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Energy/
Environment
Systems Division

February 27, 1991

Mr. John D. Kinneman
Region I
Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19400

Subject: **REVISED PROPOSED CONFIRMATORY SURVEY PLAN - WESTINGHOUSE
ELECTRIC CORPORATION - BLOOMFIELD, NEW JERSEY**

Dear Mr. Kinneman:

Enclosed is a copy of ORAU's revised proposed confirmatory radiological survey plan for the remediated and non-remediated areas at the Westinghouse Electric Corporation facility in Bloomfield, N. J. The survey, as described in this plan, is tentatively scheduled to be performed March 11-22, 1991, and will take approximately ten working days to complete. The survey will consist of alpha, beta, and gamma surface scans, surface activity measurements, removable activity measurements, and sampling in all buildings between Arlington Avenue and MacArthur Avenue (Buildings 1 through 6), the garage (located on the south side of MacArthur Avenue), and on the surrounding grounds west of Arlington Avenue.

Provided as an appendix to the proposed survey plan are cost estimates for the various site activities. The estimate is divided into the following areas: plan preparation costs, on-site activities, sample analysis, and report preparation costs. Also attached are cost estimate sheets for each proposed survey area. These sheets provide time and cost estimates, a brief description of the area to be surveyed, and a summary of survey activities to be conducted in the area.

Comments and requests for additional information may be referred to me at FTS 626-0065.

Sincerely,

Wade C. Adams
Staff Health Physicist
Environmental Survey and
Site Assessment Program

WCA:mp

Enclosure

cc: D. Tiktinsky, NRC/NMSS 6A4
M. Roberts, NRC/Region I
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File: WEB/167

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**PROPOSED
CONFIRMATORY RADIOLOGICAL SURVEY PLAN
FOR PORTIONS OF THE
WESTINGHOUSE ELECTRIC CORPORATION BLOOMFIELD LAMP PLANT
BLOOMFIELD, NEW JERSEY**

I. INTRODUCTION

The Bloomfield Lamp Plant, owned by Westinghouse Electric Corporation (WEC), located in Bloomfield, NJ is comprised of eleven principal buildings and several smaller structures (Figure 1). The facility contains approximately 1,000,000 ft² (93,000 m²) of usable floor space and is located on 14 acres (5.7 ha) in a mixed industrial residence area. WEC operated this facility until 1982 under NRC License No. SMB-1527.

The plant operations were devoted principally to the development and manufacture of electric lamps; however, radioactive materials were utilized in various processes during the plant operation. Thorium was used in a variety of studies and manufacturing processes related to the production of metallic wire for filaments. Uranium was employed in work related to the Manhattan Project (Manhattan Engineer District) during World War II and in projects prior to and following that period. The primary area of uranium use was in the basement of Building 7 which will not be part of this confirmatory survey.

The facility is in the process of being decontaminated and decommissioned for unrestricted use. At present, WEC is responsible for overseeing the decontamination of the facility and has contracted several organizations to perform characterization surveys, remedial decontamination activities, and final radiological surveys. At present, Buildings 1 through 6, the garage, and property on the west side of Arlington Avenue, have been remediated and are awaiting final NRC approval for release without radiological restrictions. Buildings 7 through 10A are currently in the process of being remediated. It is expected that all remedial actions will be completed in 1992.

Prepared by the Environmental Survey and Site Assessment Program of Oak Ridge Associated Universities, Oak Ridge, TN, under interagency agreement (NRC Fin. No. A-9076) between the U. S. Nuclear Regulatory Commission and the U. S. Department of Energy.

February 27, 1991

In May, June, and July of 1986, Radiation Management Corporation (RMC) (currently Canberra/RMC), performed a radiological characterization survey of the WEC facility (Reference 1). The purpose of the survey was to identify areas within the facility that contained radioactive materials or contamination. The survey also provided quantitative and qualitative information involving these materials. In addition, the survey identified areas that exceeded prescribed limits of contamination for unrestricted release and provided additional information as to the level of decontamination effort that would be required to meet release criteria.

Scientific Ecology Group, Inc. (SEG), a subsidiary of WEC, performed the remediation work in the areas identified by RMC. During the process of remediation, SEG traced contaminated piping and venting systems to other areas and also performed remedial actions there. The remedial action included the removal of tile and scabbling concrete floor areas; excavation of soil to expose and remove contaminated piping; the removal of overhead pipes, ductwork, filters, and blower units; the removal of fire brick from the incinerator; removal of railroad ties and rails; and the removal of vessels that contained radioactive materials. Other remedial actions involved vacuuming and wiping of contaminated surfaces. Asbestos and mercury were also found in some of these locations. Asbestos was found, primarily in floor tile and pipe insulation. Mercury was found along the railroad tracks, the reservoir and in some building locations.

The final radiological survey report (Reference 2) to release Buildings 1 through 6, the garage, and property on the west side of Arlington Avenue was produced by Canberra Nuclear Services Division in May of 1990. Canberra surveyed all areas that had been remediated by SEG (Figures 1 and 2). The radiological survey report by the licensee's representative indicates that most parts of the facility satisfy NRC guidelines for unrestricted use. However, the licensee may ask the NRC for special permission to release some areas that exceed guideline levels.

The Nuclear Regulatory Commission (NRC) has requested that the Environmental Survey and Site Assessment Program (ESSAP) of Oak Ridge Associated Universities (ORAU) perform a confirmatory radiological survey of those portions decontaminated in and around Buildings 1 through 6 and the garage north of Building 1.

