

June 26, 1998

Docket No. 030-04552

License No. 19-10306-01

J. H. Zarzycki
Technical Director
Department of the Army
U.S. Army Edgewood Research, Development
and Engineering Center
SCBRD-TD
5232 Fleming Road
Aberdeen Proving Ground, MD 21010-5423

SUBJECT: INSPECTION NO. 030-04552/98-001

Dear Mr. Zarzycki:

From September 25, 1997, through May 22, 1998, Anthony Dimitriadis of this office conducted a safety inspection at the Westwood Radioactive Material Disposal Facility in the Edgewood Area of Aberdeen Proving Ground, of activities authorized by the above listed NRC license. The inspection was limited to observations by the inspector, interviews with personnel, selective examination of records, and confirmatory surveys of the Westwood Facility. The findings of the inspection were discussed with Peter Spaeth of your organization at the conclusion of the inspection. The enclosed report presents the results of this inspection.

Within the scope of this inspection, no violations were identified.

Please note that the inspection results do not constitute approval by the NRC for release of your facility for unrestricted use. The results of this inspection, and all other applicable information available to the NRC, will be examined to determine if your facility may be released for unrestricted use by the reviewer who is responsible for amending your license.

In accordance with Section 2.790 of the NRC's "Rules and Practices," Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the Public Document Room. No reply to this letter is required.

Your cooperation with us is appreciated.

Sincerely,

Original signed by Marie Miller

Marie T. Miller, Chief
Decommissioning and Laboratory Branch
Division of Nuclear Materials Safety

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J. Zarzycki
Department of the Army

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Enclosure:
Inspection Report No. 030-04552/98-001

cc:
Peter Spaeth, Radiation Safety Officer
Rafael Corpuz, Radiation Protection Officer
Timothy A. Reese, P.E., Project Manager
State of Maryland

J. Zarzycki
Department of the Army

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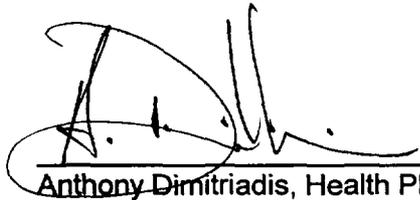
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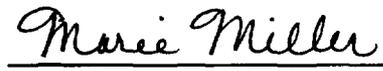
REGION I

Docket No.: 030-04552
License No.: 19-10306-01
Report No.: 030-04552/98-001
Licensee: Department of the Army
Location: Edgewood Research, Development
and Engineering Center
Aberdeen Proving Ground, MD 21010-5423
Dates: September 25, 1997, through May 22, 1998

Inspector:


Anthony Dimitriadis, Health Physicist

Approved by:


Marie T. Miller, Chief
Decommissioning and Laboratory Branch

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EXECUTIVE SUMMARY

Department of the Army
Edgewood Research, Development and Engineering Center
NRC Inspection Report 030-04552/98-001

This inspection was conducted to determine if the decommissioning activities carried out at the Westwood Radioactive Material Disposal Facility in the Edgewood Area, were conducted safely and in accordance with NRC requirements. The report covers an 18 week period of inspection. The inspection included review of the site history, decommissioning and remediation activities; equipment and instrumentation; the licensee's program for training, retraining and instruction to workers; personnel radiation protection and contamination control; radioactive waste management; posting and labeling; and the final status surveys and data analysis.

Decommissioning activities of the Westwood Radioactive Material Disposal Facility (WRMDF) in the Edgewood Area of Aberdeen Proving Ground (APG) commenced on August 19, 1997.

Site History

The licensee had adequately documented the site history, characterized the boundaries of the affected area and took good precautions in identifying areas that were cleared of unexploded ordnance.

Decommissioning and Remediation Activities

In general, the conduct of the decommissioning activities were professional and safety-conscious. Remediation activities were successfully carried out in a well planned and professional manner. Work methods demonstrated compliance with the ALARA concept, and workers and public safety were adequately protected.

Equipment and Instrumentation

The inspection verified that the licensee used suitable equipment and properly calibrated radiation detection instrumentation. Personnel used, checked and maintained appropriate survey equipment.

Training, Retraining and Instructions to Workers

The licensee contractor established a training program that meets the requirements of 10 CFR 19.12. The inspector determined that the level of training was commensurate with the potential radiological hazards.

