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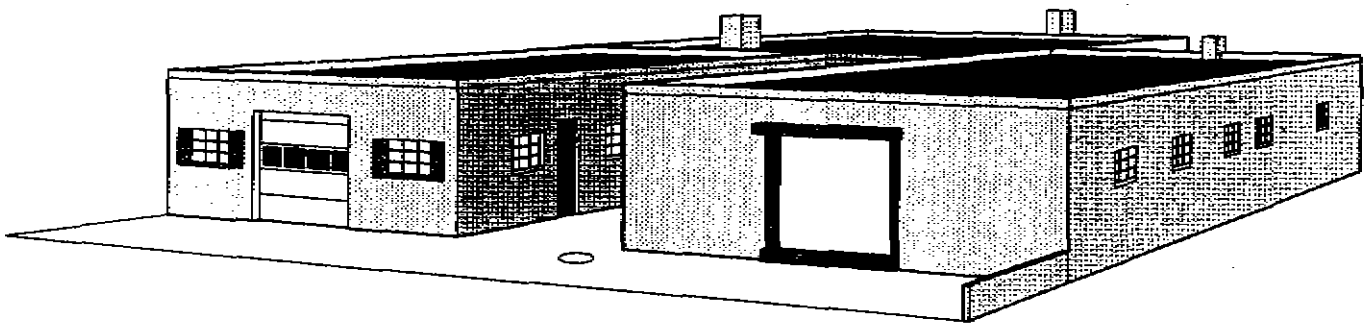
DOE/OR/21949-387

Formerly Utilized Sites Remedial Action Program (FUSRAP)
Contract No. DE-AC05-91OR21949

Post-Remedial Action Report for the Alba Craft Site and Vicinity Properties

Oxford , Ohio



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POST-REMEDIAL ACTION REPORT

FOR THE

ALBA CRAFT SITE AND VICINITY PROPERTIES

OXFORD, OHIO

AUGUST 1995

Prepared for

United States Department of Energy

Oak Ridge Operations Office

Under Contract No. DE-AC05-91OR21949

By

Bechtel National, Inc.

Oak Ridge, Tennessee

Bechtel Job No. 14501

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ACRONYMS

AEC	U.S. Atomic Energy Commission
ALARA	as low as reasonably achievable
BNI	Bechtel National, Inc.
DAC	derived air concentration
DCG	derived concentration guide
DOE	U.S. Department of Energy
FUSRAP	Formerly Utilized Sites Remedial Action Program
HEPA	high-efficiency particulate air
HSP	health and safety plan
IVC	independent verification contractor
MED	Manhattan Engineer District
NLO	National Lead of Ohio
ORNL	Oak Ridge National Laboratory
PIC	pressurized ionization chamber
PPE	personal protective equipment
TMA	ThermoAnalytical, Inc.

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UNITS OF MEASURE

cm	centimeter
cpm	counts per minute
dpm	disintegrations per minute
ft	foot
g	gram
h	hour
in.	inch
L	liter
m	meter
μCi	microcurie
μR	microroentgen
ml	milliliter
mR	milliroentgen
mrad	millirad
mrem	millirem
pCi	picocurie
yd	yard
yr	year

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1.0 INTRODUCTION

1.1 BACKGROUND

This report documents the remedial action conducted at the former Alba Craft Laboratory site in Oxford, Ohio, from August 1994 through January 1995 (Figure 1-1). This cleanup was conducted under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (DOE 1994a) and its implementing regulations, the National Contingency Plan (40 CFR 300, Section 300.145).

Remedial activities at the Alba Craft site were performed as part of the U.S. Department of Energy (DOE) Formerly Utilized Sites Remedial Action Program (FUSRAP) in accordance with DOE protocols and procedures for implementing remedial actions. FUSRAP was established to identify and clean up or otherwise control sites where residual radioactive material (exceeding current DOE health-based guidelines) remains from the early years of the nation's atomic energy program or from commercial operations causing conditions that Congress has authorized DOE to remedy. The Alba Craft site was a non-DOE-owned FUSRAP site.

The objectives of FUSRAP, as they apply to the Alba Craft site, are to

- identify and evaluate sites used to support former Manhattan Engineer District (MED) and Atomic Energy Commission (AEC) nuclear development activities;
- remove or otherwise control contamination on sites identified as contaminated above current DOE health-based guidelines;
- achieve and maintain compliance with applicable criteria for the protection of human health and the environment; and
- certify the site, to the extent possible, for use without radiological restrictions after remediation.

The primary legislation authorizing FUSRAP is the Atomic Energy Act of 1954. FUSRAP was established in 1974, and major remedial action activities began at FUSRAP sites in 1981, with Bechtel National, Inc. (BNI) as the project management contractor for DOE. Administered by the Former Sites Restoration Division of DOE's Office of Environmental Management, FUSRAP currently includes 46 sites in 14 states. ThermoAnalytical, Inc. (TMA), the radiological support subcontractor, performed laboratory

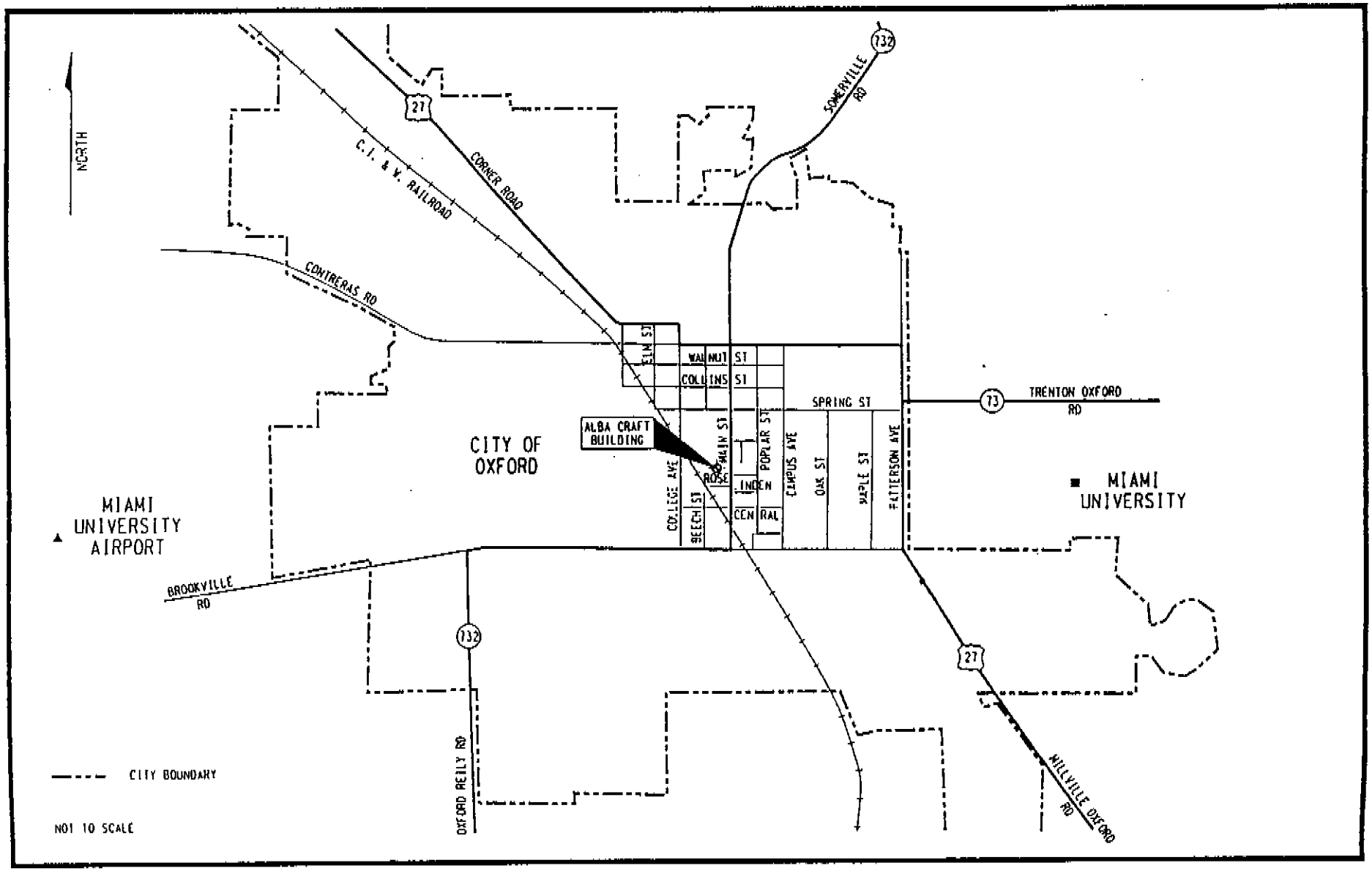

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Figure 1-1
Location of the Alba Craft Site in Oxford, Ohio

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analyses and radiological surveys for BNI during the remedial action. Oak Ridge National Laboratory (ORNL) performed designation and verification surveys at the former Alba Craft facility. Remedial action has been completed, and the area has been released for use without radiological restrictions. As the independent verification contractor (IVC), ORNL will issue a report of its post-remedial action verification survey results.

1.2 HISTORY

The former Alba Craft Laboratory site is located at 10-14 West Rose Avenue in Oxford, Ohio. Alba Craft Laboratory, Inc., performed work under a subcontract with National Lead of Ohio (NLO), a primary contractor for AEC from October 1952 to February 1957, to provide a variety of machine shop services on natural uranium metal. The uranium metal was neither enriched nor depleted but contained uranium isotopes in natural abundance. Early work included general and developmental machining of threaded fuel slugs for use in reactors at the Savannah River site. Subsequent operations were on a larger scale and consisted of hollow drilling and turning of metal slugs to be used in the Savannah River and Hanford nuclear reactors. The total quantity of uranium machined by NLO was estimated to be several hundred tons (DOE 1980).

Because of the work performed on uranium metal at the Alba Craft site, the equipment, buildings, and grounds of the laboratory and isolated areas of some of the nearby properties became contaminated with low levels of radioactivity. After the MED/AEC activities ended, the site was decontaminated in accordance with regulations in effect at that time. The site was decontaminated in January 1957 by Alba Craft personnel in accordance with specifications outlined by the NLO Industrial Hygiene Department. The equipment and floors were steam cleaned and scrubbed with wire brushes and sodium hexametaphosphate. Much of the radioactive material was reportedly swept or washed out the rear door of the building. Soil was removed from the area around the door and sent to the DOE Feed Materials Production Center in Fernald, Ohio (DOE 1994a). The health-based standards and criterion for residual radioactivity in buildings and soil have since become more restrictive for the release of such sites for use without radiological restriction.

The current owner bought and renovated the building in May 1988 and began using the building to support various business enterprises. The site was investigated during July 1992 at the request of DOE, and subsequent radiological surveys indicated that residual uranium materials exceeding current health-based standards and criterion for residual radioactive contamination were present both inside and outside the building.

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The former Alba Craft Laboratory building was composed of three cinder block structures built in sequence and joined to appear as one building (Figure 1-2). The roof consisted of metal trusses supporting wood decking with a tar-coated layer to provide waterproofing. Floors were concrete with typical crack-control and expansion joints. The west wing was built in 1952 and housed the original laboratory. The large wing to the north was added in 1955. Uranium milling operations were conducted in both the north and west wings of the building from 1955 to 1957. The east wing was completed in 1956 and was connected to the west wing by a small corridor. Uranium machining operations were then moved into the east wing as well. Because of the poor condition of the building and the presence of radioactive materials throughout the building, a decision was made to demolish the structure during remedial action and remove all building debris and radioactively contaminated soil from the site. These materials were packaged and shipped for disposal as low-level radioactive waste.

Exterior areas with radioactive material above DOE site-specific health-based guidelines included the Alba Craft property, an adjacent lot to the west, and vicinity properties at 525 South Main Street, 9 West Rose Avenue, portions of the sewer drain at 550 South Main Street, and portions of West Rose Avenue in the immediate vicinity of the Alba Craft site.

The property at 525 South Main Street was the only vicinity property found to have interior radioactive contamination. The former owner of the Alba Craft Laboratory resided at this location during the time MED/AEC activities were conducted at the laboratory. Some of the contamination is believed to have been carried to the residence on the owner's shoes and clothing; however, most of the contamination is believed to be the result of developmental machining conducted by the owner in the garage of the residence. Based on the results of investigations performed at other vicinity properties and the properties of former Alba Craft employees, it was concluded that no further investigation or cleanup was warranted on these properties.

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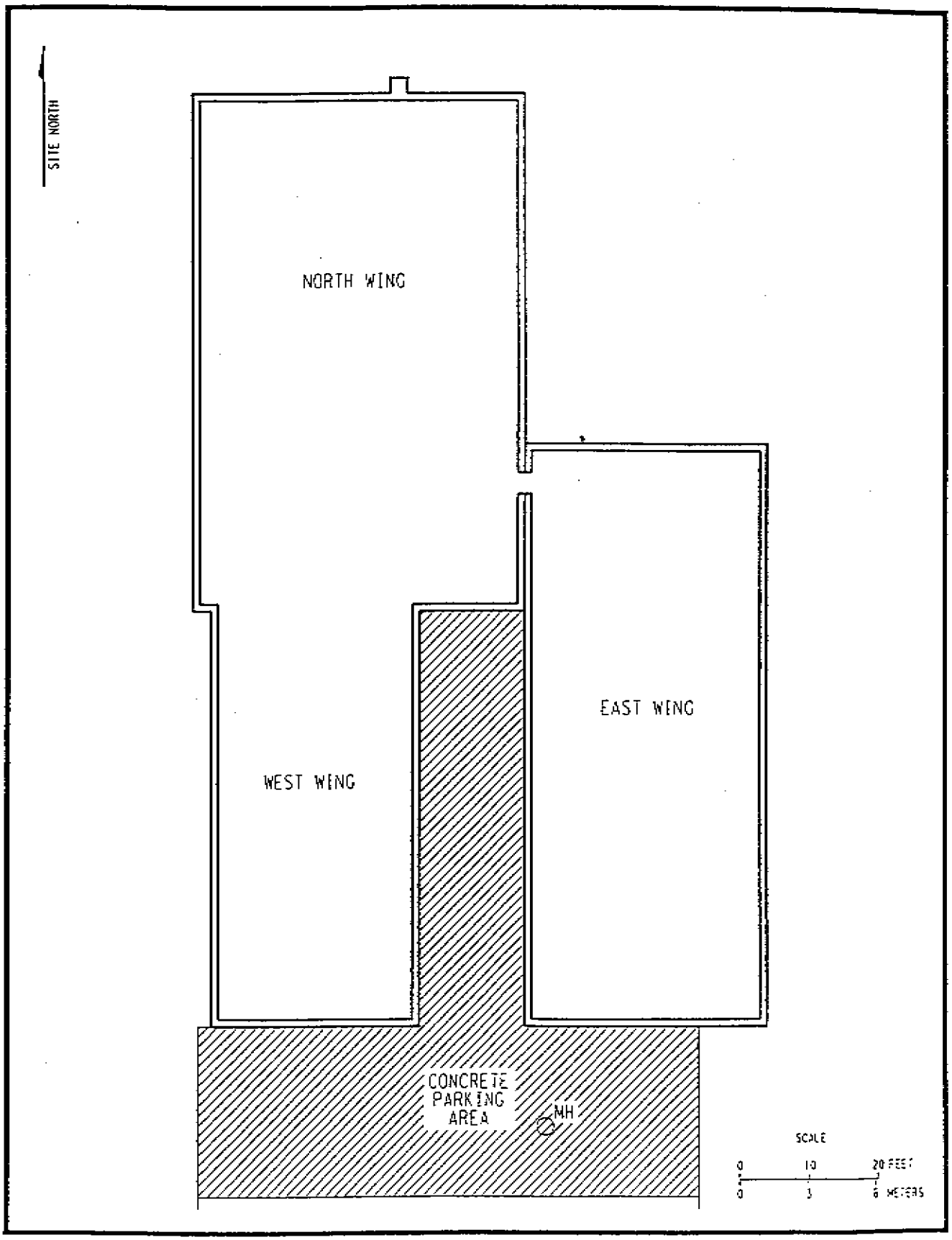

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Figure 1-2
Former Alba Craft Laboratory Building

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2.0 REMEDIAL ACTION GUIDELINES

The source of contamination on the designated properties was natural uranium metal milling operations in the Alba Craft building. Contamination in and around the building resulted from the migration of fine uranium metal dust and filings by such mechanisms as disposal (sweeping or washing through doorways, dumping), tracking out on shoes and clothing, and washing through drain lines and the storm sewer.

