

**National Institute for Occupational Safety and Health (NIOSH)
Special Exposure Cohort Outreach Meeting for Rocky Flats Plant
(SEC00192)**

Meeting Date: Thursday, May 24, 2012, 1:15 p.m.

Meeting with: Former Workers from the Rocky Flats Plant, Golden, Colorado (Second of two meetings)

NIOSH Team:

Grady Calhoun, National Institute for Occupational Safety and Health (NIOSH) Division of Compensation Analysis and Support (DCAS), Health Physicist

Lara Hughes, PhD, NIOSH DCAS, Health Physicist (by telephone)

Josh Kinman, NIOSH, DCAS SEC Petition Counselor (by telephone)

James Bogard, PhD, Oak Ridge Associated Universities Team (ORAUT), Health Physicist

Mark Lewis, Advanced Technologies and Laboratories International, Inc. (ATL), Senior Outreach Specialist

Mary Elliott, ATL, Technical Writer/Editor

Also Attending:

Wanda Munn, Advisory Board on Radiation and Worker Health (ABRWH), Rocky Flats Plant Work Group and Worker Outreach Work Group, Member

Ted Katz, ABRWH Executive Secretary, Designated Federal Official

Carolyn Boller, Office of U. S. Representative Mark Udall, Congressional Aide, Denver office

Stuart Feinhor, Office of U. S. Representative Jared Polis, Constituent Advocate, Boulder office

Dennis Mai, Office of U. S. Representative Jared Polis, Congressional Intern, Boulder office

Proceedings

Mark Lewis opened the meeting at 1:15 p.m. He thanked the former workers from the Rocky Flats Plant for coming to the meeting and welcomed back those who had attended the morning session. Mr. Lewis asked permission for the petitioners to join the meeting via telephone. The attendees granted permission.

Mr. Lewis explained that he had asked the attendees to meet with NIOSH to discuss tritium operations at the Rocky Flats Plant. NIOSH will consider the information during the evaluation of the recently qualified Special Exposure Cohort (SEC) petition for the Rocky Flats Plant.

Mr. Lewis stated that classified information should not be discussed during the meeting, but interviews to discuss such information could be conducted at another time in a secure setting. Mr. Lewis added that there would be an opportunity to discuss the 2003 fire in Building 371 at the end of the discussion about tritium operations.

At Mr. Lewis's invitation, the members of the NIOSH team introduced themselves: James Bogard, Wanda Munn, Ted Katz, and Grady Calhoun, as well as Lara Hughes and Joshua Kinman by telephone.

Mary Elliott introduced herself and explained that a sign-in sheet was being circulated to collect the attendees' contact information in the event that NIOSH should need additional information. Ms. Elliott also stated that she was recording the meeting and taking notes to prepare an account of the meeting.

[Redacted] introduced herself as the petitioner for the recently qualified Rocky Flats SEC petition.

Dr. Bogard stated that primary reason for the meeting was to talk about tritium operations, tritium incidents, and environmental and personnel tritium monitoring at the Rocky Flats Plant from 1972 through 1989. He asked the attendees who had not attended the morning session to introduce themselves, stating their names, the years that they worked at Rocky Flats, and their occupational responsibilities.

Worker 1 stated that she worked with [redacted] at Rocky Flats, beginning in [redacted]. She became the [redacted] for planning. She worked for [redacted] to [redacted] for the site. Worker 1 asked if she could present information to NIOSH about tritium at the site after 1989. Dr. Bogard responded that she could.

Worker 2 stated that she worked from [redacted]. She spent the first two years working as a [redacted] in Buildings 771 and 371, and then worked as a [redacted] from [redacted]. Beginning in [redacted], she served for [redacted] years as a [redacted] before becoming a [redacted]. Worker 2 served as [redacted] for the site during [redacted] of employment. She stated that she had worked in every building at the site.

Worker 3 stated that she worked from [redacted]. She began her career as a [redacted], and then worked as a [redacted], primarily at the solar ponds. She spent [redacted] working in Building 371.

Worker 4 stated that he worked at Rocky Flats from [redacted]. He was a [redacted]. After that, he worked for [redacted] as a [redacted] and then as a [redacted]. Worker 4 also worked during the decontamination and decommissioning (D&D) project. He [redacted]. During disassembly, he worked [redacted].

Worker 5 stated that he worked at Rocky Flats from [redacted] as [redacted]. He was [redacted]. Worker 5 stated that he wanted to share information about an incident that occurred in the Research Annex (Building 779A).

Stuart Feinhor stated that he is the Healthcare and Veteran Advocate in the Boulder office of U. S. Representative Jared Polis.

Dennis Mai stated that he is an intern in Congressman Polis' Boulder office.

The following attendees were also present at the morning focus group meeting and did not identify themselves: eight former Rocky Flats workers [redacted] and Carolyn Boller from the office of U. S. Congressman Mark Udall.

Dr. Bogard asked Worker 5 to begin the tritium discussion by relating the incident in Building 779A.

Worker 5 (*Paraphrased*): Rocky Flats was a production facility with no dedicated research facilities when I started working in [redacted]. In 1965, a research building was constructed, which was Building 779. All kinds of research operations were performed in this building. Building 779 was designed to handle plutonium as well as any other radioactive material.

The workers in Building 779 understood that they were to accept any assignment that Rocky Flats required them to perform. They were to perform the work as safely as possible based on the standards at the time, but getting the job done was the primary concern with safety being secondary.