February 27, 1991

II. **PURPOSE**

The purpose of the survey is to confirm the results of the licensee's decommissioning survey by providing sufficient data to evaluate the radiological condition of the facility relative to the NRC guidelines for unrestricted use.

III. **RESPONSIBILITY**

Work described in this survey plan will be performed under the direction of P. R. Cotten, Senior Project Leader with the Environmental Survey and Site Assessment Program of the Energy/Environment Systems Division of ORAU. The cognizant site supervisor has the authority to make appropriate changes to the survey plan as deemed necessary as the survey progresses.

IV. **PROCEDURES**

- A. ORAU will review the licensee's final survey results and supporting documentation concerning site decommissioning activities. Information will be evaluated to assure that areas identified as exceeding site guidelines have undergone decontamination and that residual activity levels satisfy the established guidelines.
- B. A survey team from ORAU will visit WEC and perform a visual inspection, independent measurements, and sampling. Survey activities will be conducted in accordance with the ORAU ESSAP Survey Procedures Manual. These procedures are listed in Section VIII of this survey plan. Deviations to this plan will be documented in the site log book.
- C. Background exposure rates will be determined for the building interiors at a minimum of 6 measurements in locations of similar construction but without a history of radioactive materials use. Also, a minimum of 6 locations for area background measurement and sampling will be selected within a 0.5 to 10 km radius of the site. Exposure rate measurements will be performed using a pressurized ion chamber and a NaI probe, cross calibrated with a pressurized ion chamber. Baseline soil samples will be collected from each location of external background measurement.

February 27, 1991

D. The areas prepared for survey include the remediated locations, areas immediately adjacent to remediated locations, non-remediated manufacturing and warehouse floor space, and other locations of potential contamination, based on operating history and NEC documents. cursory spot checks may also be performed in other locations. Information regarding suggested survey locations has been included as an Appendix to this plan for the purpose of prioritization by NRC Region I. As the survey progress in accordance with NRC recommendations, the number of remediated locations that are to be sampled may be increased or decreased based on findings. ORAU will notify the NRC and licensee of any areas noted during the survey as exceeding the established guidelines.

E. Survey Procedures

1. Indoor measurements and sampling in the remediated and immediately adjacent areas will be referenced to a 2 m x 2 m grid established by ESSAP on the floors and lower walls (up to 2 m). Areas of residual contamination approaching guidelines will be sub-divided into 1 m x 1 m grids to enable a more definitive survey and comparison with guideline averaging criteria. Upper walls and ceilings will not be gridded but will be referenced to floor grid coordinates or pertinent building features. Outdoor remediated areas to be surveyed, greater than 100 m², will be gridded in 10 m intervals, if appropriate. In areas of low potential activity and areas less than 10 m², a grid will not be established. Measurements and sampling will be referenced to grid block locations, prominent facility features, existing land marks, or nearby gridded surfaces.
2. Gridded indoor surfaces will be scanned using NaI (TI) gamma scintillation, thin window beta-gamma GM, alpha scintillation, and/or large area alpha/beta proportional detectors. All detectors will be coupled to countrate meters with audible indicators. Particular attention will be given to cracks and joints in the floors and walls, ledges, ducts, drains and other locations where material may have accumulated. cursory scans will be conducted on floor areas adjacent to remediated areas. Outdoor soil surfaces and surfaces 10 m from the exterior walls of each building will be scanned using NaI (TI) gamma

February 27, 1991

scintillation detectors. Paved surfaces may be scanned with a large area alpha/beta proportional detector if deemed appropriate. Locations of elevated direct radiation levels will be identified for further investigation.

3. Direct measurements for total alpha and beta-gamma activity will be performed on a minimum of 10% of randomly selected grid blocks. Measurements will be collected at the center and four points equidistant from the center and grid block corners. One set of five direct measurements will be obtained from each selected grid block, and one smear for transferable contamination will be taken for each set of five measurements corresponding to the location of highest direct measurement. Direct measurements and smears for transferable contamination will also be performed on ungridded surfaces. The number of such measurements will be determined based on findings as the survey progresses. Representative measurements will be taken in other (unremediated) building areas at a lower frequency.
4. Direct measurements and smears will be obtained at locations of elevated contact radiation levels identified by the surface scans of indoor areas.
5. Gamma surface scans may be performed on rooftops if deemed appropriate. Direct beta-gamma measurements will be performed on ledges and outside window sills at a minimum of 5 locations and at each elevated location that is identified.
6. Exposure rates at 1 m above the surface will be measured at 10 indoor areas and at a minimum of 6 outdoor locations, using a pressurized ionization chamber (PIC). NaI(Tl) scintillation detectors will be cross-calibrated with the PIC at these locations.
7. Representative paint samples from wall surfaces and residues from drains, ducts, floor cracks or joints, and ledges will be collected where such material is present or accessible.
8. Direct measurements and smears will be performed in selected drains and ventilation systems, as available and if deemed appropriate.

February 27, 1991

9. In areas where there is the possibility of subfloor or subsurface contamination, floor coverings may be removed so that samples can be collected. These samples may consist of subfloor construction materials or soil.
10. Surface soil samples will be collected from grid block intersections in selected areas as deemed appropriate for the area. Additional soil samples will be collected at locations of elevated contact radiation identified by outdoor surface gamma scans. Exposure rate measurements at 1 m will be taken at each soil sample location.
11. Measurement and sampling locations and frequencies may be increased or decreased, based on findings as the survey progresses and at the discretion of the NRC site representative.