Health-based standards and criterion governing the release of properties for future use are included in DOE Order 5400.5, "Radiation Protection of the Public and the Environment," and are summarized in Table 2-1. The remedial action health-based guidelines for alpha activity due to natural uranium, uranium-235, uranium-238, and associated decay products on indoor and outdoor structural surfaces are

- 5,000 disintegrations per minute per 100 square centimeters (dpm/100 cm^2) averaged over the entire surface area,
- 15,000 dpm/100 cm^2 (maximum), and
- 1,000 dpm/100 cm^2 (removable).

The site-specific criterion for residual radioactive material in soil is 35 picocuries per gram (pCi/g) of soil for total uranium averaged over the remediated area, based on applying the as-low-as-reasonably achievable (ALARA) principle to the site-specific guidance derived by Argonne National Laboratory (DOE 1994b). The site-specific criterion of 35 pCi/g could result in an exposure of approximately 2 millirem per year (mrem/yr) to the public, an insignificant amount in comparison with the 100 mrem/yr guideline. Because only trace concentrations of radium and thorium exist in uranium metal after it is processed, concentrations of these two radionuclides in characterization samples were extremely low.

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Table 2-1
Summary of DOE Guidelines for Residual Radioactive Contamination

Basic Dose Limits

The basic limit for the annual radiation dose (excluding radon) received by an individual member of the general public is 100 mrem/yr. In implementing this limit, DOE applies ALARA principles to establish the site-specific guidelines.

Site-Specific Soil Guidelines

The site-specific criterion for soil is 35 pCi/g for total uranium (DOE 1994b).

Indoor/Outdoor Structure Surface Contamination

Listed below are the residual contamination guidelines for fixed and transferable radioactive contamination (dpm/100 cm^2):

Radionuclide	Average	Maximum	Removable
U-Natural, U-235, U-238, and associated decay products	5,000 (alpha)	15,000 (alpha)	1,000 alpha
Beta/gamma emitters (radionuclides with decay modes other than alpha emissions)	5,000 (beta/gamma)	15,000 (beta/gamma)	1,000 (beta/gamma)

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3.0 REMEDIAL ACTION

3.1 REMEDIAL ACTIVITIES AT THE ALBA CRAFT SITE

Immediately before remedial action began, the site was surveyed to more accurately define the boundaries of radioactive contamination, supplement existing characterization information, and obtain the information necessary to classify the waste expected to be generated during remediation. No hazardous materials, other than trace radioactivity, were found at the site. Figure 3-1 shows the Alba Craft building before remedial action began.

Approximately 2,141 m^3 (2,800 yd^3) of low-level radioactive waste was generated during the demolition and excavation of the former Alba Craft facility and remediation of the vicinity properties. Figure 3-2 shows the areas that were excavated during remedial action. To facilitate packaging and disposal of the waste, cinder block and concrete rubble from demolition of the Alba Craft building was processed into a soil-like consistency using a commercial rock-crushing unit (Figure 3-3). This material, along with other building debris and excavated soil, was packaged in intermodal containers (Figure 3-4) and shipped to the Envirocare of Utah disposal facility in Clive, Utah. No excavated soil or crushed debris was used as backfill material on any property at the Alba Craft site. Figures 3-5 through 3-9 show remedial action under way at the site; Figure 3-10 shows the site after remedial action was completed.

3.1.1 Alba Craft Facility

The main building was vacant when remedial action began. Incidental manufacturing rubbish and debris in the building were surveyed and released as nonradioactively contaminated materials. To reduce the overall exposure of the labor force and to minimize the potential for offsite releases during demolition of the building and operation of the rock crusher, the interior of the building was surveyed to identify any "hot spots" on the overheads, floors, and walls; these areas were remediated before the building was demolished. Table 3-1 summarizes the decontamination techniques used at the Alba Craft site and vicinity properties. Other controls for minimizing potential exposure to the work force and the general public are discussed in Section 3.2.

The west wing of the building was demolished first, followed by the east wing, and the north wing (see Figure 1-2). The roof and walls of each room were dismantled before work began in the next room. After the roof and walls were removed, the concrete floor and foundation were excavated. The underlying and surrounding soil was excavated as necessary to remove any remaining radioactive material found beneath or around the building foundation.

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Figure 3-1
Former Alba Craft Laboratory Site Before Remedial Action

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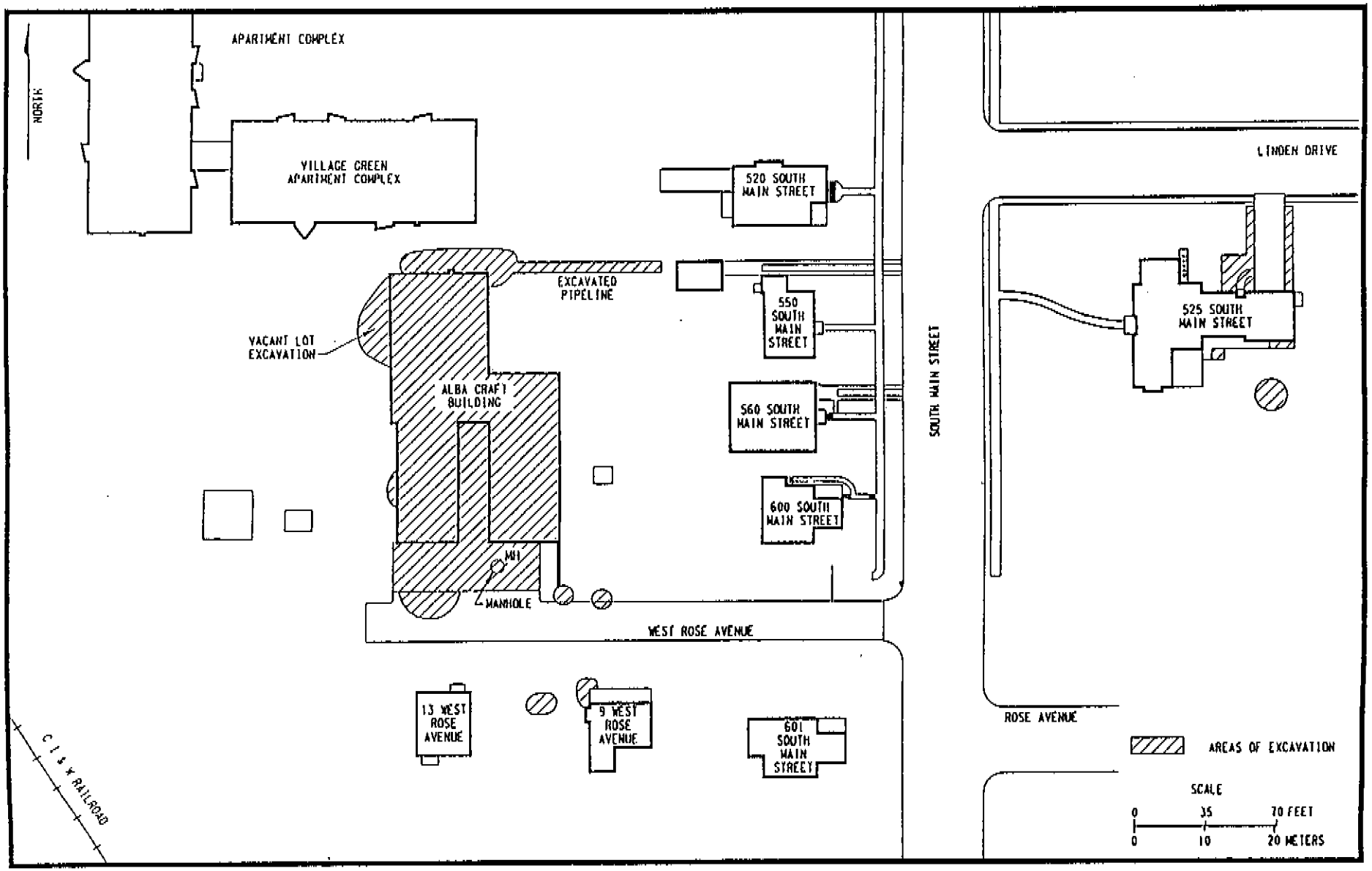

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Figure 3-2
Areas of Excavation at the Alba Craft Laboratory and Vicinity Properties

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Figure 3-3
Commercial Rock Crusher Used to Reduce Size of Building Rubble

Figure 3-4
Intermodal Container Used to Transport Waste to Disposal Facility

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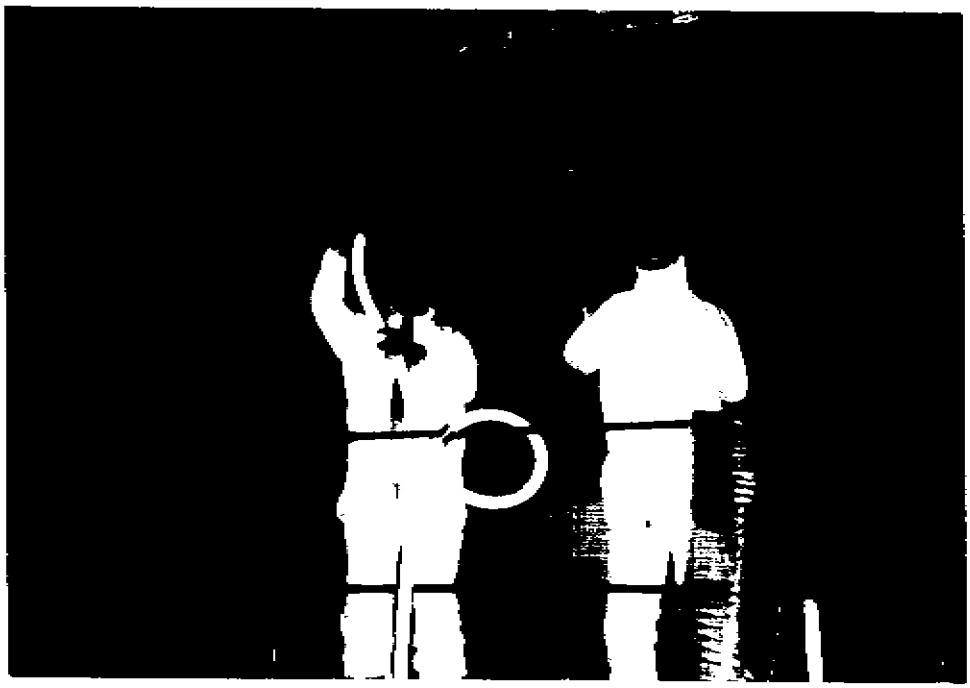

Figure 3-5
Decontamination of Building Overheads

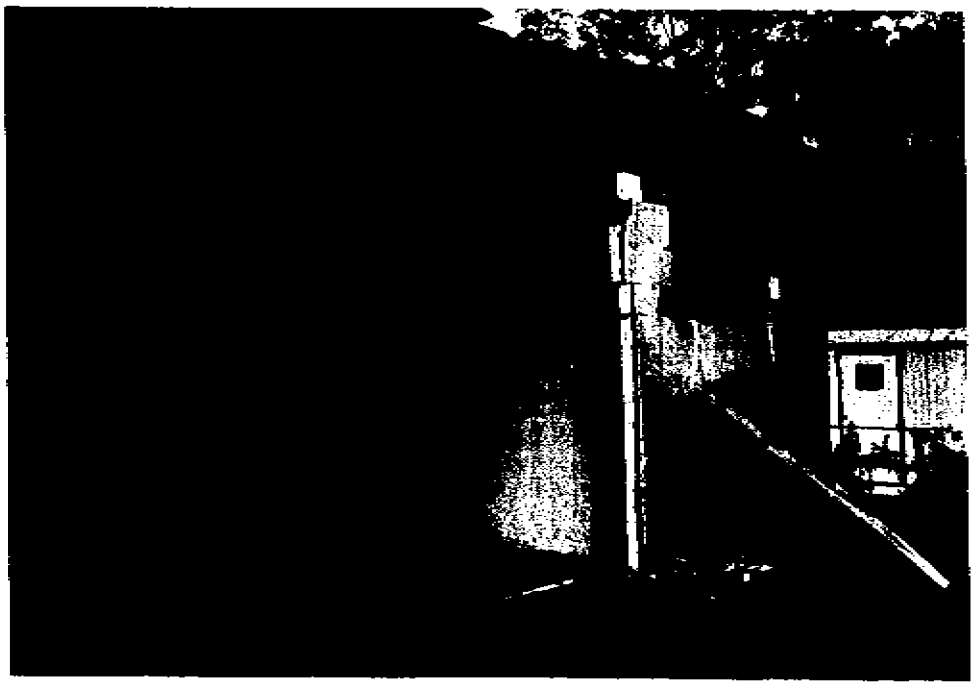

Figure 3-6
Water Mist to Control Dust During Building Demolition

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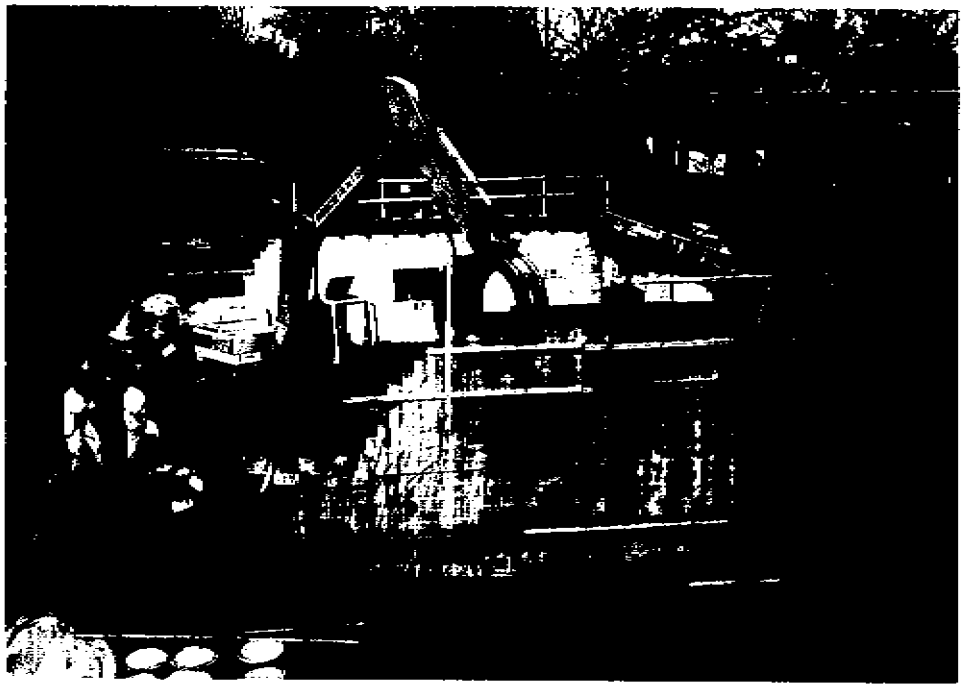