Shortly after Building 779 was built in 1965, a new nuclear weapon that required special handling was designed at Livermore, California. Rocky Flats had the responsibility of the nuclear initiation portion of that nuclear weapon. An annex (779A) to the Research Building (779) was built to handle the special combination of materials that was required for this new weapon. This facility was expected to handle unusual, unexpected things.

I [redacted] so I was familiar with most things that were going on. Remember, though, that at Rocky Flats during the period from 1963 to 1993 there was a "need to know" basis for information. If your job did not directly relate to the operation, you had no "need to know" so there was a "don't ask, don't tell" environment. Even though I was an Associate Scientist, which was the highest ranking scientific title at Rocky Flats, I was not aware of certain operations that were going on, for example, next to my laboratory in 779A.

Sometime during the period between the early 1970s and early 1980s, [redacted]Chemistry Laboratory in Building 779A was a [redacted]Of the [redacted] years that I spent at Rocky Flats, [redacted]of those years in the 'hot' areas of Buildings 779 and 779A. We were told that there was a tritium release...

Dr. Bogard: When was that incident?

Worker 5 (*Paraphrased*): It was sometime in the 1970s. I don't remember exactly when because there were so many unusual incidents involving radioactive materials in Buildings 779 and 779A that any one incident was not recorded by me or anyone else, and not really remembered by most people. I happen to have an exceptional memory of these events, especially when they involved materials – elements. I am an expert on the Periodic Table. I am a [redacted]. I have an interest in

materials. If you name the element, I can probably tell you all about it – its history, its atomic weight, and its molecular number.

I remember that there was a release in the chemistry facility run by [redacted]. A “pit” was received... For those of you who don’t know, “pits” were the major product of Rocky Flats. A “pit” is the initiator of the nuclear reaction of a nuclear weapon. It is the primary fissile component of a nuclear weapon. Whether the nuclear weapon is primarily a fusion weapon or a fission weapon, it always starts with fission and it always starts with a nuclear “pit.” These are implosion weapons, and not gun weapons, which stopped being made shortly after World War II. “Pits” usually contain plutonium and other metals.

I was told that this tritium incident resulted when a “pit” was disassembled in the chemistry lab without the personnel having knowledge that the device contained tritium and deuterium. They were probably studying the deterioration of the plutonium. Plutonium is a very chemically reactive, pyrophoric element, so it probably reacted with the tritium and the deuterium. I wish that I could tell you that we evacuated the building during this incident, but this building was evacuated so often that I cannot remember whether it was for any one particular incident. We constantly evacuated Building 779A due to unscheduled, unmonitored, and unregulated incidents – about once a week or 52 times a year. I was there for [redacted] years so that it may have happened approximately 1,500 times while I was there.

This incident in [redacted] laboratory was typical of those that happened often in Buildings 779 and 779A.

Dr. Bogard: Do you know if there was any monitoring done for this incident to quantify the release or any bioassays done for personnel that were involved?

Worker 5: Only after the release occurred. As far as I know, there was no monitoring or observation during the disassembly until somebody realized that something was being released.

Dr. Bogard: So this was a sensitizing incident that let you know that tritium was an issue? Are you saying that monitoring for tritium started after this incident?

Worker 5: As far as I know, there was not a team of monitors watching the disassembly of this “pit.” They did not expect the gas to be released.

Dr. Bogard: When I say monitoring, I am talking about air monitors.

Worker 5: There were air monitors throughout Building 779A. I do not know if they were designed to detect tritium. The air monitors in Buildings 779 and 779A were basically there to detect plutonium in the air, so tritium was unexpected, unmonitored, and unregulated. It was a big surprise.

Dr. Bogard: Were you on an internal dosimetry monitoring – bioassay – program?

Worker 5: Yes. From the time I started working at Rocky Flats, I wore a badge. I assume that it counted alpha to detect plutonium.

Dr. Bogard: What about bioassay samples?

Worker 5: Urinalysis was a standard procedure at Rocky Flats. I think we gave samples every month or every three months. I remember bringing home the bucket, but I don't remember how often.

Worker 6: It depended on where you were in the plant. It was relative to the hazards and the frequency of it.

Dr. Bogard: Do you recall ever getting a result for tritium from your bioassay?

Worker 5: No, never. I considered tritium the cost of doing business at Rocky Flats and getting a paycheck. I knew that I was going to be exposed to a number of nuclear materials. I was familiar with radiation. But my understanding was that no matter what happened at Rocky Flats, I would do the best that I could do for the country and the plant. I knew that they would stand behind me no matter what happened. That was the reason I stayed at Rocky Flats.

Dr. Bogard: Does anyone else recall this incident in 779A or have anything they can add?

Worker 6: I was [redacted].

Dr. Bogard to Worker 6: What do you recall about the incident in Building 779A?

Worker 6: There were two schedules for bioassay. People who had uptakes for plutonium were on one schedule. I had to go every month, then every three months, and then every year. If you weren't in a radiation area that would achieve above 100 millirem (mrem) and less than 1 rem, you were on an annual cycle. The process operators' badges were exchanged every two weeks, and once a month they had to do the urinalysis.

Dr. Bogard: So the change outs and the isotopes that were monitored were based on the work assignment?

Worker 6: That's right.

Worker 5: The people who can corroborate my story were probably in the morning meeting. Some of those people worked in Buildings 779 and 779A. [Redacted] handed me a piece of paper that specifically reports on this incident. It says: "Incident, tritium release in Building 779A in 1973. That's the first time that I have ever seen this. They didn't tell us that morning that tritium would be involved and to expect a tritium release. They didn't tell us that a possible evacuation might be in order.

