National Institute for Occupational Safety and Health (NIOSH)

Worker Outreach Meeting for the Pantex Plant

Meeting Date: July 31, 2007, 9:00 a.m.

Meeting with: Pantex Guards Union and Metal Trades Council of Amarillo, Amarillo, Texas

NIOSH Worker Outreach Team:

Mark Rolfes, Health Physicist, National Institute for Occupational Safety and Health, Office of Compensation Analysis and Support

Jack Fix, Oak Ridge Associated Universities (ORAU) Team, Dade Moeller, Inc., Health Physicist and Pantex Site Profile Document Owner

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

Mary Elliott, ATL, Technical Writer/Editor

Proceedings:

Mark Lewis opened the meeting at approximately 9:00 a.m. He described his background, explaining that he is a member of the United Steelworkers of America (USW) on leave of absence from the Portsmouth Gaseous Diffusion Plant where he has been employed in the Fire Department and in various other positions for more than 30 years. He is currently serving as a liaison and conducting outreach activities for the National Institute for Occupational Safety and Health (NIOSH) Dose Reconstruction Project with labor organizations and other stakeholders in the Energy Employees Occupational Illness Compensation Program Act (EEOICPA).

NIOSH develops site profiles that describe the Department of Energy (DOE) nuclear production facilities as well as other companies that performed work under DOE's atomic weapons programs. These site profiles are used in the radiation dose reconstruction process that is required under EEOICPA. NIOSH is aware that daily operations in the DOE nuclear facilities were not always carried out in accordance with written operating procedures.

One of Mr. Lewis' NIOSH Outreach tasks in support of the development of the site profiles is to open dialogues with workers about the daily work practices at their sites. Information from workers is often incorporated into the site profiles to provide information that may be missing in the "official" records of DOE and its contractors.

A brief discussion ensued regarding long-time Pantex workers who may have beneficial information regarding operations at the plant. The Pantex Guards Union (PGU) business representative stated that the nature of their work required them to adopt the government mentality that reflected "if nothing was said, there was not a need to know." Workers are still affected by that attitude and may sometimes have a "mental block" when it comes to talking about their work.

Mark Rolfes stated that NIOSH personnel had visited the Pantex plant several times, toured the training area and spoke with guards, metal trades, production technicians, and health and safety representatives. If the workers have a concern that might affect a dose reconstruction, and they are unable to discuss this information in a public forum, NIOSH can arrange to meet with workers in a secure setting.

A representative of the Metal Trades Council (MTC) asked if NIOSH had ever spoken to any of the firefighters. Mr. Rolfes was uncertain if they had; NIOSH previously met with the workers selected by the MTC and PGU at Pantex in July 2005. Mr. Lewis inquired as to who would be the contact for that group and was given that information. The firefighters' union is part of the MTC.

Mr. Lewis explained that the PGU Safety Officer had requested this meeting with NIOSH to discuss recent changes in the Pantex dosimetry program. Although he was unable to attend, the Safety Officer joined the meeting by telephone to share his concerns. Mr. Lewis asked everyone to introduce themselves and describe their affiliations.

Mr. Lewis turned the meeting over to the PGU Safety Officer, who stated several objectives for the meeting. He said that NIOSH is well respected by labor for their role in occupational safety and health. He is aware of the role they play in EEOICPA. The Safety Officers from both PGU and MTC have met with Pantex Radiation Safety personnel recently to gain a clear understanding of the changes in the dosimetry program at Pantex. Because claimants from the Pantex site are dependent on the information in the site profile, he believes that it is very important for the changes in the dosimetry program at Pantex to be reflected in the site profile. The primary concern of both PGU and MTC is that these changes will have a definite effect on EEOICPA claimants from the Pantex site. Site profiles are "living documents," which means that the document will continue to be revised as new information comes forward.

Mr. Rolfes confirmed that NIOSH will incorporate these important changes into the site profile. For the present Pantex claimant population, this is not an issue because the changes would not affect the outcome of their dose reconstructions. But for claimants who apply for compensation in the future, the changes may be important. NIOSH will have to devise a method of dose reconstruction for these future claimants based on either co-worker data or area monitoring data to assign claimant-favorable radiation doses to the workers who are no longer being monitored. Mr. Rolfes stated that NIOSH does not have a path forward for that yet, but will incorporate the changes into the Site Profile to indicate that the Dosimetry Program is in the process of changing.

The PGU Safety Officer said that Mr. Rolfes had given him the answer that he had hoped to hear. He requested that NIOSH question the officials at Pantex about the changes to the Safety Program to be certain that all of these changes are properly reflected in the Site Profile. Union leadership is aware that some of the changes that affect the PGU will also affect the MTC. The PGU wants to be certain that all those changes are clearly identified and wants to understand how they will impact future workers. They would like to have a clear understanding of the process for those who may apply for compensation in the future. The PGU and MTC work very closely together, and it is very important that all of the changes are clearly communicated so that NIOSH can reflect them clearly in the Site Profile. The PGU will continue to communicate these changes to NIOSH as developments in the Safety Program evolve. He stated that any MTC concerns that are addressed will also help the PGU because the guards are often the first responders when there are events. The Pantex Guards think it is best to get everything out on the

table so everyone understands what is taking place and communicate that clearly with plant management, the Department of Energy, NIOSH, and everyone involved. The PGU Safety officer stated that the meeting would be successful if everyone understands all of the changes to the dosimetry program and their impact. He excused himself from the meeting by stating that he was confident all would be resolved.

Mr. Lewis introduced the third item on the agenda: *Discussion of the January 2007 Comments from the Metal Trades Council Regarding the Pantex Site Profile*.

