

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

Interview with
William Beam

January 20, 2005
Las Vegas, Nevada

Interview Conducted By
Mary Palevsky

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

Mary Palevsky: *OK, so I thought we would start, if you could state your full name, date of birth, place of birth, and take a little time to give me a story about your life and maybe something about your childhood, even, and then how it led you to be working at the Nevada Test Site when it did.*

William Beam: OK, my name is William Byron Beam. I was born January 30, 1930 in Bisbee, Arizona. I went to school there. Bisbee was a mining town—copper mining—and was a typical company town of the 1930s. The company was about the only game in town, so when we were young, everybody aspired to go to work for the company. That was what happened. Being in a mining town, the aspiration of everybody was to go to work for the company in the mine. The only other occupation in that part of Arizona was cattle ranching. So when you got out of high school, if you didn't go on to college, well, that was about the only options that you had was either in ranching or mining.

One of the things that I remember growing up was when there was an accident in the mines, they blew the whistle at the powerhouse and that notified everybody that there had been an accident. Miners would talk about accidents in the mine. There was a number of boarding houses and all of us kids played around in those areas, and there was always miners out on the porch talking about mining. So that generated an interest for all of us in mining.

When I first got out of high school and went to Ajo, Arizona—which was again a company mining town, an open pit operation—that's when I first started in mining. I got a job on the jackhammer crew, which is a starting position on the surface. Then they opened up the pit in

Bisbee. They went from underground to surface mining, and I went back to Bisbee and got a job driving one of the big Haulage trucks, stripping the overburden from the copper.

Now were your parents involved in mining?

My grandfather, who came from North Carolina to Missouri to Arizona back in the late 1800s, was a miner. And then my father was a miner, underground miner.

OK. What were your father's and grandfather's names?

My father's name was William Burette Beam and my grandfather's name was Fleming Beam. They were originally from North Carolina. They were both in mining, so it was just a natural thing, I guess, to go into mining, and that was about all that we really knew how to do.

Once I got back and got to the open pit in Bisbee, I worked in the open pit for a number of years driving the big Haulage trucks. Then the opportunity came to take an ironworker's apprenticeship, and I took the apprenticeship and completed it and became a journeyman ironworker.

Then I got married, and we decided we would go to California, which a lot of the people did, go to the coast. So we came to California and I went to Darwin, California, on the other side of Death Valley, by Lone Pine, and went to work for Anaconda Copper at an underground mine out there.

What year was that?

Let's see, we got married in '53 and so that was probably late '53 or 1954.

Good. That gives me the era.

I worked underground there in Darwin, California as a miner and then as an underground welder mechanic. Then the operation—due to price fluctuation, they closed the mine down. And I went up the valley to Bishop, California and went to work for Union Carbide Corporation [UCC]—

which at that time was called U.S. Vanadium—and went to work underground as a welder. Then UCC Corporate offered a training program for safety, and I took the opportunity and entered their corporate safety training program and went through that at Union Carbide Bishop Operations, I became first a safety engineer, then mine and tunnel safety engineer. They were driving a large access tunnel in addition to the normal mining operation. And I worked there until 1965.

How long and how in-depth was the training?

[00:05:00] Most of it was on site in the underground operation, but I did go to the uranium mines in Colorado, their properties there, for that type of mining. There were two of us, myself and a man named Jim Smith. He was in the milling operations and I was the mining, and they sent us to Uravan and Slick Rock and Rifle [Colorado] and the different uranium properties for training.

Now I have a question about mining because I'm really just learning about this through talking to all the test site people who worked underground. You're talking about tunnels here that are mined into hillsides or pits?

These are vertical shafts.

These are vertical shafts.

Yes. There are tunnels, drifts, after you get underground, but these are vertical shaft mines.

I left Union Carbide in 1965 and went to work for Caterpillar at the Esperanza Mine in the open pit in Tucson [Arizona]. I worked there for a while, and then a friend of mine that I worked with in Bishop, California became a manager for a company called Atlas Copco who provides heavy equipment for mining and tunneling operations, drills and compressors and things like that. He asked me if I would go to work for them, so I moved back to California, and then I worked for Atlas Copco with the mining equipment, such as bits and steel and jumbos and

drills. At that time they were doing a lot of the water tunnels in California and the market was lucrative. I worked southern California from Baja California as far north as Sacramento. Then they put the Nevada part on my territory and I worked Bishop, California with their equipment.

Then they added the Nevada Test Site. I'd been out of safety now for two or three years. I was making calls on the test site, and one day I had lunch in Mercury with Bill [William] Flangas and Glenn Clayton, who were in the tunneling at the test site. And the talk got around to safety.

We were talking about something and safety came up and I said, Well, I was a safety engineer for eleven years for Union Carbide Corporation.

And Bill Flangas said, Hey, there's a guy I want you to talk to.

So when this fellow came into the cafeteria, he introduced me. His name was J.D. Hill. He was the new Director of Safety for Reynolds [Electrical and Engineering Company, REECo].

And he sat down at the table and Bill said, This guy here was a shaft safety guy. He said, We just lost two people up on the mesa. Two miners by the name of Parker and Johnson were killed in one of the drill hole shafts. And he said, I understand you're looking for a safety guy.

And Mr. Hill said, Yes. He asked me, Would you be interested?

And I said, Sure, I'd be interested in the job.

So I filled out an application, and about a week later I got a call to come up to Las Vegas. The REECo offices were down on Wall Street.

On which?

Wall Street. That's where REECo's offices were. I went and talked to the personnel man and filled out all the forms, you know, and did all that good stuff. I continued working for Atlas Copco with the drilling and mining equipment. I got a call, his name was Mr. Cummings, I

believe, that they were interested in hiring me and would I take the job. And I said, Sure. We were excited about moving from Yucaipa, California to Las Vegas.

So I took the job and came to the test site and started in—let's see, Parker and Johnson were killed in June or July and I came in August of 1967.

OK. Let me back up a little bit. A couple of questions were raised. When you're working for Atlas Copco and you're coming out to the test site to do a particular task—

Service equipment or sales of bits and steel and jackleg drills.

OK. At that point in time, how much do you have to know or do you know about what's happening at the test site? Are you aware of the work?

[00:10:00] Yes, I was aware of the work. A lot of the miners that worked Bishop quit Bishop and came over to the test site. Then they would quit the test site and come back to Bishop, depending on what the contract price was, how much they could make, they would work two or three months at Bishop and then they'd go over to the test site, and then come from the test site and go back to Bishop. But most of them that came to the test site stayed pretty firm. So I knew about the test site, and then going to the tunnels and the shafts on the test site as a representative of Atlas Copco, I became familiar with the operation that they were doing at that time.

Did you have to get clearance at that point?

Yes. I just had a red badge as a vendor. So I was aware of the test activities. I'd been in all of the tunnels at the test site and some of the shafts and was familiar with it the years that I worked for Atlas Copco, so I knew the way the operation was and what they were doing.

So I hired out as a safety inspector. They were really beefing up the Safety Department at that time. A lot of new safety people came in. A whole bunch of us were safety inspectors. The Chief Safety Engineer was Jim Lancaster, who I reported to.

And he was REECo. This is all REECo now?

Yes. And the Safety Director was Mr. Hill. I don't remember his first name. He wasn't there very long. They assigned me to work with the safety engineer for the tunnels and shafts, which at this time they had included the drill hole shafts on Pahute Mesa. I was a safety inspector and he assigned me to the shafts—he didn't like the shaft mining. He liked the tunnel mining, so he gave me the shafts that were operating and the drill holes, which until I came to the test site I never saw a drill hole shaft. So I quickly learned there was a lot of difference in working in the drill hole shaft and a conventional shaft.

Explain that to me. What is a conventional—?

Well, in a conventional shaft, they would sink them vertically. Out at the test site they used a Cryderman mucker – they would drill and blast and muck out and square-set timbers with the drill holes, they would drill a hole with one of the big oil field-type drills. They would drill a hole, whatever diameter was requested by the laboratory, and they would drill the hole and case it, and so you had a straight casing from the surface to the depth. Then they would set up their head frame and their normal standard mining equipment for shaft mining—a hoist and compressors and so forth—and then they would send miners down to the location that they wanted to cut the cavity. They would cut the casing and drill and blast and make the cavity for the test. So it was a little bit different—in fact, it was a lot different than conventional shaft mining.

So I worked on the drill holes and the shafts for quite a period of time. We all worked out of Mercury at that time. There was about, I'm going to guess, twenty-five to thirty safety engineers, safety inspectors. And all of us reported to Mercury and took our daily assignments there for the plan of operation we were going to be working with, inspecting, so forth.

Also I was a certified mine rescue instructor, and they gave me the training requirement to train the miners in mine rescue, and also train them in first aid. So that was just another added thing on what I did. So I trained the mine rescue teams and first aid for the mining people. This included terms for tunnel reentry after a shot.

Then at that time they hired a safety engineer, for the purpose of cleaning up the unexploded ordnance on the test site. His name was Milt [Milton] Shriver, a retired Marine Corps major, explosive type. They assigned me to him to work with [00:15:00] him when he needed help getting rid of old ordnance and explosives. That was just another added duty, and I worked with Milt, till he left, with the explosive ordnance disposal, and then they assigned that to me. That was part of my job function was to do the unexploded ordnance and disposal of conventional explosives.

Oh, so let me ask you about that. There's tests of, what, conventional—?

Explosives.

Explosives, going on at the test site.

Yes, this was all non-nuclear explosive: dynamite, ammonium nitrate, DETA

[Diethylenetriamine] sheet, whatever explosive that was excess or ordnance that was discovered on the site itself. That was the responsibility of Safety.

You said dynamite, you said something else, and I didn't understand the third word. You said—let's see what that was.

DETA sheet?

That's it.

That's just like a plastic explosive. It's used in various things on the test site, I assume. But if there was scrap left over from a test, they would call me and I'd pick it up. Sandia or the other laboratories would call and I'd pick it up and dispose of it.

So your offices were in Mercury.

At that time.

At that time. You were living in Las Vegas with your family then?

Yes.

And did you have children at this point?

I had one daughter.

OK. And so you commuted every day, is that right?

That's right. I rode the bus back and forth to the test site.

What part of town did you live in then?

Lived over in the northwest. It was way out on the edge of town, off of Saylor Way. Washington and Jones is the major cross street, or Vegas Drive and Jones, which was in the edge of town there. There was nothing beyond that, beyond Jones, at that time. In fact, my wife taught our daughter to drive on Rainbow, which was a dirt road.

That's great. So we can get back to what you were saying.

OK. Eventually the company decided that they wanted the safety people closer to the actual work areas, so they moved everybody from Mercury that was involved with the field operations, DoD [Department of Defense], with all of the laboratories and heavy construction, heavy equipment, forward to Area 6. Built a building there and we had our offices in Area 6. So all of us involved in those disciplines reported to Area 6 instead of Mercury.

Prior to that, there was a change in the REECo safety management. Mr. Hill left and Collin Dunnam became Director of Safety. And at that time, shortly after that, when they decided to keep some of the safety people in Mercury and some of them forward, they made the position of Field Superintendent, Safety, and that was my responsibility. I became Field Superintendent for the Safety Operations, and at that time I had about eight safety professionals working for me, and their disciplines were mining and tunneling, drilling, heavy equipment, construction, laboratories. So we had our own little group in Area 6, and then of course housing and feeding and motor pool. Those safety people were still in Mercury. So they separated the two groups of people, still reporting to Mr. Dunnam in Mercury, which was good for us because we were on the job quicker at the start of shift, and you could drive from Area 6 to 12 in a very few minutes and it was just a lot handier to be on the job. Reporting out of Mercury a lot of times, you wouldn't get out into the field until ten or eleven o'clock. By reporting directly to Area 6, you were on the job that much sooner, so it was much better to work out of Area 6 than Mercury.

And we were that way for a number of years. And then there were some changes in the Safety Department. OSHA [Occupational Safety and Health Administration] requirements came [00:20:00] in and we hired OSHA specialists, code compliance people. And then they decided they would put safety people with the departments, like a safety engineer for LASL [Los Alamos Scientific Laboratory] and one for LLNL [Lawrence Livermore National Laboratory] and Sandia, and embed the safety professional with the operation. And I went with Field Operations [Division], DoD [FOD/DoD], with Flangas. I reported to Flangas instead of to a safety director. And it was that way until I retired in 1993. Still worked out of Area 6 but reported to the division manager in Mercury. I also had safety professionals working for me at Tonopah [Test Range], reporting to me. So we were spread out a little bit different.

About what time did that shift take place where you go to the different departments?

Approximately?

Boy, I can't remember. It was in the eighties I believe.

OK. So that's quite a bit of time that you worked under that system.

Yes, quite a bit of time that I worked. I'm going to guess maybe in the late eighties, in the middle eighties. I don't remember. Really it wasn't much of a change because the working relationship that we had with the department managers really didn't change. It was just basically a different reporting system. It worked out real well. Working with FOD/DoD in the tunnels and the shafts was really a good operation.

