

National Institute for Occupational Safety and Health (NIOSH) Worker Outreach Meeting for Los Alamos National Laboratory

Meeting Date: Wednesday, May 9, 2007, 1:30 p.m.

Meeting with: International Association of Firefighters (IAFF) Local 3279, Los Alamos County Fire Department, White Rock, New Mexico

NIOSH/ORAU Team:

Gregory Macievic, PhD, National Institute for Occupational Safety and Health (NIOSH) Office of Compensation Analysis and Support (OCAS), Health Physicist

Jack Buddenbaum, Oak Ridge Associated Universities (ORAU) Team, Site Profile Team Leader

Don Stewart, ORAU Team, Dose Reconstructor

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

Proceedings

This is the second of three meetings between a team from NIOSH and the ORAU Dose Reconstruction Project, and members of IAFF Local 3279 representing the firefighters from Los Alamos County Fire Department who serve as first responders to calls at Los Alamos National Laboratory (LANL).

Mark Lewis introduced himself. He stated that he had worked at the Portsmouth Gaseous Diffusion Plant before coming to work for ATL, a contractor to ORAU under the NIOSH Dose Reconstruction Project. Mr. Lewis thanked the attendees for coming to the meeting.

Mr. Lewis stated that the main purpose of the meeting was to discuss the site profile for Los Alamos National Laboratory (LANL). He explained that the site profile is used by dose reconstructors to estimate radiation doses for LANL workers whose claims under the Energy Employees Occupational Illness Compensation Program Act (EEOICPA). Mr. Lewis added that the site profile is a "living document" that may be revised when new information about LANL becomes available.

Mr. Lewis introduced Greg Macievic of NIOSH, and Don Stewart and Jack Buddenbaum of the ORAU Team. He explained that Mr. Buddenbaum is the leader for the LANL site profile team. Mr. Lewis turned the meeting over to Mr. Buddenbaum for the presentation.

Mr. Buddenbaum stated that he is the team leader for the development of the technical basis documents (TBDs) that make up the LANL site profile. His team began searching for documents in 2003, both onsite at LANL and in the Federal Records Centers, to gather the information that is in the site profile. The team reviewed many documents to find information about the

radiological operations at LANL and their time frames, as well as the major sources of radiation in the different technical areas. The team also interviewed current and former LANL workers, including those who worked for Zia and other companies who had maintenance contracts in the early days. The original site profile documents were put together quickly in response to the large number of pending EEOICPA claims for LANL workers that were waiting on dose reconstructions.

Mr. Buddenbaum stated that the site profile work was being done under EEOICPA, which President Clinton signed in 2000. EEOICPA provides compensation and medical care for eligible nuclear weapons workers.

The Department of Labor (DOL) manages the EEOICPA claims process for Part B claims for radiation-induced cancer and other illnesses that are related to the production of nuclear weapons, and for Part E claims for illnesses caused by exposures to toxic chemicals. If they have a covered illness, workers or former workers from eligible Department of Energy (DOE) or Atomic Weapons Employer (AWE) nuclear weapons sites may be eligible for compensation and medical expenses from the date they file. NIOSH only does dose reconstruction for Part B cancer claims.

Mr. Buddenbaum explained the steps in the Part B process that involve NIOSH:

- DOL receives the claim, verifies the worker's employment and cancer diagnosis, and forwards the claim to NIOSH;
- NIOSH sends a request to DOE for the worker's employment history and personnel monitoring records;
- ORAU interviews the worker or survivor;
- ORAU uses the worker's information from DOE, the interview, and the site profile to reconstruct the worker's radiation dose;
- The information from the dose reconstruction is run through a computer program that determines the probability of causation (POC), or the likelihood that the cancer was caused by the worker's radiation exposure;
- The worker (or survivor) reviews a draft dose reconstruction report and has a chance to add or correct information in the report;
- When the worker agrees that the dose reconstruction is complete, he returns the OCAS-1 form;
- NIOSH returns the completed dose reconstruction to DOL;
- DOL makes the final compensation decision.

