

Off-Site Contamination at Oak Ridge National Laboratory

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Presentation at the
1993 Radiation Protection Workshop
Las Vegas, Nevada
April 13-15, 1993

*Operated by Martin Marietta Energy Systems, Inc., under contract DE-AC05-84OR21400 with the U. S. Department of Energy.

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MASTER

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Background

An upgrade of the radioactive liquid waste system at Oak Ridge National Laboratory (ORNL) had been under way for the past several years. One of the upgrades involves the construction of a Monitoring and Control Station (MCS) which will receive waste from an analytical chemistry building prior to the waste being discharged to the main waste processing area. The MCS was located in a radiologically clean area adjacent to the analytical chemistry facility and no monitoring of personnel was necessary. On December 29, 1992, workers became contaminated and left the site prior to the discovery of the contamination. The construction workers were not employees of the Facility Management Contractor, Martin Marietta Energy Systems, but were subcontractor employees answering to the Construction Manager, a different prime contractor.

Discovery of Contamination

On December 29, 1992, construction workers were performing tests on new valving and piping coming from the analytical chemistry facility to the MCS. The piping had been connected to drains within the building, but had not been released for use. Several workers noticed liquid coming from one of the pipes but, thinking that it was condensate, did nothing. When the day's work was completed, a construction worker (not working on this job) overheard several other workers joking about how difficult it was going to be to weld the waste line with liquid in it. This individual had worked previously at several nuclear sites and realized the potential for contamination since the pipe was connected inside the building. He contacted supervision to initiate worker contamination surveys. The ORNL Laboratory Shift Superintendent (LSS) was contacted who arranged for an ORNL Shift Health Physics (HP) technician to survey workers. At that time most of the construction workers had left the site and only the individuals overheard discussing the liquid in the drain were available for survey. The workers were found to be contaminated and the HP technician requested additional HP assistance.

Actions Taken to Minimize the Spread of Contamination

The LSS contacted Laboratory Management and began contacting additional Health Physics personnel to return to the Laboratory to assist in the incident. Surveys of the work site confirmed the presence of contamination and this area was zoned to prevent further track-out of contamination.

Lists of personnel working at the construction site were obtained and contact was made with each of them as the night went on. The workers were told to return to the Laboratory where they were surveyed for contamination. A total of nineteen (19)

workers were found to be contaminated. Whole body counts for these individuals were performed once decontamination was effected.

In the meantime, interviews were being held with these individuals to ascertain the possible extent of contamination spread. Each of the contaminated workers went home following work, but several of them had made stops along the way. The types of stops included:

Service Stations

A Used Car Lot

An Insurance Agency

An Automatic Teller Machine

A Subcontractor's Office in Knoxville

A Branch Office of a Credit Union

Teams of HP technicians accompanied the construction workers to their homes where surveys of family members, home furnishings, clothing, etc., was effected. Some of the construction workers expressed concern regarding the safety of their families and the possibility that family members, especially two infants, might have come in contact with or even ingested radioactive contamination. The Laboratory arranged for whole body counts and bioassay for any family member who was concerned. This helped to allay fears by the concerned workers. These body counts and bioassays were carried out over the following week.

At 8:00 am on December 30, teams of Health Physics technicians were sent to businesses in the surrounding counties which were visited by the contaminated workers. One team had to go as far from the Laboratory as Louisville, KY, where two subcontractors had returned after completing their work on the 29th. Fortunately, only one place of business was found to have any contamination, and this was the subcontractor's office in Knoxville, which was not considered a public place. In this instance contamination was found on carpet (which was decontaminated in place) and on a seat cushion (which had to be confiscated). Contamination was found in three employee's homes necessitating the removal of approximately one square foot of carpet at one location, the confiscation of a small throw rug in another, and a jacket which had been worn to work in the third. In addition, one employee's car was found to be contaminated.

Fears of Employees

One of the problems encountered in this incident involved the fear of employees that either they or their family members were put at some health risk. This was compounded by the fact that none of these people were radiation workers (this was not required since they were working in a non-radiological area) and thus did not understand the levels of contamination or the health effects. The construction company wanted to conduct a forum for the employees and their families to alleviate these fears. ORNL offered to furnish a meeting place (at the Laboratory), and to have personnel available to answer

questions. The construction company decided to have an independent health physicist on hand to answer questions and to assure the employees that they were being told the truth. In retrospect, this was probably the most important step in gaining the confidence of the employees.

Public Relations

Once the event was discovered, the public relations aspects had to be considered. A decision to have a press conference on the morning of December 30 was made while personnel and homes were being surveyed overnight. A notice to the press went out that there had been a contamination event at ORNL; a press conference was scheduled for 10:00 am and was attended by both newspaper and television media. The DOE requested that ORNL be responsible for the press conference and ORNL furnished the principal speaker (the Director of Environmental, Safety, and Health Compliance). A model of the facility that was under construction and opportunities for pictures and questions were also furnished. Contacts were established for members of the media to obtain additional information. Since DOE had established a Class B Investigation Committee to determine the cause of the incident, it was explained that questions of this nature would have to wait for the committee report; it was also explained that Laboratory policy prevented the release of names of contaminated individuals. Everything else, however, was released and updated in a free and open manner.