FOD is—?

Field Operations Division.

All right. OK, FOD/DoD. Got it.

Yes, Department of Defense, in the testing. And that was a good move. My relationship with the department manager became much closer and our common problems were easier to discuss than going through the whole system. You had a hands-on feel of the operation, rather than putting in a report and then waiting for feedback. You were included in all of his staff meetings and all of his briefings, so you knew what projects were coming on line and what you should gear up for. You knew you were going to have to have a guy in the down hole operation or—the discussions with the department managers were much better once we were embedded in the department. It was a lot easier to get things accomplished because the guy that could accomplish it was in the room next door, instead of having to go all the way back to Mercury or all the way to [Area] 12 to have a discussion on safety.

Then I continued with the mine rescue training and the first aid, the inspections, basic safety operations, and continued on. Had some really, really good man hours worked without lost time injury. There wasn't a year that I can remember working out there in the years that I worked that we didn't have one of the better safety records comparable to other types of operations. We had to kind of break ours up, mining and drilling and, you know, construction. You couldn't compare us just to the construction industry. So we had some good safety records. And REECO received a lot of awards for safety operations throughout the test site.

Also had a safety engineer at the MX [Missile Experimental] project. When there were special projects that would come up, we would assign somebody to them. And in Tonopah, we always kept one guy up there full-time in Safety who reported to Area 6. So that worked out.

But we had a good operation. We had some good people. We had quite a staff and when you combined them all together, Mercury and the forward areas, it was a big staff of safety. And they were all very, very professional. Good people.

Now this kind of safety—I'm asking a question here—you're dealing with mining kinds of safety issues as opposed to RADSAFE [radiological safety] kind of safety issues in your field?

[00:25:00] Yes. We had no involvement with RADSAFE or Industrial Hygiene, none of those. We interfaced with them on tunnel reentries or when they were having drill backs, for example, after an event, RADSAFE personnel on board, we had a safety engineer on board also. So there was a close interface between RADSAFE and Industrial Safety, and Industrial Hygiene. All kinds of work—did our own thing, only worked together.

OK. That's a great overview you gave me. Thank you. Just so laypeople and other kinds of people can understand this better, maybe you could take me through the kinds of daily things

that would be involved in this whole world of safety as far as what you would do—what would a day maybe look like when a tunnel operation was going on?

Basically, if you were going to take a look at the tunnel, you would generally go up to the tunnel when the shift went in—say, day shift and they went underground at eight o'clock—you would be there to ride in on the train with the workers. And that day, if you were coming up there for a specific reason, you wanted to look at—say, Industrial Hygiene was going to take air measurements, or the RADSAFE people were going to do their thing that particular day, they would generally be there at the same time and then you, you know, discuss and go in with them or, I'll meet you in there, or whatever. But if it was just strictly for mine safety, go up to the tunnel, get on the train, and go in and get off, go to the doghouse as the walking boss and the shifter would line out the guys and listen to what heading they were going to or what location, the lineup, and they'd look at the logbook from graveyard shift and line out the crews for the day. Then say they were drilling with a jumbo in a certain drift, you'd walk back and on the way back you'd look at the track, you'd look at the back and the rock bolts, whatever was going on in the tunnel and just make a quick visual inspection, housekeeping, this type of thing, you know, is the trash out? Are the walkways clear? They had underground shops you can go in, and say there was a welding shop, the screens in there, is the welder welding on something flat, you know, have a screen up. Just basic safety things that 99 percent of the people did anyway. They were as conscious of safety as we were. Go into the heading and they were drilling, you know, everybody had protective equipment on: hard hat, glasses, earplugs, whatever. You'd just make a mental note. Very seldom did you write anything down right, you know, in front of the person. If you saw something that you thought needed correcting or wasn't quite safe, you just make a note of it and then report it to the shift boss or the walking boss. You know, if there was a slab that

looked loose, you can just stop the operation and, Hey, shut the drill off, you know, and get that slab down, or whatever the situation was. The cooperation from the miners was normally very good. They were gung-ho mining. They weren't working on a contract basis but they liked to make footage. It was an individual thing, you know, a shift thing. They worked hard and they worked fast. Our responsibility was to see that they did it safely. And fortunately we had good people. I can say over the years that I worked underground that there were very, very few people that gave us any resistance to safety. The managers, the walking bosses, the department manager were behind whatever we did 100 percent. We had no problems with getting things done as far as safety was concerned.

Am I correct in hearing you say that they would—was their competition between the shifts about how many—?

[00:30:00] Yes, just, you know, we got more hole than you did last night, or, we broke more ground. Just friendly competition.

Sure. Good competition.

Everybody was trying to outdo the other. They were all experienced miners and they came from all over the country. I met people out there that I'd worked [with] in Arizona, in Bishop, California. Of course I knew a lot of them from being with Atlas Cotco from the little mines in Death Valley to the Nevada Test Site.

That's one of the things that's so interesting for me to learn, is about the—I don't know if you would call it a community, but in the sense a community of miners in the West here, and seeing people at different places and then people coming to Nevada to do a really different kind of mining than any other place.

It was the same type of mining, the mining as mining, but it was a different atmosphere, and it wasn't like you had to get so many tons out a day to make a profit. And there was no incentive to—it was a standard wage. There was no incentive, what they call bonus mining, like it was in the copper mines where they had a program set up. The miners called it “gypo.” Your day's pay was, I'm just using numbers, was twenty dollars, but if you drilled and blasted so many feet in the day, when they measured up at the end of the week for the pay, if you exceeded what standard they had set, you got a bonus for that much more. So there was no contract mining at the test site. It was all straight day's pay and there was no reason, really, to take shortcuts as far as safety was concerned to try to make more money. But a lot of the guys that came to the test site from the underground mining had that mindset of gypo, of making as much footage or tonnage or whatever you wanted to as they could, and that was just one of the things of the trade, I guess. And the tunnel miners were the same way. It was tunnel miners from the California water projects and back East. In fact, I think one of the superintendents was from New York, in the tunnels that they drove back there. But there was some education that had to be done, but that was done by the departments themselves. The department managers and the project managers were firm on safety. And over the years, it took years to pound it in some of their heads, but they got the message. And they had a good operation. They were good people.

And I think the years from—I missed the surface testing. That was before my time. But I did live in Death Valley at Darwin, on the other side of the Panamints, and we used to get up in the morning to watch the flash from the detonation light up the side of the hill. Somebody would say, There's going to be a test tomorrow at the test site, five o'clock, and everybody in the mining camp, kids and women, get up at five o'clock and stand outside. We

lived in trailer houses, get out, stand out there, and wait, and then see the bright flash, and then pretty soon across Death Valley you can see the mushroom up in the sun.

So we're familiar with what was going on at the test site. In fact, one time we worked swing shift and we decided we'd come to Las Vegas, and after work we got in cars and drove from Darwin down to the Panamint Valley and across Death Valley. We got out there somewhere, I guess it was between Lathrop Wells and Mercury, they had a roadblock, and we stopped and got out and sat on the fender of the car and then waited for it to go somewhere out on the test site. It was really bright and you could feel the rumble. But that's as close as I ever came to the surface testing.

But the years from 1967 to '93, I think, were the best years of the test site. They were good years and everybody worked hard and everybody that I knew of enjoyed their job. A lot of guys have a lot longer time than I had at the test site, so it couldn't have been too bad a place to work.

Right. Speaking of testing, with the safety, the tests themselves, I mean, the safety issues, I've [00:35:00] seen some photographs at the ends of the tunnels, the caverns or—

Yes. Cavities.

Cavities? Thank you. Dug out for placement of the device. Were there any particular special safety issues that happened once you got to that place where—was that a different kind of mining?

No, the mining was the same. They were just breaking rock and making a room, you know. The mining was the same. I'm sure there were other safety aspects that the laboratory had to—we had no knowledge, you know, in electricity and things like that.

OK. But from the mining aspect—

The mining and construction was the same.

And speaking of the laboratories, did you have to deal with the safety of the scientists or engineers when they went in?

They had their own safety people, and we interfaced with LLNL safety and LASL, and Department of Defense had a safety man. We interfaced with them.

Tell me more about some of the things about the drilling of the shafts. What kind of inspections would happen on that kind of thing?

Once the hole was drilled and the rig moved off the casing set, we started downhole mining. When I first went out there, the casings were forty-eight-inch diameter and the man cage that took the miners down fit inside of that casing, and the skip was underneath.

And the casing was—

Steel.

Steel. That's what I thought.

Yes, steel, just like a big steel pipe down the depths of two or three, whatever, thousand—whatever they wanted to drill. Once they got that casing set and the mining equipment set up on the surface, the hoist and the head frame and a hoist house, change room and the office trailers, the compressors, shop, then they put the man hoist on and lowered it down to the level in the casing, whatever depth that the laboratory required. And they sent two miners down in that cage, and they took a cutting outfit with them and cut a hole in the casing. And then they set up on that cage and drilled with a jackleg and blasted their way out of the casing and started forming a cavity. Then they started mining the cavity. And then they would work in shifts during the shift. Two guys or three guys would go down and work two, three hours and then they'd go up and others would come down. And inside of that casing, they had installed air and water lines,

compressed air and water, an electric line, a welding line, service lines in one part of the casing. And we would go up when we wanted to inspect the cavity, we'd just catch the cage and go down and step off at the bottom and go into the cavity and take a look at the rock. Maybe they were installing hog wire, wire mesh, and rock bolts. They would generally be either drilling or mucking out. And if you were down during the mucking cycle, they would muck into the skip at the bottom, on the bottom of the cage. The muck skip hoisted it to the surface and dumped it, dropped it back down, and the mucking cycle was finished. And then once that was done, then they'd start their drilling cycle and they'd drill out however many holes they were going to drill, they'd drill out and load and come up and blast, and go back and start the cycle again. And depending on when we got up there and what phase they were in, then we'd generally go down and make an inspection of the site; we'd inspect the hoists frequently. Had a real critical hoist inspection form that was filled out by the hoist man and the walking boss and safety. We would have drop tests on that hoist to see that the safety catches worked. This was all documented at the drill holes, and also on the standard shafts, Area 15 and the shafts down in the flats, same thing. So there was always something in the mining operation that you can go and look at and make a determination if there was anything safety-wise. And like I say, the walking bosses and the shift bosses were generally [00:40:00] on top of it pretty quick, everything. Flangas, you probably know, he was a no-nonsense sort of manager and he would back Safety 100 percent. We would run into loggerhead[s] once in a while with something and it would end up in Flangas's lap, and it didn't take him long to square everybody up and away we went again, Let's go drive tunnel.

Yes, and as an example, if you can remember, what might be something where there would be a conflict, where you, a Safety person, wanted something and, what, someone else in authority in the mine wanted something else, or is it the workers or—?

Well, generally it was just an oversight on their part, normally, or we thought it was an oversight. Maybe they didn't. Well, you know, we'll get that later. [We said] Let's do it now. Save me writing up a piece of paper. Just get it fixed, get it cleaned up, and get it out. Replace the ladder. You know, whatever it is. And after much huffing and puffing, then they'd get it done and away we went on. We were all aiming for the same thing: to get those people in and out without getting them hurt.

Right. So that's really a management thing, where you say, wait a minute, better to do it now than later.

Yes. That's right. It was a very easy safety job because the people were so cooperative. You know, you always have hard heads in any operation, but 99 percent of the time your job was very easy. It was more of an oversight than direct orders to get something safe. You could always compromise, work it out, and get it done and get it safe. And it paid off. The hardest things to do were indoctrinating new people into the use of, for example, safety glasses. Anybody that doesn't wear glasses don't want to wear glasses. And that was always something that you would go in and find a couple of guys without their glasses off. Hey, put the glasses on. They're for your protection. Oh, you know, Get 'em on. And then you go in the next day and here they are again. Eventually they get the message. But it was a very easy safety job. I know when I was with Copco, I was on a lot of what they call highball construction projects.

What does that mean, "highball"?

Anything goes. Get the job done. And then there were some atrocious safety things, like in the water tunnels, some of the big contractors, their accident frequencies were atrocious. They

weren't compared to the test site because we were a different group, but the National Safety Council kept records on coal mines and metal mines and construction, tunnel construction. And we got people from those operations and it just took a while to get them tuned in, and went along real well. It was a very, very eye-opening experience to come from a mining operation like Bishop where they'd had the same program and you did the same thing day after day—you know, go in, drill, blast, muck, drill, blast, get the ore out—to something like one of the tunnels where you would have these laboratory experiments and all of this sophisticated equipment and refrigeration units that you don't find in a normal mining operation like Anaconda in Butte [Montana] or somewhere. To me it was just amazing. It was a whole new world of safety. The fundamentals were the same, the mining safety was the same, with all of these other things thrown in, you know. You would go to a meeting and they were talking about putting in this and that and you had no idea what they were talking about. And everything that came in there had to come in through that tunnel. So it was very interesting.

Yes, that's what I was thinking, that must've been amazing, a few minutes back, when you were describing something. You've got the tunnel and you've got all this technology that going into it as well.

