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RADIOLOGICAL CHARACTERIZATION REPORT FOR THE ALBANY RESEARCH CENTER

Albany, Oregon

April 1989

Bechtel National, Inc.

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RADIOLOGICAL CHARACTERIZATION REPORT
FOR THE
ALBANY RESEARCH CENTER
ALBANY, OREGON

APRIL 1989

Prepared for

UNITED STATES DEPARTMENT OF ENERGY

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TABLE OF CONTENTS

		Page
1.0	Introduction and Summary	1
1.1	Introduction	1
1.2	Purpose and Objectives	2
1.3	Remedial Action Guidelines	2
1.4	Summary	5
2.0	Site Description and History	7
2.1	Location and Description	7
2.2	Site History	7
2.2.1	Background	7
2.2.2	Previous Radiological Surveys	10
2.2.3	1987 Site Remedial Action	11
3.0	Health and Safety	12
4.0	Characterization Procedures	13
4.1	Downhole Gamma Logging	13
4.2	Radiological Surveys of Buildings	14
5.0	Characterization Results	16
5.1	Background Radiation Measurements	16
5.2	Downhole Gamma Logging Results	18
5.2.1	Dismantled Tin Plant	18
5.2.2	Storage Yard	19
5.2.3	Lime Pit	19
5.2.4	Lower-Level Floor in Building 5	19

Page

5.2.5 Lower-Level Floor in Building 17 20

5.2.6 Drilling Southeast of Building 39 20

5.2.7 Drilling Outside of Building 3 20

5.3 Building and Equipment Surfaces Characterization 21

5.4 Gamma Logging of Floor Drains 22

5.5 Isotopic Analyses of Soil and Sludge 22

5.6 Review of Previous Survey Data 23

6.0 Conclusion 25

References 117

LIST OF FIGURES

Figure	Title	Page
2-1	Location of the Albany Research Center	8
2-2	Plan of the Albany Research Center	9
5-1	BNI Borehole Locations and ANL Sampling Locations at the ARC Site	96
5-2	Building 1, First and Third Floors	97
5-3	Building 3	98
5-4	Building 4, First and Second Floors	99
5-5	Building 5	100
5-6	Building 5, Roof	101
5-7	Building 17	102
5-8	Building 23, First Floor	103
5-9	Building 23, Second Floor	104
5-10	Building 23, Basement	105
5-11	Building 24	106
5-12	Building 25, First Floor and Mezzanine	107
5-13	Building 26, First Floor	108
5-14	Building 28, First Floor	109
5-15	Building 28, Basement	110
5-16	Building 29, First Floor	111
5-17	Building 29, Second Floor	112
5-18	Building 30, Plumbing and Mezzanine Level and First Floor	113
5-19	Building 31	114
5-20	Building 33	115
5-21	Building 34	116

LIST OF TABLES

Table	Title	Page
1-1	Summary of Residual Contamination Guidelines for ARC	3
5-1	Background Radiation Measurements and Radionuclide Concentrations in Soil at ARC	17
5-2	Borehole Gamma Logging Results at ARC	26
5-3	Building Characterization Results at ARC	33
5-4	Buildings 30 and 31 Floor Drain Gamma Logging Results	89
5-5	Radionuclide Concentrations in Soil/Sludge at ARC	90
5-6	Summary of ANL Measurements	95

ABBREVIATIONS

α	alpha
β	beta
Ci	curie
cm	centimeter
cpm	counts per minute
cm^2	square centimeter
dpm	disintegrations per minute
dpm/100 cm^2	disintegrations per minute per 100 square centimeters
γ	gamma
g	gram
h	hour
ha	hectare
in.	inch
$in.^2$	square inch
l	liter
m	meter
m^2	square meter
mi	mile
mR/h	milliroentgens per hour
mrad	millirad
mrem	millirem
mrem/yr	millirem per year
μR/h	microroentgens per hour
pCi/g	picocuries per gram
WL	working level
yd^2	square yard
yd^3	cubic yard
yr	year

1.0 INTRODUCTION AND SUMMARY

1.1 INTRODUCTION

The Formerly Utilized Sites Remedial Action Program (FUSRAP) is a U.S. Department of Energy (DOE) effort to identify and clean up or otherwise control sites where residual radioactive contamination (exceeding current guidelines) remains from the early years of the nation's atomic energy program or from commercial operations causing conditions that Congress has mandated DOE to remedy. From 1948 to 1978, the Albany Research Center (ARC) in Albany, Oregon, conducted various operations involving thorium and uranium for the Atomic Energy Commission (AEC) and the Energy Research and Development Administration (ERDA), predecessor agencies of DOE. As a result of these operations, portions of the ARC site became radioactively contaminated. From 1978 through 1982, a series of radiological surveys of ARC was conducted by Argonne National Laboratory (ANL) (Refs. 1 and 2). Based on these surveys, ARC was designated for remedial action under FUSRAP.

FUSRAP is currently managed by DOE's Oak Ridge Operations in Oak Ridge, Tennessee. As the project management contractor (PMC) for FUSRAP, Bechtel National, Inc. (BNI) is responsible to DOE for planning, managing, and implementing the program.

Extensive remedial action was completed at ARC in early 1988. However, a post-remedial action radiological survey, performed during 1987 and 1988 by Oak Ridge Associated Universities (ORAU), indicated the presence of some previously undetected areas of elevated radiological contamination. These survey results prompted a search for additional historical information concerning potentially contaminated areas. Archived documentation was examined, and ARC employees provided additional information on previous activities. Based on information provided by ORAU and these other sources, additional areas of ARC were selected for radiological characterization. BNI and its radiological subcontractor, Thermo Analytical/Eberline (TMA/E), performed the

characterization from December 1987 through February 1988. This report documents the methods used and the results obtained during this characterization effort.

At ARC, FUSRAP is authorized to remediate only those areas of contamination resulting from work performed for the AEC and ERDA. This characterization report includes all contaminated areas and items surveyed, regardless of whether the radioactive contamination originated from AEC activities or from other activities conducted involving radioactive materials at ARC.

1.2 PURPOSE AND OBJECTIVES

Radiological characterization was conducted to define the locations and boundaries of any remaining contamination including that identified by the ORAU survey. Results from this characterization survey will be used to define the scope of additional areas to be addressed at ARC by FUSRAP.

1.3 REMEDIAL ACTION GUIDELINES

Radioactive contamination at ARC consists primarily of thorium-232 residues. Uranium-238 was identified as the sole contaminant in one area, the attic of Building 17; low levels of radium-226 were found at a few locations. Table 1-1 lists the DOE residual contamination guidelines for cleanup of radioactively contaminated property. DOE implemented these guidelines for the FUSRAP program based on their consistency with the criteria used for the Uranium Mill Tailings Remedial Action Program (Ref. 3). The surface contamination criteria for equipment and structures were adapted from the U.S. Nuclear Regulatory Commission. The guidelines presented in Table 1-1 were followed in measuring contamination on surfaces such as walls, floors, ceilings, drains, and equipment, as well as in soil. If contamination exceeded the guidelines, the area or item surveyed was considered to be radioactively contaminated.

TABLE 1-1

SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES

BASIC DOSE LIMITS

The basic limit for the annual radiation dose received by an individual member of the general public is 100 mrem/yr.

SOIL (LAND) GUIDELINES

Radionuclide	Soil Concentration (pCi/g) above background[a,b,c]
Radium-226 Radium-228 Thorium-230 Thorium-232	5 pCi/g, averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over any 15-cm-thick soil layer below the surface layer.
Other radionuclides	Soil guidelines will be calculated on a site-specific basis using the DOE manual developed for this use.

STRUCTURE GUIDELINES

Airborne Radon Decay Products

Generic guidelines for concentrations of airborne radon decay products shall apply to existing occupied or habitable structures on private property that has no radiological restrictions on its use; structures that will be demolished or buried are excluded. The applicable generic guideline (40 CFR 192) is: In any occupied or habitable building, the objective of remedial action shall be, and reasonable effort shall be made to achieve, an annual average (or equivalent) radon decay product concentration (including background) not to exceed 0.02 WL.[d] In any case, the radon decay product concentration (including background) shall not exceed 0.03 WL. Remedial actions are not required in order to comply with this guideline when there is reasonable assurance that residual radioactive materials are not the cause.

External Gamma Radiation

The average level of gamma radiation inside a building or habitable structure on a site that has no radiological restrictions on its use shall not exceed the background level by more than 20 uR/h.

Indoor/Outdoor Structure Surface Contamination

	Allowable Residual Surface Contamination[e] (dpm/100 cm^2)		
Radionuclide[f]	Average[g,h]	Maximum[h,i]	Removable[h,j]
Transuranics, Ra-226, Ra-228, Th-230, Th-228 Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224 U-232, I-126, I-131, I-133	1,000	3,000	200

TABLE 1-1

(continued)

Indoor/Outdoor Structure Surface Contamination (continued)

Radionuclide[f]	Allowable Residual Surface Contamination[e] (dpm/100 cm^2) Average[g,h]	Maximum[h,i]	Removable[h,j]
U-Natural, U-235, U-238, and associated decay products	5,000 α	15,000 α	1,000 α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 β-γ	15,000 β-γ	1,000 β-γ

[a]These guidelines take into account ingrowth of radium-226 from thorium-230 and of radium-228 from thorium-232, and assume secular equilibrium. If either thorium-230 and radium-226 or thorium-232 and radium-228 are both present, not in secular equilibrium, the guidelines apply to the higher concentration. If other mixtures of radionuclides occur, the concentrations of individual radionuclides shall be reduced so that the dose for the mixtures will not exceed the basic dose limit.

[b]These guidelines represent allowable residual concentrations above background averaged across any 15-cm-thick layer to any depth and over any contiguous 100-m^2 surface area.

[c]Localized concentrations in excess of these limits are allowable provided that the average concentration over a 100-m^2 area does not exceed these limits.

[d]A working level (WL) is any combination of short-lived radon decay products in 1 liter of air that will result in the ultimate emission of 1.3×10^5 MeV of potential alpha energy.

[e]As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[f]Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

[g]Measurements of average contamination should not be averaged over more than 1 m^2. For objects of less surface area, the average shall be derived for each such object.

[h]The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

[i]The maximum contamination level applies to an area of not more than 100 cm^2.

[j]The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. The numbers in this column are maximum amounts.

The soil remedial action guideline for thorium-232, the primary contaminant at ARC, is 5 pCi/g averaged over the uppermost 15 cm (0.5 ft) of soil below the surface; the guideline is 15 pCi/g when averaged over any 15-cm- (0.5-ft-) thick soil layer below the uppermost 15 cm (0.5 ft).

The exterior areas in which elevated levels of uranium-238 are found also have elevated concentrations of other radionuclides. Therefore, remedial action to guidelines for these radionuclides will ensure that the concentration of residual uranium-238 is acceptably low. Thus, a site-specific guideline for uranium-238 was not determined. Remedial action guidelines for surface contamination at ARC vary depending upon the primary contaminant. For areas where thorium-232 is the primary contaminant, the guidelines for surface contamination are 1,000 dpm/100 cm^2 average, 3,000 dpm/100 cm^2 maximum, and 200 dpm/100 cm^2 for removable contamination. For areas where uranium-238 is the primary contaminant, the guidelines for alpha decay are 5,000 dpm/100 cm^2 average, 15,000 dpm/100 cm^2 maximum, and 1,000 dpm/100 cm^2 for removable contamination.

1.4 SUMMARY

This report describes the methods used for the most recent characterization, which was performed subsequent to the 1987 remedial action at ARC, and presents characterization results. Characterization activities included review of historical data and radiological characterization of the following: interiors of 19 ARC buildings (walls, floors, structural and equipment surfaces, surfaces and residues in manholes, sumps, trenches, and miscellaneous storage containers); exterior surface and subsurface soil; building subfloor areas; buried and exposed piping; and the lime pit east of Building 31.

Characterization data include isotopic analysis results, total and removable alpha and beta-gamma contamination levels, and gamma

radiation exposure rates associated with ARC building surfaces. Section 4.0 describes survey procedures.

Results of this characterization show that the majority of surface measurements were at background levels and that most subsurface measurements fell within guidelines. Those measurements above guidelines for indoor/outdoor structure surface contamination were generally one to five times the applicable DOE guidelines and were usually of low-level, total beta-gamma radiation. Only seven items exhibited surface alpha measurements above applicable DOE guidelines.

Contaminated items identified include floors, walls, trenches, ceiling/attic structures, windows, sumps, various pieces of equipment, and areas of residual contamination underneath asphalted areas. Complete characterization results are reported in Section 5.0.

2.0 SITE DESCRIPTION AND HISTORY

2.1 LOCATION AND DESCRIPTION

The ARC site is located in Albany, Oregon, as shown in Figure 2-1. The ARC property is roughly rectangular in shape and covers an area of approximately 17 ha (36 acres). It is bounded on the north by Queen Avenue, on the east by Liberty Street, on the south by a tennis club, and on the west by Broadway Street. A plan view of the ARC site is shown in Figure 2-2.

The site consists of three main areas: ARC proper, which consists of a number of buildings in the northern and central sections of the site; a 0.8-ha (2-acre) biomass research facility (inactive) located at the site's approximate center; and a 5.7-ha (14-acre) open area identified as the "Back Forty," which occupies the south end of the facility.

2.2 SITE HISTORY

2.2.1 Background

ARC was established in 1943 to investigate innovative approaches for developing strategic mineral resources in the United States, reducing costs for metallurgical manufacturing processes, developing materials to fight corrosion, and other activities relevant to metallurgical research.

Various operations involving radioactive materials have been conducted at ARC. From 1948 to 1956, ARC conducted work for AEC involving the melting, machining, welding, and alloying of thorium. Additional work with uranium and thorium was performed at ARC for ERDA. In addition to work conducted for AEC and ERDA, ARC has performed work for others with radioactive materials that resulted in some building contamination not subject to FUSRAP remedial requirements.

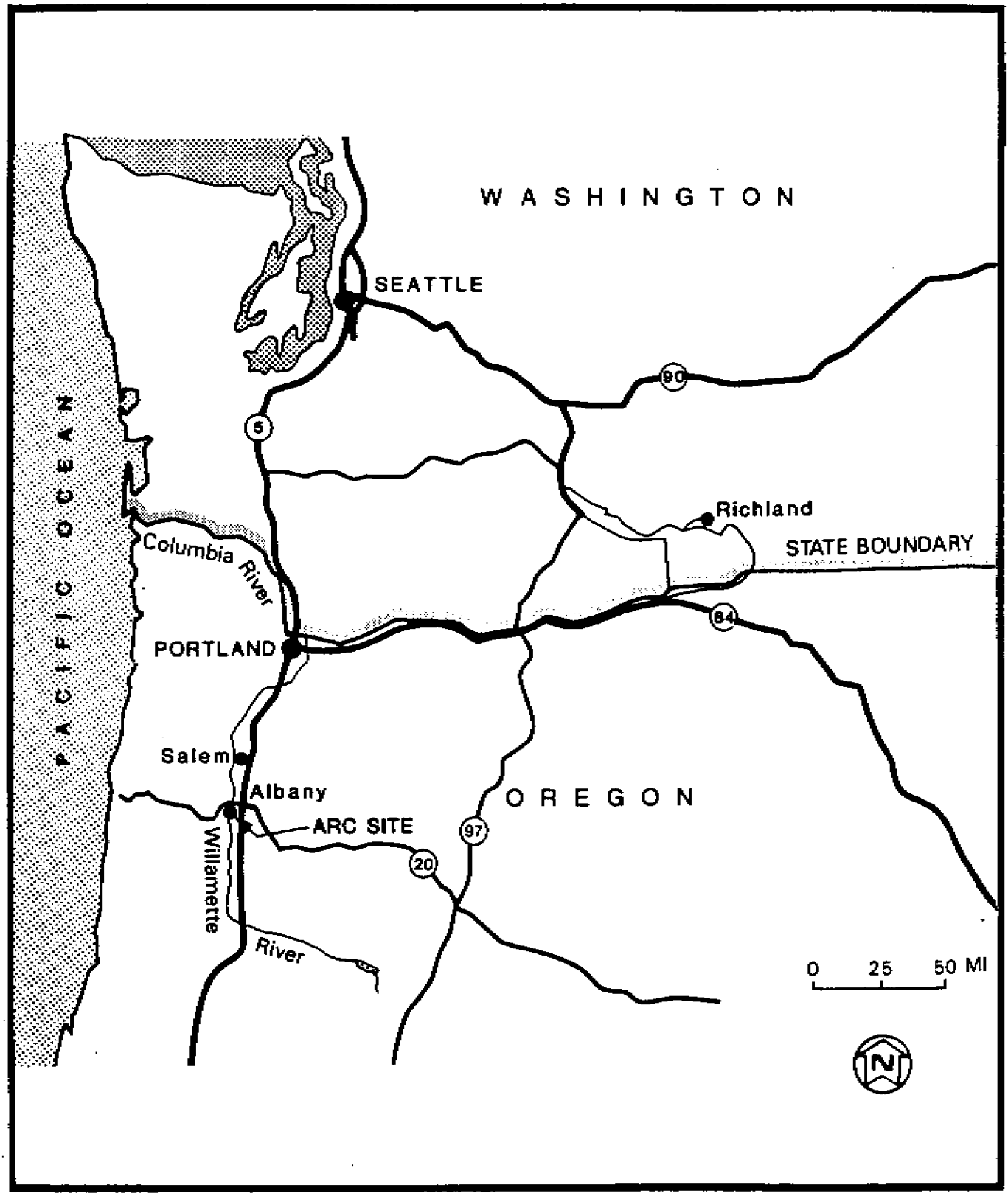


FIGURE 2-1 LOCATION OF THE ALBANY RESEARCH CENTER

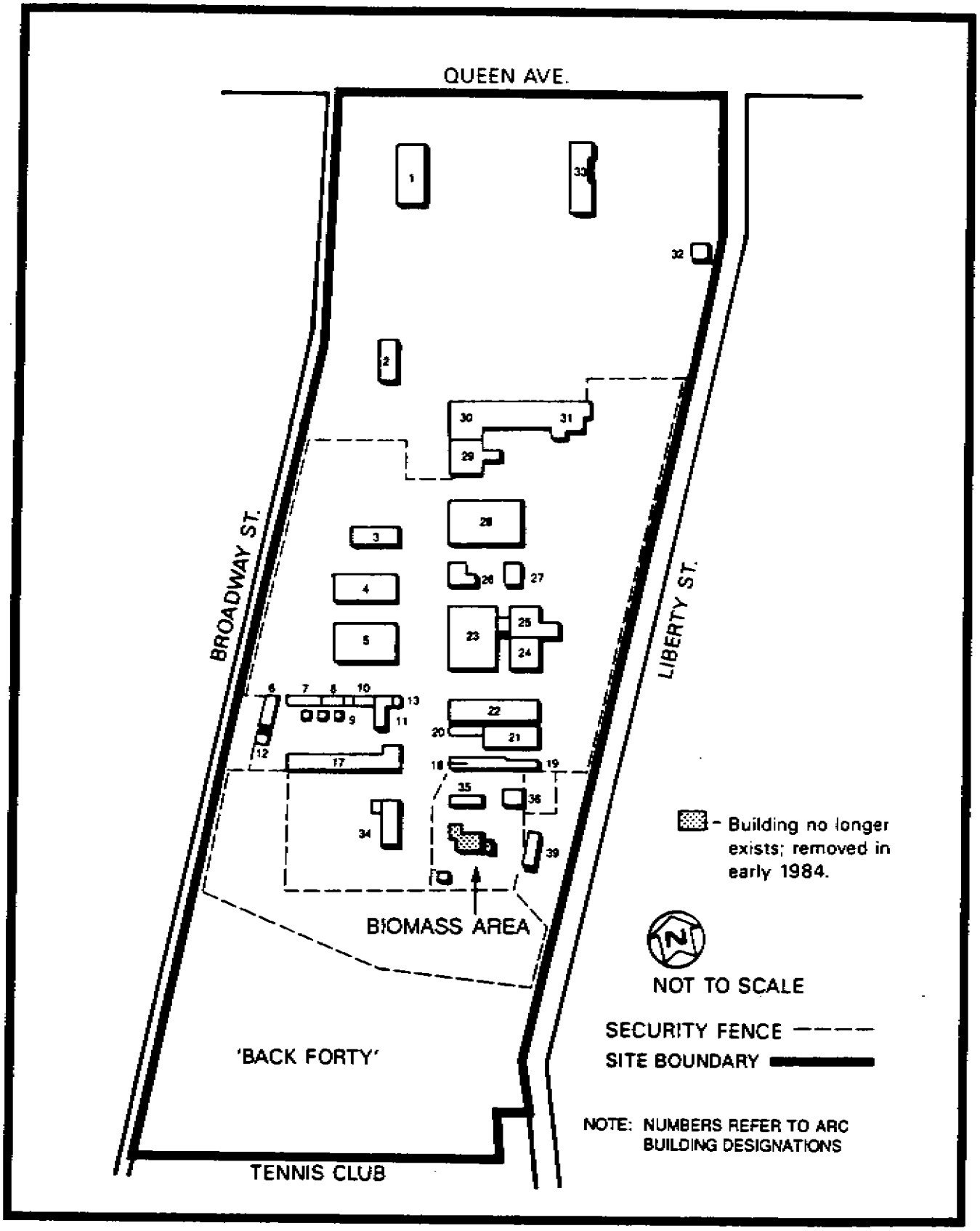


FIGURE 2-2 PLAN OF THE ALBANY RESEARCH CENTER

During the era of AEC and ERDA contracts (1948 to 1976), process buildings and surroundings were decontaminated at various times to guidelines acceptable to AEC, ERDA, and DOE. The decontamination guidelines provided at those times were not as stringent as those in effect in 1978 when work at ARC was terminated, and the records relating to the decontamination effort were not adequate to determine if the buildings and surrounding areas met the 1978 DOE radiological guidelines. As a result, a radiological assessment of ARC was initiated by ANL in 1978. Subsequent to this assessment, ANL advised that although the levels of contamination at ARC did not pose an immediate health hazard, further decontamination of the property was advisable (Refs. 1 and 2).

2.2.2 Previous Radiological Surveys

From June 1978 through September 1982, ANL and A. H. Environment, Inc. (AHE) conducted surveys of specific buildings and grounds on the ARC site to evaluate existing radiological conditions (Refs. 1, 2, and 4). Results of this work indicated that Buildings 1, 5, 17, 23, 25, 26, 27, 28, 30, and 31 contained a few small areas contaminated above remedial action guidelines. No contamination above guidelines was observed in the five buildings located in the biomass research facility area (Ref. 2).

Exterior contamination was also reported at 26 locations on unpaved areas and at 33 locations on paved areas. The vertical extent of contamination was generally confined to the top 0.3 m (1 ft) of soil. The deepest contamination exceeding DOE guidelines was at approximately 1 m (3 ft). The contamination consisted mainly of natural thorium, with lesser amounts of natural uranium.

Early in 1984, DOE directed BNI to initiate a radiological survey program to expand the data base developed by ANL and AHE. A thorough surface beta-gamma survey was conducted in all field areas at 2.5-m (8.2-ft) intervals, both at the soil surface and at approximately 0.3 m (1 ft) above the surface. Approximately 100 boreholes 0.15 m (0.5 ft) in diameter were drilled to permit surface

and subsurface soil analyses and gamma logging activities. Surface water samples from on-site standing-water areas and off-site surface water samples taken from the Back Forty drainage system were analyzed for radioactive content. Sediment samples from suspect sewers, septic tanks, and drain lines were also analyzed. All soil, water, and sediment samples were analyzed for uranium-238, radium-226, and thorium-232.

Sixteen buildings were surveyed for alpha and beta-gamma contamination. Suspect areas were also monitored for removable alpha and beta-gamma contamination. Selection of buildings for characterization was based solely on previous ANL findings and on ARC-supplied information. Results of this survey were published in January 1985 (Ref. 5). These results were used to define the scope of remedial action implemented by BNI during 1987.

2.2.3 1987 Site Remedial Action

Eleven buildings (Buildings 2, 4, 5, 17, 19, 23, 27, 28, 29, 30, and 31) were subjected to remedial action involving, in varying degrees, the surfaces of floors, walls, structural members, and equipment. Remedial activities varied from wiping and vacuum cleaning to removal of concrete surfaces by scabbling. A total volume of 306 m^3 (400 yd^3) of contaminated building material and 51 m^3 (67 yd^3) of equipment was removed and shipped to the Hanford Reservation during this remediation.

Remedial action was performed on 31 exterior areas and included the excavation of contaminated soil. A total volume of 2,277 m^3 (2,978 yd^3) of contaminated soil was shipped to the Hanford Reservation during this remedial action.

Interior concrete surfaces subjected to aggressive cleaning were patched and repainted, when necessary, to restore them to conditions previously agreed to by DOE and ARC. Disturbed soil surfaces were restored to their original conditions.

3.0 HEALTH AND SAFETY

As PMC for FUSRAP, BNI is responsible to DOE for ensuring the health and safety of personnel engaged in FUSRAP-related activities at the ARC site. Accordingly, an evaluation of various parameters for health and safety considerations was completed in early 1987, before the beginning of remedial action at the facility. Parameters evaluated included toxic hazards, fire and explosion hazards, confined space hazards, and corrosive hazards. Results of this evaluation were used to establish an appropriate health and safety plan for subsequent FUSRAP activity.

The FUSRAP Project Safety and Health Manual (Ref. 6) serves as the authorizing document for generic health and safety measures for FUSRAP sites. Specific project instructions contained in the manual provide guidance in areas such as dosimetry, bioassay, protective clothing/equipment, and training requirements. In addition to these requirements, health and safety procedures were developed specifically for conditions at ARC (Ref. 7). All FUSRAP personnel and FUSRAP subcontractor personnel complied with applicable project health and safety requirements during implementation of the ARC characterization effort.

4.0 CHARACTERIZATION PROCEDURES

The ARC characterization consisted of gamma logging 42 boreholes and surveying suspect areas within 19 site buildings (Buildings 1, 2, 3, 4, 5, 17, 19, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, and 39). The characterization was based on investigations of ARC project history obtained by interviewing personnel with historical knowledge of the ARC facility and activities conducted there.

4.1 DOWNHOLE GAMMA LOGGING

The locations of exterior and interior boreholes were chosen using the following criteria:

- Potential subsurface contamination as indicated by the site history investigation
- Potential subsurface contamination as indicated by areas of known surface contamination

The downhole gamma logging technique was used because the procedure can be completed more quickly than collecting soil samples, and it eliminates the need for analyzing samples in a laboratory. A 5-cm (2-in.) by 5-cm sodium iodide gamma scintillation detector was used to perform the downhole logging. For this instrument, it was determined that a count rate, including daughters, of approximately 40,000 cpm above background corresponds to the 15-pCi/g subsurface contamination guideline for thorium-232 (Ref. 8), and approximately 15,000 cpm corresponds to the 5-pCi/g surface contamination guideline for thorium-232. This relationship has been corroborated by results from previous characterizations when thorium-232 was found to be the major contaminant.

Based on earlier characterization work, it is known that thorium-232 is the primary contaminant at ARC. Therefore, parameters for soil sample analysis were selected to ensure that thorium-232 would be detected and measured at concentrations well below the guideline value of 15 pCi/g (in excess of the background level). Due to the

limited on-site use of uranium, most of the levels of uranium-238 were below the detection sensitivity of the analytical procedure used. Such concentrations are reported in soil data tables as "less than" (<) values. Detectable levels of radium-226 were found only in a few locations.

