

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

Interview with
Harold Cunningham

March 11, 2004
Santa Fe, New Mexico

Interview Conducted By
Mary Palevsky

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Produced by:

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

Mary Palevsky: *OK, so we could start by getting some information about when you were born and where you were born and then the way in which you ended up being involved at the Nevada Test Site.*

Harold Cunningham: OK. My name is Harold Cunningham. I was born December 10, 1926 in a little town south of what is now Truth or Consequences [New Mexico], used to be Hot Springs, and my birth certificate shows Arrey. You probably never heard of it. It's near Garfield, north of Hatch.

My father worked for the Bureau of Reclamation and we lived at a house at Percha Dam, which is right south of Caballo Dam. He then got transferred to a town near Las Cruces [New Mexico]. My mother was a grade school schoolteacher and she taught at West Picacho, East Picacho, and Dona Ana. I went to school to her when I was in the first [00:03:50] grade and that's how I got spoiled. My mother's family lived on a farm near La Mesa. They came to La Mesa from a town near Fort Worth. My grandfather was a farmer, had six children, and I spent a lot of time with my grandparents because my mother was a schoolteacher.

In the 1930s, and then beginning in the 1940s, I guess it was about 1941 that I started to high school in Las Cruces. I went to Las Cruces Union High School, it was on Alameda Street, and graduated as the salutatorian in a class of eighty students. My girlfriend whose name was Cynthia Wimberly was one year behind me.

My father wanted me to get a farming deferment. I wanted no part of that so I joined the Army and took a test which qualified me to go into what was the Army's specialized training program. As in the Navy, it was the V-12, and this was because the students graduating from high school were not going to college and the armed forces needed people with a little education.

So I passed the test. I was sent to Texas A&M for about nine months to take an engineering course. Then when I finished that I went through infantry basic and then after I finished fifteen weeks of infantry basic, which was during the Battle of the Bulge, and after firing the rifle one time I was sent to University of West Virginia at Morgantown, West Virginia to continue my engineering education.

After spending six or seven months there I was transferred to Fort Belvoir, Virginia, right out of Washington, D.C., and it was a base where technical courses were taught and you had your choice and I chose refrigeration mechanic—refrigeration and air conditioning. I spent about three months in that course and then became an instructor because the older instructors were being discharged from the service. And I was an instructor there for about a year until I was finally discharged in September of 1946. [00:07:20] I wanted to go back to school but I was three weeks late, three weeks after the semester started at New Mexico A&M [later New Mexico State]. My mother talked to Ira Renfrow who had the power to either let me start late or not start until the next semester. And she succeeded so I came back to New Mexico A&M and majored in mechanical engineering with a specialty in air conditioning and refrigeration.

Now where is—New Mexico A&M?

New Mexico A&M.

And where is that, or where was that? What city?

Las Cruces.

In Las Cruces. OK.

Well, the name was changed to New Mexico State University in the early 1960s because schools named “Agricultural and Mechanical” schools had a connotation which caused women not to enroll. So as happened all over the country, except in one state and that was Texas A&M, the rest of the schools became state universities, like Iowa State and Arizona State.

All right.

A thing that’s kind of interesting here is that by the time I got back to school, housing was very short and they had moved in several old army barracks and put them out near Tortugas. Do you know where Tortugas is?

No.

It’s a little Indian community south of Las Cruces. And the conditions were horrible. Seemed like the cracks in the wall were an inch wide and when the wind blew it went right through the building. Three of us complained so much that the president of the college, Hugh Milton, [00:09:26] let three of us live in his garage for a semester, rent-free. Which was kind of neat. We were all broke. And after that then I joined the TKE [Tau Kappa Epsilon] fraternity and moved into the TKE House.

Because I had gone to Texas A&M and the University of West Virginia, I had three semesters’ credit. So I was able to graduate in August of 1948 with a bachelor’s in mechanical engineering. I got a job with a Carrier air conditioning distributor in Abilene, Texas, and I did design work for three years but I was miserable in Abilene, Texas.

How come?

Well, because of the—it’s the capital of the hypocrites.

What do you mean?

Seriously.

What do you mean? In what sense?

Well, if you wanted to go to a restaurant you could take a bottle in a brown bag, but liquor was not sold freely there. The preachers and the bootleggers kept the law that prevented liquor from being sold. That's the kind of thing that bugged me.

OK.

Anyway, I had a good friend that worked for Robert E. McKee at Los Alamos and he told me about the possibility of getting a job with a company named Brown and Olds Plumbing and Heating Company, headquartered in El Paso. I was successful in getting this job and we moved to Santa Fe and this was in about August of 1951. We had one child and another on the way shortly.

Just for the record, your wife's name?

Cynthia Wimberly

[00:11:42] *OK, Cynthia Wimberly, and you were married what, in the late 1940s or something?*

We were married a year after I graduated. Because she had another year to go, we were married in June of 1949.

OK, and so you come with your first child to Santa Fe.

Yes, we brought our first child to Santa Fe.

And what is that child's name?

His name was Frank Wimberly Cunningham.

OK.

So anyway I got this job with Brown and Olds and started working at Los Alamos. And there were three companies that were involved financially. Robert E. McKee was the lead company

and Brown and Olds Plumbing and Heating Company and the Reynolds Electrical and Engineering Company [REECo].

Anyway, we moved here [Santa Fe] in August of 1951 and I learned in the early part of January 1952 that I would be transferred to the Nevada Test Site. I guess it was because I lived in Santa Fe and Frank Rogers lived in Los Alamos that we drove out there together, out to Las Vegas, on January 7, 1952. And we stayed at the El Cortez Hotel downtown for two or three days and then we moved out to the Nevada Test Site, to Mercury. The housing was really quite sparse. We lived in plywood hutments. They were four-man and eight-man hutments that were plywood with an oil stove in the middle. And this would never be permitted now with OSHA [Occupational Safety and Health Administration]. Never. And the bathroom, the latrine, was a block or so down a gravel path. And we lived there for a series that started in the late winter of 1952. [00:14:17] I want to go back a little and talk about the beginning of testing at the Nevada Test Site. Is that all right?

OK. Yes, and just for clarification, Frank Rogers at that time was—?

Deputy manager.

Of—?

The Reynolds Electrical and Engineering Company.

And you were with another—?

No, they sent us out—well, the Atomic Energy Commission developed a contract with the Reynolds Electrical and Engineering Company to do the construction work at the Nevada Test Site. And this was after a year in which there were major, major problems with the contractor that had been doing this work named the Haddock Engineering Company.

But back to the beginning of testing at the test site. You're aware of what was happening in the fall of 1950 when it was decided that there needed to be a site in the continental limits of the United States for testing atomic devices.

Correct.

And Truman finally agreed that that site could be developed and a chunk of land about thirteen hundred square miles was carved out of the Nevada Test Site. The beginning of testing was Operation Ranger, and the work was started in December of 1950 with supervisors and managers being transferred from these three companies to Nevada and the local unions furnishing the manual employees. There was nothing at the Nevada Test Site in the way of facilities so these supervisors and managers were housed at the Indian Springs Air Force Base, [00:16:47] and as I recall they finally housed about a thousand people there. Indian Springs was not being used. So people commuted from Indian Springs. And these were the manual laborers—electricians, plumbers, all those kinds of people. There was a paved road that went from Las Vegas to Reno, so they went on the paved road to what is now the turnoff to Mercury. And from then on it was just a gravel road, not maintained. There were no water wells. All the water had to be hauled from Indian Springs.

So this was the beginning of Operation Ranger. There was a control point established in the pass right out of what is now Mercury which overlooked Frenchman's Flat. And of course this was all plywood. In order to have a control point there had to be signal cables run from the control point to the ground zero location which was about eight-and-a-half miles into Frenchman's Flat. One story I get is that the people doing the work decided, you know, we can't put the cables on the ground because the rodents will eat the insulation off. We have to put them on poles. So somebody came up with the idea, Why don't we cut the poles in two and we can do

the work on the crossbars from the ground? Which worked out to be very well. The other story is the Corps of Engineers didn't send enough poles so they cut them in two to get enough.

OK.

So anyway, you know, there were five tests in Frenchman's Flat. These were all airdrops from planes coming out of Kirtland Air Force Base in Albuquerque. And the first test was the twenty-seventh of January 1951. The last of the five tests was the sixth of February 1951. I guess the largest test was the 22 KT [kiloton] test which really shook Las Vegas because they had not determined that weather had to be watched very carefully when the tests are executed because [00:19:46] the shock waves could bounce off the clouds and hit nearby areas. And this happened. It broke windows in Las Vegas, it cracked plaster at Cashman's Cadillac on Main Street lost its plate glass window in its showroom. Las Vegas had been warned that there were to be some tests conducted but no one knew there was going to be any damage.

So the 22 KT test was exciting in Las Vegas. And this Frenchman's Flat, then it was designated as Area 5. The superintendent for these tests, or the general manager for Reynolds Electrical and Engineering Company, was a man named Joe Lopez, an electrical engineer. Very bright. And he had been working for REECo at Los Alamos. And that I think is the main reason that the AEC [Atomic Energy Commission] selected REECo.

OK. Because of him.