Yes, plus you come from a standard shaft mining operation with the deep holes, for example, you have a big square-set shaft with a double-drum muck hoist and a great big vertical hole into the ground down three, four thousand feet, three thousand feet, thirty-eight hundred, whatever. And then you go up on the mesa where they have the same thing down at the depth but you got just a forty-eight-inch pipe to go down, you know, and to me it was just amazing. There were no [00:45:00] levels between the surface and the cavity. There was nowhere you could stop and get

off, like in a mine, you know, you go from level 1 to 3 to 5 to whatever and it stops and get off and get on. The drill holes were just a straight shot from the surface to the job.

That's interesting. In a normal mining, would you have the levels because you were mining at those levels?

Yes, depending on the type of mining, you would be mining on different levels in the mine, where in the drill holes, just that one operation at the bottom.

So forty-eight, that's four feet.

Four-foot diameter.

And two of you would get in that—

Cage. Two or three, depending on the size of the guys.

How big would the cavities at the bottom be?

I don't really know the actual dimensions.

Like approximately. Enough for how many people to fit in there?

Oh, it would be bigger than this room, they would mine out.

OK, so which is big, which is probably—OK.

I don't have any idea on it. Once they got it mined out, and then they started putting all the different support systems on the roof and sides of the cavity, and below was a sump.

So you could fit fifty people in there easily, I would guess.

Oh yes, you could. I never remember seeing that many people in there but there would be, you know, six or eight at the maximum, that I remember, in the cavity.

That was my next question.

But the cage, the man cage, would hold three or four, depending on the size of the guys.

What's it like to go down that deep? What's the deepest you've ever been and what is that like to be that far underground?

I don't know what the deepest—the deepest hole that I was in was one up on Pahute Mesa, but I don't really know how deep it was. You know, once you're more than five foot nine below the ground, my size, it doesn't really make any difference how deep you go.

That's funny. But a thousand feet or so.

Yes, they were deep.

And what was that like? I mean did it have an effect on just like sort of your animal responses?

Do you feel yourself—?

No. I've taken people down that got claustrophobia, you know. There's one fellow I remember was with the Bureau of Mines out of Reno, good friend of mine that I'd known for a long time, mine rescue, an instructor for the Bureau of Mines. I took him down a hole up on Pahute Mesa. Went up there and he wanted to see the drill holes, so we took him down, and we dropped from the surface down to the bottom, and when we got to the bottom, he never even remembered coming down that hole. Just a psychological thing, I guess, in getting in that pipe and going down to the bottom of it. But in the cage you had a radio unit that you could plug into the wiring after the cage stopped and talk to the surface, you know.

It was an interesting operation, the drill holes. I really enjoyed working up on Pahute Mesa. I used to stay in [Area] 12 camp a lot when they were busy, a lot of operations. Instead of coming all the way to Las Vegas every night, I would just get a room in 12 and stay there and make the drill holes on the night shift. And we had a safety engineer on duty all three shifts. Not all of them but just like the swing shift, we'd have one safety engineer on site for traffic accidents and, you know, things like that. And then in graveyard, we had a safety engineer on

duty, and they worked out of Mercury. That was before. And then after we got fancy and got pagers and all this stuff. A guy could be on call, you know—like we had some guys that lived in Mercury, some single safety guys that stayed in Mercury—so they were on call and didn't have any site surveillance on the off shifts, as things slowed down at the test site. But when everything was really roaring and boring, we had people physically in the field on swing and graveyard.

What was it like out there at night in those days? It's so desolate when you visit it today.

Oh, the big high point of activity was the recreation hall in Area 12, I guess. Everybody seemed to end up there on the day shift guys. I used to teach first aid classes in the Area 12 cafeteria on [00:50:00] swing shift. The miners, day shift miners, would come to get first aid training and we'd hold the classes in Area 12, and then after the classes we'd all end up in the rec hall there, drinking beer and doing a lot of mining. We had blaster certification courses, too, that had to be renewed periodically, and I would run blaster classes in Area 12 on the night shift.

What is that blaster certification?

Handling explosives for construction and mining. The safety aspects of blasting and blaster certification course was to handle and use explosives. And that had to be renewed periodically, so the guys that worked day shift, after dinner in the mess hall, would come and have blaster training in the little movie theater there in Area 12.

So there was always something going on in 12, and all of the trailers and housing was full in 12. A lot of people stayed a week at a time on the test site and go home on the weekends. The miners stayed there, so there was always something that you can do. You can go up and give a class, get enough guys that wanted and needed the blaster certification, just go up and hold a session of the class and recertify them.

Were there any women out there?

Very few. Very few.

What kind of work would they do if they were there? Like clerical stuff or—?

Yes, there was one lady worked with Sandia. I don't really know what they did. There wasn't very many that I remember and that stayed in 12, not that I know of. They may have.

On the days when a test would actually take place, would you have a certain routine or would that be beyond what your—?

You mean when there was a test in the forward area?

When there was an actual test.

Generally we were held in Mercury until after the event. And we didn't have any responsibility for the tests at all as far as occupational and industrial safety was concerned. That was RADSAFE and Industrial Hygiene. At request, if there had been, say, there had been a subsidence after a test, periodically they would request a safety engineer there. Trailers were maybe thrown off of a stand or something, tipped on its side, and the construction guys would have to go in. Then a safety guy would respond if it was requested by the manager.

You had said earlier that there were things on reentry and—

We always had a safety guy on reentry. Most generally on the backup or rescue team. They would have the reentry team and then they would have a backup rescue team and we would have a safety guy on that, assigned to that reentry.

OK. I know you said there were very few accidents, but can you give me a sense of the kinds of accidents that you were involved with and what was required from your guys' end?

Normally, it was just, you know, construction, the same accidents you have with construction on a hotel or something: mashed fingers and broken bones once in a while. Traffic accidents, we had a number of fatalities in traffic vehicles. Underground, I can't remember the exact number of

fatalities that we had, but there were some. And I can think of maybe four or five at the most fatalities in the underground. Traffic, we had a traffic safety guy, and I don't know that. But the injuries, and we were fortunate—which is different than a mining company—we were fortunate we had medics at different locations, medics in Area 12, medics in Area 6 and Mercury, medics in Tonopah, on call twenty-four. And in the forward area, like [Areas] 19 and 20 when there was activity up there, we had a medic station up there. So medical coverage was really good as far as an accident during any of the shifts.

With the fatalities, what were the kinds of causes when that would happen?

[00:55:00] I was trying to think of—well, the two that got me to the test site were Parker and Johnson. They were killed in one of the drill hole casings. Inrushing mud and water filled the cage. That was just before my time. I came in August and that one happened in July.

OK, so to help me understand the actual mechanics of safety, would there have been a possible remedy to that or was that just an accident that was going to happen?

They figured it out and made changes in their mining procedures that took care of the inrush of water into the muck skip and the cage. It was an accident, and again that was just before my time. We had one fellow that was a fatality. A piece of LOS [line-of-sight] pipe crushed him. And we had another fellow that an eyebolt, rock bolt, pulled out and he was crushed. We had, you know, broken legs, arms, just general construction-type accidents. We had one fellow walk off into a drill hole up in the Pahute Mesa, carrying a piece of plywood and stepped off and went to the bottom of the hole.

Oh, my gosh. He just didn't see it, then.

But the majority of them were just construction-type accidents, you know, lots of bumps and lots of back strains. And the workforce, the guys who were out there, as they all aged, you know,

down in the back, or it's just natural attrition, I guess, and any industry, I'm sure, has the same problem.

Sure. Well, this kind of industry, for sure, where you're using your body to do your work.

Yes. One of the hardest things, too, was to get people to use ear protection. Nobody liked to wear muffs and plugs, and you see all the guys nowadays who are all half deaf, you know. We used to have this breakfast [informal monthly meeting of REECo retirees], you've been to it, we used to be just in the general café, you know, in the restaurant, with all the noise and everybody talking, and you can't concentrate on just one person. Everybody's yelling, so finally these last few years they started putting us back in the banquet room where everybody can talk.

Right. Yes, well, right, because it's noisy enough, I mean the times I've been, just in that room, everyone talking at the same time.

Yes, and nobody can hear, you know, that's something else.

So it gets real noisy in the mines, then?

Running the drilling equipment, the jumbos and the jacklegs and the Alpine Miners and all of those heavy equipment in that enclosed area. The industrial hygienists would, you know, give us a report of the decibels of what was happening around those machinery, and they'd try to keep everybody wearing their earplugs or ear muffs. And after a while, it was quite a while, but everybody seemed to pretty well accept them. For years, people mined and didn't use that and they came to the test site and just continued to, even when they had ear protection, they could continue with a hearing loss.

It used to be silicosis. My grandfather died from silicosis from the copper mines. Dust. And a lot of our miners, a lot of the miners from the test site have dust, too. Lung problems. I don't know.

I never did hear the silica content of the sand tuff at the test site.

[00:59:16] End Track 3, Disc 1.

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

[Beginning of photo review]

OK, so this is photo 1. I'm going to mark it "1". [Portmanteau]

This is the setup for the reentry into the drill hole that the device was emplaced. And this was the two-man cage, one above and one below. And this was the rescue cage. It's the same thing, with man above and man below, only open.

Oh, so you would put—

If something happened, you could—in the top of this cage here, you can open the flap and get out and get into the other cage and come back up. So this was just a backup cage, and it was lowered with a crane on a different line. You had this crane for the rescue and this crane for the entry.

OK. Now this is on this test where what happened exactly?

Something happened to their wiring or timing and firing. I don't really know. But they wanted to go down—they destemmed it to the area that they wanted to get to, and they wanted to go down and photograph that section of the bundle.

OK. Which is stuck down there or—?

No. I got on the bottom and Greg Calvert got on the top, the industrial hygienist, and they gave me a camera. I don't know if there's a picture of it. It was a Hasselblad, I know. I thought, man, taking it down in the rocks and dust. But anyway, they de-stemmed the hole and got this all set up, and I got in the bottom deck and Greg Calvert got in the top, the industrial hygienist, and they lowered us down to, in my mind, thirteen hundred feet. I don't really know. But anyway, they lowered us to the level where they wanted the photograph taken of the bundle. I took the

photographs, Greg tested the air and all the good things that Industrial Hygiene does, took the photographs, and we came back out and discussed what we had saw with the test director or the test manager.

Right. And this is Livermore now.

Yes, LLL [Lawrence Livermore (National) Laboratory].

Right, because of who you guys are.

I don't remember these. [photo 2] And this guy's name was Asa Morrison. He was with REECo.

He's the guy on the very right.

This is the laboratory. And this is the man that wanted the information. And this is Terry Roy, LLL Safety.

Terry Roy in the red hard hat. OK.

And this is Greg Calvert, the industrial hygienist. He just passed away. And this is Jim Rice, who was on the mine rescue team.

Right. So Jim Rice is on the very left, and then Terry is next to him—

You mean Greg?

Oh, Greg. Excuse me.

Then me and Asa Morrison and Terry Roy and then I think he was the test director. And this was another man who I—

OK, so that's right to left.

And he was asking me questions about what I saw down hole, and I had taken photographs and given them the camera and we were just discussing what I'd saw down hole.

OK. So this is photo 2. That's interesting. Now give me a little history of what had happened previously.

Of course they didn't tell us a lot about anything. They wanted us to do that one function. But apparently they had ran the test on their cables and something wasn't right, and they wanted to check that particular section of the cable bundle. And so they lowered us down and I took the pictures and brought them back, and that was all we did.

And then did the test go successfully?

Oh yes, the test went eventually, yes. But I don't know anything about what they were doing. We did so many things.

This is another down hole repair in the area.

This is number 3.

It's not the same event.

I understand, yes.

Another down hole.

And that's a mine rescue team training.

Now there are women here, so this must be later.

Yes. Genery Spears was an radiation monitor. This girl was in Safety. This was a RADSAFER.

Jeannie Faiss, she [00:05:00] was an executive secretary. She was Harold's secretary.

Oh, OK, so she's second from the left, kneeling, right?

Yes. This was a paramedic. And Ann Martin, I forgot what she did at the test site. These are just recent pictures. This is another, and this is all a lot of Pan Am photographers in this class.

Now tell me what the deal is with Pan Am because you said they took pictures of that tower being—

Yes. They did all the photography for the test site at that time.

Pan Am. The same thing as the—

Pan American Airways.

The airline?

Yes, Pan Am.

How interesting. So this is number 5. This is then—

Most of these people are Pan Am people.

Yes. How interesting.

They wanted their people trained in mine rescue, so I did that.

Oh, I see.

That's just a drill rig.

This is the salt mines in Louisiana. [Weeks Island, SPRO, Strategic Petroleum Reserve Storage Site, photo 5a]

Yes.

Harrison Schmidt.

How come you have that picture?

He was the first rock guy on the moon. Geologist.

Oh, he was the first geologist on the moon?

Yes. He was the first geologist on the moon, yes.

Oh wow!

Yes, I went to a briefing with him. It was really interesting.