Personnel Radiation Protection and Contamination Control

The licensee contractor provided good radiological controls for the decommissioning work in the restricted and unrestricted areas. Licensee surveys of equipment and waste storage containers were thorough in assessing the radiological conditions. Environmental sampling and assessments were performed in a well planned and professional manner.

Radioactive Waste Management

This inspection verified that the licensee contractor provided proper waste characterization and storage. The soil sampling program was performed in a very professional manner and provided good support, data analysis and waste classification.

Posting and Labeling

The licensee contractor provided good posting and labeling throughout the site in a manner that clearly informed all visitors of the hazards.

Final Status Surveys

The licensee's final status surveys demonstrated that all radiological parameters satisfy the established guideline values and conditions. Good performance was noted in health physics support to acquire radiation levels in the affected and unaffected areas.

Independent Measurements

The NRC conducted confirmatory surveys on January 28, 1998 and February 4, 1998. The inspector took gamma exposure rate measurements during the inspection, in the area of decommissioning, around the east and west pipes in the restricted area. In addition, soil sample results indicate that the site meets the criteria for unrestricted release.

Within the scope of this inspection, no violations of NRC requirements were identified.

REPORT DETAILS

I. Site History

a. Site History

The Westwood radioactive Material Disposal Facility is located south of the old Magnolia Road gate adjacent to the Edgewood Area boundary of Aberdeen Proving Ground, Maryland. This site was initially used as a waste handling facility and later for radioactive waste research and development. Radioactive waste was processed and packaged in this facility prior to its ultimate disposal.

In the early 1970s two buildings, a concrete slab, and a tank pit were removed from this site. The site currently exists as an open grassy area. The only remains at this site include three wastewater discharge pipelines at the edge of Reardon Inlet Marsh immediately south of the area. The ground surface elevation in the area of the site is approximately 15 feet above mean sea level and surface water drainage leads to the Reardon Inlet.

The major contaminant found in a number of locations, primarily in the areas near the underground piping, was Cesium 137 (Cs-137).

b. Observations and Findings

The Westwood facility is in the process of remediation under a site specific work-plan being administered by the United States Army Core of Engineers under a contract with the U.S Army Garrison, Aberdeen Proving Ground-Directorate of Safety, Health and Environment (DSHE). Decommissioning activities are authorized under the Department of the Army, Edgewood Research, Development and Engineering Center, (ERDEC).

The licensee had identified and clearly posted the affected area. The affected area measures approximately 80 m by 90 m with an envelope extending approximately 40m into the Reardon Inlet. The affected area was bounded by a chain-link fence completely surrounding the site. Colored flags were utilized to indicate areas surveyed and cleared for the presence of unexploded ordnance (UxO). Air sampling stations and contamination reduction zones were established and well equipped. The contamination reduction zones were set up with a decontamination station designated for personnel and equipment decontamination.

Clear markings were used to identify the presence of three underground pipes which were subsequently designated as the East, West and Extreme West pipes. The East pipe was measured approximately 13.72m (45 ft), the West pipe length is approximately 30.48m (100 ft) and the Extreme West pipe measured approximately 19.81m (65 ft). At the northern end of the Extreme West pipe, remnants of a buried concrete chamber were identified.

The distance to the site boundary and nearest residential dwelling are approximately 61m (200 ft) and 79.25m (260 ft) respectively. Security and control of the affected area containing the contaminated material is maintained by locked fence and guards

are posted at each entrance between the hours of 9:00pm and 4:00am.

c. Conclusions

The licensee had adequately characterized the boundaries of the affected area and took good precautions in identifying areas that were cleared of unexploded ordnance.

II. Decommissioning and Remediation Activities

a. Inspection Scope

The inspection included a review of the licensee's decommissioning and remediation practices as described in the licensee's work plan submitted on June 5, 1997. Foster Wheeler Environmental Corporation is the primary contractor at this site. The inspector discussed with licensee representatives the requirements for maintaining records in accordance with 10 CFR 30.35(g). The inspector reviewed topographic drawings of the affected and surrounding areas.

b. Observations and Findings

Decommissioning activities of the Westwood facility commenced on August 19, 1997. The majority of the work involved the excavation of abandoned pipes and equipment and the removal and disposition of cesium-137 contaminated soil. Primary health physics oversight was conducted under the purview of the Radiation Safety Officer of the installation and the Department of the Army, Edgewood Research, Development and Engineering Center. Day to day activities were supervised by the Site Superintendent who served as the principle field authority for ensuring that remediation activities were in accordance with the work plan. Between September 25, 1997, and May 22, 1998, the inspector conducted frequent reviews and assessments of ongoing decommissioning activities. Remediation activities concluded on February 25, 1998.