Figure 3-7
Demolition of North Wing of Alba Craft Building

Figure 3-8
Size Reduction of Concrete Rubble Before Placement in Rock Crusher

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Figure 3-9
Removal of the Building Footer

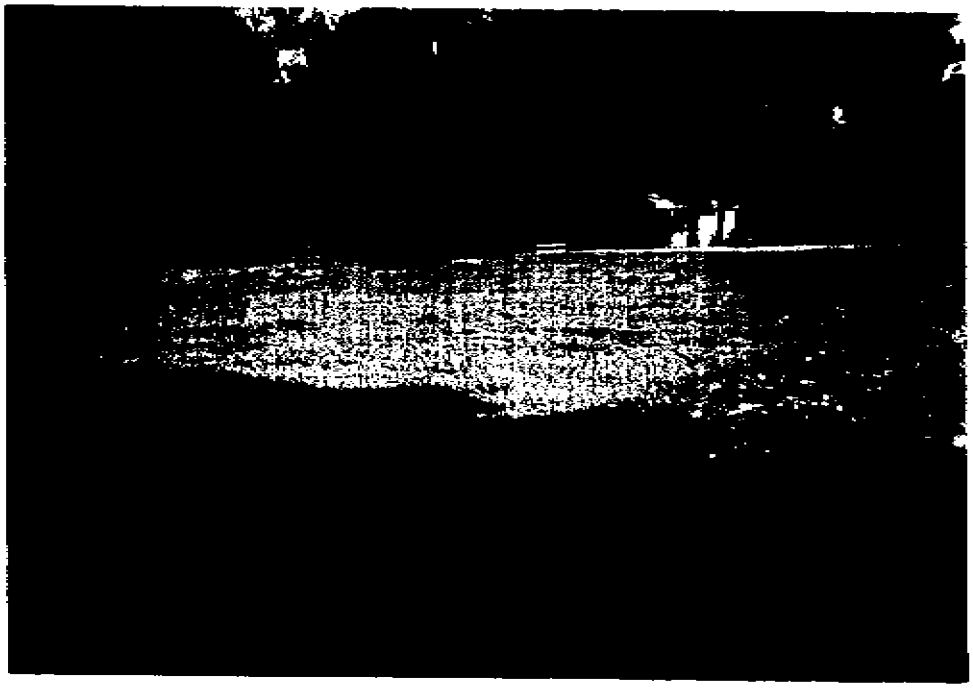

Figure 3-10
Former Alba Craft Laboratory Building Site after Remediation

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Table 3-1

Decontamination Techniques Used at the Alba Craft Site

Technique	Description
HEPA vacuuming	High-efficiency particulate air (HEPA)-filtered vacuum cleaners were used to remove loose contamination, primarily in overhead areas.
Mechanical shot blasting	Two commercially available shot-blast systems, the BlasTrak™ and VacuBlast™ decontamination systems with self-contained dust collection systems, were used to clean "hot spots" on the floor and wall surfaces by using metallic abrasive material on the work surface and removing incremental layers of contaminated material.
Cutting with a gasoline-powered circular saw	A gasoline-powered circular saw with a concrete cutting blade, vented to the exterior of the building, was used to remove sections of the foundation that had expansion joints with material that exceeded the health-based standards for residual radioactive material.
Demolition and excavation	The Alba Craft building was demolished and all material disposed of as low-level radioactive waste at the appropriate facility. The contaminated soil under the building and any detected migration, indicated by sampling, on vicinity properties was excavated and disposed of in the same manner.

3.1.2 Vicinity Property at 525 South Main Street

The property at 525 South Main Street was designated for remediation after ORNL performed a designation survey of the property in 1992. The survey confirmed that residual radioactive material exceeding current health-based standards and criterion was present inside the dwelling and on portions of the grounds.

The interior areas requiring remedial action are shown in Figure 3-11; these areas included

- the fireplace footer in the den;
- the subfloor of the den;
- the subfloors of the upstairs east bedroom, the hallway between the bedroom and the connector, and the entrances to the crawl space of the connector;
- the floor and door frame of a bathroom in the garage; and
- the entrance to the southern garage door.

These areas were decontaminated using the techniques described in Table 3-1. The interior was restored to its original condition after remedial action was completed.

The exterior areas that were excavated at the residence included flower beds in the front and rear of the house and along both sides of the driveway and a small [approximately 3.7-m^2 (40-ft^2)] area in the back yard (see Figure 3-2). All excavated areas were recontoured and reseeded after post-remedial action surveys were performed by TMA and verified by the IVC. The areas were then released for use without radiological restrictions.

3.1.3 Other Vicinity Properties

As the foundation of the Alba Craft building was excavated, a sewer drain in the northeast corner of the building was found to contain radioactive material above DOE health-based standards and criterion and was excavated, along with all contaminated soil surrounding the drain pipe (see Figure 3-2). Excavation to remove the 20-m (65-ft) length of pipe extended onto the adjacent property at 550 South Main Street.

Excavation of radioactively contaminated soil was also conducted on a small area [approximately 37.2 m^2 (400 ft^2)] of West Rose Avenue in front of the Alba Craft building and a small section [approximately 4.7 m^2 (50 ft^2)] at 9 West Rose Avenue (see Figure 3-2). Following remedial action, ORNL performed verification surveys to confirm that the

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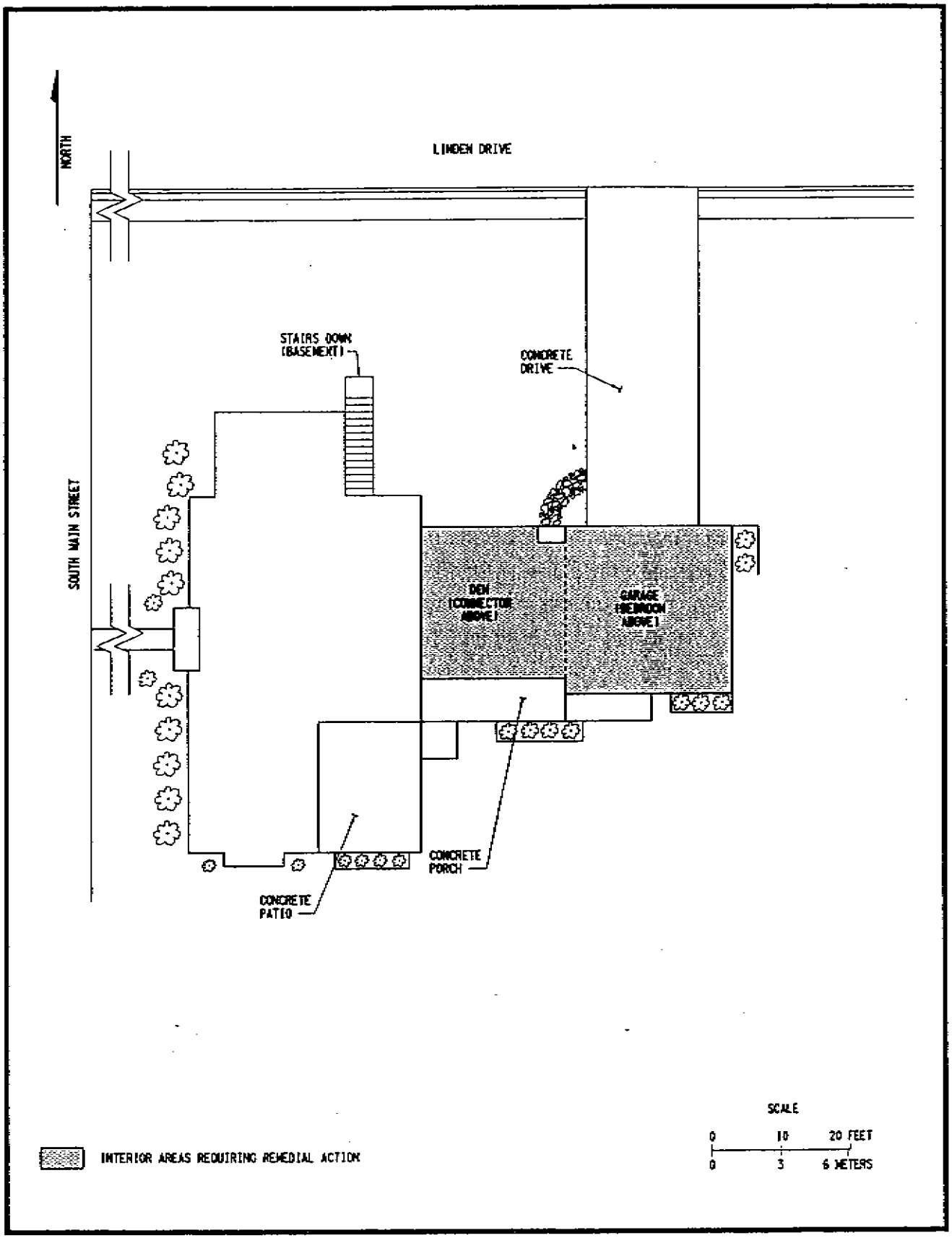

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Figure 3-11
Site Plan of the Vicinity Property at 525 South Main Street

remedial action was complete. All properties were restored to existing grade and reseeded, except for the adjacent lot to the west, which was restored to a gravel surface (Figure 3-2).

3.2 CONTAMINATION CONTROL DURING REMEDIAL ACTION

During the remedial action, engineering controls, administrative controls, and monitoring were used to protect workers and the public from potential exposure to radiation in excess of applicable standards. Workers wore personal protective equipment (PPE) to further limit exposure and to prevent the spreading of contamination. These controls are outlined in the health and safety plan (HSP) for the Alba Craft site (BNI 1994).

All personnel working in contaminated areas were required to use PPE specified in the HSP. If conditions warranted, additional protective clothing and equipment such as hoods and respirators were used. Workers exiting radioactively contaminated work areas were subjected to a scan (frisked) at the control point by a health physics technician with a hand-held radiation detection instrument to ensure that their protective clothing was not radioactively contaminated and to eliminate the potential for spreading contamination to clean areas. A frisk is a search for radioactive material that may have become attached to the clothing of individuals inside the work area. The hand-held radiation detection instrument is held approximately 5 cm (2 in.) away from the area to be frisked and moved slowly [about 5 cm (2 in.) per second] to scan the portion of the body or clothing being inspected. Contaminated PPE was packaged and shipped to the Envirocare disposal facility.

The primary potential exposure pathways for onsite personnel during remediation activities were inhalation and ingestion of radioactively contaminated dust from the mechanical decontamination of interior structural surfaces, debris size reduction operations, and excavation of the building. Work controls, procedures, PPE, monitoring, high-efficiency air particulate (HEPA) filtration units, and commercially available decontamination systems that control the spread of dust were used to protect workers from undue exposure and to minimize the potential for contaminants to become airborne.

The primary exposure pathways for exposure to radioactive material for members of the public were inhalation and ingestion of radioactively contaminated airborne dust generated during the excavation of contaminated soils and during operation of the rock-crushing unit. The potential for dust migration was minimized by maintaining adequate soil moisture with a fine mist of water during excavation and rock-crushing operations, erecting work area fences, placing waste in intermodal boxes, and by adhering to established work practices and procedures.

During remediation, particulate air monitoring devices were placed in the areas being remediated. The concentrations of uranium-238 ranged from background of 1.9×10^{-15} μCi/ml to 7.6×10^{-15} μCi/ml (1.9×10^{-6} to 7.6×10^{-6} pCi/g) to a maximum of 7.0×10^{-13} μCi/ml (7.0×10^{-4} pCi/L). These concentrations were conservatively derived by collecting air particulate samples daily from lapel air samplers worn by workers. After the gross activity per volume of air that passed through the filter was determined, the source of all activity on the filter was conservatively assumed to be uranium-238. The measured airborne concentrations were then compared with the applicable health-based guideline, the derived air concentrations (DACs). For occupational exposures to airborne uranium-238, the DAC is 2.0×10^{-11} μCi/ml (0.02 pCi/L) (DOE Order 5480.11).

Perimeter air particulate sampling was also performed adjacent to areas being remediated to ensure that no member of the general public was exposed to radioactivity above the current health-based standards and criterion (DOE Order 5400.5). These standards were established to protect members of the general public and the environment against undue risk from radiation. The limits expressed in DOE Order 5400.5 are derived concentration guides (DCGs); a DCG is the concentration of a particular radionuclide that would yield a committed effective dose equivalent of 100 mrem/yr (the DOE basic dose limit) to an individual continuously exposed to the radionuclide by one pathway for an entire year. A high-volume air sampler was used for the air particulate sampling. The filters were collected daily and counted after sufficient time was allowed for radon progeny decay. Concentrations of uranium-238 measured by area particulate air samplers ranged from background of 1.9×10^{-15} μCi/ml to 7.6×10^{-15} μCi/ml (1.9×10^{-6} to 7.6×10^{-6} pCi/g) to a maximum of 1.9×10^{-14} μCi/ml (1.9×10^{-5} pCi/L). The DCG is 2.0×10^{-12} μCi/ml (0.002 pCi/L) for uranium-238.