Mr. Rolfes explained that the NIOSH Team had prepared responses to these comments for a January 2007 meeting that was postponed due to inclement weather. The MTC had concerns about ongoing work in some areas at Pantex and possible unmonitored exposures that could be of concern. One of the MTC issues that NIOSH also heard consistently in worker interviews was the inconsistent use of lead aprons. Based on worker input, NIOSH developed a method to address unmonitored dose or to correct recorded dose for workers wearing lead aprons versus workers not wearing them, using an assumption that results in a higher dose to the organ of concern. For a worker who has lung cancer but wore a lead apron, the dose to the lung would be less than to an area of the body not protected by the apron. Mr. Rolfes turned the discussion over to Mr. Jack Fix, the Pantex site profile document owner.

Mr. Fix presented the NIOSH Team responses to the MTC comments. NIOSH takes the most conservative approach to dose reconstruction and assumes the circumstance that results in the higher radiation dose to the organ affected by a worker's cancer. The approach would vary depending on whether the organ is inside or outside of the area protected by the lead apron. NIOSH often does not know if the worker wore an apron, even if it may have been required. In dose reconstruction, NIOSH assumes the circumstance that will result in the most favorable outcome for the claimant. The Pantex site profile contains logic diagrams that give the dose reconstructors guidance on how to best complete dose reconstructions for different circumstances.

The MTC Safety Officer stated that he had attended a NIOSH Dose Reconstruction Workshop the previous summer where he learned about the process. He requested that Mr. Rolfes explain dose reconstruction for those who were not familiar with the method for calculating the workers' radiation doses.

Mr. Rolfes explained that NIOSH first receives a claim after covered employment and a covered cancer have been verified by the Department of Labor (DOL). NIOSH then requests the employee's dosimetry records from DOE. The DOE dosimetry records response is examined to determine if the worker was monitored or unmonitored. The information in the site profile is used to get information for any periods of time when the worker may not have been monitored or was monitored and did not receive any recorded exposures. The site profile provides guidance on the interpretation of the employee dosimetry records, job duties, and historical practices. To reconstruct a dose to the specific organ affected by cancer, NIOSH takes the recorded whole body dose, plus potential missed dose, as well as any potential unmonitored dose, and based on the information in the site profile, applies a prescribed dose conversion factor specific to that organ. NIOSH selects the dose conversion factor for the specific target organ based on the type and energy of the radiation to which the worker was exposed. NIOSH calculates the amount of radiation that would have penetrated to the dividing layer of skin (for a skin cancer claim), or the lung tissue (for a lung cancer claim), or the bone tissue (for a bone cancer claim), etc. There are

documented numbers that represent conversion factors to specific organs. Other correction factors may also be applied to compensate for the location of the cancer in relation to any protective equipment the worker may have used.

Mr. Fix said that there is a distinct difference between the DOE radiation doses in a worker's dosimetry records and the calculated NIOSH radiation dose. The DOE exposure records show the radiation dose to the dosimeter, whereas the NIOSH dose is based on the relationship between the DOE dosimeter dose and the worker's cancer site. Because the cancer occurs in a specific tissue of the body, dose reconstructors must calculate the approximate radiation dose to the organ based on the recorded dose to the dosimeter. The information used to make these conversions is based on many epidemiological studies conducted by the International Commission on Radiological Protection and the National Cancer Institute that relate the radiation dose to the front of the body, where a dosimeter may be worn, to where the dose may be in various tissues of the body. This is not unlike radiotherapy, where a therapeutic dose must be calculated to determine how much radiation is necessary to treat a specific organ.

Mr. Fix described "missed dose," which is one of the assumptions used to make the dose reconstruction process more favorable to the claimant. For each "zero" reading in a worker's DOE dosimetry records, NIOSH assigns a dose equal to half of the minimum detectable level of the dosimeter. Other "missed doses" may be applied if there is no information for a given period of a worker's employment.

Other considerations address the relationship of a worker's cancer to any protective equipment that was used. For example, a skin cancer on the arm would be outside the area that a lead apron would have protected. Other cancers, such as colon cancer, would likely have been within the area the apron protected. However NIOSH generally proceeds with dose reconstruction assuming there was no protection at all. Normally, a dosimeter located under an apron would typically show a lower radiation exposure, but studies at Pantex didn't really show that. "Benchtop geometry" corrections are also made for workers who may have been in assembly areas where certain organs may have been closer to the radiation source than the dosimeter.

Question:
If there were no dosimeters, how would you detect anything?

Mr. Fix:
Do you mean if nobody at Pantex had a dosimeter? That would be really difficult. The dosimeter is a convenient device, especially if everybody wore one all the time like what has been typically company policy. But you are asking, "If nobody had a dosimeter at Pantex, how would we do a dose reconstruction?" We would have to extrapolate dose rates from the other radiation detection devices. We have to have some fundamental information. Radiation doses can be calculated very accurately with computer radiation transport codes based on the element in the device and how the device is constructed.

Question:
But the question that I am trying to ask is this: How do you prove or disprove that there was any connection of cancer to a worker – like a guard for instance. We are all over the place, but we don't actually work on the weapons. We are there to protect it, we open doors to where the weapons are stored.

Mr. Fix:
Do you wear dosimeters?

Response:
Yes, but they decided to do away with the dosimeters for the guard force. How will we prove or disprove that we were exposed to radiation?

Mr. Fix:
It becomes more of a challenge to prove it, and that gets to the core of your current issue. There is no question that it is easier with dosimeters. If you weren't wearing them, NIOSH would base your exposure on co-worker data, assuming that there are workers in Pantex workplaces who are wearing dosimeters. NIOSH can develop statistical profiles based on those workers and then make some underlying assumptions for workers who are not monitored, such as: "Are the guards exposed at the same levels, less, or more?" Then NIOSH looks at the distribution of doses for people who are being monitored and uses that information to infer the exposure the guards are getting.