Yes. When this series Ranger was over the Reynolds contract was not continued. A company named the Haddock Engineering Company was brought in as the general contractor. And they worked for the balance of 1951 building temporary housing, cafeterias, temporary office buildings in Mercury, building a control point building in the saddle between Frenchman's Flat and Yucca Flats, building a power generating station in Mercury because there was no power

lines from commercial power to the Nevada Test Site. They also paved some roads. Besides the control point building, which is a concrete structure and still exists, and a radiation safety building at the control point site, those two concrete structures were the biggest project. They also built underground structures in Areas 1, 2, 3, and 4. They built four structures named the 300 Structures and two named the 330 Structures, and in these underground structures were to be placed the electronic recording equipment for the tests. They were there for Operation Buster-Jangle in 1951 and the AEC was extremely unhappy with their performance. It was a seven-
[00:23:18] -day-a-week, twenty-four-hour-a-day job, the cost overruns were dramatic, and they did not continue with Haddock as a prime contractor.

The temporary plywood structures in Mercury were then available for the Reynolds, or REECo, when we were then granted a contract to start work in January of 1952. And we lived in the hutments, and it was a great time, even though it was very primitive. We ate in the plywood cafeteria. We were paid a seven-dollar-a-day subsistence for the inconvenience of working sixty-five to ninety miles from town. And the way we paid for our meal, there was a turnstile where you put a silver dollar, and you could go through the turnstile and then go back as many times as you wanted.

Anyway, we lived in those temporary structures through 1952, yes. Operation Tumbler-Snapper. OK? The operation that Haddock was responsible for in 1951 was Buster-Jangle. And there's a Y in the road out past Area 7 that is the BJ Y to this day—Buster-Jangle.

Interesting. So when you, just so I get clarity on this, you said at first that you worked for another contractor, then you come with Frank Rogers. So had REECo hired you or--?

Well, the Brown and Olds Company had. Brown and Olds and the Reynolds Company were all affiliated with the Robert E. McKee Company. So when I was sent to Nevada in 1952 I was sent

[00:25:55] out there with the REECo company, because REECo had the contract.

I understand now. All right.

OK? OK, in 1952 this was the Tumbler-Snapper series. Eight tests were conducted. We went there in January of 1952 and the first test that was conducted was April the first, and we tested into early June of 1952. We had tests in Area 5, which was Frenchman's, 7, 1, 4, 3, 2, which all were in Yucca Flats. There had been a company which was a subsidiary of Haddock Engineering Company named the Nevada Company that was responsible for maintenance work throughout the test site and the operation of the generators and I didn't mention they also installed a steam plant in Mercury with underground lines reaching all around Mercury. And the contract with Nevada Company, with Haddock, was canceled and REECo was given the responsibility of all the maintenance beginning in 1952.

The tests in 1952 were three for LASL [Los Alamos Scientific Laboratory], one for the Department of Defense [DoD]. They were airdrops and weapons effects tests. The way we operated at that time was that when there was to be a series of tests at the test site and Reynolds had the contract, the necessary management, administrative, and supervisory people from Reynolds, McKee, and Brown and Olds were transferred to Nevada. We'd stay there for the series of tests and when that was over we'd be transferred back to our parent company, which was a little inconvenient, but anyway we went along with it. And then after that test series was over, it was normal that the Atomic Energy Commission would have a series of tests in the Pacific.

During all this time there was another company that had a prime contract at the test site and that was EG&G [Edgerton, Germeshausen, and Grier]. They were the technical contractors [00:29:03] responsible for timing and firing and the gathering of diagnostic information. And

we, REECo, probably had twenty-five hundred to three thousand people working for us. They might have had seven or eight hundred.

So anyway after 1952 I went back to El Paso with Brown and Olds.

Oh wow, all the way back to El Paso.

There was nothing happening in Santa Fe. So I went to El Paso, worked on the construction of a couple of buildings in El Paso, and then in 1953 there was a series started named Operation Upshot-Knothole. It lasted from March of 1953 until June of 1953. There were eleven tests. Now during this time there was only one laboratory and that was Los Alamos. Then Dr. Teller decided that there needed to be another laboratory because if you don't have competition you're not going to accomplish anything, so the Lawrence Livermore Laboratory was established. So we started doing work for LLL. Oh yes, in 1953 one of the shots that was interesting was an artillery test [Grable], a cannon that was placed not too far from where the original control point was in Frenchman's Flat, but the shell was fired into Frenchman's Flat. And it was decided that artillery was not really the way to use the atomic device in wars, because if you're going to create a lot of radiation it could blow right back in your face, so that was abandoned, even after two or three cannons were sent to Germany. But they abandoned the use of artillery for firing the atomic device.

Did you see that one?

Yes. You know the exciting thing about tests, atmospheric tests, and these were all atmospheric, was that the best time of the day for the test to be conducted was about four o'clock in the morning when there's no sunlight, because a lot of information was gathered from photography.

[00:31:56] So if you were really interested you'd get—and we were staying in Mercury, we'd get up and go out to the control point, they'd give you some black goggles, and you'd watch the

test. And when the device went off, whether it was an airdrop or whether it was a balloon shot or on the tower, it was much brighter than looking right here, much brighter.

Really.

Oh yes. You had to wear these glasses or it could ruin your eyesight.

So anyway I guess after that series in 1953, Upshot-Knothole, the next test was in 1955, and I had gone back to El Paso for a few months and they had an operation named Teapot. There were fourteen tests. They were all in Yucca Flats except one and that was in Area 5. There were towers, there were airdrops. I don't think balloons were used yet.

So that series went on from 1955 to January of 1956. And it became apparent that the AEC was going to stop testing in the Pacific and all the tests would be conducted at the Nevada Test Site. And it was decided, or it appeared, that this would be a continuous thing at the test site, so I bought a house and we moved to Nevada at Thanksgiving of 1954. There was also another construction job awarded to REECo because we had the necessary Q-cleared personnel, and it was at a location that you can read about in *Skunk Works* [Ben R. Rich and Leo Janos, Little Brown 1994].

All right.

You know what that is.

Yes. The area that doesn't exist.

Fifty-one.

Yes.

[00:34:32]OK. So we went out there and it was really crude because the sand was not sand, it was dust that you drove in until we finally—we could not find a successful water well. And so

we had to haul all the water from Mercury. We built three dormitories, a cafeteria, and a couple of hangars. That's described in the--

OK.

And the way that it was discovered that there was something going on north of the Nevada Test Site in an area called Groom Lake was that when they finally started using this site, and these were people from Burbank, California—that's where the Skunk Works was.

Oh, OK, I didn't know that.

Yes. The area was kind of nicknamed Watertown because we couldn't get any successful water wells. The way it was discovered was that a little boy in Austin, Texas in show-and-tell got up before the class and said, *My father was killed at Watertown yesterday. The plane crashed.* So that's how it came out into the open that there was something going on at Groom Lake.

Interesting. That's interesting.

Yes. OK, I've mentioned Plumbbob. This was when it really kind of started having continual tests year-round at the test site. And Plumbbob, from May of 1957 till September of 1957 there were twenty-nine tests. And Los Alamos was doing all the testing. I don't think that Livermore had really yet developed the capability to design and build a bomb, so it was all Los Alamos. There were towers, three [500-foot] and one or two 700-foot towers. We didn't build those. There were contracts developed with a company out of Los Angeles named the Vinnell Company. There were balloon shots. The balloon would be at an altitude of about [00:37:16] two thousand to twenty-five hundred feet. And these balloons were built by General Mills, which is kind of interesting. And there were balloons, there were what they called shafts, which were hand-excavated shafts so that the device could be detonated below ground.

But we're not talking real deep at this point.

No, not yet.

OK.

Oh yes, there's one thing that is interesting here. From the 300 underground structures, the four, and the two 330 underground structures which had the recording equipment—and the main reason I think they sent me out there was that Haddock had built the structure but had not installed the air conditioning and that was my specialty. So anyway, they sent me to Nevada to be a part of installing the air conditioning systems in these six underground structures. From the underground structures was run coaxial cable, out the front, then up the tower leg to the data gathering equipment on the tower, and this coaxial cable was three-and-a-half inches in diameter, aluminum shielded, bought in Germany. Today they would use a cable that might be as big around as your finger that would be capable of gathering a hundred times the information that that one cable was.

Anyway, of course when the device was detonated on the tower everything was turned to gas and went off to the east. The tower, the data gathering equipment, and everything—the only thing that was taken off the tower was the elevator, and it was saved for the next tower.

Was taken off before the shot and then saved for the next time.

[00:39:44] Yes. In one of these shots, and I'm not sure which one, when the button was pushed at the control point to detonate the device it didn't detonate. Herb Grier and Barney O'Keefe, EG&G, were at the control point. So they flipped a coin to see who would go up the tower. The elevator was gone. They had to climb the three-hundred-foot tower to correct what problem existed on the device to keep it from detonating. Barney lost so he went up and corrected it, came back to the CP [control point], and it went off successfully.

So maybe what, a dial not turned the right way or what?

I have no idea. I don't know. Anyway, he did it.

He found it.

Yes. Then in 1958 there was a series called [Operation] Hardtack II. There were thirty-seven tests in various areas and I think the reason that they were testing so many was they could see the end of testing coming for a while, so in 1958 there was begun the Eisenhower moratorium which lasted until 1961.