Dr. Bogard: Do you recall other incidents involving tritium?

Worker 5: No.

Worker 6: That's the only one that I can remember.

Worker 7 to Worker 5: Do you remember the Hydride Lab in 779A? That's attributed with some of the tritium.

Worker 5: That's exactly right. It was [redacted] Hydride Lab.

Worker 2: I was there when it melted through the bottom of the box.

Worker 5: This revolutionary new weapon involved a composite. The way that they separated the plutonium from the composite was to react the plutonium with hydrogen. That was done in the Hydride Lab. That was basically the only way to recover the plutonium. What it was attached to was nuclear poison to plutonium.

Dr. Bogard: I think that I have a reference for that.

Worker 5: This should fit in with what I've said like a key into a lock with other things. It's just that I'm telling it from my perspective. You may have heard it from a different perspective.

Dr. Bogard: Thank you. Who is next?

Worker 8: He just made a good point when he said that the "pits" were cut in half. They went to one building where the pit was cut in half on a machine. That meant that the tritium got out right then at that machine. It was sent down to Building 771 in two halves in an open B-type box where it was processed for the next step. Therefore, it got into the ventilation system right there. The air comes into the box like this and goes up right there. That would account for it being in the ventilation system. In the next step, it went to another line where it was processed in a "hat." That would account for the tritium being in the pipes and the plumbing and the tanks because what was dissolved there went directly into those tanks. That just made me think of three ways that tritium could have gotten around there.

Worker 7: There is something that I need to bring into this. Before about 1974, Building 779 did not have a central plenum system. A lot of those dry boxes and B-boxes had individual vent stacks on the roof of the 79 Building. When they built that building directly east, that's when they had a plenum that cleared all of the effluents. The reason that I'm bringing that up is because it was virtually impossible to monitor all those vent pipes on the roof. Do you remember that? There must have been a dozen and maybe more. A lot of them were to the boxes and B boxes in the work areas. Then they built that plenum building. They had that big tank in the building that was adjacent on south side – for the deluge system where they had it as a catch basin. Those things were Johnny-come-lately in the tritium story, in my mind. I don't believe that tritium monitoring occurred routinely or predictably as long as we had the individual stacks.

Worker 5: I wonder if tritium monitoring occurred at all. I was never told that tritium was an issue at Rocky Flats.

Worker 2: That's why I'm here – to tell you the things we didn't do. I started working as a [redacted] in [redacted] and my first building was 779 and 779A. Everything was very secretive. We could only go certain places to do our surveys, but I was never trained to survey for tritium. Then when I moved to Building 707, one of my duties was to exchange the bottles on the tritium bubblers. We would fill these bottles with distilled water, trade them out periodically in little

milk cartons, and turn them in. Nobody ever told us any results from these or why we were doing it. Then all of a sudden, one day they told us that we didn't have to do it anymore, so we let all of the bubblers just dry up. Then I was on midnight shift covering Buildings 706, 707, 776, 777, and 779, and the alarm for the getting system in 776 went off – that was the system in the lines to detect tritium. We had no idea how to respond to that so we called in the supervisors and other people who also had no idea how to respond.

Dr. Bogard: Ultimately, you [redacted], didn't you?

Worker 2: Yes, but that was many, many years later. Tritium wasn't even a concern for us as far back as I remember until I left. Our priorities were the plutonium and uranium facilities on the south side of the plant.

Dr. Bogard: We have heard that at least some tritium bioassays were done. Do you know what the analytical technique was? Did they report the results to you?

Worker 2: No, they were doing that while I was still a monitor and wasn't in on anything like that. We knew that there was a concern when they disassembled the boxes in 776 and 777. I don't know whether or not we did tritium bioassay then. My work was more program related by that time.

Worker 7: I don't know if it's been mentioned, but we had a sizeable project called the J Line, which consisted of tritium containers. I don't know how they verified the design and the welds and all that, but that was a big part of our production on the south side of Central. We inherited that from ACF Industries in Albuquerque in the early 1960s. The problem that we have is that none of us know everything that happened because the plant was in operation for over 50 years. A lot of this was spook work and some of it was just routine production, but the J Line is a very important thing. Most of that occurred in 81 Building and maybe 83 Building. Rocky Flats was a huge production facility

Dr. Bogard to Worker 2: Who decided when monitoring for tritium, in particular, was necessary? How did they decide?

Worker 2: Usually, Radiological Engineering made that determination. I don't know how it was before I started but when I started in [redacted], they only had two Rad Engineers for the whole site and they couldn't keep up with everything. A lot of it was left up to the supervision for radiation protection and management back then. I'm not sure how knowledgeable those people were.

Dr. Bogard: Do you know who did the dose assessments when tritium bioassay was done?

Worker 2: I don't even know when tritium bioassay was done. If it was, it would have been Internal Dosimetry when I was there. In the 1970s, I don't know.

Dr. Bogard: Does anyone else want to talk about your personal experience with tritium? Is there anybody here who has any information about how participants were chosen for the bioassay monitoring programs, what analytical techniques were used for tritium, who did the dose assessments, where the records are, and where one would go to find records?

Worker 8: I can give you one small part. Anybody who worked in the contamination areas was on the bioassay program. They called it the “pee buckets.” If you worked on the south side – we just called it the “hot side,” you were on one of the programs. You had a badge, you had a TLD badge for alpha and whatever else they had, and then you had the buckets. I don’t remember the frequency, but I’ll say every three months for lack of something better. If you were on the “cold side,” I would assume that it depended on the particular job you were doing. For example, over in the 44 Building and buildings where they were doing other stuff, they still had alpha contamination so they were still on some type of a program.

