

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

Interview with
Richard Wyman

July 7, 2005
Boulder City, Nevada

Interview Conducted By
Suzanne Becker

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

Richard Wyman: Do you want me to just start talking?

Suzanne Becker: *Yes, I think last time we were talking about—you wanted to talk about reentry a little bit.*

Yes.

So if you could just give it a little bit of context.

OK. In each of the underground experiments in the tunnels, these were Department of Defense [DoD] experiments for weapons effects tests. At the end of the test, when the atomic device was detonated, there was usually a reentry into the tunnel by people that were involved in the testing, for various reasons that I can tell you about. For one thing, there were some passive experiments. Most experiments were monitored electronically, but there were also some passive experiments, [where] something was placed in a critical place and they wanted to see what would happen to it. *OK, when you say “passive”—*

I mean not electronically tabulated. In other words, like blowing up a box of jellyfish or something. They would like to know what happened to it, but they couldn't monitor it because it's not that kind of an experiment. So that would have to be recovered. Then also, they wanted to inspect the tunnel to see if it would be usable again because we wanted these tunnels to be used several times. In other words, the tunnel inspection was part of the reentry. Another part of the reentry was Plowshare. That is, peaceful uses of atomic energy. This was especially true on Hard Hat and Pile Driver. And also in order to study what the effect was of the explosion on the rock. They wanted to put more tests in the same rock formation, and how it affected the rock was

important. These reentries were done on tunnel shots and shafts, that's vertically where people reentered. It was never done on something that was only a drill-hole shot.

Explain that a little bit.

Well, the tunnels were made—they're the size that you can drive vehicles in, and these are the ones that were the weapons effects tests by the Department of Defense. Earlier on, there were many kinds of tests in these, but in the final analysis, those were all weapons effects tests. People could go into them to put many, many experiments in. And for the reentry, people went in to pick up passive tests, to examine the structure, and so on.

Now, you did a fair amount of reentry?

Yes, the two principal ones that I was involved in were Marshmallow and Pile Driver. I was also involved in at least four other smaller—well, not necessarily smaller—four other tests that I wasn't intimately involved in. The people who went in after the shot consisted of the REECo [Reynolds Electrical and Engineering Company] construction managers, some miner-trained people, RADSAFE [radiological safety] people, REECo RADSAFE, radiation safety. The RADSAFE people went in and construction managers and some specially-trained miners. Ordinary miners never went in on the reentry.

And that's because you were gathering information and because it was more of a delicate situation?

The whole thing was a delicate situation. Only managers and scientists and engineers could go in, and they had to be specially trained. We were specially trained by the U.S. Bureau of Mines. Now, after the first reentry, then the people from the agencies – that's LLL [Lawrence Livermore National Laboratory], LASL [Los Alamos Scientific Laboratory], Sandia [National Laboratories], and the Department of Energy [DOE] – they could go in, but they would go in

with guides that came from this other group. In other words, REECo was in charge. REECo RADSAFE and REECo managers. We had one person that was really pretty much in charge of most reentries, and that was Glenn Clayton. Unfortunately, he died about a year or so ago, [00:05:00] so you can't interview him unless you already did. He might've been interviewed before sometime, but not for this particular thing. And he was well trained by the Bureau of Mines in order that he could train us. Every six months, we got retrained in two things: mine rescue and the operation of the McCAA rescue breathing apparatus. The McCAA breather meant that we breathed none of the tunnel air at all. None of it at all. It was where our body and our head are entirely enclosed in an artificial atmosphere made up of oxygen from the McCAA breathing apparatus. And it could operate for eight hours, so we can go into a tunnel with this and we don't smell anything, we don't breathe the tunnel air, we don't breathe anything into our body. It all comes from that McCAA breathing—rescue breather.

Did you wear this or was this a precaution?

No. You wore it before you ever went in. It was worn and checked out and every six months we had a refresher course.

On how to use it.

Because it had to be automatic. You didn't have time to ask somebody what to do. If you're wearing that sort of a thing, you have certain controls, and these have to be absolutely automatic so that you reach for them and you never pull it off or something like that.

Hit the wrong thing.