To accomplish downhole logging, boreholes were drilled to a specified depth or until the hole penetrated to a depth beneath the contaminated material. After a borehole was drilled to adequate depth, it was temporarily lined with a closed-end, water-tight, 10.2-cm- (4-in.-) diameter polyvinyl chloride (PVC) pipe or equivalent. The probe was then lowered into the pipe to obtain a profile of the contamination. Gamma radiation measurements were taken at 0.3-m (1-ft) intervals to determine the depth and concentration of contamination. Subsection 5.2 provides gamma logging results from the boreholes.

In boreholes where samples were collected for isotopic analysis, both analysis results and gamma logging results were evaluated to identify contaminated areas.

Soil samples were taken in ten boreholes. The samples were taken at 0.3-m (1-ft) intervals at a depth of 0.3 to 3.0 m (1 to 9.8 ft) and analyzed for uranium-238, thorium-232, and radium-226. Subsection 5.5 provides analysis results for soil samples from the boreholes.

4.2 RADIOLOGICAL SURVEYS OF BUILDINGS

Selection of buildings for inclusion in this characterization program was based on the following criteria:

- Historical information
- Radiological data gathered during the course of previous remedial action
- Uncertainty or lack of previous characterization information

Beta-gamma surface measurements were taken with pancake geometry Geiger-Mueller tube detectors (EIC model HP-210/HP-260 and Bicron instruments). Surface alpha measurements were made with 59-cm^2 (9-$in.^2$) zinc sulfide (ZnS) scintillation probes (EIC model AC-3) coupled with PRS-1 ratemeter/scaler instruments. Gamma measurements were made with 5-cm (2-in.) by 5-cm sodium iodide detectors (EIC model SPA-3) coupled with PRS-1 ratemeter/scaler instruments. Removable alpha measurements were taken with a silver-activated zinc sulfide [ZnS(Ag)] scintillation counter (EIC model SAC-4).

5.0 CHARACTERIZATION RESULTS

Radiological characterization activities at ARC consisted of several types of surveys designed to identify and quantify residual contamination. Survey results were compared with the DOE guidelines presented in Subsection 1.3 when determining the presence, or suspected presence, of residual contamination.

5.1 BACKGROUND RADIATION MEASUREMENTS

Background radiation measurements taken and radionuclide concentrations measured in soil during the 1984 survey program (Ref. 5) are presented in Table 5-1. The background measurements are applicable in evaluating the results of this survey. Use of the "less than" (<) notation in reporting results indicates that the radionuclide was not present in concentrations that are quantifiable with the instruments and techniques used. The "less than" value represents the lower limit of the quantitative capacity of the instrument and technique used. This value is based on various factors, including volume, size, and weight of the sample for bulk samples; surface area of the detector for direct and removable alpha and beta-gamma measurements; type of detector used; counting time; and background count rate. The actual concentration of the radionuclide is less than the value indicated. Because radioactive decay is a random process, no precise correlation between the rate of disintegration and a given radionuclide concentration can be established with the instruments and techniques used. For this reason, the exact concentration of the radionuclide cannot be determined. As such, each value that can be quantitatively determined has an associated uncertainty term (±) that represents the amount by which the actual concentration may differ from the value given in the table. The uncertainty term has an associated confidence level of 95 percent.

TABLE 5-1

BACKGROUND RADIATION MEASUREMENTS AND RADIONUCLIDE CONCENTRATIONS IN SOIL AT ARC

(1984 Survey Program)

Locations[a]	Gamma Exposure Rate at 1 m (μR/h)	Gamma at 1 m (cpm)	Surface Beta-Gamma Dose Rates (mrad/h)	Radionuclide Concentration (pCi/g)		
				U-238	Ra-226	Th-232
1	8.0	6,203	0.03	<1.0[b]	1.0 ± 0.5	1.2 ± 0.4
2	7.9	6,025	0.03	<1.0[b]	1.1 ± 0.8	< 0.2[b]
3	8.8	8,060	0.02	<1.0[b]	2.7 ± 0.8	< 0.2[b]
4	9.1	8,261	0.04	<1.0[b]	0.4 ± 0.6	0.4 ± 0.6
5	7.4	5,224	0.03	<1.0[b]	1.2 ± 0.5	< 0.2[b]
6	6.1	4,707	0.02	<1.0[b]	< 0.4[b]	< 0.2[b]
Average[c]	7.9	6,413	0.03	<1.0[b]	1.1 ± 0.5	0.4 ± 0.2

[a]Background locations are at distances of 500 to 3,700 m from the ARC site.

[b]Use of the "less than" (<) notation in reporting results indicates that the radionuclide was not present in concentrations that are quantifiable with the instruments and techniques used. Concentrations are dependent on many variables (e.g., sample size, moisture content, other radionuclide peaks present, etc.).

[c]For the purpose of calculating an average, the "less than" values were considered to be the maximum possible value (e.g., <0.2 was considered to be 0.2).

5.2 DOWNHOLE GAMMA LOGGING RESULTS

Forty-two boreholes were drilled and gamma logged to varying depths. Most of the boreholes were drilled outside the buildings, as shown in Figure 5-1. The gross radioactivity of surface and subsurface soil was measured both beneath building floors and in outside areas; results are presented in Table 5-2. A count rate, including daughters, of approximately 40,000 cpm corresponds to a 15-pCi/g subsurface contamination guideline for thorium-232 (Ref. 8).

Borehole locations were chosen to define the horizontal and vertical boundaries of potential subsurface contamination. The major portion of the gamma logging characterization effort concentrated on investigation of seven potential areas of subsurface contamination, briefly described in the following subsections. Based on background information and site history, contamination was suspected to be present within 0.3 to 0.45 m (1 to 1.5 ft) of the surface. To define the vertical extent of contamination, most boreholes were drilled to a depth of 1.5 m (5 ft).

5.2.1 Dismantled Tin Plant

Fifteen boreholes were drilled and gamma logged in an effort to locate the buried metallic remnants of a tin plant that is believed to have contained some radioactive contamination and buried baghouse residue. The area investigated is outside, between Buildings 17, 18, 34, and 35. These boreholes are identified as boreholes 20 through 34 in Table 5-2 and Figure 5-1. They were drilled to a depth of 1.5 m (5 ft), and gamma logging points were measured at the surface and at 0.3-m (1-ft) increments. Results of these measurements indicated that the area was not contaminated above guidelines. Gamma readings of the surfaces ranged from 6,500 to 8,700 cpm, and subsurface readings ranged from 10,900 to 19,900 cpm.

5.2.2 Storage Yard

Four 1.2-m- (4-ft-) deep boreholes were drilled and gamma logged in an attempt to locate contaminated metal possibly buried in a storage yard near Buildings 7, 8, 9, and 10. These holes are identified as boreholes 12, 13, 14, and 15, as shown in Table 5-2 and Figure 5-1. No metal was found, and three of the borehole measurements approximated background levels (6,800 to 14,400 cpm). Gamma logging results from borehole 15 indicated slightly elevated radioactivity (however, below DOE guidelines), with a surface gamma reading of 10,200 cpm, a peak measurement of 36,076 cpm at 0.15 m (0.5 ft), and a minimum of 12,300 cpm at 1.2 m (5 ft).

Subsection 5.5 discusses results of isotopic analyses of soil samples from boreholes 13, 14, and 15.

5.2.3 Lime Pit

Boreholes 37 and 38 were drilled near the lime pit east of Building 31 to investigate possible soil contamination. Borehole 37 collapsed before gamma readings (other than an elevated surface measurement of 72,400 cpm) could be taken. Measurements taken in borehole 38 indicated minimal soil contamination. The elevated surface measurement could have resulted from past operations involving torch-cutting of thorium plate in this area. The potential for subsurface contamination in this area still exists and will be investigated during future on-site FUSRAP activities.

Subsection 5.5 discusses isotopic analyses for boreholes 37 and 38.

5.2.4 Lower-Level Floor in Building 5

Boreholes 39 through 42 were drilled and gamma logged to investigate the possibility of contamination associated with an original floor covered by the present floor in Building 5 (see Table 5-2 and

Figure 5-1). Measurements were obtained from the surface to a depth of 1.5 m (5 ft). These measurements were below DOE guidelines, ranging from 6,300 to 17,500 cpm.

5.2.5 Lower-Level Floor in Building 17

Boreholes 1 through 11 were drilled in Building 17 to investigate subsurface contamination associated with an original floor and with the soil below the loading dock and the open storage areas at the west end of the building. Measurements from two of these boreholes (boreholes 4 and 7 for the open storage areas) indicated contamination levels exceeding DOE guidelines. Measurements from these two boreholes ranged from 7,400 to 45,200 cpm. Measurements taken from the other nine boreholes ranged from 7,300 to 24,100 cpm.

Subsection 5.5 provides results of isotopic analyses for Boreholes 1 through 9.

5.2.6 Drilling Southeast of Building 39

Two 3.0-m- (10-ft-) deep boreholes (boreholes 35 and 36) were drilled and gamma logged southeast of Building 39 to investigate the possibility of buried radioactive waste, reportedly emplaced during the early years of site operation. The resulting measurements did not indicate the presence of buried waste.

Subsection 5.5 discusses isotopic analyses for boreholes 35 and 36.

5.2.7 Drilling Outside of Building 3

Four boreholes were drilled outside near the south wall of Building 3 to determine whether earlier detection of slightly elevated gamma measurements could have originated with subsurface soil contamination between Buildings 3 and 4. Gamma logging results indicated no such contamination.

5.3 BUILDING AND EQUIPMENT SURFACES CHARACTERIZATION

Radiological characterization of interior surfaces was performed at 19 buildings (Buildings 1, 2, 3, 4, 5, 17, 19, 23, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, and 39), one of which (Building 5) also required characterization of some exterior surfaces. Results of the surveys are presented in Table 5-3. Background levels have been subtracted from the results reported in the table; therefore, ranges and averages represent the level of contamination above background.

Table 5-3 includes all areas and items surveyed regardless of the suspected origin of contamination. Items shown on Figures 5-2 through 5-21 are either contaminated or suspected to be contaminated in excess of DOE guidelines. A definitive determination is not possible for some marginally contaminated areas without additional measurements. Other areas are suspected of being contaminated because of their association with contaminated items (e.g., piping associated with contaminated drains). Followup surveys of items will be conducted during future on-site FUSRAP activities. Figures 5-10 and 5-19 also show specific locations in Buildings 23 and 31 where asbestos was found.

In April 1989, an ORAU survey found contamination to be present in areas in Building 23 not determined to be contaminated by this survey. Contamination of these areas may have taken place after this survey was conducted as a result of ongoing ARC activities with zircon sand. This building will be resurveyed during future on-site FUSRAP activities.

Characterization activities inside the buildings included measurements for surface beta-gamma, surface alpha, gamma and, in a few cases, removable alpha and removable beta-gamma. In some locations, only beta-gamma radiation was measured because overlying paint, tile, or rough surfaces would attenuate any alpha contamination. The instruments used for this characterization are discussed in Subsection 4.2.

The majority of characterized surface areas that exceed DOE guidelines include floors, walls, cabinet surfaces, sumps, trenches, drains and associated piping, and equipment.

Results of the isotopic analyses of soil samples and sludge samples from the drains, pipes, and trenches are discussed in Subsection 5.5.

5.4 GAMMA LOGGING OF FLOOR DRAINS

The embedded floor drains in Building 30 were characterized by gamma logging. Results of this effort are presented in Table 5-4. The measurements include background and were obtained by moving a gamma detector into the drain pipe in 0.15-m (0.5-ft) increments, taking gross activity readings at each step. The locations of the listed floor drains are identified in Figure 5-18.

5.5 ISOTOPIC ANALYSES OF SOIL AND SLUDGE

Isotopic analyses were performed on samples of soil and sludge to determine levels of uranium-238, radium-226, and thorium-232. Sampling locations were chosen based on the potential for contamination to be present.

Analyses were performed on samples of subfloor soil and of sludges associated with trenches, drains and piping, sumps, and boreholes in Buildings 4, 5, 17, 23, 24, 28, 30, and 31. In addition, soil samples from exterior boreholes 13, 14, 15, 16, 17, 18, 19, 35, 36, 37, and 38 were analyzed. The samples were taken at 0.3-m (1-ft) intervals at depths of 0.3 m (1 ft) to 3.0 m (9.8 ft). Analytical results are reported in Table 5-5. Elevated readings were obtained most often in sludges present in drains, pipes, and trenches.

Ranges of contaminant concentrations were as follows:

Uranium-238	<1 to 2100 ± 200 pCi/g
Radium -226	<0.6 to 570 ± 20 pCi/g
Thorium-232	<0.8 to 1800 ± 100 pCi/g

Results from the analyses were considered with the results of gamma logging to determine areas of contamination.

5.6 REVIEW OF PREVIOUS SURVEY DATA

A review of the results from previous surveys (Refs. 1 and 2) was conducted to ensure that all areas of potential contamination previously identified are addressed. This review identified several areas of contamination located by ANL that were not investigated during subsequent characterization efforts. The type and level of contamination at these locations are presented in Table 5-6. A summary discussion of these locations follows.

ANL locations 252, 257, and 258 are in Building 25 on the mezzanine (see Figure 5-12). ANL estimated the area of contamination as 2,000 cm^2 (310 $in.^2$) at ANL location 252 and as 1,000 cm^2 (160 $in.^2$) at ANL location 258. No areal estimate was given for ANL location 257. The readings for these locations are shown in Table 5-6. The mezzanine has been used primarily as a storage room. Subsequent BNI surveys have not identified contamination in this room in the vicinity of the ANL locations. It is likely that contaminated materials stored at these locations were removed after the ANL survey.

ANL location 134 is in Room 8 of Buildings 30 and 31, as shown in Figure 5-19. The size of the contaminated area in this room was not estimated in the ANL survey report (Ref. 1). TMA/E surveyed Room 8 in June 1988 and found no radiation levels exceeding DOE guidelines. ANL locations 39, 40, 41, 43, 44, and 45 are between Buildings 26 and 27, as shown in Figure 5-1. The contaminated area was identified as concrete and was estimated to be 1,000 cm^2 (160 $in.^2$) for ANL locations 39, 40, and 43, and 9,000 cm^2 (1,400 $in.^2$) for ANL location 41. ANL locations 44 (sewer) and 45 (grate) were reported to have contaminated areas of 1,000 cm^2 (160 $in.^2$) and 300 cm^2 (50 $in.^2$), respectively. ANL readings

for these locations are given in Table 5-6. TMA/E resurveyed the area between these buildings in June 1988 and did not find radiation levels exceeding DOE criteria. It is suspected that asphalt applied to this area after the ANL survey resulted in the attenuation of radiation from the subsurface source. This area will be investigated further during future on-site FUSRAP activities.

ANL locations 28 through 31 are all on the south side of Buildings 30 and 31, as shown in Figure 5-1. The size of the contaminated area was 1,000 cm^2 (160 $in.^2$) for ANL location 28 (side of the building); 150,000 cm^2 (23,000 $in.^2$) for ANL location 29 (lawn); 100 cm^2 (16 $in.^2$) for ANL location 30 (concrete); and 1,000 cm^2 (160 $in.^2$) for ANL location 31 (concrete). Readings for ANL location 31 are given in Table 5-6. In June 1988, TMA/E surveyed this area and found levels of radioactivity above background. Therefore, this area will be investigated further during future on-site FUSRAP activities.

6.0 CONCLUSION

This report was developed to provide the results of the radiological survey completed in early 1988 at ARC. Three boreholes (4, 7, and 37) contained levels of contamination that exceeded DOE guidelines, and numerous surfaces on items in 15 buildings exceeded applicable DOE guidelines. In addition, several areas and surfaces, including Building 23, require further investigation, which will be conducted during future on-site FUSRAP activities.

TABLE 5-2

BOREHOLE GAMMA LOGGING RESULTS AT ARC

Borehole No.	Corre-sponding Figure No.	Depth[a] (m)	Count Rate[b,c] (cpm)	Comments
1	5-7	Surface	9,412	Location - Building 17
		0.3	10,907	Open Storage
		0.6	11,595	
		0.9	12,001	
2	5-7	Surface	7,270	Location - Building 17
		Below Surface	12,807	Open Storage
		0.3	15,043	
		0.6	16,477	
		0.9	16,721	
3	5-7	Surface	9,275	Location - Building 17
		0.3	10,591	Open Storage
		0.6	11,631	
		0.9	12,267	
4	5-7	Surface	7,398	Location - Building 17
		Below Surface	16,590	Open Storage
		0.3	30,879	
		0.6	44,806	
		0.9	20,692	
5	5-7	Surface	9,085	Location - Building 17
		0.3	10,700	Open Storage
		0.6	11,352	
		0.9	12,657	
6	5-7	Surface	8,511	Location - Building 17
		0.3	11,767	Open Storage
		0.6	16,138	
		0.9	24,097	
7	5-7	Surface	7,040	Location - Building 17
		Below Surface	12,773	Open Storage
		0.3	45,185	
		0.6	17,698	
		0.9	17,119	
8	5-7	Surface	12,614	Location - Building 17
		0.3	12,354	Loading Dock
		0.6	13,654	
		0.9	12,746	
		1.2	12,329	
		1.5	12,624	

TABLE 5-2

(continued)

Borehole No.	Corre-sponding Figure No.	Depth[a] (m)	Count Rate[b,c] (cpm)	Comments
9	5-7	Surface	14,849	Location - Building 17
		0.3	14,372	Loading Dock
		0.6	13,933	
		0.9	13,371	
		1.2	12,420	
		1.5	12,392	
10	5-7	Surface	8,428	Location - Building 17
		Below Surface	12,904	Lab 10
		0.3	16,261	
		0.6	19,253	
		0.9	17,519	
		1.1	18,363	
11	5-7	Surface	34,371	Location - Building 17
		Below Surface	38,454	Men's Room
		0.3	36,764	
		0.6	19,459	
		0.9	17,961	
12	5-1	Surface	8,585	Location - South of
		0.3	12,694	Building 7
		0.6	13,974	
		0.9	13,047	
		1.2	12,906	
		1.5	13,144	
13	5-1	Surface	6,756	Location - South of
		0.3	13,612	Building 14
		0.6	14,352	
		0.9	13,750	
		1.2	12,267	
		1.5		Hole Sloughed Off
14	5-1	Surface	6,827	Location - South of
		0.3	13,962	Building 16
		0.6	14,386	
		0.9	13,301	
		1.2	12,594	Reading Taken in Water

TABLE 5-2

(continued)

Borehole No.	Corre-sponding Figure No.	Depth[a] (m)	Count Rate[b,c] (cpm)	Comments
15	5-1	Surface	10,233	Location - South of
		0.15	36,076	Building 16
		0.3	32,332	
		0.6	24,913	
		0.9	22,080	
		1.2	15,852	Reading Taken in Water
16	5-3	Surface	9,500	Location - South of
		0.3	12,833	Building 3
		0.6	13,737	
		0.9	13,714	
		1.2	12,263	Reading Taken in Water
17	5-3	Surface	8,786	Location - South of
		0.3	12,949	Building 3
		0.6	13,875	
		0.9	13,622	
		1.2	12,599	Reading Taken in Water
18	5-3	Surface	8,443	Location - South of
		0.3	12,600	Building 3
		0.6	12,985	
		0.9	12,230	
		1.2	11,934	Reading Taken in Water
19	5-3	Surface	8,968	Location - South of
		0.3	12,300	Building 3
		0.6	12,992	
		0.9	11,956	
		1.2	11,702	Reading Taken in Water
20	5-1	Surface	6,868	Location - South of
		0.3	11,058	Building 17
		0.6	15,408	
		0.9	15,924	
		1.2	15,979	
		1.5	14,419	
21	5-1	Surface	6,518	Location - North of
		0.3	13,612	Building 34
		0.6	16,032	
		0.9	16,200	
		1.2	15,258	
		1.5	13,738	

TABLE 5-2

(continued)

Borehole No.	Corre-sponding Figure No.	Depth[a] (m)	Count Rate[b,c] (cpm)	Comments
22	5-1	Surface	7,480	Location - East of Building 34
		0.3	12,646	
		0.6	17,540	
		0.9	17,320	
		1.2	15,566	
		1.5	15,536	
23	5-1	Surface	7,779	Location - East of Building 34
		0.3	12,054	
		0.6	16,593	
		0.9	16,483	
		1.2	13,942	
		1.5	12,986	
24	5-1	Surface	8,604	Location - East of Building 34
		0.3	15,929	
		0.6	16,742	
		0.9	16,099	
		1.2	15,602	
		1.5	14,092	
25	5-1	Surface	8,281	Location - West of Building 35
		0.3	15,229	
		0.6	17,020	
		0.9	15,810	
		1.2	14,746	
		1.5	14,124	
26	5-1	Surface	8,700	Location - West of Building 35
		0.3	10,921	
		0.6	11,599	
		0.9		Hole Collapsed
		1.2		
		1.5		
27	5-1	Surface	7,763	Location - Between Buildings 34 and 35
		0.3	14,032	
		0.6	16,214	
		0.9	16,134	
		1.2	14,682	
		1.5	15,105	

TABLE 5-2

(continued)

Borehole No.	Corre-sponding Figure No.	Depth[a] (m)	Count Rate[b,c] (cpm)	Comments
28	5-1	Surface	7,656	Location - Between Buildings 34 and 35
		0.3	15,341	
		0.6	16,517	
		0.9	15,998	
		1.2	15,796	
		1.5	15,638	
29	5-1	Surface	7,343	Location - Between Buildings 34 and 35
		0.3	13,396	
		0.6	16,377	
		0.9	16,832	
		1.2	16,730	
		1.5	15,003	
30	5-1	Surface	8,569	Location - Between Buildings 17 and 18
		0.3	12,889	
		0.6	14,906	
		0.9	13,862	
		1.2	14,647	
		1.5	13,285	
31	5-1	Surface	7,037	Location - Between Buildings 17 and 18
		0.3	13,094	
		0.6	16,283	
		0.9	16,395	
		1.2	15,947	
		1.5	15,282	
32	5-1	Surface	8,568	Location - West of Building 18
		0.3	15,839	
		0.6	16,286	
		0.9	15,398	
		1.2	15,553	
		1.5	15,246	
33	5-1	Surface	7,730	Location - NW of Building 35
		0.3	17,281	
		0.6	18,938	
		0.9	19,937	
		1.2	17,772	
		1.5	17,723	

TABLE 5-2

(continued)

Borehole No.	Corre-sponding Figure No.	Depth[a] (m)	Count Rate[b,c] (cpm)	Comments
34	5-1	Surface	8,140	Location - SW of
		0.3	12,677	Building 35
		0.6	16,604	
		0.9	16,053	
		1.2	14,974	
		1.5	15,347	
35	5-1	Surface	11,437	10.2-cm (4-in.) Sch. 40
		0.3	29,307	PVC casing utilized.
		0.6	23,039	Location - South of
		0.9	17,684	Building 39
		1.2	14,148	
		1.5	13,031	
		1.8	12,723	
		2.1	11,777	
		2.4	11,110	
		2.7	10,486	
		3.0	10,226	
36	5-1	Surface	6,795	10.2-cm (4-in.) Sch. 40
		0.3	16,075	PVC casing utilized.
		0.6	16,601	Location - South of
		0.9	14,604	Building 39
		1.2	13,845	
		1.5	13,812	
		1.8	13,348	
		2.1	11,714	
		2.4	12,827	
		2.7	12,187	
		3.0	11,625	
37	5-1	Surface	72,421	Location - Building 31
				Lime Pit Area
				Hole Collapsed
38	5-1	Surface	11,024	Location - Building 31
		0.3	12,446	Lime Pit Area
		0.6	10,389	
		0.9	10,561	
		1.2	9,080	
		1.5		Hole Collapsed

TABLE 5-2

(continued)

Borehole No.	Corre-sponding Figure No.	Depth[a] (m)	Count Rate[b,c] (cpm)	Comments
39	5-5	Surface	7,560	Location - Building 5
		Below Surface	10,500	
		0.3	14,500	
		0.6	15,890	
		0.9	14,900	
40	5-5	Surface	6,300	Location - Building 5
		Below Surface	10,400	
		0.3	13,840	
		0.6	16,720	
		0.9	16,850	
41	5-5	Surface	6,350	Location - Building 5
		Below Surface	10,320	
		0.3	12,930	
		0.6	16,190	
		0.9	17,500	
42	5-5	Surface	8,800	Location - Building 5
		Below Surface	10,320	
		0.3	15,260	
		0.6	16,660	
		0.9	15,546	

[a]1 m is equivalent to 3.3 ft.

[b]Measurements include background.

[c]The values presented are actual measurements as recorded by survey personnel. These measurements will fluctuate depending on instrument and techniques used.