V. **SAMPLES ANALYSES AND DATA INTERPRETATION**

Samples and data will be returned to the ESSAP laboratory at ORAU in Oak Ridge, TN for analysis and interpretation. Smears will be counted using a low background alpha/beta counter to determine gross activity. Direct measurements will be converted to units of $\mu\text{R/h}$ (gamma exposure rate) and disintegrations per minute per 100 cm^2 for alpha/beta total and removable activity measurements. Soil, residue and miscellaneous samples will be analyzed by solid state gamma spectrometry. Analysis for isotopic Uranium and Thorium will be performed on selected samples. Data will be compared with the NRC guidelines for this site. Results will be presented in a report and provided to the NRC for review and comment. Data and samples collected as part of this survey will be archived by ORAU.

February 27, 1991

VI. SITE RELEASE CRITERIA

ORAU will use the following criteria as required in its preparation of the confirmatory survey report that will be provided to the NRC.

Site Release Criteria for Unrestricted Use

	<u>Total Uranium</u>	<u>Total Thorium</u>
Surface Contamination		
Average	5000 dpm/100cm ² alpha	1000 dpm/100cm ²
Maximum	15000 dpm/100cm ² alpha	3000 dpm/100cm ²
Removable	1000 dpm/100cm ² alpha	200 dpm/100cm ²
Soil Concentration	35 pCi/g	10 pCi/g

VII. TENTATIVE SCHEDULE

Measurement and Sampling	March 1991
Sample Analysis	June 1991
Draft Report	August 1991

VIII. LIST OF CURRENT PROCEDURES TO BE USED IN THE SURVEY

Applicable procedures from ORAU ESSAP Survey Procedures Manual include:

Section 5.0	Site Preparation
5.1	Clearing to Provide Access
5.2	Reference Grid System
Section 6.0	Measurement Techniques
6.1	Alpha Radiation Measurement
6.2	Beta-Gamma Radiation Measurement
6.3	Gamma Radiation (Exposure Rate) Measurement
6.4	Surface Scanning
6.10	Instrument Calibration

February 27, 1991

Section 7.0

Sampling Procedures

- 7.1 Surface Soil Sampling
- 7.2 Subsurface Soil Sampling
- 7.7 Determination of Transferrable Contamination
- 7.10 Sample Identification and Labeling

Section 8.0

Integrated Survey Procedures

- 8.1 Background Measurements and Baseline Sampling
- 8.3 Surveys of Open Land Areas
- 8.4 Surveys of Indoor Areas

February 27, 1991

IX. **REFERENCES**

1. "Radiological Survey of the Westinghouse Electric Corporation/North American Phillips Corporation Facility at Bloomfield, NJ," Radiation Management Corporation, August 27, 1986.
2. "Decontamination Confirmatory Surveys for the Bloomfield Lamp Plant, Westinghouse Electric Corporation," Canberra Nuclear Services Division, May 1990.

