ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

February 13, 1997

SNM-368

Ms. Marie Miller
U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

SUBJECT: FINAL REPORT—RADIOLOGICAL SCOPING SURVEY OF BUILDINGS 3H AND 6H AT THE FORMER UNC H-TRACT FACILITY, NEW HAVEN, CONNECTICUT (DOCKET NO. 70-371; RFTA NO. 96-37)

Dear Ms. Miller:

The Environmental Survey and Site Assessment Program (ESSAP) of the ORISE conducted a scoping survey of Buildings 3H and 6H at the former UNC H-Tract Facility in New Haven, Connecticut on September 16 and 17, 1996. Scoping survey activities consisted of gamma surface scans; beta scans of drain openings; subfloor soil sampling; pipe trench residue sampling; and storm/sewer system sediment sampling.

Enclosed are five copies of the subject document. ESSAP has incorporated the comments that you provided on the draft report. Please direct any questions or comments to me at (423) 576-3740 or to William L. (Jack) Beck at (423) 576-5031.

Sincerely,

Eric W. Abelquist
Assistant Program Director
Environmental Survey and
Site Assessment Program

EWA:tsf

Enclosure

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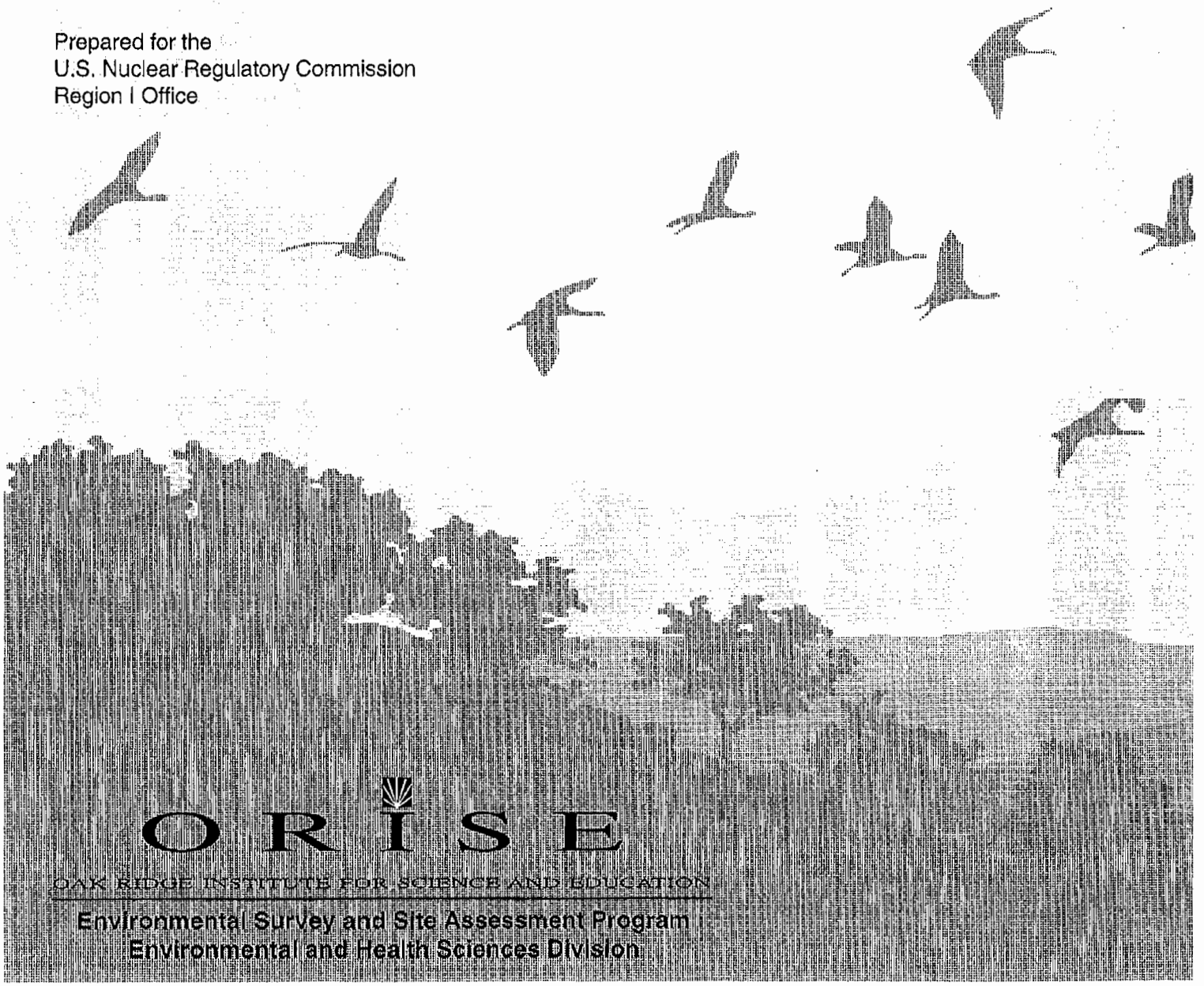
RADIOLOGICAL SCOPING SURVEY OF BUILDINGS 3H AND 6H AT THE FORMER UNC H-TRACT FACILITY NEW HAVEN, CONNECTICUT

[DOCKET 70-371]

J.L. PAYNE

Prepared for the
U.S. Nuclear Regulatory Commission
Region I Office



ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

Environmental Survey and Site Assessment Program
Environmental and Health Sciences Division

RADIOLOGICAL SCOPING SURVEY OF BUILDINGS 3H AND 6H AT THE FORMER UNC H-TRACT FACILITY NEW HAVEN, CONNECTICUT

Prepared by

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Prepared for the

U.S. Nuclear Regulatory Commission
Region I Office

FINAL REPORT

JANUARY 1997

This report is based on work performed under an Interagency Agreement (NRC FIN. No. A-9093) between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy. Oak Ridge Institute for Science and Education performs complementary work under contract number DE-AC05-76OR00033 with the U.S. Department of Energy.