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4.0 POST-REMEDIAL ACTION MEASUREMENTS

Before post-remedial action data were collected, background measurements were made and samples were collected from locations that were in the general vicinity of the Alba Craft site but were not affected by operations at the facility. The approximate background sampling locations are shown in Figure 4-1. Background soil samples were analyzed for uranium-238, and external gamma radiation exposure rates were measured. These data are presented in Table 4-1.

After each portion of the site was remediated, an external gamma radiation survey was conducted to confirm that there was no residual radioactive material above the health-based standards and criterion (see Table 2-1). Measurements of direct and transferable contaminant concentrations were taken on a stormwater pipeline, a manhole cover, and the interior of one residence.

Direct surface contamination is the total amount of radioactive contamination on a surface; therefore, a survey of direct surface contamination quantifies both that portion of the contamination that is removable and that which is fixed. Transferable contamination is the removable component of the total contamination on the surface and is the contamination that could potentially rub off on clothing or skin upon contact.

To quantify direct surface contamination, radiation detection instrumentation is placed directly on the surface to measure the radioactivity emitted from a known surface area. Direct alpha radiation is measured with an alpha scintillation detector connected to a rate meter, an instrument that counts the number of radioactive disintegrations (decays) detected in a specified amount of time. Direct beta/gamma radiation measurements are obtained with a Geiger-Mueller probe attached to a rate meter. The probe is placed on the surface to be surveyed, and pulses are allowed to accumulate for one minute on the rate meter, resulting in a measurement of counts per minute (cpm) for the surface area. These measurements are then converted, with appropriate calibration and conversion factors, to disintegrations per minute per 100 square centimeters (dpm/100 cm^2), a commonly used unit of measurement in health physics.

Transferable contamination is the unattached radioactive material that can be removed from a surface when it is "swiped" or "smeared" with a soft absorbent paper. The smear is placed in a portable smear counter, and alpha and beta/gamma radiation are each counted for one minute. The resulting measurements in counts per minute are then converted to dpm/100 cm^2.

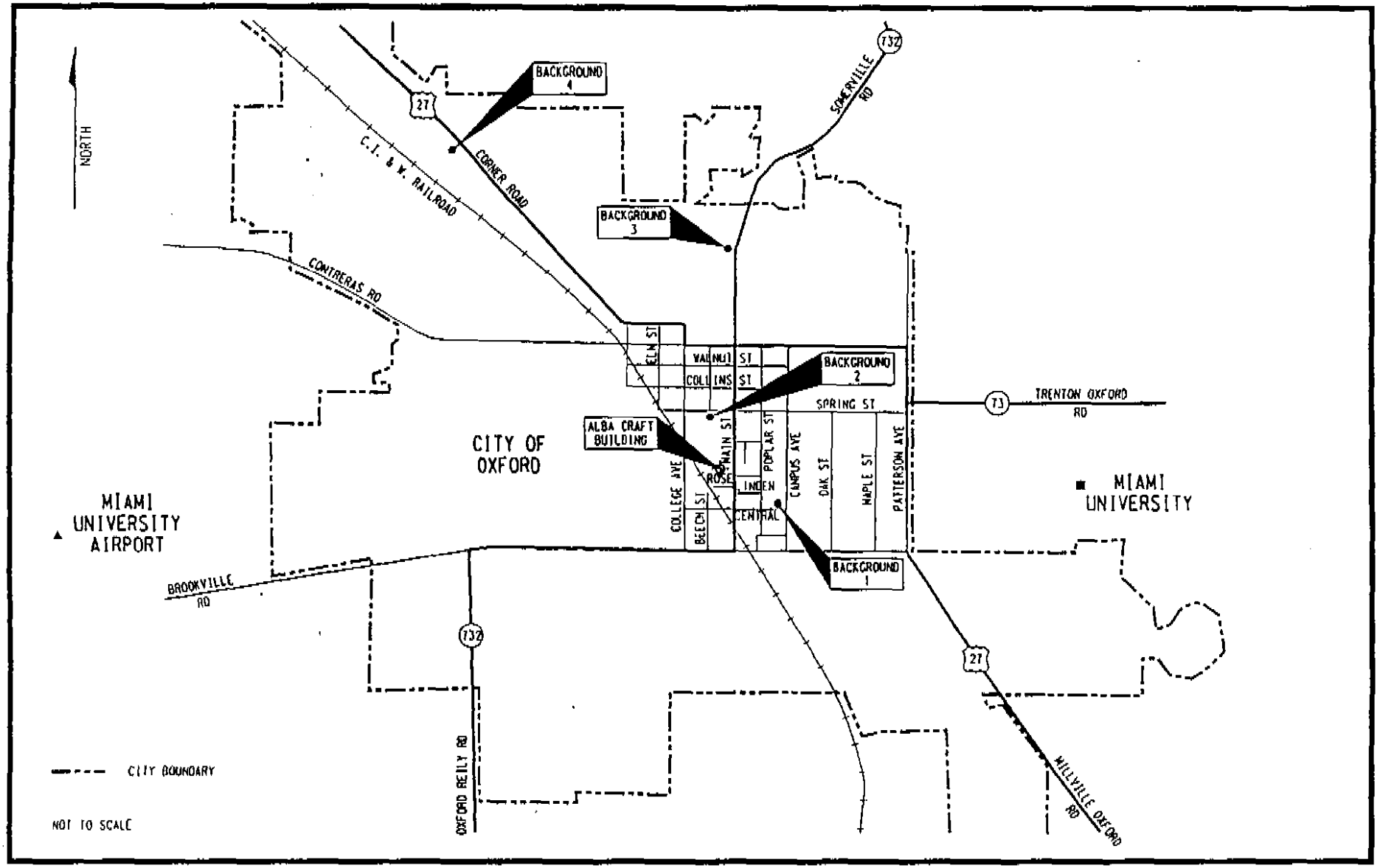

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Figure 4-1
Background Sampling and Survey Locations

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Table 4-1

Uranium-238 Concentrations and External Gamma Radiation Exposure Rates at Background Locations

Location[a]	Gamma Radiation Exposure Rate (μR/h)	Uranium-238 (pCi/g)
1. Intersection of Central St. and Campus St., 40 ft from sidewalk, toward recreation facility	9.0	<3.00
2. Stewart Elementary School, intersection of W. Spring St. and S.Beech St., baseball field, second base	8.0	<2.80
3. Field adjacent to Hamilton Ophthalmology Clinic at intersection of N. Main St. and E. Sycamore St.	---[b]	<3.00
4. Scottish Inn, Highway 27 North	9.4	---[b]
Average background radioactivity	8.8	<2.9
DOE Guidelines	---[c]	35.0

[a]Approximate background sampling locations are shown in Figure 4-1.

[b]--- indicates that no measurement/sample of this type was collected at this location.

[c]--- Less than 20 μR/h above background for habitable structures or a maximum of 100 mrem/yr from all pathways except radon.

NOTE: "<" indicates that the measurement is less than the minimum detectable activity.

A pressurized ionization chamber (PIC) was used to measure the external gamma exposure rates at a height of 1 m (3 ft). Readings collected at this elevation provide an estimate of the potential exposure from gamma radiation to the critical body organs near the ground or floor.

The soil samples from each area of the site were collected systematically by laying out a 10-m by 10-m (30-ft by 30 ft) grid over the area and labeling the coordinates. This system provides a reliable and reproducible method of sampling an area. Twenty-five samples, 2.5 cm (1 in.) in diameter by 15 cm (6 in.) deep, were collected from each 100-m^2 grid block.

Initial post-remediation surveys were conducted by the radiological support contractor. Survey techniques used during the post-remediation and verification surveys included measurements of direct and transferable surface contamination (where appropriate), walkover gamma scans, exposure rate measurements, and soil sampling. Methodologies for each of the survey techniques are described in the *Alba Craft Post-Remedial Action Survey Plan* (Appendix A). TMA, the radiological support subcontractor, analyzed the samples that were collected for BNI, and ORNL performed independent verification surveys of the remediated areas using similar survey techniques. When remedial action was completed, the property was restored to a condition satisfactory to the property owner.

4.1 ALBA CRAFT FACILITY

To confirm that no radioactive materials exceeding the health-based standards and criteria remained after remediation of the former Alba Craft Laboratory at 10-14 West Rose Avenue, radiological surveys were conducted as remedial activities were completed. These surveys included measurements of direct (nontransferable) and transferable contamination on structures remaining after remediation was complete, soil samples collected from the excavated areas, and measurements of external gamma exposure rates.

4.1.1 *Direct and Transferable Surface Contamination*

Direct and transferable beta/gamma measurements were performed on the pipeline at 550 South Main Street and on the manhole north of West Rose Avenue in the concrete parking area of the Alba Craft property. Results of these measurements indicate that the pipeline and manhole were remediated to levels below the current health-based standards and criterion. Measured values are presented in Table 4-2.

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Table 4-2

Post-Remedial Action Measurements in Drainpipe and Manhole

	Direct Beta/ Gamma Results (dpm/100 cm^2)	Transferable Beta/ Gamma Results (dpm/100 cm^2)
Distance into remaining piping:		
1 ft.	531	<12
2 ft.	398	<18
3 ft.	929	<-8
4 ft.	1,142	<-32
5 ft.	1,088	<-42
6 ft.	504	<12
7 ft.	1,035	<-61
8 ft.	717	<21
9 ft.	770	<26
10 ft.	1,115	<3
Manhole cover, edge	391	<-25
Cover, ledge	559	<-30
Concrete base	363	<-20
Concrete base	112	<-16
DOE Guidelines	5,000	1,000

NOTES: 1. "<" sign indicates that the measurement is less than the minimum detectable activity (MDA).

2. "<-" sign indicates that the measurement was less than the MDA and that after background was subtracted, the numerical value was negative (e.g., <MDA result minus >MDA background = negative result indicated by "<-").

4.1.2 External Gamma Radiation Exposure

Table 4-3 presents the results of the external gamma exposure rate survey conducted over the former Alba Craft Laboratory property where remedial action was performed. The gamma exposure rate was measured 1 m (3 ft) above the ground to provide an estimate of the potential exposure from gamma radiation to the critical body organs nearest the ground.

Measurements were taken using a PIC. Exposure rates ranged from 7.5 to 11.6 μR/h (insignificant when compared with background of 8 to 9.4 μR/h). The exposure rates were therefore well below the health-based guidelines established by DOE.

4.1.3 Soil Samples

Twenty-five soil samples were collected from each 10-m by 10-m (30-ft by 30 ft) grid at the site. These samples were composited and analyzed by gamma spectroscopy to ensure that contaminated soil had been removed to concentrations below the site-specific cleanup guideline of 35 pCi/g total uranium. Figure 4-2 shows the grid used for collecting samples at the Alba Craft property and the small areas of contamination on West Rose Avenue and 9 West Rose Avenue. Numbers shown in the grids indicate the concentrations of total uranium in post-remedial action samples, including background concentrations for the Oxford area. Table 4-3 presents details on the sampling locations and the analytical results for each sample. Only the grids where remedial action was required are included in Figure 4-2 and Table 4-3.

4.2 VICINITY PROPERTY AT 525 SOUTH MAIN STREET

To confirm that no radioactive material exceeding DOE health-based standards and criterion remained in the remediated areas of the residence at 525 South Main Street, radiological surveys were conducted as remedial activities were completed. These surveys included direct and transferable surface measurements inside the dwelling and analysis of soil samples collected from the excavated areas of the crawl space and outside the structure.

4.2.1 Survey of Direct and Transferable Surface Contamination

Post-remedial action surveys were conducted on all decontaminated surfaces inside the dwelling. Data for the post-remedial action surveys for direct surface contamination and transferable contamination are presented in Table 4-4; all survey results were well below the DOE health-based guidelines.

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Table 4-3

Alba Craft Post-Remedial Action Sampling Results

Grid	Coordinates[a]	Sample No.	Uranium-238 (pCi/g)	Total Uranium[c] (pCi/g)	Gamma Exposure Rate[c] (μR/h)
1	N43, E15	10994091	8.5	16.9	10.5
2	N43, E5	10994092	6.0	12.0	11.3
3	N35, E5	10994056	<1.7	3.4	10.6
4	N35, E15	10994057	3.4	6.8	10.3
5	N50, E15	10994029	<2.0	4.0	10.6
6	N50, E00	10994030	2.1	4.2	11.6
7	N40, E-2.5	10994043	<1.6	3.2	10.8
8	N25, E25	10994044	3.2	6.4	8.4
9	N25, E15	10994099	3.5	7.0	9.8
10	N25, E5	10994063	1.6	3.2	10.2
12	N15, E25	10994045	2.6	5.2	8.3
13	N15, E15	10994105	6.1	12.2	9.0
14	N15, E05	10994065	12.9	25.6	7.9
16	N5, E25	10994066	3.6	7.2	10.2
17	N5, E15	10994106	10.3	20.6	8.7
18	N5, E5	10994072	5.0	10.0	9.1
19	N10, E0	10994094	2.3	4.6	8.9
20	N-4.5, E27	10994078	12.9	25.8	7.5
22	N-2, E20	10994073	4.3	8.6	8.5
23	N-5, E26	10994069	3.7	7.4	10.1
24	N45, E26	10994075	2.3	4.6	8.6
27	N-4, E37	10994089	8.7	17.4	10.0
28	N-19, E27	10994079	7.0	14.0	7.5
29	N-17, E24	10994082	1.1	2.2	8.2
DOE Guidelines				35	---[b]

[a]All grid coordinates indicate the center of the grid where a composite sample was obtained.
[b]Less than 20 μR/h above background for habitable structures or 100 mrem/yr from all pathways, except radon.
[c]All results include background readings for the Oxford, Ohio, area.

NOTE: "<" indicates that the sample result is less than the minimum detectable activity.