February 27, 1991

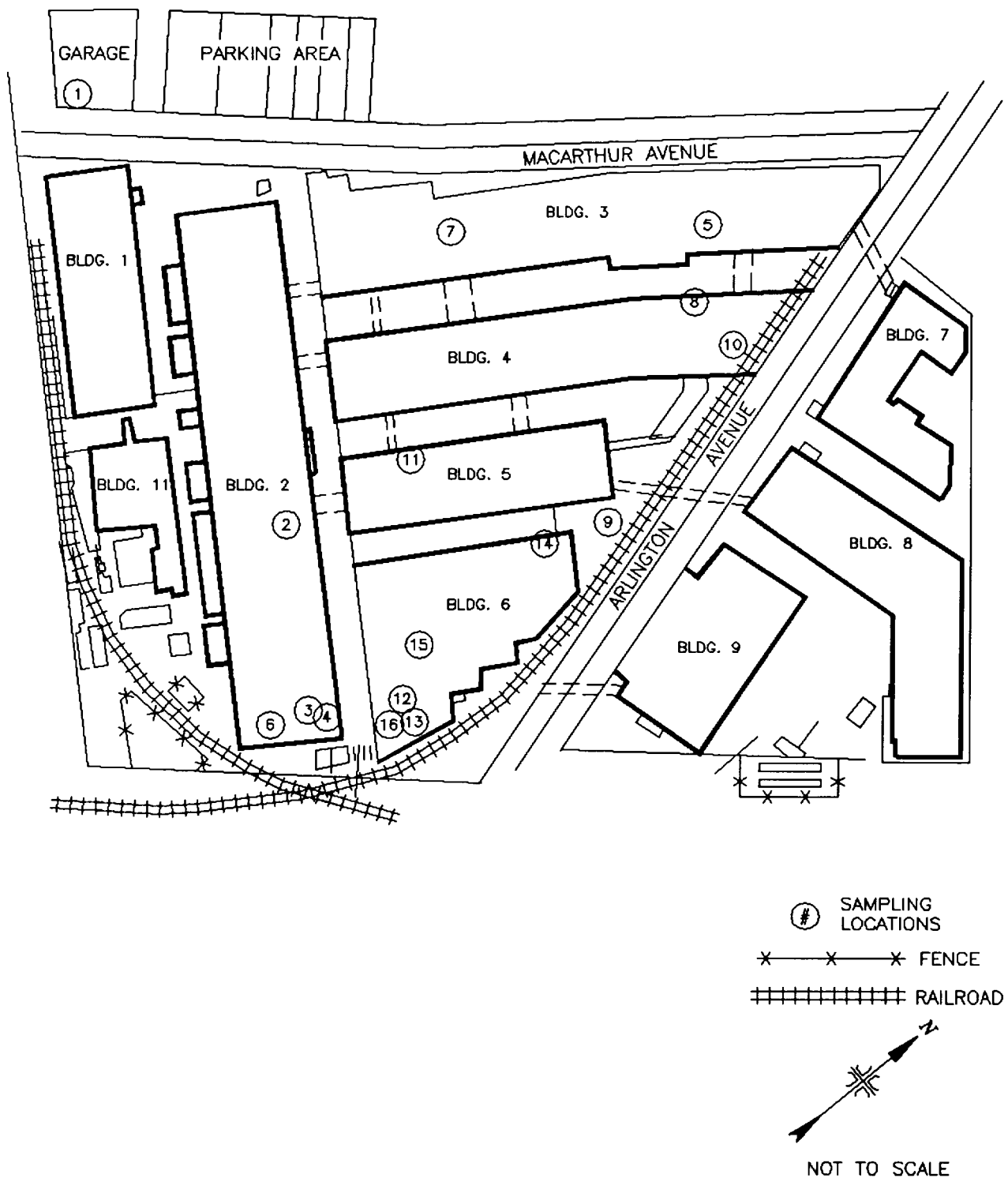


FIGURE 1: Westinghouse Electric Corporation, Bloomfield, New Jersey, Remediated Areas

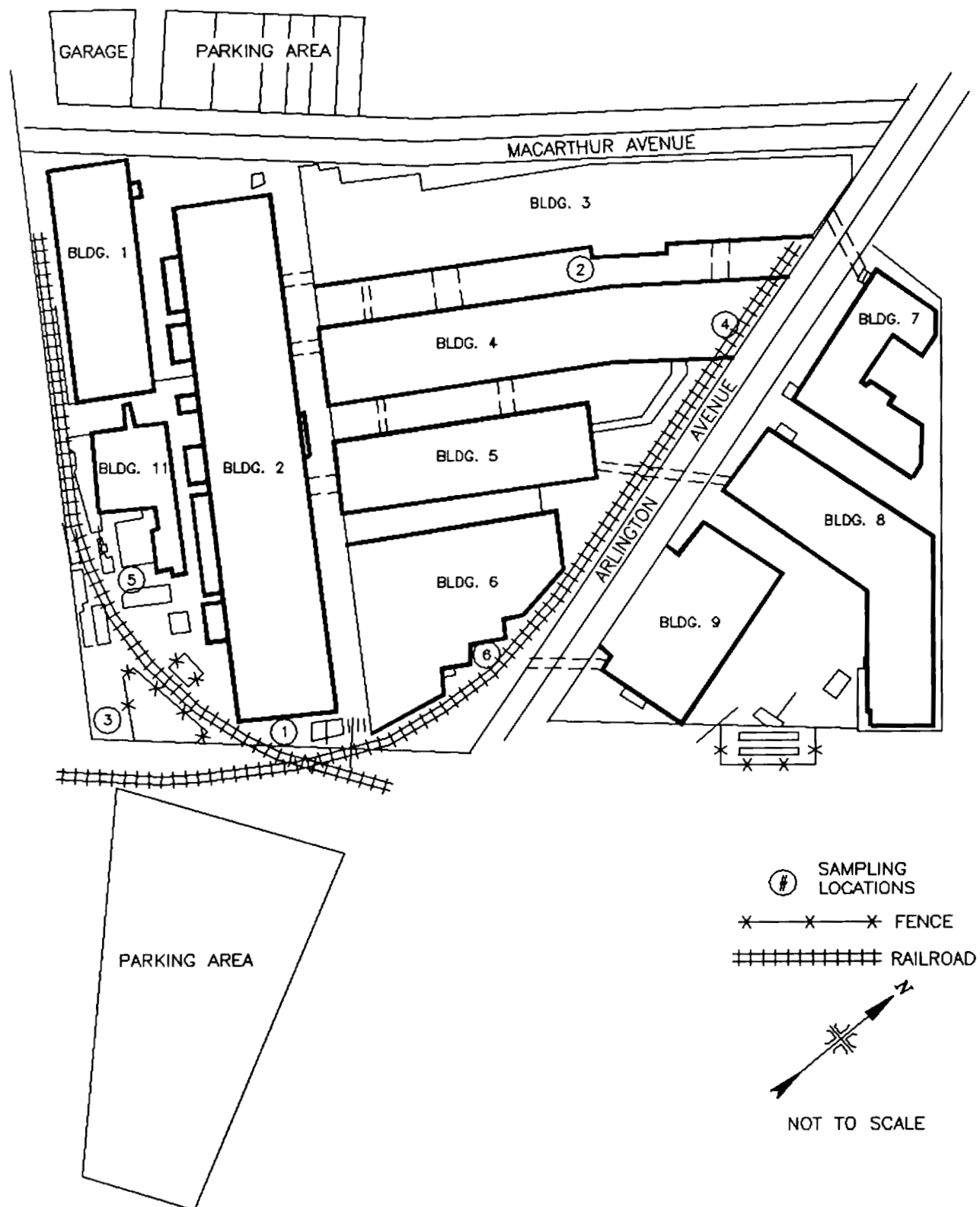


FIGURE 2: Westinghouse Electric Corporation, Bloomfield, New Jersey, Outdoor Remediated Areas

**APPENDIX A
WESTINGHOUSE ELECTRIC COMPANY
COST ESTIMATE*
BLOOMFIELD, NEW JERSEY**

Plan Preparation - \$20,000

Plan preparation includes the following activities: document reviews, preliminary site visits, survey plans, preparations, and the cost estimate.