Mr. Rolfes:
One of the possible ways that we might address unmonitored workers is to look at what exposures the guards were receiving when they were monitored. For those guards who were receiving recorded doses, NIOSH could do a statistical analysis to develop a co-worker dose distribution that could be applied to the unmonitored guards. Another hypothetical example: if a person was routinely wearing a badge, and was receiving a recorded dose, and then left the dosimetry program, NIOSH could assign the previously recorded doses for the period where the employee was not monitored. This assigned dose would likely be much higher than what the employee would have actually received.

If an unmonitored worker was involved in an incident, there would be formal studies done to investigate and document any exposure that the worker may have received. NIOSH could also look at any historical exposures that guards may have received, look at the highest exposure during the highest production periods, and apply that recorded dose to the unmonitored guards. There are other methods that we could use that have not yet been formally documented. In dose reconstruction, a radiation dose would be assigned to the worker regardless. NIOSH would not assume that this person was not monitored because he or she was not exposed.

Mr. Fix:
At this point, we're really getting into the reasons that we have a Site Profile or a dose report for a claimant. The dose reports are fairly involved, but they do contain a lot of information. Claimant-favorable assumptions are made where there is no information.

Comment from the PGU President:
By eliminating the dosimetry program for the guards, Pantex management has simplified their

job, but compounded yours. If one of us was diagnosed with cancer, it would be more difficult for you to do a dose reconstruction.

Mr. Fix:
It is true that it makes it more difficult because we have to make some assumptions. But they may have made their own job more difficult because they are putting pressure on themselves to prove that the dose levels are below a certain level. They have radiological protection regulations that must be met. Any worker who receives 100 millirem (mrem) per year, or a 100 mrem committed effective dose equivalent for internal, has to be monitored. They have put themselves in the position of having to prove that the annual dose for any unmonitored workers is less than 100 mrem because now they have to prove what level of exposure is being received without the benefit of the dosimeter. I don't know if they can do that or not, but I have no say in this issue.

Comment from the MTC Safety Officer:
But it increases the doubt factor. I was in a meeting approximately a year and a half ago when this first came up, and I gave them a couple of scenarios of exposure in a particular part of a building. When there is an accident, the guards are the first responders. They are there to protect the workers inside from the atmosphere and the environment. They are going to be right there in the middle of it, on the front line.

Question – MTC Safety Officer to the PGU Business Representative:
If I have an accident in 1298, can the guards go in there, or are you to stay outside?

Response from the PGU Business Representative:
There are two scenarios: If there was an accident inside that bay, we cannot go in. If there was a terrorist attack on that bay and we were in pursuit, then we could enter.

Comment from the MTC Safety Officer:
Another concern that has been brought up is that being first responders in an area where an incident has occurred, whether it is plutonium or whatever, the guards are right there. They get some of the first exposure.

Mr. Fix:
As you know, there have been decisions made from the beginning of the history of the Pantex plant about who is going to be monitored. In the very beginning, they were not required to monitor everyone. The regulations have varied over the years. In all cases, it is a matter of judgment regarding what is the appropriate practice. Certainly, the idea of having to respond to an incident has historically been a substantial issue. How much protection should you have if you are going to be responding to an incident? I assume that there has been much discussion on this, and that seems the appropriate avenue. NIOSH can probably do dose reconstruction under most scenarios using a variety of inferences such as Mr. Rolfes described. Certainly, lack of dosimetry makes for a more difficult task and creates more uncertainty. Historically, there have been incidents where either the dosimetry failed or they may not have had the dosimetry, and dose reconstruction had to be done for DOE or AEC compliance.

Mr. Rolfes:
When Mr. Fix and I speak of uncertainty – any time there is an uncertainty – NIOSH assumes the higher dose. For example, if you have 100 ±25 mrem, rather than assuming that the worker got 100-25 mrem, NIOSH will assume 125 mrem. Every time there is an uncertainty, NIOSH

will assign the claimant-favorable result; and those are compounded several times. NIOSH uses uncertainties in dose reconstruction to the benefit of the claimant.

I want to answer something you brought up previously. If there is a concern about a release in an area, there is not typically a serious external dose hazard. For example, if you have a pit that has ruptured like the occurrence in Cell 6 in 1961, the immediate hazard is that of an internal dose hazard because there is airborne plutonium that could be inhaled or ingested. The workers who were in the room and exposed to the airborne radiological materials weren't necessarily at an elevated external dose risk. (The release of airborne contamination into the workplace would not significantly contribute to a worker's external dose.)

Typically when there is an accident, such as the release in Cell 6 in 1961, or the tritium release in 1989, several workers were monitored for internal exposures after the incident occurred. If a worker was involved in an incident and there was no bioassay data for that specific worker, if there was a possibility that he or she could have been internally exposed, NIOSH has information on the doses received by other workers. For example, in the site profile, NIOSH has information on the average tritium doses for monitored workers which can be assigned to unmonitored workers to overestimate their potential dose. From what we understand, workers with the highest exposure to tritium were those who were involved in routine disassembly operations. We used the highest bioassay data to develop a distribution of the potential doses by year. If a worker was involved in a serious accident and did not have bioassay data for some reason, NIOSH would give the worker the highest dose for that particular year. If there was an accident like the one in 1989 – and I believe that there would be bioassay results for something of that magnitude – NIOSH could assign the maximum recorded individual tritium dose for a similar accident. NIOSH has scientific approaches that can make a very strong argument that the assigned dose is most likely much higher than the worker probably received.