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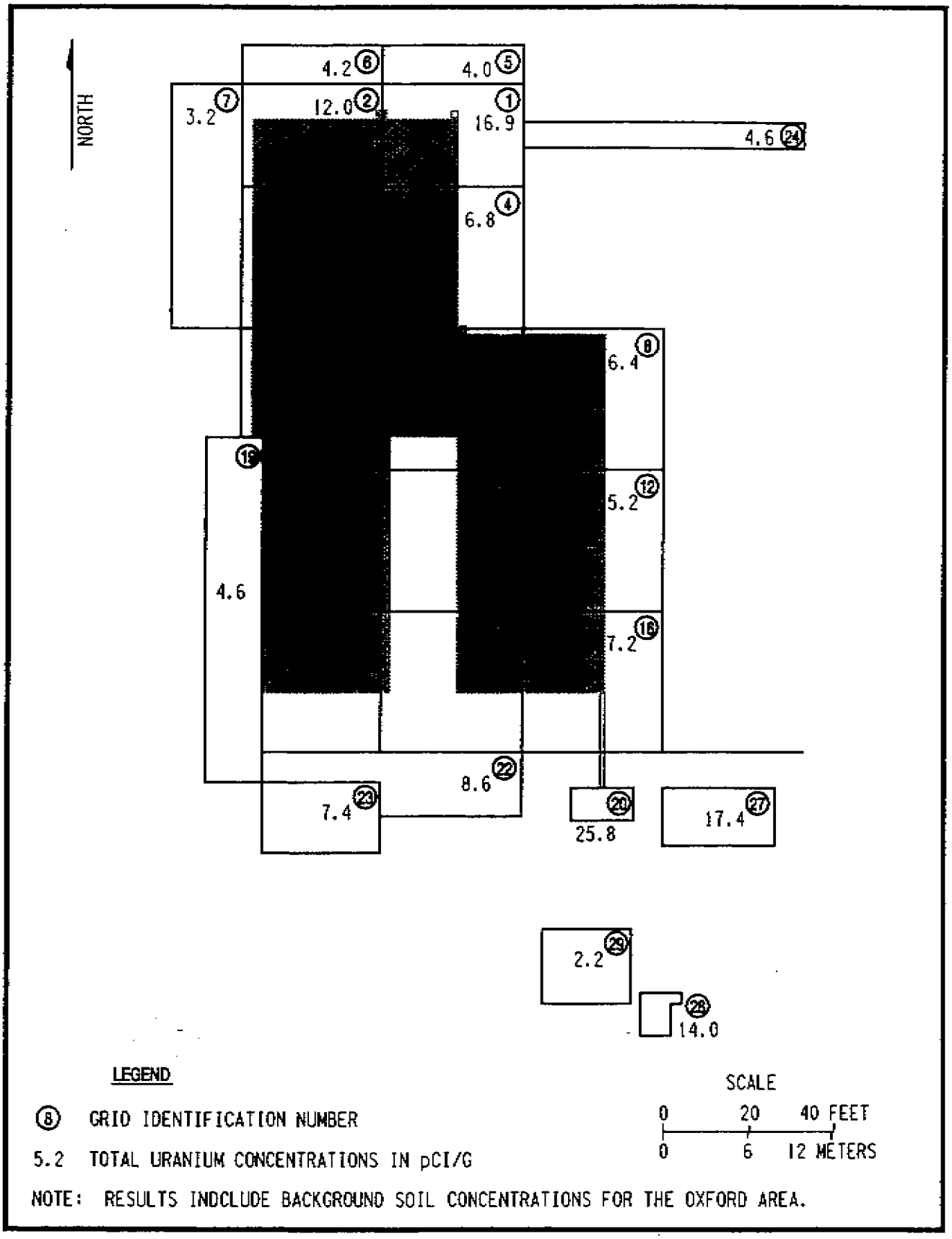

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Figure 4-2
Post-Remedial Action Soil Sampling Results at the Alba Craft Site

Table 4-4

Post-Remedial Action Radiological Survey Results for 525 South Main Street

Room/Location	Direct Surface Contamination				Transferable Contamination			
	Alpha		Beta/Gamma		Alpha		Beta/Gamma	
	Sample Activity Range (dpm/100 cm²)	Number of Measurements/ Number below Criteria[a]	Sample Activity Range (dpm/100 cm²)	Number of Measurements/ Number below Criteria[a]	Sample Activity Range (dpm/100 cm²)	Number of Measurements/ Number below Criteria[a]	Sample Activity Range (dpm/100 cm²)	Number of Measurements/ Number below Criteria[a]
Den floor[b]	<27	42/42	<243 - <503	42/42	3 - 6	42/42	<37 - <67	42/42
Fireplace footer in den[c]	32 - 219	15/15	<370 - <707	15/15	<2 - 8	15/15	<58 - <102	15/15
Floor joist in den[c]	<33 - 172	6/6	<370 - 693	6/6	<2 - 8	6/6	<58	6/6
Upstairs bedroom[b]	<16 - <31	48/48	<243 - 818	48/48	3 - 6	48/48	<37 - <67	48/48
Entrances to crawl space adjacent to connector[b]	<16	3/3	<243 - <440	3/3	3	3/3	<37 - <44	3/3
Connector entrance to hallway[b]	<16 - <31	2/2	275 - 1069	2/2	3	2/2	<37	2/2
Upstairs landing and hallway to bedroom and connector[b]	<16	8/8	<243 - <461	8/8	3 - 6	8/8	<37 - <44	8/8
Floor of garage bathroom[d]	<2 - 124	17/17	<459 - 1027	17/17	<3 - <6	17/17	<55 - <73	17/17
Door frame of garage bathroom[d]	18 - 98	2/2	<706 - 1188	2/2	<3	2/2	<55	2/2
Top of east wall of garage bathroom[d]	<2	2/2	<882 - 1059	2/2	<3	2/2	<55 - <59	2/2
Southern garage door threshold[d]	69 - 140	3/3	468 - 676	3/3	<2 - 5	3/3	<52	3/3
DOE Guideline[e]	5,000		5,000		1,000		1,000	

[a]A measurement that is below criteria is judged to be radiologically clean.
[b]Surveys performed October 26-27, 1993.
[c]Survey performed January 6, 1994.
[d]Surveys performed March 3-12, 1994.
[e]The guidelines presented are extracted from DOE Order 5400.5, "Radiation Protection of the Public and the Environment"; these values represent the average allowable surface residual contamination (over a 1-m² area).
NOTE: "<" sign indicates that the measurement is less than the minimum detectable activity.

After walkover (external gamma exposure rate) surveys were completed, survey grids with 1-m (3-ft) spacing were established over the remediated floors, and measurements to detect both alpha and beta/gamma radiation were taken at the corners and in the center of each grid square (Figures 4-3 through 4-7).

4.2.2 External Gamma Radiation Exposure Survey

Table 4-5 presents the results of the gamma radiation exposure survey conducted in each room where remedial action was performed. The gamma exposure rate 1 m (3 ft) above the floor was measured in the rooms where contaminated flooring was removed (see Figures 4-3 and 4-7). Readings taken at this height provide an estimate of the potential exposure from gamma radiation to the critical body organs nearest the ground or floor.

Measurements were collected using a PIC. All exposure rates were indistinguishable from the background exposure rate, which ranged from 8 to 9.4 μR/h (Table 4-5). The exposure rates inside the dwelling were therefore well below the DOE health-based guideline, which specifies that an exposure rate of 20 μR/h above background is the maximum acceptable average exposure rate inside a building or habitable structure.

4.2.3 Crawl Space Soil Samples

To confirm that all radioactive material above guidelines was removed from the crawl space adjacent to the basement, soil samples were collected and analyzed for uranium-238, uranium-235, and uranium-234. The sum of the concentrations of the three uranium isotopes was the total uranium concentration for a sample.

To obtain the samples, a 1-m (3-ft) grid was established in the crawl space, and samples were collected from the first 15 cm (6 in.) at 14 of the grid locations. These 14 samples were composited and analyzed as a single sample representing the average for the first 15 cm (6 in.) of the soil in the crawl space. Additionally, from 6 of those 14 locations, soil samples collected at the 15- to 30-cm (6- to 12-in.) depth were composited and analyzed as a single average sample. Sampling locations are shown in Figure 4-8.

The concentrations of total uranium in these samples were indistinguishable from background and were therefore well below the 35-pCi/g limit established for the site. The soil sampling results for the crawl space are summarized in Table 4-6.

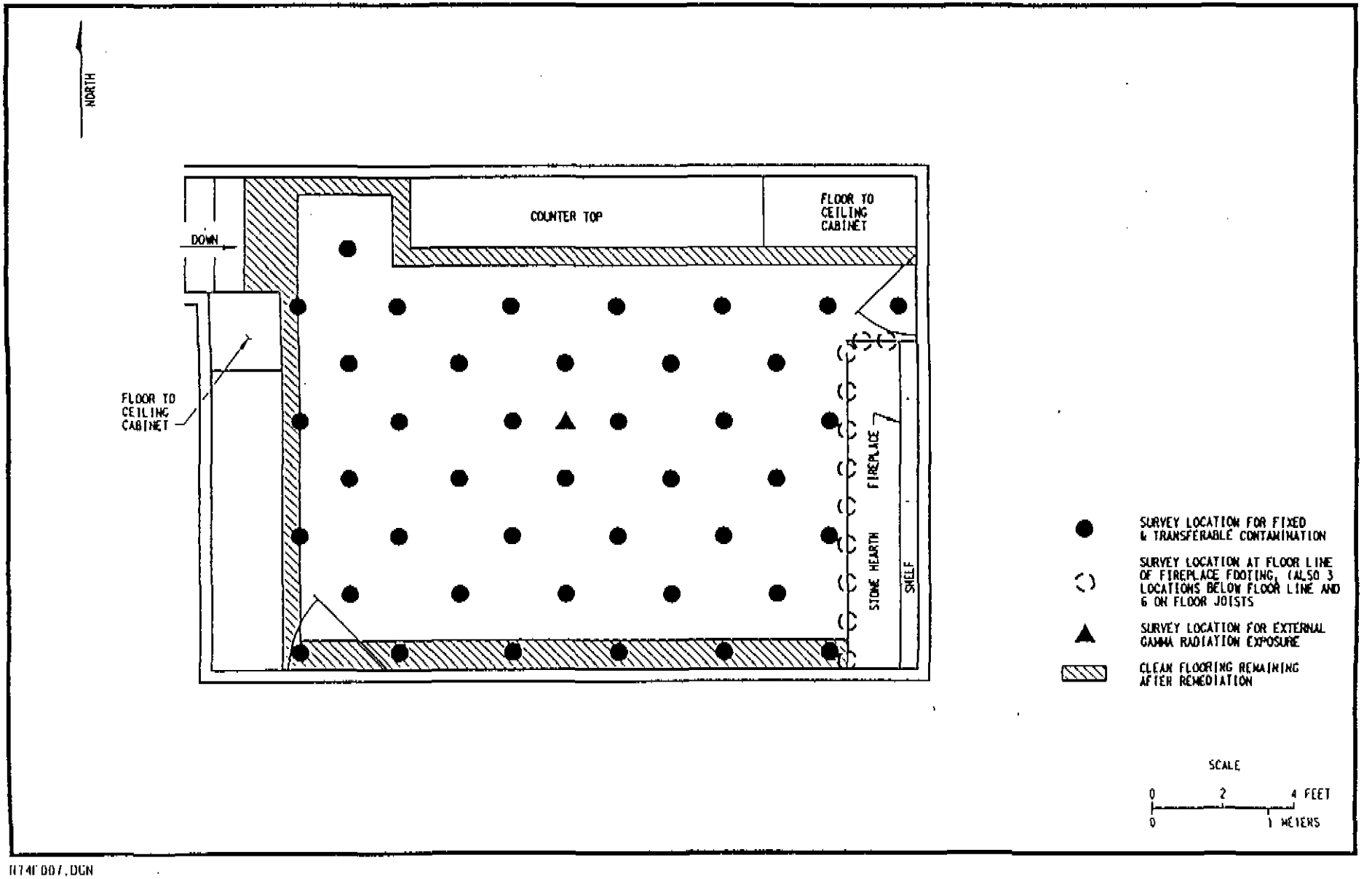

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Figure 4-3
Post-Remedial Action Survey Locations at 525 South Main Street - Downstairs Den

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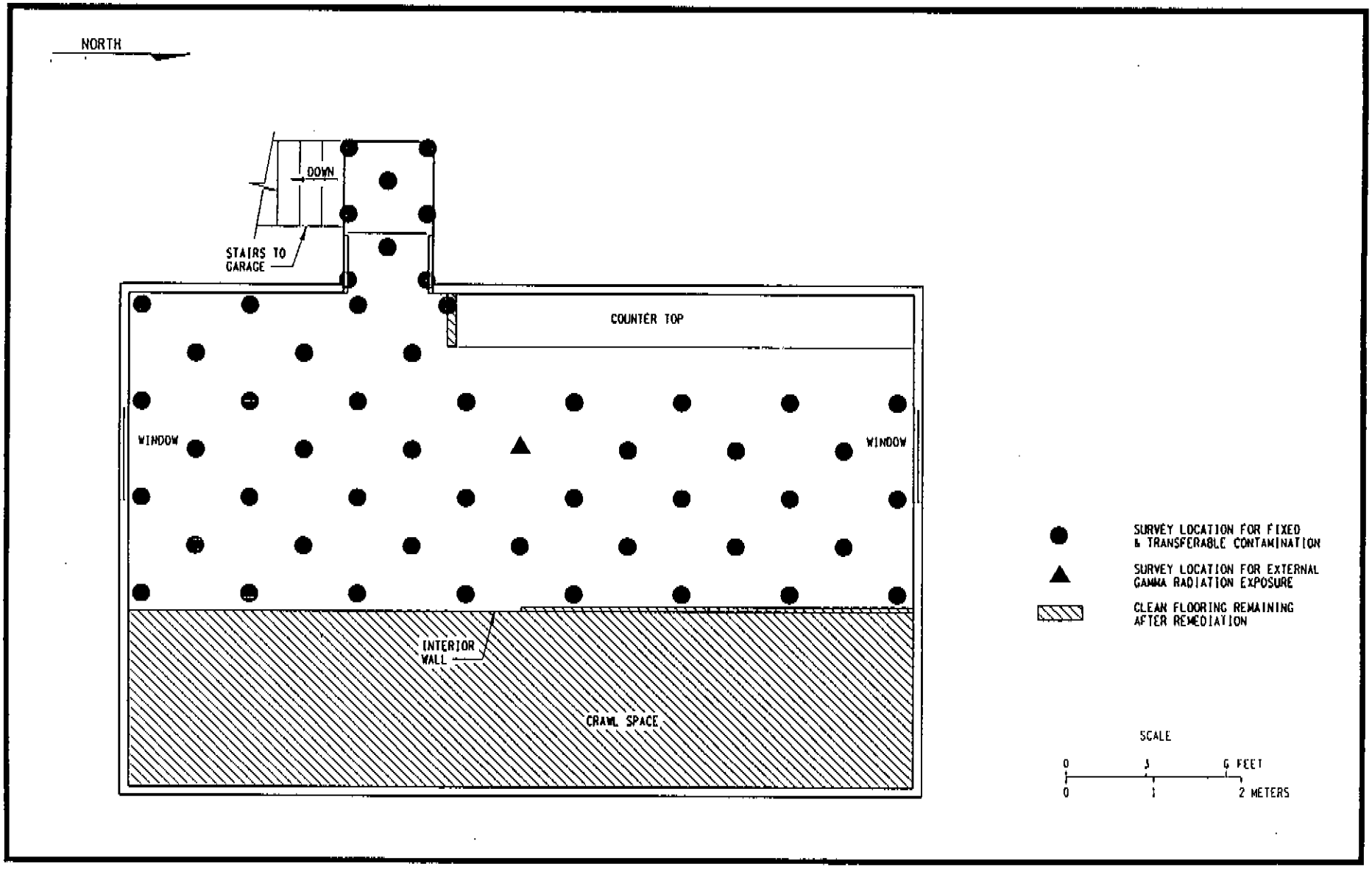

