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

Interview with Peter Zavattaro

May 31, 2005
Las Vegas, Nevada

Interview Conducted By
Mary Palevsky

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Mary Palevsky: *Peter Zavattaro, thank you so much for meeting with me today. And I thought we could begin by having you tell me a little bit about your background, starting with your full name, your place of birth, your date of birth, and something of your education and how you came to be working for EG&G [Edgerton, Germeshausen, and Grier].*

Peter Zavattaro: OK. My name is Peter Zavattaro. I was born in Weehawken, New Jersey, overlooking the entrance of the Lincoln Tunnel, June 26, 1937. I went to college at Stevens Institute of Technology, which is in Hoboken, New Jersey, so I could be close to home. When I graduated from college, I was looking around for a job, like all new graduates, and EG&G came down to campus and was interviewing. This was the first time they went to a college outside of MIT [Massachusetts Institute of Technology]. Most of their engineers came from MIT because of their association. So they hired about four of us from my graduating class at Stevens.

What was your degree in?

My degree was a bachelor of engineering. At Stevens you get four years of mechanical engineering, whether you like it or not, and my specialty was electronics. So instead of taking an M.E., I took the bachelor of engineering. I could have taken either degree.

I was hired on at EG&G during the moratorium, so at that time they were looking to get some new blood into the system to look at commercializing some of the equipment that they used in the test program.

OK, and what was the year?

Nineteen fifty-nine. I moved up to Boston and went to work for this small company. It was like a hundred engineers in total working for EG&G at the time. They had the office in Boston and the office in Las Vegas. And just as I joined EG&G, they opened an office in Santa Barbara [California] also. The Santa Barbara office was a Barney O'Keefe idea. He found a fairly creative marketing type called Sandy [Sanford C.] Sigoloff who wanted to live in Santa Barbara, which was the main reason why we had an office in Santa Barbara. His logic was, if I move to Santa Barbara I can hire really great people because people really like to live in Santa Barbara. So that's how it all started. It's a very interesting part of the history.

Well, I was working on building a commercial version of our oscilloscope and some pulse generators and things, electronics things. Did a few jobs for Doc Edgerton because he was kind of outside the company and would come in and borrow people every once in a while.

Shortly after I got started in this, we got involved with Los Alamos [National Laboratory] on a project called—well, we were building a system called a Z system, and this was designed to—this was a pre-Vela [Uniform] activity and it was designed to look at air fluorescence of a nuclear burst out of space, out in the outer atmosphere. The X-rays would impinge on the atmosphere and light it up at certain precise wavelengths. So we built this system to look at that. And it was deployed around the world. We also built some other systems, again to detect clandestine testing by the Soviets [USSR] because everybody thought they would try to sneak in a few tests. They surprised us. They just waited till they were ready to have their test areas and said we're going to start testing and they did.

So I worked on those systems more related to Vela for several years. I got tied into Los Alamos pretty well. The lead scientist from Los Alamos was somebody named Don Westerfeld, so I worked with him forever, next thirty years or so. And we built all these systems which

[00:05:00] were deployed by the Air Force and eventually the designs were incorporated in a satellite by Sandia [National Laboratories], so the Vela satellites which orbit the Earth and look over things were all part of that project.

In ‘62 when the Russians [USSR] broke the treaty, things got really exciting around EG&G, as you can imagine; hired a lot of people, madly went back into testing, got involved in [Operation] Dominic and spent the next six months in the Pacific floating around and flying around.

So let me understand a couple of things. The Santa Barbara office was set up, but did you go there, or you stayed in Boston?

No. No, I stayed in Boston. I stayed in Boston until 1970. And at the time, a lot of the—well, in the sixties, a lot of the engineering, the senior engineering design work supporting the test program, even Las Vegas, came out of Boston. And it was more technical support in Las Vegas. Then they slowly built up their engineering capability to take on a lot of the things that were designed in Boston. But for years, people in Boston used to fly back and forth to Las Vegas on a weekly basis.

So tell me a little bit about Dominic.

Dominic was the Pacific test program and, was kind of a period where we tested, I guess it was over 100 tests, every day almost. And I was supporting a branch of the Air Force at the time. And we had a KC-135 that was filled with instrumentation, cameras, antennas. We looked at electromagnetic pulses and photographed things. And we flew on the airplane. Whenever there was a test, we would fly down to Christmas Island or wherever the test was, collect data, and fly back. Lived in Oahu, so we worked out of Hickam Air Force Base [Hawaii] for months and months.

In July of ‘62, I think it was ‘62, [07/09/1962] we started the high-altitude series, which the first test was Starfish. Starfish was a large-yield device, 400 miles up or something. It’s in the book someplace. [DOE/NV—209 Rev 15 December 2000]

But anyway that lit up the whole sky. You could see that the sky turned green from Hawaii to Samoa. It was just spectacular. I had a copy of *Life* Magazine that had that on the cover and I can’t find it.

I’ll make a note of it. Maybe we have it at the library. [*Life Magazine,* July 20, 1962.]

It would be in ‘62; ‘62 issue of *Life*. But after that particular test, there was concerns about what the Russians were doing, and the plane that I was supporting went to Russia. I stayed in Hawaii and took a trailer of equipment, and the government rented a freighter, a Portuguese freighter called *Private Frank J. Petracka*. My trailer was strapped to one of the holds on this freighter and we went down to Johnson Island, and I spent forty-six days anchored off Johnson Island looking at the rest of the high-altitude series plus some atmospheric shots. The shots down there, the famous one was Bluegill because it took them three tries to actually get that successfully fired. The first one blew up on the pad. The second one blew up shortly after launch, so there were parts of rocket motors and things falling down. And the third test was successful.

Now, I know I could look this up, but you’re working for the Air Force. Are their concerns with these tests weapons effects or detection or what—?

Oh, they were detection. Detection. I can’t really go into too much of it, but they were working in association with the labs, and we had a separate contract with the Air Force, and I supported them for many years building equipment and helping them with their work.