Even though testing was stopped I didn't have to leave the test site because I was transferred out to Jackass Flats where there was to be testing of the Kiwi reactor [Rover program—Nuclear Rocket Development Station (NRDS)] for powering a rocket in outer space. So I was transferred out there to be in charge of the construction work necessary, and we can get into that a little later, what I did out there.

OK.

There were other tests that were conducted and when we went back to testing in 1961 in Carlsbad [New Mexico] named Gnome. And this was a Plowshare shot. Not in Carlsbad, near Carlsbad. And we had the responsibility of excavating the shaft. We sent people out to Carlsbad to excavate the shaft and do whatever was necessary for the test.

In 1961 there were tests conducted in Areas 3, 12, and 9 and those were all weapons tests and I think they were all Los Alamos tests.

Now are we still in atmospheric testing here?

Yes, we're still in atmospheric testing.

OK, and the Gnome Plowshare, was that like what, to see about mining, using it for excavation kinds of things, or do you remember why they did that?

You know, I can't answer that question. I don't really remember.

I can look it up.

I don't really remember. It was a Plowshare test.

OK.

So anyway we went back to testing in June of 1963 and then there had been an agreement made with the Soviet Union [USSR] that no radiation would leave the continental limits of either country. So we had to go underground.

Now, a little correction here. In 1963 there were forty-six tests at the test site and there were some tests in the Pacific and I don't know what tests those were, in 1963. But at the test site there were DoD and Los Alamos tests.

It became necessary then to start excavating what they call shafts but they were drilled, cased holes. The first one that was drilled was drilled in Area 3 and we brought in a company to drill the hole and then we cased the hole.

It was cased in—?

Steel.

[00:44:17] *Steel. OK.*

Yes, and I think this was probably a thirty-six-inch drilled hole with a casing about thirty inches in diameter. It went down to probably twelve or fifteen hundred feet, something like that. That was the first underground test. Then there was Operation Storax from July of 1962 to June of 1963 and there were fifty-one tests at the Nevada Test Site. The AEC and the laboratories had a little catching up to do so they had a lot of tests. And this series included Sedan, which was probably the last test that was not underground. Sedan was a test to see whether or not it was feasible to use the atomic device for excavation purposes, for building highways through

mountains or building another canal in Panama. And that was exciting but now I don't remember the depth. It was 104 KT which was a pretty good size shot. But this was held mid-morning and you can't imagine the dirt that went off to the east. Have you been to Sedan?

I saw the crater. It's just—

You saw the crater. Well, all that dirt went up in the air and blew to the east.

Yes, we just stood on the edge and said, Oh my God, this is a big hole.

Yes, we put in some kind of a system to take equipment and vehicles down into that crater and do some drilling and data-gathering, and what that was was steel aircraft landing bats. You might have seen them there, laying on the side of the crater going down to the bottom? And this is the way we put equipment down into the hole.

Oh, OK, well when I go again I'm going to have to look for that. I was just looking at the depth in utter amazement.

[00:46:43] OK, the next test series was Operation Niblick in August of 1963 to June of 1964. Fifty-nine tests that were conducted on Los Alamos devices and Lawrence Livermore devices. DoD didn't develop any tests but they took part in a lot of weapons effects tests. And this series included shafts, tunnels, and cased holes. We also had a test near Fallon, Nevada named Shoal, and this was a part of the Vela Uniform series. And as I recall, and it seemed kind of asinine to me, we excavated a shaft in a fault zone and what we were told was that the AEC and the laboratories were trying to determine if an earthquake could be caused by a device being detonated in a fault zone. Well, it didn't happen. That was Shoal, near Fallon.

The next series was from July of 1964 to June of 1965 called Operation Whetstone. Fifty-one tests, all tunnels and cased holes. Cased holes were called shafts in that book. But we had started doing drilling ourselves in about 1962. We didn't really know much about drilling but we

obtained what they called class-one drill rigs. We got two of them from the oil industry in west Texas and three or four smaller rigs for doing exploratory drilling. Anyway, over a period of time—the way this was done at first was to drill a small hole, then ream it out to a bigger size, and finally get to the size you wanted. And what they really wanted was a hole that would accept an eighty-six-inch casing. So we finally developed a way to drill these holes with one pass, using what was called a flat-bottom bit. It was a large bit with a lot of small bits around the bottom. And what you do, you start out drilling and you have a pipe that holds this bit assembly and you're circulating drilling fluid down and the drilling fluid when it comes back out is bringing the cuttings with it. So we finally got to the point where we could drill say **[00:50:30]** about a ninety-six-inch hole with one pass. And you know it might take a month or two but in the early days it might take eight or ten months. And so this method of drilling shafts was then taken off-site by commercial drilling companies to excavate shafts by drilling instead of by using miners.

Yes. And you developed this.

We developed it by working with drilling equipment companies like Smith and companies like that, yes, yes. We would come up with a possibility of how this should be done and try to sell it to a drilling company and then finally we got to the point where we were drilling ninety-six-inch holes.

That was Niblick Now the next test series is Whetstone. Fifty-one tests from July of 1964 to June of 1965. They were conducted in tunnels and shafts, and this test series included Salmon near Hattiesburg, Mississippi and it was another Vela Uniform test. I mentioned how we developed methods for drilling holes. In the beginning when we were required to excavate tunnels we didn't really know much about excavating tunnels, so we finally built up the

capability. There were a lot of miners in Nevada and we were able to get some very capable mining supervisors and miners from the eastern and the central part of Nevada, and one of the men that I will always admire was named Frank Solaegui. You have to remember this, Frank Solaegui, a Basque. Frank came in as a mining supervisor and we finally learned how to excavate tunnels and do it efficiently. We excavated tunnels that were more than twenty feet in diameter to accept a twenty-foot diameter pipe. And these were weapons effects tests. Usually, I think in most cases, the device was furnished by Los Alamos. And we would go back in the side of a mountain and we had four tunnel complexes and we would install a pipe. At first it was a smaller pipe that would graduate up to twenty feet in diameter and on this pipe was data-gathering equipment. [Several vacuum pumps evacuated the pipes to near a perfect vacuum.] What they were trying to do, the idea of the test, was to determine what would happen or the effect of detonating a device in outer space. Weapons effects. So if you had a rocket up there with electronic equipment they wanted to see if detonating a device nearby would spoil the effectiveness of the electronic equipment. So this went on until testing was stopped in 1992, and it was in Area 12, the far north area of Yucca Flats.

How far in would the tunnels go?

A mile. What we would do, some of them went in a mile and then there would be drifts. A drift is a side tunnel off of the main tunnel. In the drift the test would be conducted, everything would be cleaned up, and the main tunnel would be used again to excavate other side tunnels. So I don't have any idea how many of these tests were conducted, but a lot.

Yes. So the actual test would be in the drift and then the main tunnel—

The test would be at the end of the drift. You might start off with a pipe twelve or fourteen inches in diameter at the end of which was placed the device, and then it would graduate and

increase in size to pipes normally maybe six or eight or ten feet in diameter—the biggest one was twenty feet—and on the side of these pipes and sticking into the pipes was the data-gathering [00:55:58] equipment, and cable then went out the tunnel to recording equipment outside the tunnel. They finally decided it might be more appropriate to drill a hole from the top of the mesa—this was in Rainier Mesa which was above what became the Area 12 camp. But anyway, drill a hole from the top down into the tunnel and run the cables down that way instead of running them in through the front.

Oh, I see what you're saying.

After everything was in place then the tunnel was stemmed. That means we pumped in grout and filled up the tunnel so that radiation would not come out the front. OK.

Let's see, that was, what, Whetstone, then there was [Operation] Flintlock in 1965-1966, [Operation] Latchkey in 1966 and 1967. Oh, that was where the Vela Uniform test was conducted in Hattiesburg, Mississippi. In 1967-1968 Operation Crosstie, fifty-four tests including Gasbuggy—that was at Hattiesburg. We sent people down to do all this work. And then there was also—excuse me, Gasbuggy was at Farmington.

Farmington, New Mexico.

Yes. And the idea was to drill a hole into an area where it was known that there was some natural gas, but to stimulate the gas area so it could come out and be used commercially. Well, it didn't work.

Then there was Operation Bowline in 1968 and 1969. There were fifty-seven tests. You can see testing really picked up. Operation Mandrel in 1969 and 1970. Seventy-nine tests [00:58:19] including Rulison in Colorado, where they're now attempting to go in and do some

drilling but the natives are up in arms. These were Plowshare tests, and that was gas stimulation also.

And that's an idea that I guess, in addition to the one at Farmington, just never bore fruit?

Well, I don't think it stimulated the gas but then they determined that there was so much radiation coming out with the natural gas, it couldn't be used commercially.

OK.

Then in 1970 as a part—oh, there was a test in Amchitka named [Operation] Milrow and this was a seismic calibration test to determine if we could figure out if the Soviets were conducting tests.

Nineteen seventy and seventy-one was Operation Emery, 1971 to 1972 Operation Grommet. Thirty-nine tests including Cannikin in Amchitka. This was a test of a warhead for a Spartan missile.

Oh, OK. Did you go up for those tests?