These are in Bishop, California. [photo 6]

And this is a safety training I had out at the test site. He [Willy Nash] went on to become the Director of Safety for BART [Bay Area Rapid Transit] in San Francisco.

Really! OK, so this is number—

Or not in San Francisco, but Washington, D.C. Metro, when they were building that underground.

Yes, and that's number 6.

He left the test site and went there.

Yes. How interesting.

This is up at the Bishop mine and these are all Bishop.

Yes, they're all labeled "Bishop" so that's great. [photo 6a]

This is out in Area 20. And this guy took a nap, this miner, at lunch, and while he was sleeping, they cut his pant legs off, see? [photo 6b] Got his boots and his pants, made him a pair—

And this is part of the mine rescue training.

Oh, I see. So you have to be able to crawl through those—

Crawl through the vent line.

This is A Tunnel, the first one that was driven by jacklegs at the test site. We used it for a mine rescue reentry training area. [All members of the team for reentry needed training]

Oh, I see. That's a neat picture. That's number 7.

That's A Tunnel.

A Tunnel. OK.

And this is the same crew practicing with a stretcher.

These are all miners with mine rescue gear on, training.

This is that same old tunnel, with the smoke and fire.

We'll put "8" on that. All of these on this page are the training.

Yes. Training in A Tunnel.

And these are just mine rescue teams.

Right. They're labeled.

These are places that I worked before. This was us building the jumbo.

Oh, let's put a label on these. This is Darwin and—

Yes, that's the Darwin, California mines.

And Red Mountain. Where's Red Mountain? [photo 9]

Down by Randsburg. You go down the highway from Darwin, or down from [Interstate] 95 and turn off and you go back into Randsburg and Red Mountain, almost to the Four Corners.

Oh really. OK. So that was 9.

This is DoD. This is when I first came to the test site in '68. [photo 9a]

Yes. That's 10. This is in the dorm. OK, this is—

That's when we were in the dorm and everybody reported to Mercury.

Yes. OK, so that's number 10. That's interesting, those two pictures.

This is just a load test on a crane. That's in Mercury.

Let's put that there. That's interesting, too. So that's 11. You're in Mercury.

And these are crane collapses, [equipment] accidents that happened.

Oh yes, those are interesting. Let me look at those better. These are falling off. I'll put them back. So these are accidents. This is page 12. Yes.

These are crane accidents. Tipped over and collapsed the boom.

Let's see, that's just a car wreck.

This is where the guy was killed in the bottom of the shaft.

This is a crane accident.

So these are more accidents. This is 13. OK.

This is just snowfall up on—

Look at how much snow there is up there!

[00:10:00] Here's John Campbell.

Oh, that is John.

That's up at 19e.

OK. So this is 14. Where are you in this picture?

That's a deep hole. I'm not in it. I took the picture.

You're not in it. You took the picture. OK.

Yes, that miners at 19e.

That's 14. OK.

And that's its location during the snowstorm.

The same location?

Yes. This is 19e.

Oh wow! How deep is that snow? It looks many feet—

And it was. It was—

Like fifteen.

We'd had a real snowfall. [Area 19E Pahute]

This is a Pan Am photographer.

Look at him. OK, that's number 15, with the snow. All right.

These are Pan Am photographers.

That's 16, the Pan Am—that's a good picture of the photographers with all their gear on.

That was in Jekyll Island, Georgia. [photo 16] This is the thirtieth anniversary of REECo as a company. [photo 17] [MORT, Management Oversight and Risk Training]

Oh really?

He tried to have somebody from every one of the groups.

I'm just going to see. Number 17. OK.

This was the thirtieth. They made a "3."

Oh, look at that. It's in the shape of a "30."

Yes, they had people from—Jenny McNeill.

So we're on 17. OK.

Personnel. Housing. Feeding. Drilling. Mine rescue. Cook. Baker. In this Area 12.

Yes, look at him with the chef's hat on. That's great.

Yes. And the nurses. Somebody from planning. That was the thirtieth anniversary of REECo.

That's great. That's a great photo.

And these are mine rescue guys.

This is just Bisbee. [photo 18]

That's a postcard I bought in Las Vegas in the 1950s.

Really. Of the mushroom cloud up there.

Yes. Here's another one.

Let me see the—yes, that one I've seen but—16, we'll put this 17. I haven't seen this one, though, before. I wonder what—

I don't know. Maybe it says that I got it—it says on the back—maybe not.

Maybe not. That's OK. I'm just going to put my little "18" on it so I know that that's what I'm talking about.

That's Bisbee.

This is underground in Bishop. And that's 1980.

That's labeled.

[Sorting through photographs] Let's see, back here in 5 and 3.

Hey, I got my numbers going backwards.

That's all right. [Sorting through photographs] That's Greg [Calvert] on top.

This is a good picture, too. What I might have to do here, let me look at my last one. I see I'm not doing them right. I usually do a bunch of them ahead of time. 18. We're going to say—oh, 19 is—19e, that works. So now I'm at 20. So let's go back to this. This is very interesting where Greg—this is 20. So he's getting in on the top of the rescue cage.

He's on top. This is when we came up.

Oh, I see, you're coming up there.

See how dusty we are?

Yes, I do.

This is me in the bottom down here.

Do you remember how long you were down there?

Probably twenty minutes, half hour. We took a whole roll of film with that brand new camera.

Pshooo! Look at how dusty we are.

I see it.

That's my arm.

That's amazing. This must be before—

It'd be prior, we're going down, now here's Greg [Calvert] and me.

Yes, that's 21.

This is the iron workers rigging it up.

Was that something that happened—that must've happened unexpectedly.

Yes. Yes, they had two or three of those over the years while we were out there, and fortunately we didn't have to go down most of them.

This is a good one. This is you?

Here? Yes. We're just checking out the equipment.

Yes, that's an interesting picture.

Greg would end up up here. That's Greg.

OK. So that's 22.

And this is the entry. This is making a dry run down to the level and back up. We're just waiting to go down.

That's 23.

And we're waiting to go down here.

Yes, 24. I'm just going to get those. Now this one which we did first, are you actually in there now?

No, not yet. They were just all testing before we go down. And that's where we're going down hole, getting ready to go down hole just to see if everybody fits in.

25. Right.

That's a mine rescue hoist. This is that same hole.

Right, you got more of the same. Yes.

This is a rescue cage with a drill hole stamp. If something happened to the other cage, then we could lift this cage up and lower it down and get the guys out.

Oh, that's interesting. I see. So we'll call that 26 in that photo.

That's 19e.

Yes, 19e. Right.

Sedan. [photo 26a]

Yes, that was Sedan. We have lots of pictures of that, so— This is a good picture. This is picture number 27. This is—

[00:15:00] Bill Flangas.

In the middle, right.

Galen Adair.

To his left.

Glenn Clayton.

To his left.

And Don Beckett.

To his left. And there's you to his right.

Willie Sweeney.

Oh.

Barge Massey.

OK. Well no, I did that backwards. To my right. OK, so that's—all right.

These are all in FOD/DoD.

That's a good picture.

Willie Virgil. This is the same. Don Beckett.

So this is 28. This is you and Willie Virgil. OK.

Yes, and I can't remember this guy's name. Don.

This was a fellow from DoD. I don't remember him. Adair. Massey. Sweeney. Here's Flangas.

That's Flangas? Well, yes, I guess it is. And that's—?

Collin Dunnam.

That's picture 29 and Flangas is kneeling on our right and Collin Dunnam is kneeling on our left.

That's over at MX.

OK, that's 30. Let's just say that MX is 30. Oh, there's Collin Dunnam. [photo 30a] There's an article about him.

Yes. And this is when I was teaching first aid. They're all miners.

This is after the event.

Well, let me go back to that. You're saying this is after the event. Which is that?

I think this was in 15 Shaft. I'm not sure, but I think it was.

Does this tell you anything, this writing up there?

No.

I think that should be 31. OK, so that's after an event.

This is the way we did it before we got Safety.

Wait a minute. Well, let's see.

Or was it down hole before we got into Safety? That was way before my time.

Oh wow, look at that. 32. That's how the guy's going down?

Yes. I don't know when that was.

These were secretaries and—

This is all in 19e. 20m. 19e.

Yes, those are all labeled. That's great. Now we're back to the same—

Yes, that's MX.

We can put those together.

That's MX. These are all the same thing.

This is MX, this thing here?

Yes, that's MX. Both of those.

Wow. 33 and 34. So what am I seeing here in this picture?

It's getting ready for a test. And here's the test, the next one.

So here's 33 is getting ready and—oh, there's the test.

It's coming out.

The missile's coming out. OK.

That's MX.

This is, too? 35.

That's one of the tunnels. I don't know if it's A or B.

Here's another shot of that.

Oh, here's the last MX one. Let's make that 35. Wow. Amazing. Oh, there's another one.

This is another shot of it. There's a good one.

Yes, these are good, too. 35 and 36.

And as far as I know, these are all unclassified or they wouldn't have given them to me, I don't think.

If I have any concerns, I'll check with DOE [Department of Energy].

This is the layout of the MX project. A and B Tunnels.

Oh, right. That's a good one. That's 38. We're still on MX. Those are the two tunnels.

That's MX.

Yes, 39 is also MX.

That's A.

That's Tunnel A. What's this that you're showing me here?

That's one of the pipes, concrete conduit things that they had at MX that they were going to use.

I don't know what they ever did with it.

Wow. Who is that at the end there?

I don't know.

That's an interesting picture. That's 40.

This is in Pile Driver. That's in an Area 15 shaft.

We'll just call that Climax Shaft, Area 15. Let's call that 41, this whole page. All right. Great.

This gives me a really good idea of the different kinds of things that are going on.

[00:20:00]

One of the miners carved me a miner out of a piece of coal. Have you ever seen one of those?

No. I haven't.

I'll get it for you. It's sitting right over here.

Oh, look at that! That is so great! So who carved this for you?

They got it in Beckley, West Virginia at a school. A guy there did carvings like that.

I've never seen anything like that before. That's really amazing. That's a big piece of coal, too, I guess, for someone who's only seen little pieces of coal.

This is a—

Oh, what is that?

That's what they used to test for oxygen deficiency after they gave up on canaries. It's called a Wolf lamp. And you light this and then you go into a heading and you check oxygen content. If you hit methane, it pops in here. And that's what they used before industrial hygienists, the Wolf lamp.

That is really interesting. Wow. Those are two interesting artifacts. This guy is really incredible, too. And that's all coal. Beautiful.

Now there's one other picture that I want to ask you about. What is this?

This is Area 6. This is the CP [control point] up here. This is down in the heavy equipment yard.

Fuel storage. This is our office, the Safety Office, here. This is it. We're at Yucca Lake.

OK, is in front of the picture.

See, it's right here. Yes, you're looking from across out off of the lake back toward the mountains. That's the CP.

Right, and then you got these beautiful snow-covered hills behind the CP. OK, we'll call that photograph 42. That's really interesting.

Is anything written on the back?

It has a number on the back.

Yes. Those are all Pan Am numbers, I guess, or laboratory. I don't know.

Oh, I see. OK.

But that's Area 6 compound.

OK. OK. Great. This is really great. And you call it "A Mucker's Memoirs."

Yes. And you see this? See the face? The rock is sticking its tongue out at the miners trying to get it down?

And the side is sticking its tongue out at them.

At the rock. Yes.

The rock is. Oh, that's great.

It's called a Widowmaker.

That kind of rock is called a Widowmaker?

It falls down out of the back. He's taking it down close to where—

Wow. That's interesting because they named the highway the Widowmaker, too, didn't they?

Yes.

I wonder if they took it from the mining. And who's this?

Buck O'Donnell. Yes, he was the staff artist for that competitive mining machine—what was it, machinery center? Let me see what the name of it was. It was one of our competitors when I was at Atlas Copco. It was on those other two books you got.

Oh, I see. That book there.

Yes. "The Rhymes of the Mines."

Oh, right.

Yes. Buck O'Donnell.

OK. Buck O'Donnell.

It's the little books.

Where is that little book? Did we leave it in the other room?

Maybe. I thought it was here. No.

Hmm. Then it's got to be in here. Oh, it's sitting inside this other one.

[00:25:00] Was it? See, Buck O'Donnell, he did all the drawings. He did all of these. He did all the drawings for—

That's really great.

Yes, he had a real talent. You ever seen a ship in the bottle?

Yes. [Looking at something]

Yes, that was in the tunnels.

Wow.

There's two miners in the bottle.

Oh, look at this great stuff you have!

A guy broke his leg one time, a miner, and while he was in the hospital—

He made this?

He made that for me, yes.

How do they do that? That's amazing!

That's an old time column-and-bar setup. That's the way they used to drill before they had jumbos.

I see.

That's neat, isn't it?

That's neat. So this would be almost like on a sled going down?

Yes, it just sat on the ground. After they'd get ready to blast, they'd take it out, then come back in and muck out and set it up again. Column-and-bar.

And it would have two sides.