RADIOLOGICAL SCOPING SURVEY
OF BUILDINGS 3H AND 6H
AT THE
FORMER UNC H-TRACT FACILITY
NEW HAVEN, CONNECTICUT

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ACKNOWLEDGMENTS

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

PAGE

ABBREVIATIONS AND ACRONYMS

AEC	Atomic Energy Commission
ASME	American Society of Mechanical Engineers
Bkg	background
cm	centimeter
DOE	U.S. Department of Energy
EML	Environmental Measurements Laboratory
EPA	Environmental Protection Agency
ESSAP	Environmental Survey and Site Assessment Program
GM	Geiger-Mueller
kg	kilogram
MDC	minimum detectable concentration
MeV	million electron volts
NaI	sodium iodide
NIST	National Institute of Standards and Technology
NRC	U.S. Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory
pCi/g	picocuries per gram
UNC	United Nuclear Corporation

RADIOLOGICAL SCOPING SURVEY OF BUILDINGS 3H AND 6H AT THE FORMER UNC H-TRACT FACILITY NEW HAVEN, CONNECTICUT

INTRODUCTION AND SITE HISTORY

United Nuclear Corporation (UNC) Naval Products Division fabricated reactor fuel elements for the Naval Reactors Program at the New Haven, Connecticut H-Tract facility under U.S. Nuclear Regulatory Commission (NRC) Docket No. 70-371, License No. SNM-368. The Atomic Energy Commission (AEC) issued the special nuclear material license to Olin Mathieson Corporation in 1959, which was later transferred to UNC in 1961. This license authorized possession and use of enriched uranium and later source materials, including natural uranium, depleted uranium, and thorium for research and nuclear fuel fabrication (NRC 1996).

Manufacturing activities at the H-Tract facility involved the fabrication of fuel elements which were then shipped to another site for upgrading into naval reactor components. The radioactive material used in these operations was primarily enriched and natural uranium. The H-Tract production facility received enriched uranium and combined it with zirconium to form fuel elements suitable for upgrading into fuel assemblies. All work involving unclad uranium fuel was performed in radiologically controlled areas.

Decontamination, the final licensee survey, and confirmatory activities have been completed at the UNC, Naval Products Division H-Tract facility. The structures that were remediated within this tract included Buildings 3H, 6H through 11H, 14H, and 44H. Facility decontamination was conducted in three phases involving the removal and disposal of radioactive waste and removal of the following equipment systems: 1) exhaust ducting, blowers, filters, hoods, furniture, process equipment, drop ceilings, floor tiles, and flooring; 2) sumps, drains, and pipes feeding the Rad Waste System and; 3) the Rad Waste System. Final survey activities were completed in 1976 and results indicated that the release criteria at the time were satisfied and the license was terminated (UNC 1976). However,

1976 soil sample data from areas below concrete flooring—but not provided to the NRC until May 29, 1996—indicated enriched uranium soil contamination ranging from 30 to 700 pCi/g within the decontamination pit and hot waste pipe trenches (NRC 1996).

The NRC has initiated a program to ensure that licenses for facilities, where activities authorized by the AEC and/or the NRC were conducted, have been terminated in accordance with the NRC's current criteria for release for unrestricted use. As part of this program, the NRC's contractor, Oak Ridge National Laboratory (ORNL), identified License No. SNM-368 as a site that required additional review. NRC Region I staff reviewed the file and determined that further information on the radiological status of this site was necessary. Region I staff conducted a safety inspection in May 1996, which included radiological survey activities in Buildings 3H and 6H where radioactive materials were used. Some facility areas, having the potential for residual contamination, were not readily accessible for survey during the May 1996 site visit. These areas included the decontamination pit, hot waste pipe trenches, subfloor soils, and drains that lead to the city storm and sanitary sewer system.

As a result of UNC's 1976 subfloor soil data and the inaccessibility of potentially contaminated areas during the May 1996 NRC inspection, the NRC Region I Office requested that the Environmental Survey and Site Assessment Program (ESSAP) of Oak Ridge Institute for Science and Education (ORISE) perform a radiological scoping survey of suspect areas of Buildings 3H and 6H, and the associated storm/sanitary sewer system, at the Former UNC H-Tract Facility in New Haven, Connecticut.