No, the AEC in their esteemed wisdom hired another contractor, Peter Kiewit, and they excavated a shaft. I think they drilled a shaft. And they needed at the bottom of this shaft a large excavated cavity, but this contractor could never figure out how to keep the water out of that cavity. So the AEC came to Reynolds and said, Have you got somebody that can go up and solve the problem? And so we sent Frank Solaegui, and he took three or four of his tunnel walkers who were supervisors. It was Peter Kiewit who was the contractor.

[01:00:40] *OK, Peter Kiewit?*

Peter Kiewit. And I don't know if they exist any longer or not but they were one of the contractors on the building of Boulder Dam.

OK, so Frank Solaegui goes up and he—

He solves the problem in about two weeks. You know it's a guy that had little education, he was a paratrooper during World War II, and he had smarts. He was very, very intelligent.

So there was great concern on the part of people in neighboring islands as to whether or not they would be contaminated with the radiation. And I think it was for this test but anyway the secretary of the AEC, James Schlesinger?

Could've been.

He took his family up there so he would show the world that he was not afraid. So they had the test and everything went fine.

Interesting. I never heard that story.

Then there was Operation Toggle in 1972-1973. Thirty-three tests, including three near Rifle, Colorado, and these were also gas stimulation tests. Didn't work.

Nineteen seventy-three, seventy-four, Operation Arbor. Twenty tests. Nineteen seventy-four, seventy-five, Operation Bedrock. And this was always a combination of Livermore, Los Alamos testing their devices and DoD coming in with special requirements for the testing effects. And when we talk about the effects of testing, back in the early 1950s, I think about 1953, there were several weapons effects tests conducted in Frenchman's Flat. They built [01:02:44] railroad trestles, they built underground garages, they built underground shelters, what they called motels which were long series of buildings—a long series of a building with different types of construction. They would have adobe, they would have metal, they would have frame—and these were different distances from ground zero—to see the effect of the detonation on different types of construction. They had metal buildings—anyway a lot of that stuff is still down in Frenchman's, a lot of ruins.

Nineteen seventy-three, seventy-four, Arbor. Nineteen seventy-four, seventy-five, Bedrock, thirty tests. In 1975-1976 was Operation Anvil, twenty-two tests, and during that series was the eight hundredth nuclear test conducted. It finally got up to about eleven hundred and fifty but I thought that was interesting.

That is interesting.

Then nineteen seventy-six, seventy-seven, Operation Fulcrum, twenty-two tests. Nineteen seventy-seven, seventy-eight, Operation Cresset, and I think that was the first time we had a test for the United Kingdom. There were twenty-four tests, one for UK. Nineteen seventy-eight, seventy-nine, fourteen tests, two for UK. And so kind of routinely here every time there was a series through 1981 there was a test or two for the UK. [Pause] And that went on through, let's see, 1984 to 1985, and then in 1986 I retired.

Oh, OK.

[01:05:05] We had five-year contracts with the Department of Energy [DOE]. AEC, ERDA [Energy Research and Development Administration], and then the Department of Energy.

Right. OK.

So I picked a time when we didn't have any union contract expiring in the middle of a five-year contract with REECo and I thought—other reasons—but I picked a time to retire in June of 1986.

Well, you mentioned something that I want to get clear on. REECo is working for AEC, ERDA, and DOE and so you're not working for a lab per se, you're working for the DOE—

Oh no, no, no. Our contract was with the Department of Energy to do the support work at the Nevada Test Site. This support work—back in the early 1960s we'd be up to about sixty-two

hundred employees. When I left we had fifty-five hundred. Part of those were doing other work which I'll tell you about later. But anyway.

But a lab would come and say, well, we need this?

The laboratory had specific areas at the test site assigned to them. And they would come to the AEC with a requirement to do this kind of a test. The information was very sparse. We had what was called a "cost plus" contract. That was cost plus a fixed fee that was negotiated annually. And they would furnish information to the architect engineering contractor, which in the early days was Silas Mason, and then became Holmes and Narver.

So they would give this information to Holmes and Narver. They would then design whatever was needed, but most of the design work was really word-of-mouth in the field from Los Alamos engineers to us. Holmes and Narver, when they could design something, they designed it. There was another contractor named Fenix and Scisson. It was a firm out of [01:07:45] Tulsa, Oklahoma that had the responsibility as a design contractor for drilling. It was another kind of a farce because most of the information was developed in the field between the laboratory and us, and Fenix and Scisson was getting a fee for being an AEC contractor. That's not sour grapes; that's the truth. OK?

OK. You were there.

So anyway I went out there as a mechanical engineer, then I was given the responsibility for the mechanical division which had two or three hundred people: plumbers, sheet metal workers, and pipe fitters. A lot of the work we did in the early days, the pipe fitting work, was up on the tower where they were using the pipes with instruments installed, so the plumbers installed those pipes.

So anyway I then left part of the test site work and became manager of a division called Special Projects which included at the test site the communications responsibility, the

maintenance responsibility, the Plowshare work at Fallon, Plowshare work at Hattiesburg, work in Colorado, and work in Farmington.

So that went on for, I don't know, two or three years, and then it was decided by the AEC that Reynolds was really not doing a spectacular job in certain areas so they talked to Mr. Reynolds, and to solve the problem he decided to bring a company in named the May Company, a personnel management consulting company. And we called it "May-Day." They came in and interviewed everybody. There were people promoted, people demoted, and people fired. And as a result of the May Company, I was given the responsibility for what was named the Operations Division, which was all construction work.

And what era is this around?

Nineteen sixty-five.

[01:10:25] *OK, great.*

And I had about thirty-two hundred employees. And things went quite well. And then I think it was 1966 or early 1967 that the AEC decided to have contractors bid on this work. They sent out an RFP, request for proposal, and we worked night and day on that thing for weeks and weeks and finally we were re-awarded the contract for five years.

After we were re-awarded the contract, EG&G bought us, bought REECo, in 1967. And the reason they bought us was that they were afraid that if we lost the contract for some reason, default or whatever, that a larger contractor like Peter Kiewit would be brought in and they might take over the work that EG&G was doing. So anyway they bought us for probably not much money. And Mr. Reynolds was really getting fairly feeble and he wanted to get out of the business. This was 1967.

So from late 1967 until the end of 1969, early 1970, EG&G decided, we're going to solve all those problems that Reynolds has and we're going to send in some

management folks. And they sent in some dogs, really terrible, a guy named—well, I'll mention his name, he's dead. His name was Frank Strabala—as the manager. And they established Herb Grier as the president. Well, Herb Grier didn't know anything about what we did. And Strabala decided the way to solve all these problems was to have sensitivity training and T-groups. You hear about that?

Yes.

It was terrible. Just awful. The management was taken off to places like Bullhead City or Lake Mead to spend a weekend or a week telling each other what was wrong with them. The only way that we succeeded in keeping the contract, we had some good second-level supervisors and they [01:13:04] continued doing the work and having shots. Anyway, Frank Strabala was told by the manager of the Nevada operations office—well, Herb Grier was told, You get Frank Strabala out of there or your contract is cancelled, so Frank was fired.

Wow. You have to stop right there because I want to change this CD.

[01:13:28] End Track 2, Disk 1.

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

OK, so you were saying the T-groups didn't work and Strabala had to go.

Strabala had to go. The AEC was getting really, really unhappy with what was happening.

So the attempt at management was actually making things worse is what you're saying?

Yes.

OK.

You know Strabala had a psychological problem. He really did.

So anyway I retired in June of 1986 and there were—

Well, let me back up a little bit here because you were giving me a nice overview of your different positions. So that's the 1960s when this is happening so—

Yes. There were three program managers and I had one of those jobs. When Strabala left, his deputy who was named Ron [Ronald] Kiehn was made manager and I was made deputy manager and that was in 1970. I continued in that job until the summer of 1976 when REECo and EG&G had developed a proposal for the management of the test facility at Idaho Falls, and it was named EG&G/Idaho. Ron Kiehn was sent up there as manager and I replaced him as a manager of REECo. This was the summer of 1976.

And they did testing up there?

No, they didn't do any bomb testing. They had several projects for the testing of different types of reactors.

That's what I thought. I had heard that Idaho had to do with the reactors.

And [Admiral Hyman] Rickover had a site up there. And it's kind of interesting, one story about Rickover. If you went into his office to talk to him you would sit down on a chair and you were very uncomfortable because he had front legs cut off two inches so it would be a short meeting.

Interesting.

Yes, most of these were reactor tests.

That's what I thought, yes.

They also were testing a reactor for the powering of an airplane but it turned out that in order for the reactor plus all the shielding required, it was too heavy to be used for an airplane.

Yes, I did read something about that. Yes, that's interesting.

So that project was cancelled, and I don't remember the name of it. Anyways these were all reactor tests.

Right. So you're the manager—

Beginning in 1976. And then I retired in—

But then you moved up, did you? Well, you were president at one point, is that right?

Well, I was president and general manager.

OK, that's the same.

Same. And then EG&G made me a vice president of EG&G in about 1979. There was always the push on the part of EG&G corporate in Wellesley, Mass. [Massachusetts] for REECo to change its name to EG&G/REECo. I would never go along with this because there was EG&G Energy Measurements, there was EG&G Special Projects—that was that other site north of—so I would never agree to that and I really think it was wise. But anyway when we go to lunch I want to show you a neon sign out here that is appropriate that it was given to me at my retirement party. (The sign read something like “EG&G a REECo Company.”)