TABLE 5-3

BUILDING CHARACTERIZATION RESULTS AT ARC

Interior Measurement Location		Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 1 (Figure 5-2)							
Room 116	Floor/Wall Interface	Surface Alpha	3	dpm/100 cm^2	210 - 2100	1200	1
	Floor	Surface Beta-Gamma	3	dpm/100 cm^2	3100 - 19000	9100	2
Room 302	Floor	Gamma	3	μR/h	0.3 - 0.8	0.5	
	Samples	Gamma	1	μR/h	4.5	—	
Room 303	Floor	Gamma	7	μR/h	0 - 1.6	0.5	
Room 304	Floor	Gamma	6	μR/h	0.6 - 1.4	1.0	
	Samples	Gamma	1	μR/h	29	—	3
Room 306	Floor	Surface Beta-Gamma	41	dpm/100 cm^2	0 - 1600	220	
		Gamma	13	μR/h	0 - 3.3	0.07	
	Sinks (6)	Surface Beta-Gamma	6	dpm/100 cm^2	0 - 790	190	
		Gamma	4	μR/h	0 - 0.3	0.1	
	Sink Drain (North Wall)	Surface Beta-Gamma	1	dpm/100 cm^2	170	—	
	Under Sink (North Wall) in Cabinet	Surface Beta-Gamma	7	dpm/100 cm^2	170 - 10900	3400	4
		Surface Alpha	1	dpm/100 cm^2	1100	—	
Infrared Lab Floor		Gamma	4	μR/h	1.0 - 2.2	1.4	
Men's Room Floor		Gamma	6	μR/h	0 - 2.4	0.9	
Building 3 (Figure 5-3)							
Room 101	Floor	Surface Beta-Gamma	14	dpm/100 cm^2	670 - 8000	3500	1

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 3 (continued)						
Room 101 Oven	Gamma	3	μR/h	8.7 - 12.5	11	
Room 102 Hydraulic Press	Surface Beta-Gamma	5	dpm/100 cm^2	2400 - 6200	4900	2
Room 103 Floor	Surface Beta-Gamma	19	dpm/100 cm^2	150 - 2200	730	
Zircon Sandpile	Surface Beta-Gamma	1	dpm/100 cm^2	13000	—	4
	Gamma	1	μR/h	30	—	
Crusher	Surface Beta-Gamma	1	dpm/100 cm^2	16400	—	3
	Gamma	1	μR/h	16	—	
Building 4 (Figure 5-4)						
Room 103 Drain	Surface Beta-Gamma	2	dpm/100 cm^2	1100 - 1200	1100	1
	Gamma	1	μR/h	1.9	—	
Drain	Surface Beta-Gamma	2	dpm/100 cm^2	1200 - 1200	1200	1
	Gamma	1	μR/h	1.8	—	
Drain	Surface Beta-Gamma	2	dpm/100 cm^2	790 - 1200	980	
	Gamma	1	μR/h	1.9	—	
Trench	Surface Beta-Gamma	32	dpm/100 cm^2	0 - 15000	1700	2
Room 104 Floor	Surface Beta-Gamma	63	dpm/100 cm^2	0 - 1040	490	
North Wall	Surface Beta-Gamma	11	dpm/100 cm^2	0 - 750	290	
North Floor/Wall Interface	Surface Beta-Gamma	6	dpm/100 cm^2	210 - 1100	530	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 4 (continued)						
Room 104 Ceiling Catwalk	Surface Beta-Gamma	32	dpm/100 cm^2	42 - 1500	760	
	Surface Alpha	8	dpm/100 cm^2	46 - 100	79	
Room 105 Drain	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
	Gamma	1	μR/h	0	—	
Manhole (North Wall)	Surface Beta-Gamma	1	dpm/100 cm^2	1200	—	3 & 4
(East Wall)	Surface Beta-Gamma	2	dpm/100 cm^2	1400 - 2200	1800	3 & 4
(South Wall)*	Surface Beta-Gamma	1	dpm/100 cm^2	1600	—	
(Bottom)	Surface Beta-Gamma	4	dpm/100 cm^2	2300 - 3000	2700	3 & 4
	Surface Alpha	2	dpm/100 cm^2	430 - 440	440	
	Gamma	1	μR/h	8.4	—	
Manhole (North Wall)	Surface Beta-Gamma	2	dpm/100 cm^2	1500 - 2300	1900	3 & 4
(East Wall)	Surface Beta-Gamma	2	dpm/100 cm^2	1700 - 2100	1900	3 & 4
(South Wall)	Surface Beta-Gamma	1	dpm/100 cm^2	830	—	
(Bottom)	Surface Beta-Gamma	4	dpm/100 cm^2	960 - 1600	1400	3 & 4
	Surface Alpha	1	dpm/100 cm^2	300	—	
	Gamma	1	μR/h	8.2	—	
Trench	Surface Beta-Gamma	6	dpm/100 cm^2	130 - 2300	770	
	Gamma	1	μR/h	0.5	—	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 4 (continued)						
Room 106 Trench	Surface Beta-Gamma	8	dpm/100 cm^2	460 - 15000	4700	5
	Surface Alpha	2	dpm/100 cm^2	270 - 460	370	
	Gamma	1	μR/h	23	—	
Drain Pipe (From Trench)	Surface Beta-Gamma	1	dpm/100 cm^2	6900	—	5
Mezzanine	Surface Beta-Gamma	11	dpm/100 cm^2	0 - 290	38	
Vent Duct	Surface Beta-Gamma	4	dpm/100 cm^2	620 - 3400	1600	6
Room 110 Drain	Surface Beta-Gamma	2	dpm/100 cm^2	220 - 300	220	
Drain	Surface Beta-Gamma	2	dpm/100 cm^2	570 - 1000	810	
West Wall	Removable Alpha	100	dpm/100 cm^2	0 - 8	*	
Floor	Removable Alpha	302	dpm/100 cm^2	0 - 3	*	
Room 206 Exhaust Fan	Surface Beta-Gamma	4	dpm/100 cm^2	3500 - 5400	4200	7
	Surface Alpha	4	dpm/100 cm^2	0 - 23	9	
Building 5						
Plumbing Shop & Storage Room Floor (Figure 5-5)	Surface Beta-Gamma	47	dpm/100 cm^2	130 - 29000	2100	1
	Gamma	1	μR/h	1.3	—	
Machine Shop Conduit	Surface Beta-Gamma	4	dpm/100 cm^2	980 - 2900	1900	2
	Surface Alpha	3	dpm/100 cm^2	150 - 940	470	

*Survey provided number of measurements and range of values not individual measurements. Average not able to be calculated.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 5 (continued)						
Machine Shop (continued)						
3.2-cm (1.25-in.) Pipe	Surface Beta-Gamma	7	dpm/100 cm^2	1200 - 4500	2600	3
	Surface Alpha	7	dpm/100 cm^2	400 - 1800	1100	
3.2-cm (1.25-in.) Pipe	Surface Beta-Gamma	4	dpm/100 cm^2	1100 - 1700	1300	3
	Surface Alpha	4	dpm/100 cm^2	250 - 500	340	
6.4-cm (2.5-in.) Pipe	Surface Beta-Gamma	3	dpm/100 cm^2	510 - 2100	1200	3
	Surface Alpha	3	dpm/100 cm^2	140 - 330	260	
Plumbing Shop & Storage Room (Figure 5-6)						
Ceiling	Surface Beta-Gamma	9	dpm/100 cm^2	0 - 11000	3600	4
Ceiling Supports	Surface Beta-Gamma	21	dpm/100 cm^2	380 - 30000	4800	4
Roof (Figure 5-6)						
Vent (#1)	Surface Beta-Gamma	6	dpm/100 cm^2	0 - 600	170	
Vent (#2)	Surface Beta-Gamma	5	dpm/100 cm^2	75 - 1200	490	
Vent (#3)	Surface Beta-Gamma	6	dpm/100 cm^2	0 - 1900	900	
Vent (#4)	Surface Beta-Gamma	7	dpm/100 cm^2	0 - 1200	540	
Blower	Surface Beta-Gamma	14	dpm/100 cm^2	670 - 49000	12000	1

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 5 (continued)						
Roof (continued)						
Vent	Surface Beta-Gamma	5	dpm/100 cm^2	110 - 1500	750	
Vent	Surface Beta-Gamma	3	dpm/100 cm^2	260 - 370	320	
Air Conditioner	Surface Beta-Gamma	2	dpm/100 cm^2	370 - 600	490	
Rain Gutter	Surface Beta-Gamma	47	dpm/100 cm^2	37 - 1300	480	
Horizontal Seam Flashing	Surface Beta-Gamma	35	dpm/100 cm^2	0 - 11000	2800	2
Spot	Surface Beta-Gamma	5	dpm/100 cm^2	1700 - 2900	2300	3
Building 17 (Figure 5-7)						
Room 10A Drain	Surface Beta-Gamma	1	dpm/100 cm^2	430	—	3
	Gamma	1	μR/h	56	—	
Floor, Wall	Surface Beta-Gamma	1	dpm/100 cm^2	3000	—	2
	Gamma	2	μR/h	18 - 29	24	
Men's Room						
Water Heater	Surface Beta-Gamma	1	dpm/100 cm^2	790	—	1
	Surface Alpha	1	dpm/100 cm^2	77	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 17 (continued)						
Men's Room (continued)						
Shower Stall	Surface Beta-Gamma	1	dpm/100 cm^2	830	—	
	Surface Alpha	1	dpm/100 cm^2	16	—	
Lockers**	Surface Beta-Gamma	1	dpm/100 cm^2	1000	—	
	Surface Alpha	1	dpm/100 cm^2	57	—	
Toilet Tank Top**	Surface Beta-Gamma	1	dpm/100 cm^2	2400	—	1
	Surface Alpha	1	dpm/100 cm^2	97	—	
Toilet Tank Top	Surface Beta-Gamma	1	dpm/100 cm^2	3100	—	1
	Surface Alpha	1	dpm/100 cm^2	160	—	
Toilet Seat	Surface Beta-Gamma	1	dpm/100 cm^2	87	—	
	Surface Alpha	1	dpm/100 cm^2	57	—	
Lavatory	Surface Beta-Gamma	1	dpm/100 cm^2	4100	—	1
	Surface Alpha	1	dpm/100 cm^2	170	—	
Towel Dispenser*,**	Surface Beta-Gamma	1	dpm/100 cm^2	1700	—	1
	Surface Alpha	1	dpm/100 cm^2	16	—	
Floor	Surface Beta-Gamma	7	dpm/100 cm^2	0 - 1400	580	
	Surface Alpha	7	dpm/100 cm^2	6 - 120	60	
Concrete Block*,**	Surface Beta-Gamma	1	dpm/100 cm^2	1500	—	
	Surface Alpha	1	dpm/100 cm^2	47	—	

*Item not indicated on figure.
**Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 17 (continued)						
Men's Room (continued)						
Pipe	Surface Alpha	1	dpm/100 cm^2	720	—	
Pipe	Surface Alpha	1	dpm/100 cm^2	910	—	
Room 10 East Wall	Surface Beta-Gamma	43	dpm/100 cm^2	350 - 10000	3300	6
Window #1	Surface Beta-Gamma	5	dpm/100 cm^2	3300 - 8300	6200	6
Window #2	Surface Beta-Gamma	8	dpm/100 cm^2	2400 - 26000	12000	6
Window #3	Surface Beta-Gamma	9	dpm/100 cm^2	2900 - 19000	8500	6
Window #4	Surface Beta-Gamma	8	dpm/100 cm^2	2300 - 25000	11000	6
South Wall	Surface Beta-Gamma	6	dpm/100 cm^2	2500 - 8700	6200	5
Floor	Surface Beta-Gamma	156	dpm/100 cm^2	600 - 26000	5200	8
	Surface Alpha	26	dpm/100 cm^2	100 - 2600	800	
Drain	Surface Beta-Gamma	1	dpm/100 cm^2	22000	—	4
	Surface Alpha	1	dpm/100 cm^2	270	—	
Drain (Inside)	Surface Beta-Gamma	1	dpm/100 cm^2	56000	—	4
Trench	Surface Beta-Gamma	4	dpm/100 cm^2	1400 - 2100	1700	7

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 17 (continued)						
Open Storage - Trench	Surface Beta-Gamma	5	dpm/100 cm^2	860 - 1400	1200	9
	Gamma	5	μR/h	1.3 - 1.9	1.6	
Trench	Surface Beta-Gamma	5	dpm/100 cm^2	900 - 1700	1400	9
	Gamma	5	μR/h	0.4 - 1.9	1.4	
Lockers	Surface Beta-Gamma	14	dpm/100 cm^2	2600 - 13000	5700	10
	Surface Alpha	14	dpm/100 cm^2	250 - 1100	680	
	Removable Alpha	15	dpm/100 cm^2	0 - 5.3	1.3	
2nd Floor Storage Room						
Cabinet	Surface Beta-Gamma	2	dpm/100 cm^2	3700 - 4700	4200	11
	Surface Alpha	2	dpm/100 cm^2	3600 - 3800	3700	
Cabinet	Surface Beta-Gamma	2	dpm/100 cm^2	3100 - 4500	3800	11
	Surface Alpha	2	dpm/100 cm^2	950 - 4100	2600	
Workbench	Surface Beta-Gamma	1	dpm/100 cm^2	6300	—	12
	Surface Alpha	1	dpm/100 cm^2	2700	—	
Cabinet*	Surface Beta-Gamma	1	dpm/100 cm^2	1500	—	
	Surface Alpha	1	dpm/100 cm^2	300	—	
Attic** - Truss #1	Surface Beta-Gamma	12	dpm/100 cm^2	0 - 3500	1200	
	Surface Alpha	14	dpm/100 cm^2	220 - 1000	610	
Truss #2	Surface Beta-Gamma	19	dpm/100 cm^2	560 - 14000	2300	
	Surface Alpha	21	dpm/100 cm^2	320 - 1400	730	

*Additional measurements required to determine if item is contaminated above guidelines.
**Radiological contaminant in Building 17 attic is U-238 (see Table 1-1 for criteria).

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 17 (continued)						
Attic (continued)						
Truss #3	Surface Beta-Gamma	19	dpm/100 cm^2	520 - 8200	3900	
	Surface Alpha	20	dpm/100 cm^2	370 - 4100	1300	
Truss #4	Surface Beta-Gamma	11	dpm/100 cm^2	2900 - 30000	13000	13
	Surface Alpha	17	dpm/100 cm^2	950 - 6100	2500	
Truss #5	Surface Beta-Gamma	8	dpm/100 cm^2	8200 - 36000	16000	13
	Surface Alpha	13	dpm/100 cm^2	1300 - 5300	2300	
Truss #6	Surface Beta-Gamma	12	dpm/100 cm^2	3300 - 21000	9400	13
	Surface Alpha	11	dpm/100 cm^2	400 - 3000	1200	
Rafters	Surface Beta-Gamma	207	dpm/100 cm^2	0 - 91000	6900	14
	Surface Alpha	207	dpm/100 cm^2	0 - 6300	1100	
Floor	Surface Beta-Gamma	218	dpm/100 cm^2	0 - 79000	3900	14
	Surface Alpha	218	dpm/100 cm^2	10 - 2700	450	
	Removable Alpha	28	dpm/100 cm^2	6 - 120	40	
Center Platform	Surface Beta-Gamma	2	dpm/100 cm^2	1000 - 2600	1800	
	Surface Alpha	2	dpm/100 cm^2	100 - 1300	690	
Light	Surface Beta-Gamma	1	dpm/100 cm^2	350	—	
	Surface Alpha	1	dpm/100 cm^2	120	—	
Cross Brace	Surface Beta-Gamma	1	dpm/100 cm^2	740	—	
	Surface Alpha	2	dpm/100 cm^2	390 - 440	420	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 17 (continued)						
Attic (continued)						
South Eave	Surface Beta-Gamma	1	dpm/100 cm^2	1100	—	
	Surface Alpha	2	dpm/100 cm^2	330	330	
Stringer	Surface Beta-Gamma	1	dpm/100 cm^2	80	—	
	Surface Alpha	1	dpm/100 cm^2	360	—	
Ceiling Base (Under Insulation)	Surface Beta-Gamma	1	dpm/100 cm^2	900	—	
	Surface Alpha	1	dpm/100 cm^2	100	—	
Center Walkway	Surface Beta-Gamma	1	dpm/100 cm^2	860	—	
	Surface Alpha	1	dpm/100 cm^2	210	—	
Section Beams	Surface Beta-Gamma	9	dpm/100 cm^2	1100 - 14000	7700	14
	Surface Alpha	9	dpm/100 cm^2	370 - 1600	840	
Light	Surface Beta-Gamma	4	dpm/100 cm^2	920 - 14000	7700	14
	Surface Alpha	4	dpm/100 cm^2	350 - 1200	1000	
Roof Vent	Surface Beta-Gamma	1	dpm/100 cm^2	790	—	
	Surface Alpha	1	dpm/100 cm^2	510	—	
Building 23						
Basement (Figure 5-10)						
Floor/Wall Interface	Surface Beta-Gamma	63	dpm/100 cm^2	0 - 21000	2200	4

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
Basement (continued)						
Floor/Wall Interface (Divider)	Surface Beta-Gamma	8	dpm/100 cm^2	0 - 1200	390	
Shelves	Surface Beta-Gamma	3	dpm/100 cm^2	1200 - 1900	1500	6
Drain*	Surface Beta-Gamma	1	dpm/100 cm^2	2900	—	
Drain	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
Elevator Pit	Surface Beta-Gamma	2	dpm/100 cm^2	3700 - 19000	11000	5
	Gamma	9	μR/h	4.4 - 79.5	21	
Floor (General)	Surface Beta-Gamma	66	dpm/100 cm^2	0 - 6200	1100	2
Floor (East End)	Surface Beta-Gamma	33	dpm/100 cm^2	380 - 9400	2000	2
Shelf	Surface Beta-Gamma	2	dpm/100 cm^2	1100 - 1300	1200	6
Sump (SE Corner)	Surface Beta-Gamma	31	dpm/100 cm^2	0 - 4200	1300	8
Sump Pumps (SE Corner)	Surface Beta-Gamma	13	dpm/100 cm^2	400 - 4400	2500	8
Windowsill	Surface Beta-Gamma	10	dpm/100 cm^2	160 - 7400	2400	4
Pipe (NE Corner)	Surface Beta-Gamma	5	dpm/100 cm^2	360 - 1000	650	
Shelf	Surface Beta-Gamma	2	dpm/100 cm^2	0	0	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
Basement (continued)						
Pipe	Surface Beta-Gamma	3	dpm/100 cm^2	0 - 80	27	
East Wall	Surface Beta-Gamma	32	dpm/100 cm^2	0 - 910	370	
West Wall	Surface Beta-Gamma	16	dpm/100 cm^2	87 - 1400	660	
South Wall	Surface Beta-Gamma	18	dpm/100 cm^2	300 - 1700	850	
Wall - Pipe Assembly	Surface Beta-Gamma	21	dpm/100 cm^2	0 - 6000	2000	*
Equipment	Surface Beta-Gamma	16	dpm/100 cm^2	420 - 2800	1800	7
Ceiling Pipe	Surface Beta-Gamma	13	dpm/100 cm^2	870 - 12000	3400	1
Ceiling Pipe	Surface Beta-Gamma	13	dpm/100 cm^2	130 - 10000	1800	1
Ceiling Pipe	Surface Beta-Gamma	13	dpm/100 cm^2	410 - 8600	2700	1
North Wall	Surface Beta-Gamma	25	dpm/100 cm^2	0 - 2700	610	
West Stairway (Basement)						
Floor Adjacent to Wall	Surface Beta-Gamma	11	dpm/100 cm^2	1000 - 7000	2800	3
Floor	Surface Beta-Gamma	22	dpm/100 cm^2	0 - 24000	3300	3
Pipe (Surface)	Surface Beta-Gamma	3	dpm/100 cm^2	1100 - 1300	1300	3

*Item not indicated on figure.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
West Stairway (continued)						
Pipe (Inside)	Surface Beta-Gamma	1	dpm/100 cm^2	>33000	—	3
Pipe (1.8-m pit)	Surface Beta-Gamma	1	dpm/100 cm^2	35000	—	3
Stair wood	Surface Beta-Gamma	1	dpm/100 cm^2	4700	—	3
Door frame	Surface Beta-Gamma	2	dpm/100 cm^2	1200 - 2300	1700	3
1.8-m pit (North Wall)	Surface Beta-Gamma	3	dpm/100 cm^2	790 - 1400	1100	3
(East Wall)	Surface Beta-Gamma	4	dpm/100 cm^2	870 - 1200	1100	3
(South Wall)	Surface Beta-Gamma	4	dpm/100 cm^2	1100 - 1500	1300	3
(West Wall)	Surface Beta-Gamma	3	dpm/100 cm^2	960 - 1300	3400	3
Basement Tunnel Pipe A	Surface Beta-Gamma	8	dpm/100 cm^2	0 - 1200	520	
Pipe B	Surface Beta-Gamma	8	dpm/100 cm^2	0 - 1000	570	
Pipe C	Surface Beta-Gamma	8	dpm/100 cm^2	0 - 470	160	
East Wall	Surface Beta-Gamma	9	dpm/100 cm^2	0 - 9900	1300	9
West Wall	Surface Beta-Gamma	19	dpm/100 cm^2	0 - 560	170	
Pipe	Surface Beta-Gamma	7	dpm/100 cm^2	130 - 1400	580	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
Basement Tunnel (continued)						
North Wall	Surface Beta-Gamma	12	dpm/100 cm^2	0 - 1000	170	
North Wall Pipe	Surface Beta-Gamma	1	dpm/100 cm^2	1000	—	
North Wall Pipe	Surface Beta-Gamma	4	dpm/100 cm^2	520 - 1200	770	
North Wall Pipe	Surface Beta-Gamma	8	dpm/100 cm^2	430 - 1100	620	
North Wall Pipe	Surface Beta-Gamma	3	dpm/100 cm^2	0 - 910	520	
Ceiling	Surface Beta-Gamma	9	dpm/100 cm^2	87 - 910	540	
South Wall	Surface Beta-Gamma	21	dpm/100 cm^2	0 - 690	220	
Basement Cement Support Beam & Pillars	Surface Beta-Gamma	18	dpm/100 cm^2	87 - 950	610	
1st Floor (Figure 5-8)						
Thorium Room						
Floor	Surface Beta-Gamma	34	dpm/100 cm^2	560 - 37000	5100	4
North Wall	Surface Beta-Gamma	25	dpm/100 cm^2	730 - 12000	3700	4

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Thorium Room (continued)						
Wall Heater	Surface Beta-Gamma	3	dpm/100 cm^2	1400 - 13000	5600	4
West Wall	Surface Beta-Gamma	2	dpm/100 cm^2	2400 - 35000	19000	4
East Wall	Surface Beta-Gamma	7	dpm/100 cm^2	640 - 18000	4000	4
South Wall	Surface Beta-Gamma	7	dpm/100 cm^2	1900 - 58000	14000	4
Light Fixture	Surface Beta-Gamma	2	dpm/100 cm^2	4400 - 5600	5000	5
Light Fixture	Surface Beta-Gamma	2	dpm/100 cm^2	6200 - 6800	6500	5
Duct 1 & 2	Surface Beta-Gamma	4	dpm/100 cm^2	770 - 1800	1300	4
Duct 3	Surface Beta-Gamma	5	dpm/100 cm^2	470 - 1400	790	
Hood	Surface Beta-Gamma	5	dpm/100 cm^2	470 - 1600	1000	6
Trench (Bottom)	Surface Beta-Gamma	10	dpm/100 cm^2	630 - 5000	1400	6
	Surface Alpha	3	dpm/100 cm^2	40 - 720	310	
(Walls)	Surface Beta-Gamma	11	dpm/100 cm^2	0 - 1100	610	
(Pipe)	Surface Beta-Gamma	2	dpm/100 cm^2	1300 - 1300	1300	6
(Pipe)	Surface Beta-Gamma	3	dpm/100 cm^2	1600 - 2200	2000	6