Two drills on it, yes. Yes, I thought that was pretty neat.

That is really neat. And what kind of old bottle is this?

I have no idea.

This is like an old—not a Coke bottle. That is really terrific. These things go well together, too, these three things. So this was the guy's—what was the guy's name who made that? That's not—

Joe Delagadell.

OK. Wow, that's great. I'm going to change the subject. Tell me a little bit about your cowboy poetry. But the question that's related to your cowboy poetry is—when you were talking back

about being in where you grew up, the mining town, you said some of the kids went off and worked at ranches. Did you do that?

Yes. Before I was old enough to go underground, worked summer—what they called day work.

Right. So you ride and all these kinds of things?

Yes, I rode in the rodeos and did all the crazy things young guys do, you know. Before I got married, in between working periodically for PD, for Phelps Dodge, I hired out and quit and worked, you know—young guy, work two weeks and get two weeks' pay and grab another guy and take off and go somewhere. And we'd generally go work on a ranch somewhere for a couple of weeks, three weeks, a month. And we went to Idaho, Montana, Texas, and just kind of bummed around all over.

So you'd be cowboys.

We'd go and punch cows for a while and then we'd come back and go to work at the pit or go to work underground, and we'd work a couple of weeks and say, Well, let's go see what's down in Texas, and we'd take off, just ran around, before either one of us got married. And during that time, you'd go to work on these different ranches. There was always a bunch of cowboys there, buckaroos in Montana or Wyoming, and cowboys in Texas and New Mexico. And these old guys would spout this cowboy poetry, the classics that you heard from the time you were born, you know, the "Strawberry Roan" and "Boomer Johnson" and some of those old poems, Curly Fletcher poems. And you'd hear them.

Well, after I retired I thought, man, I got to find something to do, you know. We were living over on Kathy Court over off of Rainbow and Westcliff. I had a big house out in the northwest and we sold it and sized down. So I decided I'd do some cowboy poetry. So I started collecting the classics that I knew, that I'd heard. And after I got a few, then I thought, well, I

think I'll just put a book together of experiences that I've had when I was a cowboy, different things that happened. So I sat down and started, just made a list of events that I could think of. I worked for the S Bar S and other outfits, and tried to remember where I'd heard the poem, and gathered a lot of classics from different old time cowboy poets. And then of course at that time there was Waddie Mitchell and Baxter Black were doing cowboy poetry, and I knew both of them, and would see them at gatherings. So I started attending the gatherings, as they call them. And they have an annual Arizona cowboy poets' gathering every year in Prescott, Arizona, so I went. Well, at first I went to Sierra Vista, [00:30:00] Arizona to a gathering down on the Mexican border in my home country. It was about forty miles from where I was raised. They have a big gathering there. And listened to the cowboy poets and I go, I'll just write some poems. So I took all these experiences that I could remember and wrote a poem about them. And I thought, well, I'll put them in a little book. Something to do. So I put it together and self-published it and did real well with it, so then I decided I'd do a second one. So I put another one together. And I used those poems in those books, and then I'd also recite the classics from the old time cowboy poets.

Oh, you do.

So I go to the different gatherings and recite cowboy poetry.

You do. How interesting.

Yes. I wrote I think about 112 poems, and then I use probably thirty poems of the classics when we recite. When you go to these sessions, they have different sessions. One is classics only. One is new poetry. One is ranch poetry. One is ranch wife poetry. They got different sessions that they put you in and you go and—And the big poetry gathering, of course, is Elko [Nevada] in the last week of January, is the place to be.

Really? Elko in the last week of January. So that's coming up.

Yes. That's the granddaddy of all the cowboy poetry gatherings back in the late or middle eighties, '83, '84, a bunch of poets, cowboys from Nevada got together at this little gathering in a bar in Elko, and it's grown now to the biggest one in the world. The Nevada Historical Society and the Western Heritage Museum, the things that they put in Elko, they have a real good, big gathering there. But I go to little ones here and there. I've done poetry for the GATE [Gifted and Talented Education] program here in Clark County.

Did you?

All the kids, yes, and all these junior highs and elementary schools. And Nevada Reading Week, I go and do poetry for the kids in the school. And then private things, too. I've been out at Red Rock [National Conservation Area] at the Visitors' Center, and did poetry out there in Spring Mountain [Ranch State Park], and do a few around here. The one I really look forward to is the one in Prescott. I go down every year. In fact, we're thinking about moving to Prescott.

Are you?

Las Vegas is getting just too big.

Yes. Prescott's nice.

Yes, Prescott's nice. I've been there a lot of times. I've gone the last thirteen years to Prescott, every year. New poetry. And I just got the invite for this year, in August.

It's in August. That would be something to see.

It's good. To me that's the best gathering in the United States is Prescott.

Better than the one in Elko.

Yes, Elko has gotten too big. And in Arizona it's just strictly poetry. They have some music, you know, cowboy music.

How do the kids—how do the high school and junior high—how do the kids respond?

Pretty good. The smaller ones, the middle school, are very, very good. Of course, you know, you take your saddle with you, and bridle, and whatever, and put a cowboy hat on one of them and let them read a poem. They do real well. The high school kids, they're too far gone. [laughing] The young ones—and the kids in the GATE program are really—what the teachers have done is most generally they've had them make a four-line rhyming poem, four-line verse, about anything they want to, a kitten or a brother or whatever, and then when they get there I have them recite the poem, or read them. And it's fun with the kids. I enjoy working with them.

But Waddie Mitchell, I've worked with Waddie a few times. He's a good cowboy poet. He went into it, quit his job cowboying and went into entertaining, like Baxter Black, full time.

But that's where I started. I thought, well, I'll just put all these poems together. First thing I had to do is get, as you saw in the book, a little story on how the poem came about, and then make a poem to fit the story. [Bill Beam, *A Collection of Southwestern Cowboy Poetry*, Shadow Rider Publishing, Las Vegas, NV 1993].

I like the way you did that.

And it gives you an idea of where you're coming from. You just pick up a poem and read it, you have the background on how you arrived at it. To me it was interesting.

It was interesting to me, too.

And besides, it fills more pages on the book. You don't have to write so many poems [laughing].

Absolutely. Oh great. That's very interesting.

[00:35:00] Yes. So I thought, well, I'll write those two books. And I started one on hard rock miners of the West and have quite a bit of material, looking at miners that I've known from the

mines in Arizona and California. Hard rock miners, tunnels stiffs, trying to put together a story about each one of them that I can remember.

I would love to see that when you're ready. But I'm asking you, you're doing it as sort of little stories about each individual?

Yes.

That's great.

And then I can remember the time I associated with them, you know, I mean where they came from and where they mined and their family, their kids. Miners were terrible for nicknames, you know.

I've heard that.

And Hose Nose and Flash Gordon and Captain America, you know, all of these guys that I've ran into over the years, try to remember, like those miners in Bisbee when I was a kid. I remember this Flash Gordon was a big, blonde guy, wore a pair of white knickers and white socks and would get out there and box with these other guys on the porch. They'd put on the gloves and whale away at each other, and of course us kids were really impressed with them. That's the best miner, you know, Crazy Horse Pete. Flash Gordon. Some of those guys. Bigfoot. But I don't know if I'll ever get around to getting it all together. And I've read a number of books on hard rock mining and the format is good, and of some of them are too technical with mining geology, you know, and things.

Yes. I've just got a—I'll have to copy it off and send it to you. I got, through the university, a little blurb on a book that someone had written about mining in this area. I'll send you the reference.

I read one book that was about the mine up at Potosi.

I think a guy just wrote it himself, sort of his own history of it, and I just got the notice the other day. It's not something necessarily that I would need to read but I'll get it out for you and I'll send it to you.

Are you going to put poems with your miners?

I hadn't thought about it. There's a lot of mining poems: Ned White, the bard of Brewery Gulch—

The bard of who?

Brewery Gulch, in Bisbee. He's written a lot of poems. Most of his are around the time of Pancho Villa. He wrote one about the raid on Columbus, New Mexico, and "The Red Mare" about the Pony Express people. He was a very prolific writer up in Brewery Gulch there in Bisbee, and he has a lot of poetry out on mining.

I didn't know that there was such a thing.

I've got a whole bunch of his poems. My sister still lives in Bisbee, and she's always finding me stuff, like Badger Clark, the poet laureate of North Dakota. She got me a bunch of material. She also went over to Tombstone [Arizona] and got me handwritten depositions of those people involved in the OK Corral.

Really?

Yes. Wyatt Earp. Doc Holliday. C.S. Fly, the photographer. And a miner's wife. There's about fourteen handwritten depositions. She made me copies of them. Got them from the courthouse, the old courthouse in Tombstone, or city hall, and sent them to me. It's neat reading through them about the OK Corral.

That must be interesting.

The aftermath of the OK Corral gunfight.

Right. How interesting is that. So these are the depositions of the aftermath?

Yes.

How interesting.

It was really, really good.

Because I said I had been to Bisbee and that was that same trip, must've been twenty—ten years ago, we went through Tombstone—

Made the loop?

And did that whole thing, yes.

I was born in Bisbee, Arizona and Connie [wife] was born in Nogales, Arizona. And we were both raised in Bisbee.

So you knew her from when you were a kid?

I knew her sister. Her sister's the same age as me. When I was a kid, I didn't know Connie.

Connie's four years younger than I am. I went to high school with her sister.

The OK Corral thing, I was really excited when I got those handwritten depositions of what they saw at the OK Corral.

But no, I hadn't thought about miners' poems, and probably if I did put any, I would use [00:40:00] Ned White's, get permission and use his poems, from his heirs. He was a very prolific mining poet.

Interesting. It's very interesting how—and we were talking a little bit when we had the tape off—the way the miners when you were growing up, the way you kids would look up to them.

Oh yes, that was our heroes, miners. You know you'd hear somebody say, Well, Crazy Horse Pete Ivanovich, he's the best mucker, or the best timber man. And then when we'd see Crazy Horse Pete—and most of the miners were of Serbian descent, Vukonovic, Blagovic,

were all—and a lot of Cousin Jack, Cornish miners, in Bisbee, Englishmen. And there was always kind of a rivalry between the Serbians and the Cousin Jacks, the English, you know.

You called them “Cousin Jacks”?

Yes. You know why they call them Cousin Jacks?

No.

When the English miners from Cornwall first came to the United States, they would get a job, and after they—they were such good miners, particularly in hard rock, the boss would ask them, You know anybody else that needs a job? And they'd say, Oh yes, my cousin Jack. And they'd have somebody come over from England and get a job. There was a large Cousin Jack element in Bisbee, and it was right on the Mexican border. There was a large Mexican population and a large Cousin Jack population and a large Slav, groups, three, and they were all competitive. And the one good thing about it is as a kid, you know, you played with all the kids. One time you'd go in and you'd get a chicken pot pie or a pasty in Pinky's house, and the next day you might go down to Tarin's house and have a taco and, you know, beef and—it was a very mixed community. And everybody worked for the company. I mean there were businesses but, you know, the company ran your life. And you were fortunate you had medical and you had the company store and prices were low and they paid on payday, you got your check minus what you had spent at the store or your house rent. But you know your house was like twelve dollars a month. And they used to—the sheriff, when you got old enough to drive, as soon as you got your driver's license, how he knew you got it and other than seeing you driving, he'd stop you and tell you, If my light ever comes on behind you, you stop, put your car keys on the roof, and if you don't I'll shoot you. Scared the devil out of all of us [laughing].

[Laughing] I guess. But I guess you all did it.

Oh yes, there was no question, right or wrong.

During the war, World War II, a lot of the miners got drafted, so they brought in a bunch of soldier miners. These guys were in the Army and most of them were from the coal mines in the East. They built a project and they moved all of these miners in, these soldiers in to mine the copper. And those people were from back east, and they were strange to us. I had some buddies from the coal miner guys, but they were weird people compared to the people in Bisbee. And they would work in the mines and if they get mad and want to quit, they'd just send them back to their unit. They were still soldiers, you know, soldier miners, during World War II. Yes, it was quite a mining camp. It was booming.

It's funny they didn't—

Leave the miners that were there.

Draft the miners that were there—

I guess when your number came up, you went.

You went wherever, and then they had a unit that came in and mined.

They brought in the soldier miners.

Interesting.

But there were about five or six shafts going. The old open pit was not operating during the war. But after that, in the fifties, they decided they would strip that and mine the copper open pit. So that's what happened. That's when I went to work in the copper mine.

Right. You mentioned World War II, and there had been one other question I wanted to ask you about the test site, and then we should probably wrap it up because you've given me a lot of your time. Speaking of the war, to what extent, or do you at all think about the Cold War atmosphere while you're working at the test site? How much of an element is that in your own life?

[00:45:00] I think probably you realize, and I know I did, realize that what you were doing was hopefully helping to prevent a nuclear war. I guess in the back of everybody's mind you always thought, well, if we have the capability and the best and the latest weapons, we're one up on them. I know that they say there was an arms race but, you know, you never really thought about that. You thought that what you were doing was keeping them from firing at us, because we had the ability to retaliate. I don't ever remember thinking that we have a first-strike capability. That never entered my mind. But I always thought that what we were doing was helping preserve the safety of the people in the United States. I know every time we had a shot and it was successful and we understood—we weren't privy to the information, you know, but we understood that they either got what they wanted or they didn't, that was common knowledge, from the test.