Worker 2: But do you know what isotopes they were checking for when they analyzed that?

Worker 9: We also had a fecal smear that they did if you were in a big incident.

Worker 2: That was much later.

Worker 7: That came after there was a radiation control guy who came on to assess dose.

Worker 2: That came after 1995 when we implemented the DOE Rad Con Manual.

Worker 7: The fecal sampling was not a real popular thing.

Worker 1: I can only speak for the [redacted] years that I was there from [redacted]. I had an office [redacted]. However, I worked in all the buildings throughout the site, both as oversight for maintenance and later for traffic and transportation for the garage and the fleet, as well as for all roads and grounds. Never once did I have a urinalysis. I was never given a badge until after I contracted cancer in [redacted] and I insisted on having a badge. I only had urinalysis upon my exit interview in 2000. If you’d like to see them, I have those records that show that the urinalysis indicated that I had uranium, americium, and plutonium in my urine; but there is no indication for what they tested for, which included thorium. There was no indication whatsoever that they tested for tritium. I understand that the only way that you can identify tritium is through a liquid scintillation process, which is why they have to have urinalysis to identify that as part of a bioassay.

Dr. Bogard: So your job assignments took you all over the plant.

Worker 1: Correct, and also all of the roads and the grounds.

Worker 8: They had a set of visitor badges on the Hot Side. I’m surprised that they didn’t give you one.

Worker 2 to Worker 1: Were you in the process areas?

Worker 1: When I came back, I put a badge on and I went to a meeting down in the cafeteria in 771 and immediately got (inaudible).

Worker 8: They had a badge board for visitors and for temporary visitors. The temporary people only came in once in a while. Visitors that came in daily usually had a permanently assigned temporary badge.

Worker 1: I do remember that when I was an escort, I would put one of those badges on but I never received any of that information.

Dr. Bogard: Did those badges have dosimeters?

Worker 8: Yes, they were TLDs.

Worker 2: The visitor badges were signed out on a log so they knew it belonged to that person.

Worker 7: But the TLDs were more specialized than that. In some areas, they had different crystals in the body than in others. It depended on your job assignment, your area, and the frequency. All of that was part of the consideration in the crystal pack that was in your TLD.

Worker 2: But the TLD did not record alpha contamination. It only recorded gamma, neutron, and beta radiation.

Dr. Bogard: Then it probably did not measure tritium.

Worker 2: It certainly did not measure tritium. We didn't check for it.

Worker 6: I have a lot of my bioassay and radiation reports. I went through them a while back and there is not one place in all of those records that there is a tritium dose given or even mentioned. It's just the alpha and gamma rays.

Worker 5: I will back that up. That's my experience. There was no category for tritium.

Worker 4: I worked construction out there. In certain areas, it was monthly or quarterly. All of a sudden they would tell me that they needed a fecal sample or I couldn't go back into the area. That was not randomly. There was a reason. It was an incident. We would be in there and they would run us out to the gate. We would go forward and line up – and it didn't matter about the weather. Then the next thing I knew, I would get a little card that said I had to go to the building and pick up a bucket. I did that for a month.

Dr. Bogard: Those came from your supervision, right?

Worker 4: Yes, from my supervisor.

Dr. Bogard: Do you know who made the decision about the monitoring?

Worker 4: This was from DOE. It came from Rad Con. I would not get a TLD unless I followed through with the fecal sample. They requested monthly. Sometimes, in certain areas, we had two badges that we would take in daily and get another one. We didn't know what was going on. We were just going in to do our jobs.

Worker 2: It was a dust tracking thing, but none of that was related to tritium. More than likely, you were requested to give fecal samples because airheads would come up positive. They should have explained that to you.

Worker 4: Yes. We didn't know what was going on. We were kind of naïve.

Dr. Bogard: It sounds like there was pretty good control if a bioassay sample was requested, and that someone might not be allowed back into work until they checked the sample.

Worker 2: But that was later. That was from 1995 until closing. We were better at it closer to the late 1990s through 2005.

Worker 7: If you remember, they went to the security badge and you had to run that in the cypher lock in a lot of the areas. If your qualifications were not up to date, they would kill your badge and you couldn't get into your work area.

Worker 2: Yes, we finally initiated a computer system that would lock you out if you didn't keep up with your qualifications or if you had positive bioassays or if for some reason we didn't want you back in that area. Our other choice would have been to have someone there checking your records. That wasn't until 1999 or 2000.

Worker 1: Unfortunately, I don't have the entire manual but this is the Rad Con Manual in December 1994. It shows compliance to 10 CFR 831. It shows that, as of that date, the site was 39% compliant and 55% noncompliant.

Worker 2: With the Rad Con Manual? We weren't required to have full compliance until 1995.

Dr. Bogard: Is this mine to keep? This is the RCM Status Report for Rocky Flats, dated December 7, 1994. It is a survey of issues that are either in compliance or not in compliance with the Rad Con Manual. Had it been implemented?

Worker 2: No. It was fully implemented in July 1995. Part of the implementation was training 300 RCTs and changing PPE (personal protection equipment). It was a very detailed plan. Laundry procedures had to change. It took a long time to get every little piece in place.

Dr. Bogard: This is a little bit outside the time scope, but it is still good information.

Worker 7: Rad Con dictated a lot of things that were supposed to happen. We were negotiating for the D&D contract in your time frame. Up until that point, we were in a production agreement. Rad Con and some of these other things were brought in to the work agreement when we started D&D.