SITE DESCRIPTION

The UNC H-Tract facility is located at 71 Shelton Avenue in the west section of Science Park industrial park in northwest New Haven, Connecticut (Figure 1). The former H-Tract area is generally bounded by Division Street on the north, Shelton Avenue on the west, and the Winchester Gun Company on the east. The former 3H and 6H contiguous building is adjacent to Argyle Street to the south. The associated storm/sanitary sewer system included in this survey runs along the center line of Argyle Street (Figure 2).

The 3H and 6H building is a large one-story structure which is currently being used as a warehouse by a private citizen. Construction is mainly concrete floors and block or brick walls. Building 3H housed the initial fuel fabrication operations before a portion of the building between columns 33 and 39 was decontaminated and a concrete cap poured on the production floor. The concrete cap was removed prior to final survey activities (UNC 1976). Floor corings performed by ESSAP indicated that two distinct layers of concrete floor still remain. Building 6H housed the chemistry laboratories and the component assembly area. Clad fuel machining and non-fuel machining operations were also performed in 6H. Figure 3 shows the floor plan of Buildings 3H and 6H. The remaining buildings from the original decontamination efforts have since been demolished.

The areas of concern for this scoping survey, the decontamination trench and the hot waste pipe trenches, have been filled with concrete. One pipe trench, running the length of the building along the south wall, was not filled. Much of the buildings floor space in areas of concern was inaccessible due to storage by the current occupant.

OBJECTIVES

The objectives of the radiological scoping survey were to provide independent document reviews and radiological data for use by the NRC in evaluating the radiological conditions as compared to the current NRC guidelines for release for unrestricted use.

PROCEDURES

During the period of September 16 and 17, 1996, ESSAP performed a radiological scoping survey of portions of Buildings 3H and 6H and the associated storm/sewer system of the former UNC H-Tract facility in New Haven, Connecticut. The survey was performed in accordance with a survey plan dated September 10, 1996 which was submitted to and approved by the NRC Region I Office (ORISE 1996) and with the ORISE/ESSAP Survey Procedures and Quality Assurance Manuals (ORISE 1995a and b). Due to the difficulty in removing the two layers of concrete floor at some core locations, the survey plan was altered by ESSAP and a reduced number of subfloor soil samples were collected. It should be noted that the total thickness of concrete flooring was

approximately 30 cm. Additionally, at the request of the NRC site representative, the scope of the plan was altered to best fit the needs of the survey. This alteration consisted of collecting residue samples from the open pipe trench on the south side of the building rather than collecting residue samples from open drains. This report summarizes the procedures and results of the survey.

SURVEY PROCEDURES

Reference System

Sampling locations were referenced to prominent building features and recorded on appropriate maps.

Surface Scans

Surface scans for gamma radiation were performed over accessible floor space in all areas of concern. Scans for beta radiation were performed at the openings of accessible floor drains. Scans were performed using NaI scintillation and GM detectors coupled to ratemeters or ratemeter-scalers with audible indicators. Locations of elevated direct radiation identified by surface scans were marked for further investigation.

Soil Sampling

Background soil concentrations determined from a previous ESSAP survey site in the vicinity were used for comparison with NRC guidelines (ORISE 1993).

A total of five subfloor soil samples were collected from three floor core locations in Building 3H, two in the X-ray Reading Room and one in the decontamination pit area (Figure 3). At each location the floor was cored, a gamma radiation measurement was performed, and the soil directly beneath the concrete was sampled to 15 cm using a manual auger. If a post-sample gamma measurement indicated an increase in activity, a second sample was collected from 15 cm to 30 cm. This process

Room required sampling to 45 cm, the other two cores required sampling of only the first 15 cm of soil.

Miscellaneous Sampling

ESSAP collected two residue samples from the open pipe trench running along the south wall of the building—one from the Rectifier Room in Building 3H and one from the Chemistry Laboratory in Building 6H (Figure 3). Additionally, two sediment samples were collected from the storm/sewer system from manholes on Argyle Street (Figure 4).

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples were returned to ORISE's ESSAP laboratory in Oak Ridge, Tennessee for analysis and interpretation. Sample analysis was performed in accordance with the ORISE/ESSAP Laboratory Procedures Manual (ORISE 1995c). Soil and residue samples were initially analyzed by solid state gamma spectrometry. The radionuclides of interest were Th-232, U-235, and U-238; however, spectra were reviewed for other identifiable photopeaks. Based on the results of gamma spectrometry, four samples were also analyzed by alpha spectrometry to determine isotopic uranium abundances. Soil and residue sample results were reported in units of picocuries per gram (pCi/g). The data generated were compared with the NRC guidelines established for release for unrestricted use.

FINDINGS AND RESULTS

SURFACE SCANS

Gamma surface scans identified two locations of elevated direct radiation on the floor in the X-ray Reading Room of Building 3H. Direct radiation at these locations was approximately three times ambient background levels; both locations were confined to an area of about 300 cm^2. Note that borehole #1 (Table 1) was selected at one of these locations of elevated direct radiation. Beta scans of accessible floor drains did not identify any locations of elevated direct radiation.

RADIONUCLIDE CONCENTRATIONS IN SOIL

Radionuclide concentrations in subfloor soil samples are summarized in Table 1. Uranium concentrations for the five soil samples ranged from <0.2 to 25.6 pCi/g for U-235, <0.7 to 2.5 pCi/g for U-238, and <6.3 to 723 pCi/g for total uranium. Isotopic uranium results indicate that the contamination is enriched uranium. Background concentrations of total uranium in soil collected by ESSAP during a previous survey in the vicinity ranged from 3.2 to 5.6 pCi/g (ORISE 1993). Total thorium concentrations ranged from 1.0 to 2.2 pCi/g in the subfloor soil samples.