[00:10:00] But after Dominic was over, I became more involved with Los Alamos. The first thing that happened after the test series was over was coming up with a readiness program for

resuming testing in the Pacific, and that was called the Future Off-Continent Program, FOC. And I worked on that until the program was cancelled. Basically, it was a clause in one of the safeguards, Safeguard C, that said we had to be prepared to promptly resume atmospheric testing in the Pacific. So they came up with a concept for that exercise. The concept was that to solve some of the logistics problems of the past test series—because weather in the Pacific is really spotty. You never know where you can see things. So the concept was they would have a flying experiment. They would have the drop plane fly and they would have an array of airplanes follow it and they would find some nice clear place in the Pacific and fire the test. So this was the concept, and to support that, each of the labs had designed an aircraft for their experimentation. Sandia had their own, [Lawrence] Livermore [National Laboratory] had their own, and Los Alamos had their own. So they modified these three aircraft, which were called NC-135s, which were refuelable KC-135s, at Fort Worth [Texas]. General Dynamics modified the planes. And I supported—we would go down and we designed the camera mounts and a lot of the stuff that went on the air—a lot of the supporting infrastructure, cameras and things, that went on the airplanes. And then after they completed them, they moved them to Kirtland Air Force Base [New Mexico]; Holmes and Narver designed an array of pad, three pads, for the aircraft, and they were stationed down there. And we had an array of trailers and we staffed it with people from Boston. The first test of this system was called Crosscheck, and we had an experiment. We went out to the Pacific and checked out with a flare and cameras and the whole nine yards to see if everything worked.

And we would do these readiness exercises, which started to get boring really quick; and everybody was concerned that you wouldn’t be able to keep people in the program if they had to just go around and pull film. So the concept was we ought to do something scientific to hold

people's interests. And the first experiments they had were for—if there was a solar eclipse, we went out and looked at solar eclipses, collected data on solar eclipses. And the other thing was aurora. We did a series of experiments called conjugate aurora experiments, looking at the aurora in the Northern Hemisphere and the Southern Hemisphere at the same time and found that they were mirror images of each other. The cosmic rays would come down and would excite the atmosphere on both poles simultaneously. So we did those kinds of experiments. But it got so there wasn't enough natural phenomena for us to look at, so we went into creating our own phenomena, and the first ones were barium thermite bombs. We would shoot it up with a rocket, a barium explosive, and we do this pre-dawn. We'd do it so that the sun would illuminate where the detonation would occur, and the sunlight would ionize the cloud, so we'd get a neutral cloud and an ionized cloud very similar to what you would have in a high-altitude test. So we did a whole bunch of barium experiments.

Where was that, that you did it?

In the Pacific. We did one down in the gulf.

[00:15:00] *The Gulf of Mexico?*

Yes. At Eglin Air Force Base, if I remember. But mostly we went out to the Pacific because we used Barking Sands [Pacific Missile Range Facility] to fire the rockets from Kauai [Hawaii].

So we did that for quite a few years. The program was really very stimulating because we designed a lot of interesting equipment to support this. We built very sophisticated television cameras which would be pretty primitive by today's standards but back in the seventies it was pretty much state of the art. Color television for personal use was almost unheard of. It's hard to believe where we've come in thirty years.

So during the seventies, President [Gerald R.] Ford removed the word "promptly" from Safeguard C, and with that the funding dried up for the FOC program, so that was cancelled. At that time, I was program manager for the FOC program. And during that time, I had moved from Boston to Los Alamos. What happened in that period was we were supporting Los Alamos. I was flying to Los Alamos almost every week, spending like Monday to Friday in Los Alamos and flying home for the weekend and turning around and flying back. It was getting to be tough for the people. What was going on in Boston, supporting Los Alamos, was looking at the high-altitude data. We were digitizing all the thousands of frames of data that we had from the high-altitude tests with very sophisticated digitizing equipment at the time. And the lab felt that the arrangement was too costly to have this interface, so they wanted us to move our resources that supported them to Los Alamos, and that's when we basically opened the office there. I moved to Los Alamos in '70 to set up an engineering department; and I moved about, I think it was thirteen or fourteen people that worked for me from Boston to Los Alamos.

This is a little bit of a diversion but I'm curious. So Los Alamos as a laboratory has made the decision or continues the idea that for that kind of sophisticated engineering, they would have EG&G do it rather than set something up themselves?

Yes.

[Pause for telephone]

So I was saying that the relationship of using EG&G engineers not for everything but obviously for certain special things.

Well, at that time, you have to realize that in the sixties EG&G was almost all weapons tests, and through the sixties; into the seventies they started getting into a lot of other things, and in fact in the late sixties they started acquiring commercial companies to broaden their business base. And

with that, the company started looking like a different kind of company than it did earlier, so it made sense to try to separate. Both the labs and the government wanted to separate out the work supporting them from the commercial side.

I understand.

So through—I think it was about ‘72 when they finally executed the separation where we had a separate contract that was totally captive to the government. Before we would just support them as a commercial enterprise and had our own resources. So when it became captive, then we changed the character of the business quite a bit, and I moved to Los Alamos. We had a few people there, and it went from like twelve people to 150 in a year. And we rented space and caused quite a commotion in the community there at the time.

Why?

You have to know Los Alamos.

I know it a little bit.

Back in that period of time, they just didn’t want any outsiders there. We were outsiders. We were taking jobs and space in the community away from people that really belonged there.

[00:20:00] *Interesting.*

They closed a schoolhouse, and we rented that for our space, and there was protests and all kinds of things.

[Pause for telephone]

I’m sure you’re going to get some calls. OK. So you moved to Los Alamos—

So we moved to Los Alamos, we rented space around town, storefronts and things, and eventually we rented the Canyon School; and had letters to the editor and protests and all kinds

of monkey business going on with that. Finally they accepted us after a few years and we settled in.