Worker 2: After the shutdown in 1988 and until then, we were working on cleaning up and restarting production. The restart never happened.

Worker 7: That was still under the production agreement.

Worker 1: This might be of some interest to you. This is a marked up copy of part of my packet that I received when I became a claimant for three primary cancers. EEOICPA (Energy Employees Occupational Illness Compensation Program Act) issued this, put out by Industrial Hygiene Processing. It has my name, my Social Security number and the dates of my employment. It shows the years, what my job title was, and what buildings I worked in. Note that I have corrected it to say that I was working throughout the entire site and the processes that were going on. Again, I was working post-production from 1991 to 2000. I would like you to

note that in the 1997 column under hazardous materials, along with plutonium, carbon tetrachloride, silicone oils, chromium, etc., tritium is also listed as an exposure. Other claimants might take a look at their records because this is a standard piece of paper that comes out to all claimants from the program. If you just would block out my Social Security number, I have been reminded by my Congressman's aide.

A brief discussion about EEOICPA ensued among the former Rocky Flats workers regarding their claims reports.

Worker 5: I would like to go back to the compliance tabulation that [name redacted] handed you. Did you say that it stated that, up until 1993, we were basically 55% in compliance?

Worker 2: The Rad Con Manual wasn't even in place until after that. We worked on compliance from probably about 1990 until 1995, when we were fully implemented.

Worker 5: So the period before that is included in the period that you're interested in, and the compliance level was considerably below.

Dr. Bogard: It wasn't compliant with the Rad Con Manual, but that doesn't address compliance with what happened before the manual.

Worker 2: We had regulatory documents before then that we were compliant with to the best of our knowledge and ability.

Worker 10: I would like to digress back to the tritium stream. Two things come to mind. For many years, the plant laundry handled coveralls, socks, and underwear for all the process areas on both sides of the plant site. Do you remember when that laundry was closed down?

Worker 2: It was probably about 1994. We no longer handled the uranium-contaminated clothing at some point.

There was some disagreement among the other attendees that the date was later in the 1990s. After some discussion, several workers reached the consensus that the uranium-contaminated clothing was sent to a contract laundry (INS) in Santa Fe, New Mexico.

Worker 10: I'm talking about the period prior to the laundry being sent offsite. Protective clothing from every process area at the site went to that laundry, so you are probably going to see a tritium issue with the laundry as well. The second thing that I want to bring up is the incinerator in Building 771. Any of the waste streams that went through the incinerator was also coming in from every process facility on the plant site, so you are going to see tritium there as well.

Worker 7: For the record, the laundry was known as Building 778 Laundry.

Worker 2: They washed beryllium, uranium, and everything all in the same machines – respirators, booties... They tried to separate it at some point, but they used the same machines, the same pipes. The laundry was between 707 and 776 by the dock in the horseshoe.

Worker 11: I worked in the laundry for a period of time. Worker 2 is absolutely correct. We washed clothing from one building and then threw another building's clothing right after that. Nothing was changed out, no filter changes.

Worker 10: There was a very limited system of monitoring in that laundry.

Workers 2 and 10: If we had "hot" bags and "hot" booties, we sent them in the disposable bags. We had a monitor in there. We did routine surveys.

Worker 1: A lot of those also went out in bags to WIPP (Waste Isolation Pilot Plant) for burial. Not all of it got washed.

Worker 2: That was much later.

Worker 7: The laundry dumped the water into a sump on the west side of the building. There was a valve pit and some other assorted piping. There was an underground room that had some tanks. I was part of the preliminary group doing the strip-out. We were told to check for alpha and gamma radiation. One day, I went in there with the Electra, which was capable of reading beta, and it lit up. I went to my boss and I said that even though the instrument wasn't cleared to measure beta, it looks like we've got a problem that is over and above what we anticipated. It's in keeping with what [name redacted] said. Whatever was on the plant site went through that laundry prior to them entering into that disadvantaged contractor agreement with INS.

Dr. Bogard: Do you know what kind of a monitor the Electra was?

Worker 7: It could be all kinds of things. There was a scaler made by NE, a British company. You could have a scintillator counter that could be cleared for alpha or beta, as well as some other things that you could plug in. It had a scintillator – a triangular crystal.

Worker 2: It was a Geiger meter-type instrument.

Dr. Bogard: What I am getting at is whether or not this instrument would be able to detect tritium.

Worker 7: It was capable of reading beta if you cleared it.

Worker 2: If you had enough tritium...

Worker 7: I never checked for tritium with it, but it was beta capable. As you know, tritium is a very weak beta emitter so I don't know the response on that crystal.

Worker 10: I think the maximum energy level on beta for tritium is about 18.6 keV. We were told a number of times, in using that instrument, that beta was of no concern.

Worker 2: I have a comment on the waste stream. You got me thinking about the laundry and the valve vaults. As a [redacted], we checked those valve vaults every shift for leakage. There were always operators from 774 and 374 who did all of the liquid processing from waste streams and so on. We got all the laundry water. We did not wear any kind of respiratory protection. They

actually used that pond water to make the pondcrete and the saltcrete. It was a process that went into a mix that came from the solar ponds. Everything was connected. I had forgotten that I was in those valve vaults many, many times in the process area and in 374 as an operator mixing up the stuff. I remember that when the laundry water came through, we changed the filters without respiratory protection. Man, did that stuff stink! It smelled like dirty socks.

Dr. Bogard: You were never told of specific concerns about tritium in that water?