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Crusher Room						
Crusher Platform	Surface Beta-Gamma	20	dpm/100 cm^2	130 - 4300	1100	8
Storage Room Floor	Surface Beta-Gamma	10	dpm/100 cm^2	420 - 1300	800	
Floor	Surface Beta-Gamma	35	dpm/100 cm^2	0 - 6400	780	7
Crusher Platform (Inside)	Surface Beta-Gamma	44	dpm/100 cm^2	380 - 4300	1400	8
Equipment*	Surface Beta-Gamma	1	dpm/100 cm^2	1700	—	7
Equipment	Surface Beta-Gamma	1	dpm/100 cm^2	9100	—	7
Equipment	Surface Beta-Gamma	1	dpm/100 cm^2	4300	—	7
East Wall	Surface Beta-Gamma	4	dpm/100 cm^2	0 - 650	340	
Ore Bin Room						
Ore Bin #1	Surface Beta-Gamma	2	dpm/100 cm^2	1700 - 5900	3800	9
	Surface Alpha	2	dpm/100 cm^2	42 - 62	52	
Ore Bin #2	Surface Beta-Gamma	2	dpm/100 cm^2	0 - 5200	2600	9
	Surface Alpha	2	dpm/100 cm^2	42 - 82	62	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Ore Bin Room (continued)						
Ore Bin #3	Surface Beta-Gamma	2	dpm/100 cm^2	0 - 350	180	
	Surface Alpha	2	dpm/100 cm^2	0 - 32	16	
Ore Bin #4	Surface Beta-Gamma	2	dpm/100 cm^2	0 - 2000	1000	9
	Surface Alpha	2	dpm/100 cm^2	0 - 92	46	
Ore Bin #5	Surface Beta-Gamma	2	dpm/100 cm^2	0	0	
	Surface Alpha	2	dpm/100 cm^2	0 - 2	1	
Ore Bin #6	Surface Beta-Gamma	2	dpm/100 cm^2	0	0	
	Surface Alpha	2	dpm/100 cm^2	0 - 2	1	
Ore Bin #7	Surface Beta-Gamma	2	dpm/100 cm^2	1500 - 7700	4600	9
	Surface Alpha	2	dpm/100 cm^2	0 - 82	41	
Ore Bin #8	Surface Beta-Gamma	2	dpm/100 cm^2	0 - 2000	1000	9
	Surface Alpha	2	dpm/100 cm^2	2 - 42	20	
Ore Bin #9	Surface Beta-Gamma	2	dpm/100 cm^2	0 - 610	310	
	Surface Alpha	2	dpm/100 cm^2	2 - 12	7	
Ore Bin #10	Surface Beta-Gamma	2	dpm/100 cm^2	6000 - 15000	10000	9
	Surface Alpha	2	dpm/100 cm^2	46 - 300	170	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Ore Bin Room (continued)						
Ore Bin #11	Surface Beta-Gamma	2	dpm/100 cm^2	0 - 2300	1200	9
	Surface Alpha	2	dpm/100 cm^2	6 - 36	20	
Ore Bin #12	Surface Beta-Gamma	2	dpm/100 cm^2	1900 - 5500	3700	9
	Surface Alpha	2	dpm/100 cm^2	36 - 86	61	
Ore Bin #13	Surface Beta-Gamma	2	dpm/100 cm^2	1300 - 4200	2700	9
	Surface Alpha	2	dpm/100 cm^2	0 - 36	19	
Ore Bin #14	Surface Beta-Gamma	2	dpm/100 cm^2	0	0	
	Surface Alpha	2	dpm/100 cm^2	6 - 76	40	
Ore Bin #15	Surface Beta-Gamma	2	dpm/100 cm^2	0 - 570	280	
	Surface Alpha	2	dpm/100 cm^2	6 - 110	60	
Ore Bin #16	Surface Beta-Gamma	2	dpm/100 cm^2	0	0	
	Surface Alpha	2	dpm/100 cm^2	6	6	
Ore Bin #17	Surface Beta-Gamma	2	dpm/100 cm^2	0 - 400	200	
	Surface Alpha	2	dpm/100 cm^2	16 - 36	26	
Ore Bin #18	Surface Beta-Gamma	2	dpm/100 cm^2	0	0	
	Surface Alpha	2	dpm/100 cm^2	16 - 36	26	
Floor	Surface Beta-Gamma	6	dpm/100 cm^2	220 - 480	340	
	Surface Alpha	5	dpm/100 cm^2	0 - 22	5	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Ore Bin Room (continued)						
Floor/Wall Interface	Surface Beta-Gamma	7	dpm/100 cm^2	0 - 960	280	
	Surface Alpha	5	dpm/100 cm^2	2 - 32	20	
Drain	Surface Beta-Gamma	6	dpm/100 cm^2	0 - 10000	3400	9
	Surface Alpha	3	dpm/100 cm^2	42 - 210	150	
Windowsill	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
	Surface Alpha	1	dpm/100 cm^2	2	—	
Trash can	Gamma	1	μR/h	11	—	
Trash can	Gamma	1	μR/h	16	—	
Trash can	Gamma	1	μR/h	27	—	9
19-l (5-gal) can	Gamma	1	μR/h	12	—	
19-l (5-gal) can	Gamma	1	μR/h	15	—	
Trash can	Gamma	1	μR/h	17	—	
Burlap Sack	Gamma	1	μR/h	11	—	
19-l (5-gal) can	Gamma	1	μR/h	14	—	
19-l (5-gal) can	Gamma	1	μR/h	18	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Ore Bin Room (continued)						
19-1 (5-gal) can	Gamma	1	μR/h	13	—	
Square can	Gamma	1	μR/h	12	—	
Cardboard barrel	Gamma	1	μR/h	13	—	
Burlap sack	Gamma	1	μR/h	16	—	
Burlap Sack	Gamma	1	μR/h	20	—	9
Bag in Drum	Gamma	1	μR/h	35	—	9
Drum	Gamma	1	μR/h	35	—	9
Burlap Sack	Gamma	1	μR/h	16	—	
Burlap Sack	Gamma	1	μR/h	20	—	9
Burlap Sack	Gamma	1	μR/h	31	—	9
Can	Gamma	1	μR/h	11	—	
Drum	Gamma	1	μR/h	10	—	
19-1 (5-gal) Bucket	Gamma	1	μR/h	10	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Ore Bin Room (continued)						
19-l (5-gal) Bucket	Gamma	1	μR/h	13	—	
19-l (5-gal) Bucket	Gamma	1	μR/h	13	—	
19-l (5-gal) Bucket	Gamma	1	μR/h	10	—	
Trash Can	Gamma	1	μR/h	12	—	
Can	Gamma	1	μR/h	21	—	9
Can	Gamma	1	μR/h	19	—	
Can	Gamma	1	μR/h	12	—	
Drum	Gamma	1	μR/h	18	—	
Drum	Gamma	1	μR/h	13	—	
Drum	Gamma	1	μR/h	14	—	
19-l (5-gal) Bucket	Gamma	1	μR/h	16	—	
19-l (5-gal) Bucket	Gamma	1	μR/h	14	—	
Trash Can	Gamma	1	μR/h	10	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Ore Bin Room (continued)						
Cardboard Barrel	Gamma	1	μR/h	12	—	
19-l (5-gal) Bucket	Gamma	1	μR/h	10	—	
19-l (5-gal) Bucket	Gamma	1	μR/h	14	—	
19-l (5-gal) Can	Gamma	1	μR/h	13	—	
Cardboard Box	Gamma	1	μR/h	11	—	
Cardboard Box	Gamma	1	μR/h	13	—	
Cardboard Box	Gamma	1	μR/h	11	—	
Ore Storage Room						
Floor/Door (to Basement)	Surface Beta-Gamma	3	dpm/100 cm^2	610 - 910	740	
Floor	Surface Beta-Gamma	1	dpm/100 cm^2	910	—	
Lab 1 Trench (20 ft E of W Wall)	Surface Beta-Gamma	27	dpm/100 cm^2	870 - 9100	2300	1
	Surface Alpha	27	dpm/100 cm^2	21 - 880	270	
Trench (West Wall)	Surface Beta-Gamma	9	dpm/100 cm^2	450 - 1500	1000	1
	Surface Alpha	8	dpm/100 cm^2	66 - 170	110	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Lab 1 (continued)						
Trench	Surface Beta-Gamma	13	dpm/100 cm^2	190 - 2500	800	
	Surface Alpha	13	dpm/100 cm^2	9 - 120	60	
Trench	Surface Beta-Gamma	15	dpm/100 cm^2	150 - 1700	830	
	Surface Alpha	15	dpm/100 cm^2	0 - 89	33	
Pump Pit	Surface Beta-Gamma	29	dpm/100 cm^2	190 - 1200	710	
	Surface Alpha	29	dpm/100 cm^2	0 - 140	35	
Trench (NE Corner)	Surface Beta-Gamma	26	dpm/100 cm^2	260 - 3400	1600	1
Trench (East Corner)	Surface Beta-Gamma	17	dpm/100 cm^2	260 - 4900	1300	1
Trench	Surface Beta-Gamma	20	dpm/100 cm^2	1300 - 1300	1300	1
Trench*	Surface Beta-Gamma	1	dpm/100 cm^2	1300	—	
Trench	Surface Beta-Gamma	3	dpm/100 cm^2	2100 - 5600	3500	1
Trench (Middle of Lab)	Surface Beta-Gamma	54	dpm/100 cm^2	580 - 6800	2200	1
Trench (Pipe)	Surface Beta-Gamma	10	dpm/100 cm^2	290 - 2200	1100	1
Pipe	Surface Beta-Gamma	8	dpm/100 cm^2	540 - 1600	1100	1
Pipe	Surface Beta-Gamma	6	dpm/100 cm^2	0 - 540	170	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
1st Floor (continued)						
Lab 1 (continued)						
Trench (Bottom)	Surface Beta-Gamma	6	dpm/100 cm^2	2400 - 7200	5200	1
Walls	Surface Beta-Gamma	11	dpm/100 cm^2	490 - 2400	1200	
Pipe	Surface Beta-Gamma	2	dpm/100 cm^2	820 - 1200	990	
Furnace Pit	Surface Beta-Gamma	13	dpm/100 cm^2	720 - 1800	1100	2
Grinder	Surface Beta-Gamma	6	dpm/100 cm^2	670 - 20000	7000	2
Sump*	Surface Beta-Gamma	1	dpm/100 cm^2	1600	—	
	Gamma	1	μR/h	7.5	—	
Sump	Surface Beta-Gamma	1	dpm/100 cm^2	4700	—	3
	Gamma	1	μR/h	2.4	—	
Sump	Surface Beta-Gamma	1	dpm/100 cm^2	910	—	
	Gamma	1	μR/h	3.7	—	
Sump*	Surface Beta-Gamma	1	dpm/100 cm^2	1700	—	
	Gamma	1	μR/h	2.4	—	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
2nd Floor (Figure 5-9)						
Crusher Room						
East Windowsill	Surface Beta-Gamma	14	dpm/100 cm^2	130 - 1200	470	
	Surface Alpha	6	dpm/100 cm^2	0 - 50	15	
East Floor/Wall Interface	Surface Beta-Gamma	13	dpm/100 cm^2	480 - 1600	910	
	Surface Alpha	2	dpm/100 cm^2	20 - 30	25	
South Wall	Surface Beta-Gamma	2	dpm/100 cm^2	0	0	
South Windowsill	Surface Beta-Gamma	4	dpm/100 cm^2	0 - 560	280	
	Surface Alpha	2	dpm/100 cm^2	20 - 20	20	
South Floor/Wall Interface	Surface Beta-Gamma	5	dpm/100 cm^2	740 - 1200	950	
	Surface Alpha	2	dpm/100 cm^2	30 - 30	30	
Wall (SW Corner)	Surface Beta-Gamma	4	dpm/100 cm^2	650 - 1100	710	
SW Corner Floor/Wall Interface	Surface Beta-Gamma	7	dpm/100 cm^2	520 - 1900	960	
North Wall	Surface Beta-Gamma	3	dpm/100 cm^2	170 - 7500	400	2
North Floor/Wall Interface	Surface Beta-Gamma	4	dpm/100 cm^2	790 - 1700	1300	2
Floor	Surface Beta-Gamma	33	dpm/100 cm^2	0 - 1400	640	
Electric Oven	Surface Beta-Gamma	9	dpm/100 cm^2	0 - 4400	1500	3
Vent	Surface Beta-Gamma	3	dpm/100 cm^2	1400 - 3500	2200	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
2nd Floor (continued)						
Crusher Room (continued)						
West Wall	Surface Beta-Gamma	2	dpm/100 cm^2	560 - 600	590	
West Floor/Wall Interface	Surface Beta-Gamma	6	dpm/100 cm^2	170 - 1000	790	
	Surface Alpha	2	dpm/100 cm^2	0 - 50	25	
Closet Floor	Surface Beta-Gamma	3	dpm/100 cm^2	0 - 390	130	
Ore Bin Room						
Ore Bin Holes	Surface Beta-Gamma	10	dpm/100 cm^2	0 - 650	140	
	Gamma	10	μR/h	0 - 59	11	
Grinder	Gamma	1	μR/h	1.2	—	
Drum	Gamma	1	μR/h	32	—	4
Drum	Gamma	1	μR/h	14	—	
Drum	Gamma	1	μR/h	32	—	4
Drum	Gamma	1	μR/h	30	—	4
19-l (5-gal) Can	Gamma	1	μR/h	23	—	4
Drum	Gamma	1	μR/h	35	—	4
Can	Gamma	1	μR/h	5	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
2nd Floor (continued)						
Ore Bin Room (continued)						
Bucket	Gamma	1	μR/h	7	—	
Drum	Gamma	1	μR/h	9	—	
Can	Gamma	1	μR/h	0.1	—	
Can	Gamma	1	μR/h	16	—	
Wooden Tote	Gamma	1	μR/h	9	—	
Wooden Tote	Gamma	1	μR/h	15	—	
Drum	Gamma	1	μR/h	6	—	
Drum	Gamma	1	μR/h	0.1	—	
Drum	Gamma	1	μR/h	1.8	—	
Drum	Gamma	1	μR/h	1.8	—	
Storage Room #2						
Ore Bin #1	Gamma	1	μR/h	0	—	
Ore Bin #2	Gamma	1	μR/h	0	—	
Ore Bin #3	Gamma	1	μR/h	0	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
2nd Floor (continued)						
Storage Room #2 (continued)						
Ore Bin #4	Gamma	1	μR/h	0.1	—	
Ore Bin #5	Gamma	1	μR/h	0	—	
Ore Bin #6	Gamma	1	μR/h	0	—	
Ore Bin #7	Gamma	1	μR/h	0.2	—	
Ore Bin #8	Gamma	1	μR/h	0	—	
West Wall	Surface Beta-Gamma	9	dpm/100 cm^2	1000 - 3500	1900	5
Truss #1	Surface Beta-Gamma	22	dpm/100 cm^2	0 - 830	290	
Conduit	Surface Beta-Gamma	12	dpm/100 cm^2	380 - 2800	1500	1
Pipe	Surface Beta-Gamma	10	dpm/100 cm^2	210 - 8200	2100	1
Truss #2	Surface Beta-Gamma	24	dpm/100 cm^2	0 - 500	170	
Conduit	Surface Beta-Gamma	16	dpm/100 cm^2	0 - 5900	1500	1
Truss #3	Surface Beta-Gamma	18	dpm/100 cm^2	0 - 83	12	
Truss #4	Surface Beta-Gamma	18	dpm/100 cm^2	0	0	
Truss #5	Surface Beta-Gamma	16	dpm/100 cm^2	0	0	
Conduit	Surface Beta-Gamma	7	dpm/100 cm^2	0 - 460	190	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 23 (continued)						
Truss #5 (continued)						
Conduit	Surface Beta-Gamma	8	dpm/100 cm^2	0 - 130	16	
Truss #6	Surface Beta-Gamma	14	dpm/100 cm^2	0	0	
Cross Brace (Truss 1 & 2)	Surface Beta-Gamma	4	dpm/100 cm^2	130 - 380	230	
Cross Brace (Truss 1 & 2)	Surface Beta-Gamma	4	dpm/100 cm^2	210 - 460	300	
Cross Brace (Truss 5 & 6)	Surface Beta-Gamma	4	dpm/100 cm^2	42 - 290	180	
Cross Brace (Truss 5 & 6)	Surface Beta-Gamma	4	dpm/100 cm^2	250 - 580	380	
Cross Beam Conduit	Surface Beta-Gamma	17	dpm/100 cm^2	0 - 6000	1500	1
Cross Beam Junction Box*	Surface Beta-Gamma	1	dpm/100 cm^2	2600	—	
Cross Beam (North)	Surface Beta-Gamma	13	dpm/100 cm^2	0 - 920	180	
Cross Beam (South)	Surface Beta-Gamma	12	dpm/100 cm^2	0 - 500	100	
Building 24 (Figure 5-11)						
Room 103 Trench	Surface Beta-Gamma	38	dpm/100 cm^2	600 - 11000	2500	1
Room 104 Floor	Surface Beta-Gamma	7	dpm/100 cm^2	970 - 2000	1400	2
	Gamma	8	μR/h	2.2 - 5.4	3.8	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 24 (continued)						
Room 104 Valves (2)	Surface Beta-Gamma	2	dpm/100 cm^2	2800 - 7400	5100	3
Room 106 Floor	Surface Beta-Gamma	19	dpm/100 cm^2	700 - 3700	1700	9
Sink	Surface Beta-Gamma	3	dpm/100 cm^2	1700 - 5500	3300	6
Room 106 Trench	Surface Beta-Gamma	11	dpm/100 cm^2	730 - 4600	2700	5
	Surface Alpha	3	dpm/100 cm^2	250 - 540	360	
Floor Crack	Surface Beta-Gamma	5	dpm/100 cm^2	810 - 1900	1300	8
	Surface Alpha	5	dpm/100 cm^2	31 - 72	54	
Circuit Breaker Box	Surface Beta-Gamma	1	dpm/100 cm^2	6200	—	7
	Surface Alpha	1	dpm/100 cm^2	10	—	
Ceiling	Surface Beta-Gamma	13	dpm/100 cm^2	660 - 11000	6100	4
	Surface Alpha	13	dpm/100 cm^2	57 - 1700	840	
Building 25 (Figure 5-12)						
1st Floor - Floor	Surface Beta-Gamma	30	dpm/100 cm^2	0 - 4100	880	1
	Gamma	28	μR/h	0 - 8	1.2	
Floor Material	Surface Beta-Gamma	9	dpm/100 cm^2	330 - 2500	1100	2
Sandpile	Gamma	1	μR/h	36	—	3
Buckets	Gamma	1	μR/h	24	—	4
Barrels	Gamma	1	μR/h	10	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 25 (continued)						
Mezzanine						
Wall (NW Corner)	Surface Beta-Gamma	12	dpm/100 cm^2	500 - 6500	3200	7
Floor	Surface Beta-Gamma	26	dpm/100 cm^2	0 - 2900	530	
Catwalk	Surface Beta-Gamma	8	dpm/100 cm^2	0 - 6400	2900	7
	Surface Alpha	8	dpm/100 cm^2	15 - 610	310	
	Removable Alpha	8	dpm/100 cm^2	0 - 32	14	
Workbench	Surface Beta-Gamma	1	dpm/100 cm^2	35000	—	5
	Surface Alpha	1	dpm/100 cm^2	91	—	
	Removable Alpha	1	dpm/100 cm^2	0	—	
Zircon Sand	Gamma	2	μR/h	19 - 58	39	8
Sand Furnace Lid 1	Surface Beta-Gamma	3	dpm/100 cm^2	1600 - 3400	2300	6
Sand Furnace Lid 2	Surface Beta-Gamma	2	dpm/100 cm^2	3500 - 3700	3600	6
Sand Furnace Lid 3	Surface Beta-Gamma	3	dpm/100 cm^2	2000 - 3000	2600	6
Sand Furnace Lid 4	Surface Beta-Gamma	3	dpm/100 cm^2	1700 - 3000	2200	6
Building 26 (Figure 5-13)						
Room 103 Furnace Foundation	Surface Beta-Gamma	4	dpm/100 cm^2	1400 - 4000	2200	1
	Gamma	4	μR/h	9 - 15	10	
Floor (NE Corner)	Surface Beta-Gamma	5	dpm/100 cm^2	37 - 560	300	
(SE Corner)	Surface Beta-Gamma	5	dpm/100 cm^2	75 - 490	300	
(General)	Gamma	-	μR/h	0.7 - 1.2	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 28						
Basement (Figure 5-15)						
Blue Metal Cabinet*	Surface Beta-Gamma	1	dpm/100 cm^2	1300	—	1
	Surface Alpha	1	dpm/100 cm^2	28	—	
	Gamma	1	μR/h	0	—	
Press	Surface Beta-Gamma	1	dpm/100 cm^2	4300	—	3
	Surface Alpha	1	dpm/100 cm^2	629	—	
Green Scale	Surface Beta-Gamma	1	dpm/100 cm^2	18000	—	8
	Surface Alpha	1	dpm/100 cm^2	1600	—	
	Gamma	1	μR/h	2.2	—	
Floor Spot	Surface Beta-Gamma	1	dpm/100 cm^2	12000	—	7
	Surface Alpha	1	dpm/100 cm^2	1200	—	
Welding Rod Rack	Surface Beta-Gamma	1	dpm/100 cm^2	4700	—	5
	Surface Alpha	1	dpm/100 cm^2	18	—	
Saw	Surface Beta-Gamma	1	dpm/100 cm^2	6700	—	6
	Surface Alpha	1	dpm/100 cm^2	47	—	
	Gamma	1	μR/h	0	—	
Floor (Near Oven)	Surface Beta-Gamma	2	dpm/100 cm^2	8200 - 9100	8600	7
	Surface Alpha	2	dpm/100 cm^2	360 - 620	310	
	Gamma	2	μR/h	0.2 - 0.7	0.5	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 28 (continued)						
Basement (continued)						
Overhead Pipe	Surface Beta-Gamma	1	dpm/100 cm^2	7000	—	9
	Gamma	7	μR/h	1 - 45	18	
Oven	Surface Beta-Gamma	1	dpm/100 cm^2	8800	—	10
	Surface Alpha	1	dpm/100 cm^2	870	—	
	Gamma	1	μR/h	0.3	—	
Oven	Surface Beta-Gamma	1	dpm/100 cm^2	5000	—	11
	Surface Alpha	1	dpm/100 cm^2	990	—	
	Gamma	1	μR/h	0	—	
Sump	Surface Beta-Gamma	2	dpm/100 cm^2	6500 - 8700	7600	2
	Gamma	2	μR/h	0 - 28	14	
Sump	Surface Beta-Gamma	2	dpm/100 cm^2	1800 - 2600	2400	2
	Gamma	2	μR/h	0 - 3	2	
Sump	Surface Beta-Gamma	2	dpm/100 cm^2	6500 - 13000	9800	2
	Gamma	2	μR/h	4 - 7	6	
Scale	Surface Beta-Gamma	1	dpm/100 cm^2	6900	—	4
Drain Pipe	Gamma	2	μR/h	0 - 10	5	
Drain Pipe	Gamma	2	μR/h	0.4 - 3	2	

TABLE 5-3

(continued)

Interior Measurement Location		Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 28 (continued)							
Basement (continued)							
	Drain Pipe	Gamma	2	μR/h	3 - 9	6	
	Piping (NE Corner)	Gamma	7	μR/h	0 - 4	0.6	
	Sump (NE Corner)	Gamma	1	μR/h	6	—	
1st Floor (Figure 5-14)							
Lab 2	Floor/Wall Interface	Gamma	3	μR/h	0	0	
	Under Sink	Gamma	2	μR/h	0 - 0.1	0.05	
	In Hood	Gamma	1	μR/h	0	—	
Lab 2	Drains (5)	Gamma	1*	μR/h	0	0	
Lab 3	Floor	Surface Beta Gamma	44	dpm/100 cm^2	0 - 11000	520	1
		Surface Alpha	44	dpm/100 cm^2	0 - 28	4	
		Gamma	44	μR/h	0 - 87	4	
	Pipe (In Cabinet, North Wall)	Surface Beta Gamma	6	dpm/100 cm^2	2400 - 45000	11000	2
		Gamma	6	μR/h	2.4 - 54	36	
		Removable Beta-Gamma	3	dpm/100 cm^2	0 - 13	4	

*One sample taken for each drain.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 28 (continued)						
1st Floor (continued)						
Lab 3 (continued)						
Drain (Under Sink)	Surface Beta Gamma	1	dpm/100 cm^2	690	—	2
	Gamma	1	μR/h	66	—	
Drain	Surface Beta Gamma	1	dpm/100 cm^2	900	—	
	Gamma	1	μR/h	9	—	
Drain*	Surface Beta Gamma	1	dpm/100 cm^2	3000	—	3
	Gamma	1	μR/h	0	—	
Drain	Gamma	1	μR/h	0	—	
Drain	Gamma	1	μR/h	5	—	
Drain	Gamma	1	μR/h	0	—	
Drain	Gamma	1	μR/h	0.8	—	
Drain	Gamma	1	μR/h	0	—	
North Wall	Surface Beta-Gamma	7	dpm/100 cm^2	0	0	
	Surface Alpha	7	dpm/100 cm^2	0 - 28	4	
South Wall	Surface Beta-Gamma	7	dpm/100 cm^2	0	0	
	Surface Alpha	7	dpm/100 cm^2	0	0	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 28 (continued)						
1st Floor (continued)						
Lab 3 (continued)						
West Wall	Surface Beta-Gamma	4	dpm/100 cm^2	0	0	
	Surface Alpha	4	dpm/100 cm^2	0 - 8	3	
East Wall	Surface Beta-Gamma	4	dpm/100 cm^2	0	0	
	Surface Alpha	4	dpm/100 cm^2	0 - 28	12	
Top of Cabinet (North Wall)	Surface Beta-Gamma	4	dpm/100 cm^2	0	0	
	Surface Alpha	4	dpm/100 cm^2	0 - 8	2	
Vent Ducts (Near Ceiling)	Surface Beta-Gamma	10	dpm/100 cm^2	0	0	
	Surface Alpha	10	dpm/100 cm^2	0 - 67	10	
Floor (In Hall Outside Lab 3)	Gamma	1	μR/h	17	—	
Lab 13 Cabinet (Floor/Wall Interface)	Gamma	6	μR/h	2.2 - 3.2	2.7	
Top of Cabinet	Gamma	2	μR/h	1.9	1.9	
Drain	Gamma	1	μR/h	1.2	—	
Drain	Gamma	1	μR/h	1.3	—	
Drain	Gamma	1	μR/h	0.1	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 28 (continued)						
1st Floor (continued)						
Lab 13 (continued)						
Drain	Gamma	1	μR/h	1.4	—	
Drain	Gamma	1	μR/h	1.4	—	
Drain	Gamma	1	μR/h	0	—	
Drain	Gamma	1	μR/h	0	—	
Drain	Gamma	1	μR/h	0.8	—	
Drain	Gamma	1	μR/h	0.4	—	
Lab 14 Hood Work Surface	Surface Beta-Gamma	15	dpm/100 cm^2	1400 - 2400	2000	4
	Surface Alpha	15	dpm/100 cm^2	0	0	
Lab 15 Floor	Surface Beta-Gamma	54	dpm/100 cm^2	0 - 5600	1400	5
	Gamma	2	μR/h	1.8 - 2.6	2.2	
East Wall (Under Cabinet)	Surface Beta-Gamma	10	dpm/100 cm^2	0 - 5600	1400	6
South End of Cabinet	Surface Beta-Gamma	8	dpm/100 cm^2	0 - 9500	1800	6
Back of Cabinet	Surface Beta-Gamma	9	dpm/100 cm^2	0 - 5700	1800	6
Cabinet/Floor Interface	Surface Beta-Gamma	3	dpm/100 cm^2	1700 - 3700	2700	6

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 28 (continued)						
1st Floor (continued)						
Lab 15 (continued)						
Cabinet Floor	Surface Beta-Gamma	13	dpm/100 cm^2	210 - 3800	1300	6
Cabinet Top	Surface Beta-Gamma	12	dpm/100 cm^2	43 - 21000	4100	6
	Surface Alpha	3	dpm/100 cm^2	274 - 1900	840	
	Gamma	3	μR/h	2.2 - 4.2	3.0	
Metal Plate (Between Shelves in Cabinet)	Surface Beta-Gamma	1	dpm/100 cm^2	13000	—	6
Hoist	Surface Beta-Gamma	1	dpm/100 cm^2	600	—	
	Surface Alpha	1	dpm/100 cm^2	580	—	
Shelf (Under Hood Sink)	Surface Beta-Gamma	1	dpm/100 cm^2	10000	—	7
	Surface Alpha	1	dpm/100 cm^2	2200	—	
Drain Under Sink	Surface Beta-Gamma	1	dpm/100 cm^2	5000	—	7
	Gamma	1	μR/h	12.5	—	
Wall (Behind Sink)	Surface Beta-Gamma	1	dpm/100 cm^2	5000	—	7
Wall (Near SE Corner)	Surface Beta-Gamma	2	dpm/100 cm^2	2900 - 3000	3000	7
Floor	Surface Beta-Gamma	3	dpm/100 cm^2	2600 - 11000	5500	5
	Gamma	2	μR/h	1.8 - 2.6	2.2	
Samples	Gamma	1	μR/h	5.2	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 28 (continued)						
1st Floor (continued)						
Lab 15 (continued)						
Floor/Wall Interface (North Wall)	Gamma	7	μR/h	1.1 - 2.6	1.8	
Trench	Gamma	1	μR/h	0	—	
Trench	Gamma	1	μR/h	0	—	
East Wall	Gamma	2	μR/h	1.8 - 2.2	2.0	
Sump	Gamma	1	μR/h	1.4	—	
Wall (Outside Hood)	Gamma	2	μR/h	7.6 - 12.5	10	
Floor/Wall Interface (West Wall)	Gamma	1	μR/h	0.9	—	
Attic Trusses	Surface Beta-Gamma	21	dpm/100 cm^2	360 - 6500	2700	8
	Surface Alpha	13	dpm/100 cm^2	41 - 940	370	
Mezzanine (Above Lab 15)						
Floor	Surface Beta-Gamma	11	dpm/100 cm^2	0 - 450	100	
	Surface Alpha	9	dpm/100 cm^2	0 - 41	15	
Beams	Surface Beta-Gamma	6	dpm/100 cm^2	0 - 130	37	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 29						
1st Floor (Figure 5-16)						
Room 101 Floor/Wall Interface	Gamma	2	μR/h	6.7 - 9.1	7.9	
Room 106 Drain	Surface Beta-Gamma	4	dpm/100 cm^2	1400 - 2000	1500	1
	Gamma	1	μR/h	2.6	—	
Top of Counter (West Wall)	Gamma	1	μR/h	34	—	1
Hallway Floor (North of Rooms 101 - 104)	Surface Beta-Gamma	20	dpm/100 cm^2	0 - 680	200	
	Surface Alpha	20	dpm/100 cm^2	0 - 39	9.2	
Room 109 Counter & Hood	Surface Beta-Gamma	9	dpm/100 cm^2	0 - 640	360	
	Surface Alpha	9	dpm/100 cm^2	0 - 29	11	
Floor	Surface Beta-Gamma	13	dpm/100 cm^2	0 - 640	200	
	Surface Alpha	13	dpm/100 cm^2	0 - 48	15	
Floor in Cabinet	Surface Beta-Gamma	12	dpm/100 cm^2	0 - 3800	450	2
	Surface Alpha	12	dpm/100 cm^2	9.6 - 48	16	
Drain (East Wall)	Surface Beta-Gamma	1	dpm/100 cm^2	5100	—	4
Drain (South Wall)	Surface Beta-Gamma	1	dpm/100 cm^2	110	—	
Drain (SW Corner)*	Surface Beta-Gamma	1	dpm/100 cm^2	2900	—	3
	Surface Alpha	1	dpm/100 cm^2	0	—	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 29 (continued)						
1st Floor (continued)						
Room 109 (continued)						
Area Near SW Drain	Surface Beta-Gamma	4	dpm/100 cm^2	1100 - 1600	1300	3
	Surface Alpha	1	dpm/100 cm^2	39	—	
Room 111 Floor/Wall Interface	Surface Beta-Gamma	24	dpm/100 cm^2	0 - 1000	290	
Floor/Wall Interface*						
East Wall	Surface Beta-Gamma	9	dpm/100 cm^2	0 - 3200	560	5
Floor	Surface Beta-Gamma	6	dpm/100 cm^2	0 - 2000	740	
0.26-m^2 (0.3-yd^2) Wall Area	Surface Beta-Gamma	5	dpm/100 cm^2	1300 - 3900	2200	
Drain	Surface Beta-Gamma	1	dpm/100 cm^2	800	—	
	Gamma	1	μR/h	4.6	—	
Drain	Surface Beta-Gamma	1	dpm/100 cm^2	680	—	
	Gamma	1	μR/h	5.4	—	
Drain	Gamma	1	μR/h	8.4	—	
Drain	Gamma	1	μR/h	0	—	
Drain	Gamma	1	μR/h	5.4	—	
Drain	Gamma	1	μR/h	2.1	—	

