, put the camera inside the shelter, and I pointed the camera at a volt meter just so I'd have a picture, and went back to Fallon, took the receiver, and went over to the high school, which was just off the main street—that was the only two-story building near our project office. I asked the principal if I could go up on the roof and make an experiment and he said sure. So I went up on the roof with this receiver and an extension cord and a dish and a monitor and panned the dish around, got the microwave signal, got the picture, and here's the picture of the volt meter out of there. So I knew I had a microwave path. I called back to Jim Sugden at AEC and I said, Yes, we can do it. So I contacted the phone company in Fallon, had them put up an H-frame tower by the school that was going to be the headquarters, an old abandoned school, and we put a dish up there and put in a twenty-channel microwave system to the site to put the phones in, so they had phone service. That was interesting.

And when they had the shot—and of course I always goofed around—but I had a rental car, [00:10:00] and the shot party was going to be at the base of the mountain out on the other

side of Fallon, facing away from Fallon. The shot party included the reentry group and everything like that. And I drove up there early in the morning with this rental car and I'd taken about four clip-on antennas and put it on the side of the car, and I had a telephone sitting on the dashboard.

And one of the timing-and-firing men came over when I'd parked there, just before the ground-zero time, and said, Hey, he said, we need to call Fallon. Can I use your phone?

And I said, That's just a phone. I don't have any phone service. All I have is radio.

And he said, Oh, you—well, he called me a few names. But anyway, it was a fun time. Anyway, that was an interesting project, putting in the phone service for that event.

*Yeah. Sounds like it.*

Yeah, and well, we had, oh, I don't know, there's so many things that I can think of that we used the cameras for and the microwave. Like I said, the first commercial television out to the test site, which they now have going full-time, was done by using some of the old equipment.

[Telephone ringing]

*Do you need to get that?*

No. That's my fax machine. It's not an important one. Most of those garbage calls.

And let's see. Oh, NRDS. NRDS. Nuclear Rocket Development Station [Nuclear Rocket and Development Station]. That was Area 25. You have to excuse me. I'm getting old and some of these things don't come to me too quick.

*Well, that's a very normal thing and you know that's why we can look things up, too, so it's not a big deal. I do have a couple of things that I'm curious about. One is just going back to the*

*balloon testing in the atmospheric days. Not a lot of people in the world have seen atmospheric tests. Can you talk about what that was like and if you recall at all what you were thinking?*

Oh, I do very much because, see, for all of the balloon shots I was at the control point. I would sit out on the rail and put the heavy goggles on, except the one that I sat at the console. But it's an experience to see. I never believed it, and that's another thing I'll mention just a little bit later. But blast, looking at these shot goggles, you've seen them, they're so dark you can't see anything. I mean you can look right at the sun.

*Right, the big dark goggles.*

Yeah. There is so much power in one of those shots. You see that fireball and then you feel the shock wave come rolling over you. It's a unique experience. Very unique.

*Now you had mentioned that you'd seen them maybe when you were a kid or, you know, younger.*

Oh, when I got out of the Navy, from Vegas, when they had a shot, yeah, you could feel the shock wave and you could see the fireball, or not the fireball but the cloud raise up because the cloud would go many thousands of feet high.

*And so how was that when you were actually out at the test site, then, and all of a sudden you're seeing the full thing?*

Well, you realize the power and the force. Like this particular one was a 70 KT [kiloton], Hood, with a balloon at fifteen hundred feet, and that was approximately fifteen miles from the CP, and to realize how that spread out and the damage it could do, I mean it's—

*At the time, did you think about the implications of what the capabilities of this technology was?*

Well, it made me realize like the people, what they must've felt in Hiroshima and Nagasaki when that happened. But in a way, to many of them, it's instantaneous. You don't even know. You're

just gone. It's the ones that suffer later from radiation and things like that that are bad, that are on the outskirts of our outskirts. But in the immediate area of the device, you wouldn't know the difference. It would be like being in a head-on collision in a car. You wouldn't know what happened, except for the few seconds you saw the car come. So I don't know.

**[00:15:00]** The other very interesting shot was Sedan, and I was at CP-1, too, standing and watching that. And to see that come out, the earth come out, and the giant hole they made.

*Pretty big cloud that came up from that?*

Oh, that was a huge cloud. A huge cloud. That one was huge. But that was what it was intended.