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Figure 4-4
Post-Remedial Action Survey Locations at 525 South Main Street -
Upstairs Bedroom and Hallway

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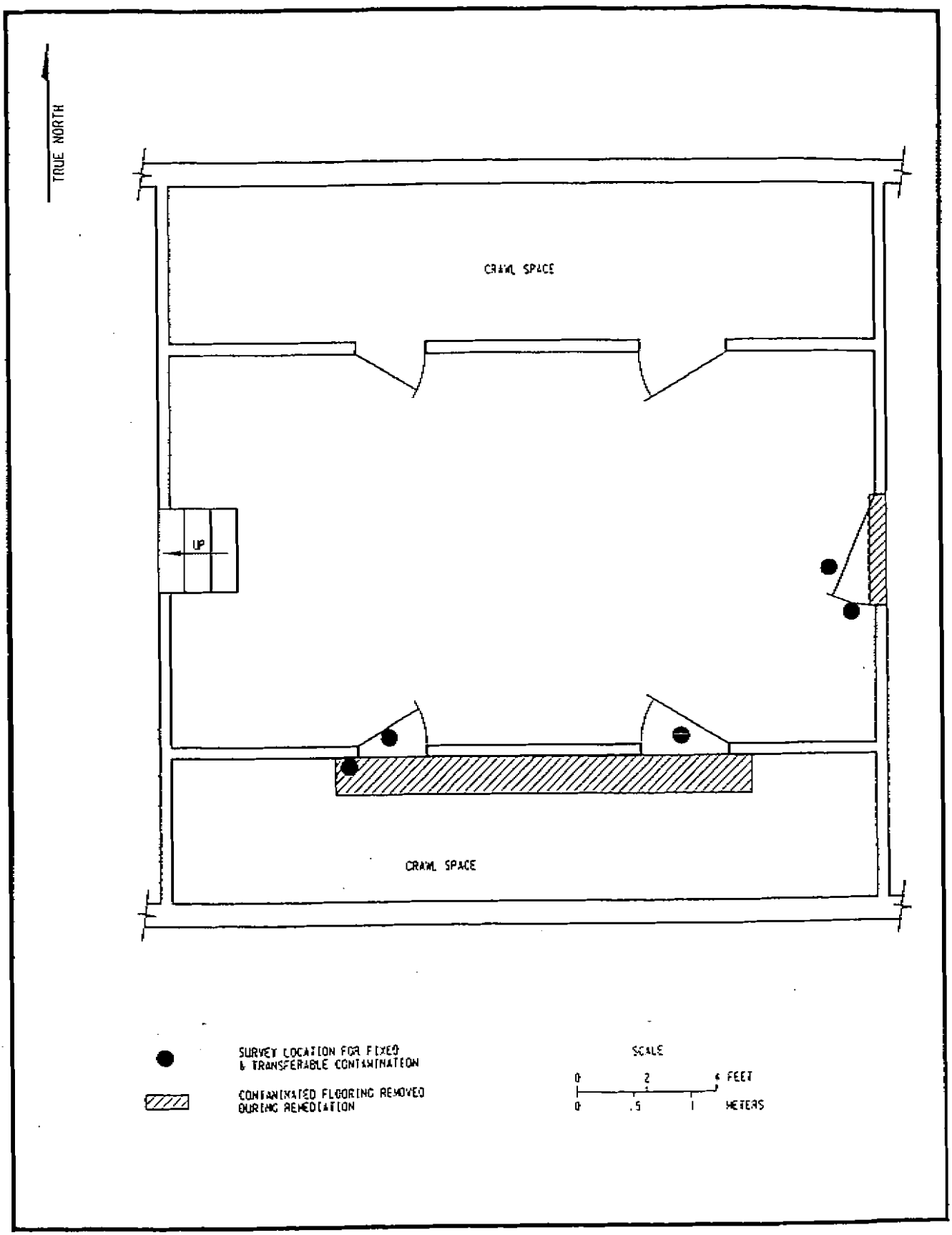

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Figure 4-5
Post-Remedial Action Survey Locations at 525 South Main Street - Upstairs Connector

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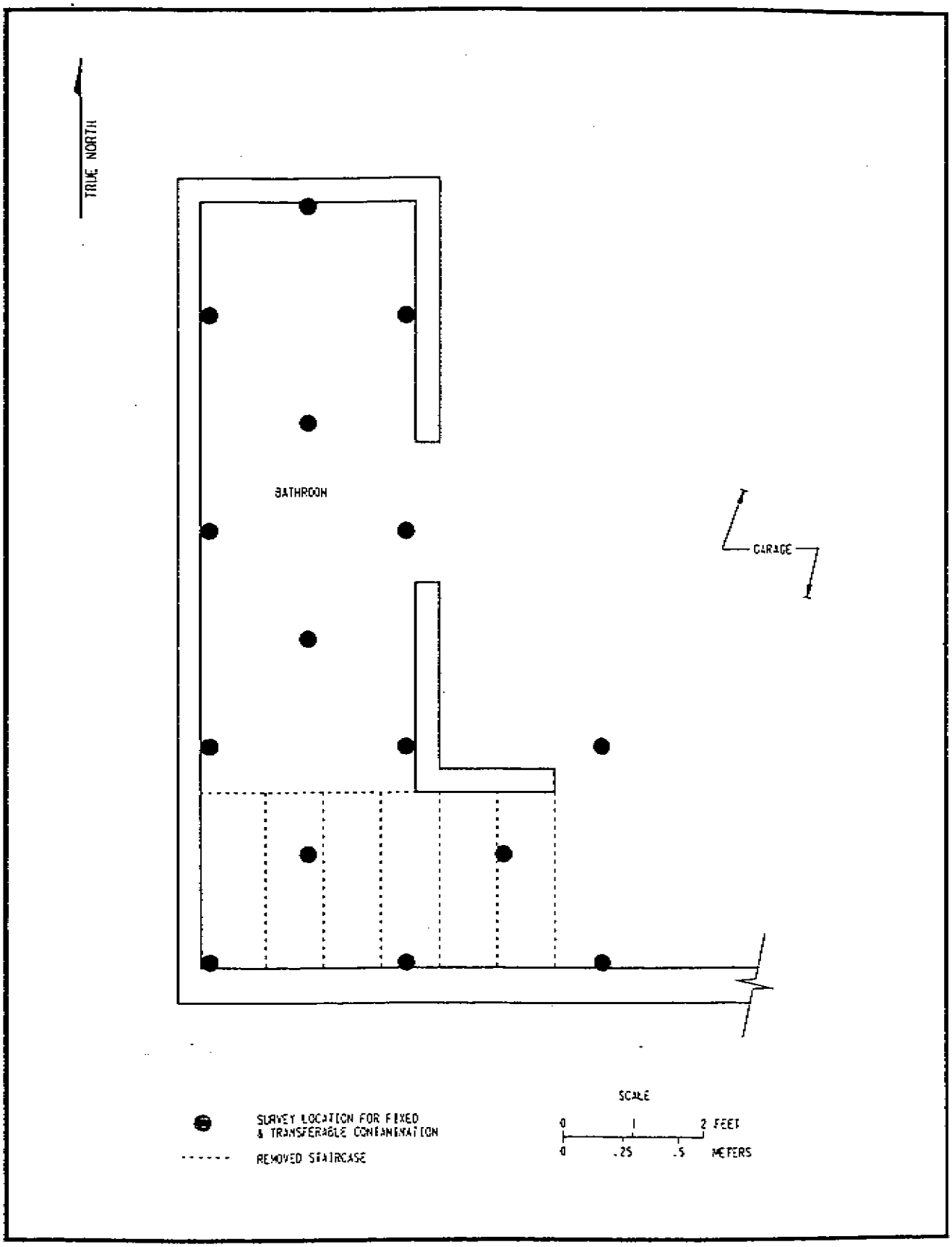

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Figure 4-6
Post-Remedial Action Survey Locations at 525 South Main Street - Garage Bathroom

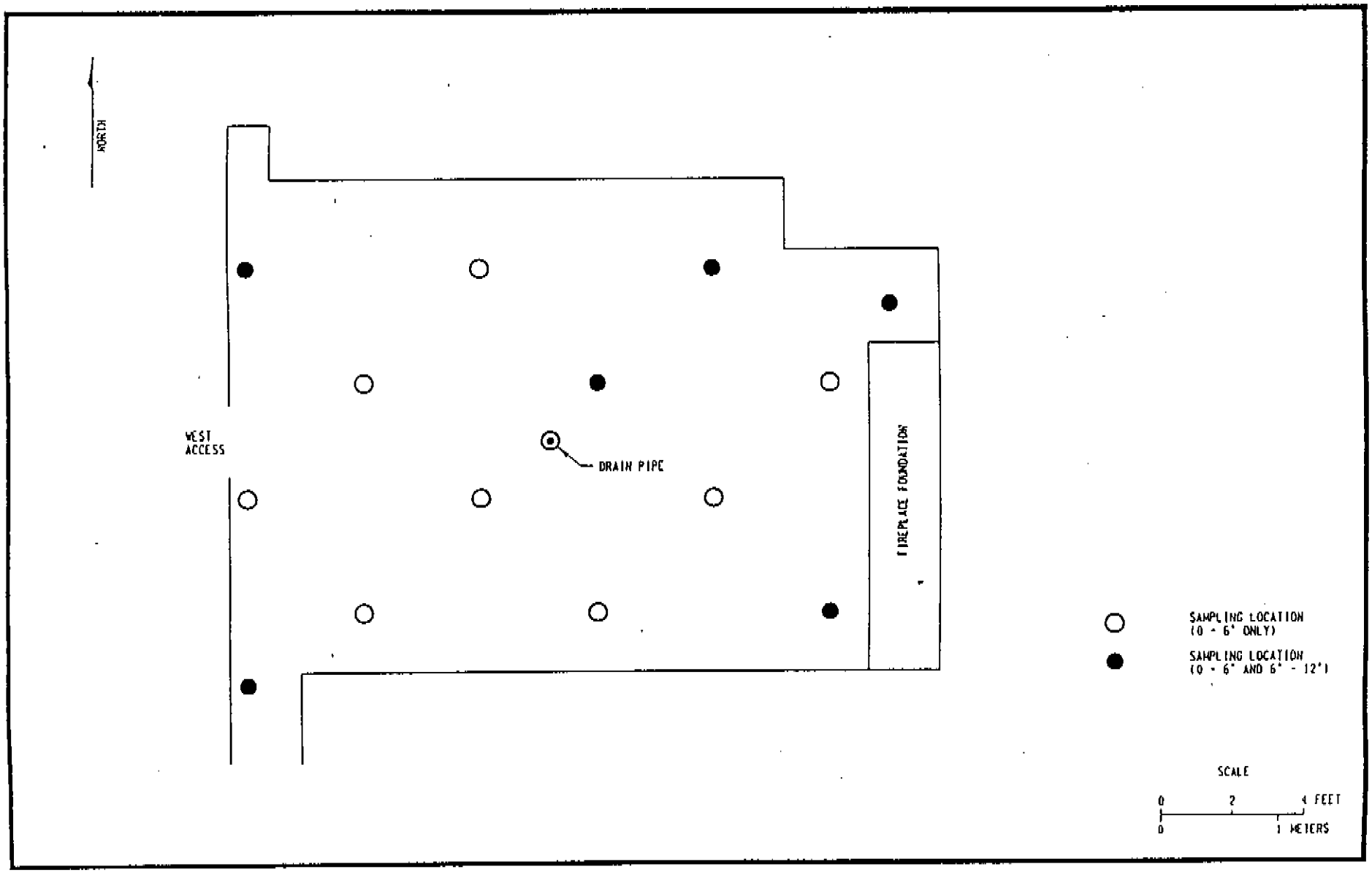

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Figure 4-7
Post-Remedial Action Survey Locations at 525 South Main Street - Basement Crawl Space

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Table 4-5

Post-Remedial Action Gamma Radiation Exposure Rates

Room or Area	Exposure Rate[a] (μR/h)	Number of Measurements	Number Exceeding Indoor Exposure Limit[b]
West bedroom	8.0	3	0
Den	8.8	3	0
Background range	8.0 - 9.4	3	N/A
DOE guideline[b]	20		

[a]Reported gamma radiation exposure rates include background for the Oxford area.

[b]The guideline is extracted from DOE Order 5400.5, "Radiation Protection of the Public and the Environment," which states that the average level of gamma radiation inside a building on a site that has no radiological restrictions on its use shall not exceed the background level by more than 20 μR/h.