Comment from the PGU Business Representative:
We had a guard who was a first responder in the 1989 incident who developed radiogenic cancer. Back then, we had the dosimetry program that we have now, but we had smaller dosimeters. The present dosimeters came into use about 1991. He is dying now from his cancer. They are denying all of his claims because they say they have enough data to show that he did not have enough exposure. But he was right there, blocking the entrance to Cell 1. There were a lot of mistakes in the scenario in his case. First, they let everyone leave without stopping them to figure out what was the accident and what they should have done in the first place. Then they sent people in wearing protective clothing. Those guards who were standing there were not wearing any special clothing to protect them. He was the closest one to the accident. After they went back in to figure out how much dose the workers got, then they took up all of the dosimeters. As I said, the dosimeters we were wearing then probably wouldn't have captured it.

Mr. Fix:
In 1989 they were using the Panasonic 802 system. That would be a very sensitive dosimeter for significant work external radiation exposure. None of these dosimeters will measure tritium because it has a very low energy. For an incident of that type, there would almost always be some bioassay data available.

Mr. Lewis:
If the guard was there immediately following the incident and the other guards know he was there, couldn't they use co-worker affidavits to help prove it?

Mr. Rolfes:
NIOSH would not even request proof that he was there. We would take his word for that, even if there were no bioassay data for him. Let me clarify: For that incident, a whole body dosimeter would not have recorded any tritium exposure. The radiation safety department would have requested a urine sample for bioassay. The most important piece of information for reconstructing a worker's exposure in that incident would be their urinalysis data. The amount of tritium excreted in the urine is directly proportional to the amount inhaled, ingested, or absorbed through the skin. All of the tritium will be excreted eventually. NIOSH has models that tell us the rate at which different radioactive materials leave the body. Those models allow us to estimate the amount of the material in the initial exposure, and from that amount we can determine where in the body it is distributed – what organs are affected and how long it stays in those organs. That directly gives us the dose because we know how radioactive the material is and how long it stays in that organ, along with the energies of the radiation being released from that material. For a specific claim such as this, we would take bioassay data and use it to determine how much tritium he inhaled, ingested, or absorbed through his skin and calculate the dose to the organ affected by his cancer. If there were no urinalysis data, NIOSH has information in the Site Profile on the highest recorded individual tritium doses by year and would apply the highest recorded dose for 1989. For this incident, it was 1.18 rem whole body dose. If a worker said he or she was involved in that incident but was not monitored, NIOSH would likely assign that dose of 1.18 rem in order to be claimant-favorable and overestimate the individual's internal dose. In some cases, the less information we have, the higher the assigned dose becomes because of all of these compounding uncertainties that are applied.

Response from the PGU Business Representative:
As I recall, they were giving out bioassay kits so people could go home to give the samples. But I don't recall them ever giving any of those kits to the guards.

Mr. Rolfes:
In that case, if NIOSH had any indication that a guard was involved, we would look through the information that we have for the incident for any additional details for that worker, including bioassay data. That would be the most important thing we would need to do a dose reconstruction. If we had no indication, we would likely assign coworker dose.

Mr. Fix:
That is what would be in the dose reconstruction. First of all, there should have been an investigation or a follow-up here at Pantex. For example, we have other exposure scenarios that have been evaluated, such as the criticality at Y-12. Four workers suffered high exposures and it was well documented that they received very substantial doses. There were also about 200 other people in that building at the same time, but none of them received the same level of follow-up. The NIOSH program went back and did dose reconstructions for the entire 200 to arrive at a reasonable, claimant-favorable assessment of the dose they could have received in that incident. I think that is what would be done here. I don't think we would come in and just give a dose; we would want to do some investigation to see what was done at the time – what type of evidence we have to base a dose reconstruction on. If there was very little evidence, we would have to assign a higher dose because we assume the worst if we don't have the information. But for most sites there is a fair amount of information available, particularly for an incident.

Response from the PGU Business Representative:
That brings us to our point. If they take away the guards' dosimeters, then you would have to assign us the highest dose all the time.

Mr. Fix:
Your issue is really what you would do tomorrow, not what you would do 10 or 20 or 30 years from now if the worker filed a claim. If this happened tomorrow, there would have to be an investigation done here at Pantex and they will have to put a lot of energy into gathering bioassay data. Bioassay data is really very good because it is specific to the worker and the source of exposure. The Company would have to put a lot of energy into reconstructing what dose you had for compliance with current DOE standards. The NIOSH program's possible involvement is really way into the future. It is a much more important issue regarding what would be done here at the site by the site management if it happened tomorrow. I can understand that there seems to be a difference of opinion. I certainly do not feel at all qualified to come here and judge what the circumstances are here at Pantex. I do not know nearly enough about the situation to understand or have an opinion. I think this has gone on at most sites over the years for different reasons.

Comment from MTC Safety Officer to PGU Business Representative:
I think that you should probably go back to see what numbers were given on this guard's dose reconstruction.

Mr. Fix:
"Radiogenic" normally means that the cancer is associated with an exposure to radiation.

Mr. Lewis:
There are 22 radiogenic cancers in this program.

Mr. Fix:
Yes, and they are based on models that came out of the National Cancer Institute. One of the really unfortunate things for everybody is that if anyone in this room is diagnosed with cancer tomorrow, we probably would never know what caused it. That is what is unfortunate – we would not really know if it was occupational or caused by something else.

Comment from the MTC Safety Officer:
If there was documentation that there were high levels of exposure, then that would increase the probability that the cancer is radiogenic.