But when I was at Los Alamos, when I first moved to Los Alamos, we were still doing a lot of the scientific experiments with the aircraft. When that program ended, we got into looking at how to do things at the test site that would support the same kind of science that they were doing. Primarily the group that we were supporting and that I was personally supporting was interested in high-altitude effects. So we did a couple of underground experiments that had lines of sight to the surface. There was one experiment that I worked on for a year. In fact, that was while the FOC program was still active, I think it was 1967, called Umber [06/29/1967].And I built these huge sixteen-inch-diameter telescopes that were on a station looking at ground zero where we had a line of sight to the surface and a window, and I was looking at fluorescence in that window from the X-rays that would come out. But to build all this equipment took a year because we designed special cameras, very high speed electronic cameras to photograph what we wanted to see.

Now, which division or group were you supporting at Los Alamos?

This was J-10. J-10 was the field division, the real test division, and at that time that was the biggest, the key group. It was headed up by a guy named Herman Hoerlin who was a quite famous scientist from Germany, and he was a very interesting guy. But we supported them. Some of the groups that came later were like J-12 was Pinex experiments, which was just getting started—

Pinex?

Pinex is pinhole experiment, and what they were looking at, this was for underground testing, they were looking at taking a picture underground of the radiation. When they originally did

these, there would be a film pack with filters so they'd get different levels of intensity, and it would be in a tube filled with mud, and they would extract a capsule up through the mud so they'd have containment. And they called those the Mudex experiments, but they were really Pinex. And the things that we were working on with J-12, which was just in its infancy, was to do it electronically, do underground Pinex experiments electronically. So we'd have a TV camera down there that would look at a floor that would be exposed to radiation and give us our image, and then we'd transmit that image up hole before the shock wave destroyed the camera, because it's only 100 feet away. So we were working with very high speed data transmission techniques at that time that now would be a piece of cake, but again we're talking about forty years ago. It was a different kind of electronics then.

And the other group that we supported primarily—both Pinex Group, which was J-12, and Alpha Group, which was J-14, worked mostly with Las Vegas, and we worked mostly with **[00:25:00]** J-10, which was the high-altitude stuff. So J-14, which did alpha, most of their work was out at the test site and with the Las Vegas troops. Again, we were supporting J-10, so when they did a few experiments at the test site, I supported those.

What's your position now [at that time]?

I was the Future Off-Continent program manager, and when the program cancelled I was—let's see, what did I become? Nineteen seventy-eight, about three years later, I became the Los Alamos program manager and moved to Las Vegas. So between '75 and '78, I was assistant program manager or something. I forgot. I worked for a guy named Charlie Hatcher. In '78 we had a major change in management at EG&G. Previously the general manager was a guy named Gaelen Felt, who was an old-time Los Alamos scientist. And he got crosswise with the Department of Energy [DOE] and departed the scene and they changed out a whole bunch of the

management people. And at that time I moved. My boss Charlie Hatcher was going to be the new general manager, and that didn't work out. And in the process of all of that I got his old job, which was the program manager for Los Alamos, and the plan was that I'd move to Las Vegas to run the program so they'd have a better coupling to what went on at the test site. So from '78 to '81 I was Los Alamos program manager, so I was responsible for all the tests we did, all the tests at the test site.

And who was the head of J-Division then?

It went through a few people. Herman Hoerlin, after Herman left, God, I can't—

A whole bunch of people. Don [Donald M.] Kerr was there for a while. Hard to remember all these things. It's been so many years.

So I moved to Las Vegas and was Los Alamos program manager, so I was responsible for what went on in Santa Barbara and Los Alamos. We still had an office in Boston where we made cathode ray tubes to support the oscilloscopes. And merrily went on my way until about 1981 I became deputy general manager, and that only lasted a year and then Bob [Robert] Hammon passed away and I became general manager. So from '83 to the end of the contract, I was general manager.

And so how does that work career wise? You're an engineer, you're developing all this high-tech equipment. At some point you exhibit, I guess through program management you exhibit these management skills that—?

Yes. I guess so.

You don't know? I'm asking from a personal standpoint. Is it conscious on your part that you like administrating or administration?

Well, I never looked at it as administration. I looked at it as running technical programs. So, it became administration when I became general manager for sure, but I got there through having fun running technical programs. And that happens, you know. It happens quite a bit.

I know it does. I was just curious—

But I was obviously successful enough, I exhibited the right mixture of things that I was accepted in that position.

Now your family, obviously, is moving with you from—

Right. We moved from Boston to Los Alamos, spent seven years in Los Alamos, and then to here.

And you have children, I assume, so they're—

Right, yes, they're all in their forties now.

So they're still in school, then, in the seventies when you moved to Los Alamos.

Oh, yeah, when we moved to Los Alamos. We all liked Los Alamos. The kids had trouble **[00:30:00]** when they moved here, some more than—I have three girls and the transition from Los Alamos to here was really hard on them. They were very young when we moved to Los Alamos, so that wasn't a problem. But here, one was in high school and the other junior high kind of thing.

Well, I guess Las Vegas in those days was still pretty much of a small town.

Oh, yeah, it was like 160,000 people or something. We lived down on the east side of town right near—what's the school, Cimarron? Cheyenne? No. No, it was Chaparral.

Well anyway, so that's kind of a snapshot of what I did. Most of the interesting stuff was back in the seventies and early eighties.

So let's just talk a little bit about what you did from the time you become general manager and you're here, and then I have some questions, we can go back to some of the earlier stuff.

OK. Well, one of the things that was high on the agenda, with our growth and our change—space and facilities were a major issue because the DOE had very arcane views of how—their way of controlling the budget was to prevent anybody from getting any more space, because as soon as they got space they had people and they needed money. It's a part of logic that if you needed space, you needed space, and they felt if you didn't get any space, you wouldn't need as much money. That was the basic logic, believe it or not.

So we went through all kinds of things to get space. It became a real issue. We had built a building out in North Las Vegas which has that big tower, and it took us five years to get that started. And it was basically to save money because we were going to do all this site prep downtown instead of doing it out at the site, which is far more expensive. So we had that building. Prior to that, we had all commercial space that EG&G, Inc. had arranged for us. Now we were a captive contract, so it was a different situation in getting added space.