*Detail of 0.5-m^2 (0.6 yd^2) area.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 29 (continued)						
1st Floor (continued)						
Room 111 (continued)						
Drain*	Surface Beta-Gamma	1	dpm/100 cm^2	1600	—	6
	Gamma	1	μR/h	5.4	—	
Drain*	Surface Beta-Gamma	1	dpm/100 cm^2	1700	—	7
	Gamma	1	μR/h	4.6	—	
2nd Floor (Figure 5-17)						
Rafters	Surface Beta-Gamma	29	dpm/100 cm^2	0 - 670	180	
HEPA Filter*	Surface Beta-Gamma	1	dpm/100 cm^2	1500	—	1
Building 30 (Figure 5-18)						
Workshop Drain (#1)	Surface Beta-Gamma	2	dpm/100 cm^2	1800 - 2900	2300	3
	Surface Alpha	1	dpm/100 cm^2	130	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 2.3	1.5	
Drain (#2)	Surface Beta-Gamma	2	dpm/100 cm^2	1800 - 2900	2300	3
	Surface Alpha	1	dpm/100 cm^2	18	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 5.1	1.7	
Drain (#5)	Surface Beta-Gamma	2	dpm/100 cm^2	1400 - 2600	2000	3
	Surface Alpha	1	dpm/100 cm^2	8	—	
	Removable Alpha	3	dpm/100 cm^2	0	0	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 30 (continued)						
Men's Room Drain (#7)*	Surface Beta-Gamma	1	dpm/100 cm^2	1200	—	3
	Surface Alpha	1	dpm/100 cm^2	0	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 2.3	0.8	
Power Room Drain (#6)*	Surface Beta-Gamma	1	dpm/100 cm^2	2900	—	3
	Surface Alpha	1	dpm/100 cm^2	18	—	
	Removable Alpha	3	dpm/100 cm^2	0	0	
Room 8 Drain (#11)*	Surface Beta-Gamma	1	dpm/100 cm^2	1100	—	3
	Surface Alpha	1	dpm/100 cm^2	38	—	
	Removable Alpha	1	dpm/100 cm^2	2.3	—	
Room 9 Drain (#10)*	Surface Beta-Gamma	1	dpm/100 cm^2	2000	—	3
	Surface Alpha	1	dpm/100 cm^2	0	—	
	Removable Alpha	1	dpm/100 cm^2	51	—	
Fabrication Room Drain (#12)*	Surface Beta-Gamma	1	dpm/100 cm^2	1500	—	3
	Surface Alpha	1	dpm/100 cm^2	0	—	
	Removable Alpha	3	dpm/100 cm^2	0	0	
Drain (#13)*	Surface Beta-Gamma	1	dpm/100 cm^2	1800	—	3
	Surface Alpha	1	dpm/100 cm^2	18	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 11	4.4	
Drain (#14)	Surface Beta-Gamma	1	dpm/100 cm^2	4600	—	3
	Surface Alpha	1	dpm/100 cm^2	8	—	
	Removable Alpha	3	dpm/100 cm^2	11 - 19	16	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 30 (continued)						
Fabrication Room (continued)						
Drain (#15)	Surface Beta-Gamma	1	dpm/100 cm^2	3000	—	3
	Surface Alpha	1	dpm/100 cm^2	0	—	
	Removable Alpha	3	dpm/100 cm^2	0	0	
Drain (#16)	Surface Beta-Gamma	1	dpm/100 cm^2	3400	—	3
	Surface Alpha	1	dpm/100 cm^2	18	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 2.3	0.8	
Drain (#17)*	Surface Beta-Gamma	1	dpm/100 cm^2	2200	—	3
	Surface Alpha	1	dpm/100 cm^2	28	—	
	Removable Alpha	3	dpm/100 cm^2	2.3	2.3	
Drain (#18)	Removable Alpha	3	dpm/100 cm^2	2.3	2.3	
Drain (#19)	Removable Alpha	3	dpm/100 cm^2	2.3 - 5.1	3.2	
Drain (#20)	Surface Beta-Gamma	1	dpm/100 cm^2	3200	—	3
	Surface Alpha	1	dpm/100 cm^2	18	—	
	Removable Alpha	3	dpm/100 cm^2	2.3 - 5.1	4.2	
Drain (#21)	Removable Alpha	3	dpm/100 cm^2	0	0	
Drain (#22)	Surface Beta-Gamma	1	dpm/100 cm^2	6100	—	3
	Surface Alpha	1	dpm/100 cm^2	48	—	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 30 (continued)						
Fabrication Room (continued)						
Drain (#23)	Surface Beta-Gamma	1	dpm/100 cm^2	3800	—	3
	Surface Alpha	1	dpm/100 cm^2	28	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 2.3	0.8	
Drain (#24)*	Surface Beta-Gamma	1	dpm/100 cm^2	2200	—	3
	Surface Alpha	1	dpm/100 cm^2	28	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 2.3	0.8	
Drain (#25)*	Surface Beta-Gamma	1	dpm/100 cm^2	1700	—	3
	Surface Alpha	1	dpm/100 cm^2	68	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 2.3	0.8	
Drain (#26)	Removable Alpha	3	dpm/100 cm^2	0 - 5.1	2.5	
Drain (#27)*	Surface Beta-Gamma	1	dpm/100 cm^2	2100	—	3
	Surface Alpha	1	dpm/100 cm^2	200	—	
	Removable Alpha	3	dpm/100 cm^2	2.3	2.3	
Drain (#28)	Surface Beta-Gamma	1	dpm/100 cm^2	1000	—	
	Surface Alpha	1	dpm/100 cm^2	160	—	
	Removable Alpha	3	dpm/100 cm^2	8 - 82	38	
Drain A	Surface Beta-Gamma	1	dpm/100 cm^2	6100	—	3
	Surface Alpha	1	dpm/100 cm^2	28	—	
	Removable Alpha	3	dpm/100 cm^2	0	0	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 30 (continued)						
Fabrication Room (continued)						
Drain B*	Surface Beta-Gamma	1	dpm/100 cm^2	1400	—	3
	Surface Alpha	1	dpm/100 cm^2	130	—	
	Removable Alpha	1	dpm/100 cm^2	2.3	—	
Drain C	Removable Alpha	3	dpm/100 cm^2	0	0	
Drain D*	Surface Beta-Gamma	1	dpm/100 cm^2	1700	—	3
	Surface Alpha	1	dpm/100 cm^2	110	—	
	Removable Alpha	3	dpm/100 cm^2	0	0	
Drain E	Surface Beta-Gamma	1	dpm/100 cm^2	730	—	
	Surface Alpha	1	dpm/100 cm^2	130	—	
	Removable Alpha	3	dpm/100 cm^2	0	0	
Floor	Surface Beta-Gamma	18	dpm/100 cm^2	2300 - 210000	23000	2
	Surface Alpha	17	dpm/100 cm^2	8 - 17000	2000	
Hydraulic Press	Surface Beta-Gamma	29	dpm/100 cm^2	0 - 1300	350	
	Surface Alpha	29	dpm/100 cm^2	0 - 2300	220	
Baldwin Press	Surface Beta-Gamma	5	dpm/100 cm^2	3400 - 19000	13000	3
	Surface Alpha	1	dpm/100 cm^2	1000	—	
Electric Furnace	Surface Beta-Gamma	3	dpm/100 cm^2	3800 - 15000	8700	3
Cart	Surface Beta-Gamma	4	dpm/100 cm^2	3800 - 13000	8500	3

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 30 (continued)						
Fabrication Room (continued)						
Steel Mill	Surface Beta-Gamma	19	dpm/100 cm^2	1200 - 25000	7400	3
Lindberg Furnace Floor	Surface Beta-Gamma	5	dpm/100 cm^2	3200 - 19000	6700	3
	Surface Alpha	5	dpm/100 cm^2	0 - 3900	870	
Furnace	Surface Beta-Gamma	1	dpm/100 cm^2	3200	—	3
	Surface Alpha	1	dpm/100 cm^2	3900	—	
Clark Puller	Surface Beta-Gamma	3	dpm/100 cm^2	5200 - 10000	7600	3
Building 31 (Figure 5-19)						
Room 1A Floor/Wall Interface (South Wall)	Surface Beta-Gamma	24	dpm/100 cm^2	120 - 45000	5200	4
	Surface Alpha	21	dpm/100 cm^2	23 - 5100	620	
Floor/Wall Interface (NE Wall)	Surface Beta-Gamma	12	dpm/100 cm^2	0 - 1000	420	
Desk Shelf	Surface Beta-Gamma	2	dpm/100 cm^2	390 - 810	600	
Hood	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
	Surface Alpha	1	dpm/100 cm^2	0	—	
Heater	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
	Surface Alpha	1	dpm/100 cm^2	0	—	
Drain	Gamma	1	μR/h	0	—	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 31 (continued)						
Room 1A (continued)						
Floor, General	Gamma	4	μR/h	0 - 1.1	0.5	
Floor/Wall Interface (Tile #25)	Gamma	1	μR/h	7.8	—	
Room 2 Hood (West) (South Wall)	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
	Surface Alpha	1	dpm/100 cm^2	0	—	
Hood (Center) (South Wall)	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
	Surface Alpha	1	dpm/100 cm^2	0	—	
Hood (East) (South Wall)	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
	Surface Alpha	1	dpm/100 cm^2	0	—	
Heater	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
Floor/Wall Interface North Wall*	Surface Beta-Gamma	1	dpm/100 cm^2	2000	—	2
East Wall	Surface Beta-Gamma	4	dpm/100 cm^2	3500 - 7300	4800	2
South Wall	Surface Beta-Gamma	3	dpm/100 cm^2	3000 - 6400	4200	2
	Surface Alpha	2	dpm/100 cm^2	61 - 144	100	
North Wall	Surface Beta-Gamma	1	dpm/100 cm^2	11000	—	2
	Surface Alpha	1	dpm/100 cm^2	440	—	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 31 (continued)						
Room 2 (continued)						
North Wall	Surface Beta-Gamma	2	dpm/100 cm^2	7000 - 8000	7500	2
	Surface Alpha	2	dpm/100 cm^2	140 - 420	280	
	Gamma	1	μR/h	2.4	—	
North Wall (Floor)	Surface Beta-Gamma	1	dpm/100 cm^2	3600	—	2
	Surface Alpha	1	dpm/100 cm^2	96	—	
	Gamma	1	μR/h	2.3	—	
Hood (Room Center)	Surface Alpha	2	dpm/100 cm^2	1400 - 1500	1400	6
East Wall (Behind Sink)	Surface Alpha	1	dpm/100 cm^2	260	—	
Floor, General	Gamma	5	μR/h	0 - 0.6	0.1	
East Wall, Shelf	Gamma	1	μR/h	2.4	—	
Outside, South and East Wall	Gamma	2	μR/h	4.9 - 5.6	5.3	
High-Voltage Room						
Floor/Wall Interface						
West	Surface Beta-Gamma	1	dpm/100 cm^2	3500	—	3
South	Surface Beta-Gamma	1	dpm/100 cm^2	3600	—	
Floor, Spots	Surface Beta-Gamma	5	dpm/100 cm^2	5000 - 8700	6300	3
Floor, Anchor Bolt	Surface Beta-Gamma	1	dpm/100 cm^2	6800	—	3

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 31 (continued)						
Room 13 Floor	Gamma	13	μR/h	0.3 - 1.2	0.7	
Cabinet Floor	Gamma	2	μR/h	0.3 - 0.6	0.5	
Drain	Gamma	4	μR/h	2.3 - 2.6	2.5	
Floor Adjacent to Drain	Gamma	3	μR/h	1 - 1.3	1.2	
Wall Adjacent to Drain	Surface Beta-Gamma	5	dpm/100 cm^2	2400 - 6100	4700	7
	Gamma	1	μR/h	1.5	—	
Room 15 Mezzanine Bottom Rail	Surface Beta-Gamma	5	dpm/100 cm^2	940 - 1300	1100	8
	Surface Alpha	6	dpm/100 cm^2	310 - 550	430	
Main Hallway						
Drain Header	Gamma	1	μR/h	8	—	5
Drain (#4)*	Surface Beta-Gamma	1	dpm/100 cm^2	1700	—	5
	Surface Alpha	1	dpm/100 cm^2	0	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 5.1	1.7	
Drain (#8)*	Surface Beta-Gamma	1	dpm/100 cm^2	1200	—	5
	Surface Alpha	1	dpm/100 cm^2	8	—	
	Removable Alpha	3	dpm/100 cm^2	0	0	
Drain (#9)	Surface Beta-Gamma	1	dpm/100 cm^2	540	—	
	Surface Alpha	1	dpm/100 cm^2	58	—	
	Removable Alpha	3	dpm/100 cm^2	0 - 7.9	3.4	

*Additional measurements required to determine if item is contaminated above guidelines.

TABLE 5-3

(continued)

Interior Measurement Location		Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 31 (continued)							
Main Hallway (continued)							
	Floor	Surface Beta-Gamma	25	dpm/100 cm^2	0 - 560	94	
		Surface Alpha	25	dpm/100 cm^2	0 - 29	6.2	
	Floor/Wall Interface	Surface Beta-Gamma	25	dpm/100 cm^2	0 - 1600	220	
		Surface Alpha	25	dpm/100 cm^2	0 - 110	21	
	Wall	Surface Beta-Gamma	25	dpm/100 cm^2	0 - 780	230	
		Surface Alpha	25	dpm/100 cm^2	0 - 140	30	
Attic	Floor Above Room 1	Surface Beta-Gamma	5	dpm/100 cm^2	710 - 2100	1300	1
		Surface Alpha	5	dpm/100 cm^2	1.9 - 98	40	
		Removable Alpha	5	dpm/100 cm^2	0 - 5.8	4.0	
	Rafters Above Room 1	Surface Beta-Gamma	4	dpm/100 cm^2	1300 - 1900	1600	1
		Surface Alpha	4	dpm/100 cm^2	89 - 140	110	
		Removable Alpha	4	dpm/100 cm^2	0 - 5.8	1.5	
	Vent Fan Above Room 1	Surface Beta-Gamma	1	dpm/100 cm^2	83	--	
		Surface Alpha	1	dpm/100 cm^2	31	--	
		Removable Alpha	1	dpm/100 cm^2	0	--	
	Above Room 13	Surface Beta-Gamma	5	dpm/100 cm^2	42 - 290	140	
		Surface Alpha	5	dpm/100 cm^2	31 - 210	94	
		Removable Alpha	2	dpm/100 cm^2	0 - 2.7	1.6	
	Above Main Hallway	Surface Beta-Gamma	13	dpm/100 cm^2	0 - 420	96	
		Surface Alpha	13	dpm/100 cm^2	0 - 60	15	
		Removable Alpha	11	dpm/100 cm^2	0 - 5.8	1.5	

TABLE 5-3

(continued)

Interior Measurement Location		Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 31 (continued)							
Attic	Above Room 14	Surface Beta-Gamma	5	dpm/100 cm^2	250 - 920	590	
		Surface Alpha	5	dpm/100 cm^2	31 - 1000	260	
		Removable Alpha	5	dpm/100 cm^2	2.7 - 49	25	
	Above Room 1A	Surface Beta-Gamma	7	dpm/100 cm^2	0 - 500	240	
		Surface Alpha	7	dpm/100 cm^2	60 - 540	220	
		Removable Alpha	7	dpm/100 cm^2	0 - 8.9	3.9	
	Above Room 2	Surface Beta-Gamma	1	dpm/100 cm^2	7	—	
		Surface Alpha	1	dpm/100 cm^2	250	—	
		Removable Alpha	1	dpm/100 cm^2	0	—	
	Light	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
		Surface Alpha	1	dpm/100 cm^2	350	—	
		Removable Alpha	1	dpm/100 cm^2	2.7	—	
	Wall	Surface Beta-Gamma	1	dpm/100 cm^2	710	—	
		Surface Alpha	1	dpm/100 cm^2	680	—	
		Removable Alpha	1	dpm/100 cm^2	5.8	—	
	Catwalk Above Room 1*	Surface Beta-Gamma	-	dpm/100 cm^2	>3000	—	1
	East Eaves Above Room 1	Surface Beta-Gamma	5	dpm/100 cm^2	2400 - 3600	3000	1
	West Eaves Above Room 1	Surface Beta-Gamma	3	dpm/100 cm^2	2400 - 3700	3100	1

*Survey indicated all measurements are >3,000 dpm/100 cm^2 and, therefore, above guidelines. Specific measurement locations were not documented by survey personnel.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 31 (continued)						
Attic Oblique Roof Supports*	Surface Beta-Gamma	-	dpm/100 cm^2	1000 - 3000	—	1
North Wall (Top of Masonry)	Surface Beta-Gamma	14	dpm/100 cm^2	1200 - 4600	2900	1
South Wall (Top of Masonry)	Surface Beta-Gamma	6	dpm/100 cm^2	2400 - 3400	2700	1
Building 33 (Figure 5-20)						
Room 103 Floor	Surface Beta-Gamma	1	dpm/100 cm^2	17000	—	1
	Surface Alpha	1	dpm/100 cm^2	1700	—	
Room 104 Floor	Surface Beta-Gamma	1	dpm/100 cm^2	120000	—	1
	Surface Alpha	1	dpm/100 cm^2	83	—	
Building 34 (Figure 5-21)						
Base Metals Smelter Handlift	Surface Beta-Gamma	1	dpm/100 cm^2	9100	—	1
Base Metals Smelter Pedestal Tube	Surface Beta-Gamma	1	dpm/100 cm^2	8300	—	2
	Gamma	1	μR/h	25.6	—	
Building 39						
Reception Room Floor	Surface Beta-Gamma	5	dpm/100 cm^2	0 - 77	15	
	Gamma	5	μR/h	0.1 - 1.8	1.0	

*Survey indicated all measurements ranged from 1,000 - 3,000 dpm/100 cm^2 and, therefore, the average would be greater than guidelines. Specific measurement locations were not documented by survey personnel.

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 39 (continued)						
Receptionist's Office Floor	Surface Beta-Gamma	4	dpm/100 cm^2	0 - 350	98	
	Gamma	4	μR/h	0.2 - 0.9	0.4	
Office No. 1 Floor	Surface Beta-Gamma	5	dpm/100 cm^2	0 - 390	220	
	Gamma	5	μR/h	0.04 - 1.3	0.73	
Office No. 1A Floor	Surface Beta-Gamma	2	dpm/100 cm^2	160 - 460	310	
	Gamma	4	μR/h	0.3 - 1.4	0.6	
Office No. 2 Floor	Surface Beta-Gamma	5	dpm/100 cm^2	0 - 350	160	
	Gamma	5	μR/h	0.03 - 0.3	0.17	
Office No. 3 Floor	Surface Beta-Gamma	5	dpm/100 cm^2	270 - 700	480	
	Gamma	5	μR/h	0 - 0.2	0.1	
Office No. 4 Floor	Surface Beta-Gamma	4	dpm/100 cm^2	0 - 770	400	
	Gamma	4	μR/h	0 - 0.7	0.3	
Office No. 5 Floor	Surface Beta-Gamma	4	dpm/100 cm^2	0 - 500	220	
	Gamma	4	μR/h	0 - 0.5	0.2	
Office No. 6 Floor	Surface Beta-Gamma	5	dpm/100 cm^2	0 - 430	250	
	Gamma	5	μR/h	0.6 - 1.2	0.9	
Office No. 7 Floor	Surface Beta-Gamma	5	dpm/100 cm^2	190 - 390	340	
	Gamma	5	μR/h	0 - 1.6	0.8	
Office No. 8 Floor	Surface Beta-Gamma	4	dpm/100 cm^2	120 - 350	220	
	Gamma	4	μR/h	0.2 - 1.4	0.8	

TABLE 5-3

(continued)

Interior Measurement Location	Parameter	Number of Readings	Unit	Range of Measurements[a,b]	Average Reading	Figure Item No.
Building 39 (continued)						
Office No. 9 Floor	Surface Beta-Gamma	3	dpm/100 cm^2	0 - 39	26	
	Gamma	3	μR/h	0.5 - 1.5	1.0	
Office No. 10 Floor	Surface Beta-Gamma	5	dpm/100 cm^2	0 - 620	230	
	Gamma	5	μR/h	0.2 - 0.4	0.3	
Men's Room Floor	Surface Beta-Gamma	3	dpm/100 cm^2	580 - 1300	910	
	Gamma	3	μR/h	0.3 - 0.5	0.4	
Women's Room Floor	Surface Beta-Gamma	4	dpm/100 cm^2	160 - 460	300	
	Gamma	4	μR/h	0.7 - 1.1	3.5	
Hallway	Surface Beta-Gamma	8	dpm/100 cm^2	0 - 540	240	
	Gamma	8	μR/h	0 - 0.9	0.4	
Hallway Between Men's and Office No. 3	Surface Beta-Gamma	3	dpm/100 cm^2	39 - 430	230	
	Gamma	3	μR/h	0.1 - 0.2	0.2	
Janitorial Room						
Transform	Surface Beta-Gamma	2	dpm/100 cm^2	540 - 960	750	
Sink	Surface Beta-Gamma	1	dpm/100 cm^2	420	—	
Drain	Surface Beta-Gamma	1	dpm/100 cm^2	0	—	
Floor/Wall Interface	Surface Beta-Gamma	3	dpm/100 cm^2	130 - 710	430	

[a]Measurements are given above background.

[b]Unless otherwise indicated, the residual surface contamination guideline (Table 1-1) for thorium-232 is applicable.

TABLE 5-4

BUILDINGS 30 and 31 FLOOR DRAIN GAMMA LOGGING RESULTS[a,b]

Drain No.[c]	Surface Reading	Depth Below Floor Surface[d] (m)						
		0.15	0.3	0.45	0.6	0.75	0.9	1.1
1	7,789	12,377	14,148	14,545	14,420	14,271	16,667	
2	7,918	12,831	13,967	13,913	13,934	13,488		
3	9,514	13,405	13,647	14,053	13,723	13,684		
4	7,274	9,585	13,651	14,288	15,441	15,624	15,618	14,883
5	12,916	14,104	14,291	14,428	14,830	14,652	13,703	
6	6,178	8,164	7,894	8,011	8,777	7,353		
7	7,153							
8	7,073	8,143	13,408	14,238	14,566	15,353	15,202	14,568
9	7,943	8,651	13,444	14,420	13,532	15,541	15,585	16,796
10	8,355	8,520						
11	9,246	8,555						
12	11,717	13,613	13,826					
13	6,501	7,237	13,328	14,099	13,836	13,586	12,991	
14	6,908	7,264	13,253	14,098	14,401	14,625	14,279	
15	10,343	13,207	13,740	14,323				
16	6,608	7,041	13,183	13,741	13,987	14,081	14,892	14,071
17	9,300	12,529	13,750	13,864	14,332			
18	8,475	11,320	13,393	13,330				
19	6,397	6,993	12,677	13,767	13,555	12,972		
20	10,193	12,885	13,390	13,598				
21	8,591	13,748	13,678	13,685				
22	10,192	13,210	13,628	13,617				
23	7,106	8,057	13,292	14,042	14,499	14,534		
24	7,034	7,417	13,411	14,570	13,598	14,038	13,481	
25	10,149	13,530	13,673	14,472				
26	6,505	7,527	12,934	13,681	13,938	15,050	15,812	
27	10,425	12,649	13,891	13,796				
28	10,681	13,673	15,169	16,821				
29	8,283	6,130						

[a]Measurements include background and are expressed in counts per minute (cpm). 1 μR/hr = 1,426 cpm; background = 6,478 cpm.

[b]The values presented are actual measurements as recorded by survey personnel. These measurements will fluctuate due to the instrument and techniques used.

[c]See Figure 5-18 for approximate drain locations.

[d]1 m is equivalent to 3.3 ft.

TABLE 5-5

RADIONUCLIDE CONCENTRATIONS IN SOIL/SLUDGE AT ARC

Location	Depth[a,b] (m)	Concentration (pCi/g) U-238[c]	Ra-226	Th-232
Building 4				
Room 105, Manhole	NA[d]	<13	2.2 ± 0.9	14 ± 3
Room Center	NA[d]	<9	1.3 ± 0.6	6 ± 2
Room 106, Manhole	NA[d]	<19	63 ± 3	14 ± 3
SW Room, Trench	0.6 - 0.8	<3.3	<0.6	<1.0
Bath, E End Trench	0.6 - 0.8	<6.5	<1.0	<1.6
SW Room, W Trench	0.6 - 0.8	<3.7	<0.7	<1.0
Bath, W Trench	0.6 - 0.8	23.1 ± 2.7	<1.0	<1.5
Bath, N Trench	0.6 - 0.8	11.6 ± 1.9	<0.7	<1.1
Building 5				
Borehole 39	0.3	<13	2.3 ± 0.7	2 ± 1
	0.6	<12	1.7 ± 0.8	5 ± 1
	0.9	<6	1.2 ± 0.7	2 ± 1
Borehole 40	0.3	<11	1.4 ± 0.5	<1
	0.6	<11	1.4 ± 0.6	3 ± 1
	0.9	<5	1.3 ± 0.5	1.3 ± 0.9
Borehole 41	0.3	<11	1.8 ± 0.6	2.2 ± 0.8
	0.6	<6	0.7 ± 0.6	1.4 ± 0.9
	0.9	<7	2.0 ± 0.7	<1
Borehole 42	0.3	<13	3 ± 1	2 ± 1
	0.6	<13	6 ± 1	9 ± 2
	0.9	<6	1.2 ± 0.7	1.6 ± 0.8
Building 17				
Borehole 2	0.3	<6	1.3 ± 0.5	0.8 ± 0.7
	0.6	<6	1.7 ± 0.6	2 ± 1
	0.9	<5	1.1 ± 0.3	0.9 ± 0.6
Borehole 4	0.3	<8	0.8 ± 0.4	7 ± 2
	0.6	<3	0.9 ± 0.4	2.3 ± 0.6
	0.9	<8	1.6 ± 0.5	1.6 ± 0.6
Borehole 7	0.3	<170	33 ± 13	330 ± 50
	0.6	<4	1.1 ± 0.5	1.1 ± 0.7
	0.9	<10	0.8 ± 0.5	1.4 ± 0.7

TABLE 5-5

(continued)

Location	Depth[a,b] (m)	Concentration (pCi/g) U-238[c]	Ra-226	Th-232
Building 17, continued				
Borehole 1	0.3	<10	1.1 ± 0.5	0.8 ± 0.5
	0.6	<13	1.8 ± 0.7	<1
	0.9	<6	1.4 ± 0.6	1.3 ± 0.8
Borehole 3	0.3	<8	1.3 ± 0.6	1.2 ± 0.9
	0.6	<11	1.7 ± 0.6	2.1 ± 0.8
	0.9	<8	0.9 ± 0.7	3 ± 1
Borehole 5	0.3	<6	1.2 ± 0.6	1.3 ± 0.8
	0.6	<5	0.8 ± 0.7	1.4 ± 0.9
	0.9	<12	1.7 ± 0.8	3 ± 1
Borehole 6	0.3	<8	0.7 ± 0.6	2.1 ± 0.9
	0.3	<14	1.6 ± 0.7	3 ± 1
	0.6	<6	1.4 ± 0.5	1.4 ± 0.8
	0.9	<10	2 ± 1	4 ± 1
Borehole 8	0.3	<3.1	<0.7	<1.1
	0.6	<4.0	<0.9	<1.2
	0.9	<2.7	<0.6	<1.1
	1.2	<3.7	<0.9	<1.3
	1.5	<2.3	<0.6	<0.7
Borehole 9	0.3	<4.1	<0.8	<1.4
	0.6	<3.4	<0.7	<1.2
	0.9	<3.7	<0.8	<1.3
	1.2	<2.6	<0.6	<0.9
	1.5	<3.7	<0.8	<1.0
Men's Room, Floor Drain	NA[d]	<6	1.1 ± 0.5	1.0 ± 0.7
Room 10, Floor Drain	NA[d]	1100 ± 100	2 ± 1	9 ± 2
Pipe	0.9	2100 ± 200	480 ± 20	1100 ± 100
Building 23				
Basement Tunnel	0 - 0.15	<8	3.5 ± 0.9	5 ± 1
10.2-cm (4-in.) Pipe	NA[d]	<90	<10	1800 ± 100
Pump Sump	NA[d]	<10	5 ± 1	23 ± 2
15.2-cm (6-in.) Pipe		<43	<3	530 ± 40
Holding T.	NA[d]	2 ± 1	1.3 ± 0.1	1.8 ± 0.2

TABLE 5-5

(continued)