You could die of it, you know, if you did the wrong thing, so you're not going to do the wrong thing. That's why we had training every six months in it. Glenn Clayton [taught] these refreshers. The U.S. Bureau of Mines provided the initial training and then they gave you a certificate. And

that was quite extensive, like I say, every day for a week or ten days. And then after that, every six months we had a one-day refresher.

The principal ones that I was on was Marshmallow and Pile Driver.

I'm wondering what it was like when you went back in after a shot. Were you ever nervous about that? What were you thinking?

Well, you always wonder, but anyhow, no, we knew ahead of time quite a bit about it because they had monitors. They had an electronic radiation monitor, they had radiation monitors throughout the tunnel, and they had some collapse monitors. They knew if the tunnel had collapsed we wouldn't get beyond that point. So we pretty well knew what had happened before we went in. And of course, this is part of the job. We went in so that it could be rehabilitated and made safe again. And then they would turn on ventilation to blow good fresh air into the tunnel, and eventually it got so that workmen could go in and put things back together again.

How long after a shot was it safe to go back in for the workmen?

For the workmen? Well, it would depend on what was found, but the initial reentry is the same day.

So you guys went in right after the shot.

Within hours.

Right. And then it had to clear out a little bit before the workmen could go back in.

Oh, yes. A little bit, yeah. They would ventilate it completely.

Well, I don't mean "a little bit" but they had to clear it out for a couple of days, I would imagine.

Were you ever worried about going back in?

No. It was part of the job, and we also knew that the radiation level was very low or we wouldn't be going in. We also knew that it wasn't going to collapse. The collapse[s] are calculated.

There's not a great deal of mystery about it. The atomic blast is confined in a tunnel complex that is constructed in order to accept the blast and to collapse. It's made to collapse in behind what we call stems. The stems are parts of the tunnel that've been filled with sand and grout.

They try to make it the same density as the rock. We called it ground-matching grout. It was very close to the same density as the rock, and in [00:10:00] that way it doesn't attract blast waves and it doesn't turn them away. So when the shear waves are coming through the rock, they don't favor going one way or the other. The stems act just as though they're part of the rock. And then the blast is kept beyond them. In Marshmallow we had four stems. Each one of them was about fifty or sixty feet of tunnel, filled up. And there were four of them, calculated by some scientists. One of them told me that according to his calculations, the last stem will move four inches. And when they went in and we did the reentry and surveyed it, the last stem had moved four inches.

Pretty good calculations.

Then outside of that, they had a big concrete blast door, they called it. It's a concrete structure with a big steel door in it. That really didn't take effect unless you had a failure of the stemming. But in these ones, the Pile Driver and the Marshmallow, we had no failure of the stemming. They did have some stemming failures in Area 12, a predecessor to this, in I and J Tunnel. So based upon that, yes, I would've been worried if I'd been in the tunnel when it went off, but no, going back in is not the same thing.

OK, now one of the things I mentioned is we wanted to see the structure of the tunnel itself, to see if it could be reused. In the Marshmallow tunnel, we found that there were horizontal fractures. Those horizontal fractures allowed some radioactive gas to get into the

tunnel [and] would make the tunnel very difficult to reenter. So when we reentered, we made a new tunnel and went all the way to the ground zero with a new tunnel.

Really!

Yes. And in order to do this, we would make the tunnel blast and then spray the face and the walls of that with some concrete that we call shotcrete, but in those days we called it gunite. And that would keep that gas from coming in, so the men would not work in an atmosphere that had radioactive gas.

And you would spray that as you dug out and you went along.

Yeah. And that worked perfectly. So one of the problems in reentry is what they call burn-out. It's not that the person gets burned out, but they only allow a worker in the test site to have a certain amount of radiation per year. It used to be something like 3,000 mR, or 3 roentgens. This amount of radiation was believed to be equivalent to something like an X ray, and not in any way harmful. So when a worker got up to that level, then he no longer could work in a radiation area. He had to go somewhere else. That was what we referred to as "burned out." He wasn't really hurt at all. He wasn't burned.

But he was up to his level.