On-Site Activities - \$73,000

These expenses consist of the following: trip preparation, travel to and from the site (airlines and rental vehicles), hotel expenses and per diem, unpacking equipment, and logging in samples. On-site activities will also include 10 working days at the site performing the following: gamma and alpha/beta surface scans, baseline measurements and sampling, gridding, mapping, fixed measurements and smears, soil sampling, miscellaneous sampling, and exposure rate measurements.

Sample Analyses - \$10,000

Based on the information obtained from the cost estimate sheets, smear analysis will cost ~ \$2500 and soil and miscellaneous samples will cost ~ \$7500. Approximately 10% of the soil and miscellaneous samples will receive alpha spectrometry analysis. This cost was not estimated in the cost estimate sheets, but is estimated here.

Report Preparation - \$19,000

The report preparation will include the following activities: tabulation of data, illustrations, and writing and reviewing the prepared report.

Total Cost Estimate - \$122,000

**Estimates are for survey of all areas listed on the following forms. Reduction in the number of areas being surveyed would result in a decrease in the "on-site activities" and "sample analyses" categories.*

Other Factors to Consider

1. Time for initial and close-out site meetings.
2. Unloading and loading the truck at the site will take a couple hours at the start and finish of the survey. Equipment set-up time and gas proportional detector purge times.
3. If debris remains on the floor, the floor must be swept before the floor monitors can be used. In some areas, standing water was noted on the floors. The floor monitors will not be used in these areas unless the water can be removed.
4. It will take time to assemble scaffolds, ladders, scissor lifts and for transferring equipment from one area to another.
5. The baseline measurements and samples and all the PIC site measurements will take a 2 man team approximately 1 day to complete.
6. This estimate does not account for miscellaneous sampling which may be required if direct measurements are inconclusive.
7. Recommend that due to time and costs of soil samples that soil samples be taken only in suspect areas and in areas of elevated activity.
8. Ten percent of the areas immediately adjacent to remediated areas may be included as part of the 10% of the non-remediated, manufacturing and warehouse building floor space to be scanned. Existing building maps will be marked to showcase scanned locations.
9. The estimate does not include:
 - a. sub-dividing 2 m x 2 m grids into 1 m x 1 m grids if contamination levels approaching guidelines are discovered.
 - b. areas with elevated direct radiation levels that may require further investigation.
 - c. duplicate measurements and samples for QA/QC purposes.
 - d. renting equipment, i.e.; scaffolding, scissor lifts, lightning systems, and heaters.
 - e. checking ventilation systems that may still exist.
 - f. scanning outdoor areas adjacent to remediated areas.

**COST ESTIMATE* SUMMARY SHEET
FOR PROPOSED SURVEY LOCATIONS**

REMEDIED AREAS-INDOORS

1. Garage Basement - \$744
2. BLDG 2, 1st floor beneath Moly Ribbon Room - \$820
3. BLDG 2, 1st floor, gaged area - \$200
4. BLDG 2, 2nd floor, Moly Ribbon and Blower Rooms - \$1896
5. BLDG 3, 3rd floor, Caustic Wash Area - \$352
6. BLDG 3, 3rd floor, Hallway Walls - \$317
7. BLDG 4, 3rd floor, East Storage Area - \$2190
8. BLDG 4, Loading Dock - \$1288
9. BLDG 5, Loading Dock - \$24
10. BLDG 6, 4th floor - \$24
11. BLDG 6, Second Tungsten Reduction Area - \$158
12. BLDG 6, Fork Lift Ramp Area - \$909
13. BLDG 6, Moly Rolling Area - \$92
14. BLDG 6, Powder Storage Area - \$92
15. BLDG 6, Doping Area - \$193
16. INCINERATOR - \$652

REMEDIED AREAS-OUTDOORS

1. BLDG 2, Pipe Run, South Wall - \$1530
2. BLDG 3, Sump on the South Side - \$294
3. RESERVOIR - \$2140
4. Rail Spurs adjacent to Buildings 4 and 6 - \$2310
5. ROOFTOP - \$600
6. INCINERATOR - \$730

NON-REMEDIED AREAS-INDOORS

1. Garage, Ground Level - ?
2. BLDG 1 - \$260
3. BLDG 2 - \$1180
4. BLDG 3 - \$1500
5. BLDG 4 - \$600
6. BLDG 5 - \$660
7. BLDG 6 - \$1240
8. BLDG 11 - \$80

NON-REMEDIED AREAS-OUTDOORS

1. Rest of area - ?

**Estimates are for on-site survey activities and do not include general costs for document/report preparation; travel, lodging, and per diem; administration; and special analyses.*

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ

ORAU #: 167 - WEB

THE GARAGE BASEMENT:

Time estimate: 182 min ~ 3 hrs

Cost estimate: \$744

The garage is located on the north side of MacArthur Avenue. The remediated basement area is approximately 6.1 m x 15.2 m. The radiological contaminant of concern was uranium. A furnace and small water heater was removed, surveyed and cleaned. Asbestos was removed from the furnace and the furnace ash tray was removed and disposed of as rad waste. Based on site visit observations, all surfaces within the garage area had been remediated to some extent. The floor, walls, and the ceiling had been remediated (scabbled) and piping had been removed from the ceiling.