DOL sends a worker's claims to NIOSH after verifying the worker's employment and medical diagnosis. Dose reconstructors use the site profile and other documents to determine if the worker's radiation exposure while working at a DOE or AWE site is "at least as likely as not" to have caused the cancer. DOL makes the final compensation decision based on the dose reconstruction.

Mr. Buddenbaum reiterated Mr. Lewis' statement that the purpose of the meeting was to discuss the LANL site profile and to hear about the firefighters' work experiences on the LANL site. He

added that he was interested in hearing any comments or concerns that they might have about the site profile or its development process.

Mr. Buddenbaum compared the dose reconstruction process to solving a jigsaw puzzle. The site profile is one piece of the puzzle, along with the worker's dosimetry records and other exposure information – film badge or TLD (thermoluminescent dosimeter) readings, medical X-rays that were taken as a condition of employment, bioassay results, incident reports. If there is no dosimetry data for a worker, dose reconstructors may use a coworker's dosimetry data if they were working in a similar environment. Claimants are also interviewed to get additional information about their work histories and exposures. Dose reconstructors must take steps to make the process "claimant favorable" by making assumptions to find the pieces of the puzzle that will help bring the claim as close as possible to being compensated.

Mr. Buddenbaum explained that there are not always sufficient records to complete dose reconstructions for workers – especially employees of subcontractors – during the early years at LANL. A petition was recently approved that will add a class of LANL employees to the Special Exposure Cohort (SEC). Eligible employees who worked between 1943 and 1975 will be automatically compensated if they have one of 22 specific cancers and worked at least 250 days during that time period. Mr. Buddenbaum explained that any future efforts to revise the site profile will likely focus on 1976 forward because nearly every worker prior to that will be compensated as part of the SEC class. The SEC petition passed because there are large data gaps in the "puzzle" for that period.

Mr. Buddenbaum stated recordkeeping at LANL got better over time. There are more records for the period after 1975, but not all records may be available or easy to locate. The team will continue to search the Federal Records Centers for LANL records

Mr. Buddenbaum stated that the LANL site profile is an overall description of the production facilities and processes, sources of radiation, typical exposure scenarios for workers, dosimetry programs, and other site-specific details that will help the dose reconstructors figure the worker's radiation dose. The sources of information are referenced in the site profile documents, including the team's interviews with current and former LANL employees. The input from these workers helped Mr. Buddenbaum's team to better understand the potentials for radiation exposure, as well as the monitoring practices and controls on those exposures. He emphasized that this information was an important element in the development of the site profile.

Mr. Buddenbaum stated that the LANL site profile is made up of six different technical basis documents (TBDs): Introduction, Site Description, Medical Dose, Environmental Dose, Internal Dose, and External Dose.

The Introduction explains the different technical elements of the site profile and the different doses that are part of dose reconstruction.

The Site Description explains the processes and operational dates, such as the Omega West Reactor and the RaLa (radiated lanthanum) shots in Bayo Canyon in the 1940s and the 1950s. This section is like a map of the LANL site over time. Recent revisions added information about

operations that were not included in the first version of the document, as well as start and end dates for some operations. The Site Profile team is still looking for documents that will fill in some of the gaps. The Site Description gives details of the programs at LANL, starting with the Manhattan Project and the Trinity Shots and continuing through the present.

LANL's primary mission has always been weapons design and device testing. During the 1950s and 1960s, the site produced plutonium to help meet the needs of weapons production during the height of the Cold War. High explosives development and weapons safety have also been an important part of their mission. Nuclear reactor research and waste disposal have also been factors in LANL workers' radiation doses. The primary radionuclides are tritium, fission and activation products, uranium, and other transuranics. The sources of radiation are listed in Table 2-1. Accidents and incidents are shown in Table 2-4. These revisions are in the final review process.