He was up to the level where he wasn't allowed to work in that area anymore. Well, in the Marshmallow reentry, we didn't have anybody that was burned out, and we went all the way to ground zero. The same applied to Pile Driver. So that's one of the reasons for the initial reentry is to assess the structure of the rock to see what needs to be done.

OK, I told you who takes part in this. And the training was by REECo people principally under Glenn Clayton and the U.S. Bureau of Mines. We no longer have the U.S. Bureau of Mines. I don't know what they do now. The Clinton administration decided that they weren't

necessary. But we also stopped underground testing back in '92, so.... But the Bureau of Mines was very good about this and they provided the training. Then you got a certificate that showed you had taken this training.

[00:15:00] *And you'd done quite a bit of that.*

Well, I didn't—I took the training and I did the reentries. It's too bad that you can't interview Glenn Clayton because his part in this was very good, and I think that he took part in all of the reentries. Well, I don't know for a fact because he might've missed one, but I think that he did take part in all of the reentries after he was at the test site.

I don't know if this is the right way to phrase it, but what percentage of tests did you do the reentries on?

All of them.

All of them.

Yes. Unless there was one that was really blowing out, like I say, one of the tunnels in Area 12, and nobody could reenter that for years. But no, for ordinary successful experimental shots, they were all reentered one way or another.

Right. And how long, on average, does it take a tunnel to clear of radiation? You guys have gone in and done your stuff and now—

Well, usually there isn't very much anyhow. If it's contained properly, there isn't any radioactivity to speak of in the tunnel, so you go in from the portal and it's clear. But you know this going in because you have radiation monitors that are remote reading, and if after the event they're reading zero or close to it, you're all home free. You go in that afternoon, two hours after the blast.

Ever have any incidents happen while you were down there or anything go wrong or that you didn't predict?

Well, only ordinary things. I told the officers on ours, Captain Morgan—McPherson Morgan was the officer in charge of the Department of Defense on our Marshmallow. And I told him that [if] anything went wrong, it was because of the Tommy Knocker, and you have to take care of the Tommy Knocker. The Tommy Knocker is a little man that wears red pants and a green shirt, or else green pants and a red shirt, and he's got a little pointed hat, and he stands about three feet tall. And if he likes you, he takes care of you. If he doesn't like you, he screws up your problems. Makes things bad for you. So I said you have to take care of the Tommy Knocker. In Peru, we called him the *Muki*. In Ireland, they call him a leprechaun. In the United States, we called him a Tommy Knocker. He's the same kind of a guy. Anyhow, I said you have to leave some snuff for him. He loves to have snuff, and if he comes in the tunnel at night and nobody's around and he finds some snuff, he loves you and he'll do a good job of protecting your job. Well, on the Marshmallow tunnel, what do you think we found when we went back in? I didn't know that the DoD had actually bought twelve cans of snuff and put them out opened. And when we went back in, each of them had had some snuff taken out of it.

That's funny.

It's true, too.

I had no idea.

You didn't know about the Tommy Knocker?

I did not know about the Tommy Knocker.

The Tommy Knocker is absolutely a fact. We know about him in mines because he warns the miner if there's something wrong because the miner will hear the rock, hear him pounding on the rock, and that means there's a danger, don't go there.

That's interesting.

You don't see him, though, because he hides.

Of course. It's a good thing he was around for all this.

Yeah. I worked in Peru in a mine. We lived there, Anne and I lived there, my wife and I lived there. And there they call him the *Muki*. And the *Muki* shows you where you can find some ore. But if you don't treat the *muki* right by giving him some cigarettes or something like that, some Coca, then he will also do things bad to you.

So you have to leave him a little offering.

Yes.

For things to go right. I'm just looking back through my notes from last time. Remind me again, you started out at the test site in 1962?

October 1961.

Nineteen sixty-one. And Marshmallow was 1962.

[00:20:00] Yes. I mean that was when the event was. The construction was in 1961 and '62. And Pile Driver was in '66. And it was a test of various kinds of permanent underground construction to be resistant to a direct atomic attack. And that's why these DoD shots are the ones that are weapons effects. They're not testing a new weapon. They're not a weapons test at all. They know what this thing will do, this bomb. And they're testing what it's going to do to other things that we hold important. That's why it's called a weapons effects test. And the more they know

about it—they want to know exactly what that bomb is, so they're not testing something new there.