Lessons Learned

A great deal can be learned from the handling of this incident. It is of the utmost importance to realize that when contamination is removed from the site, we are no longer dealing with knowledgeable people, but have to deal with the public's fears (real and imagined) of radiation/contamination, their fear of the unknown and their distrust of big companies (and the government). When making surveys of homes and property the technician must be careful not to aggravate these fears. As an example, ORNL found that having the audio on the survey instrument turned off kept people from thinking that they were contaminated ("I know they said I was clean, but I heard that thing clicking"). This is harder on the technician, since many rely on the sound to help them detect contamination, but it was necessary in order that we keep the panic level down. Offering to do whatever is necessary to assure workers that their families are safe, including whole body counts and bioassay for family members was very helpful.

The need to have technicians trained in the survey of homes also became apparent. A systematic approach (even to the use of a check sheet) is necessary. Having technicians make their surveys in a professional manner is taken for granted, but when dealing with the public this becomes absolutely essential.

Bringing the Laboratory's Public Affairs group on board at an early stage prevented the event from becoming a fragmented series of "leaks" that would have hampered both the immediate handling of the event and the subsequent investigation.

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Discovery of Contamination

- **Area Was a Construction Area**
- **Area Was a Non-Radiological Area**
- **Personnel Were Not Required to Frisk When Exiting the Area**
- **Construction Workers Noticed Liquid Coming From a Pipe, but Did Not Think It Important**
- **LUCK: A Knowledgeable Construction Overheard Other Workers Talking About the Liquid**

Immediate Actions Taken

- Additional HP Survey Personnel Were Called Back to the Laboratory**
- Construction Site Surveyed and Zoned to Prevent Further Track-out**
- Lists of Personnel Working at the Contaminated Area Were Obtained.**
- All Personnel Were Contacted and Either Returned to the Laboratory for Survey or Teams of HPs Went to Their Location and Surveyed Them.**

Interviews

- **A Total of 19 Workers Were Found to be Contaminated.**
- **Decontamination of the Workers Was Accomplished Without Difficulty and Whole Body Counts Indicated No Significant Uptake.**
- **Bio-Assay Samples Were Requested.**
- **Teams of HPs Conducted Interviews With the Workers to Determine Where They Had Been Since Leaving the Laboratory.**
- **Locations Visited Included:**
 - Service Stations**
 - Used Car Lot**
 - Insurance Agency**
 - Automatic Teller Machine**
 - Subcontractor's Office**
 - Branch Office of a Credit Union**

We Were Lucky

- **The Workers All Went Home, But Several Stopped Along The Way.**
- **None Went Out For Any Social Events.**
- **The Week Between Christmas and New Years is a "Dead Time."**
- **The Incident Happened on a Tuesday, and the Credit Union Branch Was Closed on Wednesday.**
- **The Insurance Office Was Operated by the Author's Insurance Agent.**
- **The Worker Who Visited the Car Lot Did Not Test Drive Cars, But Only Picked Up a Car Selected Previously.**
- **The Subcontractor's Office Was Managed by an Individual Who Had Nuclear Plant Experience.**

Contamination Found

- **Three Workers' Homes Were Found to be Contaminated.**

(1) One Square Foot of Carpet

(2) One Jacket

(3) One Throw Rug

All Were Confiscated.

- **Subcontractor's Office Carpet Was Contaminated - This was Cleaned.**

- **Subcontractor's Office Had a Contaminated Chair Cushion Which Was Confiscated.**

- **One Worker's Car Was Contaminated.**

Fears of Workers

- **None of the Workers Were Radiation Workers**
- **All Expressed Concern About Possible Health Effects for Themselves and Their Families**

Open Forum For Workers & Families

- **The Construction Subcontractor Suggested Holding an Open Forum for Workers and Families to Answer Their Questions and Concerns.**
- **ORNL Agreed and Furnished Health Physics and Medical Professionals Along With Representatives of DOE, ORNL, And the Subcontractor.**
- **The Forum Was Held After Working Hours at ORNL.**
- **This Forum Was Very Successful in Dealing With the Fears of the Workers.**

Public Relations

- **Public Relations Aspect of the Event Had to be Considered.**
- **While Survey of Personnel and Homes Was Being Conducted, A Decision To Have A Press Conference at 10:00 am Was Made.**
- **DOE Requested That ORNL Take the Lead in the Press Conference. This Responsibility Was Given to a Senior Laboratory Official.**
- **Calls Went Out To Local Newspapers, Radio and TV Informing Them of the Press Conference and the Reason For It.**
- **A Model of the Construction Site Was Available For Use With the Media.**

Public Relations

- **Since DOE Had Established A Class B Investigation Committee To Determine the Cause of the Incident, It Was Explained to the Media That Questions of This Nature Would Have to Await The Committee Report.**

- **Everything Else (other than names of individuals and businesses) was released in a free and open manner.**

Lessons Learned

- **The Public Has A Fear of Radiation, A Fear of the Unknown, and a Distrust of Big Companies (and the Government)**
- **When Making Surveys in Homes and Businesses, A Technician Must be Careful Not to Aggravate These Fears.**
- **Offering To Do Whatever Is Necessary to Assure Workers That Their Families Are Safe (Including Whole Body Counts and Bio-Assay for Family Members) Was Very Helpful.**
- **A Systematic Approach to the Survey of Homes and Businesses is Essential.**
- **A Professional Attitude on the Part of the Technicians Is Also Essential.**
- **Bringing the Laboratory's Public Affairs Group On Board At An Early Stage Prevented the Event From Becoming a Series of "Leaks."**