Then you may know or have heard about the shots in Buckboard Mesa.

*Tell a little bit about that.*

Well, they took five nuclear devices, and like Sedan, they buried them only under the surface, maybe a hundred, couple of hundred feet, and lined them up. And the intent was to see if they could possibly dig a canal across Panama using the devices [Buggy A-E].

*So to do a new Panama Canal.*

Right. And there are five holes out there. I don't know how many people see those because they're way the hell out and bus tours sure don't go to them.

*No. I actually am not as familiar with that. Sedan, I think everybody gets a view of and understands what that is.*

See, another thing, too that's also very interesting, like Pile Driver out in Area 9, a shaft shot with tunnels off of the shot. To go down in one of those is very interesting. I'll say this, too. I feel fortunate, I have been in tunnels like E Tunnel, N Tunnel. I've been down hole in Pile Driver. I have been pretty much involved with every type of nuclear shot in one way or the other.

*Of all of those, do any stand out in your mind as being, I don't know if "effective" is the right word but maybe in your mind, what were some of the more effective or useful, if you will, tests that went on? Do you have a sense of that?*

Well, that's sort of hard to say. I think each one—again, working with both the laboratories, Livermore and Los Alamos, and Sandia, all the laboratories, having been to Livermore and Los Alamos and Sandia, the minds or the brilliance of some of these people and what they've developed and what has come out of this, that to me is amazing. The devices themselves, the design. I know we have a stockpile and I know that it's necessary to perform tests of some type to see that that stockpile is good and safe. Yes, the radiation and what they've done in radiation, too, they've developed devices with very little radiation, and they've also developed ones that are very dirty. Both of these things—the scientific minds that have been accumulated in these various laboratories are amazing. It'd be hard to find anyplace in the world that would—if you take the Ph.D.s and so forth that are in Livermore labs, Sandia base, Los Alamos—and some of these people, too, have moved on into the—like I knew one of the Sandia men who moved into NASA, the space program. I don't know where he is now. Other ones have moved into Washington, into very significant roles in the Department of Energy or whatever it is right now. I mean it's the Department of Energy now, ERDA [Energy Research and Development Administration] and all the different names that it's had. A lot of the people in Reynolds Electric, which Lou [L.J.] Reynolds himself, very benevolent man, have gone on to—they are since passed away but have gone on to develop and push forward many things that have helped humanity.

I know radiation is thought of as bad. It affects different people. Now in my early days when I was in atmospheric testing and we'd go back into ground zero, I had 2 to 3 R [REM,

[00:20:00] roentgen equivalent man] for two years, '57 and '58. Three R was the max. That was the yearly level that you could have. But now they worry about 10 mR [milliroentgen] which is a milliroentgen. Much, much, much more. And you have people that say they've been affected. It's possible. *But* other people haven't been affected. Like I say, I've been exposed my whole life to it.

*Was that ever something that you guys thought about much when you were out there?*

Yes. You'll notice that picture [showing photograph]. See the hair I got on that head? No, didn't think much about it at the time.

*Was it ever something that was talked about?*

Very much. It was very much—personally I thought that the control and the cautionary, or I should say precautions they took about people being exposed was very good. The records were very good. Now right now you can still find my records somewhere.

*Do you have copies of those?*

No. I did have and that's where I knew I had the 2.5 or 3 R the first two years. And, well, but they are on—like I say, I don't know where they are but they are—

*But they're still intact.*

They're available. They're available. The same is that book is still somewhere in the archives in Washington of atmospheric testing using balloons in the Pacific. And I had a copy of that, too. I wish I would have kept it.

*There are those that will swear up and down that they are sick or became ill because of the work that they did, or perhaps even because they were in areas that were affected by fallout, particularly in the atmospheric tests.*

Oh, yes. Well, there's another, too, there's a large group from Baneberry, the underground that leaked. I don't know. I think to myself it would be very interesting, and now I get philosophical, I guess, but it's about like politicians, too. What they say and what they do isn't always what they mean. People, yes, I feel very bad for people that are actually affected. I don't have a lot of feeling for people that are using it as a means to gain money or attention. That's my own personal belief.