The third section of the site profile is the Medical Dose section, which discusses the medical X-ray program at LANL over time. Medical X-rays are those that are required as a condition of employment. Some of the medical records from LANL have been difficult to obtain, so the dose reconstructors must make assumptions to estimate the medical dose. These assumptions are very conservative and very favorable to the claimant because the documentation about the medical X-ray equipment at LANL is not complete for all periods. NIOSH does not always get information from LANL about the occupational X-rays so for the occupational medical dose, so the dose reconstructors assume that all workers had all the X-rays.

During the early years at LANL, photofluorographic equipment that was used for workers' medical X-rays gave two times the dose of standard X-ray machines did. That is considered in the medical doses of workers during that period. But with the recent addition of the SEC class, that will only apply to the claims of workers prostate and skin cancers.

Senator Udall has helped NIOSH get access to some of the medical records for LANL that have not been available but the records have to be decontaminated. The site profile team believes that some of these records may be useful once they become available to the team.

The next section is the Environmental Dose. Environmental radiation dose is that dose that workers receive while working around LANL outside of the production areas. Dose reconstructors consider both the internal and external doses from the workers' environmental exposures. The environmental dose is an important part of the dose for unmonitored workers or for workers without dosimetry or co-worker data.

The Environmental Section has been revised to include additional pre-1970 data for outdoor air concentrations. The revision also includes some additional external data that goes back to 1958. Those data can be used for workers with non-qualifying cancers under the SEC. the revision is under review and may be available to dose reconstructors very soon.

For the external environmental dose, the values are between 30 and 55 millirems (mrem) per year for the years 1958 to 2002. These values come from the area TLDs that are mounted around the various Technical Areas to keep track of the ambient radiation levels. Data for additional years after 2002 will be added to this section periodically as LANL publishes new information.

Several minutes are inaudible due to an alarm and other background noise when the Fire Station received a call.

The changes in the ambient levels over time can be linked directly to activities at LANL. Dose reconstructors also consider the workers' exposures to gamma radiation emissions from the stacks at LANSCE and other facilities that contribute to their whole-body doses as part of their external environmental doses. LANL added a delay line to the stacks at LANSCE to reduce the amounts of activation product that is emitted into the environment.

The internal environmental dose is the largest contributing dose within the site boundaries for most workers. The Environmental Dose section also provides annual values for radioactive concentrations around the Lab to help dose reconstructors figure the worker's internal environmental dose. These values (30 to 55 mrem per year) are based on a working year of 2,080 hours. Data for tritium, iodine, thorium, uranium, plutonium, americium, and mixed fission products are included. The revisions to this section will provide additional data for years before 1971.

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Worker 1: We work more than 2,080 hours per year. Our schedules are usually 24 hours on, and 24 hours off – more than 50 hours a week. We wear our badges every time we respond to a call to the Lab.

Mr. Stewart: The work hours definitely factor into your dose reconstructions. We usually get this information from the claimants during their telephone interviews. When we decide on the approach we will take for each dose reconstruction, we consider factors like how much a worker may have been exposed. With workers who have a lot of exposure, we would probably overestimate the dose so we can give the worker more dose to get the claim to be compensable without taking a lot of time on the dose reconstruction.

A discussion ensued regarding the work schedules of firefighters:

Worker 2: We worked 18-20 hours per day during the Cerro Grande fire in 2000. The current work schedule at the Los Alamos Fire department is 48 hours on duty followed by 96 hours off, or 240 hours per month.

Worker 3: We worked 144 hours per two-week pay period (24 hours on, 24 hours off) when we worked for DOE in the 1970s and 1980s. The schedule changed to 112 hours per pay period when Los Alamos County took over in September 1989, the schedule changed to 112 hours per pay period.

Dr. Macievic: Work hours are a certainly a big factor for response personnel whose schedules change according to demand instead of 8-hour shifts.

Mr. Buddenbaum: We would like to get some information on the Cerro Grande fire while we are here. We haven't really heard much mention of the fire yet, probably because the responders don't have claims at this time.

Worker 1: Most of us were on duty for nine days straight during the Cerro Grande fire.

Worker 3: They gave us a list of buildings during the Cerro Grande fire and told us that we were to protect them "at all cost." The historic buildings at S Site in TA-16 burned during the fire, including Building 1. All of S Site is contaminated.