RADIONUCLIDE CONCENTRATIONS IN MISCELLANEOUS SAMPLES

Radionuclide concentrations in residue samples collected from the open trench and from two storm/sewer manholes are summarized in Table 2. Concentrations ranged from 0.1 to 7.7 pCi/g for U-235, from <0.7 to 7.7 pCi/g for U-238, and from 3.0 to 217 pCi/g for total uranium. Total thorium concentrations ranged from <0.7 to 2.2 pCi/g.

COMPARISON OF RESULTS WITH GUIDELINES

The NRC guidelines for residual concentrations of thorium and uranium wastes in soil, established for license termination of a facility for unrestricted use are presented in Appendix C. The primary contaminants for this site are enriched and depleted uranium and thorium. The Option 1 average soil guideline for enriched uranium is 30 pCi/g. The guideline for total thorium (Th-232 + Th-228) is 10 pCi/g.

Six samples collected by ESSAP exceeded the guideline for total uranium. These included the three subfloor soil samples from the X-ray Reading Room, borehole 1, the residue samples collected from the Rectifier Room pipe trench in Building 3H, the residue sample from the Chemistry lab trench in Building 6H, and the sediment sample collected from manhole 3 of the storm/sewer system. All total thorium concentrations were less than the guideline limits.

SUMMARY

During the period September 16 and 17, 1996, at the request of the NRC Region I Office, the Environmental Survey and Site Assessment Program of ORISE performed a radiological scoping survey of Buildings 3H and 6H, and the associated storm/sewer system at the Former UNC H-Tract Facility in New Haven, Connecticut. The survey activities consisted of gamma scans, subfloor soil sampling, residue sampling, and sediment sampling from the storm/sewer system.

Samples collected from each area of concern—subfloor soil, trench residue, and manhole sediment—indicated the presence of enriched uranium that exceeds the established NRC guidelines for total uranium. Total thorium concentrations were all less than the guideline limits.