Location	Depth[a,b] (m)	Concentration (pCi/g) U-238[c]	Ra-226	Th-232
Building 23, continued				
Ore bin #1	NA[d]	48 ± 10	39 ± 3	3 ± 1
Ore bin #2	NA[d]	23 ± 11	28 ± 2	2 ± 1
Ore bin #7	NA[d]	25 ± 16	34 ± 3	<1
Ore bin #10	NA[d]	36 ± 14	61 ± 3	1.4 ± 2
Ore bin #12	NA[d]	40 ± 8	30 ± 3	<1
Lab 1, Trench	NA[d]	<42	5 ± 3	110 ± 10
Sump	NA[d]	<1	1.0 ± 0.3	8 ± 1
Building 24				
N/S Trench	0 - 0.15	<13.4	14.3 ± 1.7	15.3 ± 0
Building 28				
Lab 3, Floor Drain	NA[d]	<13	0.8 ± 0.4	1.7 ± 0.8
Basement Shelf	Surface	230 ± 80	570 ± 20	130 ± 10
Basement, NE Sumps	0 - 0.08	<10.1	<2.1	28.9 ± 1.2
Buildings 30 and 31				
Rain Gutter Drain	0 - 0.15	<4.7	0.3 ± 0.1	<0.3
Borehole 13	0.3	<5.3	<1.2	<1.6
	0.6	<3.4	<0.8	<1.2
	0.9	<4.5	<1.0	<1.5
	1.2	<3.8	<0.8	<1.4
	1.5	<3.9	<0.9	<1.1
	1.5	<3.9	<1.0	<1.3
Borehole 14	0.3	<4.8	<1.2	<1.6
	0.6	<3.1	<0.7	<1.1
	0.9	<2.8	<0.5	<1.0
	1.2	<2.5	<2.5	<0.8
	1.5	<4.1	<4.1	<1.2
Borehole 15	0.3	<8.9	<1.5	11.3 ± 0.9
	0.6	<4.7	<1.0	<2.2
	0.9	<5.5	<1.3	5.1 ± 0.7
	1.2	<3.9	<0.8	<1.6
	1.5	<3.8	<0.9	<1.5

TABLE 5-5

(continued)

Location	Depth[a,b] (m)	Concentration (pCi/g) U-238[c]	Ra-226	Th-232
Borehole 16	0.3	<4.5	<1.2	<1.4
	0.6	<4.3	<1.0	<1.7
	0.9	<4.5	<1.0	<1.8
	1.2	<3.0	<0.6	<1.1
	1.5	<2.6	<0.7	<0.9
Borehole 17	0.3	<4.2	<1.0	<1.3
	0.6	<4.3	<1.0	<1.8
	0.9	<3.8	<0.8	<1.2
	1.2	<3.4	<0.8	<1.1
	1.5	<2.9	<0.6	<1.1
Borehole 18	0.3	<6.8	<1.6	<2.1
	0.6	<3.5	<0.8	<1.3
	0.9	<3.6	<0.9	<1.2
	1.2	<3.1	<0.7	<1.0
	1.5	<4.0	<0.9	<1.2
Borehole 19	0.3	<3.6	<0.8	<1.2
	0.6	<5.2	<1.2	<1.7
	0.9	<4.3	<1.0	<1.6
	1.2	<3.4	<0.9	<1.2
	1.5	<2.9	<0.7	<1.0
Borehole 35	0.3	<6.7	<1.3	4.8 ± 0.6
	0.6	<5.4	<1.1	<2.2
	0.9	<3.4	<0.8	<1.3
	1.2	<7.6	<1.4	<2.1
	1.5	<4.1	<0.8	<1.6
	1.8	<5.6	<1.3	<2.0
	2.1	<2.9	<0.6	<0.9
	2.4	<6.3	<1.6	<1.7
	2.7	<2.5	<0.6	<0.8
	3.0	<3.3	<0.8	<1.0
Borehole 36	0.3	<4.1	<1.0	<1.4
	0.6	<2.9	<0.7	<1.1
	0.9	<4.2	<0.9	<1.3
	1.2	<2.4	<0.6	<0.9
	1.5	<3.7	<0.8	<1.3
	1.5	<3.6	<0.9	<1.4
	1.8	<2.9	<0.6	<1.2
	2.1	<2.8	<0.6	<0.9
	2.4	<4.7	<1.2	<1.6
	2.7	<3.8	<0.8	<1.2
	3.0	<2.4	<0.6	<0.9

TABLE 5-5

(continued)

Location	Depth[a,b] (m)	Concentration (pCi/g) U-238[c]	Ra-226	Th-232
Lime Pit				
Borehole 37	0.3	51.2 ± 7.2	<1.7	43.1 ± 2.9
	0.6	<3.9	<0.9	<1.1
	0.9	<5.6	<1.0	<1.5
	1.2	<3.1	<0.7	<1.1
	1.5	<4.9	<0.9	<1.3
Borehole 38	0.3	37.0 ± 3.8	<1.1	29.9 ± 3.6
	0.6	8.0 ± 3.7	<1.2	30.9 ± 1.4
	0.9	20.3 ± 3.4	<1.2	23.6 ± 1.8
	1.2	37.8 ± 5.3	<1.3	31.8 ± 2.1
	1.5	30.1 ± 4.3	<1.3	30.0 ± 0.9
	1.5	38.3 ± 5.2	<1.4	30.2 ± 1.6

[a]1 m is equivalent to 3.3 ft.

[b]Depths are not given for those items for which samples were taken over an unknown range of depths, collected from several surfaces, or are not applicable.

[c]Estimated by analyzing for Th-234.

[d]NA - Not available.

TABLE 5-6

SUMMARY OF ANL MEASUREMENTS

Location	Maximum PAC[a] Reading (Beta-Gamma/Alpha) (dpm/100 cm^2)	Contact GM[b] Reading (mR/h)	Removable (Beta-Gamma) (dpm/100 cm^2)
ANL 134	9,400/Background	NA[c]	0
ANL 252	20,000/21,000	0.6	NA
ANL 257	3,000/470	NA	NA
ANL 258	12,000/1,200	0.06	NA
ANL 39	43,000/1,200	0.2	16
ANL 40	42,000/47,000	0.06	18
ANL 41	20,000/1,700	0.08	20
ANL 43	16,000/1,900	0.2	10
ANL 44	5,900/5,900	0.5	NA
ANL 45	46,000/NA	0.5	NA
ANL 31	7,100/1,200	NA	NA

[a]Gas-flow proportional counter.

[b]Geiger-Mueller counter.

[c]NA - Not available.

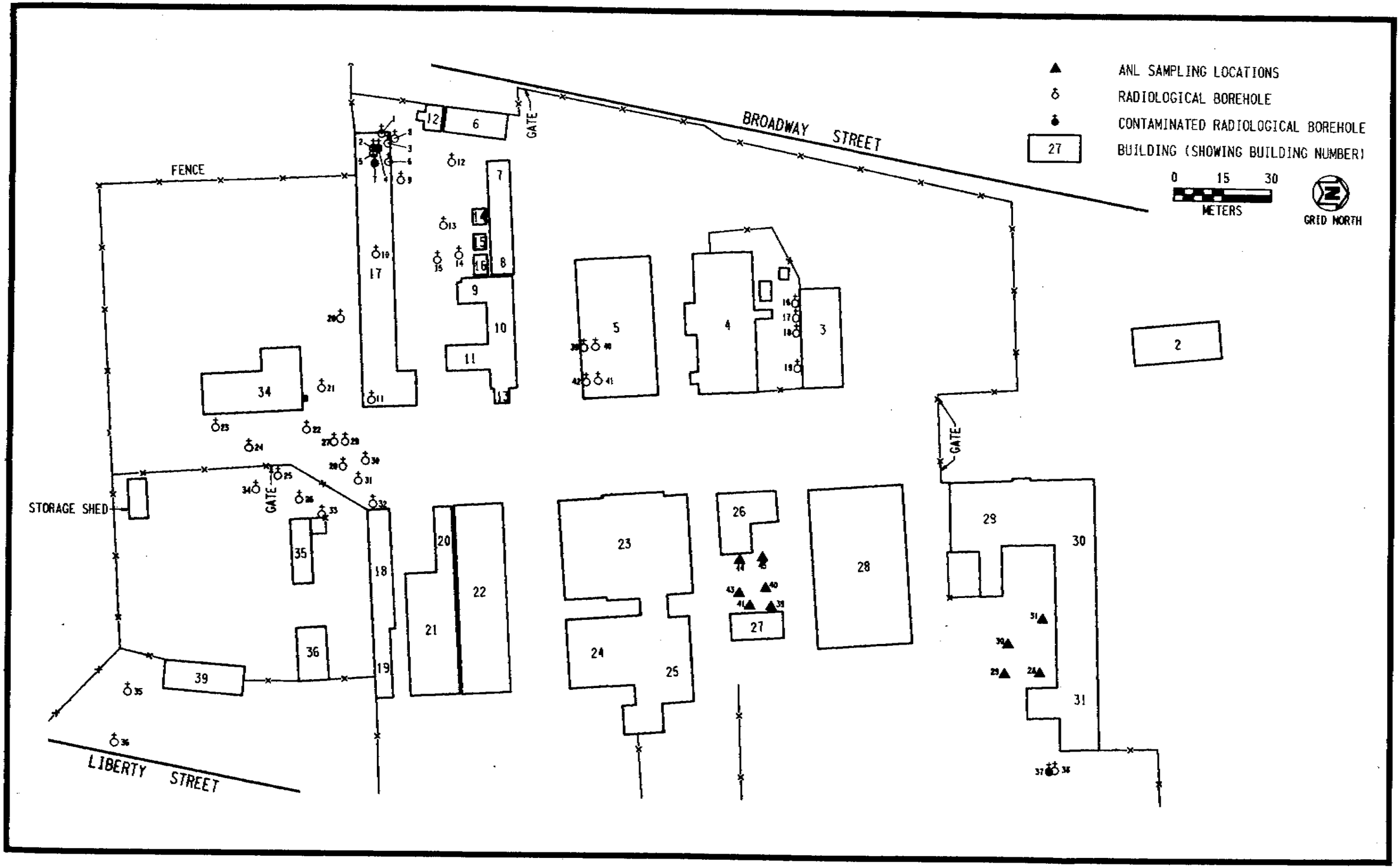
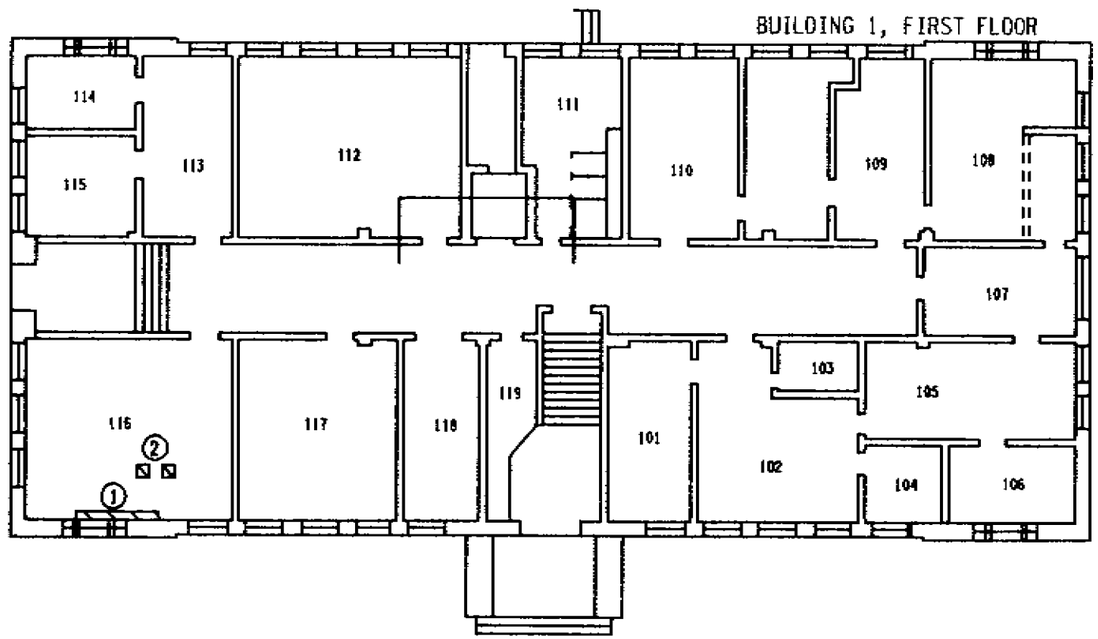
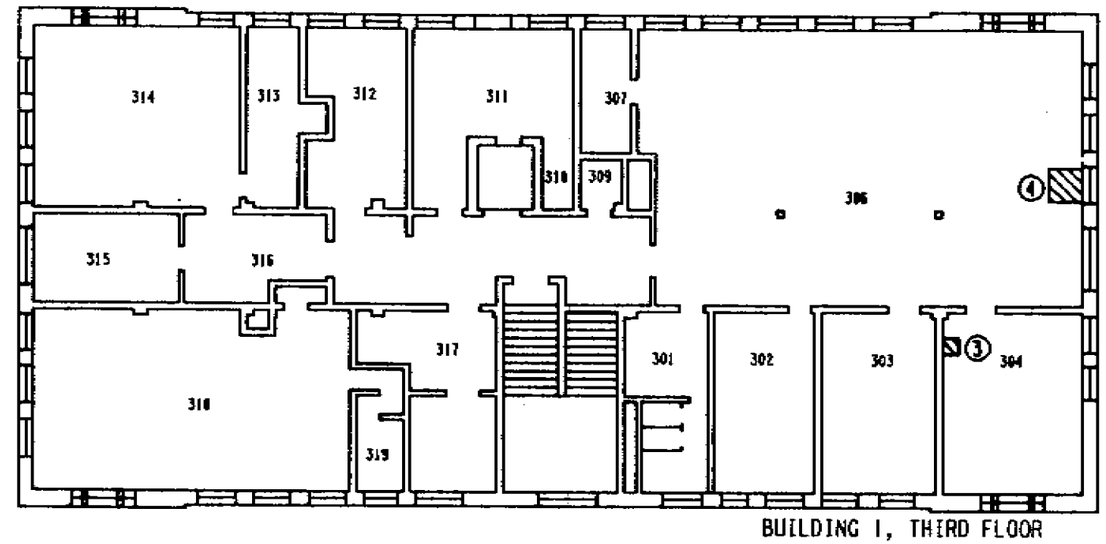


FIGURE 5-1 BNI BOREHOLE LOCATIONS AND ANL SAMPLING LOCATIONS AT THE ARC SITE

E42,13102F002.DGN





ROOM	ITEM NO.	ITEM
116	1	FLOOR-WALL INTERFACE, FLOOR
116	2	FLOOR
304	3	SAMPLES
306	4	UNDER SINK (IN CABINET)

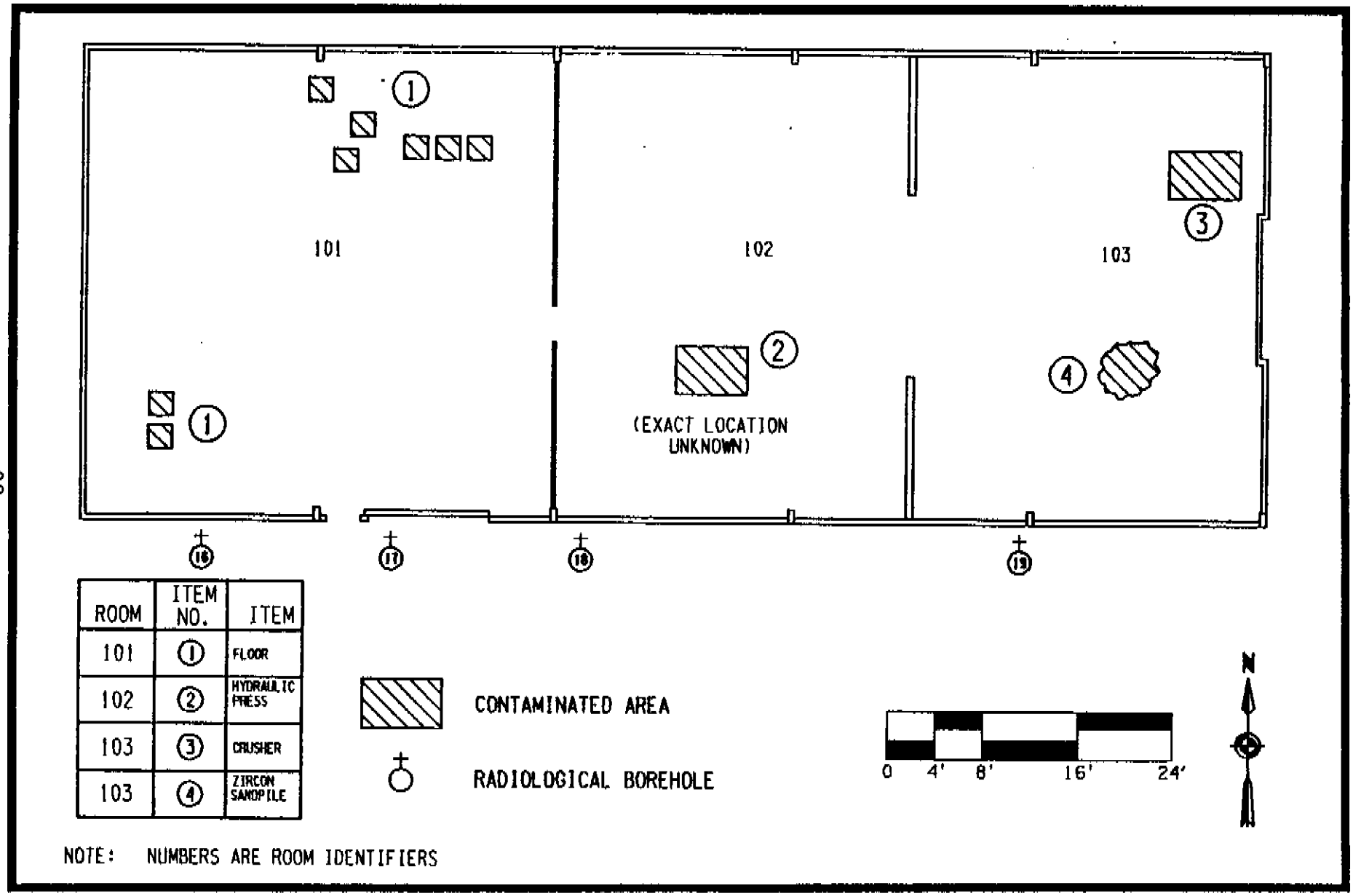
CONTAMINATED AREA

0 4' 8' 16' 24'

NOTE: NUMBERS REFER TO ARC ROOM DESIGNATIONS

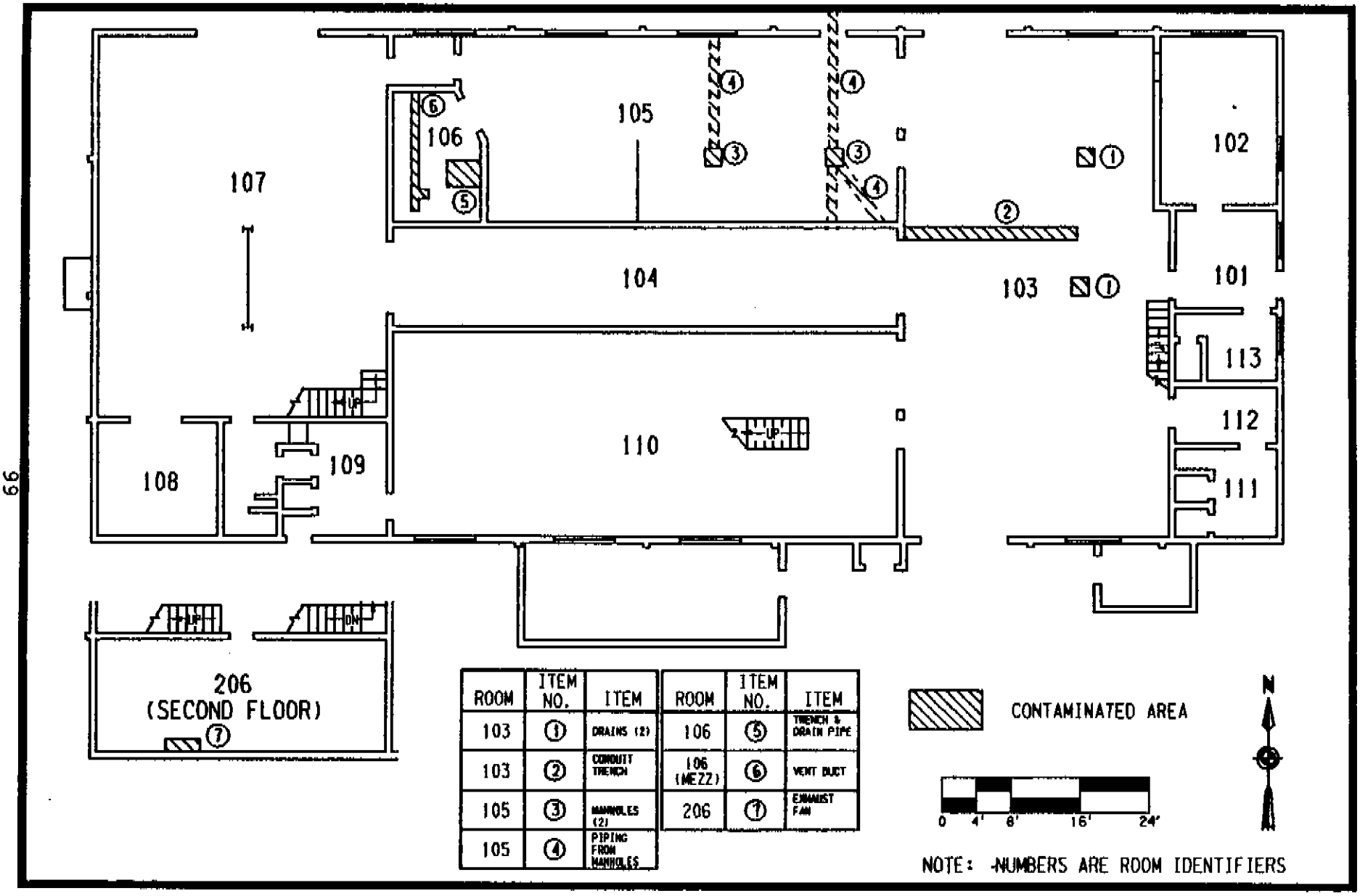
FIGURE 5-2 BUILDING 1, FIRST AND THIRD FLOORS

GR9: [42,1] BLDG1B.DGN



ROOM	ITEM NO.	ITEM
101	1	FLOOR
102	2	HYDRAULIC PRESS
103	3	CRUSHER
103	4	ZIRCON SANDPILE

FIGURE 5-3 BUILDING 3



ROOM	ITEM NO.	ITEM
103	1	DRAINS (2)
103	2	CONDUIT TRENCH
105	3	MANHOLES (2)
105	4	PIPING FROM MANHOLES

ROOM	ITEM NO.	ITEM
106	5	TRENCH & DRAIN PIPE
106 (MEZZ)	6	VENT DUCT
206	7	EXHAUST FAN

FIGURE 5-4 BUILDING 4, FIRST AND SECOND FLOORS

F42,11 BLDG4B.DGN

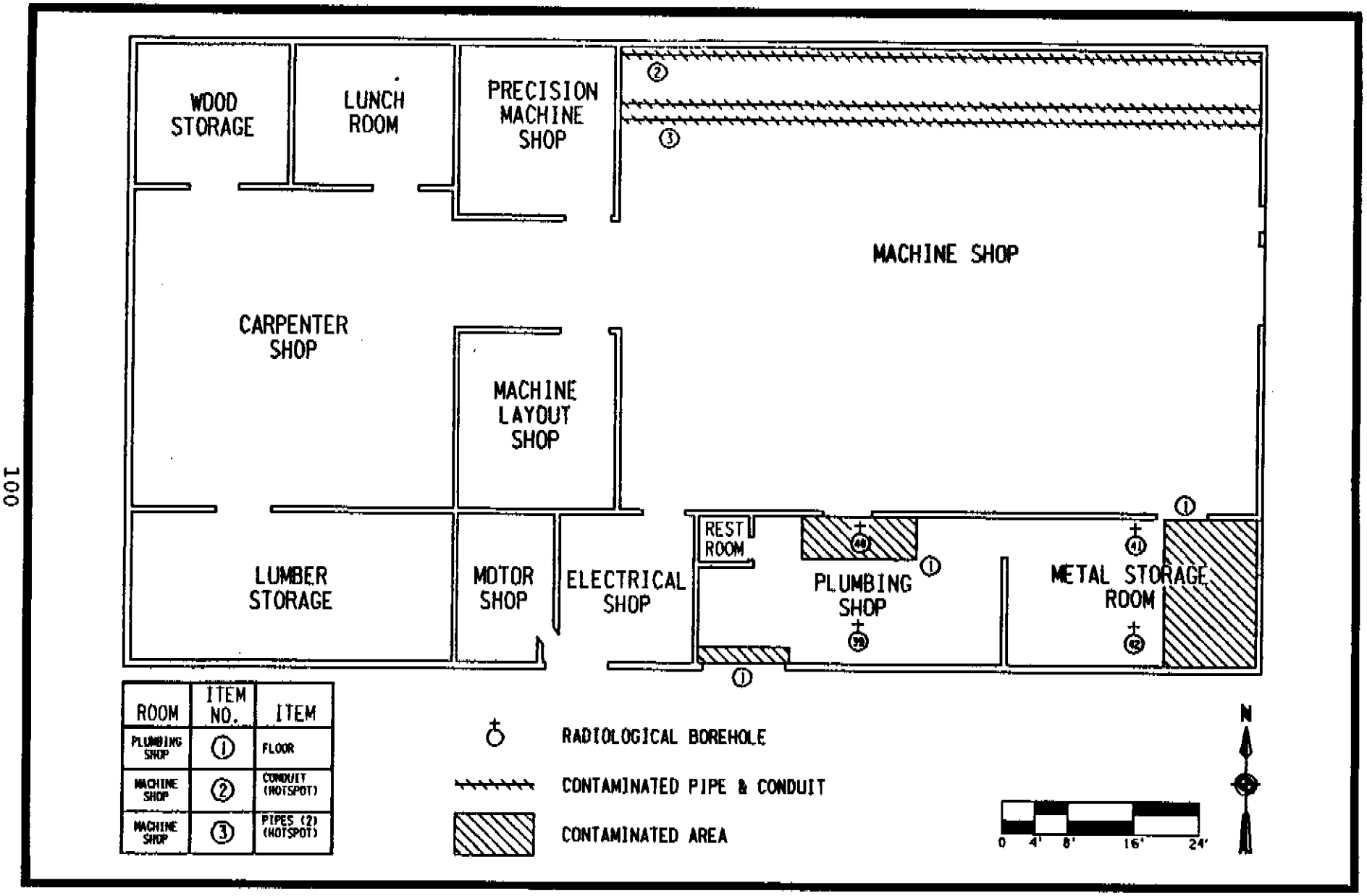
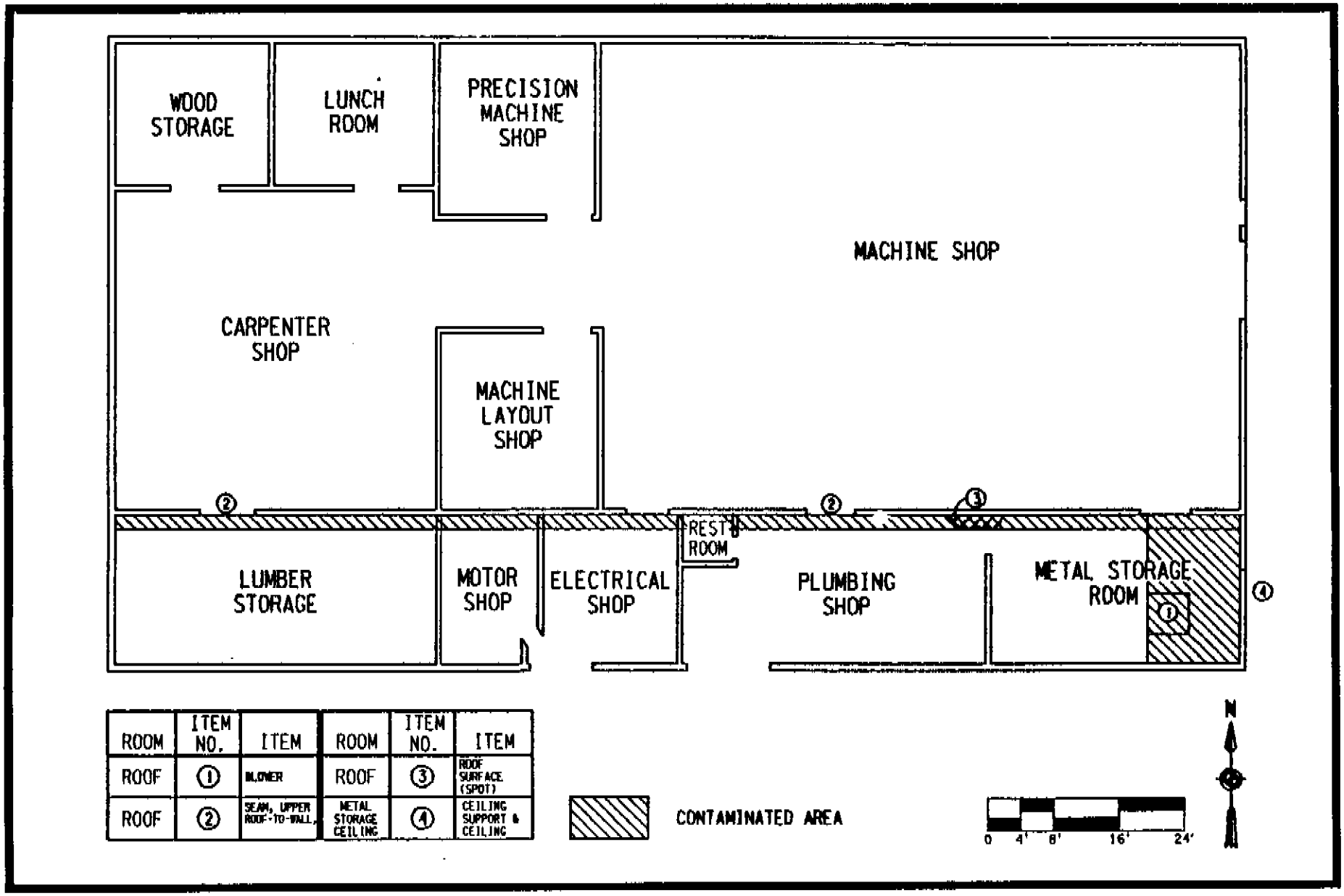