The total floor space in the garage is approximately 93 m². This area will be divided into 2m x 2m grid blocks. Gamma and alpha/beta surface scans will be performed on the floor and walls (up to 2 m). 36 fixed measurements (to include 6-5 points and 6 single point measurements) and 12 smears will be taken in this area.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 2, 1ST FLOOR BENEATH MOLY RIBBON ROOM:

Time estimate: 173 min ~ 2.9 hrs

Cost estimate: \$820

The room is approximately 15 m x 15 m. The primary contaminant identified by Canberra Nuclear Services Division was thorium. Remedial activities involved the removal of overhead pipes and drains from the ceiling. These pipes and drains were from the Moly Ribbon Room which is directly above. The holding sumps were cleaned and small volumes of soils surrounding the pipes and sumps were excavated and disposed of as rad waste.

The floor space is approximately 225 m² and will require alpha/beta and gamma surface scans. Approximately 20% of the walls up to 2 m will be scanned. The remediated areas, which includes the upper wall and ceiling, where pipes and drains were removed will receive the most attention. Forty direct measurements (20 for alpha and 20 for beta-gamma) will be taken in this area. 20 smears for removable activity will be taken at the direct measurement locations.

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Environmental Survey and Site Assessment Program
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Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 2, 1ST FLOOR, CAGED AREA:

Time estimate: 38 min ~ 0.64 hrs

Cost estimate: \$200

Two small drums containing radioactive samples and waste (Thorium and Uranium) and one piece of contaminated tubing was removed from this storage area and disposed of as rad waste. This area is approximately 3 m x 12 m.

Survey activities in this area will include a drawing, alpha/beta and gamma floor scans, and 6 single point measurements. Since this area is called the caged area, it is assumed that there are no solid walls to survey.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 2, 2ND FLOOR; MOLY RIBBON AND BLOWER ROOM:

Time estimate: 467 min ~ 7.8 hrs

Cost estimate: \$1896

In the moly ribbon room, which is a 12 m x 18 m area, floor tile was removed and the underlying concrete was chipped and scabbled to remove fixed contamination. Also, overhead ductwork, leading to the blower room was removed. The contaminant of concern was thorium.

The blower room, which is adjacent to the moly ribbon room, contained an air handling/ventilation system. The blower unit, filters, and duct work from this area was removed. Tile was removed from the floor and parts of the underlying wood floor were cleaned. The surface of a concrete slab was scabbled. The contaminant of concern in this 8 m X 9 m area was thorium, also. These areas will require more intensive surveys.

Survey activities in these areas will include dividing the area into 2m x 2m grid blocks, drawings, alpha/beta and gamma surface scans of the floor and lower wall up to 2 m. 28 direct measurements for fixed and removable activity and 28 smears will also be taken in this area.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
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Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 3, 3RD FLOOR, CAUSTIC WASH AREA:

Time estimate: 81 min ~ 1.4 hrs

Cost estimate: \$352

The brick flooring and sub-floor below it, and drain piping exiting from the area, were removed. The primary contaminant was thorium. The area is approximately 5 m X 8 m. Only one wall is located in this area.

The total floor space in this area is approximately 40 m². This area will be divided into 2m x 2m grid blocks. Gamma and alpha/beta surface scans will be performed on the floor and walls (up to 2 m). 18 fixed measurements (to include 3-5 points and 3 single point measurements) and 6 smears will be taken in this area.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ

ORAU #: 167 - WEB

BUILDING 3, 3RD FLOOR, HALLWAY WALLS:

Time estimate: 60 min = 1 hr

Cost estimate: \$317

Slightly elevated exposure rates were measured on contact with these walls. Wall construction material sampling (taken by Canberra Nuclear Services Division) showed that the material contained naturally occurring Ra-226 and daughters. No remediation was performed. The area involved is estimated to be 12 m X 3 m. A wall (concrete) sample will be collected to confirm that elevated readings are the result of naturally occurring radioactive materials (NORM) present in the walls.

The total floor space in this area is approximately 36 m². Gamma and alpha/beta surface scans will be performed on the floor and walls (up to 2 m). 6 fixed measurements, 6 smears, and 1 concrete wall sample will be taken in this area.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
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Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 4, 3RD FLOOR, EAST STORAGE AREA:

Time estimate: 527 min ~ 8.8 hrs

Cost estimate: \$2190

The entire wood and tile floor surfaces were removed in a 42 m X 12 m area and disposed of as rad waste. The concrete below the flooring was scabbled in many locations. Portions of a wall near the floor were removed, as were isolated locations on the west wall and several pillars. The room was divided by a plastic sheet wall which had been set up for decontamination purposes. One existing wall remains. The primary contaminant was thorium.

The total floor space in this area is approximately 504 m². Survey activities will include dividing the area into 2m x 2m grid blocks and performing gamma and alpha/beta surface scans on the floor and lower walls (up to 2 m). 108 fixed measurements (to include 18-5 points and 18 single point measurements) and 36 smears will be taken in this area.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 4, LOADING DOCK:

Time estimate: 302 min ~ 5 hrs

Cost estimate: \$1288

This area is approximately 5 m X 30 m. Tile was removed and the concrete floor beneath the tile was scabbled to remove fixed contamination. The primary contaminants were thorium and uranium. There is approximately 120 m² of wall space (up to 2 m) in this area.