Now we have had a medical NTS history. In fact I went to a couple of the things there to be screened, and they asked me to come back. This was all part of the deal where they were awarding sums to people that had been exposed. And I went to the person and everything checked out and I looked and that was the last one I went to. Now I did have a few years back—this is quite a few years back when I had my heart problem and stuff—X rays, and I had traces of asbestos in my lungs. It's gone away. It's not in my later X rays. Yes, I could've gone in and said oh, boy, I can get on one of these class action suits, but I guess that's not my—well, my bag. *And you didn't feel it was a result of the work that you'd done out at the test site.*

No. Oh, I was exposed. I was exposed to carbon tetrachloride, asbestos, all those things. It could've been but it didn't affect me. I think some people are susceptible to some things and other people aren't.

*Yeah, I think that's pretty valid.*

I've got allergies. Other people don't have allergies. I can't help it. I sniffle. But no, I would say this, that as far as the test site goes, I do think that through all of the years, the many things—**[00:25:00]** and again I have seen some absolutely what I consider very influential people in the fact of what their knowledge is and how they use that knowledge—I have seen some people, you know. One that was my favorite, Bob Campbell, who was test director of Los Alamos for a long

time, or head of Los Alamos, just one heck of a nice person. It didn't matter that I was a technician and he was a Ph.D. test director. Just like when I walked into that trailer at Rulison and he was sitting there—in fact he was laying on the couch and he says, Lew, he says, what you doing here?

And I says, Well, I'm putting in the video system.

He says, Oh, he says, we're OK then.

And I felt good about that. Now, see, that made my whole day. It may've made the whole program for me. But the same as going up to visiting the laboratories at Livermore and stuff and seeing some of that.

*Well, it sounds like that that's a unique part of the test site itself, you know, the test site culture, the life, is that it was so, you know, you guys were almost like your own little community.*

Oh, yeah, it was. And Los Alamos—very, very interesting place. Like the time I set up the— from a basement in Los Alamos, a link to Alaska, way up on the northern part of Alaska. We had a circuit—that was another one, I'll mention that one, too—but we had a circuit. They wanted to look at the polar cusp, and I got some equipment—that reminds me of some more things—but I had some experimental equipment and was able to take a camera picture up—and I forget the name of the place; it's up by Nome, Alaska, right near the Arctic Circle. We shipped this picture back by phone line all in little bits and put it back together in this basement at Los Alamos so they could see the polar cusp. They were shooting an ionosound transmitter, which is a low-frequency job, up into the air, and you could actually see the cusp because it would bounce off. That was interesting, to sit there and know that you're watching a picture being transmitted from up there down to Los Alamos. We had an HF [high frequency] system that was also talking to a plane that was flying over Canada at the same time.

*That's amazing.*



What I was going to tell you that I thought was here we go; I'm starting to slip. Oh, which one was that? Let's see, give me just a second.

*Sure.*

No, I had it and then I lost it.

*OK.*

It was—I talked to you about the cameras and that slipped my mind, too, and it was fairly significant.

*OK. Well, maybe it'll come back if we talk a little bit more.*

Yeah. OK. So I can't think of—

*Well, let me ask you this. You've basically been at the test site from beginning to end, more or less.*

Oh, I might add that from 1970 on, my office was downtown.

*Here?*

Yeah, in Vegas, and I would just go up to the test site once or twice a week.

*Right. But you've been involved.*

Oh, yeah.

*I'm just curious if at all your perceptions, your thoughts have changed from, say, the first shot that you worked on through the moratorium in 1992. Did your perceptions ever change?*

**[00:30:00]** The only thing that really bothers me, I guess, about the test site right now, since '92, since they went to the moratorium on all nuclear testing, is that facility with everything that it has, all of the power grid, power lines, power grid around the site and connected to both California and southern Nevada, that they have not—again, this is political—used that site for either a nuclear reactor or wind or solar power generation. There are places out there that are

windy all the time, I know, I took wind measurements. There are places that have sun all the time. I mean, you know, when I'm saying "all the time," 95 percent of the time.