OK. But I think I want to make sure that I'm understanding what you're saying here, which is that you felt that REECo should retain its own identity.

Retain its identity. Yes, I didn't want it to appear that these three contracts were all EG&G. I [00:05:00] wanted in the community of Las Vegas for REECo to stand out as *a* company, and EG&G Energy Measurements was another company, and then there was Special Projects. So I wanted our identity to be retained.

I understand. OK.

So anyway, I retired in June of 1986. There were several other series conducted from 1986 through 1992 when tests were stopped. And these were all—well, there were some UK tests, there were tunnels, there were shafts, and there was finally, as I recall from one of those books,

when testing was stopped there had been a thousand and fifty-four tests, Pacific and Nevada.

OK?

Right. Yes. You know when we went to the site they have left one of the devices [Icecap ground zero], I think it's a UK test that was to have been lowered. and I guess when the moratorium came it just stopped, so of course they've taken everything important off of it but the person can see what a huge—

Was it a tower?

Well, we went up in a tower but that thing wouldn't have been shot from a tower so it would have been—

No, what I think it was—and I don't recall what this *particular* thing was—in order to put everything together to go down hole, there was a large modular building built with twenty-five-foot square sections stacked on top of the other. They'd stack them as high as they needed, and inside that was placed the canister. The canister had all of this data-gathering equipment and on the bottom of it was the device. And leading to that were up to two hundred, two-hundred and twenty-five cables that went down with the canister. And these cables were all laid out in a spiral form on the ground, and as this went down—and it was put down with a crane—they would pick it up, move the modular building aside, lower the device down, and as it went down it took all these cables with it. When all that was completed and the device was down where it was supposed to go, the hole was stemmed. It was stemmed with material that had a specified moisture content because if it might not be completely dry it could bridge, which means it would stop at a particular place. And there might be quite an area between that bridge and the device that had nothing in it. So we had what we call the stemming plant where we produced this material and then it was placed in this cased hole, which was watched very, very carefully by the

architect engineering contractor, and they took samples to make certain that we didn't have too much moisture in the stemming material. Probably most of the holes were twelve hundred to two thousand feet deep in Yucca, but it was decided back in the mid-1960s that there needed to be devices with a greater yield tested, so another area called Pahute Mesa was developed, and we went up to Pahute Mesa and built roads and a control point. It was really a nice area, piñons and Ponderosa pines. We drilled holes up there as deep as a mile. In fact the AEC might have brought in another contractor to drill one or two of these holes. And at the bottom of some [00:10:00] of these holes they needed a cavity, so who did we send up to do that? It was Frank Solaegui. And he would go down, he'd excavate the cavity, and come back out and we would go through the same process as we did down in Yucca with the installation of the device and stemming and all that. I think we had, as far as I remember, tests up to one-and-a-half megaton, a million tons, which shook the heck out of things but it was far enough away from Las Vegas, it didn't damage Las Vegas. So that's why the new area was developed.

Yes, we drove up there and I remember we stopped for lunch up there. I don't know if you know a guy who works at the DOE named Bob Friedrichs?

Yes.

He took us. He said that in order for us to do research on the test site we had to be there. So when people like you talk to us about these different places we have some sense of the distances. And he was very wise in that way. But we had lunch up there and yes, the beautiful pines and it was I think a little snow up there even.

Oh yes, I think the elevation was probably about like Santa Fe. A couple of thousand feet or more higher than Yucca.

Yes. So what we were seeing [Icecap] I guess was this modular building, because we walked up a spiral staircase, and it showed the assembly and the place where the device would have been.

So that thing would have been lowered down from there.

Well, all the work on the canister was done in this modular building. Then the modular building was moved aside—

See, I think they hadn't gotten to that point yet so I think the building was there.

Yes, it was moved aside and then the device was lowered by the use of a very large crane,

Manitowoc crane. We had two or three of those that was capable of moving this modular

building aside. Anyway, what else? So they stopped testing when I left. Maybe it was my fault.

I had a couple of questions, unless there's something else you want to add to this.

Well, there's other stuff I want to mention.

I know you do but why don't you go ahead and mention that? I'll keep my questions to the end.

Oh yes, in 1957 there were built what they call the pig pens, right out of Mercury in the pass

where the original control point for the Frenchman's test was built. And there were twelve

hundred pigs in the pig pens. This was a DoD effects test, and they say that a white pig

resembles the most of any animal to the human being. So they put the pigs in different kinds of

shelters, they put the pigs in army uniforms and this stuff. This was one of the weapons effects

tests. There was also constructed a forest. We [REECo] brought 135 trees from Lee Canyon. You

know where Lee Canyon is?

No.

You know where [Mount] Charleston is?

Yes.

Well, Lee Canyon is an area just about twenty miles north and it is Ponderosa pines. We brought in 135 Ponderosa pines and dug holes, stuck them in the holes, and poured concrete, and we had a forest. In one of these things there's a picture of those trees after the device had gone off.

But that's interesting because I always wondered how those trees got to a place like the test site where there are no trees like that growing.

Yes, we brought them out of Lee Canyon.

Interesting.

[00:15:00] And I mentioned the motels, the different kind of construction, metal buildings, railroad trestles. Oh yes, a thing that is publicized a lot is News Nob. When I left there were still bleacher seats for the press to sit on and watch the device go off. Who was it, Walter Cronkite, was he one of the people?

I think he was. That's what I've read.

I think so, yes. Anyway, when we first went out there in 1952, in addition to the responsibility for construction and maintenance we were required to furnish vehicles for all of the construction people that required a pickup or a sedan, plus the laboratories, plus the AEC, so we rented up to two thousand vehicles. Most of them came from Los Angeles. And then we also rented construction equipment because there was none in existence, so renting of equipment was a big responsibility.

We also were given the responsibility for communications. We had six radio nets. Throughout the test site we had repeater stations, and to install a radio in a vehicle—the radio itself was about four times as big as your recording device, installed between the passenger seat and the person driving, and then when you got a call you picked up the mike and you answered

it. Well, the whole world was listening to you so you couldn't use any classified information. It would've been nice to have had the cell phone during those days.

Yes, I think, you know, historically it's just so amazing to people now to think of how difficult a problem communications was. A huge problem. So you're saying four times as big—this is probably what--?

It was about that wide [demonstrating size] and it was about that long.

So what would that be in feet, do you think?

It would be oh, I'd say about eighteen inches to twenty inches long, twelve to fourteen inches wide. And it took up the space between the two seats.

So you couldn't say anything classified on it? You couldn't talk about location and how you were--?

No. And it was used mainly to communicate between the laboratories and the contractors and the AEC. Well, the AEC might have a net—LASL might have a net. Anyway, our net was mainly for our use in doing the construction work.

And "net" means that people in your group would have access to that communication net?

Well no, only that one net.

That's what I'm saying, so the different nets would be separated from each other.

Right. True. So we had six different radio nets.

Wow. And then what is required there physically? You have towers of some kind, or poles that you put the—no, radio's wireless, or how does that work?

You mean to transmit the message from here to the other side of that mountain, we'd have a tower on top of that mountain which would pick up the message and send it down—.

And transfer it down.

Yes. Yes.

OK.

We had a medical responsibility. We had, I don't know, thirty-five or forty first aid people that were located in places like Area 12, CP [control point], and back in Mercury. Because the work we were doing, drilling and construction and mining, was very hazardous, and it was not uncommon to get somebody hurt, so we had the responsibility for medical. In the beginning when we went out there I guess we didn't even have a doctor on site. There was a doctor in Las Vegas named who would come up there once a week and check and see what was going on. But finally when I left we had six doctors. We had a medical director and five doctors working for him because we had the responsibility for doing routine physical examinations for [00:20:00] Department of Energy and contractor personnel. So we had a little clinic in Las Vegas plus a fairly large building in Mercury that housed our medical folks.

You know, feeding was a big responsibility. After we finally got permanent mess halls it became a simpler task, but in the beginning it was very, very crude, but we fed all employees at the Nevada Test Site. We had a little feeding facility in the control point. We finally had another new mess hall in Mercury, a cafeteria which turned out to be a real coup because it was very crude before that.

When did that happen?

The new mess hall? It was probably in the mid-1970s.

And of course another big responsibility and a major task was dealing with the unions. In the early 1950s Las Vegas was booming, and then we came in and made things boom more, so the unions got very independent and it was not uncommon to go to work in the morning and find a picket line at the Nevada Test Site. We had agreements with all of the construction trades. We

did the maintenance work under the same agreements as the construction work, which it was very uneconomical because the maintenance work was more stable and more routine than the construction work and if a person went to work in maintenance he might be there for a couple years, where construction he might be there for three or four months. So anyway the maintenance people were paid the same. Washington was on our back to get separate maintenance agreements which would have lower hourly rates, and they pushed and pushed. But things were really booming and between 1963 and 1965 we made several trips to Washington to meet with the international unions to try to convince them that it would be appropriate to have separate agreements, with no success. So in 1965 our general manager who was J. R. Crockett at that time, he hired a person by the name of Kevin Efrogmson who's still practicing in Las Vegas. Kevin had been working in Chicago for NBC. A very capable, a very ruthless, negotiator. We took a hundred-and-five-day strike in 1965 before we finally succeeded in getting maintenance agreements, which lowered the cost considerably of doing work. The Teamsters were trying to organize everybody. They organized the first aid worker, they organized the communications technicians. The business agent was named Bill Carter. His brother was Joe. But anyway Kevin succeeded after several strikes in solving a lot of uneconomic labor practices. And I understand Kevin's still in practice there, representing some of the hotels on the Strip. Very capable. Very ruthless. He was, but successful.