The total floor space in this area is approximately 150 m². This area will be divided into 2m x 2m grid blocks. Gamma and alpha/beta surface scans will be performed on the floor and walls (up to 2 m). 72 fixed measurements (to include 12-5 points and 12 single point measurements) and 24 smears will be taken in this area.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ

ORAU #: 167 - WEB

BUILDING 5, LOADING DOCK:

Time estimate: 7 min ~ 0.12 hrs

Cost estimate: \$24

A pallet with contaminated oil containers was removed and the surrounding floor was surveyed. No further remedial actions were performed. The primary contaminant in this 3 m X 3 m area was thorium. This area will be sketched and survey activities will include gamma and alpha/beta floor scans, only. Direct measurements will be taken if scan data is inconclusive.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
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Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 5, 4TH FLOOR:

Time estimate: 7 min ~ 0.12 hrs

Cost estimate: \$24

In this room, a container of bricks was removed and shipped as rad waste. The rest of the area required no further remediation. The primary contaminants in the 3 m x 3 m area were thorium and uranium. This area will be sketched and survey activities will include gamma and alpha/beta floor scans, only. Direct measurements will be performed if scanning data is inconclusive.

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Site Survey - Cost Estimate Sheet
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Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 6, SECOND TUNGSTEN REDUCTION AREA FLOOR:

Time estimate: 20 min ~ 0.34 hrs

Cost estimate: \$158

Contaminated concrete, wood, and soil was removed from an open 2 m X 2 m X 0.3 m excavated area. The remaining wood and concrete surfaces were vacuumed and all materials were disposed of as rad waste. It is not clear how much remaining wood and concrete surfaces exist. Survey activities will include a sketched drawing, gamma and alpha/beta surface scans and collecting 2 soil samples. The primary contaminant was thorium.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 6, FORK LIFT RAMP AREA:

Time estimate: 182 min ~ 3 hrs

Cost estimate: \$909

An area, approximately 1 m deep, 1.2 m wide, and 15 m long, underneath the former fork lift ramp was excavated to expose a 13 cm diameter pipe. Approximately 15 m of the pipe and surrounding soils were removed and disposed of as rad waste. The fork lift ramp floor area was approximately 3 m x 15 m. The primary contaminant was thorium.

The total floor space in this area is approximately 45 m². This area will be divided into 2m x 2m grid blocks. Survey activities will include gamma and alpha/beta surface scans of the floor and lower walls (up to 2 m) and of the excavated area, 19 fixed measurements (to include 3-5 points and 4 single point measurements), 7 smears and 5 soil samples.

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Site Survey - Cost Estimate Sheet
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Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 6, MOLY ROLLING AREA:

Time estimate: 13 min ~ 0.22 hrs

Cost estimate: \$92

One bucket of contaminated debris was removed and isolated contaminated spots on the floor were cleaned by chipping and vacuuming. The primary contaminant in this 4 m X 2 m area was thorium. Survey activities will include floor surface scans, 4 direct measurements, and 4 smears.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
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Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 6, POWDER STORAGE AREA:

Time estimate: 13 min ~ 0.22 hrs

Cost estimate: \$92

This area, which is approximately 4 m X 2 m, contained a number of empty cans which were used to store thorium powder. These cans were removed, cleaned by wiping or disposed of as rad waste. Survey activities will include floor surface scans, 4 direct measurements, and 4 smears.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 6, DOPING AREA:

Time estimate: 33 min ~ 0.5 hrs

Cost estimate: \$193

This area, which is approximately 3 m X 2 m, contained a single drum of debris, which was disposed of as rad waste. Isolated spots on the surrounding floor had to be scabbled. A second location, along a seam in the concrete, was scraped and vacuumed. Survey activities will include surface scans, 4 fixed measurements, 4 smears, and a concrete sample from along the seam. The primary contaminant was thorium.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 2, PIPE RUN, SOUTH WALL EXTERIOR:

Time estimate: 285 min ~ 4.8 hrs

Cost estimate: \$1530

Two drainage lines and the soil surrounding the pipes were removed and shipped as rad waste. The primary contaminant was thorium. The excavated area was 1 m wide, 1 m deep, and 18 m long, and has been filled in to prevent accidents. The exterior wall of the building on the south side has been scabbled up to approximately 0.8 m. ORAU will perform an alpha/beta wall scan on this remediated wall surface. The ground and wall surface will be gridded into 2m x 2m grid blocks out from the wall and ground interface. 10 direct measurements and 10 smears will be taken along the lower wall of the building. Soil samples will be collected from 10 locations. Since this area is backfilled, the NRC will request whether this area is to be surveyed.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 3, SUMP ON THE SOUTH SIDE:

Time estimate: 43 min ~ 0.72 hrs

Cost estimate: \$294

All the surfaces inside the sump were steam cleaned. This area is still contaminated above release limits. Since the removal of this pipe would require the demolition of a wall in Building 3, WEC is trying to get special permission from the NRC to release this area as it exits. ORAU will survey this area for comparative data. The survey will include surface scans for gamma and alpha/beta activity, 5 direct measurements, and 2 soil samples.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

RESERVOIR:

Time estimate: 370 min ~ 6.2 hrs

Cost estimate: \$2140

A 20 m X 40 m area is designated as the reservoir. Soil was removed from five areas. Soil samples were investigated for U-238, Ra-226, and Th-232 by Canberra Nuclear Services Division. Since this area is backfilled, the NRC will request whether this area is to be surveyed. If the NRC requests, then ORAU survey activities would include gamma surface scans, gridding (10m x 10m grid blocks), and approximately 20 soil samples.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

RAIL SPURS ADJACENT TO BUILDING 4 AND TO BUILDING 6:

Time estimate: 285 min ~ 4.8 hrs

Cost estimate: \$2310

Surface soil was removed from an area 6 m X 20 m on the rail spur adjacent to Building 4, and shipped as rad waste. A concrete pad was scabbled to remove surface contamination and vacuumed. Railroad ties and rails were removed and pressure washed.