Worker 4: The Cerro Grande fire destroyed parts of TA-8, TA-9, TA-11, TA-16, and TA-22. We were not monitored during the fire, even though those areas contained wastes from almost 60 years. The flames turned colors as the different materials burned.

Worker 2: One of the reports on the Cerro Grande fire says that the contamination levels were within acceptable levels. I am not sure that the air samplers were located in the area of the fire. I know that the air samplers at Station 4 were located to the west of the fire, but I remember that the wind was blowing toward the east.

Mr. Stewart: Do you remember giving bioassay samples after the fire?

Consensus of several attendees: No. The firefighters were taken off the bioassay program in 1991 or 1992.

Mr. Stewart: NIOSH has data about the air concentrations during fire, but I don't remember if there are specific numbers for firefighters.

Worker 2: Our schedule changed to 48 hours on, then 24 hours off during the Cerro Grande Fire because more manpower was needed. People were sleeping in their vehicles in the parking lot because so many firefighters had been called in from other places and the station was crowded

Mr. Buddenbaum: The site profile team should think about including information in the revision of the Environmental Section about your longer work hours being a potential contributing factor to higher doses due to longer work hours.

The Internal Dose section helps dose reconstructors figure the internal doses for workers who were involved with radioactive materials and participated in the bioassay program. This document describes the bioassay program that was run by the LANL health physics group. It explains how they decided who should be monitored and what parts of the program the workers would participate in. Some of the monitoring methods included urinalyses, whole body counting, chest counting, and wound counting for radionuclides such as uranium, plutonium, and tritium. Bioassay data for thorium, mixed fission products, curium, and lanthanum were kept in handwritten logbooks and notebooks, but these are difficult to find. Mr. Buddenbaum explained that the SEC was approved because NIOSH could not come up with a credible way to estimate doses for lanthanum, curium, and the mixed fission products because LANL did not monitor for those radionuclides routinely in workers' urine or by whole body counting.

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Mr. Buddenbaum stated that one of the major revisions to this section was made because the site profile team found documentation that a small amount of plutonium-239 was included in the “pits” that are used to detonate the weapons. The first version of the Internal Dose section assumed that workers were exposed to pure plutonium-238. Since plutonium-239 has a higher dose conversion factor, dose reconstructors use that in the dose reconstructions of workers who have results for plutonium-238 in their bioassay records. This assumption increases the internal doses for these workers.

The External Dosimetry includes information on sources of exposure, the types of dosimeters and dosimetry practices that were used, including the badge exchange frequency, the adjustments that were made to the recorded dose, and the minimum detectable levels (MDLs) of the dosimeters. LANL began monitoring gamma radiation and X-rays in 1943. They began monitoring beta and neutron radiation in 1949. The workplace radiation fields and the locations of the workers around the radiation sources are documented. Dose reconstructors use this information as they are calculating the worker’s external dose. They may also use the MDL to calculate a “missed dose” if the worker has a “0” reading in the badge results.

Some of the larger sources of external exposure are present in TA-1, TA-3, TA-21, TA-55, the Bayo Canyon shots from the 1940s through the 1960s, the Omega Reactor, X-ray units, and the pits associated with destructive testing devices. The revised External Dose section includes photon-to-neutron dose ratios associated with handling the pits.

Worker 1: We were doing “evolutions” on the roof and around the building perimeter at DP Site in TA-21 during a training class on response procedures in 1990. We had not been notified before the exercise that there had been a tritium release at the facility.

Mr. Stewart: Specific information can help us link the activities to contamination survey reports. We can use the airborne contamination data in the survey reports to model the “missed dose” for dose reconstructions of unmonitored workers.

Mr. Buddenbaum: This information would probably be discussed during a claimant’s telephone interview. It is important for you to document events like this so the information is available.

Worker 2: There aren’t always RCTs around when we respond to a call or when we’re training at the site. Sometimes we respond to an event and don’t know what they have been using.