*So it's a pretty versatile piece of land that's very well—*

And it's also—just like when you go by Highway 95 and see Mercury over to the right, you don't see the other side of it that's the test site that goes on for sixty more miles and forty miles wide. Nobody sees it. It's just like I guess I was having the same thought about the repository, and this is not a shared thought by many people—I know it's a very political situation on the repository—but actually if they never said anything about it and the media had never been involved, nobody would've known the difference. If it wasn't in the paper, you could've talked to anybody on the street and say hey, you know Yucca Mountain? Yucca who? What is Yucca Mountain? It's a big rolling piece of dirt out there. But I mean I think that there's nothing wrong if the necessary safeguards have taken place of using it to store nuclear waste. I also think that nuclear waste at some point in time in the future can be developed to be useful for something. I don't think it should be considered completely waste. But anyway, what is out there and the people of Vegas and about the people of Vegas being harmed by that, it's no more than—well, I'm sorry, I'll say it, young people going to one of these clubs on the Strip and taking Ecstasy and a few other things, then going out and driving their cars. Your chance—

*Right. Just a different kind of—*

Yeah, a different approach, different thing. But I just feel—

*But the same danger.*

I feel that it can be put in out there. I believe very strongly in the rail line they're proposing that's from Caliente over north by Warm Springs and down in. That is through areas that most of these people wouldn't even drive out there.

*So it's pretty remote.*

It's remote. Very remote. Yeah, there's a few ranchers along the way but I'm sure they'll be well compensated for the land that is used. Nuclear power. I don't think we can rely on oil for the rest of our lives. Your life, maybe my life, we can, no problem. But I think nuclear energy can be—we haven't done anything toward that in the last few years because of the political implications, and I'm thinking that it can be developed properly and safely.

*So with that in mind, I mean what do you think the chances are? They talk a lot about the test site being reactivated.*

Yes, it could be reactivated to test nuclear devices, but there is plenty of area at the site to leave a portion for that and still, if they wanted to build a large solar system, even where the nuclear reactor is out there in Area 25—I mean not nuclear reactor but the nuclear dump. There's still plenty of area around that that has no bearing at all on what is being buried underground as far as like putting solar panels or wind turbines. I know the Air Force complained about the wind turbines would interfere with radar, and it would; it would cause a problem with radar. But it could be done in conjunction with where their testing area is. Now I was involved a lot with the Tonopah Test Range, and I've been [00:35:00] up in Piute Mesa, way out on the very far end of Piute Mesa, which looks right over the Air Force test area, and seen, up on some of those high mesas, jets fly down below heading on some of these missions. It can be done. We are too far along, or too far advanced technologically not to be able to overcome those little problems. And it seems a shame to me—like I say, power seems to be very critical to everybody. Lake Mead is getting less and less. If we have a severe drought, we could be very hard up for power through the dam. But when you have all of the infrastructure, the power lines to the test site—see, the Communications Department I went to work for later became the Power and Communications

Department. Larry Winter, my good friend, was the department manager of that for a while, and so I got to know the power grid out there and everything else pretty well. It's amazing, the power lines that are available already in place, it'll cost millions to put in someplace else.

*But they're already there.*

They're already there. And they could tap into that and bring power to Vegas and to southern California.

*Why do you think that that's not done?*

It's political. It gets, I think, very much political. There may be other underlying reasons but I don't think that they're significant enough they could not be overcome. Hard to say. I really want to say there are areas out there that I know about and of course we don't discuss, but I don't know. It just makes me stop and think a lot and I have to wonder where we're headed and why we don't do more of some of the things that I think we could do, which is only my opinion.

*Two questions come to mind. I'm curious about what your experience has been. There is a lot of political controversy that surrounds the test site and there always has been and I'm sure that you're well aware of a lot of this. I guess one, you mentioned when you were talking about, was it Rulison, or not Rulison but maybe Cannikin, having to deal with protesters. Did you ever have to deal with that out on the test site as well?*

Oh, yes, we had protesters out there at the main gate, flocks of them, all the time.

*And what are your recollections of that?*

Well, my first—and my comments always were on seeing these busloads of protesters going out, where do they get the money? I can't afford to go and spend a week sitting outside the gate protesting and waving the flag. These people aren't rich. You look at them and you know damn well they aren't rich. Or I should say "well-to-do." In fact, a lot of them looked fairly shabby. So

how do they get there? How do they get back and forth? How do they eat? What do they do? Where are their families? Those are just questions I have. I myself couldn't do it. I could go protest and stand in front of a building, let's say here in town, for a couple of days but not if I wasn't retired. If I was working, I couldn't do it.