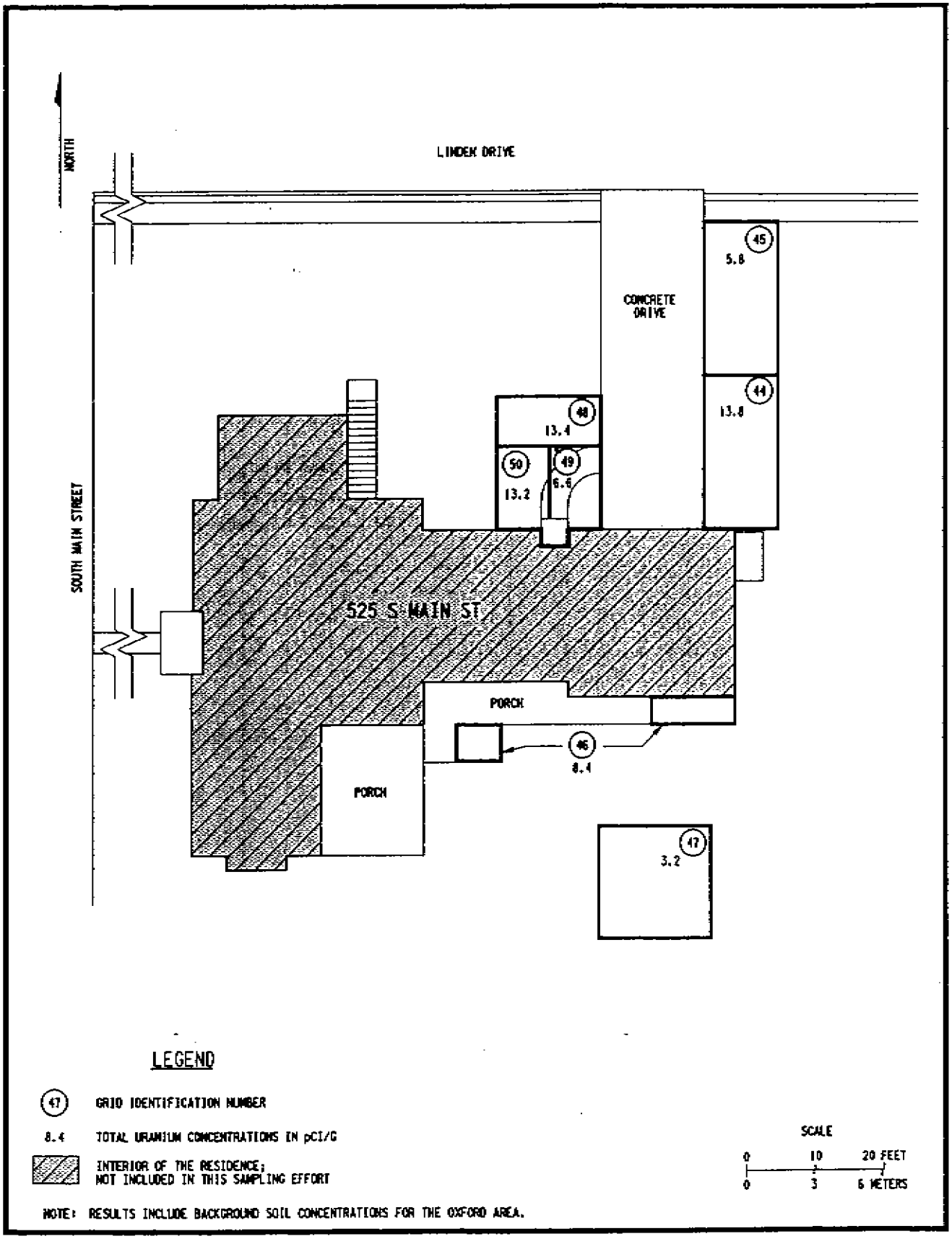

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Figure 4-8
Post-Remedial Action Soil Sampling Results at 525 South Main Street

Table 4-6

Post-Remedial Action Soil Samples from the Crawl Space at 525 South Main Street

Sampling Location	Uranium Concentration (pCi/g) in Soil Samples					Number of Sampling Locations
	Gamma Spectroscopy Results	Alpha Spectroscopy Results				
	Uranium-238	Uranium-238	Uranium-234	Uranium-235	Total Uranium[a]	
0 to 6 in.	<1.50	1.60 ± 0.71	1.60 ± 0.72	0.08 ± 0.11	4.79	14[b]
6 to 12 in.	<2.50	1.40 ± 0.57	1.80 ± 0.69	<0.08	4.54	6[b]
Average background	<2.90	-	-	-	-	3
DOE Guideline	-	-	-	-	35 pCi/g	

[a]Represents the maximum total uranium concentration in the sample (95% confidence), calculated as the sum of the results for uranium-238, uranium-234, and uranium-235 and their respective error terms.

[b]Samples collected from each location were composited and analyzed as a single sample.

NOTE: "<" sign indicates that the measurement is less than the minimum detectable activity.

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4.2.4 Exterior Soil Samples

Composite soil samples were collected from the excavated areas of the property to verify that the remedial action was successful. Figure 4-8 and Table 4-7 present the total uranium concentrations for samples collected from exterior areas of the property after remediation was completed. The results presented include background soil concentrations for the Oxford area. The data show that uranium concentrations in soil are well below the current DOE health-based standards and criterion.

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Table 4-7

Post-Remedial Action Sample Results for 525 South Main Street

Grid	Coordinates[a]	Sample No.	Uranium-238 (pCi/g)	Total Uranium (pCi/g)[c]	Gamma Exposure Rate (μR/h)[c]
44	N18, E23	10994033	6.9	13.8	9.1
45	N25, E23	10994034	2.9	5.8	9.1
46	N5, E13	10994035	4.2	8.4	9.1
47	N-1, E20	10994036	1.6	3.2	9.5
48	N19, E15	10994037	6.7	13.4	9.9
49	N17, E16	10994038	3.3	6.6	9.9
50	N17, E14	10994070	6.6	13.2	9.9
DOE Guidelines			35	---[b]	

[a]All grid coordinates indicate the center of the grid where a composite sample was obtained. Grid locations are shown in Figure 4-8.

[b]Less than 20 μR/h above background for habitable structures or 100 mrem/yr from all pathways, except radon.

[c]Results include background readings for the Oxford, Ohio, area.

5.0 POST-REMEDIAL ACTION STATUS

The post-remedial action survey data indicate that all accessible areas of the former Alba Craft facility and designated vicinity properties are in compliance with applicable DOE health-based standards and criterion for cleanup of residual radioactive material. After reviewing post-remedial action measurements, survey procedures, and quality assurance data, the IVC confirmed that the site was decontaminated to the radiological guidelines established for the site.

After the verification activities were completed, the IVC notified DOE-Headquarters and the DOE-Oak Ridge Operations, Former Sites Restoration Division, of its findings and recommendations. DOE reviewed the data to determine whether the remedial action was successful. Based on this review, radiological conditions at the site were determined to be in compliance with DOE decontamination criteria and standards to protect health, safety, and the environment. A certification docket will be prepared to officially certify that the site was remediated to established criteria. The issuance of the certification docket will be documented through publication of a notice in the *Federal Register*.

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REFERENCES

Bechtel National, Inc., 1994. *Health and Safety Plan for the Alba Craft Site, Oxford, Ohio* (109-HSP, Rev. 0), June.

DOE, 1992. Memorandum from W. A. Williams, Designation and Certification Manager, Division of Off-Site Programs, Office of Eastern Area Programs, Office of Environmental Restoration, to file (February 11).

DOE, 1994a. *Engineering Evaluation and Cost Analysis for the Alba Craft Site, Oxford Ohio*, Oak Ridge Operations Office (August).

DOE, 1994b. Memorandum from J. W. Wagoner (DOE-HQ) to L. K. Price (DOE-FSRD), "Uranium Guidelines for the Alba Craft Site, Oxford, Ohio," BNI CCN 118575 (July 15).

Oak Ridge National Laboratory, 1993. *Results of the Radiological Survey of the Former Alba Craft Laboratory Site Properties, Oxford, Ohio* (OXO001), ORNL/RASA-92/14, Health and Safety Research Division (March).

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GLOSSARY

Alpha-emitting - See **Radiation**.

Ambient Background Radiation - Ambient background radiation refers to naturally occurring radiation emitted from either cosmic (e.g., from the sun) or terrestrial (i.e., from the earth) sources. Exposure to this type of radiation is unavoidable, and its level varies greatly depending on geographic location. For example, New Jersey typically receives 100 millirem per year (mrem/yr), Colorado receives about 115 mrem/yr, and some areas in South America receive up to 7000 mrem/yr. Naturally occurring terrestrial radionuclides include uranium, radium, potassium, and thorium (see **Radionuclide**). The dose levels do not include the concentrations of naturally occurring radon inside buildings.

Beta-gamma-emitting - See **Radiation**.

Centimeter - A centimeter (cm) is a metric unit of measurement for length; 1 inch is equal to 2.54 cm; 1 foot is equal to approximately 30 cm.

Contamination - The term "contamination" is used generally to mean a concentration of one or more radioactive materials that exceeds naturally occurring levels. Contamination may or may not exceed the DOE cleanup guidelines.

Disintegrations per minute - Disintegrations per minute (dpm) is the measurement indicating the amount of radiation being released from a substance per minute.

Dose - As used in this report, dose is actually dose equivalent and is used to relate absorbed dose (mrad) to an effect on the body. Dose is measured in mrem. For comparison, a dose of 500,000 mrem to the whole body within a short time causes death in 50 percent of the people who receive it; a dose of 5,000,000 mrem may be delivered to a cancerous tumor during radiation treatment; normal background radiation at or near sea level results in an annual dose of about 100 mrem; DOE radiation protection standards limit the dose that may be received by members of the general public to 100 mrem/yr above background levels; living in a brick house typically results in a dose of about 75 mrem/yr above the background level.

Exposure Rate - Exposure rate is the rate at which radiation imparts energy to the air. Exposure is typically measured in microroentgens (μR), and exposure rate is typically expressed as μR/h. The dose to the whole body can be approximated by multiplying the exposure rate by the number of hours of exposure. For example, if an individual were exposed to gamma radiation at a rate of 20 μR/h for 168 h/week (continuous exposure) for 52 weeks/yr, the whole-body dose would be approximately 175 mrem/yr.

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Gamma Radiation - See **Radiation**.

Meter - A meter (m) is a metric unit of length; 1 m is equal to approximately 39 inches.

Microroentgen - A microroentgen (μR) is a unit used to measure radiation exposure. For further information, see **Exposure Rate**.

Millirem - The millirem (mrem) is the unit used to measure radiation dose to man. The DOE dose limit is 100 mrem above background radiation levels within any one-year period for members of the general public. Naturally occurring radioactive substances in the ground result in a yearly exposure of about 100 mrem to each member of the population. To date, no difference can be detected between the health of population groups exposed to 100 mrem/yr above background and the health of groups who are not exposed.

Natural Background Radiation - Natural background radiation refers to radiation emitted from the naturally occurring radionuclides found in manmade materials. The concentrations of the radionuclide, and thus the radiation, will vary widely because of variations in the composition of the materials.

Radiation - There are three primary types of radiation: alpha, beta, and gamma. Alpha radiation travels less than an inch in air before it stops, and it cannot penetrate the outer layers of human skin. Beta radiation can penetrate the outer layers of skin but cannot reach the internal organs. Gamma radiation, the most penetrating type, can usually reach the internal organs.

Radionuclide - Radioactive elements are also referred to as radionuclides. For example, uranium-235 is a radionuclide, uranium-238 is another, thorium-232 is another, and so on.

Remedial Action - Remedial action is a general term used to mean "cleanup of contamination that exceeds DOE guidelines." It refers to any action required so that a property may be certified as being in compliance with guidelines and may therefore be released for future use. Remedial action also includes restoring remediated properties to their original conditions as far as possible.

Uranium - Uranium is a naturally occurring radioactive element. The principal use of refined uranium is for the production of fuel for nuclear reactors. Uranium in its natural form is not suitable for use as a fuel source.

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APPENDIX A Alba Craft and Vicinity Properties Post-Remedial Action Survey Plan

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ALBA CRAFT AND VICINITY PROPERTIES
POST-REMEDIAL ACTION SURVEY PLAN

PURPOSE

The purpose of this plan is to describe the methodologies that the Formerly Utilized Sites Remedial Action Program (FUSRAP) will use for radiological surveys, sampling, and analysis to document the final condition of the Alba Craft properties as radioactively clean according to the release standards of Department of Energy (DOE) Order 5400.5 (reference 1). This plan addresses the DOE protocol for verification and certification of sites under FUSRAP (reference 2).

Bechtel National, Inc. (BNI) will be the FUSRAP remedial action contractor, and the Oak Ridge National Laboratory (ORNL) will act as the Independent Verification Contractor.

REFERENCES

(1) DOE Order 5400.5, Radiation Protection of the Public and Environment, Washington, D.C.

(2) DOE, 1990, Verification and Certification Protocol for the Office of Environmental Restoration FUSRAP and D&D Program, Revision 3, November.

(3) ORNL, 1993. Results of the Radiological Survey at the former Alba Craft Laboratory Site Properties, Oxford, Ohio (OXO001), BNI CCN 102192, March.

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(5) ORNL, 1994. Summary of Site Visit and Information Concerning the Church of God, M. Murray to A. Williams, BNI CCN 112674, January 20.

(6) ORNL, 1994. Summary of Work and Information Concerning the Municipal Landfill in Oxford, Ohio, M. Murray to A. Williams, BNI CCN 112675, January 20.

(7) ORNL, 1994. Radiological Survey Results for 601, 602, 609, 611, 516, and 613 South Main Street, M. Murray to A. Williams, BNI CCN 112677, January 21.

(8) ORNL, 1994. Results of Radiological Survey at 525 South Main Street, Oxford, Ohio (OXO002), from M. Murray to A. Williams, BNI CCN 115778, April 22.

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(9) BNI, 1994, "ALB-Historical Info-Public Meeting Notes (3/22/94)," memo to file from M. J. Williams, BNI CCN 117579, June 21.

(10) Argonne National Laboratory (ANL), 1994, Derivation of Uranium Residual Radioactive Material Guidelines for the Former Alba Craft Laboratory Site, Oxford, Ohio (ANL/EAD/TM-9).

(11) Wagoner, J. W., 1994, Memorandum, "Designation of Vicinity Properties in Oxford, Ohio," BNI CCN 117155, June 8.

(12) ThermoAnalytical (TMA), Health Physics Operational Procedures Manual

A) 3C.2 "Determination of Background"
B) 3B.1 "Delineation of Survey Areas in Open Land"
C) 3B.3 "Gamma Ray Exposure Rate Surveys at 1-Meter in Open and Enclosed Areas"
D) 3A.2 "Direct Surface Contamination Survey"
E) 3A.3 "Transferable Surface Contamination Survey"
F) 4A.1 "Systematic and Bias Surface Soil Sampling (Radiological)"

(13) BNI, 1993, Instruction Guide for Post-Remediation Survey of Soil, 191-IG-032, Revision 0.

(14) BNI, 1992, Instruction Guide for Decontamination of Field Sampling Equipment at FUSRAP Sites, 191-IG-011, Revision 5

(15) BNI, 1993, Instruction Guide for Surface Water and Sediment Sampling Activities, 191-IG-028, Revision 0.

(16) BNI, 1994, How to Ship Samples from a FUSRAP Site, PI R4.7, Revision 2.