Mr. Stewart: It is important that you keep some kind of a record of that.

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Worker 3: We often go to wildland fires in the canyons where LANL did a lot of destructive testing a long time ago. The things we do to contain and extinguish those fires disturb the soil and stir up some of the stuff left over from that testing. Most of those areas have been remediated, so there may not be any RCTS out there doing surveys. Do dose reconstructors consider that some radioactive materials might become airborne during our activities?

Mr. Stewart: We can use the data in environmental reports to develop models that take these things into account. Survey reports of the area from the operational period may also contain data that can be used to develop a model for the resuspension of contaminated residue. We need these models to help dose reconstructors make an accurate estimate of the radiation doses for firefighters and other workers who are not normally considered radiological workers but who come into contact with contaminated materials while performing their job duties.

Worker 5: In the 1970s and 1980s, firefighters were called to S Site for shot activities all the time. They went to the site and waited at a safe distance until after the shot was fired and someone gave them a signal to go put out the fires. The firefighters were not monitored, even though there were a lot of “hot” spots from the shots.

Worker 2: I remember going to an event at PHERMEX, where they have depleted uranium in the shots. But the material was lithium hydride and it is water reactive. Nobody told us what the material was and we sprayed the fire with water. We weren't wearing respiratory protection and we were inhaling the plumes of smoke. Some of us were sent to the hospital and they monitored us for a while. I think that was in 1990.

Another time, we were called out to the site to put out several small shot fires. At first, they didn't tell us what was in the shot, but after we had been putting out the fires for about a half hour, they told us that we should probably be wearing respirators. I think that the material they were worried about was beryllium, though, and not DU.

Mr. Stewart: It would certainly be beneficial to you and your fellow firefighters if you documented these events.

Worker 2: We record our activities in a log book – date, time of call, facility, shot time, time of the all-clear signal, etc. Los Alamos County took over the fire department in 1989, so any records before then would belong to DOE.

Worker 4 to Worker 2: How were incidents were documented prior to the late 1990s when before the fire department started using the Firehouse Reporting System (FRS) computer program that is maintained by the state?

Worker 2: They were noted in the logbook and the captain wrote reports in a computer file. The FRS can be queried for reports but hard copies of reports written before it was implemented may be kept in records archives at Station 4.

Worker 5: The captain's reports were handwritten when I started working in the 1970s.

Worker 2: Most of the reports don't include information about the materials in the shots because they don't usually tell us.

Worker 2: We keep single incident dosimeters on the truck, but we rely on the RCTs to tell us if it is necessary to wear a special device to monitor for special things.

Worker 4: The RCTs sometimes provide breathing zone samplers during incidents such as the Cerro Grande fire to check contamination levels to tell us how long we can stay in the involved area. But they don't advise us of the contamination levels.

Worker 3: Firefighters don't receive any information regarding their dosimeter readings.

Mr. Stewart: NIOSH calculates the radiation dose differently than the DOE radiation dose. The DOE sites limit a worker's radiation exposures to keep dose levels under the regulated annual limits so the DOE dose records may give the impression that the worker did not receive any dose. But NIOSH takes all of the worker's radiation doses into account during dose reconstruction, including doses from occupational X rays and the ambient radiation that falls below the limits of detection. The SEC class of LANL workers from 1943 through 1975 was added because NIOSH could not find enough data to determine a bounding dose for all the members of that class.

Mr. Buddenbaum: LANL does a pretty good job of sampling around the site, especially after the 1970s. There is a lot of data about legacy materials in the different TAs and the legacy contamination on the ground. I would think that the areas are marked to indicate the contamination levels.

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Mr. Buddenbaum: In conclusion, the workers' input is very important to us. The site profile documents are "living documents." We want to add to them and revise them as we gather new and useful information. We are always trying to improve the process to make it more favorable for the claimant. You can send your comments to NIOSH. Here is the contact information. If you need more information, here is the Web address. Thank you for your time.

Mr. Buddenbaum adjourned the meeting adjourned at approximately 3:00 p.m.