Worker 2: We didn't know downstream from that. I never heard of tritium until I [redacted].

Worker 12: I worked as an environmental design engineer in the early 1990s. One of my jobs was [redacted]. It was leaking through the concrete into the soil.

Worker 4: I worked with her on that project. We used a plastic material from Texas to keep the seal from leaking out instead of in. We used special glue and it didn't work. It didn't keep the valves from leaking.

Dr. Bogard: Was this a specific valve or all the valves?

Worker 12: It was all of the valve vaults.

Worker 4: We even tried changing all of the gaskets. The gaskets were asbestos and they were still leaking. We changed all of the valves.

Dr. Bogard: Were these valves associated with a particular operation?

Worker 12: We didn't know. We were just told to go in and seal the valve vaults.

Dr. Bogard: What building were the valve vaults in?

Worker 2: They were across the whole site around the buildings.

Dr. Bogard: Were these like pipe chases?

Workers 2 and 4: They were equipment areas. You had to open up a manhole to get in.

Worker 2: Some of them had like a little outhouse over them with stairs going down.

Worker 13: They ran double-contained piping between the process buildings and the waste water treatment buildings. Some of those went down into these valve vaults. That's why they would be "hot."

Worker 12: That's why they did the double-contained (piping) because they were leaking.

Worker 1: We had problems with PCBs (polychlorinated biphenyls) down there frequently about 1995 or 1996.

Dr. Bogard: But this wasn't related to tritium issues as far as you know?

Worker 12: We were not told what was in the valve vaults.

Worker 4: It could have been drained off from laundry. A lot of the stuff came from the buildings.

Worker 9: It also came from the labs.

Dr. Bogard: One of the things that is much clearer to me now is how interconnected all of these buildings are and all of the process. I have run across that in some of the documents that I have read, but now I have a stronger sense of it.

Worker 1: I would like to ask the others a question. I ran across a document dated 2002 that stated on page 6 that Rocky Flats had recently identified tritium-contaminated equipment in Building 776. As late as 2002, there was still tritium-contaminated equipment.

Worker 2: It doesn't surprise me that they found tritium in Building 776 because that's where tritium was supposed to be.

Worker 7: Keep in mind the difference between the biological half-life and the physical half-life. If you believe what they told us, it was 12 years, and it takes seven cycles to reach unity. Tritium contamination should be detectable in small part for at least 70 or 80 years.

Worker 2: But the biological half-life is only eight days, because it clears the body very quickly. How long it stays in the sewer system is a different matter.

Mr. Calhoun: It clears the body in a matter of days.

Worker 7: The point that I am trying to make is that the residual effect for the contaminant outside the human body could drag on for many months and years. That's how they found it in the Great Western water supply. We didn't routinely check the things going into salvage. We had a salvage warehouse where they sold things to the public. I never checked for anything other than alpha and a quick screen.

Worker 2: It was supposedly all gone by the time we all came along.

Worker 7: So there are millions of dollars' worth of equipment that went who knows where.

Worker 4: We buried it.

Worker 7: Some of it was sold. They had that warehouse on Highway 93 in Broomfield.

Worker 5: They sold the surplus out of 850.

Worker 1: That warehouse transferred material out to Building 60 warehouse on Highway 93. I was [redacted] and I worked [redacted] that carried that stuff out. There was monitoring on those but to the best of my knowledge, they didn't ever check for anything like tritium.

Worker 7: It was alpha smear, alpha direct, possibly beta, and maybe gamma but to my knowledge, we were never required to check for tritium.

Dr. Bogard: It sounds to me like we have exhausted your personal experiences with tritium for the years of interest, unless anyone has anything else or anyone from the NIOSH team has any questions.

Worker 12: Could you mention the letter to the staff that you have there?

Dr. Bogard: Who handed this to me?

Worker 13: This is a letter from another employee. Unfortunately, she doesn't have her phone number or any other contact information on here. (*Another attendee stated that the former employee who wrote the letter now works at the Nevada Test Site.*) She tells about getting a tritium exposure while she was pregnant and that she was treated like it really wasn't a big deal, and then she miscarried.

Dr. Bogard: The letter is from [redacted]. It deals with a tritium exposure while she was pregnant and her experience with the follow up on that.

Worker 12: She wanted to be on the phone conference today but she could not be. The point that she wanted to make was that she was not told until after the fact that that she was exposed to tritium and that she was pregnant at the time. She was told in a critique. That was that important thing that she wanted to mention. It was her job to go around and do the critiques.

Worker 13: I have a document here that discusses how to deal with tritium-contaminated equipment. It is dated 2002 and it references Building 776 tritium-contaminated equipment.

Dr. Bogard: This is from the Waste Management Conference from February 24 to 28, 2002, in Tucson. The title of the paper is *Los Alamos National Laboratory Tritium Technology Deployments: Large Scale Demonstration and Deployment Projects*. It refers to text above the table on page six of that report. The report date is 2002 but I don't see a reference to the date of the Rocky Flats tritium-contaminated equipment. I will have to read it to see if there is any more information in here.