Mr. Rolfes:
Yes, that is correct.

Mr. Fix:
Yes. We have documented cases of workers with very high doses who did not die from cancer and lived to very old ages. Congress passed this legislation and put the conditions into the law for the circumstances under which the compensation can be awarded. The way it is structured is that the dose they received must be "at least as likely as not" to have caused the cancer. That is why NIOSH does dose reconstruction. In almost every case, workers are assigned doses far in excess of what is in their official DOE dose records.

Comment from the MTC Safety Officer:
This brings us to another scenario. The other one is the disposal of weapons, or as the units are transported or in process.

Comment from the PGU Business Representative:
I received a questionnaire over the internet that they wanted the guards to fill out, so I put it out to my people and I should be getting them back any day. I gave it mostly to the older guards because they were there when we were doing all this stuff, but it has changed over the years. A lot of these guys would open the doors to the bays and they wouldn't have an apron. The weapons were in there, or the pits were in there exposed, and the other workers would come in with their aprons on and get in the forklifts. The guards were always standing there without aprons or any other protection. The incident in 1226 was the same thing. It is the vault where they keep the plutonium pits, and it was staged at that time – the pallets were too high – so they went over their quantities and the numbers were extremely high.

Mr. Rolfes (showing drawing):
I have a drawing of a round room – Cell 8 – about half full, I guess, with 2030s and 2040s. They have dose rate measurements in various areas, along with neutron and photon contributions. I wanted to show the effect of distance on the radiation dose rate at the center of the cell in comparison to the entrance to the cell; the dose rate drops quickly as you increase your distance from the radioactive material.

Response from PGU Business Representative:
Yes, this is Cell 8 (referring to the drawing), but the place we are talking about is the vault.

Response from MTC Safety Officer:
No, the vaults were actually stacked up against the wall. It all depended on what kind of weapon system they had in there, but they were extremely "hot." *To Mr. Rolfes:* We have talked about that, how the numbers were extremely high. *To the PGU Business Representative:* But the thing we want to talk about here is this: Did the guards have dosimeters at that time?

Response from PGU Business Representative:
The dosimeters that we had back then were the smaller ones that you were talking about earlier (Panasonic 802). When we would bring them in, we had alarms there. If a truck was coming in and it was "hot," the alarm would go off about 500 yards away. Then they backed the trucks up into the 1226 to unload them. The other workers in the area were wearing aprons, but the guards weren't. We had to open up the rollup door and stand by or sit there and watch until the trailers were unloaded and they went into the vault. We always questioned why we didn't have aprons and we were told that we weren't working with it, so we didn't need them. Well, we weren't working on the weapons, but we were around it when they were loading and unloading them.

Question from the MTC Safety Officer to the PGU Business Representative:
How close were you to the weapons?

Response:
I would say sometimes five feet, sometimes ten feet. When I had this duty, I would open the door and say "Hey, would you wait until I open the door?" so I could back up, but a lot of people didn't do that. I would try to back away, but some people didn't know. They would say "You're just a guard. You just sit here and make sure nobody comes in."

Mr. Fix:
Did you have a dosimeter when you were doing this?

Response from the PGU Business Representative:
Yes, we had a small one.

Question from the MTC Safety Officer:
Let me ask you a question about dosimeters: Did the 812 monitor for neutrons?

Mr. Fix:
Yes. The 809-812 combination you have had since 1993 is a very good neutron dosimeter. The 802 you had before 1993 was a very sensitive beta-gamma badge, but it had limitations on neutrons. It wasn't very precise. I would have to look at the data to see the extent of the problem because the dose typically would go high and low and not be very precise. It had a lot of trouble on the DOELAP (Department of Energy Lab Accreditation Program) performance testing.

Comment from the MTC Safety Officer:
The dosimetry changes progressed over time to a better dosimeter. The scenario that we are discussing is that other departments – Transportation for one – that did not receive dosimeters because they were not physically working on the weapons did not have dosimeters until the 1983-1984 timeframe. Of course, I would question the Dosimetry Department because the alarm would go off because of the neutrons. You're not going to stop the neutrons. They're going to come into some high quantities.

The other scenario is the vault – if you were close to that thing… The company will go back and reflect on what they call area dosimeters, because they had them up on the wall. But the area dosimeter was located a distance away from the material. You could walk up and get very close to it.

Mr. Fix:
If I was in this position, my concern would not be whether I was wearing an apron, but rather how high the dose rate was.

Response:
This is what we are really looking at.

Mr. Rolfes (referring to a radiation safety survey of 12-44, Cell 8 from 1987):
If you take a look at the cell, there are different dose rates there. There are neutron and gamma measurements and actually the highest rates for both neutrons and photons are where the most material is located. As you go away from the center of the cell, the total dose rate drops; however, the neutron dose to photon dose ratio increases. It all depends on where the worker is.

When doing a dose reconstruction for a guard who was not wearing a lead apron but had a dosimeter and received some recorded photon doses – let's say 100 mrem on his badge from photons – NIOSH would determine whether it would be more or less claimant-favorable to assume that he was wearing a lead apron. The scenario would be selected based on the type of cancer that would result in the highest external dose to that organ. That would probably be the scenario for a worker exposed to the bare pits when he or she would be exposed to the highest amounts of neutron and photon dose because there aren't other materials around. Once we have the gamma dose corrected for the lead apron and the cancer location, we would assign neutron doses to that person based on a co-worker model. We have taken all the recorded positive neutron doses from monitored workers and determined the median ratio and the 95th percentile neutron-to-photon ratio. We assign the highest neutron-to-photon ratio – we refer to it as the 95th percentile – for all intents and purposes it is very near the maximum of the distribution.