*If you actually had a job that you had to be at and stuff.*

Most of these people that I see are younger people, not retired people, and like I say, I definitely don't think by the appearance of the majority of them—I know we get some movie stars in, but I have my same thoughts on movie stars, again it's in the political scene, too. They have the money to do it. Are they supporting the other ones? But again, I don't know. I guess that's my thoughts on the thing. How can these people afford to be doing that? And how much of a conviction, or are they being paid to do it?

*Right. That's a good question. I mean that's an interesting thought. What are your thoughts about some of the things that they were protesting? Did you have an understanding at the time of some of the reasons that they were out there?*

[00:40:00] Oh, yes, some. Many times, humanitarian reasons. Nuclear weapons destroy lives. Radiation destroys people. This type of thing. That I think is—well, I don't know. That's a very deep question, really, to get into because there are so many things. I really—I guess I think, I wonder if these people couldn't—if they're so concerned about humanity and everything, couldn't be doing something more productive than sitting out there, and being tossed in one of those holding pens, taken up to Beatty, booked, and let go. It's costing you, me, all taxpayers money to do that. I don't know. Again, it's a free country and you should be able to protest anything that you feel like protesting. I see nothing wrong with being against something. I'm against a lot of things. But it's how you go about it and at the same time that they wanted to stop

people from crossing the picket line or the line that they were setting up to protest, they wanted to stop the buses and so forth, there were people on the buses that wanted to go to work and make money to feed families. Maybe there were people that were very benevolent that gave a lot to the church and to goodwill societies and so forth. So I don't know. Would those same people that are protesting be willing to go out and work eight hours a day in 105-degree heat? I don't know. But they'll sit out there and wave a sign in 105-degree heat. We're back to the same thing of human nature, I think, and people themselves, everybody has a little bit of different thought on life and a different outlook in how they want to go about it. And we're in a country where you can do all of it.

*Yeah. I see that as just also a part of the whole test site story, if you will, it's just there are so many different facets to it.*

Well, there are many, many different facets. Just like you have all of the people that are still filing claims in Utah from downwind.

*Right, the Downwinders.*

Downwinders. I always say gee, I had way more radiation than they ever thought of having. But here again I have to consider, maybe there are some that, because of their physical structure and their makeup, would still be here if they had not have had that radiation. I don't know. And maybe that same person that was affected by radiation might have stepped out of his car and been hit by a truck. Same difference. I mean it happens. Different things happen to people all the time.

*Right, and there's no rhyme or reason.*

To be compensated for it, I don't know. Some I can see yes, they deserve compensation. Some I think they're just getting on the bandwagon because it's easy money, they think.

*I guess in your opinion, do you think that any of the controversy—I mean particularly in the beginning of the test site's history, it seems like there was at least between the folks out in that area, whether it be some of the surrounding ranches or Utah [clock chimes] let's wait for this to go.*

My thirty-year present from the company.

*It's nice. Big. Do you think that some of this is a PR [public relations] thing? Do you think at first there was sort of a lack of communication between, say, the test site and the local people in the area?*

**[00:45:00]** OK, I'll say this. I think that yes, in two different ways, I think sometimes the media takes anything and blows it out of proportion. I have seen the media because they have been involved in many of the events, like up in Cannikin I was at the Royal – oh, that's what I was going to tell you—Royal Hotel in Anchorage, which was the second control point for the Cannikin event. They actually had a small cadre on island to do the actual firing of the shot. But then the main group of people from the laboratories, AEC, or ERDA, and Washington were in the Royal Hotel in Anchorage. It was that hotel that I was there with Don Knoll who has since passed away, one of the men that I worked with. We'd set up a communications system there to talk to both Nevada, Washington, and the people on [the] island. I had gone over to the GSA [General Services Administration] building a couple of blocks over, in the snow and ice, and set up a hotline to the basement in Washington, to the White House in Washington, because they needed presidential approval before the shot could be fired and they had to have actual an voice approval, and so this hotline—GSA set it up but I coordinated the effort over to the Royal Hotel—and so the test director could pick up the phone and talk to the president and they'd say

go ahead. And then of course that was relayed to the island where they would do the shot. But I thought that was interesting.