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BACKGROUND

From 1952 to 1957 Alba Craft Laboratory, Inc. was a subcontractor to National Lead of Ohio (NLO), which was a primary contractor for the Atomic Energy Commission (AEC). Alba Craft provided a variety of machine shop services on normal uranium metal for NLO, including general machining and developmental machining of threaded slugs for the Savannah River Site in the early years, and large production scale hollow drilling and turning slugs in later years for Savannah River Site and Hanford facility reactors. NLO also used the Alba Craft facilities in 1954 and supplied its own operators and material for machining. The total quantity of uranium machined by Alba Craft is estimated at several hundred tons; the quantity machined by NLO during 1954 is unknown.

As a result of these activities at the AEC-contracted Alba Craft site, equipment, buildings, and land at some the site and at some properties in the immediate vicinity became radioactively contaminated resulting in low levels of contamination (references 3 - 8). At contract termination, sites used by contractors were decontaminated in accordance with the standards and survey methods in use at that time. Since the original assessments, radiological criteria and guidelines for the release of such sites for unrestricted use have become more stringent. As a result, the Formerly Utilized Sites Remedial Action Program (FUSRAP) was established in 1974 to identify these formerly used sites and to reevaluate their radiological status.

The former Alba Craft building is a composite of three cinder block structures joined to appear as one building. The first building, now the west wing, was free-standing and housed the original laboratory. Doors opened on the north wall and on the southern end of the east wall. The eastern wing was built and connected to the western by a small corridor along the north end. Operations moved to the eastern wing after its completion. The last addition was the large room to the north (reference 9). Uranium milling operations were also conducted in the west and north wings of the building.

RESIDUAL CONTAMINATION GUIDELINES

The source of contamination of the designated properties was uranium metal milling operations in the Alba Craft building. Contamination around the building and on the properties along the facility boundary is the result of migration of that material by such mechanisms as disposal (sweeping or washing through doorways, dumping), tracking in shoes and on clothing, and washing through drain lines and storm sewer.

The applicable residual contamination guidelines are as follows:

- The site-specific criterion for soil is 35 pCi/g for total uranium (reference 10).

- The residual contamination guidelines for fixed and transferable radioactive contamination (dpm/100 cm^2) (reference 1):

Radionuclide	Average	Maximum	Removable
U-Natural, U-235, U-238, and associated decay products	5,000 α	15,000 α	1,000 α

DECONTAMINATION ACTIVITIES

The designated Alba Craft properties are (references 3, 8, and 11):

- Alba Craft Laboratory Site Properties, 10 - 14 West Rose
- 525 South Main Street
- 550 South Main Street
- West Rose Avenue in the vicinity of the site.

With the exception of the Alba Craft Laboratory building, all remaining designated areas of contamination are exterior: yard areas at 525 South Main Street, sewer drain at 550 South Main Street, and West Rose Avenue in the vicinity of the site.

DOE has also indicated that it is their expectation that regardless of whether a site has been designated, it is appropriate for remediation staff to establish fences and other access control measures at the site before beginning remedial action, and to remove any residual uranium located within this control area (reference 11). Real Estate Instruments shall be in place for all properties remediated.

At a minimum, remediation of the site will consist of:

- prior to demolition of the building, spot decontamination/removal of components of the Alba Craft facility structure including but not limited to expansion joints, masonry block, and overhead joists, in order to better protect the health and safety of the workers and residents in the vicinity of the property

- total demolition of the building with subsequent rubblization

- following demolition of the building, excavation of soil with total uranium concentrations exceeding the 35 pCi/g site-specific guideline

Consequently, verification surveys and sampling will focus on confirming that soil remaining after remedial action does not contain radioactive contamination at concentrations exceeding applicable guidelines. To the extent necessary, equipment used during the decontamination activity will be cleaned and surveyed for surface contamination prior to release.

Areas where remediation activities will be conducted will include, but not be limited to, those identified by the designation contractor in the site designation reports (references 3 and 8). The soil samples collected for designation of the site were initially screened using a site-specific criterion for total uranium that was higher than 35 pCi/g; consequently, to meet the 35 pCi/g criterion, some additional areas must be remediated that were not specifically identified in the designation reports (reference 7). These areas will be subject to excavation for remediation.

Figures 1a and 1b (and Design Drawing 109-DD460-C03) delineates those general areas that will be excavated. These areas of radioactive contamination include a portion of the footprint of the former Alba Craft facility to a depth of 2 feet and various areas immediately adjacent to the building; areas along the boundaries of several properties in the immediate vicinity of the Alba Craft building, West Rose Avenue adjacent to the Alba Craft facility; the area along the storm sewer on the property at 550 South Main Street; and the eastern side of the driveway, the flower bed at the north entrance, and one location in the south yard of the 525 South Main Street property.

POST-REMEDIATION SURVEYS AND SAMPLING

Following remediation, the FUSRAP Radiological Support Subcontractor (ThermoAnalytical, TMA) will perform post-remedial action surveys and sampling to determine the completeness of the corrective action and to document that the site now complies with the applicable criteria.

Survey Equipment

The recommended equipment for use by FUSRAP for release of equipment and materials from the site includes:

- Alpha Scintillation detector (Eberline AC-3 or equivalent)
- Beta/Gamma Pancake GM detector (7 mg/cm^2 mylar shielded (Eberline HP-210 or equivalent)
- Alpha Scintillation Counter (Eberline SAC-4 or equivalent)

The recommended equipment for use by FUSRAP for Post-RA verification includes:

- Portable Ratemeter/Scaler (Eberline PRS-1 or equivalent)
- Gamma Scintillation Detector (Eberline SPA-3 or equivalent), or low range/high range HP-270 or equivalent
- Reuter-Stokes Pressurized Ion Chamber (PIC)
- Field Instrument for Detection of Low-Energy X-Rays (FIDLER)

The calibration sources and methods for instrument calibration will be coordinated between Bechtel and ORNL to insure compatibility and reproducibility of results.

Background Measurements

Prior to performing post-remedial action surveys, TMA will obtain site-specific background measurements from three remote background locations in the general vicinity of the site (0.5 to 3 miles) according to TMA procedure 3C.2 (reference 12A). The location for background measurements will be selected by Bechtel and TMA, and background measurements will be made at each location by TMA and ORNL.

Surveys

After completion of excavation of the contaminated soils, TMA shall conduct post-remedial action surveys to verify satisfactory decontamination of the area. A survey grid shall be established at the site, conforming to the specifications in TMA procedure 3B.1 (reference 12B) and the "Instruction Guide for Post-Remediation Radiological Survey of Soil" (191-IG-032) (reference 13), and surveys shall be conducted in each square of the 10 m by 10 m grid. ORNL will use the same grid.

TMA will measure external gamma radiation exposure at a height of 1 m in the center of each survey grid block as required by 191-IG-032 (reference 13) using methods in accordance with TMA procedure 3B.3 (reference 12C).

Any structures left after remediation, such as pipes, will be surveyed for alpha and beta/gamma direct and transferable contamination according to TMA procedures 3A.2 and 3A.3 (references 12D and 12E).

Soil Sampling

TMA shall also collect post-remedial action soil samples to verify satisfactory remediation of the area. Samples shall be collected in each square of a 10 m by 10 m grid as directed in 191-IG-032 and TMA procedure 4A.1 (references 12F and 13). Based on current estimates of anticipated areas of excavation, a minimum of 11 samples will be collected; conservative estimates suggest 25 samples (21 from the Alba Craft properties and those in the immediate vicinity, and 4 from 525 South Main Street). ORNL may collect splits concurrently.

Samples from each grid square shall be collected using properly decontaminated sampling equipment (reference 14).

TMA samples shall be handled using the same custody and labeling methodology described for sediment samples in the "Instruction Guide for Surface Water and Sediment Sampling Activities" 191-IG-028 (reference 15) and the sample surveying, packaging, and shipping methodology in PI R4.7 "How to Ship Samples from a FUSRAP Site" (reference 16).

Samples shall be analyzed in the field using the field portable gamma spectroscopy system. All significant peaks will be noted. Of these samples, 5% will be analyzed by gamma spectroscopy in the TMA laboratory.

Quality Assurance/Quality Control

QA/QC field duplicate samples and measurements shall be collected at a frequency of one additional sample/measurement for each 20 collected.

Rinse blanks from decontaminated sampling equipment shall be collected at the rate of one rinse per day of sampling. Rinse blanks shall be collected according to the recommendations in 191-IG-028 (reference 15).

Data Quality Objectives

The detection limit for total uranium by gamma spectroscopy shall be less than 17 pCi/g (half criterion); therefore, the detection limit for uranium-238 shall be less than 8 pCi/g. Quality indicator goals shall be as follows: Precision, $\pm$ 2 sigma; completeness, 75%; Accuracy, $\pm$ 25%). QA/QC samples are discussed in the previous section.

/ 3 3 6 4 3

BECHTEL/ORNL COORDINATION

Bechtel is the contractor responsible for completing the remedial action. To define the areas for remediation, Bechtel used data collected by ORNL during designation, as well as supplemental information obtained by Bechtel as part of pre-RA planning and scoping.

Bechtel will have responsibility for "hot spot" decontamination, subsequent dismantlement and demolition of the building, and excavation of contaminated soil. Upon completion of these activities, ORNL will commence verification of the remediation of the ground surface. ORNL will perform a walkover survey on the surface of the ground using a FIDLER or equivalent to measure beta-gamma radiation directly. The result of this walkover survey shall be used to determine whether there are areas requiring additional remediation. This survey is expected to include all areas previously identified as being contaminated on the designated properties and on those properties in the immediate vicinity of the Alba Craft properties (Figures 1a and 1b). Bechtel will assist ORNL in this survey by interfacing with property owners in advance to secure their approval for property access.

Bechtel will initiate remediation concurrent with ORNL verification activities, to the extent that remediation does not interfere with verification. Bechtel will provide ORNL access to remediation results as they become available. The Bechtel Site Superintendent will notify ORNL when remediation of an area is complete, and ORNL will perform final independent verification surveys of the area. ORNL may collect soil sample splits concurrent with Bechtel sampling efforts.

Remedial action will continue until ORNL agrees decontamination is complete based on direct reading measurements and field gamma spectroscopy results. Bechtel and ORNL may both utilize the field gamma spectroscopy system. Measurements taken by Bechtel and ORNL at identical locations should agree within the 95 percent confidence interval for the analytical methods used (reference 2). For consistency and ease of data comparison, Bechtel and ORNL shall utilize the same type of calibration techniques, calibration sources, and survey techniques in conducting the surveys. Bechtel and ORNL shall establish a mutually agreeable survey grid across the decontaminated areas and shall conduct their surveys referring to that grid.

Upon agreement by both parties that the site is decontaminated, ORNL will then demobilize, and Bechtel will remain to restore the site to the condition agreed upon by the property owner(s).

Bechtel will provide final verified sample results to ORNL as soon as they are available. Bechtel will prepare a post-remedial action report (PRAR) for DOE review (copy to ORNL) within 3 months following demobilization, and then begin completion of the Certification Docket. ORNL will issue a verification report to DOE (copy to Bechtel) within 4 months following demobilization (reference 2).

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APPENDIX B Waste Minimization Summary

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WASTE MINIMIZATION SUMMARY FOR THE

FORMER ALBA CRAFT FACILITY AND VICINITY PROPERTIES

The decontamination and demolition of the Alba Craft building was conducted in a manner that would reduce costs while expediting the remedial action. One cost-reduction measure was the use of a Torgerson Rock-Crusher. The crusher was used to reduce the size of concrete debris from the building into a granular soil-like consistency. The soil-like material could be shipped and disposed of at significantly lower unit rates than the rates for shipping and disposing of debris.

The types of waste streams and the volumes that were generated during cleanup of the Alba Craft site are listed in Table B-1. All of the excavated material was disposed of as low-level radioactive material; none of the crushed building material was used for backfill or fill material.

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TABLE B-1
REMEDIAL ACTION SUMMARY

WBS 109

SITE Former Alba Craft Laboratory

OWNER Mr. Gilbert Pacey

SITE ADDRESS 10-14 West Rose Avenue

CITY, STATE Oxford , Ohio

REMEDIATION AUTHORITY

☒ NEPA/CERCLA

☐ SUPERFUND

☐ RCRA

ACTION	DATE	RESPONSIBLE ENTITY	DOCUMENT
DESIGNATION	09-25-1992	DOE	Designation/Authorization Report
CHARACTERIZATION	03-10-1992	ORNL	Results of the Radiological Surveys at the Former Alba Craft Laboratory Site Properties, Oxford, Ohio
CHARACTERIZATION	04-04-1994	ORNL	Results of Radiological Survey at 525 South Main Street
CHARACTERIZATION	09-02-1994	ORNL	Alba Craft Site - Radiological Condition of the Property at 550 South Main Street
FINAL RA	07-31-1995	DOE/ORNL/ BNI	Post-Remedial Action Report for the Former Alba Craft Laboratory Site and Vicinity Properties, Oxford, Ohio

TOTAL VOLUME 2764 yd^3

To Remain In Situ 0

Volume Reduction 0

Net Disposal 2764 yd^3

Documentation Used: N/A

TYPE OF WASTE FOR NET DISPOSAL:

REGULATORY		VOLUME	DISPOSAL SITE
☒	LLRW	2764 yd^3	Clive, Utah
☐	11(E)2		
☐	MIXED		
☐	CHEMICAL		
PHYSICAL			
☐	BUILDING RUBBLE		
☐	SOIL		
☐	LIQUID		
☐	OTHER		

TREATMENT TECHNOLOGIES APPLIED AT THE SITE:

Togerson Rock Crusher -Volume Reduction Unit

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Bechtel

Oak Ridge Corporate Center
151 Lafayette Drive
P.O. Box 350
Oak Ridge, Tennessee 37831-0350

Facsimile: (615) 220-2100

Job No. 14501, FUSRAP Project
DOE Contract No. DE-AC05-91OR21949
Code: 7330/WBS: 109

AUG 28 1995

U.S. Department of Energy
Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, TN 37831-8723

Attention: David G. Adler, Site Manager
Former Sites Restoration Division

Subject: Alba Craft - Post-Remedial Action Report - Publication

Dear Mr. Adler:

Enclosed is a copy of the subject document. All comments on the previous draft have been incorporated.

This document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that the information submitted was properly gathered and evaluated. To the best of my knowledge and belief, they are true, accurate, and complete.

If you have any questions, please call me at 576-1710.

Sincerely,

for

G. L. Palau
Project Manager - FUSRAP

GLP:ebs:LR_1636
Enclosure: As stated

cc: S. K. Oldham

Concurrence: W. Cosey @ J. G. Wood E. B. Speaks

ACTION REQ'D	[ ] YES	[✓] NO	DUE DATE
RESPONSE TO CHRON NO.			
☐ FFA ☐ Permit ☐ Milestone ☐ GcR ☐ CCN ☐ CAR ☐ Mid-Yr ☐ Yr-End ☐ Periodic Rpt			

Bechtel National, Inc.