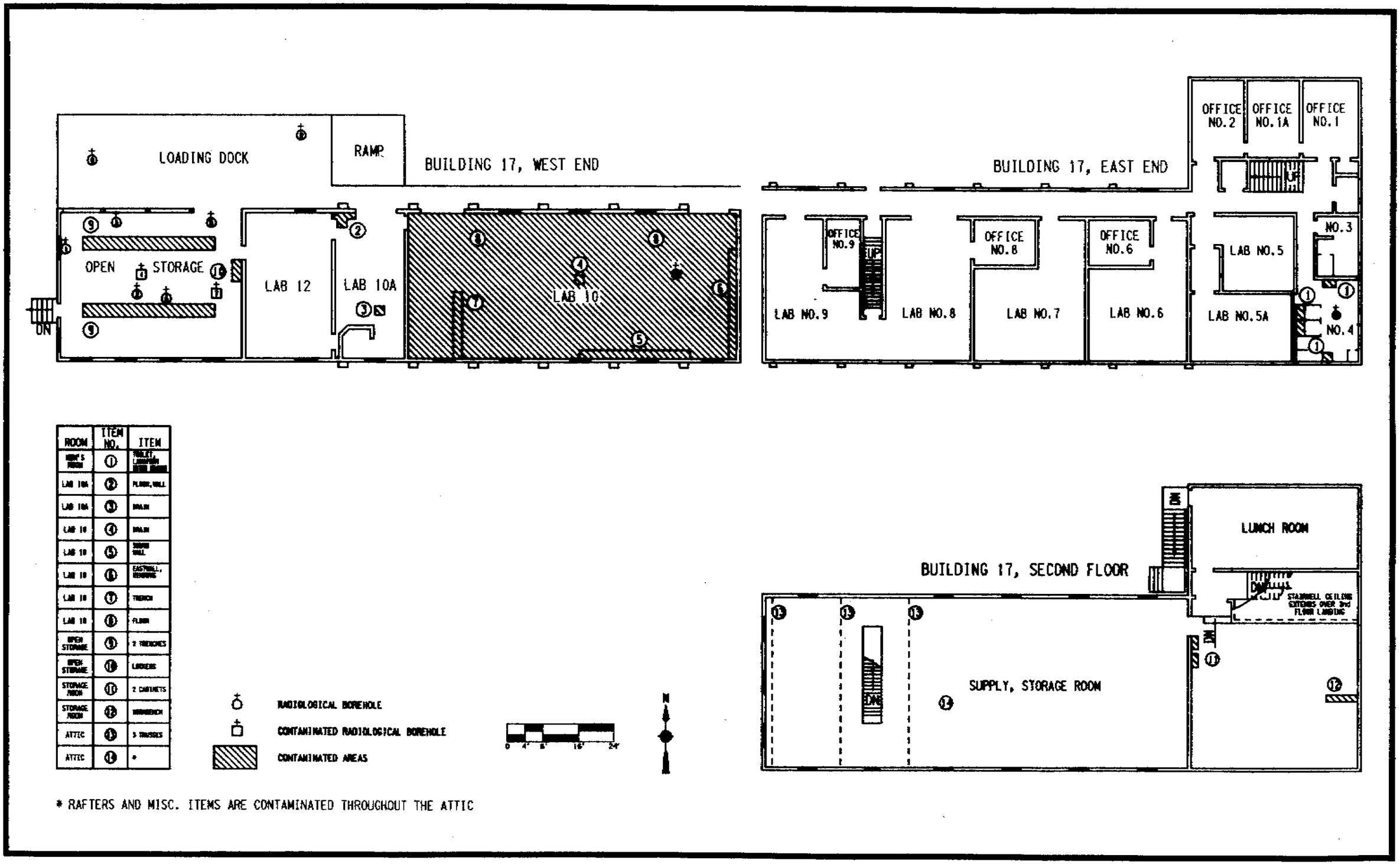
FIGURE 5-5 BUILDING 5

[42,1] BLDG5B.DGN



ROOM	ITEM NO.	ITEM	ROOM	ITEM NO.	ITEM
ROOF	1	BLOWER	ROOF	3	ROOF SURFACE (SPOT)
ROOF	2	SEAM, UPPER ROOF-TO-WALL	METAL STORAGE CEILING	4	CEILING SUPPORT & CEILING

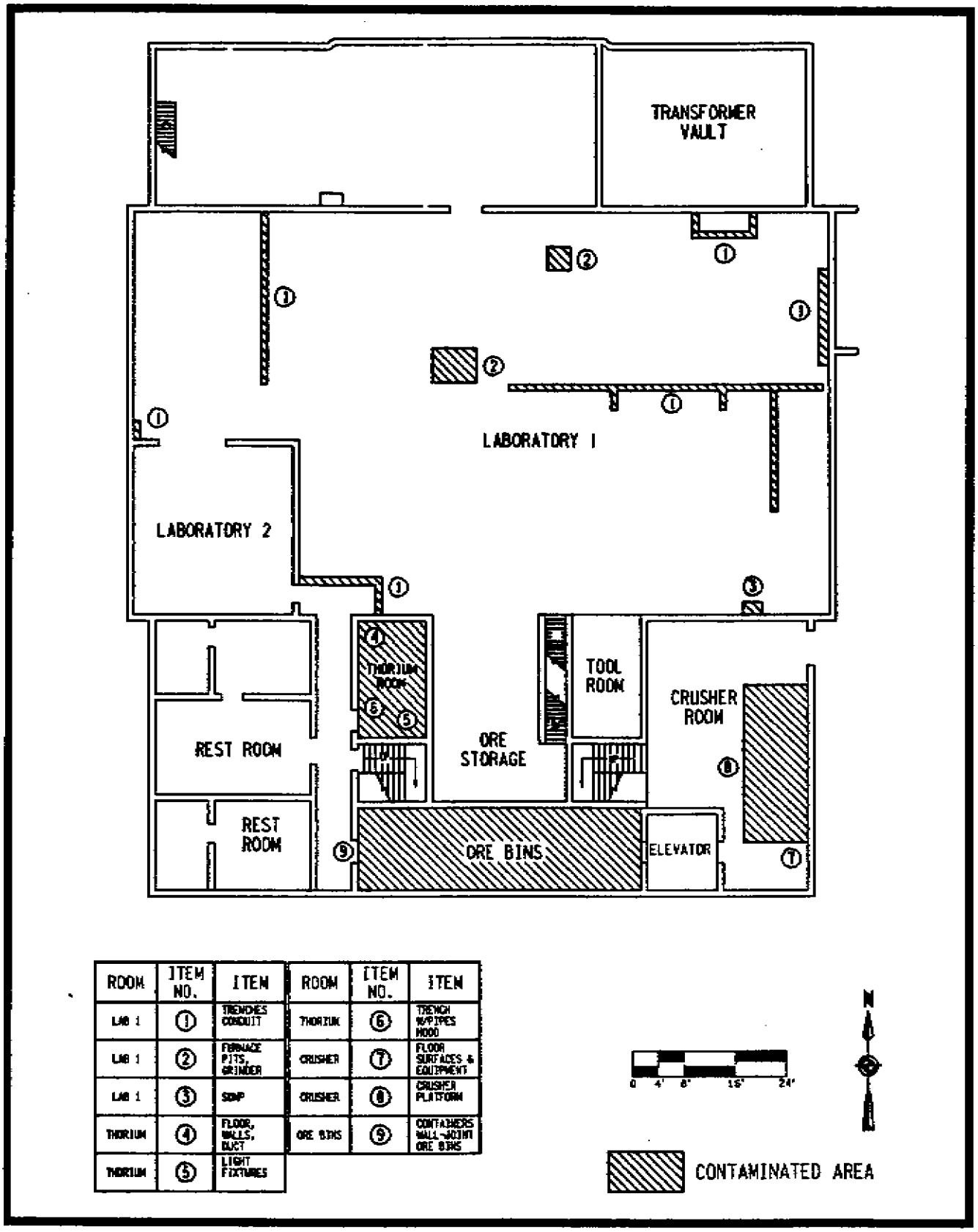
FIGURE 5-6 BUILDING 5, ROOF



ROOM	ITEM NO.	ITEM
[illegible]	1	[illegible]
LAB 10A	2	FLOOR, WALL
LAB 10A	3	DRAIN
LAB 10	4	DRAIN
LAB 10	5	SOUTH WALL
LAB 10	6	EAST WALL, [illegible]
LAB 10	7	TRENCH
LAB 10	8	FLOOR
OPEN STORAGE	9	2 TRENCHES
OPEN STORAGE	10	LOCKERS
STORAGE ROOM	11	2 CABINETS
STORAGE ROOM	12	WORKBENCH
ATTIC	13	3 TRUSSES
ATTIC	14	*

* RAFTERS AND MISC. ITEMS ARE CONTAMINATED THROUGHOUT THE ATTIC

FIGURE 5-7 BUILDING 17



ROOM	ITEM NO.	ITEM	ROOM	ITEM NO.	ITEM
LAB 1	1	TRENCHES CONDUIT	THORIUM	6	TRENCH W/PIPES HOOD
LAB 1	2	FURNACE PITS, GRINDER	CRUSHER	7	FLOOR SURFACES & EQUIPMENT
LAB 1	3	SUMP	CRUSHER	8	CRUSHER PLATFORM
THORIUM	4	FLOOR, WALLS, DUCT	ORE BINS	9	CONTAINERS WALL-JOINT ORE BINS
THORIUM	5	LIGHT FIXTURES			

FIGURE 5-8 BUILDING 23, FIRST FLOOR

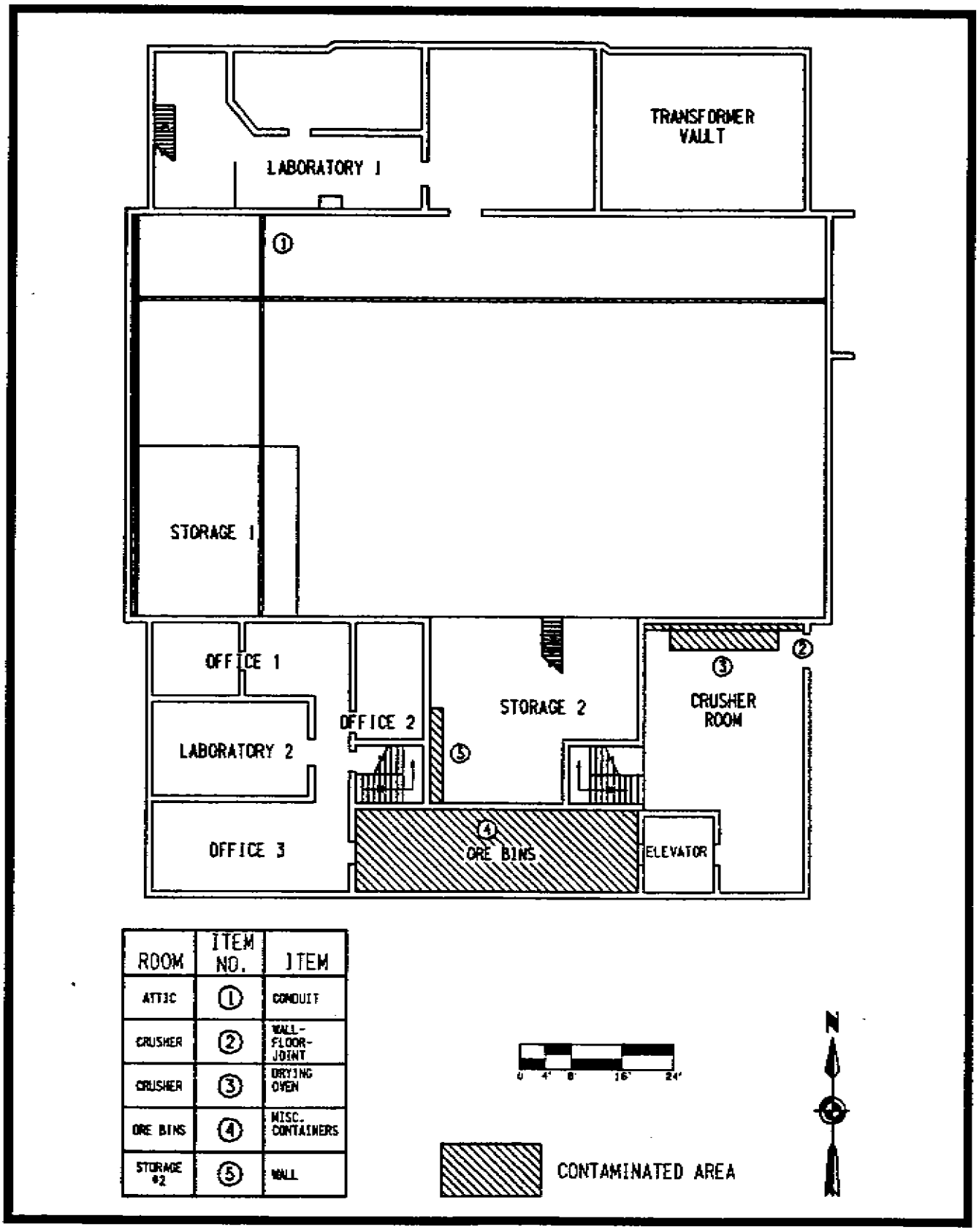
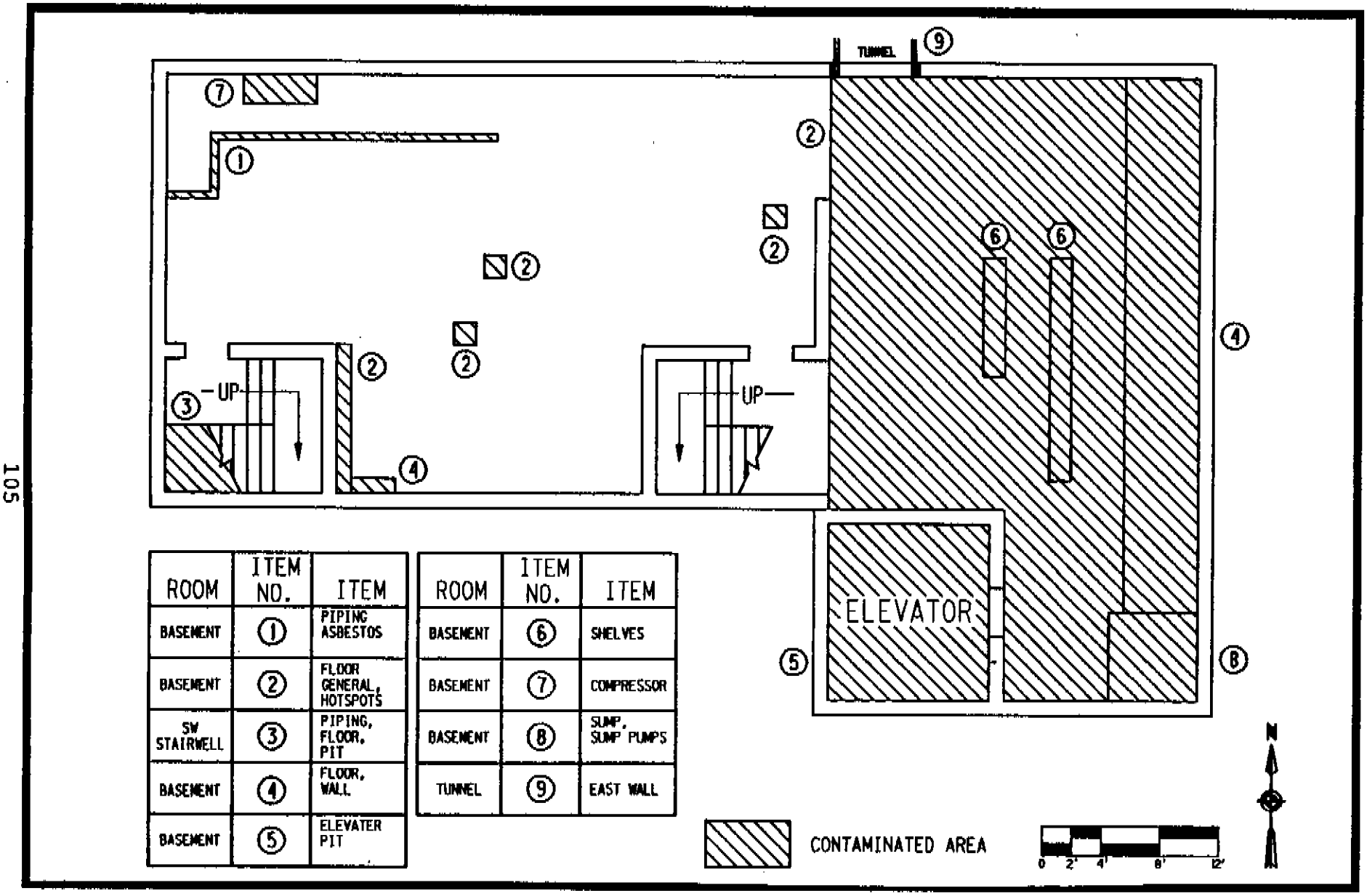


FIGURE 5-9 BUILDING 23, SECOND FLOOR

:B: [42.11 BUD023C.DGN

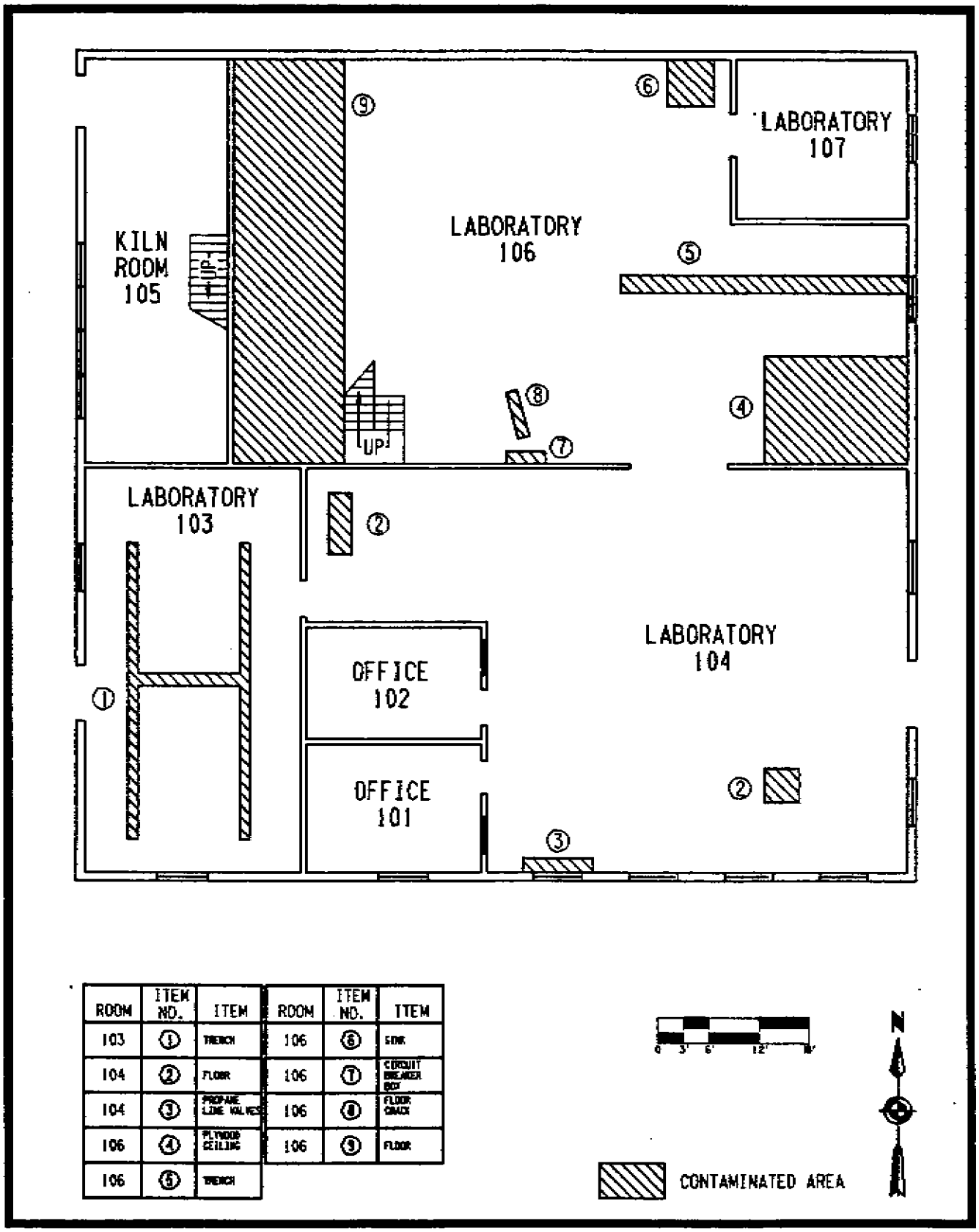


ROOM	ITEM NO.	ITEM
BASEMENT	1	PIPING ASBESTOS
BASEMENT	2	FLOOR GENERAL, HOTSPOTS
SW STAIRWELL	3	PIPING, FLOOR, PIT
BASEMENT	4	FLOOR, WALL
BASEMENT	5	ELEVATER PIT

ROOM	ITEM NO.	ITEM
BASEMENT	6	SHELVES
BASEMENT	7	COMPRESSOR
BASEMENT	8	SUMP, SUMP PUMPS
TUNNEL	9	EAST WALL

FIGURE 5-10 BUILDING 23, BASEMENT

12.11 BLDG23R.DGN;2



ROOM	ITEM NO.	ITEM	ROOM	ITEM NO.	ITEM
103	1	TRENCH	106	6	SINK
104	2	FLOOR	106	7	CIRCUIT BREAKER BOX
104	3	PROPANE LINE VALVES	106	8	FLOOR CRACK
106	4	PLYWOOD CEILING	106	9	FLOOR
106	5	TRENCH			