Excavation activities were carried out in well defined zones and Health Physics support personnel were present throughout the remediation activities. The licensee contractor allocated considerable effort in obtaining radiological field screening measurements for soil removal and proper waste classification. Soil removed from the excavation area and found to be free of contamination was stored for use as backfill material.

c. Conclusions

In general, the conduct of the decommissioning activities were professional and safety-conscious. Remediation activities were successfully carried out in a well planned and professional manner. Work methods demonstrated compliance with the ALARA concept, and workers and public safety were adequately protected.

III. Equipment and Instrumentation

a. Inspection Scope

A review was performed of equipment and instrumentation, their use for surveys, decontamination and protection of personnel, with emphasis placed on calibration of instruments.

b. Observations and Findings

The inspector reviewed the licensee's instrumentation and calibration program. It was observed that operable and calibrated survey instruments were possessed and used by the licensee contractors.

A brief list of the instruments include:

- a. Ludlum model 19 micro-R meter
- b. Ludlum model 2221 with model 44-62 probe
- c. Ludlum model 2221 with model 44-10 probe
- d. Ludlum model 2221 with model 44-2 probe
- e. Ludlum model 3 with model 44-9 probe
- f. Ludlum model 2220 with model 44-1 probe

A contractor employee demonstrated the use of a portable radiation survey instrument, Ludlum Model 19 micro R meter, S/N 120926, during the remediation/clean-up work, in the 40 by 90 area surrounding the east pipe. The instrument was held approximately 1m (3.28 ft) above the surface of the ground in the vicinity of the decontamination reduction zone of the restricted area where the remediation work was being performed. The radiation levels measured approximately 8-10 micro roentgens per hour ($\mu\text{R/hr}$), which closely coincided with the inspector's measurements.

The inspector observed the contractor use a Ludlum model 2221 with a Ludlum model 44-10 2" x 2" NaI probe to scan the soil in each bucket during remediation. The probe was held approximately 15.24 cm (6 inches) above the surface of the soil for approximately 6 seconds.

The inspector reviewed a sample of instrument calibration records. The exposure rate and reference source serial number were clearly listed on each instrument calibration record. Calibration of the Ludlum Model 19 micro R meter and a Ludlum model 2221/44-10 high-energy gamma scintillator, used in the field, were performed on August 1, 1997 and September 29, 1997 by Ludlum Measurements, Inc., Sweetwater, Texas and GTS Instrument Services, Pittsburgh, Pennsylvania, respectively. The instruments were calibrated at six locations with exposure rates ranging from 100 to 4000 micro roentgens per hour ($\mu\text{R/hr}$) or 100 to 400,000 counts per minute respectively. The input sensitivity and instrument voltage settings are clearly indicated on the calibration record. The licensee also performed and recorded a daily instrument check which included the background, battery and response to a check source for all instruments.

Smears of removable contamination were counted in a Ludlum Model 2200 attached to a Ludlum Model 44-1 beta scintillator. The smears were typically counted for 1 minute, and 10 minutes if the results seem elevated. Background levels were typically around 210 disintegrations per minute. The MDA calculated for this instrument during this inspection period was 137 dpm and the efficiency was about 15% for beta emitters. This instrument was last calibrated on August 25, 1997 by Ludlum Measurements, Inc., Sweetwater, Texas. The input, sensitivity and reference calibration points were clearly listed on the calibration record.

c. Conclusions

The inspection verified that the licensee used suitable equipment and properly calibrated radiation detection instrumentation. Personnel used, checked and maintained appropriate survey equipment.