Mr. Fix presented a simplified explanation of "distribution," explaining that applying a 95th

percentile value to a given radiation dose every year, the unmonitored worker would have a higher cumulative dose than the monitored workers because the assigned doses would be at the 95th percentile every year. It would be very unusual for a monitored worker to have the highest dose value every year.

Mr. Rolfes stated that if a worker was in an area where he could have been exposed to neutrons, neutron doses would be assigned.

Question from the MTC Safety Officer:
When you are talking about neutron exposures, is there a consideration for the time they would stand there while the trucks are unloaded – 2, 3, 4 hours?

Mr. Rolfes:
For a worker who is not monitored with a dosimeter, the time would be important because radiation exposure is determined by three factors: time, distance and shielding. If the worker has a dosimeter, it won't be necessary to know the time because the total exposure will be integrated into the badge. If NIOSH had to perform a source term estimate without dosimetry information or a dose rate meter, time would be an important factor. We would have to look at the materials being handled, how long they were being handled, what was being done, but there are very few scenarios where that is necessary because we do have dosimetry records and other measurements that allow us to make claimant-favorable assumptions regarding the radiation dose received. In a hypothetical scenario where we didn't have a complete set of information, we would have to do a source term estimate and the time factor would be very important.

I saw one instance where workers were X-raying components and putting their hands into the beam without monitoring. The approach was to estimate the amount of time the hand was in the beam and use the measurements of the machine to determine how much radiation the worker received during that time. NIOSH examines these exceptions on a case-by-case basis.

Following a short break, Mr. Fix began the presentation of the Pantex site profile. He explained that the site profile describes not only the Pantex site and the work done there, but also the sources and types of exposure in different work areas of the plant. All of this information is important in determining the worker's radiation dose. Mr. Fix and Mr. Rolfes explained how this "living" document evolves over time in a process of regular reviews and revisions when new information becomes available. The Advisory Board on Radiation and Worker Health (ABRWH) is reviewing the document now with the help of their independent contractor. NIOSH wants the document to be as accurate and comprehensive as possible so the dose reconstruction process is claimant-favorable and scientifically defensible

The President of the MTC inquired whether BWXT (BWX Technologies, Inc.) is setting up its own review board. Mr. Rolfes replied that the ABRWH is a panel of Presidential appointees that is responsible for the oversight of the NIOSH Dose Reconstruction Project. The Board is a diverse group of people from the medical and scientific professions as well as workers from some of the DOE nuclear sites. ABRWH has an independent contractor, Sanford Cohen & Associates (SC&A), who conducts audits of the work of NIOSH and its contractors. Mr. Lewis added that SC&A critiques the site profiles as part of the review process.

Mr. Fix stated that the site profile teams work very closely with the site contractors to get the records that are used in the development of the documents. It is also important that the teams interview workers from the sites to get information about work practices. SC&A sometimes

follows up with visits to the sites to speak to workers as well. There are many checks within the EEOICPA program to assure that the documents give the dose reconstructors the best guidance possible and to make certain that it is being applied.

The MTC President stated that BWXT has an advisory committee that reviews its work as well. He explained that the reviews are used to "dress up data" so that it can be presented again. The PGU Business Representative concurred and said that was why the Guards Union had gone to the front with the dosimetry issue. Mr. Rolfes stated that the ABRWH is not associated with those reviews. Mr. Fix interjected that most of NIOSH's interaction with BWXT is through a point of contact at the DOE Amarillo office. Other than submitting information for the Site Profiles, BWXT is not involved in the compensation program for energy employees.

The PGU Business Representative introduced (name withheld), a former Pantex worker who now heads the Amarillo Pantex Former Worker Health Screening Program. She explained that she had come to the meeting both as a worker representative and as an individual. She stated that after SC&A had toured the plant all day, they had asked the Screening Program to gather a group of workers. SC&A met with the group for five hours and left with a lot of worker information about the plant, as well as historical documents that plant management had not given them. Ms. (withheld) described her background as a Pantex worker, as well as her family's work history in the nuclear industry. She also stated that she works closely with Dr. Lar Fuortes, as well as being one of the Special Exposure Cohort (SEC) filers. She explained her association with other worker advocates at other sites and stated that SC&A is highly respected by the worker advocacy groups.

(Name withheld) stated that it was one of the auditors from SC&A who formerly worked at Rocky Flats that brought up the issue of the presence of Americium in the decaying pits. It is more harmful to workers because it has a shorter half-life, but they are not monitored for its presence.

Mr. Rolfes replied that Americium is being monitored by the whole body dosimeter. When a new plutonium (Pu) pit comes onto the site, there is a small amount of Pu-241 contamination in the pit but the metal is primarily Pu-239, which is has a very long half-life in comparison. Pu-241 has a much shorter half-life. When a weapon comes back into the plant after it has been in the Department of Defense (DOD) program for 20-30 years, it will actually be more radioactive because there will be more photon dose coming from the pit due to the Americium-241 resulting from the decay of Pu-241. The whole body dosimeter will reflect the photon exposure contribution from the Americium-241. The presence of the Americium is documented.

(Name withheld) stated that this would be important information for a guard – or any another employee – who may not have had a whole body dosimeter.

A discussion ensued regarding the transfer of workers and records from the Iowa Army Ammunition Plant (IAAP, also known as Iowa Ordnance Plant) in Burlington, Iowa. Much of the work that was done at the Iowa plant also came down to Pantex in 1975. Mr. Fix stated that some of the records from the earlier sites were also sent to Amarillo. (Name withheld) asked whether NIOSH had access to the dose records that went to Aberdeen Proving Ground (APG) from Line 1 at the Burlington Plant. Mr. Rolfes stated that NIOSH received dosimetry records for IAAP through Pantex, but he is unsure if they include the ones from APG.