But during my regime, so to speak, we added all kinds of things. We added the Nellis Air Force [Base] RSL [Remote Sensing Laboratory] space, and we were planning to build that on the north side of McCarran [International Airport], but it turned out the land was tied up by Summa Corporation because it was part of the [Howard] Hughes estate. And we played around with that for a year and a half. We had the design and everything, and we could never get release on the land. We were afraid to go to Nellis because we thought we would be second-class citizens out there, with all the activity. Turned out it was the best thing that happened because with the growth of McCarran, we'd have been really second-class citizens if we stayed on McCarran.

Tell me a little bit about the RSL because I really don't know very much about that and what that was about.

Oh, all through the history of EG&G we've been involved with monitoring radiation. In fact, I've got quite a bit of that in my history. But we would fly aircraft; we had helicopters and we had a Martin aircraft. There was a couple of missions. One mission was, we were prepared for, during nuclear tests, to track clouds. That was a big part of our mission. So if there was a venting or something, we had to be able to track the cloud, find out where it's going, what the intensity was, to predict fallout and stuff like that.

And we were also responsible for aerial surveys of the DOE sites. We surveyed all the reactor sites. We took over what USGS [U.S. Geological Survey] used to do for the AEC [Atomic Energy Commission]. They didn't want any part of that anymore, so we were involved in that. We even surveyed the Sierras to look at snow pack to figure out how much water there was in the snow and things like that by looking at background radiation that's attenuated through the snow pack. So we did all of that kind of stuff.

[00:35:00] And in the seventies, we started getting involved with the NEST [Nuclear Emergency Search Team] program, which is the emergency response. And we had already been building radiation detection equipment for our other work. And that's our business, so we expanded on that and got involved with nuclear emergency response work. And as that grew, the space that we had on Sunset [Road] was very inadequate. It was the old Escondido Building. So that's why we needed this fairly new, sizeable facility, which eventually got built. At the time, when I was there, we had thirteen aircraft. We had a Citation jet and we had a whole bunch of King Airs, a whole bunch of helicopters, so we had quite a fleet.

So that's EG&G under contract with the DOE is doing this still, is that right?

Yes. And when the second runway was in at Sunset, we lost all our buildings that were on Sunset, so that was enough impetus to get some additional space. But we never could really do it, like a build-to-suit, designed-for-purpose kind of construction. We basically got the Collins Brothers to build us some buildings on a short-term lease that they could convert in case we ever leave, and we built what was called a B-complex out at North Las Vegas. But it was a strange set of buildings because they were building it like hey, in case these guys go away, we have to do something with these buildings; so it was kind of like a Las Vegas mall rather than an engineering facility.

So we went through this harangue. And I built the building in Los Alamos, so eventually we got thrown out of the Canyon School because it couldn't meet any of the DOE safety standards. So we found a builder that would build that and lease it, and a corporation took on the liability of the lease because the government wouldn't do that.

So we were going around the country building replacement facilities. We had built a facility in Woburn, Massachusetts for the CRTs cathode-ray tubes. We eventually leased space out in Santa Barbara. We built a building out in AVO. So during my—

Where was the last place you said?

In California, at Amador Valley, to support Livermore. See, we were in some old facilities that we leased in the early seventies, I think, near Livermore that were becoming inadequate and we needed more space, so we found a builder that would build us space to lease. But it was all outside the contract because the DOE couldn't give us funding to build buildings, so that became strange but a big issue for us to get facilities to do our work. And the final story was that DOE bought all the buildings that we had arranged for, so they own it all now, so it's all government. Except for Los Alamos, Amador Valley, and Santa Barbara—well, the outlying locations are still

leases, so I guess they're under contract. So that was a sizeable issue. Then during my reign, we went up and down in staffing quite a bit. So it was those kinds of administrative problems we were dealing with.

*You mention in the book [*Zavattaro, Peter. "EG&G: Historic Involvement in the Nuclear Weapons Program." *Las Vegas, NV: NTS Historical Foundation, 2002.] and I know from other things that we've done, about the JVE [Joint Verification Experiment] and CORRTEX.*

Oh, joint venture. Yes.

Can you talk a little bit about that?

All the treaty work and working with the Russians was always involved with verification. How do you prove what you're doing is what you say you're doing? And the concept of verification dates back to the first test ban treaty when we stopped testing in the atmosphere. And they could never come up with a way to stop testing entirely because there was no way you could **[00:40:00]** verify that somebody isn't cheating; there's all kinds of techniques they use, decoupling, *et cetera*, *et cetera*, masking it with natural phenomena and things like that. So verification always became an important issue. And the one treaty [Threshold Test Ban Treaty] that we had was the yield had to be under 150 KT [kilotons]. So the idea is how do you verify that it's under 150 KT with any degree of accuracy? And there was a resistance to any kind of concept that would be invasive to the test. And the way you measure yield, one of the most basic ways is what they call hydrodynamic yield, and that is you measure the rate—growth of the fireball. We used to do this in the atmosphere with photographs. You look at the fireball growth and there's a formula that you apply to that and it tells you what the yield is, and it's fairly accurate. What we were doing is basically doing this underground because the fireball does grow

underground, just like there was no earth there. And we had a technique called SLIFER that had an oscillator down hole that would look at the growth rate of the fireball—

SLIFER?

SLIFER, it was called.

And it was kind of like the approach we'd want to use, but it was too invasive for the technique. And a guy from Los Alamos, Dr. Don Eilers, had the concept of doing time domain reflectometry, and we built the system for him, for his concept. And what it involved is just having a bare cable run down the hole and we would send a train of pulses down and look at the return signal, and you could measure the growth rate of the fireball that way. And that became CORRTEX. And we built a whole bunch of systems and we sent a bunch to Russia so they could take them apart to make sure we didn't have any ulterior motive. And that became the standard that allowed the treaty to be verified. And it was used on all the tests. What they would do to make it truly uninvasive is to drill a separate hole, a pilot hole, alongside the main hole to run the cable in. And the interesting thing is when we went to Russia. The Russians don't drill as good as we do, and it turned out we had to send a drill rig over to drill the pilot hole. And they were absolutely amazed that we could drill a pilot hole to follow their main hole as it screwed down, so we could do the CORRTEX experiment. So we sent the drill rig and everything over to Russia.