IV. Training, Retraining and Instructions to Workers

a. Inspection Scope

A review was performed of the training and instruction to worker requirements. In an effort to evaluate personnel knowledge of the training program, the inspector interviewed several individuals about radiation safety training and instruction. The inspector focused on radiation surveys and decontamination procedures.

b. Observations and Findings

The inspector reviewed the licensee's program for training and instruction to workers, including contractor personnel, who perform the majority of the work. Contractor and subcontractor personnel receive annual radiation safety training in accordance with the training program prepared by Foster Wheeler Environmental Corporation. Field workers receive approximately 8 hours of radiation safety training prior to the start of work at the site. At the conclusion of the training session, an examination is given to the participants to verify understanding of the course contents. No work is permitted on the site before the individual passes a recent physical and receives the training described above. A score of 70 or better is required on the written exam prior to commencing work on the site. Initial training is supplemented by weekly and daily health and safety training which includes radiation safety topics.

In addition to radiation safety training, field workers complete 40 hours of hazardous material training, as required in 29 CFR 1910.120. The licensee's Quality Control Systems Engineer is responsible for reviewing the contractor's training program and ensuring that the program is in agreement with the Site Specific Work Plan and in compliance with 10 CFR 19.12.

Individuals entering a restricted area are required to read and sign a radiation work permit (RWP) which is kept in the work trailer on the perimeter of the work site. The work is typically discussed during the daily morning safety briefing where all aspects of the work plan are discussed. The morning briefing provides all radiation workers

an opportunity to discuss any concerns, and frequently workers ask questions about their specific duties. It also enables the Project Manager to make adjustments to the daily work plan as necessary to ensure that the ongoing work is in compliance with the work plan and supporting documents.

The inspector interviewed contractor employees and reviewed select training records. Training records indicate that radiation safety training was conducted during the week of August 11, 1997. Interviews with several field personnel revealed a good working knowledge of the policies and standard operating procedures related to safety, survey, and decontamination. The workers were familiar and comfortable with the amount of training and topics covered. In addition, the personnel displayed a good understanding of the instrumentation used at the site and their detection capabilities.

c. Conclusions

The licensee established a training program that meets the requirements of 10 CFR 19.12. The inspector determined that the level of training was commensurate with the potential radiological hazards. No safety concerns were identified.

V. Personnel Radiation Protection and Contamination Control

a. Inspection Scope

The inspector reviewed the licensee's radiation survey and contamination control program, interviewed radiation protection personnel, and toured work locations of radiologically controlled areas. A review was performed of the licensee's program for monitoring the external doses to personnel, and for evaluating the dose to members of the public.

Particular emphasis was placed on work planning process and personnel contamination and safety. The inspector reviewed dosimetry and air sampling records, and interviewed the Site Superintendent and Field Radiation Safety Supervisor.

b. Observations and Findings

Standard operating procedures require that radiation workers wear protective equipment as specified by the Site Safety and Health Officer. The inspector observed personnel performing remediation work and waste removal wearing Level D personal protective clothing/equipment. This includes a hard hat, safety glasses, tyvek suit, coveralls, safety shoes/boots with steel toes, shoe covers, outer gloves and latex inner-gloves.

Each team working in the field is equipped with radiation detection equipment used to scan the areas of work and soil removed. Individual workers were observed wearing external dosimeters and self-reading personnel dosimeters. The inspector observed the contractor employees conducting radiation surveys before exiting the restricted area. The instruments used include a Ludlum 14C coupled to a Ludlum model 44-9, pancake probe. The intermodal waste transport containers were wiped with absorbent

paper and scanned with portable survey meters. Wipe tests were taken for analysis in a Ludlum model 2200 linked to a Ludlum model 44-1 beta scintillator.

Air monitoring was performed outdoors during operations with an Eberline model RAP-1 pump using a cellulose filter. The flow rate of the pump is approximately 2 ft³ per minute. In addition to the continuous monitor, the contractor collected a daily high volume air sample to measure airborne radioactivity. The average volume of the high volume air sample was approximately 20-30 CFM. The filters are counted for 10 minutes in a Ludlum model 2200/44-1 beta scintillator.

The inspector reviewed the contractor's air monitoring records and found that the typical minimum detectable activity (MDA) for a 10 minute count for Cesium 137 was approximately 4×10^{-14} $\mu\text{Ci/ml}$. The highest reading noted by the inspector in January 1998 was 5.94×10^{-11} $\mu\text{Ci/ml}$. According to the contractor's procedures, if the air concentrations exceed 10% of the DAC, workers are required to don respiratory protection. The DAC was never exceeded, so the respiratory protection equipment was not required. The inspector verified that the concentrations were below the limits outlined in 10 CFR 20.1502 and 20.1204.

c. Conclusions

The licensee contractor provided good radiological controls for the decommissioning work in the restricted and unrestricted areas. Licensee surveys of equipment and waste storage containers were thorough in assessing the radiological conditions. Environmental sampling and assessments were performed in a well planned and professional manner. No safety concerns were identified.