But it gets us back to the media. They had a lot of media on this and, like in front of the hotel, snow and ice and everything up in Anchorage, and here's this guy, broadcaster, comes out of the hotel, NBC, ABC—I don't know which one it was—a pair of Levi's, a skaggy old shirt, puts on a real nice sport coat, they shoot a picture, and he looks like he's as fresh as a daisy and he's been sitting in—

*You'd never know.*

Never know, and he's been sitting in there slugging down a drink and having a toddy and comes out. I don't know which network it was. I wouldn't even want to say because that would put me in deep trouble. But I've seen that, the same as I have seen some of these pictures that they shoot over in Iraq, and the same—I'm not going to run down anything about what happened in Louisiana [Hurricane Katrina], that's very bad—but the media, they will shoot pictures of some area that's been devastated when right alongside everything may be going great. But that doesn't sell papers or cause people to listen to the news. People like to see devastation. They like to see—I won't say “like,” that's the wrong word. They are more interested in seeing tragedy and devastation than they are seeing a happy-go-lucky situation.

*Yeah, somehow that seems to hold our interest better.*

Look at right now, young folks, and you're still young, enjoy some of these movies where the whole movie is car wrecks, people shooting each other, and being blasted out of the place, and cars, if they don't roll over seventeen times, it's not even worth going. You don't see people going to see something like *On Golden Pond*, which is a little deep and moving.

*And no cars.*



And what's drawing the bucks? The bucks, the people coming to see it. And so it makes the money. Same thing with the cars. Build a cheap, low-priced car that's very fuel-efficient and it goes right down the tubes. Stick a big engine in that car, put a few doodads on it, sells like mad, raise the price by twenty thousand, it'll go. So, people.

*You're absolutely right. So, people and perception.*

People and perception. Very deep.

*And so in terms of I guess, you know, the test site or if you want to say PR about the test site, [00:50:00] maybe this is the stuff that people would rather—gets people's attention, rather than the normal, mundane—.*

People would much rather jump on something such as they had an event out there, it vented, there is radiation coming out, it's headed for St. George [Utah], than they had an event out there, it was completely contained, they received all of the diagnostic information they wanted to receive, and they have learned several very important scientific things. Oh, page seven.

Radiation escaped, page one. Why? Well, I know, because a radiation escape may affect people.

It may.

*You're right about that.*

No, I don't know. All I can say, again, is that the people that I have worked with, both the contractors, and there have been many contractors, F&S [Fenix and Scisson], Holmes and Narver, REECo (the one I was with), and many other subcontractors, and the laboratories, for the most part, and a very large "most part," have been very, very nice people, good people. And some very, very intelligent, especially in some of the higher echelons of the laboratories; very intelligent. And I have also found that the more intelligent, the more open the person is. I don't know how to say this but some of those people—again I always talk about some of the Ph.D.s;

they're very learned—were so down-to-earth and not pretentious like some of the lesser—and I'm not saying lesser people in a sense but lesser-educated people. It just made me feel very good to work with those. I was classified for many years as a senior electronic engineer before I went into the management side, and I had the opportunity of flying around to the various military bases and so forth, and I always enjoyed meeting these people because you could sit down and talk to them and discuss things, and just like we're talking right now. And it wasn't somebody that was on a high fence, raving about this or that or carrying some flag and waving it. So I guess that's what I enjoyed about my whole career.

*Well, just a very human connection and experience, camaraderie and people were peers.*

Very nice. So that's basically my—

*Well, that's a pretty amazing lifetime of experience you had.*

I enjoyed it. Like I say, I would not trade it. I would not trade it at all for—some of the people I've had the opportunity to work with, be with, live with for a while, even, very nice. It helped my outlook on life, I think, which right now at my age is getting pretty bad at times. I have thoughts, which I shouldn't. But anyway.

*Well, I think everyone—*

That's another thing, too, I enjoyed, too, as I say I was Q-cleared one month after I went to work there, and a Q-clearance, you know, is pretty good, but I also carried the sigma qualifications: Sigma one, two, and twelve.

*What is that?*

That's levels of clearance of what you can know or what you can expose yourself to or be exposed to.

*I guess for some reason I never heard the full name of it.*

Yeah, sigma levels, and then I was also involved with crypto.

*Wow. You've seen a lot.*

So anyway, that's about the size of it.

*Well, I definitely you taking the time to talk with me about your experiences and your memories and what you did out there.*

Well, I hope I've given you something.

**[00:55:00]** *Oh, it's great. Thank you.*

**[00:55:04]** End Track 2, Disc 2.

[End of interview]