So that was to follow their hole that had the device in it.

Their hole. Right. The main hole.

Oh, interesting.

So we did the same thing over here, and we both had CORRTEX gear to look at the signals and verify the yield.

Now, on the JVE, did you actually go to the Soviet Union?

No, I didn't go.

So the way it works, then, is these experiments are done one in the Soviet [Union], one each, and then you show that CORRTEX accurately verifies the yield, and then you know that it's possible to verify each other's yield?

No, they agreed that it would accurately verify the yield, and it was just to verify the yield of that particular test.

Right. OK.

[Recording is paused turned back on.]

So you know what the yield is supposed to be. It's verified through CORRTEX.

Right.

And then you know that you can—?

So the agreement is if we ever have another test, if we resume testing, the Russians can come over here and monitor the test. They will be given the opportunity. They don't necessarily have to come, but that's the way the treaty is written. They really like it here, so they'd probably come.

Now, were you on site or on the scene when they came here?

Certainly. When we tested here, I generally went out sometime during the test preparation activity for every test.

What were your impressions? I ask because I have a student who's probably going to do her **[00:45:00]** *master's thesis on the JVE. She's interviewed a lot of people about it, so any other tidbits that you might be able to tell me about that would be useful to her.*

Well, they were very smart scientists. They were very competent in what they did. Other than they spoke Russian, it was hard to tell them from the Los Alamos types. They were true scientists, and they did their thing. There wasn't any political agenda that you could tell. It was really a lot of fun working with them.

They had strange impressions of the United States. They just couldn't believe some of the things they saw when they were here. We took them to a supermarket, it was a Smith's or something, not any special one or anything. They thought it was staged. They couldn't believe that Americans had stores like that that they can go and they had all this stuff there and just.

Amazing. Yes, lots of stores. But of course, I guess, coming to Las Vegas, too, that must be an interesting impression of America, too.

Oh, yeah. Right. But they took them out to see some of the non-Strip kinds of things. They took them to see Siegfried and Roy, too.

That's right, I heard that story. And from the point of view of the test site, having been secret, there was on your part, I guess, as a manager, are there concerns about security? There must be.

Well, there's not much to see. There really isn't. And the scientific equipment we use is not classified, you know. The device itself, that's classified. But there's not that much that's—you go out to the site now. They would classify ground zeroes. In the normal testing, the ground zero area would be classified. You'd have to have a Q-clearance and clearance to be able to get into where all the instrumentation was and all of the stations and walking through the stations which, if you were smart enough, you would be able to determine something about the test, but you'd have to be pretty smart. I really don't know who would be able to do that. But that was the idea. And of course you protected the device itself and all of that, but other than that, there's not much that you could glean from going out to the test site. Now, there's no fence around the test site,

and if somebody wanted to walk in, which some have done, they can do that. But they're not going to find much. They're not going to find secrets that are of any use at all. This is kind of like the field test. Where the real secrets are is where they design the weapons and things like that, and that's not at the test site.

That's interesting because I've wondered about that when I've gone out, as well. I mean it would be so difficult to figure anything out on the test site, it seemed to me as a layperson.

Even if you know—like I don't think I could determine what was going on on the test site if I went through the stations, say, right now, today. You get a few ideas but nothing that would ever classify as secret information.

Interesting. So that's good. I wanted to ask you about the JVE. And that's '88, I guess.

Yes.

So take me into the years up to the end of testing and what happens with EG&G and what happens with you.

Well, we stopped testing in September '92. That was Divider. And then after that, it was kind of like [we thought], well, we'll probably resume testing in a year or two. I didn't think we'd ever resume testing.

You didn't?

No.

And did others? You were saying there was—

Oh, a lot of people did.

Why didn't you, though?

Once you stop, I just didn't believe we'd have the political fortitude to resume testing. There was a lot of resistance to testing, and once the Russians were no longer our main opponent, I figured

[00:50:00] it was all over because there was no reason, there was no driving force anymore. The Russians were the driving force and you take that away, there's really no driving force anymore. *Did you have an opinion about the wisdom of that in the larger view? Did you think we should or shouldn't?*

Resume testing?

Correct.

Well, I thought it was really time to stop. There were other things to do. There was a lot to do, and we did a lot. I was more concerned with the emergency response kind of work, nuclear threat, other kinds of nuclear threats. It is so easy to make improvised, a dispersal weapon of some kind. I find it hard to believe that there hasn't been an incident yet. And there will be. It's almost inevitable. And I fear that. That's a real concern. We were better prepared to do something about it in the nineties than we are today, to respond to a nuclear threat. Because the funding's dried up, the politics changed, the driving force has changed. We have only a shadow of the capability we had in the nineties.

Even for a post-Cold War threat, you're saying?

Yes.

That's scary.

That's scary. It's scary to me. But the contract [the EG&G contract with DOE] ended in '95, so it was only three years after we stopped testing; during those three years one of the things we did was build a building for the DOE so they could have this big facility on our site.

Where was that?

At North Las Vegas. See, originally we had twenty acres, then we added another twenty acres to build the North Las Vegas facility, then we added another twenty acres to build some more

facilities there when we lost Sunset, and then another twenty acres were held in reserve when the DOE built their final building, so they now have an eighty-acre site out there.

I didn't realize it was that big.

So after we stopped testing, there was still plenty to do, certainly. We were still building things and designing things.

Did you have anything to do because of EG&G's expertise with any of the other kinds of treaty issues, the CTBT [Comprehensive Test Ban Treaty] or anything like that?

The only real treaty issue that we dealt with was the CORRTEX for verification. EG&G at the time was involved in a lot of other sites in the DOE. We had Idaho Falls, we had Mound, [DOE Mound site, Miamisburg, Ohio] So we had a fairly big DOE presence and I was involved in what was going on in those other offices, too.