But what it does.

Yeah.

So some of the things that you see at the test site, like the railroad bridge and the bank vault and the house, would those all be considered part of weapons effects?

Yes, these weapons effects tests. There were other things that went on at the test site. Maybe I told you about the different animals?

Yeah. The cattle and the pigs and the mice—

The pigs and the mice and the dogs and the—yeah, all these.

And you were out there when they were doing that?

Yes. These biological tests are to see the effect of radiation on animals and on people, but we don't put people out there to test them.

No, I hope not.

But part of that is—the pig, for example, is physiologically close enough to man that they used some of that data.

What did they do with the mice? What did they use them for?

The mice, the same. They would feed them or irradiate them, but the mice go through so many generations. They'll go through five or six generations in a year. And so if you have a five-year test, you're going through probably thirty or forty generations. You can't do that with other animals. They can see if anything shows up due to radiation, and they know what they exposed this group to. There were many, many mice subjected to many, many different kinds of tests.

And they had to be pure mice, white mice. They can't have some that are—they don't know what the daddy was.

Right. And so they would breed those like they would breed the dogs out there, too, to look at generations.

Yes. Very carefully.

They'd have to.

It was an interesting place to work.

It sounds like it. All sorts of things going on.

Yes.

Now, you started in 1961. The last atmospheric test happened in 1962. Did you get to see any of those?

No, no. OK, no, that was—there were—that was the only one. The last atmospheric test were really in 1958. And then there was the moratorium. And then that was in 1962. At that particular time, I was over in California working for Sunshine Mining Company on the Exchequer Dam, then went back to the test site. But that was a unique thing. The atmospheric testing did not continue beyond 1958, except that.

It didn't. Just that one in July of 1962?

Yeah. But they make it sound a lot of times as though it was continuous. It wasn't. We had a moratorium, and we lived up to the moratorium. It was the Russians that didn't.

What inspired that last test in 1962? Was it because—

Why did they? I don't know. I'm not a politician.

I was just curious if you knew.

The President of the United States decides. At that time we had Lyndon [B.] Johnson.

OK. Anything else about reentry that we didn't talk about?

[00:25:00] Well, the peaceful uses. I can draw you a sketch, which I will, showing a chimney, and I'll put some words while I'm drawing it. [Note: at this point, Mr. Wyman is drawing a sketch, and describing it as he draws. See accompanying document.] In this particular case, we come in on a tunnel, tunnel level. There's a shaft here. A shaft is a vertical excavation that people can go down. Vertical, or close to vertical. You're losing elevation when you go down, and that's called a shaft. Horizontal is called a drift or an adit or a tunnel. And this is Pile Driver. It goes down like so, out here, and then we had structures, many, many structures. Over 200, I believe.

In the tunnel?

They were on the working level of this, from this shaft, in Area 15.

How long was the shaft?

How deep? That was about 1,550 feet, something like that. And then out here some thousands of feet, we had the emplacement, and here is where the—you see, you go down like this. This is the surface. Do you see that, what a cross-section is?

Yes.

This was to test these structures which were all around it in different places. OK, this is where the bomb was going to be put, fifty feet below. Then when it went off, when it goes off, first it makes a cavity like this. At the time it's shot, it makes a cavity, and it evaporates all of the rock in here. It's actually—

Around the bomb. Around where it goes off.

Yes, and makes a big cavity, and that cavity is held open by the hot gas. And this material is all melted and it runs to the bottom. So as it cools, it runs to the bottom of the cavity, and it finally

comes down here. In the bottom of the cavity you have a pool of hot glass. This rock is melted, and when it cools off again it becomes hot glass down there. But it ran off to the bottom of this, so the rock above starts to break away, and it breaks away and forms a chimney, like this. Now, this is all broken rock, and it falls down in here, so that this all becomes broken rock all the way like this in the chimney.

On top of the glass.

Yes. Now, when we come in, when we make our reentry, we come across here and we go right across there, through the chimney, and we don't recall seeing any radiation. It's all down here.