(Name withheld) said that records of certain employees who worked on the nuclear line at IAAP have not been found. She feels that the missing records leave a gap in the information that NIOSH has for that site. Mr. Fix stated that it is important for NIOSH to have any information she could give regarding those records so they can have a complete history of the site, particularly since the nuclear line at IAAP shut down more than 30 years ago. The University of Iowa has been involved extensively with the IAAP site. The NIOSH team has compared records from Pantex and the Iowa site. The PGU Business Representative stated that DOE had adopted the University of Iowa records three years ago.

Question from the MTC Safety Officer:
Do you know when the guards first received dosimeters?

Response from (Name withheld):
A guard who worked here back in the earlier years told me that they started wearing them in the mid-1980s, maybe 1985 or 1986.

Response from PGU Business Representative:
I think that it may have been 1982 or 1983 in Transportation and some of the other areas.

Response from (Name withheld):
One of the groups with very limited dosimetry was Production Control – Production Stores and Warehouse. But as I said before, the guard I was speaking of could not give me an exact date, just mid-1980s.

Response from PGU Business Representative:
Was that 1983? They took a picture of me right after I started in 1983 and I am wearing a dosimeter.

Response from MTC Safety Officer:
Prior to that, if you didn't work on the weapons line – if the position didn't require it, you didn't wear a dosimeter.

Response from (Name withheld):
There are union records that show that Department Z was the only group that did have dosimetry badges for a very, very long period of time. We have that breakdown in some of the old bylaws records that we have.

Response from MTC Safety Officer:
It was Department XYZ.

Comment from the MTC President:
That is the problem that we are having now. They are trying to get back to only badging those who work with the weapons. The Crafts are going to need them because they go into the areas to do work. The Guards are going to need them because they go all over the place and there is no telling what they are going to get into.

Comment from (Name withheld)**:**
When I was in Production, wearing a TLD didn't do me a lot of good if I was standing over a pit can, or in Cell 8. I was intermittent as a Training Specialist, so I could see me having a TLD, but the Crafts workers and the Guards who have to be able to respond quickly need them, too. Dr. Fuortes, of the University of Iowa, stated that at IAAP, the Guards had some of the highest readings. The Guard Station there was one of the most contaminated areas at the plant.

Comment from the MTC Safety Officer to the PGU Business Representative:
In the Pantex site profile, there aren't any TLD readings for 2005 and 2006. You are Division 700, so anything like 711 should have some numbers on it – 711, 772. (The document says) number of employees badged: 37 employees in 711, 43 in 772, and you have 2 workers here that received positive doses.

Comment from (Name withheld)**:**
We know that the doses are not always accurate. Right before I left the plant last year – I had not been to the line for two years because my job responsibilities had changed, so my badge was on the board. But I had a very high dose reading and was asked, "What were you doing? What have you been messing around with?" My answer was, "Nothing." There is still inaccuracy and the fact that the badges are on open boards.

Comment from PGU Business Representative:
The accuracy also depends on where those boards are located.

Mr. Rolfes:
If NIOSH saw a high result, it will not be taken away from you. NIOSH would assign that dose to you if you were a claimant. We would also take a look at some of the dosimetry cycles that did not have any positive dose. It is very possible that you were in a radiological area and your dosimeter didn't register any dose. The site profile describes how NIOSH would treat any dosimetry cycle in which no positive dose is recorded on the dosimeter. NIOSH would assign the distribution of the potential radiation dose that you could have received when your dosimeter read "0" when you actually could have received an amount of exposure less than the detection threshold (~10 mrem). The reason why we are here is to make sure we have all the information to give the claimants the most favorable results for their dose reconstructions. It is important to address any possible shortcomings in the site profile.

Comment from (Name withheld)**:**
I have seen various records. One is from a person who was in the Safety Department for a number of years. His dose records are very telling. They were handwritten at one point. It was obvious that someone went back and typed them. In another set of records I have that is supposed to be for this person, some of them have only his name and no badge number. Other documents in his records have the badge number. Still other documents that are supposed to be his dose record have no identifiers at all. That just tells me that the record keeping is less than adequate. How can they know, in the case of this man who is now deceased, that this was his? I have had people tell me how the records have been copied to put on microfilm or microfiche. They would take a group of records and just put them on the screen. For most of us, it doesn't have any date on it or any continuation identifiers. So if I copied this, how would you know that this page was supposed to go in my record or someone else's? This makes me question what is being presented.

Mr. Rolfes:
I haven't seen a case similar to what you are describing for dosimetry records. I may have seen records where a person's name was excluded from one page, but it still had the dosimetry results and the badge number reported. Those are things that we look at when we receive records from BWXT in support of our dose reconstructions. Our contractor looks through the record to make sure that it appears to be complete. They make sure that everything is copied correctly and that there are no missing or duplicated years. The records are received in hard copy form and then

scanned and entered into an Excel database. NIOSH has some quality assurances that are in place to catch discrepancies and that prompt us to go back to BWXT to request that they take a look at the records. For instance, if one record says that a worker received 50 mrem that year and another says 100 mrem, sometimes we can get a clarification. But if we have two conflicting doses and they appear to be two separate doses, we can assign the higher result or even both of them. Whenever there is any uncertainty, NIOSH takes the highest result to get a timely answer for the claim.

Comment from (Name withheld)**:**
I have seen records where all the doses were re-estimated in 1990 and that was very clearly restated on all the dosimetry reports. I have seen copies of that same gentleman's records that were supposed to be records from 1975, but they were printed in 1990 so they are not the original records.