Surface soil was removed from an area 6 m X 24 m on the rail spur adjacent to Building 6, and shipped as rad waste. Railroad ties and rails were removed and pressure washed.

Survey activities in these areas will include ground surface scans, exterior wall scans near loading dock areas, 30 soil samples, and gridding in 6m x 6m grid blocks or larger (Up to 10m x 10m), depending on how much area is available along the railroad spurs.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

INCINERATOR-INTERIOR:

Time estimate: 117 min ~ 2 hrs

Cost estimate: \$652

The ash residue from inside the incinerator and stack was removed as rad waste. The fire brick lining the interior of the incinerator and stack was removed and disposed. All interior surfaces were cleaned and vacuumed. The floors and walls (up to 2 m) will be scanned. Approximately 21 direct measurements and smears will be taken. ORAU has no data on the interior surface area. However, based on the site visit, the interior of the incinerator did not appear to be a large area.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

ROOFTOPS:

Time estimate: 145 min ~ 2.4 hrs

Cost estimate: \$600

Gamma surface scans (if deemed appropriate) may be performed on the rooftop of one building since there was an incinerator on-site. The building rooftop will be selected after consulting with SEG and the NRC on past wind patterns at the site. Approximately 10 direct measurements and smears will be taken at selected locations, such as window sills and ledges on the building.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

INCINERATOR-EXTERIOR AREAS:

Time estimate: 80 min ~ 1.4 hrs

Cost estimate: \$730

Contaminated railroad ties and rails, and contaminated soil was removed from a 6 m x 6 m area west of the incinerator. Excavations were carried out to depths of two feet in some locations around the incinerator. It is estimated that 102 m² of ground surface area was remediated. Survey activities will include gamma surface scans and approximately 10 soil samples in various locations. Not enough information was provided to give a more accurate description for the survey.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

THE GARAGE-GROUND LEVEL:

Time estimate: ?

Cost estimate: ?

ORAU does not know how large this area is or whether the NRC intends for this area to be surveyed. During the site visit, ORAU noticed that a new car dealership was parking cars in this area.

Oak Ridge Associated Universities
Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ

ORAU #: 167 - WEB

BUILDING 1:

Time estimate: 75 min ~ 1.3 hrs

Cost estimate: \$260

Office space = 5417 m²

Manufacturing space = 1536 m²

Warehouse space = 1225 m²

Total space = 8178 m²

If ORAU scans 10% of the manufacturing and warehouse floor space, then 276 m² of this building will be scanned.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 2:

Time estimate: 351 min ~ 5.9 hrs

Cost estimate: \$1180

Office space = 1672 m²

Manufacturing space = 12710 m²

Warehouse space = 150 m²

Total space = 14530 m²

If ORAU scans 10% of the manufacturing and warehouse floor space, then 1286 m² of this building will be scanned.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ

ORAU #: 167 - WEB

BUILDING 3:

Time estimate: 450 min ~ 7.5 hrs

Cost estimate: \$1500

Office space = 1022 m²

Manufacturing space = 12044 m²

Warehouse space = 4480 m²

Total space = 17546 m²

If ORAU scans 10% of the manufacturing and warehouse floor space, then 1652 m² of this building will be scanned.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 4:

Time estimate: 177 min ~ 3 hrs

Cost estimate: \$600

Office space = 6386 m²

Manufacturing space = 6033 m²

Warehouse space = 427 m²

Total space = 12846 m²

If ORAU scans 10% of the manufacturing and warehouse floor space, then 6460 m² of this building will be scanned.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ

ORAU #: 167 - WEB

BUILDING 5:

Time estimate: 194 min ~ 3.3 hrs

Cost estimate: \$660

Office space = 706 m²

Manufacturing space = 4270 m²

Warehouse space = 2837 m²

Total space = 7813 m²

If ORAU scans 10% of the manufacturing and warehouse floor space, then 711 m² of this building will be scanned.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

BUILDING 6:

Time estimate: 370 min ~ 6.2 hrs

Cost estimate: \$1240

There were 5 remediated areas in this one story manufacturing building. ORAU proposes that 50% of the floor space be scanned. The total floor space is 2722 m². If ORAU scans 50% of the manufacturing and warehouse floor space, then 1361 m² of this building will be scanned.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ

ORAU #: 167 - WEB

BUILDING 11:

Time estimate: 25 min ~ 0.4 hrs

Cost estimate: \$80

Total building space is 873 m². If ORAU scans 10% of the manufacturing and warehouse floor space, then 87 m² of this building will be scanned.

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Environmental Survey and Site Assessment Program
Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ
ORAU #: 167 - WEB

NON-REMEDIATED EXTERIOR AREAS:

Time estimate: ?

Cost estimate: ?

ORAU cannot provide an estimate of the time due to lack of information.

3 hours - 25,000

\$ 700

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Site Survey - Cost Estimate Sheet
Contract #: 1286.02

Site: Westinghouse Electric Company, Bloomfield, NJ

ORAU #: 167 - WEB

NON-REMEDiated EXTERIOR AREAS:

Time estimate: ?

Cost estimate: ?

ORAU cannot provide an estimate of the time due to lack of information.