You would know that much.

We knew that, you know, through the grapevine: . Oh man, we got lots of data, or we got everything we wanted, or we've got to do this. You would just among yourselves talk about it, and go back in and make a reentry and, Oh man, you know, So-and-so was really happy he got what he wanted. He's been bugging us all this months leading up to this test and jumping on this and that, and he's happy. So we had a sense of satisfaction. And the good thing about it was you could see the results of your work once a test was completed and you put in sixteen, eighteen months on a test, a number of tests going on at the same time, because we were all over the test site, not just one location. It's worth it. And nobody complained about the long hours. Nobody complained. I know guys would go out there and stay a week and their wives were trying to handle the kids, and everybody was really, really dedicated. And I think as far as work ethics—not because I'm from mining—but I think I the work ethic of the miner was the greatest of all of the people at the test site. No matter what came

up, they could do it, you know. One way or another, they'd get it done. A lot of times a lot of labor, physical labor.

But I'm sure now that things have changed in the last ten years. I'm sure that a lot of things have gotten better, better protection for the people, you know, I think people are more conscious of their hearing, more conscious of their lungs, and safeguards have been put in place, and I'm sure the industrial hygiene people are taking care of things that should've been taken care of years ago. Radiation safety—I think the RADSAFE people did a good job. I really do. I always had confidence in the RADSAFE people. If they said, *That's good*, that was good, you know, you could take it to the bank. Just like if a miner said, *Well, yes, you can walk out in that tunnel, the back's good, don't worry about it*, you could take their word for it. There was a lot of dependence on the other people working around you as to what was going on. And they were just a great bunch of people, everybody that worked at the test site. There was no, that I'm aware of, was no difficulty between—other than crafts, you know, but they're all [laughing], you know, *That's my job to change the light bulb, or this or that*. That's to be expected. Everybody that I worked with worked hard, put in a lot of long hours, a lot of extra time, a lot of inconvenience for them and their family, but they hung with it. And I think those were the best years of the test site.

You're saying things about the character of the miners, but to what else do you attribute this kind of dedication that was going on out there?

I don't know. I think when I was out there, the purpose was to get the tests done, get the [00:50:00] information to whoever wanted it or needed it, and to get it done in as timely a manner and as safe a manner as possible. And I think they succeeded at that, everybody that worked on the test site. You know, the guy that got you the bag of bolts from Mercury to Area

12, his job was just as important as the guy that pushed the button. And everybody had, I think, deep consideration for it, because everybody was in the same boat. You'd get in the mess hall at night, you knew everybody was the same, because the lab people were no different than the day laborer or the cook or the baker, miner. Everybody, it seemed to me, to be so much difference in the people that they got along extremely well. Oh, everybody'd have hair-pulling sessions and stuff, you know, it was normal, but they—to me that was amazing. I mean I would go and make a report to a guy that had three Ph.D.s and he treated me just like anybody else, you know, and he understood where I was coming from and I understood where he was at. We were able to communicate with great success, I think. But it was enjoyable working with all of the people there, the laboratory people and the other disciplines. I had a lot of interface with medics because we were worried about if a guy comes in, when's he going to be back at work, or is he going to be off, you know, we had concerns, too, just like the project manager, Am I going to get my guy back tomorrow or—? So they worked real well together.

I didn't get up to Amchitka [Alaska], to that test. I trained the miners that went from Area 19, the drill hole shafts, to the Amchitka operation. But [Frank] Solaegui went up there and some of the other guys, Wally Beaman—but I didn't get to Amchitka. They would, of course, come back and they were all excited about that Cannikin event. That was kind of neat to listen to their tales of Alaska.

Yes. Frank Solaegui and—

Yes, Solaegui's a nice man. I worked a lot with Frank. But all of the people at the test site were very good.

Well, great. I think we can stop there for today.

All right.

Thank you very much.

You're more than welcome.

[00:52:54] End Track 2, Disc 2.

[End of interview]



1 Portmanteau setup for reentry



2 Group with Bill Beam discussing down hole



3 Down hole repair with Joe Dehart



4 Mine rescue training team with Beam and Cunningham

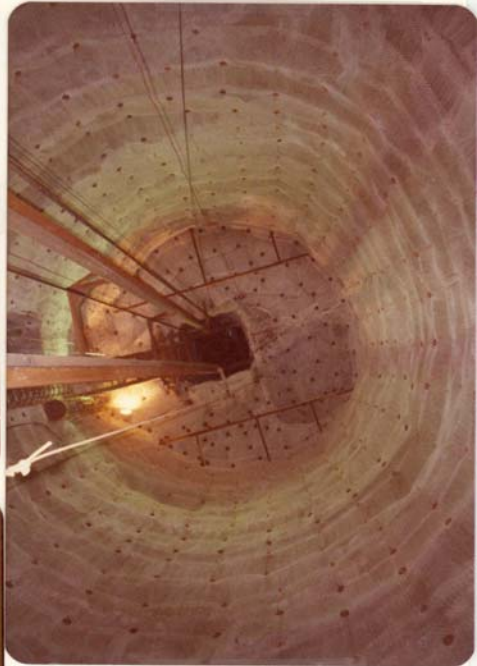


5 Mine rescue training team Pan Am photographers



SALT MINE -
SPRO-

WEEKS ISLAND LOUISIANA



5a Salt mine Weeks Island Louisiana



BEAM & NASH



RICH CHAMBERLAIN - UNION CARBIDE



EARNE PERSON - UNION CARBIDE

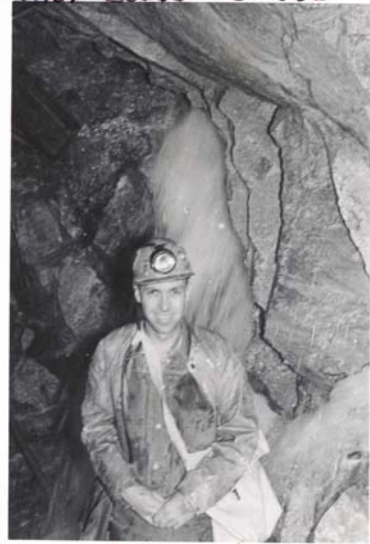
6 Bishop CA with Bill Beam and Willy Nash

EASY GOING TUNNEL



JACKSON, DOBIE, BLATTNER, PRESTON

EASY GOING TUNNEL



BEAN

EASY GOING TUNNEL - BISHOP, CALIF



AL DOBIE - JR. JACKSON & BOB BLATTNER



PINE CREEK MINE



BISHOP, CALIF.



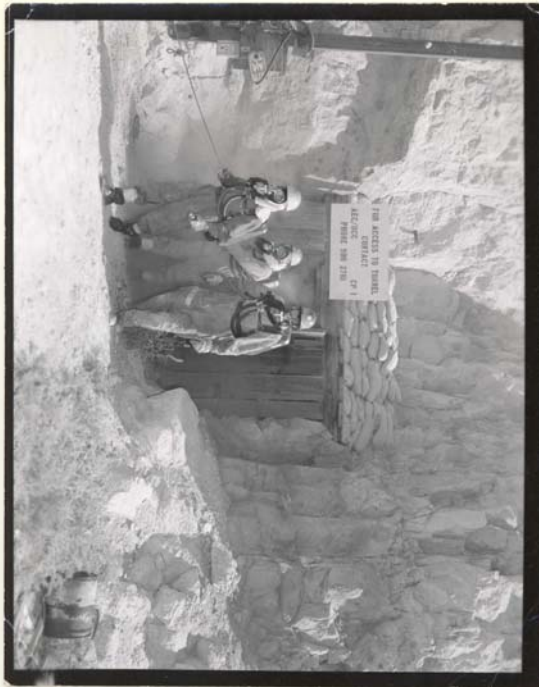
6a Bishop mountains and mine



6b Mine rescue training in Area 6 Area 3 Area 20

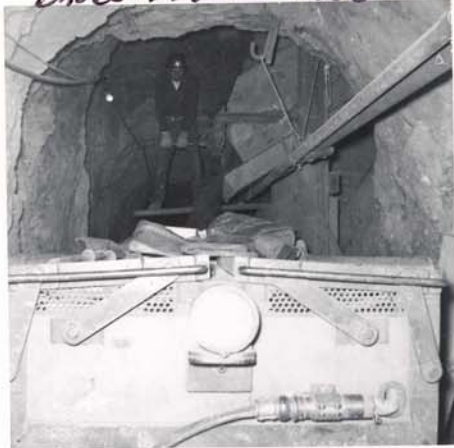


7 A Tunnel and mine rescue training with gear



8 A Tunnel mine rescue teams

DARWIN MINES - 1965



MAY
• 55

Bill Beow

CHARLEY STOLL'S DIGGING'S



MAR
• 57

RED MOUNTAIN, CALIF



MAR
• 57

9 Red Mountain mines near Randsburg California



9a NTS mine reentry



JOHN PARKER - 1968 - Dorm "D"

VIC HOWARD - LIL JOHN - BENIM



1968 - Dorm "D"



TOUCHBERRY - CORNELISON - SHEPPARD

1971



1967 - MERCURY

1971 CORNELISON



UIC SHAFT 1971

UASTHANTAY



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73146



#4-B

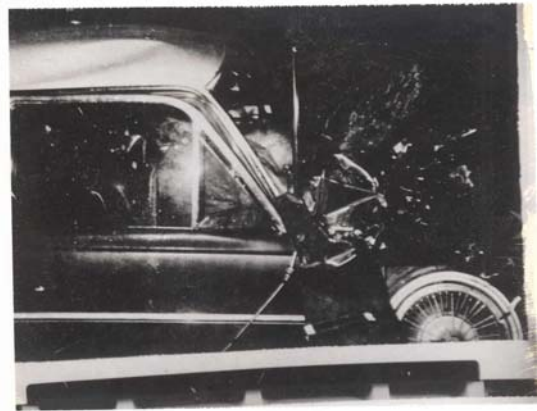
U3BF



#2-B



12 Crane collapses and accidents



U3EV- ISOM (RAD SAFE)



13 Car and crane accidents



14 Area 19e miners



15 Area 19e snow levels



16 Pan Am photographers with gear



17 REECo 30th anniversary

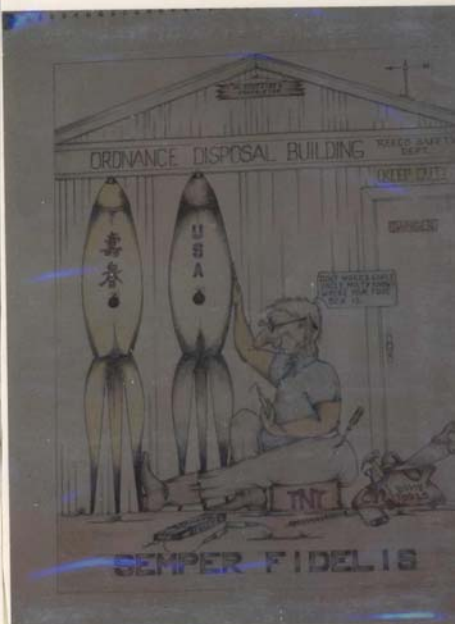


Street Scene - Bisbee, Arizona

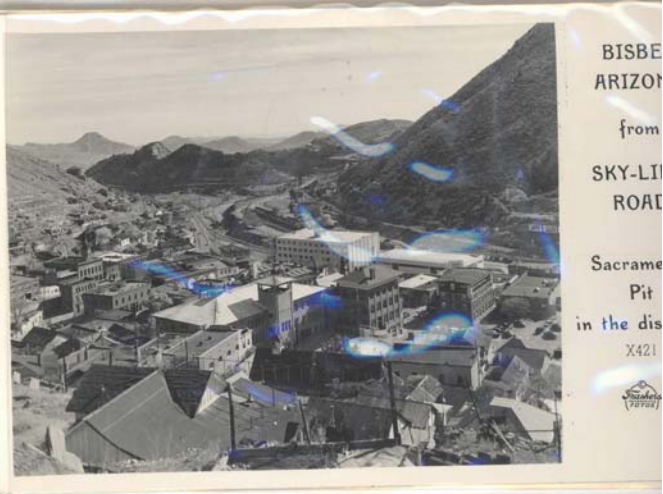
6-V-50



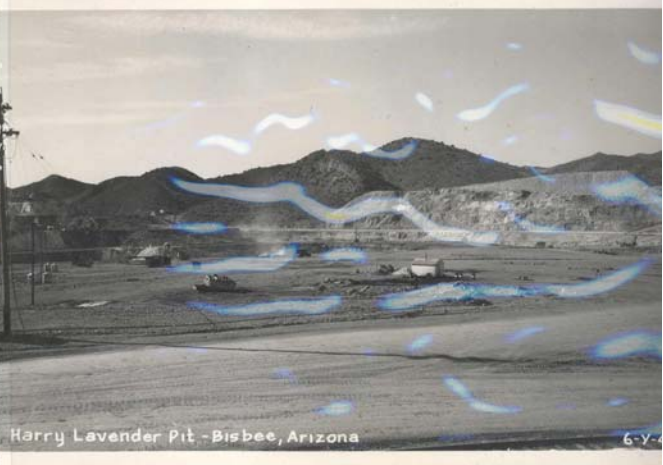
View of
BISBEE
ARIZONA
from above
BREWERY
GULCH
X420