Robert Hahn talked to me about working down on the superconducting supercollider, but when I was reading in your book I didn't see that, so was that a separate—

Yeah, I didn't write about that. That was kind of unfortunate.

Yes, I know.

We worked on that as a company and we had that tunnel just about finished and Hazel O'Leary made us fill it back up when she cancelled the program. That was a strange event.

So that was EG&G also. I wasn't misremembering that.

No, that was EG&G. So we did a lot of things. So when I think about three years between when we stopped testing and when the contract ended, other than getting DOE situated, there's not too much going on. But we had, you know, a lot going. We closed the office in Woburn. We stopped making CRTs. After they stopped testing, the technology for high-speed recording was advancing enough that we saw that the future of the CRT was coming to an end for the types that

[00:55:00] we had for the test program, so we had to phase that program out. It was part of the original EG&G core. And we also took the work at Kirtland—when the FOC program ended, the crew that was down in Kirtland was down to forty-four people and we were tasked to phase that out to zero. Sandia decided since we were local to them that they could use some of the skills that we had, so we built that up to 300 people supporting Sandia. So that never went away. But it was not supporting the moves to the Nevada program, so eventually we transferred all those people and their work to Honeywell. That was a very positive thing because they got all their benefits and were able to transfer intact, and it worked out quite well. So administrative things like that were big issues that took place.

You wrote about it but help me understand a little better. So EG&G when it is no more, it's divided into these various entities?

Well, EG&G, the new CEO, Greg Summe, who's the CEO now, basically sold EG&G and the name to a group called the Carlyle Group who brought it private. It was no longer publicly traded. EG&G had bought another company called PerkinElmer and they bought the name PerkinElmer. So the original EG&G became PerkinElmer, and the old EG&G was privately held by the Carlyle Group. They still had one DOE contract which is Morgantown, but they had to still do work at the test site here at Area 51, and that group is still EG&G.

I see. So Carlyle Group is the contractor there, then.

Not anymore. The Carlyle Group sold it again to URS, another company, and that's a public company, so EG&G is now part of URS, so it's a public company again. And it's a mere shadow of their former self, but they still have a thousand people or so.

What was in Morgantown, or what is in Morgantown?

Morgantown is the Energy Research Center, basically doing research on coal. And we set that operation up. It was originally all DOE, DOE scientists, engineers, it was a total DOE facility. And the manager there wanted it to be an O&M contract instead of being a total DOE thing. So we got involved through the DOE office here to go down and help them set up a contract environment. So we sent some people down there and we hired people and we became the on site contractor. And we built up the work force as they scaled down the DOE work force. And when it got to be a viable entity, they put it out to bid and we won the bid. Up to that point in time, it was part of my organization, and when it went out to bid and we won the bid, it went to the other side of the fence of EG&G. It became part of the corporate entities, and that's where it stayed. And we still have that contract there, it must be fifteen, twenty years. And then we had other things like the launch facility down in Florida.

So when did you retire from EG&G?

At the end of the contract. December '95.

And since then, have you remained involved in these kinds of matters?

Oh, yes. I always stay involved. The [Atomic Testing] museum is one way, of course, but I've done some consulting with various groups. I guess it was two years ago now, they were trying to **[01:00:00]** enhance their readiness status and I helped them; I did a little consulting on that.

Readiness to test?

Yes. That always becomes an issue, because the readiness to test, now they think it's three years. If they're given the word they had to resume testing, it'd be three years before they could do a test. That's basically useless. If you have to wait three years to do a test—if you got the need to do a test, you got to be able to do it. So that becomes an issue.

Now the question that come to a layperson's mind about readiness to test, that would assume that there's some kind of device or application or concern that you think requires testing, in addition to stockpile.

Yes. Right. The way the law is written, the only tests that could be conducted are for safety. You can't do a test to develop weapons and you can't do any effects tests.

So it's the safety of the stockpile.

Safety of the stockpile. So if you have stockpile problems that can't be resolved without testing, you can argue for a test. But if you have to wait three years to do the test, it becomes a moot point. So the way the situation is now and the lack of any on site capability, all the brain trust is retired and passed away by now, so to resume testing would be a real challenge. A few more years and it'll be almost impossible.

Right. There's got to be a lot of institutional memory that's—

Yeah, they say they got a knowledge-based system and everything, have all this documented, but that doesn't do it. You'd have to start with a very primitive program and then build up to capability, like it existed. You can't plan to go out and do a sophisticated test.

[01:02:24] End Track 2, Disc 1.

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

Again, this is a sort of a general public kind of question. We hear talk about testing new kinds of things like bunker busters and things like that. But that again would take a long time to set up the capability to do, no?

Well, the bunker buster is a different kind of problem. That's a delivery problem, not a weapons problem. The concept is you have to be able to penetrate the earth with some sufficient depth to

have an effect. It has nothing to do with the weapon, so it's basically delivery and how you get enough mass and enough velocity to get—it's difficult to penetrate the earth.

Yes. And what I wonder about when I hear it, then of course you have all the containment issues that you were dealing with, too, once you get that thing, I guess, exploded underneath, then you got to worry about containment of the explosion.

Sure. It wouldn't be contained, by definition, you don't have any containment design. It would be just a hole. You'd never be able to physically test a bunker buster. You can design delivery systems to test it, and that's non-nuclear, so you can go ahead and do that. In fact, they've done some of that. Not very successfully. It's a tough problem.

To get that deep into the earth.

To have any effect, yeah.

There's a couple of general things I wanted to ask you about. One, if you'd give me a little time to talk about some of the people. You've written something about the founders, but it'd be interesting just to hear your views on some of the major figures that you've worked with. And then the other question is a political question about what it was like to be working in weapons testing over this period of time when public views, I think, shifted, as you said—toward the end, there might not have been that much public support for testing—and how that impacted your own work, if at all. What your thoughts were about the politics as you did your work.