OK, I see.

It's all buried under that rock.

So it goes underneath—

This down here is the radioactive material, and we're up here, and that chimney goes all the way up. It comes close to the surface. But as it breaks, you see, the broken rock takes up more space than solid rock, and eventually it just come to a point up there. And in many cases, in the Yucca Flat and places like that, the chimney goes all the way to the surface. Now you see how it works [giving drawing to interviewer].

Yes. Interesting. Can I keep this?

Yes.

OK. And so that chimney seems like it's going to be pretty big.

Yes, it is. The reason that this is—one of the tests is the peaceful uses, because that would be a way to excavate in a mine using an atomic explosion. It's perfectly safe. And you can get that broken material out and it's all just one explosion.

Now, did you participate in the Plowshare, as well, in some of those tests?

Yes.

So that's—it's interesting.

Now, Pile Driver had a predecessor called Hard Hat that was similar, only much smaller.

[00:30:00] They worked on both of them the same way.

And is this generally how most of the underground shots like this worked?

Well, the chimney would form no matter where. Anyhow, on those that are weapons tests down in Yucca Flat and all, they were not for mining purposes. Pile Driver and the Hard Hat were mining experiments in the follow-up because they wanted to see if it was feasible, and it was. So consequently, it's never happened again.

Yes. All sorts of potential uses for it.

Maybe sometime they'll look at that again.

Possibly. Remind me again what year you left the test site.

Nineteen sixty-nine, in May.

OK. And you went to UNLV.

Yes.

So those were pretty significant tests that happened in the years that you were out there.

Yes. Those were the years of pretty heavy testing. There were thirty or more in a year. Seemed like we were always having one.

During that time, you were living in Las Vegas?

Was I—

Were you living in Las Vegas at that time?

Living here, in Boulder City.

With your family?

Yes. Except—no, earlier on, we lived in St. George [Utah] and I commuted.

That's quite a commute.

And then we lived in Boulder City and commuted, too. St. George, I could only commute once a week. It's too far to do it in a day.

So you would come in and stay over and then go back for a—

Yeah, on the weekend.

Yeah. That's significant.

Yes.

And you mentioned that during that time, your wife was in charge of everything.

Yes, she was. She's a good wife. She's the best one I have. And I've been married to her for fifty-seven years.

Wow. That's amazing. That's great.

Three cheers.

Fifty-seven years. Excellent. What did she think of your work out there?

Well, I think she liked it because I had a good job. I left the test site so that I could be at home more, and at UNLV I was home every evening. And during the day I'd see her. Very different life. In those days, people that were family couldn't go out to the test site. They didn't have any visitors. Then, I think it was '68 or so, they had the first visitors' day. Only in Mercury. Only to the Mercury camp itself. They put on displays there for them and told them about what was going on, but they couldn't go out in the forward area at all. All those visits to the forward area you can do now, you couldn't do it then.

What kind of displays, just demonstrations—

Oh, themes, a little bit. They didn't demonstrate any explosions.

No, I would imagine not. Did your family go out?

Yes, I took Bill, my son, and my wife out. They had some of the fire department that showed how you can put out a fire with this foam, no water, just foam. I remember that. I thought it was pretty good.

Yeah, that's pretty amazing.

Well, I think that we've pretty well covered everything. That drawing, I think, is pretty significant—

It is. I'm going to put it with your stuff because it's interesting. And at least for me, that's the best explanation I've ever had of—

Yes, I think it is, and I think it's also simple.

Yes, it is. Very good at simplifying [what is] probably quite a procedure.

Yeah. Well, I appreciate your asking me these things and—

[00:35:00] *I appreciate you sharing it with us. Thank you very much. And again, if you have any more, just let me know if you think of anything or you want to come out and take a look around Wright Hall again, let me know.*

There were a lot of people involved in these, and each person had his own job to do. The way the security system works is the basis of need to know. If you had a Q-clearance, you didn't find out everything there was to know. You just found out what you needed to know.

For that job.