Worker 1: I came to the site in [redacted], so I am here about the period after what you're interested in. I would like to submit what I had hoped to present to you. I can still speak to that if you would like. I have 14 references here, some of them showing some of the air monitoring. Some of those documents actually give names and telephone numbers of people doing monitoring currently for tritium. I would also like to, if time allows, go through the identification of some scenarios. I'm especially interested in the solar ponds because when I first came to Rocky Flats in [redacted] I was given a tour of the site. I started in Building 60 and then I was asked to go to [redacted]. I was in a "cold" area, but I was asked to go throughout the site, including all of the "hot" areas to do an evaluation of all of [redacted] to come into compliance for the site for a DOE order which was generated post-Three Mile Island, which was due to human error and maintenance issues. I went from being maintenance implementation plan program manager to the integrated work program, and then to traffic and transportation oversight. Some of the scenarios, as [redacted] from [redacted] timeframe, I was working with [redacted] in the warehouse where trucks entered and left the site, and also stopped to either unload empties or to be weighed before exiting the site. The warehouse is in the "cold zone" where no dosimetry was worn. That day, as we walked past a new set of drums, he realized that

they were not new drums, but were drums filled with an unknown substance. He had to deal with that, and any exposure there was, was never documented because neither of us had dosimetry on in that area. That was very typical.

Dr. Bogard: Since that is outside the dates that we are evaluating, could I have that information to put into our database? It may be very useful to the Working Group. If we are about done, I will let Worker 7 have the last word.

Worker 7: There are two things that you need to know about. Prior to the 1969 fire, 776 and 777 were essentially one big room. There weren't any air-locks or partitions, so what happened in one part would probably eventually migrate. The other thing that I haven't heard yet is the sanitation plant. We talked about the laundry, but almost everything that happened at Rocky Flats went to the sanitation plant. We had workers shoveling the sludge. We had no real-time monitoring that I was ever aware of. There were several times that the sanitation plant was "hot" but it was due to people with nuclides for cancer treatment. It came out that anyone who had radioactive isotopes in them should stay home.

Worker 2: Or they gave you bottles to fill to take all your urine home.

Worker 7: The reason that I'm telling you this is because that sanitation plant was there all throughout my career at Rocky Flats.

Dr. Bogard: Given the interconnections between all of the other parts of the plant, I wouldn't be surprised.

Worker 2: If anyone had been exposed to tritium, that biological half-life means that they excreted the tritium into the sewer system.

Workers 2 and 7: We had laborers who had to go in there routinely to clean out the sludge because it would get plugged up.

Worker 1: In some of those reference documents, it shows that tritium was assayed and found in the sludge in the solar ponds.

Worker 2: Everything went to the solar ponds.

Dr. Bogard: Thank you, everyone, for contributing to the tritium discussion. The last thing that we wanted to discuss today was a fire that occurred in 2003 in Building 371. This is separate from the tritium discussion. If any of you has any experience with that fire or would like to describe your participation in the incident, we would like to hear it.

Worker 2: I was in it.

Worker 4: I was a [redacted]. We were changing filters in Building 371, and it had to be after midnight. I can't remember what time it was, but we worked 14-hour days.

Worker 3: They were working on a glove box in Room 2325 that day.

Worker 4: It was a quiet day and then the alarm went off. We had to get out of the building because of that.

Worker 2: There was smoldering material in the bottom.

Worker 3: I was working upstairs in a different room on a different job. There was a building announcement for the BEST team to respond, which was the Building Emergency Services Team, first responders, and RCTs were the first to respond. I was both. Another worker and I went downstairs to see what was going on. They said that there was questionable smoke, or something along that line. When we got down there (in the basement of 371), there wasn't much going on. People were going about their business in the hallway. There were a lot of D&D activities going on in each of the rooms. We walked into Room 2325 and we could see that they had been bringing in fire extinguishers from the other rooms down the hallway. They were handing (the fire extinguishers) into the two operators in supplied air suits in the box, one of whom was my stepson. They had been using a sawzall or a nibbler to remove stuff from the inside of this box and had sparked something. Based on word of mouth, I believe that the RCTs were trying to get them out of the box in a safe manner. The foreman was telling them to dump water on it or use the fire extinguishers.

Dr. Bogard: How big was this box?

Worker 3: They were standing inside the box. It was about half the size of this room.

Worker 4: There were rags for cleaning. We wiped down the boxes with chemicals to clean them.

Worker 3: It was probably some solvent.

Dr. Bogard: Was it the size of a Sea-Land container?

Ms. Munn: The box would have been about half that size.

The recording stops here at 1 hour, 19 minutes, and 38 seconds. The meeting lasted several more minutes. After this point, the account of the meeting has been reconstructed from notes.

Worker 3 described the fire event in great detail: The workers in the box were in supplied air suits and were standing over the trash working with the sawzall when the fire started. They were working in a negative airflow room so the contamination would be contained. At that point, there had not been an alarm or an announcement. The announcement to the first responders came after the door was opened and workers in the area of the fire had used several fire extinguishers in an attempt to put it out. Workers responding to the alarm were not wearing respiratory protection or any other PPE because that equipment was locked up and it was quite a process to get to it.

Worker 3 left the room to prepare a step-off pad outside the contaminated area. She opened the emergency cabinet and began putting out plastic to prevent the spread of contamination. That was when they made an announcement not to evacuate the building. The foreman also radioed the fire department and told them to go back because they had everything under control. People working in the room above called the shift manager because they were smelling smoke. One of

the RCTs pulled the fire hose and set off the fire alarm, so the fire department returned to the scene.

Worker 3 recalled that the workers who were involved in the incident came out “pretty clean.” The initial report that the fire department received from the scene was that they were responding to a “smoldering” box fire. After the fact, the actual report by the fire department on the incident stated that there were “flames to the ceiling.”

Worker 3 explained that when the doors to the negative air room were opened, it caused an air reversal and everyone got sprayed. Firemen with SCBAs did their hot bottle changes in the fresh area. Worker 3 was outside the plastic and had to keep changing gloves as she took readings with the 12-1As.