18 Bisbee postcards and Las Vegas atomic postcard



BISBEE
ARIZONA
from
SKY-LINE
ROAD
Sacramento
Pit
in the dis
X421



Harry Lavender Pit - Bisbee, Arizona

6-7-4



BISHOP, CALIFORNIA

1960

19 Bisbee postcard Bishop mine group photo Las Vegas atomic blast postcard



20 Mine rescue cage



21 Setting up mine rescue cage



22 Checking equipment before mine rescue



23 Mine rescue entry dry run



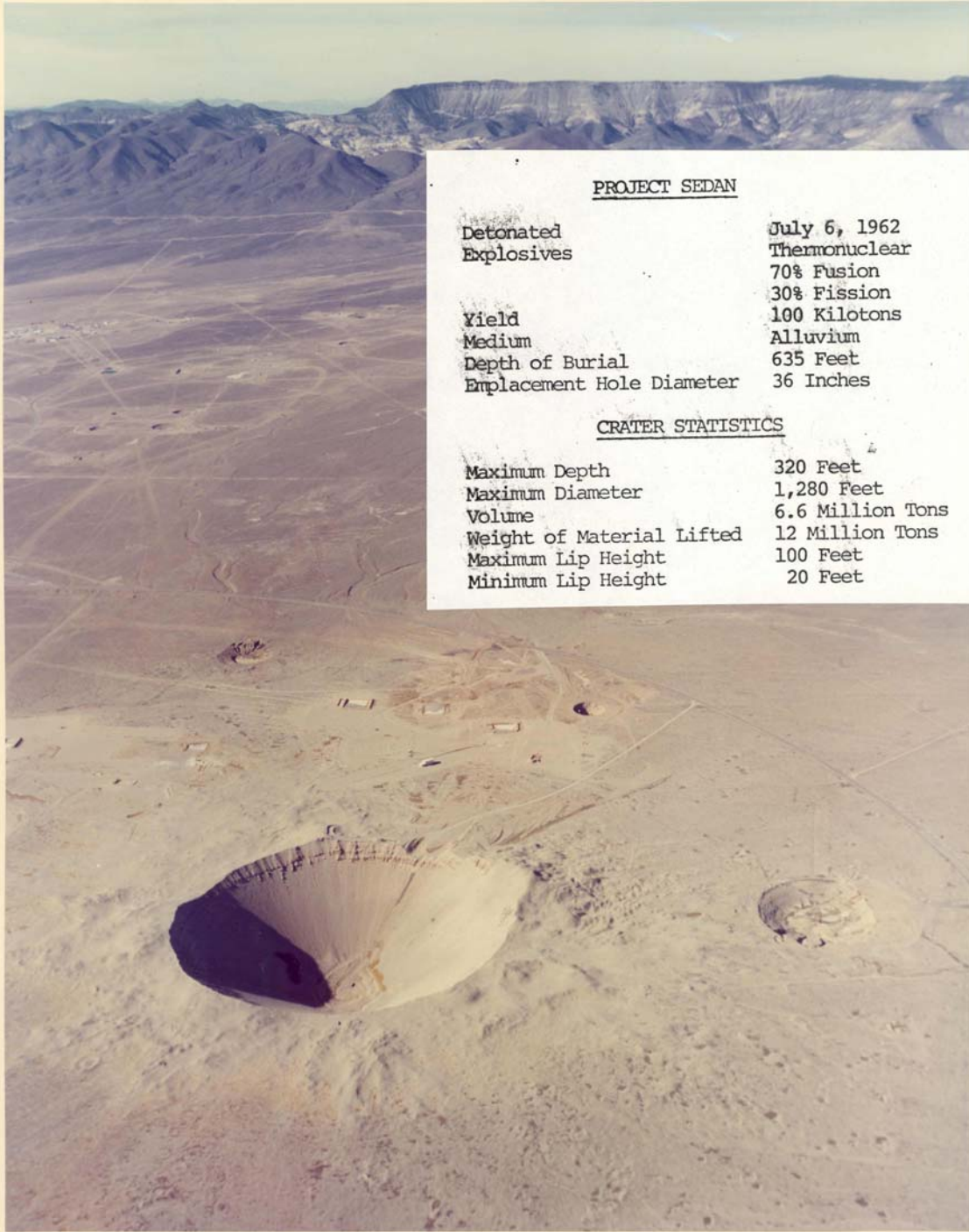
24 Waiting to go down for mine rescue



25 Getting ready to go down hole



26 Rescue cage with drill hole stamp



PROJECT SEDAN

Detonated	July 6, 1962
Explosives	Thermonuclear
	70% Fusion
	30% Fission
Yield	100 Kilotons
Medium	Alluvium
Depth of Burial	635 Feet
Emplacement Hole Diameter	36 Inches

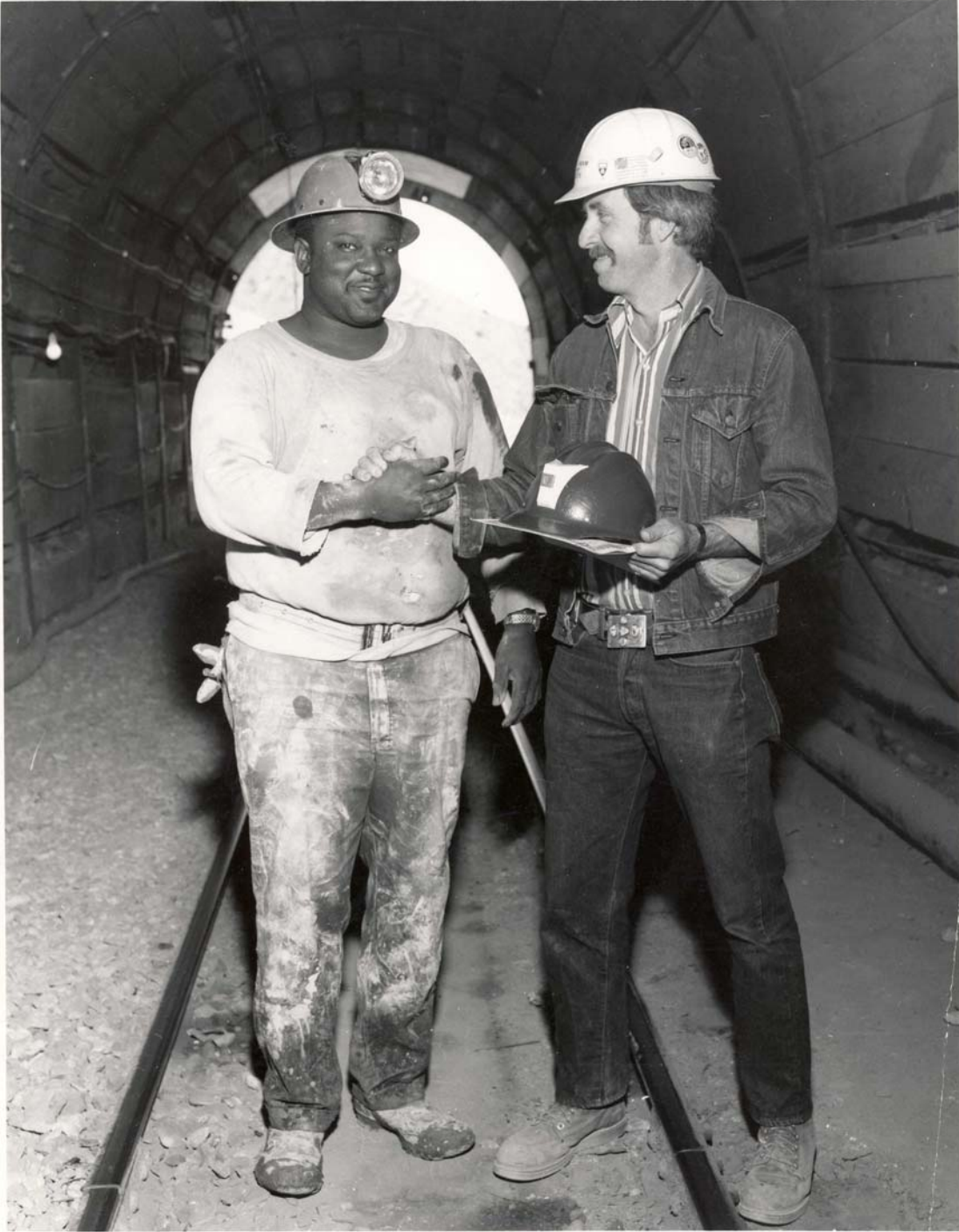
CRATER STATISTICS

Maximum Depth	320 Feet
Maximum Diameter	1,280 Feet
Volume	6.6 Million Tons
Weight of Material Lifted	12 Million Tons
Maximum Lip Height	100 Feet
Minimum Lip Height	20 Feet

26a Sedan crater



27 Group photo with Galen Adair, Bill Flangas, and Bill Beam in center



28 Willie Virgil and Bill Beam



Reynolds Electrical & Engineering Co. 3 3 9 9 - 8

29 REECO field operations group photo with Galen Adair, Bill Beam, and Bill Flangas



30 MX missile crane



COLLIN DUNNAM

Dunnam Named New Director of Safety

Collin Dunnam, who has been Acting Director of REECO Industrial Safety since December of 1967, recently was appointed Director of that division. He has been employed by REECO since August of 1965.

Dunnam, a graduate of Texas Tech, where he earned a degree in Personnel Management, has an extensive background in Industrial Safety. Before coming to REECO, he was Safety Director for the city and county of Denver, Colo. He was Safety Training and Maintenance Coordinator for the city of Lubbock, Texas, from 1958 until March of 1965.

His first position at REECO was as Chief of Records and Analysis in Industrial Safety.

The new Safety Director's education has included completion of correspondence courses from Texas A & M in personnel relations, communications, employe training and fundamentals of supervision. He also completed courses presented by the International City Managers' Association in local planning administration, municipal recreation administration and supervisory methods in municipal administration.

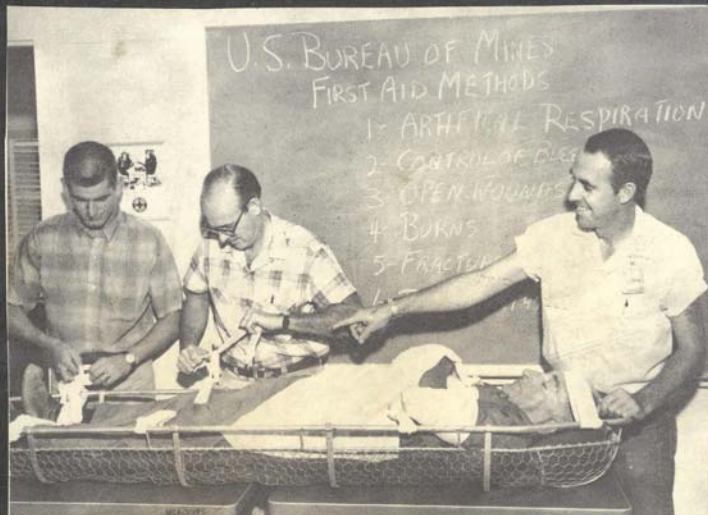
Dunnam was a Parachute Rigger 2nd Class in the United States Navy. He is a member of the American Society of Safety Engineers, and was first president of the Southern Nevada Society of Safety Engineers, which he was instrumental in organizing.