That was never particularly an issue that was paramount in my mind. We had a weapons-test community that we lived in and we conducted our business and we did it in a way that I thought was certainly above board and responsible in every respect. I never had any concerns with the way we did our business, from a personal view. The people that I worked with I respected very highly. Very responsible people. I never *once* can remember somebody saying well, maybe we

could try to get away with something. That was *never* a case in the test program. I really respected the people. Very high standards. And that made it a pleasure to work with. So we had a good relationship. I had a good relationship with the senior people all through the program.

If you're talking about people that I remember that were very significant, probably on top of that list would be Bill [William] Ogle. He was test director for Los Alamos for many years. He was just a brilliant guy and had insight in so many things and could cut through stuff like nobody else I knew. He ran a board called a Planning Board that was famous. I mean he would have meetings periodically, sometimes once a month, once a quarter, but they were always significant meetings. There was always stuff that he would bring up and have people discuss and **[00:05:00]** talk about that were meaningful and important. One of the big issues in the seventies that's still an issue today is the migration of radionuclides off the site. That was always on his agenda. He always talked about that and probed to understand really what was going on with the physics, with all that. And you just had a good feeling working with somebody that had that kind of integrity.

When you say "his insight," you're talking about his scientific insight.

Yes. But he was smart in many things, he just had a good feel how to deal with things.

Yes, I met his son last month in Albuquerque. I interviewed him. So that was interesting to get the son's viewpoint. I mean because Bill Ogle is legendary.

Yes.

So anyone else that you can—what about the founders? When you arrived, did you have any contact with them?

I had more contact with Barney O'Keefe who really ran things when I got there. He was running things pretty well when I got there. Germeshausen was around but he was much lower profile.

And I said I did some work with Edgerton, which was always a kick because he was just a lot of fun. But I didn't have any dealings at all with [Herbert] Grier because he was out in Las Vegas. By the time I got out here, he was already gone. Now I knew him, he would come to the annual meetings and I met him many times, but really never worked with him. But Barney O'Keefe was a real powerhouse in terms of getting the company to where it was. It would never be what it grew to be without Barney around.

So his interaction with the, what, government officials, or what was it?

Well, he just was an entrepreneur. He had a lot of vision, and he was, I'll tell you, he was one of the first people that wanted to store waste at Yucca Mountain. And he was on the crew, they flew Yucca Mountain way back before it ever got started. He was a big proponent of that. Never told anybody that story. But he was involved in Yucca Mountain before Yucca Mountain was even thought about.

Now, did EG&G do anything at Yucca Mountain?

No.

I didn't think so.

No. But he was interested in energy. He was interested in nuclear energy, and one of the things that he built was an energy park. And he was looking at recyclable energy. It wasn't one of his brightest ideas. It never really panned out. But now he would do major things that were just part of being an entrepreneur.

He had that vision, I guess. What's your view of what's happening with Yucca Mountain here? What's your opinion about it?

I think they ought to do it. You know, it's hard to believe. The thing that has screwed up Yucca Mountain is this concept of burying waste for ten thousand years. It's just absurd. Just think of

what has happened in the last thirty years. And I don't believe we'll ever close Yucca Mountain. You need to get all the fuel to a safe place, and Yucca Mountain is a safe place to do that. And I think before we ever seal that, we'd find some use for it. It's going to be retrievable for a hundred years. Just think where we'll be in a hundred years from now. Just think where we were a hundred years ago. This is mind boggling that anybody thinks that things are going to be the same today in a hundred years from now. It's just the whole concept of that ten thousand years was to make Yucca Mountain possible to do.

Interesting. So what—?

So I think it's going to proceed, they're going to build it, they're going to move all the waste out there, and it'll never get sealed in. It'll be retrievable storage for a hundred years and within fifty **[00:10:00]** we'll have figured out some way to make really good use out of that stuff.

Oh, use out of it.

For energy. I mean there's a tremendous amount of energy remaining in that material, because we only took some small, 5 percent of the stored energy in that fuel has been taken, has been used. So there's a tremendous amount of stored energy in that fuel which we're going to need someday. And within fifty years, we'll figure out how to use it. That's my view. And I think leaving it at reactor sites around the country in ponds is the dumbest thing possible in the world environment we live in today. I think the faster we can move it out to Yucca Mountain, the better off we are as a country. And it's just unbelievable, the political football that it's become. So I'm pro-Yucca Mountain. For good reasons.

That's fascinating what you said to me because again that ten-thousand-year, it's so mind boggling to think about that that, well, the mind boggles and you say, well, how could we possibly be doing that?

Well, it's all based on the decay, how long it takes the stuff to decay to zero or to some ridiculously low level. It has nothing to do with the advance of civilization and technology or anything else that makes sense that should be paid attention to.

That's interesting. Well, it'll be real interesting for all of us to watch what happens with that, won't it?

Well, it will be. That could change very quickly. All we need is a terrorist to make a hit on one of the reactor sites.

OK. Well, one thing you talked about. I hesitated to ask you because I haven't verified it. But I think it was John Hopkins who talked to me. Was he involved in the FOC at all? He told me about that airplane.

Yeah, he was involved. I know John very well. We're good friends. And he was the one that recommended me for the job, to become program manager when I became Los Alamos program manager. He must've been test director then. So we go way back.

I know John. But it was when we were chatting once, I think—I don't think it was during an interview—that he told me about the Aurora Borealis and the eclipses, and when you said that I couldn't verify it on paper. But he's been very helpful to me because he's doing a lot of research on the test site, and he's a very nice man so we've had a lot of interesting conversations. But I wanted to verify that that was the same thing that he had been talking about.