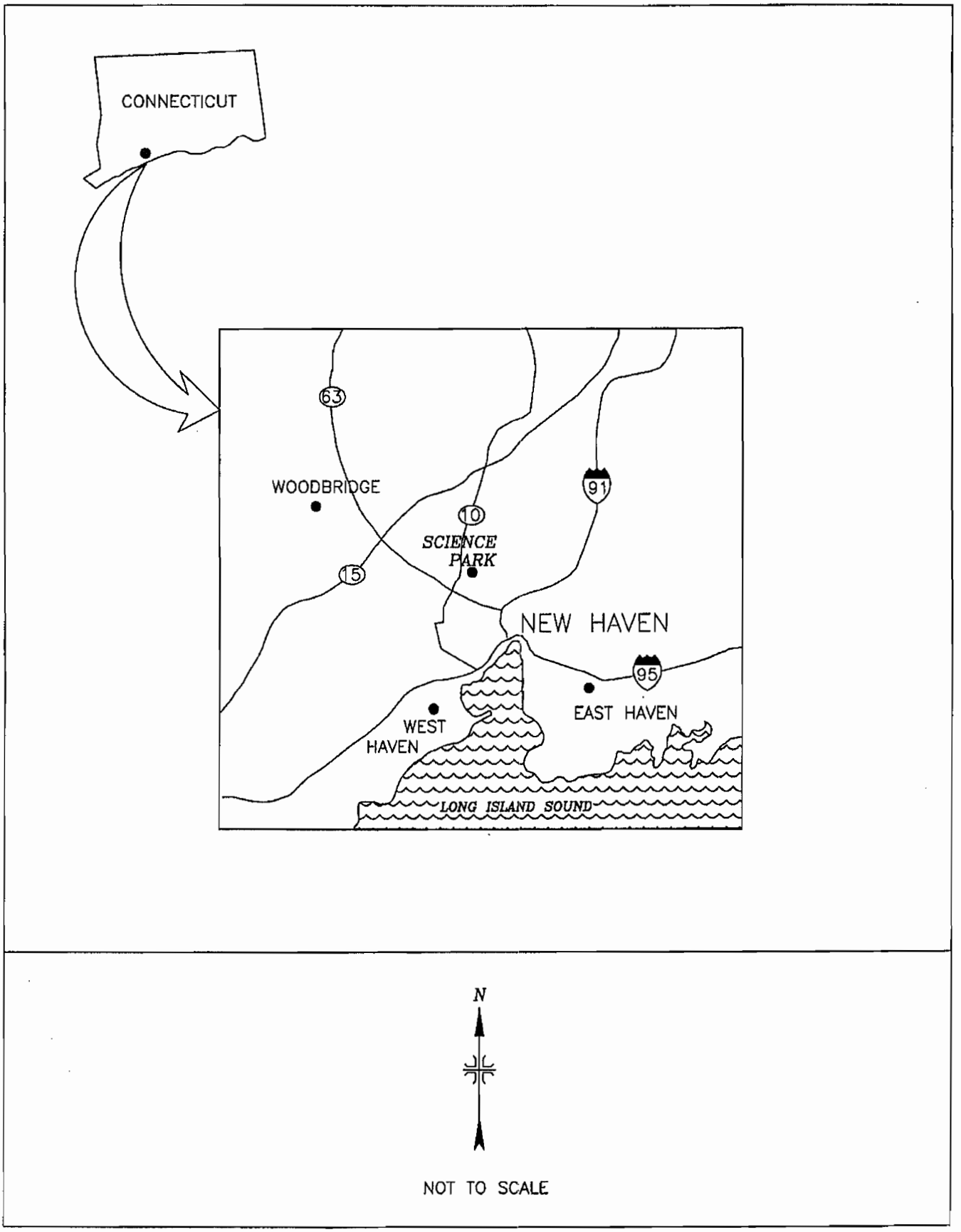
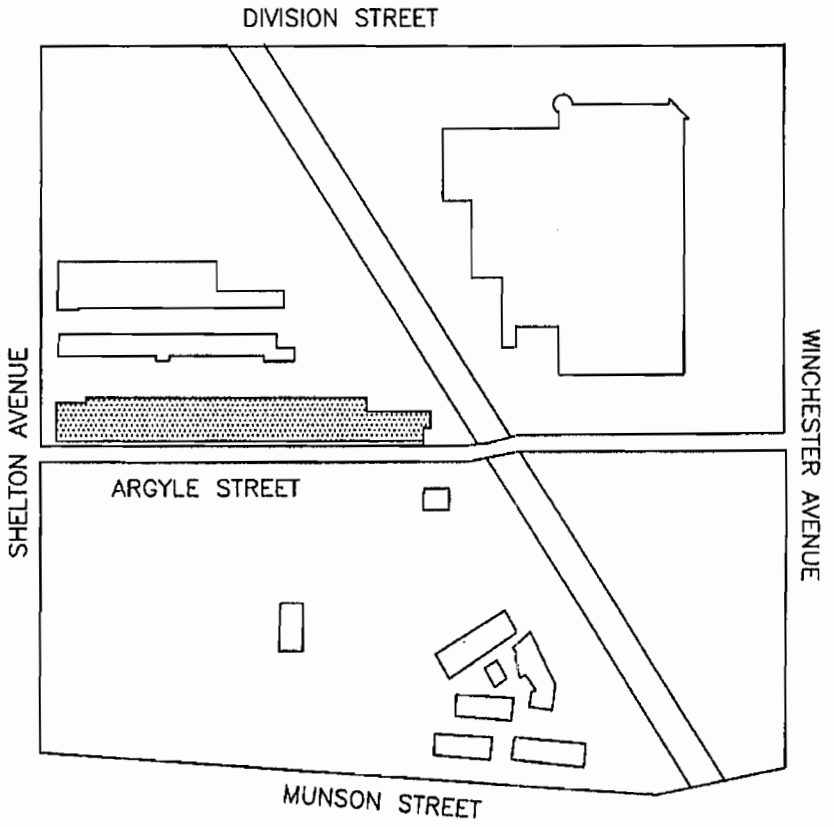