Oh yes, in Area 1 in 1953 there was Operation Teapot and there was a federal Civil Defense Administration operation in which we built a little town. We built the houses, J.C. Penney's furnished mannequins, they were suited out in regular clothes, the house was furnished and it had food on the dining room table, and we installed power lines, we installed a [00:25:00] gas system using butane. And I think it was in this same test that trenches were dug and GIs were

put in those trenches which were at different distances from ground zero. Also there were three or four two-story houses built out of either brick or stucco. Anyway the test was conducted, the town was destroyed. Looking back it's kind of asinine because they knew it was going to be destroyed.

Yes. Yes. At the time though did it seem to make sense to do all that stuff then? To you? I know you didn't design the test, all right, so you're just building it.

Well, I think at the time it was kind of seen as a challenge to build a town and then blow it up. I don't remember the size of the test but it was a three-hundred-foot tower.

And these GIs were housed at a camp that they built between Mercury and the Reno highway called Camp Desert Rock. In fact they even drilled a well out near the highway which was Army Well One which furnished the water for Desert Rock, and these well pipe lines were finally brought into Mercury. Water was a major problem. There were three wells drilled on the edge of Frenchman's Flat by Haddock Engineering sometime in 1952. And from the wells, the water was then piped to Mercury and there was a big reservoir built, but they never succeeded in getting water near the Mercury area.

I don't know, I think they brought in over a period of time as many as three thousand GIs and housed them at Desert Rock and used them in tests in the forward area.

You know, some of the other things that were used for weapons effects, there were 1936- to 1953-model vehicles used. In fact the last time I was out there, there were still some of the shells of some of these vehicles that had been destroyed or set on fire. Out in Area 7 there were different types of shelters and berms built for airplanes, and there was an airplane that was finally towed to Yucca Lake that was really damaged, and this airplane sat there and scavengers took a lot of the equipment. And finally a couple of guys from Tucson bought the thing, came

up, fixed it up, and flew it back to Tucson. They used it for crop dusting until it was finally put into a museum down there.

There was another project in which there was a tower built named the BREN Tower. It was first built in Area 1 and then it was moved to Area 400. And they had a reactor on this tower they'd run at different locations on the tower to see the effect on different things that were on the ground.

Now did you build that tower or—?

No, I don't know whether we contracted the construction of it or the AEC did. Yes, it was a 1537-foot tower. Well, it was first built in Area 4, not Area 1. It was an unshielded reactor moved to various heights in the tower to determine the protection of various structures.

I told you about the three-and-a-half-inch aluminum coaxial cable.

Right.

Oh yes, there was a test named Baneberry in 1970. It vented to the atmosphere. Some of the radiation left the test site, and they finally determined the reason for this was there was a water strata that the heat built up so much steam pressure that it came to the surface. This was in Area 7, and there was another test in Area 7, a cased hole in which the device did not [00:30:00] detonate. So in order to solve that problem a hole was drilled nearby and another test destroyed the device in the hole where the test did not detonate.

We talked about Sedan. There was an EPA [Environmental Protection Agency] farm—you know about that.

I've heard of it, yes.

OK, it was out at the far end of Yucca Flats where they fed cattle alfalfa that had radioactive dust settled on it, radioactive iodine. And in order to see what was going on in that cow's stomach, they built a window in the cow.

Yes. Did you see that?

Yes.

Yes, you did. Yes, I've seen a film.

Yes, there's a picture in that thing. Back in the early 1950s during atmospheric testing it was determined that some of the radioactive iodine was settling on alfalfa fields in southern Utah, so Las Vegas stopped bringing milk into Las Vegas from Utah, because the cows were eating alfalfa that had radioactive iodine. Of course when a test was detonated there's a great deal of attention paid to weather and wind direction. In fact there was an office of the United States Weather Bureau which became NOAA [National Oceanographic and Atmospheric Administration]. There were permanent people assigned out there to advise at the time of the briefing before the test was detonated whether or not it was advisable to detonate this test, whether the wind might be going toward Las Vegas, Indian Springs, or whatever. And in the beginning it was for atmospheric tests but they continued this because there was always a possibility of a test venting.

OK, I told you about the May Company in 1965. We had a major reorganization in 1970. This is when the EG&G came in and brought some of their management folks and we did some reorganizing. And I guess it was at that time during 1970 that I became deputy manager. So because we had a big resource of cleared personnel, construction workers, management and supervisory people, that when the Department of Defense wanted to do something they would go to the AEC and then they would order whoever and assign us that job. In about 1980 during the

Reagan administration, early 1980s, had a Department of Defense person named Perry assigned us the job of building an Air Force base near Tonopah named TIADS; they finally named it Tonopah Integrated Air Defense Command. In fact the task was so big that I sent my deputy manager up there to run this thing for a year. We built twenty-four hangars. A lot of this work we subcontracted if there was not a security problem. We extended the runway to ten thousand feet and made it a concrete runway ten thousand feet long. We built a camp to house five hundred people. We found a camp up in Wyoming that had been used for a big oil job. Then we moved the whole camp down. They were [00:35:00] on skids. And daily there were three or four 737s that flew out of Nellis to take people up there, the Air Force people. And what the base was for was for the development of the Stealth fighter. What is it, a 117? I think it's an F-117. Anyway it was a monstrous job. And during this we were still conducting tests at the Nevada Test Site.

I was going to ask, yes.

So we took the people that we could afford to take up there and continued doing the support work of the Nevada Test Site.

So then they used that base which was, you know, really a neat base until about 1990 when they transferred the Stealth fighter to Holloman Air Force Base down near the White Sands.

OK, that's TIADS. OK, right near TIADS was a facility that was operated by Sandia Corporation for the testing of rockets. And we supported that. We had a crew of people that supported Sandia at their Tonopah test range facility. OK?

Yes.

Now something on Jackass Flats? I was sent to Jackass Flats in about 1958, the beginning of the Eisenhower moratorium, and there had been work done by another contractor, Skidmore, Owens,

and Merrill. They were the architects and maybe the contractor, but anyway they built a control point building, a couple of shop buildings, and piping in Test Cell A, and this was for the testing of a reactor for the powering of a rocket in outer space. They did all kinds of sophisticated piping in the control point. When we went out there it had been determined by Los Alamos that all of this had been done incorrectly. So we ripped everything out and started all over. There was a tank farm for storing helium and hydrogen. We repaired the tank farm that had been built earlier. And all this work had been done before we got there, from 1956 to 1959, and then we took over and did the electrical work, the signal cable work from CP [control point] to Test Cell A. There was another big, big building called the MAD Building: Mechanical Assembly and Disassembly Building. The part of the building where the reactor was to be worked on had six-foot-thick walls. It had several holes for windows and I don't remember how they were bought but anyway they were leaded glass windows installed in those holes by us, where they could look through those windows, operate the manipulator on the radioactive reactor. And it was about a mile from this building to Test Cell A. They would put the reactor on a railroad car, take it down to Test Cell A, plug it in to all of these lines that came out of the face of Test Cell A for the hydrogen, the helium, and then the signal cable. An interesting thing happened there one time. We had a little camp out there and I stayed out there before one of the tests, and I was asleep in one of our little housing trailers and all of a sudden there was a big explosion. Well, after they plugged this reactor into the front of Test Cell A, they had another building that they put over the reactor so that people could work in that building and complete all the work on the reactor. Well [00:40:00] what happened, there was a hydrogen leak and the hydrogen was set off and blew every panel off of that monstrous metal building. No one was hurt. Ruptured eardrums. Anyway that was—this was where the testing of the Kiwi reactors—that was the Rover project.

Right. That's right.

There was another part of Area 400 named Pluto and it was a Livermore project for the development of a reactor to power a rocket within the atmosphere. Anyway it was not nearly as sophisticated as the Pluto [Rover] area but we supported Livermore in whatever they did on that test.

It wasn't as sophisticated as the Kiwi [Rover]?

But they didn't have a big control point and they didn't have all of the associated buildings like were down at Area 400 where the Rover project was.

OK.

I'll tell you interesting things here. The reactor from Livermore came in on a trailer and it was pulled up next to the railroad where the reactor was to be lifted and placed on a railroad car and then taken into the assembly building. Well, I sent a crane and a crane operator and two or three riggers up to pick this thing up and then put it on the railroad car. Well they got it up in the air a ways, pulled it away from the trailer, and they couldn't make it go up or down. So the operator, he gave it everything it had and the cable broke and the reactor fell to the ground. You know if that had happened today we'd have lost our contract. But you know there was two or three hundred dollars' damage done but that was it. It was exciting!

So did you see it or you had to go out when you heard about it or what?

No, I was there.

Oh you were there.