MINE RESCUE CLASS COMPLETED

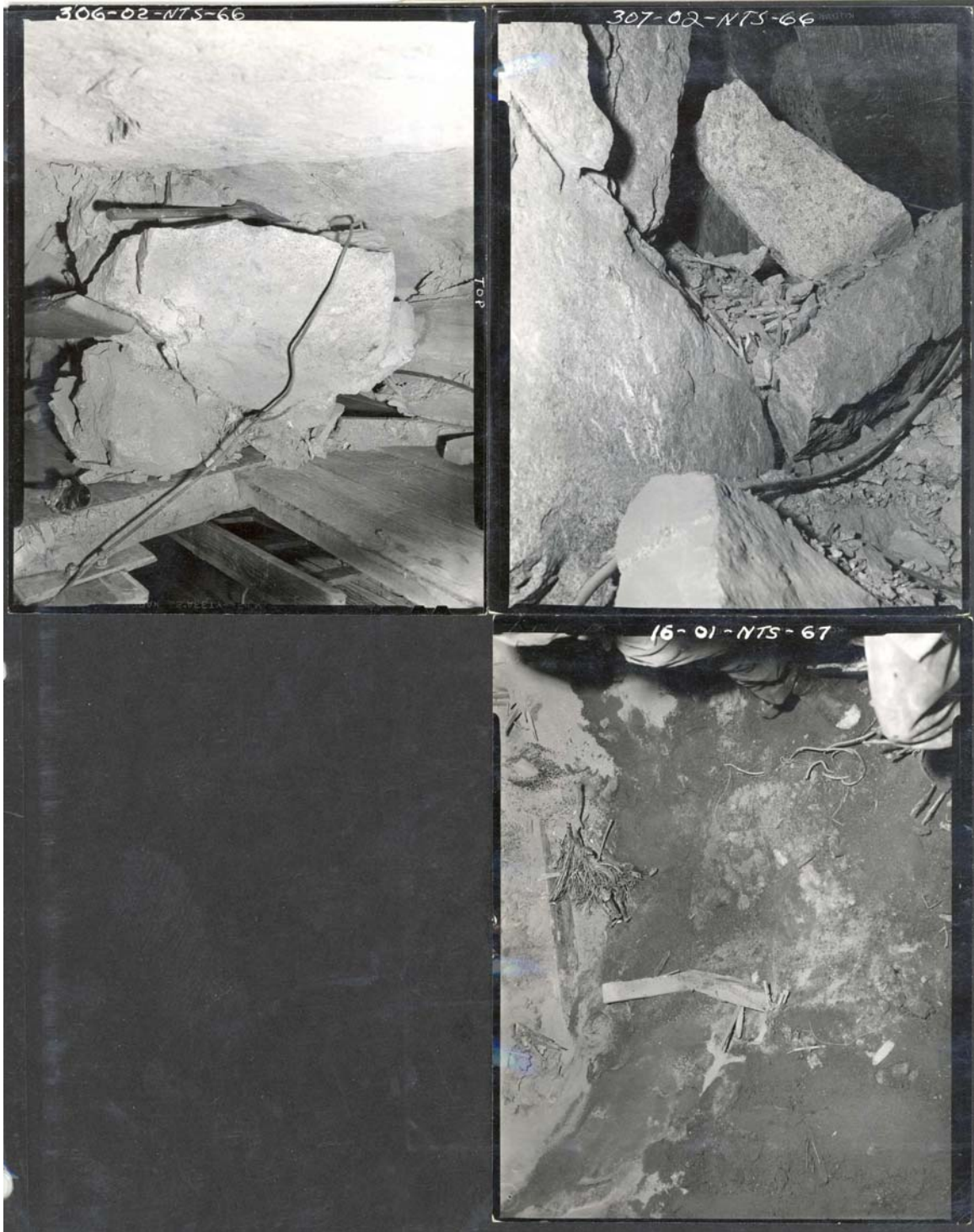
The last class of 1968 in mine rescue operations and McCaa rescue breathing equipment was conducted at the Area 12 mine rescue station during the week of October 28 - November 1.

The course was conducted by Safety Engineer William Beam and Bureau of Mines Representative H. J. McCreary. Twenty-three men completed the work, which included both classroom work and field exercises while wearing a 42-pound pack of equipment.

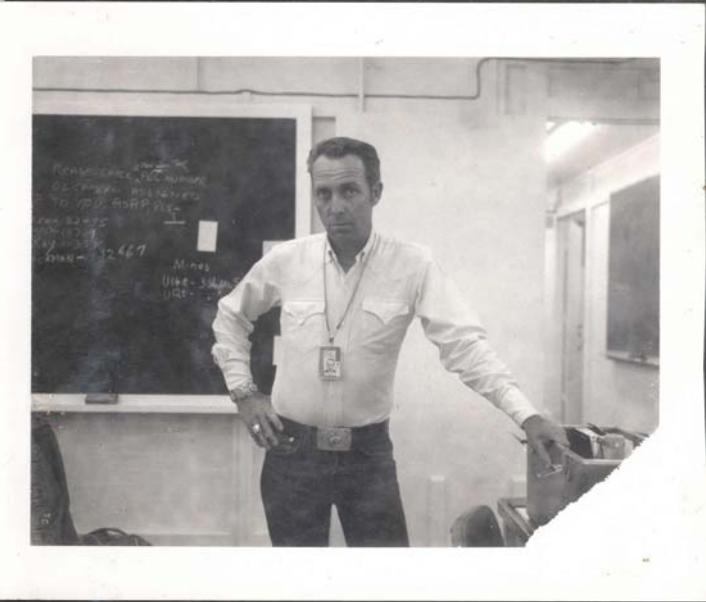
Another class is being planned for the first part of 1969.



Participating in a recent Mine First Aid Training session were John D. Cornelison, left, and Glenn L. Yankell, center. Instructor W. B. Beam is at right. "Patient" is Milton W. Schreiber, another student. All are REECO employes. The training session included artificial respiration, a comprehensive study of emergency first aid techniques, and transportation of patients.



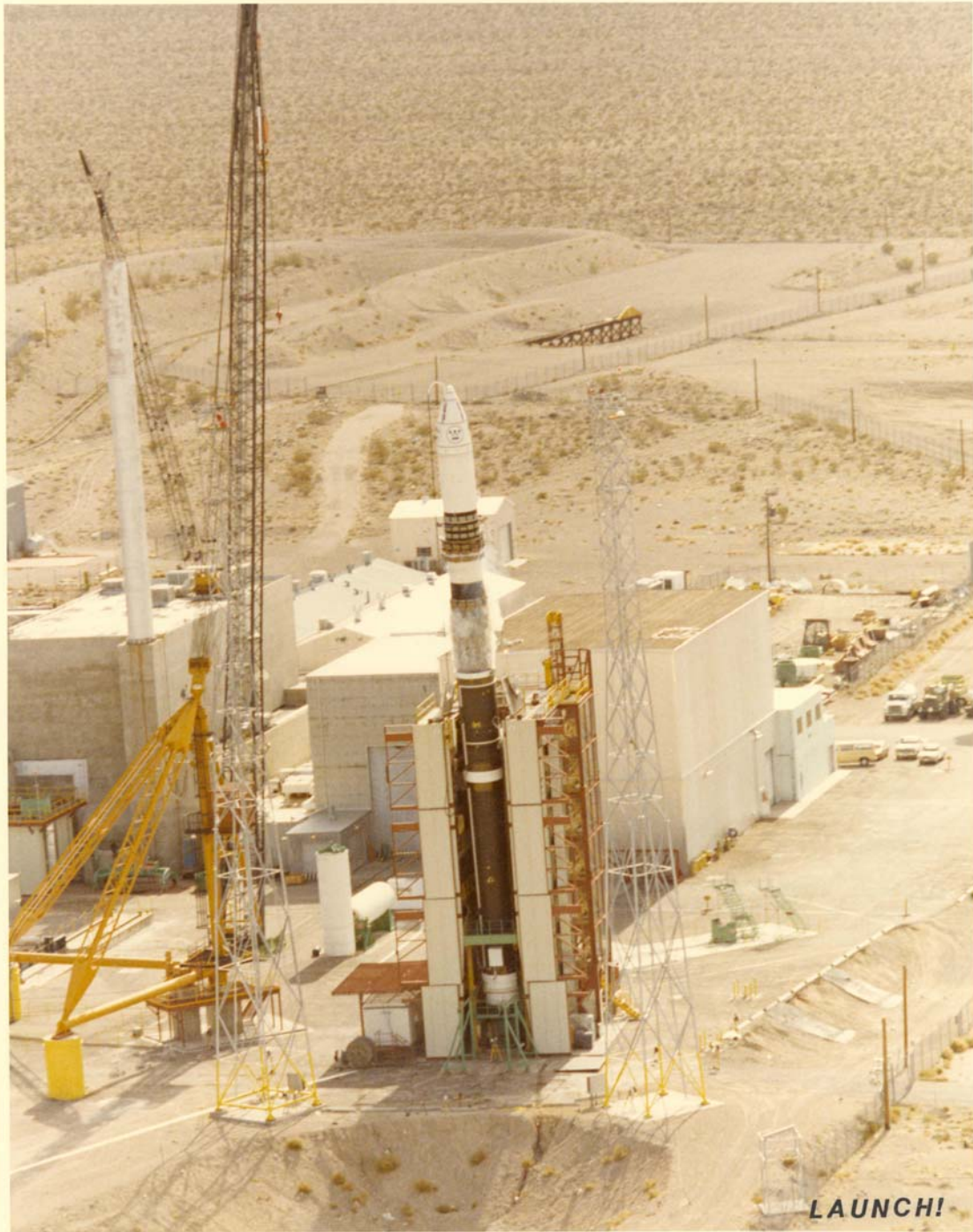
31 Pile Driver after event



32 Going down hole after an event



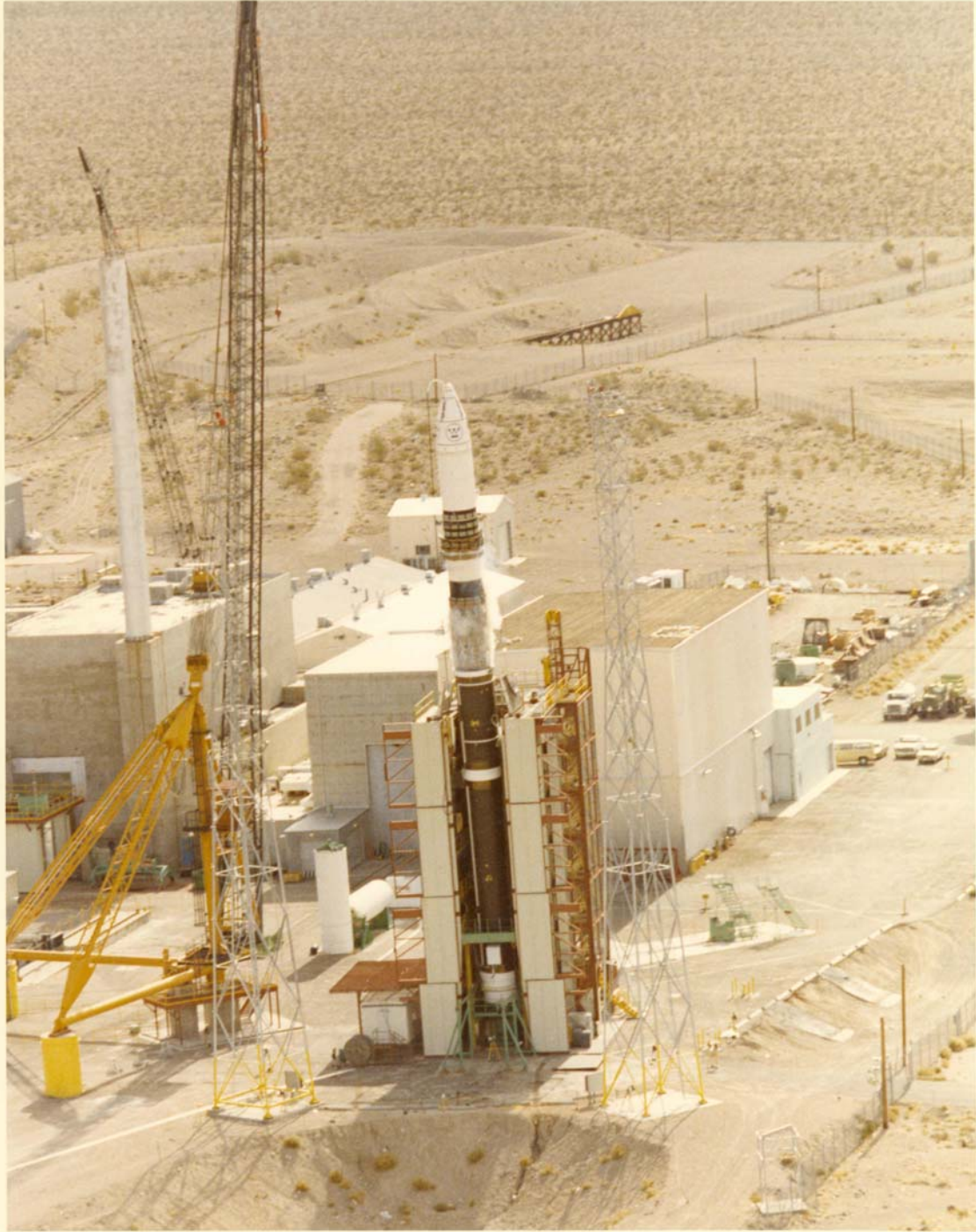
33 MX missile tower



34 MX missile in tower



35 MX missile exiting tower



36 MX missile in tower



37 MX missile close up



38 MX missile tunnels



39 MX missile A Tunnel



40 MX missile section of concrete pipe



21-07-NTS-67



488 A NTS-67

PILEDRIVER - 1967
CLIMAX SHAFT - AREA 15

41 Area 15 Climax Shaft Pile Driver



42 Arial view of CP



Certificate for Misty North William Beam