FIGURE 1: New Haven, Connecticut – Location of Science Park

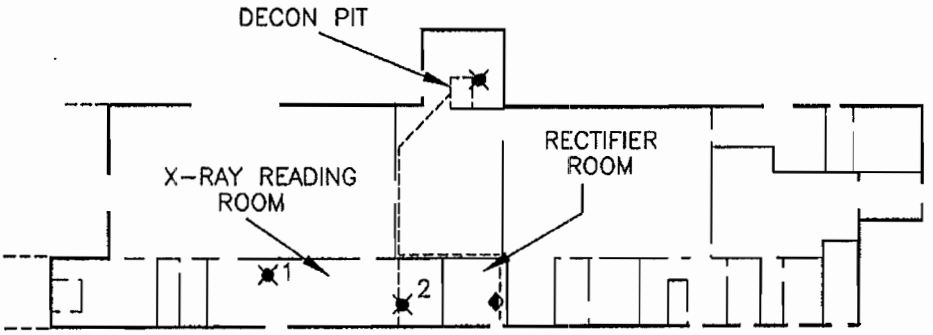


BUILDINGS 3H AND 6H

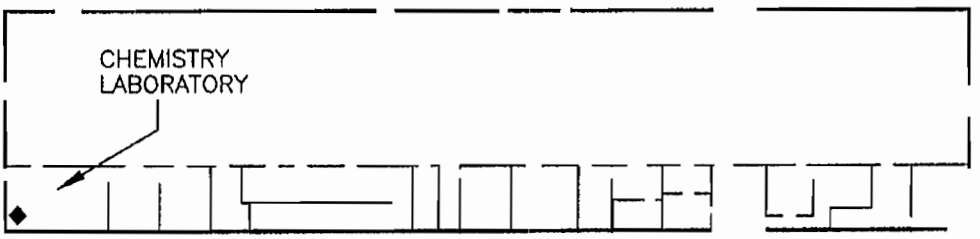
N

NOT TO SCALE

FIGURE 2: Layout of Science Park – Location of Buildings 3H and 6H



BUILDING 3H



BUILDING 6H

MEASUREMENT/SAMPLING LOCATIONS

#SUBFLOOR SOIL

RESIDUE

FORMERLY EXCAVATED TRENCH

N

NOT TO SCALE

FIGURE 3: Floor Plan of Buildings 3H and 6H – Sampling Locations

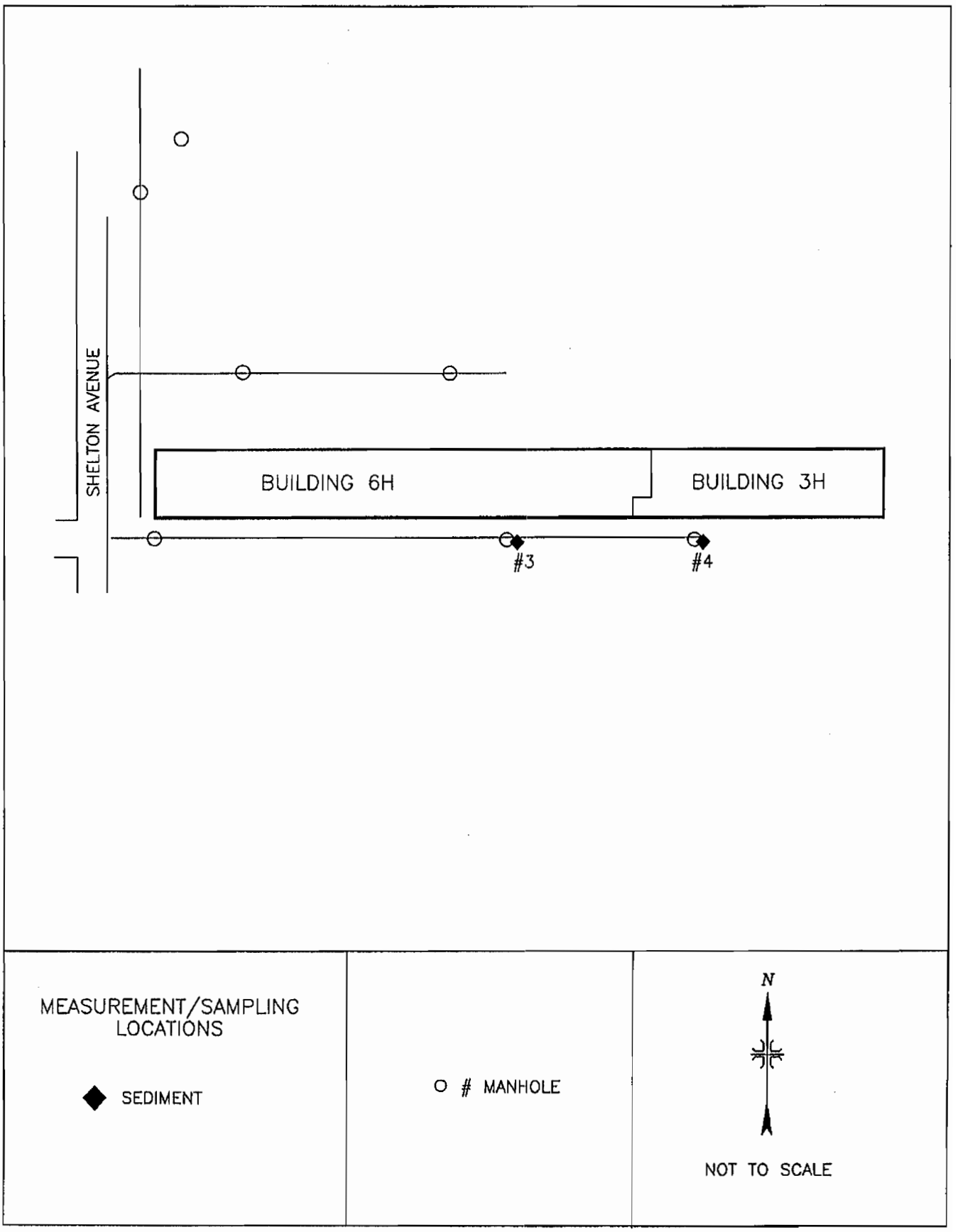


FIGURE 4: Layout of Storm/Sewer System – Sampling Locations

TABLE 1

RADIONUCLIDE CONCENTRATIONS IN SUBFLOOR SOIL SAMPLES
BUILDING 3H OF THE
FORMER UNC H-TRACT FACILITY
NEW HAVEN, CONNECTICUT

Location[a]/Depth	Radionuclide Concentration (pCi/g)				
	U-234	U-235	U-238	Total Uranium	Total Thorium[b]
Decontamination Pit					
0 - 15 cm	NA[c]	<0.2	0.7 ± 0.5[d]	<6.3[e]	2.2
X-ray Reading Room Borehole #1					
0 - 15 cm	695 ± 46[f]	25.6 ± 1.9[f]	2.5 ± 0.3[f]	723 ± 46[f]	1.0
15 - 30 cm	221 ± 15[f]	7.9 ± 0.7[f]	1.0 ± 0.2[f]	230 ± 15[f]	1.8
30 - 45 cm	NA	3.2 ± 0.3	<0.7	90[d]	1.4
X-ray Reading Room Borehole #2					
0 -15 cm	NA	0.1 ± 0.1	0.4 ± 0.3	3.2[e]	1.0

[a]Refer to Figure 3.
[b]Total thorium was calculated by adding the Th-232 and Th-228 concentrations.
[c]NA = not applicable.
[d]Uncertainties represent the 95% confidence level, based only on counting statistics.
[e]Total uranium concentrations for gamma spectrometry results were calculated based on a U-234 to U-235 activity ratio of 27 (based on alpha spectrometry results).
[f]Uranium results from alpha spectrometry analysis.