Worker 3 stated that they lost the whole basement as a result of the incident. The DOE critique of the incident stated that the entire basement was contaminated and sealed off. It also said that everyone was evacuated to an assembly area. Rocky Flats management reported that there was no release. At the end of the day, DOE posted no access to basement but the next morning everything was all cleaned up.

Worker 12 stated that [redacted] had been the foreman on the cleanup crew. Everything was stripped out of the room and put into waste crates. Worker 3 added that the basement was full of waste crates. Worker 2 stated that building management was pleased that everything had been cleaned up so quickly but upper management was not so pleased.

Worker 7 commented that the attitude at the site at that time was to either downgrade or to ignore incidents.

Worker 3 and Worker 4 stated that everyone involved in the incident and the cleanup had to give fecal samples and also had nasal smears. The firemen involved in the incident were monitored for a time for internal dose.

Worker 2 stated that the firemen who were inside the room fighting the fire had high internal doses. She added that everyone involved in the incident and the response had contamination on their skin and everything in the basement was contaminated.

Worker 3 stated that her dose over the span of her career was only 2 rem.

Dr. Bogard asked what the committed dose was for the firemen who responded to the incident. Worker 2 explained that management had kept details to themselves, but after the critiques and meetings with the Defense Board, they found out that 16 fire extinguishers had been used before the fire department had arrived at the scene.

Dr. Bogard asked if the workers had received counseling after the incident. Worker 3 responded “absolutely not,” although she had suffered injuries during the incident (broken blood vessels in one eye and a back injury).

Worker 1 stated that the Kaiser-Hill contract dated February 2000 included a line item for \$1 million to reduce radiation exposure on site. Worker 7 stated that the amount had been higher.

Worker 1 commented that she had asked for a respirator fitting and had been denied. She also stated that her dosimeter badge had been taken away after that. Worker 2 replied that Rocky Flats had a very good dosimetry program. Worker 10 stated that, as a result of the fire in Building 371, management mandated an enunciation fire alarm. Worker 9 added that management also mandated that only three fire extinguishers could be used before calling the fire department. Worker 10 commented that security took a back seat to getting the work done.

Ms. Boller asked about the possibility of extending the dates for the SEC class through D&D and closure. Mr. Calhoun responded that there was already an evaluation report that went beyond the end date, and that the current evaluation is only for tritium exposures during the time period that had been discussed earlier in the meeting.

Worker 7 commented regarding the 2003 fire during the D&D time period ... the contract provided incentives to reduce services such as dosimetry and lung counters, in addition to a shrinking workforce that was driven by a DOE directive to pull a certain number of security clearances. He stated that the company had even brought in a "chain gang" on the evening shift to do some of the asbestos abatement. Worker 2 added that these workers were brought on site in a bus. Worker 9 added that there were armed guards with these prisoners in Building 779 for more than a week.

Worker 2 stated that management had hired a number of Hispanic workers who had received their rad worker training in Spanish and may have been paid less. Worker 4 commented that some of those workers had no documentation (work visas) and had to leave the site.

Worker 7 commented that workers were caught in the crosshairs as requirements on security clearances were downgraded.

Worker 4 stated that he did not recall air sampling during the latter part of the D&D work.

Worker 10 stated that he had more information on tritium, but he was concerned about classification issues after what Rod Hoffman had told them at the beginning of the morning session. He said that he and Worker 7 had spent hundreds of hours in the Build Room. Worker 2 said that she had also spent a lot of time in the Blue Room. Worker 10 explained that the area (in 777 and 707F) was extremely contaminated with tritium during the assembly period prior to shut down.

Worker 7 stated that there was a lathe in the back of G where they were not supposed to take components ("pits"). Dr. Bogard asked if it was used during assembly or disassembly. Several workers agreed that it was used during both.

Several workers described the glove boxes as downdraft tables (super dry) with glove hands and guillotine doors. The insides were lined with aluminum foil for shielding. The "hot" stainless steel shells were clamped together and sent to the welders. One worker stated that they wore lead aprons when doing this work.

Worker 2 stated that they did not monitor for tritium when working with components and that they were not trained to monitor for tritium. She added that there were "miles of glove boxes." Worker 10 commented that there was a lot of tritium in those work areas.

Worker 4 explained the procedure for dismantling the glove boxes during D&D: workers disassembled the fire dampers, then tagged the boxes out, and cut them down into smaller pieces for removal. Worker 2 stated that any material contamination still in the boxes would have been unfissionable. Worker 7 explained that when workers were zeroing boxes, someone watched on the hi-vac system in 776 as the boxes were tagged off, and the electric lines were shut down and air-gapped. Workers concurred that this process allowed the shift supervisor positions to be eliminated and cut personnel costs. Worker 10 commented that any residual tritium was free to migrate after the fan systems were disabled during D&D.

Worker 1 stated that she had observed a worker in the 700 area carrying a glove box on a little red wagon during D&D.

Mr. Lewis thanked the former Rocky Flats workers for meeting with the NIOSH team to share their experiences. [Redacted] thanked the NIOSH team for coming to Colorado to discuss the tritium issues with the former workers.

Worker 11 commented that the woman who had been present at the beginning of the meeting did not represent the Steelworkers organization.

Worker 7 thanked the Congressional aides for attending the meeting on behalf of the workers.

Dr. Bogard thanked everyone for participating in the focus group meeting and adjourned the meeting at 3:00 p.m.