Mr. Fix:
NIOSH looks at those cases separately. Are you implying that there is fraudulent activity?

Response from (Name withheld):
I just question the accuracy of something that was from 1975 and was not documented until 1990, supposedly by computer.

Mr. Fix:
We usually look at cases like that, because my experience has been that we find that there is actually a relatively simple explanation and there is miscommunication for whatever reason. Each of the AEC sites were required to start reporting their doses in 1962 to the national office through a series of forms: a statistical report and a termination report. Not only were they required by regulation to monitor doses, but normally there would be lots of checks and balances in the process. But we are always alert to assess the quality. We have access to the Radiation Exposure Monitoring (REM) system in Oak Ridge that stores all of these records. The sites report their yearly doses to DOE. Pantex likely sent their annual report to DOE Albuquerque and they in turn send the annual report to for DOE Headquarters. Some of these records are a bit confusing, so it is very important to look at them very carefully to try to understand what circumstances are involved. NIOSH is always looking for underlying issues.

Question from the PGU Business Representative:
Would there be a reason why they would redact the names or the badge numbers?

Mr. Fix:
Yes. They may redact names to comply with the Privacy Act. At Pantex, since the radiation records fall into a certain class, every federal agency had to go through a process of identifying a system of records. Radiological records must be shared so doses can be tracked. The records have also been used for worker health studies. They have always been considered sensitive information, but they are not classified.

Response from the PGU Business Representative:
That is where it gets to that point. If you are redacting the information, then how are you going to know?

Mr. Fix:
The information to DOE is not redacted, nor is the information that is available to NIOSH. In a particular claim, DOL requests records from DOE for all of the sites where that worker may have worked. Typically, the DOE site will be very careful to only send in records for that worker.

They may redact the names of every other worker that may have been on a report for that worker. There is usually a large amount of information from any one site.

Mr. Rolfes:
If a name is redacted, it is done to protect a worker's privacy. If we received a dosimetry report from Pantex and an incident report was sent along with that, there may have been several people involved in that accident and all the other names would be redacted except for the worker involved in the claim. Pantex has been very open in not redacting the names of the others involved in incidents, but typically NIOSH only needs to know about the worker in the claim. If any other information is redacted, it is probably due to the sensitivity of the information, not necessarily that it is classified.

Mr. Fix:
The names of the workers are very important to dose reconstructors because we are looking for their job classification and what building they were working in because we are looking for trends in the exposures.

Question from (Name withheld)**:**
Can they provide you with job descriptions going back to 1960?

Mr. Fix:
They certainly have tried to do that, but it is not always an easy task for every worker. There is lot of uncertainty.

Mr. Rolfes:
When NIOSH requests exposure records from DOE, the contractor (BWXT) actually sends copies of the old cards in the worker's file. The cards generally describe what the person's position was for each year.

Response from (Name withheld):
I know that the job descriptions have been lost because they have changed titles.

Mr. Lewis:
Perhaps you can discuss this privately with (name withheld) later.

Question from (Name withheld)**:**
Do they tell you when they have changed the algorithm? I understand that has been done several times.

Mr. Fix:
The dosimetry algorithms have changed many times. Every DOE program has had many changes in algorithm for a variety of circumstances: the dosimeter may change, the reader may change, or they actually may find that there are issues with the algorithm. Pantex has hired a professional algorithm developer over the years for the Panasonic system because he specializes in that system. Rather than being interested in algorithm changes, what we would really be interested in is whether they have an audit control program. Are they running blind audits through their dosimetry system? What other types of checks and balances do they have on the system? We really don't want to get down into the minutia of the algorithm. We want to know how they know it is right. They have provided us with a lot of information on their checks and balances.

Mr. Rolfes:
There are independent certifications such as the DOELAP (Department of Energy Lab Accreditation Program) criteria.

Mr. Fix:
One of the DOELAP assessment criteria when they evaluate a program is to look at the quality assurance of the specific area of evaluation.

Response from** (Name withheld)**:
I think that one of the things we would all agree on is that things are much different now than they were in the early days.

Mr. Fix:
That is why we like to look at an audited or controlled dosimeter trail. That is not a new concept. That process typically started almost from day one because all dosimetry systems have to be calibrated.

Mr. Rolfes:
There are field validation surveys to monitor the potential radiation exposures to the workers in various areas. They check the radiation exposure rates and their energies. There are analyses, such as the lead apron issue that we were discussing earlier, regarding the dosimeter positioning either on the outside or underneath the apron. They did several phantom studies with a manikin in the pit vaults in different configurations to verify that the dosimeter was calibrated correctly for that field.

NIOSH uses claimant-favorable assumptions to calculate the radiation dose to the specific organ where the worker developed cancer. For example, if it is lung cancer we calculate the dose to the lung. NIOSH takes the worker's dosimeter dose and translates it to the affected organ. Several claimant-favorable adjustment factors are used to result in a potentially higher dose than what the worker may have actually received. The worker is always given the benefit of the doubt. If you have a set of records and add the entire dose, you may find that he or she received 2 rem during his/her career. If you look at the NIOSH dose reconstruction, we are typically assigning maximizing dose estimates that greatly exceed the recorded 2 rem (depending on the type of cancer and the claim-specific scenario). Because of the way the law is written, every possible claimant-favorable assumption is made to maximize the worker's radiation dose before a claim is denied.

A lengthy discussion of the EEOICPA dose reconstruction process ensued. Mr. Rolfes explained the Interactive RadioEpidemiological Program (IREP) that is used in the process.

The PGU Business Representative adjourned the meeting at approximately 12:10 p.m.