Let's see what else I have here. Oh, I know the other thing I wanted to ask you about. This is a general question—you're having this [EG&G] reunion—about the people of EG&G, the kinds of people that you've worked with and—

Oh, well, EG&G has really been a unique company. The people that worked at EG&G, almost everyone has good feelings about how they were treated, how we worked together, how

management ran. It's truly been a unique experience. We used to have reunions back in Boston when I went back there. People would come from all over the country to those reunions. We'd have a thousand people. Everybody that I've talked to, I talk to people at the lab, there's a lot of people at the lab that were EG&G at one time. Like the deputy director, Don Cobb used to work for me in Los Alamos. And I invited him to the reunion and he would write a couple of nice sentences about how great, EG&G was such a great experience and a unique company to work for. So it's unlike any other company that I'm aware of that has that kind of rapport and history. Like this reunion, just word of mouth and I got 400 people there, probably.

[00:15:00] *So you were mostly hiring engineers, is that right? What are the kinds of professional staff that you have?*

Engineers, scientists. A lot of scientists. RSL, the remote sensing stuff, was mostly scientific. Santa Barbara, a lot of scientists there. And a lot of engineers, lot of technicians. But the company philosophy has always been to treat everybody well, and there was no structure that was typical of a lot of companies today. It was a good place.

And so what kind of support staff would have to be there, in addition to the tech—when you're doing this kind of technical work, it's not the same as other kinds of corporations, in a sense, as far as what, secretarial support and clerical staff?

Oh, you had all of that. You had secretaries. You had a lot of administrative people. But it's the technical corps that establishes the rapport. You look at companies, there's always some element that leads the philosophy of the company. With EG&G, it's always been it's can-do technical attitude, very field oriented and positive kind of thing.

I guess in a sense because you have a particular techno-scientific mission in and of itself, it's a privilege in a sense. You don't have to deal with a lot of other kinds of bureaucratic things that

you might find, even at a laboratory, I would imagine, at a national laboratory. I don't know if that's true or not but that's what I'm wondering.

We managed to keep the bureaucracy pretty well buried. At least I did. As I say in my book, there's only four general managers in fifty years there. It was Grier, Felt, Hammon, and me for the history of our participation in the weapons program. So there hasn't been a lot of management change. I think they've had six at Bechtel [Nevada] in the last ten years.

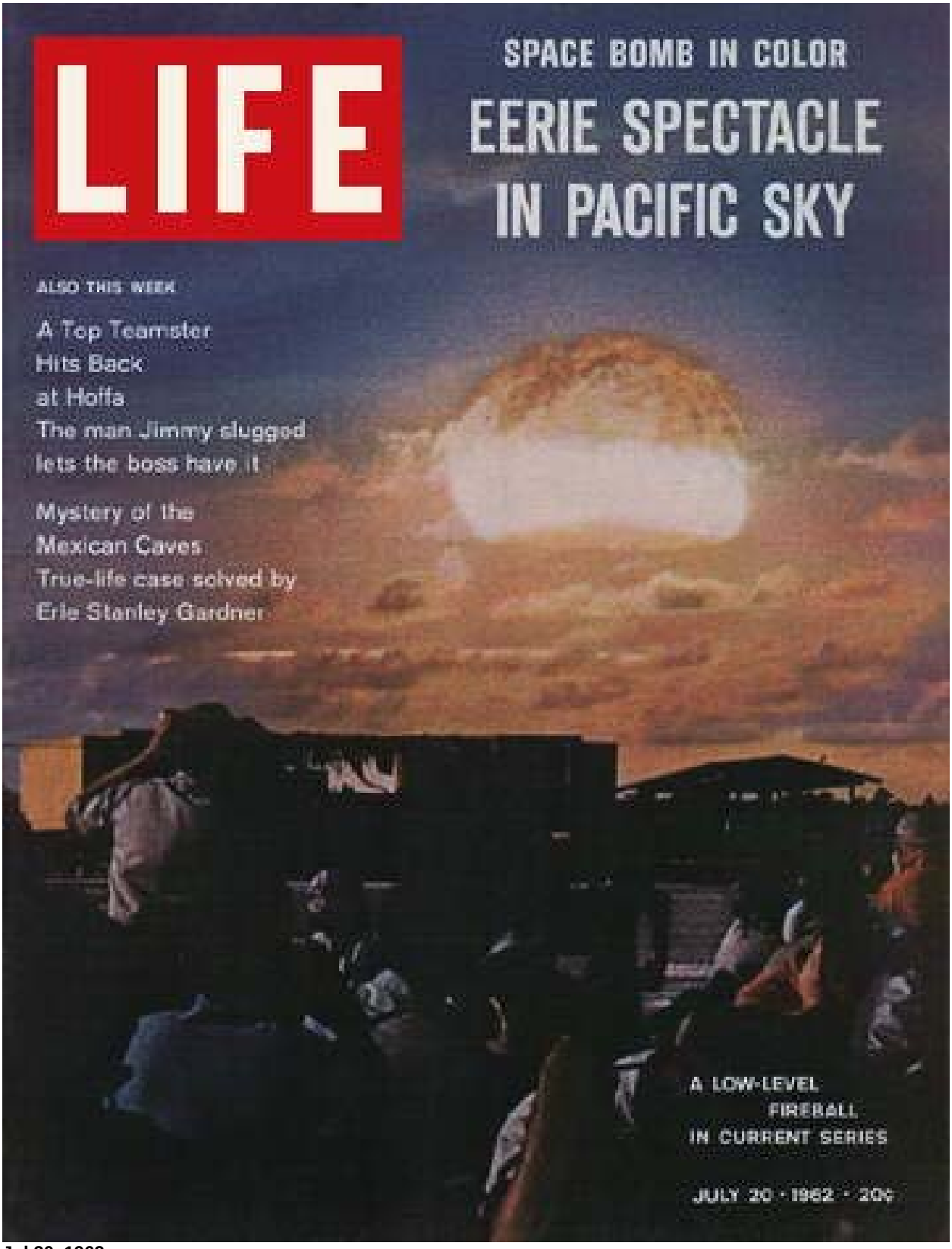
Well, is there anything else that you think you should mention at this juncture? You've given me a nice overview.

No. That's all I've got.

Great. Thank you very much.

[00:17:57] End Track 2, Disc 2.

[End of interview]



Jul 20, 1962
H-bomb tests
Photo: Oakland Tribune