Yes, and the security worked that way. There was no way that a person with a Q-clearance could find out at random or just go through things and say, I've got a Q-clearance, I want to know this. It wouldn't happen. You had on your badge several numbers. You had the color code, which said if you were a Q or not a Q. Anyhow, L, they had. And then there's an area, a

number that showed you what type of information you can have. Like if you were in the tunnels, it would be construction information. What type of information? Construction. OK. What construction information? Well, there would be another number that would say “underground construction” and another would say how far you’re allowed to go. There were various codes of numbers.

And that’s how they gave you your information.

That’s all you could have, yeah. If you needed something else, well, they would see to it that you got another number or another badge. It was good security. It worked. When I was in charge of Marshmallow, I had not yet gotten my Q. And consequently, I couldn’t know everything that I had to know [chuckling]. But I would meet with these people that had all kinds of data, and they arranged that I would meet them first because I had to leave the meeting. I didn’t have my Q-clearance.

So you were in charge of this, yet you were not privy to all the information that you needed to know—

No. I was in charge of only the construction, underground construction. And I met with them first. They had their meeting and I would be first on the agenda because I had to leave. I wasn’t going to sit around and listen to all this stuff. There wasn’t any way they could allow that. So I’d be first, and I’d give them my pitch because they needed to be trained to be safe, and I was in charge of the tunnel and their safety. I told them all about the dangerous things that they could get in trouble with unless they come to us. I said, If you want something, you come to us. Come to me, or come to the assistant superintendent, and ask him. Don’t go to some workman and say will you do this. Just come to us. We’ll give you a workman to do it. But we need to do it. We are in charge. Anyhow, I would give

them this pitch, something like that, and then I would leave. And it worked fine. Their security system worked fine.

That's good. [And] interesting. I didn't know that about the numbers either, or how they conveyed the information. So basically you had all different parts, various different groups, with different types of information, working on this project, and everybody just did their specific area.

Yes. That's right.

It's efficient. Did that ever lead to any problems?

Well, I'm sure it led to problems somewhere, but there were thousands of people that worked out there. But I never had any problems. I can't say that there were never any problems. There are always problems.

Sure. Was there ever stuff that you wanted to know but you couldn't find out?

No. If I had to know it, it was available to me. And if you have a job out there, you don't go around like you're a snoop.

Right. You just do what you guys were doing. You work on what you're working on.

Yeah.

Makes sense.

OK? Do you have anything else, Suzanne?

No. Last time we talked about a lot of really good things, and the reentry part was interesting.

[00:40:00] Yes. I thought it should've been in there. I didn't, you know—

Absolutely. It's something that you don't hear much about.

No. Actually, you don't hear much about the different animal things.

No, and I find that really interesting also. I've only heard a little bit about it and haven't met very many people that were out there and—

You might try the EPA [Environmental Protection Agency]. Because that building had—the people in the Public Health Service were involved, and I don't know what ever happened to them. But I think they were in the EPA.

We've talked to some folks that were involved with the EPA farm that's out there, with the dairy herd and the milk cows, and that was interesting. I think that with the pigs and the dogs, that's also very interesting. Most people don't know about that. Now, you weren't involved directly with that when you were out there, when that was going on.

No. No.

I'd heard, too, that particularly with the pigs because they were out there, exposed to a lot, and at one time they used uniforms to put on them. Is that true?

I don't know. It wouldn't be beyond reason. It's better on a pig than to put it on a person, if you're going to test it.

Right. See what happens to the material.

Yeah. They wouldn't be a regular uniform. They would've put the material on them, probably.

Right. Yeah, I don't think they actually had uniforms, but material.

But the people in charge of that, you'd probably have to track them down somehow. I don't know who they are. The one that I knew was a biologist by the name of Mary Mayes. She lived here in Boulder City.

Really.

Yeah.

Is she still around or—

No. I haven't seen her or heard of her for twenty-five years.

Yeah, all sorts of stuff went on out there, and you were really a part of it.

It's an interesting place to work.

What, for you, was the most interesting part?

I thought Pile Driver was very interesting. It was a multiple-interest thing. Underground construction and atomic defense and Plowshare.

So that was a big test.

OK, you want to take some pictures of those things?

Sure.

[00:43:15] End Track 2, Disc 1.

[End of interview]