VI. Radioactive Waste Management

a. Inspection Scope

Management of wastes generated during decontamination activities was reviewed, as were records of radioactivity analyses for soil removed from the exclusion zone.

b. Observations and Findings

The inspector observed the packaging and storage of radioactive waste. Foster Wheeler staff took radiation levels of each bucket filled with soil. Additional soil sampling was performed from each intermodal container to confirm the concentration of radioactivity for proper manifesting and documentation. Approximately 25,000 ft³ of radioactive waste was packaged at this site. All of the waste was comprised of contaminated soil, with the exception of one container which was filled with disposable paper, gloves, personal protective coveralls and other various items. Approximately 56 intermodal containers were prepared and packaged for transportation. Each intermodal container holds approximately 450 ft³. All radioactive waste generated on site was shipped to Envirocare, Inc., a low level radioactive waste disposal facility located in Clive, Utah.

The licensee performed waste characterization to determine the most effective method

of disposal. Prior to analysis for radioactivity, samples (100 ml) were collected and analyzed for Chemical Warfare Material. Based on the characterization information obtained from the analysis, Foster Wheeler determined that all of the soil to be shipped contained less than 70 Bq/g (0.002 µCi/g) specific activity as defined in DOT regulations, 49 CFR 173.403, and was therefore shipped without regard to its radioactivity. Shipments of wastes to the disposal site included a manifest of all wastes during transfer, in accordance with 10 CFR 20.2006.

c. Conclusions

This inspection verified that the licensee contractor provided proper waste storage and characterization in accordance with 10 CFR 61.56. The soil sampling program was performed in a very professional manner and provided good support, data analysis and classification, in accordance with 10 CFR 61.55.

VII. Posting and Labeling

a. Inspection Scope

Posting and labeling of site and restricted areas were reviewed.

b. Observations and Findings

Standard procedures require that an exclusion zone and contamination reduction zone be set up in the affected area. The inspector observed that these zones had been established and that the restricted area was conspicuously posted with the appropriate caution signs as required by 10 CFR 20.1902(e).

The inspector also observed that the licensee posted an NRC Form 3 in the work trailer along with a copy of the NRC license and a notice identifying where 10 CFR Parts 19 and 20, could be reviewed in accordance 10 CFR 19.11.

c. Conclusions

The licensee contractor provided good posting and labelling throughout the site in a manner that clearly informed all visitors of the hazards.

VIII. Final Status Surveys

a. Inspection Scope

The inspector reviewed the licensee's final status survey activities, including survey grid setup, sample collection and preparation in the field for analysis.

b. Observations and Findings

The inspector observed the contractor delineate the survey grids for the affected area. The contractor scanned 100% of the affected areas and 10% of the unaffected area

as required by the decommissioning plan. The affected areas included the grassy area north of the Reardon Inlet and south of Westwood Road. Unaffected areas were considered all other areas surrounding the affected area, including the area north of the Westwood Road. Prior to taking measurements and soil samples for remaining contamination, the contractor marked the work area to delineate grid locations. In addition, the inspector noted that the contractor randomly selected at least 30 locations in the unaffected area for soil sampling.

The inspector reviewed the contractor's results for the affected area. The highest radiation measurement noted in the affected area was 400 pCi/gm. The contractor's records did not indicate any measurements in excess of the instruments MDAs in unaffected areas. During remediation, areas in excess of guidelines for unrestricted use were resurveyed after soil removal to ensure compliance with the guidelines. Residual activity measured during the final status survey was typically less than 3 pCi/g, below the established guideline of 8 pCi/g.

During November 1997, Foster Wheeler representatives discussed the status of site decommissioning activities with the inspector. At the time of the inspection, the contractor and sub-contractor personnel discussed recent activities which involved removal of two concrete footers from a building previously dismantled in the 40 by 90 area, an area located near the east pipe. The footers were surveyed for residual radioactivity. The results indicated that no residual radioactivity remained and the footers were disposed without regard to radioactivity.

c. Conclusions

The licensee conducted final status surveys in a manner that provided data demonstrating that all radiological parameters satisfy the established guideline values and conditions. Good performance was noted in health physics support to acquire radiation levels in the affected and unaffected areas. No safety concerns were identified.