Yes, I was there. We had responsibility for installing signal cables in both of these areas and we had an electrical superintendent who was kind of in the class of Frank Solaegui. His name was Gus Fuson. He was a Cherokee Indian. He was sent out by Reynolds. He was a, you know,

remarkable guy that not to have more than a high school education, and he had working for him, no relation [to me], but a superintendent named Eldon Cunningham, and they made a real pair.

Our contract did not include the work in NRDS [Nuclear Rocket and Development Station]. It was a joint venture between NASA [National Aeronautics and Space Administration] and the AEC.

OK, NRDS.

NRDS. Pan Am was brought in as the contractor to do the support work, and when they came in they hired Gus and Eldon. Well, they weren't too happy with it. Over on the weapons side I was badly in need of a good electrical supervisory crew to support Los Alamos. They were very unhappy with what we were doing. So I talked Eldon, and Gus into coming over to Area 3, the LASL area. And things straightened out and went well until the end.

And I'm going to say one more thing before—well hell, that's my last notes. Most people don't know that Barney O'Keefe is responsible for selecting Yucca Mountain as the site for the nuclear waste repository. He knew the test site pretty well and he decided, you know, That looks like a good location. It's on the edge of the Nevada Test Site and far enough from Las Vegas, people shouldn't complain, as Nevada's governor is now suing the government. So anyway, Barney got the approval of the AEC to pursue this thing and [00:45:00] he brought about fifteen CEOs and presidents from power companies that had nuclear plants out to Nevada, had a tour, went to Yucca Mountain, then had a big cocktail party gathering in the Desert Inn where they were staying, where he invited contractors and the AEC folks. So that was the beginning of Yucca Mountain.

And about what year was this?

It seems to me like it was about in the late 1970s, I think. Because we started work out there drilling holes in the early 1980s. We were to drill the first shaft in 1984 for use in mining. Well,

you know where it is today. They were trying to hit a target date of, you know, like 2000 to start storing stuff, storing radioactive spent fuel rods, and they keep saying, you know—. Well, in the early days, Las Vegas—Clark County really appreciated the Nevada Test Site for what they were doing economically for southern Nevada. That's not the case today. Because of the increase in tourism and casinos and hotels they don't want anything to do with the Nevada Test Site, especially Yucca Mountain.

Right.

You want to go?

Yes. That's a good place to stop.

[00:46:48] End Track 2, Disk 2.

[00:00:00] Begin Track 3, Disk 2.

You talked a little bit about clearance and people in your company having clearance and I think people who haven't lived in that world of, you know, whole cleared universe

[Pause for telephone call]

[00:00:25] End Track 3, Disk 2.

[00:00:00] Begin Track 4, Disk 2.

So when you're first working for Los Alamos, I mean you have to go through some sort of clearance process but then with REECo, the company you're working with itself, everybody basically is getting cleared to be able to work out at the test site, is that right?

Well, there's the red badge and the green badge. The green badge is a Q-clearance and the red badge is somebody that's come on board and the company has not requested they get a clearance or—it takes, you know, nine months to a year to get a Q-clearance. So no, everybody has some kind of an investigation done but of course it's much more thorough for a Q.

Yes. So when you first get clearance back in the early days they have you, what, fill out a questionnaire and then they go question people who know you and things like that?

Yes, it's an investigation done by the FBI.

Yes. Now just on security in general, when you're out at REECo and you're in these management positions and things like this, I know there are all sorts of security protocols. Yesterday there was a picture this physicist showed me and there is a barrier so that people can't see them working on the device, things like this. But in general are you concerned about security? Are you worried about things like spies or people coming on in a daily basis or is it just security in general is a worry?

I guess it's security in general. They just don't want to have people working there that would gather information and feed it to a foreign country. Yes, and it takes so long to get a Q-clearance. And there are many Q-clearances that are requested that are not really necessary. There are certain areas like the control point where you have to have a Q-clearance. There's certain meetings at the Department of Energy that require a Q-clearance. But we had, you know, hundreds of people on board that had a red badge that did not have any kind of a clearance. Office personnel downtown and employees that had been hired but they were not going to be working in an area that required any kind of clearance. They had a red badge for, you know, two or three years. And then it was decided, based on a promotion or something, they needed a Q so they'd have to go through the process of having an additional investigation done, papers filled out and all that stuff. And then your Q-clearance is reinstated I think every five years, or they send somebody around to visit you and fill out some forms and they ask all kind of questions.

Yes. And I guess it was a question that came out for me when I was out at the site, you know I know there was a lot of concern about protesters getting on the site, but that's a different kind of security. That's more like people getting in your way as opposed to spy types of things.

Yes, there were protesters that would protest outside the main gate, and then once in a while somebody would sneak in when there was going to be a shot. And I don't know how they made it known but the fact that they were near ground zero, so the test was postponed until they got that person out of there. There were a couple of Catholic nuns that led a lot of those protests.

Sister Klaryta [Antoszewska] and Sister Rosemary, good friends of ours.

Good friends of yours?

Oh yes.

I think was it Rosemary Lynch, I think?

Oh, Rosemary. Klaryta and Rosemary.

Because I mentioned Liliias Gordon to you and she mentioned Rosemary. And she's well-known.

I guess she's still alive.

Yes.

I used to hear from her at Christmastime.

So they were good friends of yours and that didn't—I mean someone from the outside would say, well how could that be? You're the test site person and people are protesting the work that you're doing.

Cynthia was a member of a group that met every Monday morning. They were known as the Monday Morning Terrorists, and those two sisters were part of that.

They didn't call themselves Monday Morning Terrorists.

[00:05:00] Oh they didn't but we called them that to their face.

Because?

Because they'd get together and talk and discuss this nuclear testing business and why we shouldn't be building Yucca Mountain and that kind of stuff. And then Cynthia would write a letter to the editor. I had a hard time. I had a difficult life.

But seriously was that—Again [I ask] as someone from the outside. They're saying how could this be that this is protesting something that you do in a big way, but you didn't complain?

And you know my children became anti-nukes one hundred percent.

Did they?

Oh yes. Still are.

And how does that affect you?

Well, I don't discuss it with them.

You don't discuss it with them.

No. It doesn't do any good. Their mind is made up.

Yes. Well, I guess that raises a question about weapons in general. So you're working to make these weapons, right, or you're supporting the work of making these weapons, and the protesters are saying we shouldn't be making these weapons. So there's something in your world view that is saying we should be making these weapons, I assume, and maybe you can tell me a little bit what that is, why you disagreed with them.

Well, I have, you know, especially when the Soviet Union started developing the nuclear weapon, testing the nuclear weapon, they had the first H-bomb tested, I saw a real threat from the Soviet Union and I felt, you know, we got to keep up and surpass the Soviet Union, which we did, especially during the Reagan days. Yes, he had a big defense budget and of course you can see from that [referring to DOE Publication, NV-209 *US Nuclear Tests July 1945 through September 1992*] the number of tests that were conducted in the 1980s. So I just felt it was a real

threat from the Soviet Union. I think, you know, today we've got to keep developing better weapons because of the number of countries that have the nuclear bomb and that, you know, that's like eight or ten.

Countries, yes. OK, so this was my question—some of that literature that you referred me to with the end of Origins of the Nevada Test Site [DOE publication MA 0518] I think says the Nevada Test Site really was the battleground of the Cold War and helped win the Cold War. Is that something—?

Yes, I think it became more important as the Soviet Union developed more weapons, more missiles, and our defense budget increased because of the real threat during the Cold War. Yes. *I don't think I've ever asked anybody this question and you can figure out whether it's a good one. Was there ever anything out that was done that either the labs designed or the AEC wanted, something that you [REECo] supported that you thought was overkill or shouldn't be done or didn't make sense or—? Because we're talking about weapons here so there's a point at which you could say that's going too far.*

Well, the work we did, we were not really involved scientifically with the bomb, so when we went out to work for a year getting ready for a test or getting ready for a DoD effects test, in many cases we were not really knowledgeable on what the heck was going on. We were just doing the work we were assigned. So I didn't have that problem, no. No.

OK.

One of the concerns I did have though at times, it appeared and it turned out to be the case that Livermore and Los Alamos were in certain cases testing similar devices but they would not take the other lab's word for their results. So we'd do a test for Los Alamos here, six months later we'd do a test for Livermore which was testing essentially the same device, and the work we did

was very similar, but they would never admit that there was any interchange of information [00:10:00] between the two. I've had concerns recently about whether or not Livermore should continue to exist.

Really.

Well, why?

Yes.

Yes. Then I've got concerns about the University of California and Los Alamos and how they've had such major problems in the last few years, and now it's been decided by the secretary of the Department of Energy that this will be competed, this contract. And the University of California has not really stated publicly that they're going to be part of the competition. Of course the employees up there are very uneasy about mainly benefits. And then it turns out that one of the schools that is very interested is the University of Texas, and whether or not [President George W.] Bush would have a big influence on awarding the contract to the University of Texas—I just wish that, you know, in the last two years with the problems they've had—I wish that they had corrected those problems. They have not managed the Los Alamos-LASL for years. They have not really done a management job.

The university.