TABLE 2

RADIONUCLIDE CONCENTRATIONS IN MISCELLANEOUS SAMPLES FROM THE FORMER UNC H-TRACT FACILITY NEW HAVEN, CONNECTICUT

Location[a]	Radionuclide Concentration (pCi/g)				
	U-234	U-235	U-238	Total Uranium	Total Thorium[b]
Building 3H					
Rectifier Room Trench	NA[c]	1.3 ± 0.2[d]	<0.7	37[e]	1.6
Building 6H					
Chemistry Lab Trench	54.2 ± 3.9[f]	2.1 ± 0.2[f]	1.0 ± 0.2[f]	57.3 ± 3.9[f]	1.0
Storm/Sewer System					
Manhole #3	203 ± 15[f]	7.7 ± 0.8[f]	7.7 ± 0.7[f]	217 ± 15[f]	2.2
Manhole #4	NA	0.1 ± 0.1	0.2 ± 0.4	3.0[e]	<0.7

[a]Refer to Figures 3 and 4.
[b]Total thorium calculated by adding the Th-232 and Th-228 concentrations.
[c]NA = not applicable.
[d]Uncertainties represent the 95% confidence level, based only on counting statistics.
[e]Total uranium concentrations for gamma spectrometry results were calculated based on a U-234 to U-235 activity ratio of 27 (based on alpha spectrometry results).
[f]Uranium results from alpha spectrometry analysis.

REFERENCES

Oak Ridge Institute for Science and Education (ORISE). Confirmatory Survey of Building B-South Roof, Building L Support Areas, Pumphouse South and Septic Tank, and the Unaffected Outdoor Areas, UNC Naval Products, Montville, Connecticut. Oak Ridge, Tennessee; December 1993.

Oak Ridge Institute for Science and Education. Survey Procedures Manual for the Environmental and Health Sciences Division, Environmental Survey and Site Assessment Program, Revision 9. Oak Ridge, Tennessee; April 30, 1995a.

Oak Ridge Institute for Science and Education. Quality Assurance Manual for the Environmental and Health Sciences Division, Environmental Survey and Site Assessment Program, Revision 9. Oak Ridge, Tennessee; January 31, 1995b.

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Oak Ridge Institute for Science and Education. Scoping Survey Plan for the Former UNC Facility Buildings 3H and 6H, New Haven, Connecticut (Docket No. 70-371; RFTA No. 96-37). Oak Ridge, Tennessee; September 10, 1996.

United Nuclear Corporation (UNC). Final Survey Report after Decontamination. United Nuclear Corporation Naval Products Division H-Tract Facility. New Haven, Connecticut; February 1976.

U.S. Nuclear Regulatory Commission (NRC). Inspection No. 070-00371/96-01. July 26, 1996.

APPENDIX A

MAJOR INSTRUMENTATION

APPENDIX A

MAJOR INSTRUMENTATION

The display of a specific product is not to be construed as an endorsement of the product or its manufacturer by the author or his employers.

DIRECT RADIATION MEASUREMENT

Instruments

Eberline Pulse Ratemeter
Model PRM-6
(Eberline, Santa Fe, NM)

Ludlum Ratemeter-Scaler
Model 2221
(Ludlum Measurements, Inc.,
Sweetwater, TX)

Detectors

Eberline GM Detector
Model HP-260
Effective Area, 20 cm^2
(Eberline, Santa Fe, NM)

Victoreen NaI Scintillation Detector
Model 489-55
3.2 cm x 3.8 cm Crystal
(Victoreen, Cleveland, OH)

LABORATORY ANALYTICAL INSTRUMENTATION

Alpha Spectrometry System
Tennelec Electronics Model
(Tennelec, Oak Ridge, TN)
Used in conjunction with:
Surface Barrier and Ion Implanted Alpha Detectors
(EG&G ORTEC, Oak Ridge, TN) and
Multichannel Analyzer
3100 Vax Workstation
(Canberra, Meriden, CT)

High Purity Extended Range Intrinsic Detectors
Model No: ERVDS30-25195
(Tennelec, Oak Ridge, TN)
Used in conjunction with:
Lead Shield Model G-11
(Nuclear Lead, Oak Ridge, TN) and
Multichannel Analyzer
3100 Vax Workstation
(Canberra, Meriden, CT)

APPENDIX B

SURVEY AND ANALYTICAL PROCEDURES

APPENDIX B

SURVEY AND ANALYTICAL PROCEDURES

SURVEY PROCEDURES

Surface Scans

Surface scans were performed by passing the detectors slowly over the surface; the distance between the detector and the surface was maintained at a minimum—nominally about 1 cm. Identification of elevated levels was based on increases in the audible signal from the recording and/or indicating instrument. Combinations of detectors and instruments used for the scans were:

Beta - GM detector with ratemeter-scaler

Gamma - NaI scintillation detector with ratemeter

Soil, Sediment, and Residue Samples

Approximately 1 kg of material was collected at each sample location. Collected samples were placed in a plastic bag, sealed, and labeled in accordance with ESSAP survey procedures.