IX. Independent Measurements

a. Inspection Scope

The inspector acquired numerous independent measurements and soil samples to verify that the licensee's results are valid, reproducible and in accordance with the guidance contained in draft NUREG-5849, Manual for Conducting Radiological Surveys in Support of License Termination.

b. Observations and Findings

The NRC conducted confirmatory surveys on January 28, 1998 and February 4, 1998. The inspector took gamma exposure rate measurements during the inspection, in the area of decommissioning, around the east and west pipes in the restricted area. The measurements were made with Ludlum Micro-R meters (NRC Serial Nos. 033514 and 019636) calibrated to cesium-137.

Surface scans for gamma radiation were also performed in the restricted area,

exclusion zone, support zone and unaffected area. A Ludlum Scaler Rate meter Model 2221 coupled to a Ludlum Model 44-10 2" x 2" NaI probe was used, (NRC Serial No. 054828). The instrument was checked with a cesium-137 source on the days of use.

Background exposure rates were measured at four locations with a Ludlum microR meter (NRC tag no.033514), and ranged from 5 to 7 $\mu\text{R/hr}$, with an average of 6 $\mu\text{R/hr}$. Exposure rates in the affected area were also measured at this site. Typical exposure levels measured with this instrument were 5-8 micro roentgens per hour ($\mu\text{R/hr}$).

The highest gamma exposure rate measured in a restricted area was 10 $\mu\text{R/hr}$. Assuming that one micro roentgen equals one microrem for gamma radiation, the highest dose rate was 0.010 millirem per hour (mrem/hr). The highest exposure rate in an unrestricted area was 7 $\mu\text{R/hr}$ or 0.007 mrem/hr. This area is infrequently occupied by a member of the public (less than one hour per day), but assuming a 2,000 hour/year occupancy, the total dose that an individual would receive in one year would be less than 15 mrem, far below the 100 mrem requirement in 10 CFR 20.1301.

Soil Sampling - The inspector observed the licensee's contractor take subsurface split samples from various locations in the restricted area for analysis by the vendor and the NRC. Prior to releasing the samples for transfer to the Region I Laboratory, the Army performed analysis, in accordance with their internal requirements, to ensure that no chemical warfare material (CWM) was present in the samples.

The samples were analyzed by the Region I laboratory on a Princeton Gamma-Tech high purity intrinsic germanium detector coupled to a Nuclear Data Accu-Spec multichannel analyzer. The samples were counted for 10,000 seconds in 250 ml Marinelli beakers on a high resolution gamma spectrometry system with a detection limit of approximately 0.020 pCi/g for Cs-137.

c. Conclusions

Soil sample results indicate no values were greater than the release criteria of 8 pCi/g.

Partial List of Persons Contacted

- * Timothy Reese, Project Manager, Foster Wheeler
Jessie B. Cabellon, Program QC Officer, Foster Wheeler
- * Tom Thorsen, Field Radiation Safety Supervisor, Kevric, Inc.
Richard Evans, Interim Quality Control Engineer, Foster Wheeler
Ken Eger, Ph.D., Project CHP, Foster Wheeler
Frederick L. Ansel, Sampling Coordinator, Foster Wheeler
Pete Nowlan, Health Physicist, Foster Wheeler
- * Todd W. Park, Site Superintendent, Foster Wheeler
Keith Branch, Operations Manager, Foster Wheeler
- * Rafael Corpuz, Radiation Safety Officer, DSHE, Aberdeen Proving Ground
- * Peter Spaeth, Radiation Safety Officer, ERDEC
Scott Wesner, Health & Safety Officer, Foster Wheeler
Phillip Kirwan, HFA UxO Technician
Billy Sanders - Civil Engineer, US Army Corps of Engineers, Baltimore District
- * Joseph A. Brusman, Civil Engineer, US Army Corps of Engineers, Baltimore District
- * Kathy Kneten, Administrative Assistant, Foster Wheeler

The asterisk denotes that the individuals were present at the Exit Meeting conducted on February 4, 1998.