No. And they've had some real inept people as directors at Los Alamos. One of them became my boss, Don Kerr. He went to work for EG&G after he left Los Alamos. Didn't last. And then John Browne was put in and I'm not sure what—the problems continued under Browne. So I would *hope*—you know, for the University of California or University of Texas to compete, it probably costs them fifteen million dollars to put together a proposal. Oh yes, big, big money. So then they're saying well, maybe we need a consortium and include some of the New Mexico schools.

Well, I'm not sure there's talent there to be included. So it will be interesting to see what comes out of all this.

Yes it will, and your point about Livermore is that the kinds of work that they were doing was related to the Cold War and that era's over?

Duplicated here [Los Alamos]. And is there a real need to have two weapons laboratories now? But we do have a stockpile of weapons and if Los Alamos is managed as it should be there would be many millions of dollars that could be diverted to Los Alamos and not spent on Livermore. So maybe I'm being too caustic there but in watching some of the things they did and doing the same things over and over and over—

I mean I think that's an interesting thing, that you were there and had the insight that that does occur. Someone else might never admit that that occurred, yet you saw it occurring.

Oh yes. The lab wouldn't admit it. There used to be held on about a quarterly basis, a group called the planning board where the laboratories, the contractors, Department of Defense, and DOE would get together and have maybe a two-day meeting about what's happened in the past and what we look forward to in the future. I think it was probably a couple or three years after I became manager. The contractors were kind of treated like second class citizens. They weren't even a member of the planning board. They were just invited to attend. So I made a big push, I said, Look, if we're going to come to these meetings we need to be a part of the planning board. Once a year the planning board would go off somewhere like Santa Barbara or someplace like that and have a three-or-four-day meeting, and the contractors just went along to listen. So finally they did. They included Holmes and Narver, REECo, and Fenix and Scisson in these meetings. Which was good. We then felt that we—because before that we

weren't even obligated to say anything. Just sit and listen. So it worked out a lot better.

[00:15:00] Did you ever hear a name, Tom Scolman?

No.

Tom was a test director at the site. There were two or three test [directors]. Walt Wolff was a test director.

Yes, I've heard of him.

He's a good guy.

Yes, people are saying I should get out to Colorado to talk to him.

Trinidad.

Trinidad. OK.

The sex change capital of the country. That's right.

I didn't know that.

You're learning all kinds of things.

I am. It's a very educational day.

He was a test director. When he retired he and Edie moved to Arizona. He was a good guy. Walt Wolff *is* a good guy, and he has been somewhat active I think in doing some work for the Department of Energy since he retired. But they live, you know, fifteen miles out from Trinidad in the middle of the forest, and every Christmas I get about a three-page letter from his wife that she's written telling about all the things they've had and all the animals that they've seen on their property. What a change, you know, to go—they lived in White Rock [NM]. But you go from White Rock to fifteen miles out of Trinidad, Colorado. But they love it. I couldn't do that.

Yes. And he was test director, in what era was that?

Nineteen eighties?

Yes, that's what I thought.

Nineteen eighties. Early 1990s.

Yes.

Yes, he's a good friend. She worked for the lab and of course he worked for the lab. They lived in White Rock.

OK, that'll be good, and maybe I can talk to them both.

Do you use e-mail?

I sure do.

You want their e-mail address?

Sure, before we leave I'll get it from you. That would be great. I'm jumping a little bit because these are questions that came up. We saw and you talked about Area 12 and then the control point and then Mercury. There had to be adequate living for a long period of time, facilities, at all these places?

There were living facilities in Area 12 where a lot—the people, if they would rent a room, might stay there every night for the week and then go home on the weekend. Same thing in Mercury. So the only places there were living quarters were Mercury and Area 12.

OK, so at the control point I guess you were saying there needed to be food out there.

Well, there was a little place where we had a couple of people that were kind of fry cooks, and the laboratory people loved it because they could talk to these guys and get them to make anything. It wasn't a real cafeteria. It was on the bottom floor, and they'd serve sandwiches and stuff like that.

Yes. So the two places where people stayed and lived were—?

Area 12 and Mercury, right.

OK. Right. Now was Area 12 related to the tunnels and the underground?

Totally.

Totally. So that didn't really come into existence till that kind of testing started.

No, that's true.

OK. All right.

We had a cook out there by the name of Peter Arapis, and when I was out in NRDS—Jackass Flats—we had a little cafeteria there and Peter Arapis was the cook, and Peter was so proud. Jack Kennedy visited NRDS.

I remember that, yes.

And Peter Arapis got to cook anything that Jack Kennedy wanted to eat, and he met Jack Kennedy and served him. Then Peter Arapis when he left there he went to Area 12 and was the chef at the Area 12 cafeteria.

And the other thing I was curious about: obviously you go from a certain kind of position to another when you retire. You're the boss. But in the early days when you go out there, in the early 1950s, just so I can get a sense of it, I mean how would your day be spent? [00:20:00]

Would you be out managing people or going out to look at sites and figure—?

Well, part of it was making sure that the right equipment was ordered for this particular job, mechanical equipment. Then going out to see what's happening with the work force in particular areas. I mentioned I had sheet metal workers working for me. The sheet metal workers did not only make and install duct work for air conditioning systems. One big requirement in these underground bunkers was the installation of screen rooms—called them screen rooms. They were rooms that were completely lined with copper. That was the sheet metal workers' work. So

you know I'd have people working there and have people working in Area 12 on top of the mesa. So I spent probably half, three-fourths of my time out of the office in Mercury.

Yes. And so you have your office in Mercury and you have support staff there obviously. You have secretaries and—

And an engineer or two. Yes.

Now the whole other subject matter, and I don't know if we should get into it and it'll be probably a little bit of a conversation. But the whole other subject matter related to the test site that people wonder about is the whole question of safety and the way some of these tests seem to go bad and dosimetry and all these kinds of things, and so REECo was obviously big involved in that, right?

We were deeply involved, and you said some of the tests go bad. Very few of the tests went bad. In the early 1950s we didn't have an adequate staff—nobody did—to do off-site monitoring, to take your detection equipment and go off to Pioche or wherever. If the cloud went that way it was predicted to go out and monitor and see if you picked up any radiation. So any and everybody that worked for REECo was given a radiation detector and told where to go to check. But my feeling is that yes, we did get some criticism for some off-site radiation but it was very rare and when it happened the publicity went sky high, yes. Of course we have people suing, have been for years, suing the government because they were damaged by radiation, and I can't think of the name of the organization that these guys worked for. I had a ironworker foreman, worked in Mercury, he very seldom went past Gate 200 but he's suing the government because he maintains that he was injured and got cancer because of radiation exposure.

Right. And Gate 200 would've been where he would've been close—.

Gate 200 was the guard gate after you left Mercury and went toward Frenchman's or Yucca Flats, yes. And Gate 200 then controlled traffic at shot time. But anyway you had to go through there to go forward.

Yes. OK.

We had a lot of good times. There was a group of craftsmen that in their spare time built a barbeque pit. Every Thursday night we'd have a barbeque. So, they'd get together and bring up some meat from town and that kind of stuff. There was a lot of *compadre*-ism, it really was. We had a good time. I probably shouldn't even be telling this now but the carpenter general foreman in Mercury named Bill Benner and his carpenter foreman was named Archie Melot [sp], they lived in a eight-man hut and over a period of time they fixed that place up just as plush as any house in town: carpet on the floor, piped water in, hot water heater. Which I thought was kind of neat. Nobody ever caught them and nobody ever complained. Lots of ingenuity.

[00:25:00] *Yes, that's what I understand from people that were out in Mercury just generally, that there was a community feeling, there was a sense of shared purpose, and things like that.*

I'll tell you another quick story. I told you we had elevators on all of these towers to go up and down. There was a elevator mechanic general foreman who—with the elevator mechanics, they can do any work. Other crafts don't bother them because they have to do the electronic work, electrical work, whatever's required. And this guy worked out there from about 1950, 1951 until about 1962. At times he had a couple of people working for him, at times he didn't have any people working for him, but we were paying him general foreman's rate. A general foreman has to have a foreman or two under him. And we were told by the AEC, You've got to quit paying him general foreman's rates. He's not justified. So he quit and went back to California. And he was so good that we said, John, if we can get you those general

foreman's rates, will you come back to work for us? He said, Sure, so we went to the AEC, had a negotiation, had it written in our contract that we could pay him general foreman's rates. So he came back. And he didn't only do that work. On some of these tests we had a big hoist. He could install those, operate them. His name was John Neal. He was kind of like a Gus Fuson or a Frank Solaegui. There were some of these guys that it was just fantastic how capable they were in the kind of work they were doing. Anyway, that's just another aside. *Yes. No, but I think it's important because it can seem so monolithic, the Nevada Test Site, you know, and then you have these kinds of stories and I think they really add—*

Yes, you know, we would have a series of tests, build up and have, you know, thirty-five hundred people working in the forward area. Then the tests would be over and we would lay two thousand of them off because we didn't have work, we didn't have funding. We would keep the better people, and a lot of those guys were with us for twenty-five years. Anyway, it was a good place to work. Interesting. Challenging. And I would catch holy hell when I went home. No, she [Cynthia Cunningham] didn't give me a hard time but she was an anti-nuke. So I don't know what else.

I think this is good. We're right at the end of this CD

Good.

[00:28:26] End Track 4, Disk 2.

[End of interview]