ANALYTICAL PROCEDURES

Miscellaneous Samples

Samples of soil, sediment, and residue were dried, mixed, crushed, and/or homogenized as necessary, and a portion sealed in 0.5-liter Marinelli beaker or other appropriate container. The quantity placed in the beaker was chosen to reproduce the calibrated counting geometry. Net material weights were determined and the samples counted using intrinsic germanium detectors coupled to a pulse height analyzer system. Background and Compton stripping, peak search, peak identification, and concentration calculations were performed using the computer capabilities inherent in the analyzer system.

All photopeaks associated with the radionuclides of concern were reviewed for consistency of activity. Energy peaks used for determining the activities of radionuclides of concern were:

Th-228	0.238 MeV from Pb-212*
Th-232	0.911 MeV from Ac-228*
U-235	0.144 MeV
U-238	0.063 MeV from Th-234*

*Secular equilibrium assumed.

Spectra were also reviewed for other identifiable photopeaks.

ALPHA SPECTROMETRY

Solid Samples

Solid, soil, sludge and miscellaneous samples (debris, residues, tile, etc.) were crushed, homogenized and analyzed for isotopic uranium. Samples were dissolved by potassium fluoride and pyrosulfate fusion and the elements of interest were precipitated with barium sulfate. Barium sulfate precipitate was redissolved and the specific elements of interest were individually separated by liquid-liquid extraction and re-precipitated with a cerium fluoride carrier. The precipitate was then counted using surface barrier and ion implanted detectors (ORTEC), alpha spectrometers (Tennelec and Canberra), and a multichannel analyzer (Nuclear Data).

UNCERTAINTIES AND DETECTION LIMIT

The uncertainties associated with the analytical data presented in the tables of this report represent the 95% confidence level for that data. These uncertainties were calculated based on both the gross sample count levels and the associated background count levels. Additional uncertainties, associated with sampling and measurement procedures, have not been propagated into the data presented in this report.

Detection limits, referred to as minimum detectable concentration (MDC), were based on 2.71 plus 4.65 times the standard deviation of the background count [$2.71 + (4.65\sqrt{BKG})$]. When the activity was determined to be less than the MDC of the measurement procedure, the result was reported as less than MDC. Because of variations in background levels, measurement efficiencies, and contributions from other radionuclides in samples, the detection limits differ from sample to sample and instrument to instrument.

CALIBRATION AND QUALITY ASSURANCE

Calibration of all field and laboratory instrumentation was based on standards/sources, traceable to NIST, when such standards/sources were available. In cases where they were not available, standards of an industry recognized organization were used.

Analytical and field survey activities were conducted in accordance with procedures from the following documents of the Environmental Survey and Site Assessment Program:

- Survey Procedures Manual, Revision 9 (April 1995)
- Laboratory Procedures Manual, Revision 9 (January 1995)
- Quality Assurance Manual, Revision 7 (January 1995)

The procedures contained in these manuals were developed to meet the requirements of DOE Order 5700.6C and ASME NQA-1 for Quality Assurance and contain measures to assess processes during their performance.

Quality control procedures include:

- Daily instrument background and check-source measurements to confirm that equipment operation is within acceptable statistical fluctuations.
- Participation in EPA and EML Laboratory Quality Assurance Programs.
- Training and certification of all individuals performing procedures.
- Periodic internal and external audits.

APPENDIX C

GUIDELINES FOR RESIDUAL CONCENTRATIONS OF THORIUM AND URANIUM WASTES IN SOIL

APPENDIX C

GUIDELINES FOR RESIDUAL CONCENTRATIONS OF THORIUM AND URANIUM WASTES IN SOIL

On October 23, 1981, the Nuclear Regulatory Commission published in the Federal Register a notice of Branch Technical Position on "Disposal or Onsite Storage of Thorium and Uranium Wastes from Past Operations." This document establishes guidelines for concentrations of uranium and thorium in soil, that will limit maximum radiation received by the public under various conditions of future land usage. These concentrations are as follows:

Material	Maximum Concentrations (pCi/g) above background for various options			
	1[a]	2[b]	3[c]	4[d]
Natural Thorium (Th-232 + Th-228) with daughters present and in equilibrium	10	50	---	500
Natural Uranium (U-238 + U-234) with daughters present and in equilibrium	10	--	40	200
Depleted Uranium:				
Soluble	35	100	---	1,000
Insoluble	35	300	---	3,000
Enriched Uranium:				
Soluble	30	100	---	1,000
Insoluble	30	250	---	2,500

[a]Based on EPA cleanup standards which limit radiation to 1 mrad/yr to lung and 3 mrad/yr to bone from ingestion and inhalation and 10 μR/h above background from direct external exposure.
[b]Based on limiting individual dose to 170 mrem/yr.
[c]Based on limiting equivalent exposure to 0.02 working level or less.
[d]Based on limiting individual dose to 500 mrem/yr and in case of natural uranium, limiting exposure to 0.02 working level or less.