FIGURE 5-11 BUILDING 24

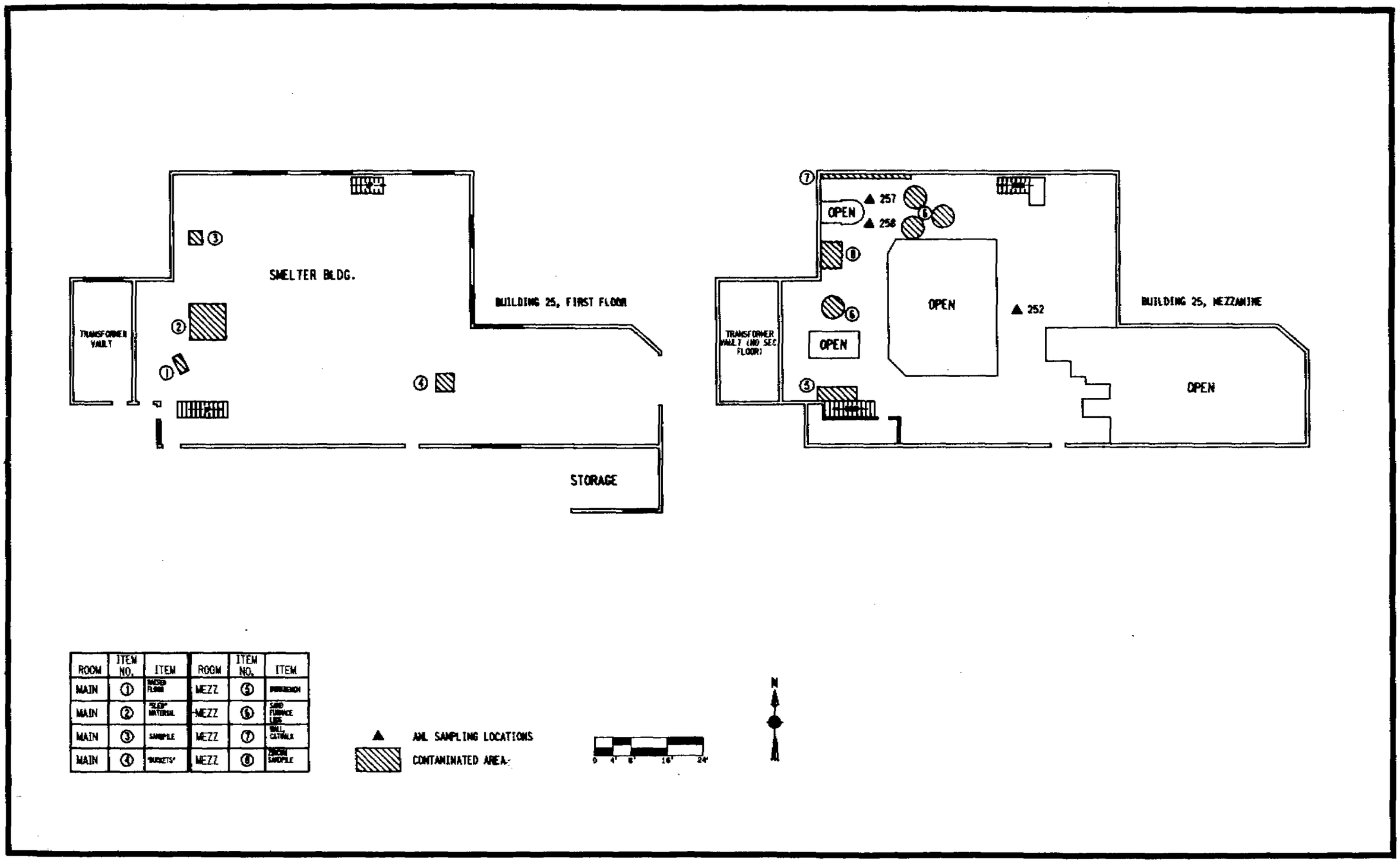


FIGURE 5-12 BUILDING 25, FIRST FLOOR AND MEZZANINE

42,11 BLDG25B.DGN

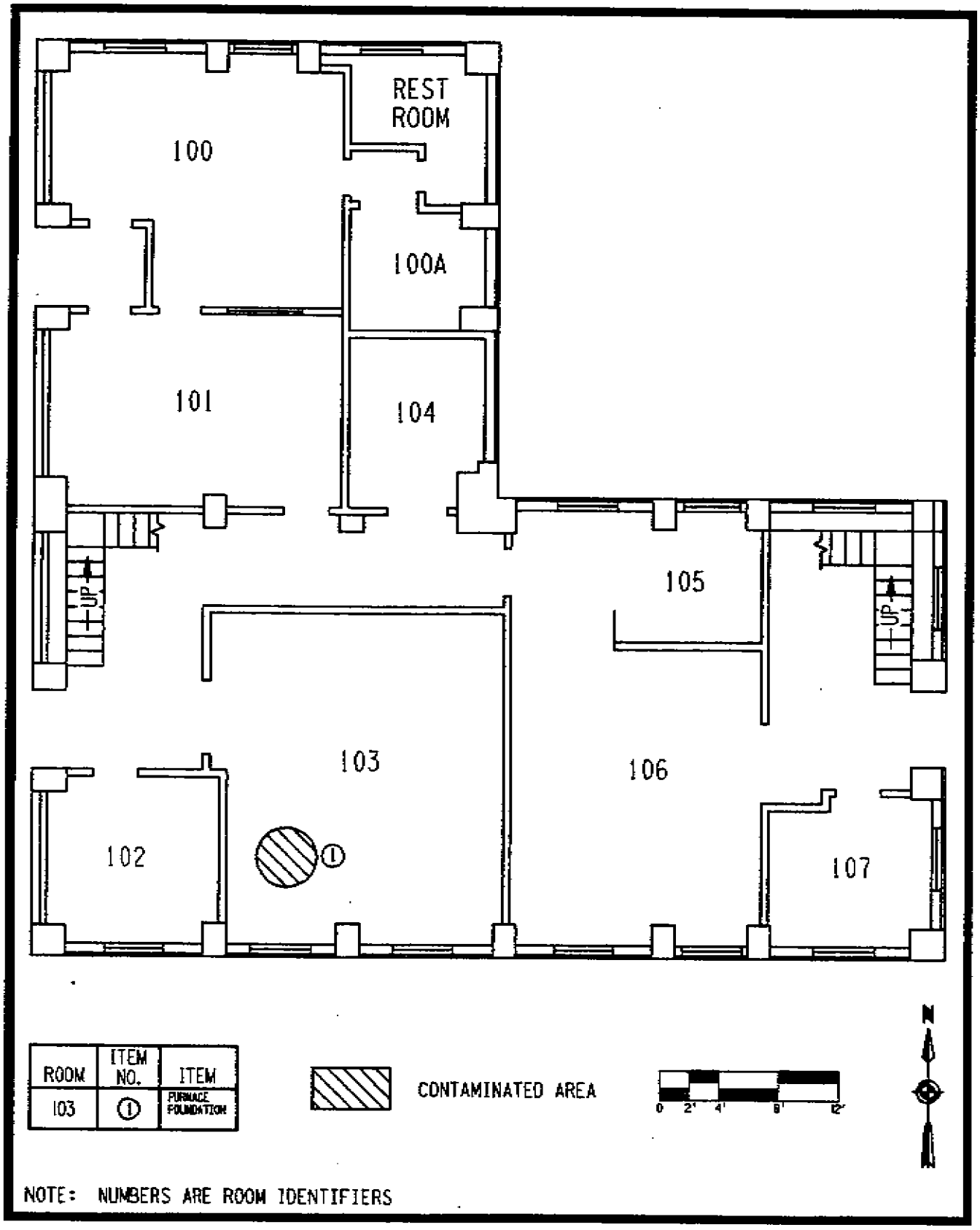
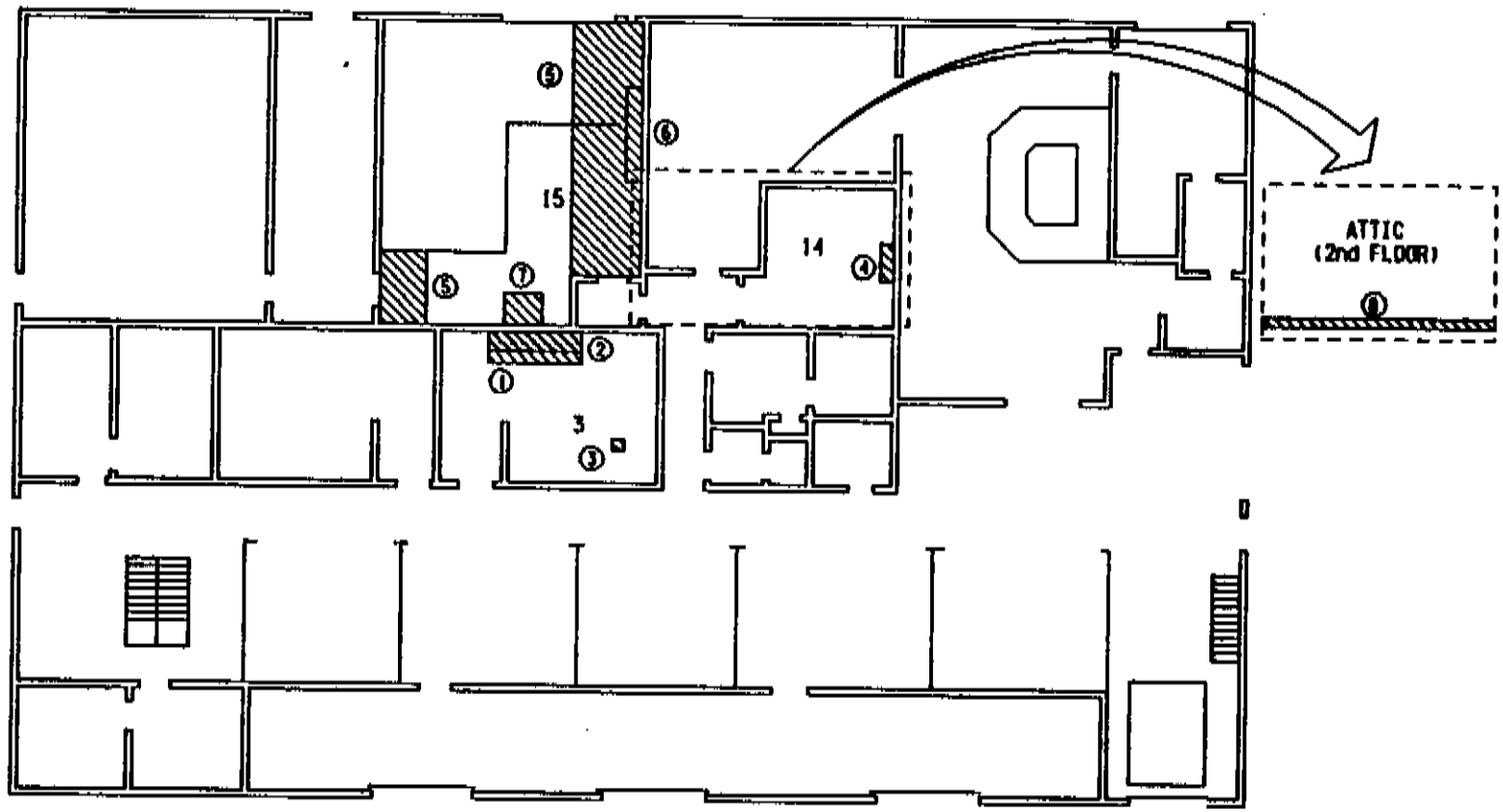


FIGURE 5-13 BUILDING 26, FIRST FLOOR

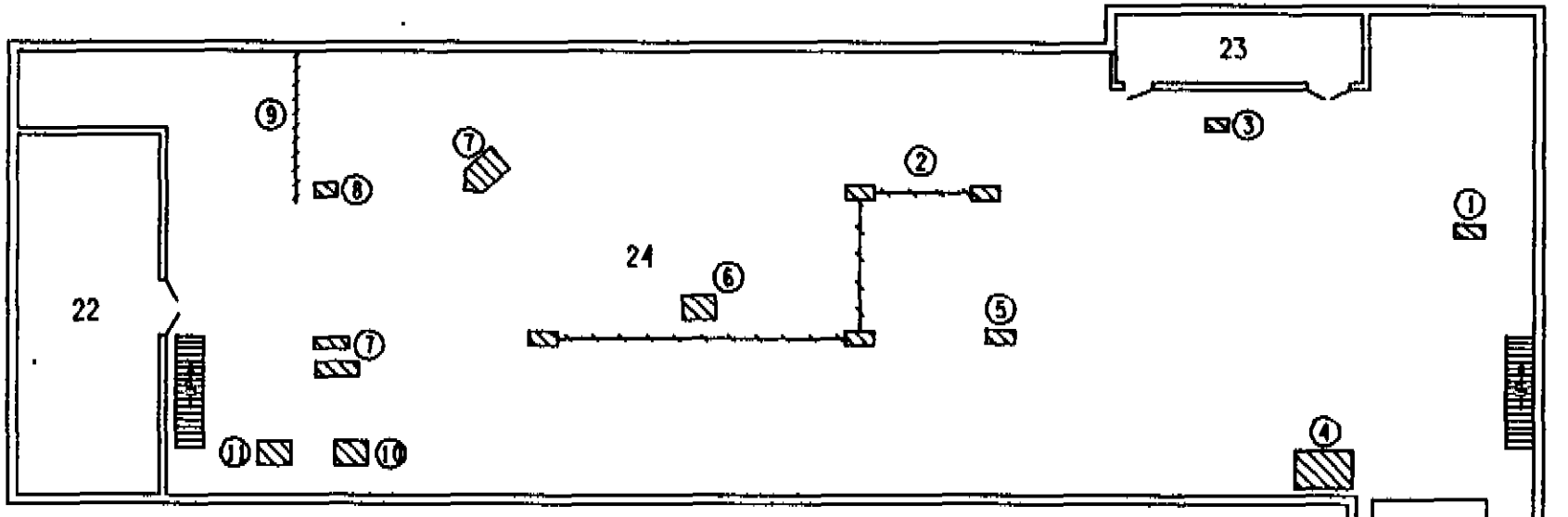


ROOM	ITEM NO.	ITEM	ROOM	ITEM NO.	ITEM
3	①	FLOOR	15	⑤	FLOOR
3	②	CABINET AND PIPE DRAIN	15	⑥	CABINET
3	③	DRAIN	15	⑦	UNDER SINK WALL, DRAIN SHELF
14	④	HOOD	ATTIC	⑧	TRUSS CROSS-BRACE

CONTAMINATED AREA

NOTE: NUMBERS ARE ROOM IDENTIFIERS

FIGURE 5-14 BUILDING 28, FIRST FLOOR



ROOM	ITEM NO.	ITEM	ROOM	ITEM NO.	ITEM
24	1	METAL CABINET	24	7	FLOOR
24	2	SUMPS & PIPING	24	8	SCALE
24	3	PRESS	24	9	OVERHEAD PIPE
24	4	SCALE	24	10	OVEN
24	5	WELDING ROD RACK	24	11	OVEN
24	6	SAW			

FIGURE 5-15 BUILDING 28, BASEMENT

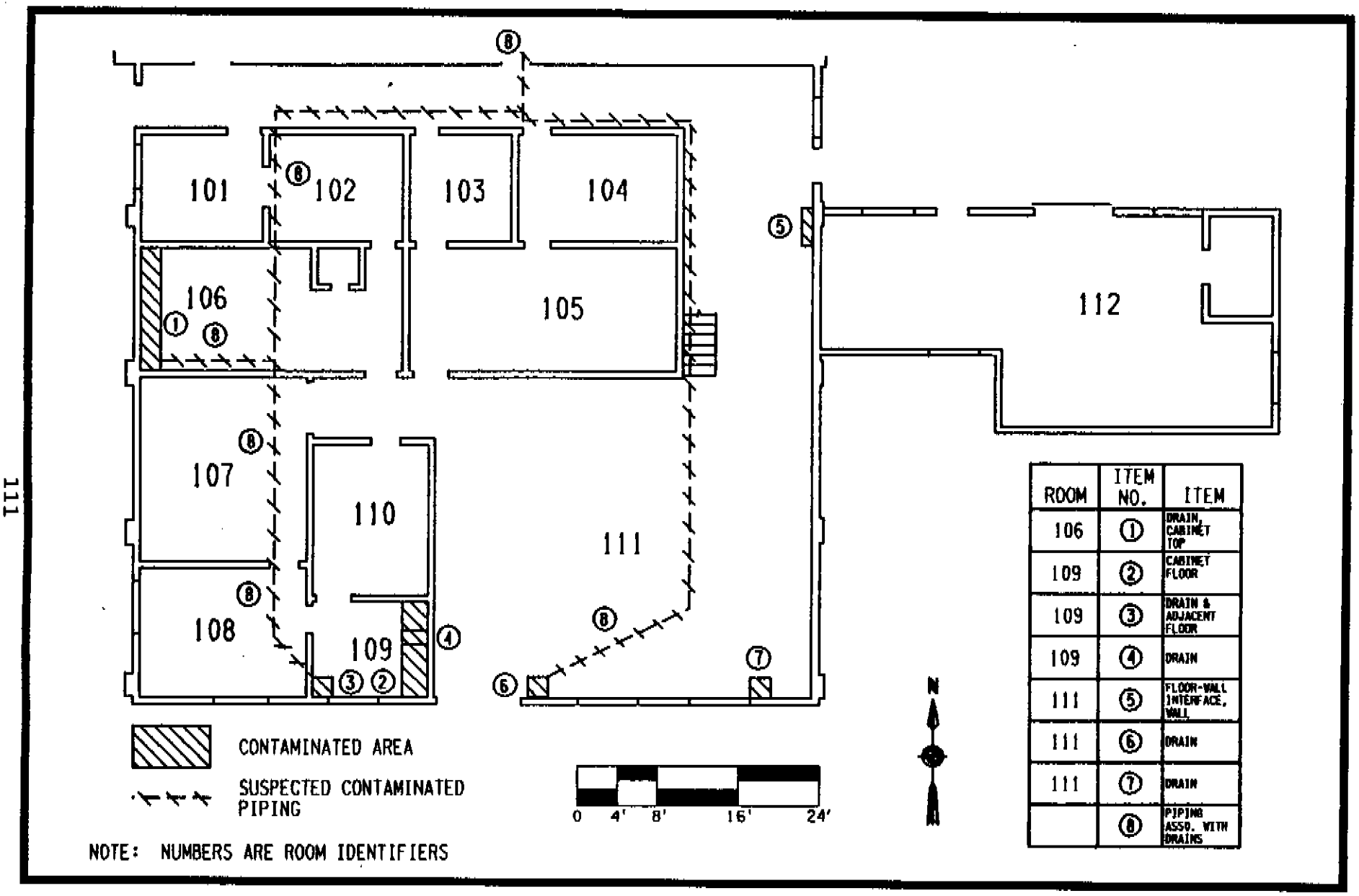
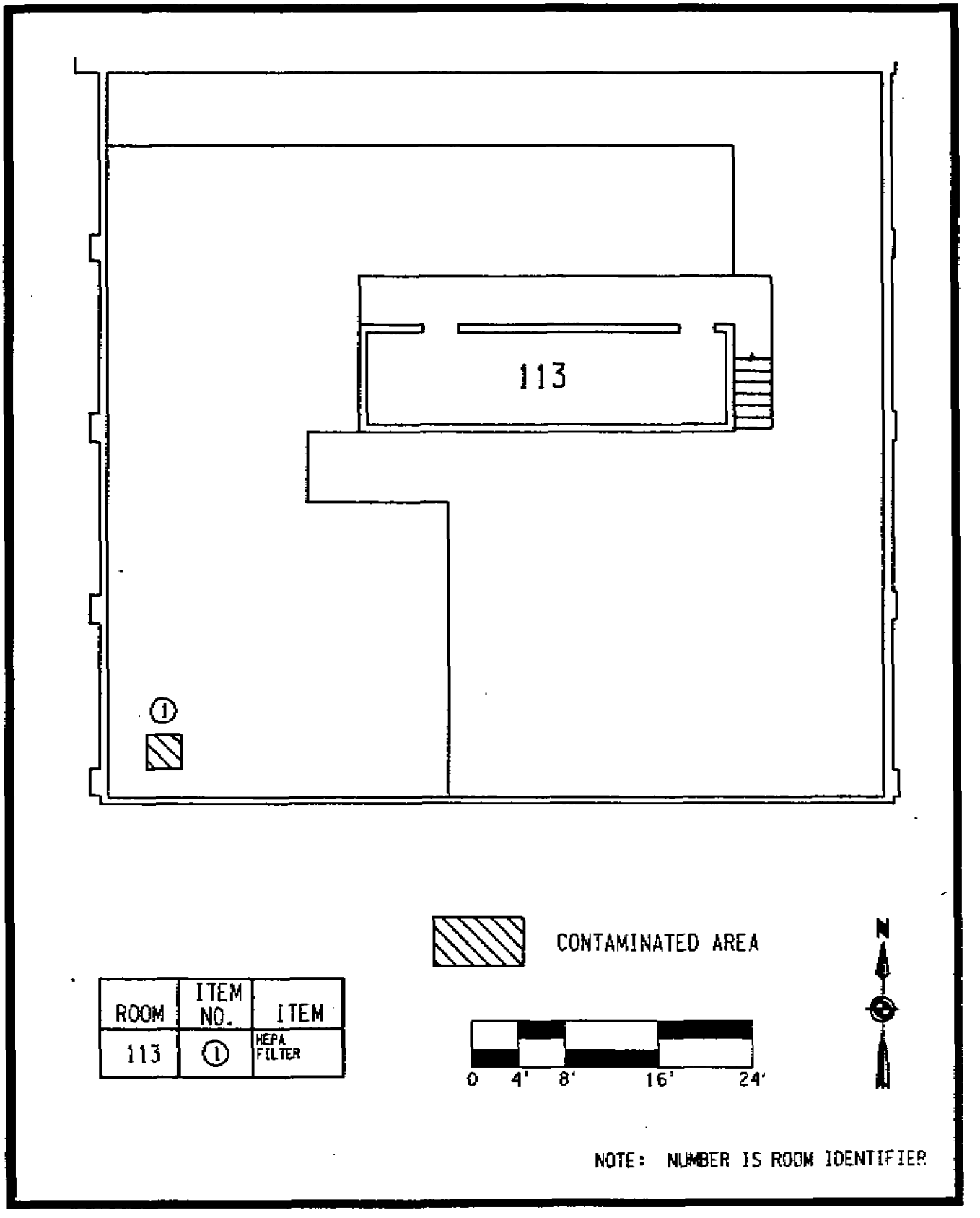


FIGURE 5-16 BUILDING 29, FIRST FLOOR



ROOM	ITEM NO.	ITEM
113	1	HEPA FILTER

FIGURE 5-17 BUILDING 29, SECOND FLOOR

: [42.1] BUDG29C.DGN

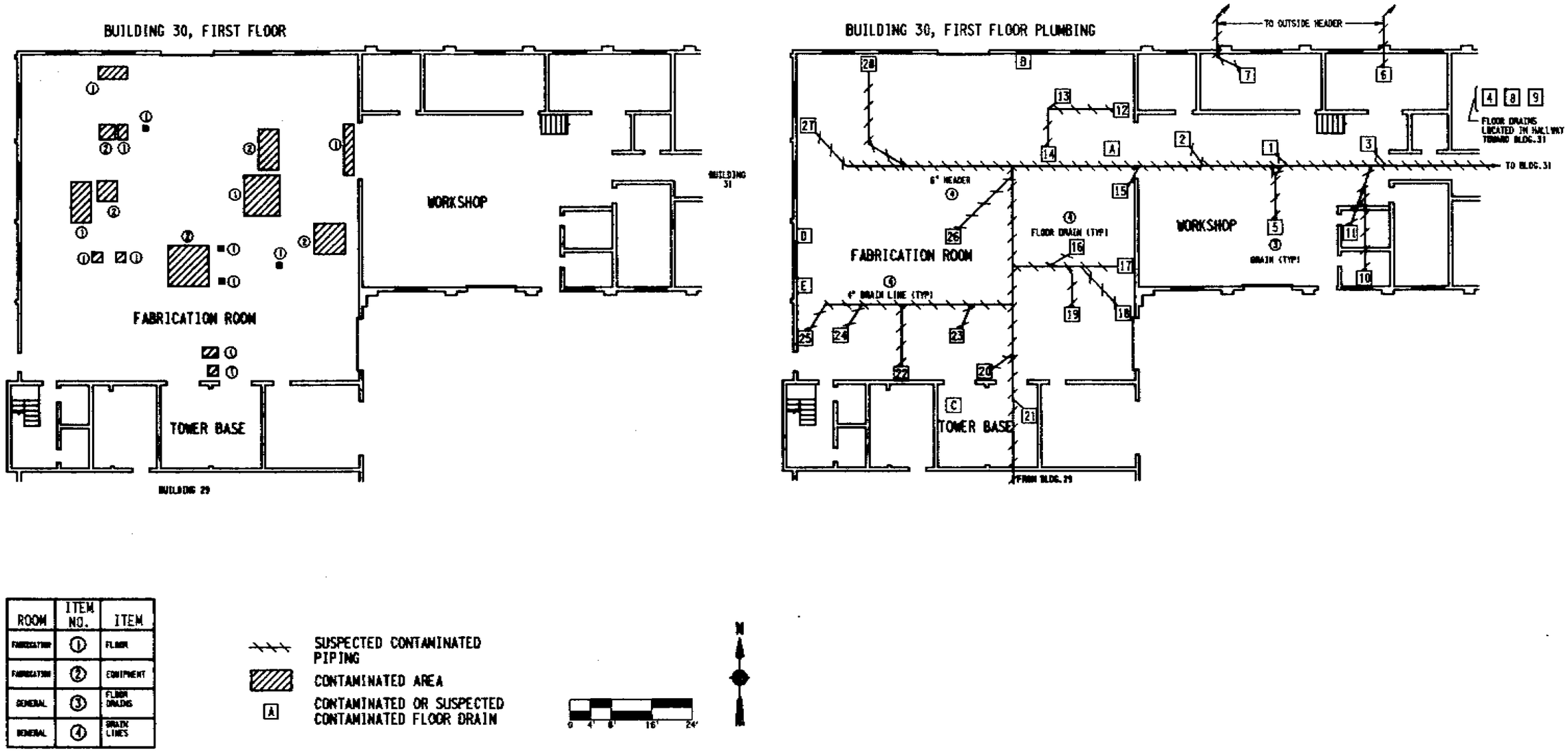
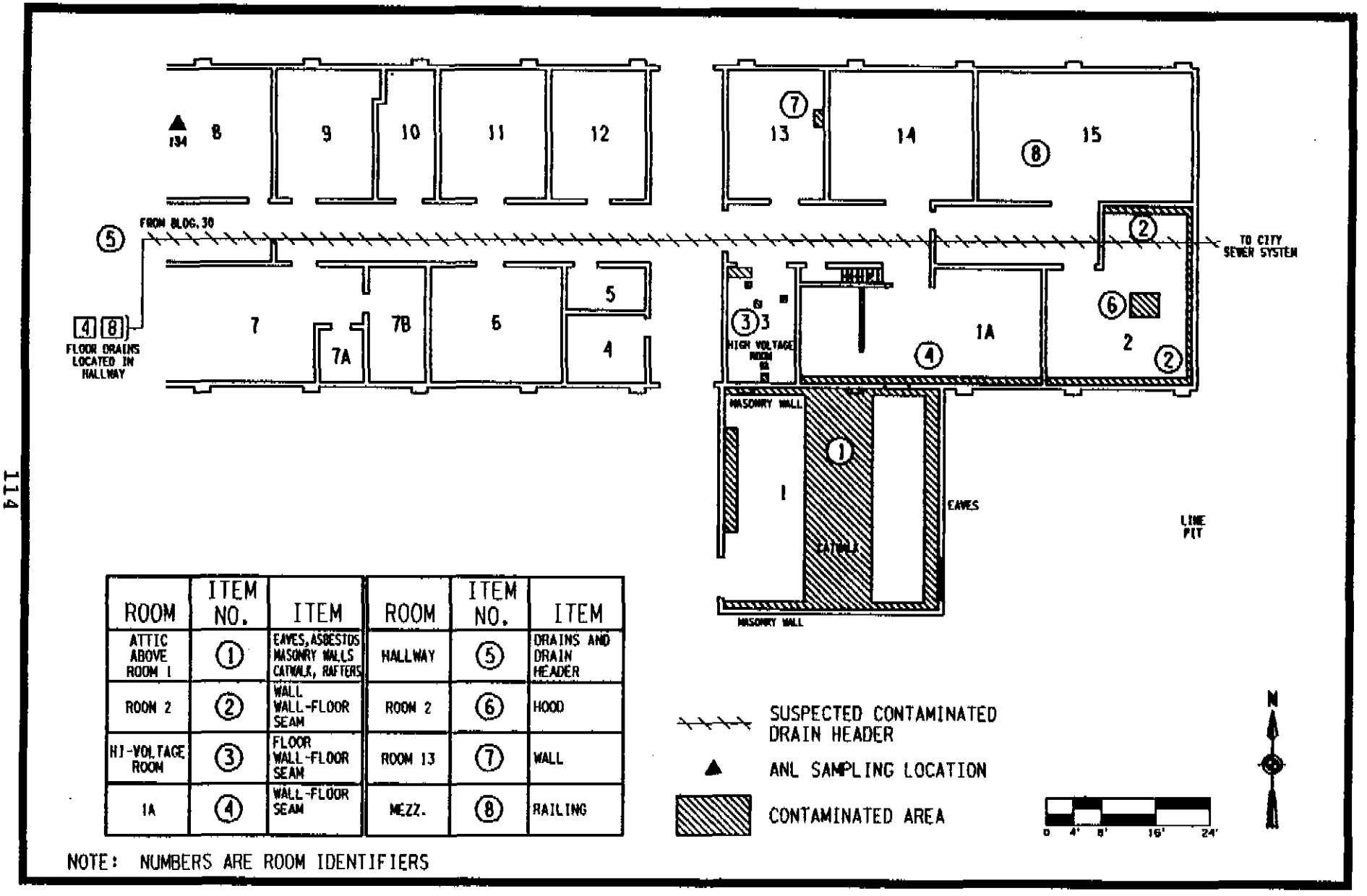


FIGURE 5-18 BUILDING 30, PLUMBING AND MEZZANINE LEVEL AND FIRST FLOOR

: [42,1] BLDG30B.DGN



ROOM	ITEM NO.	ITEM	ROOM	ITEM NO.	ITEM
ATTIC ABOVE ROOM 1	1	EAVES, ASBESTOS MASONRY WALLS CATWALK, RAFTERS	HALLWAY	5	DRAINS AND DRAIN HEADER
ROOM 2	2	WALL WALL-FLOOR SEAM	ROOM 2	6	HOOD
HI-VOLTAGE ROOM	3	FLOOR WALL-FLOOR SEAM	ROOM 13	7	WALL
1A	4	WALL-FLOOR SEAM	MEZZ.	8	RAILING

NOTE: NUMBERS ARE ROOM IDENTIFIERS

FIGURE 5-19 BUILDING 31

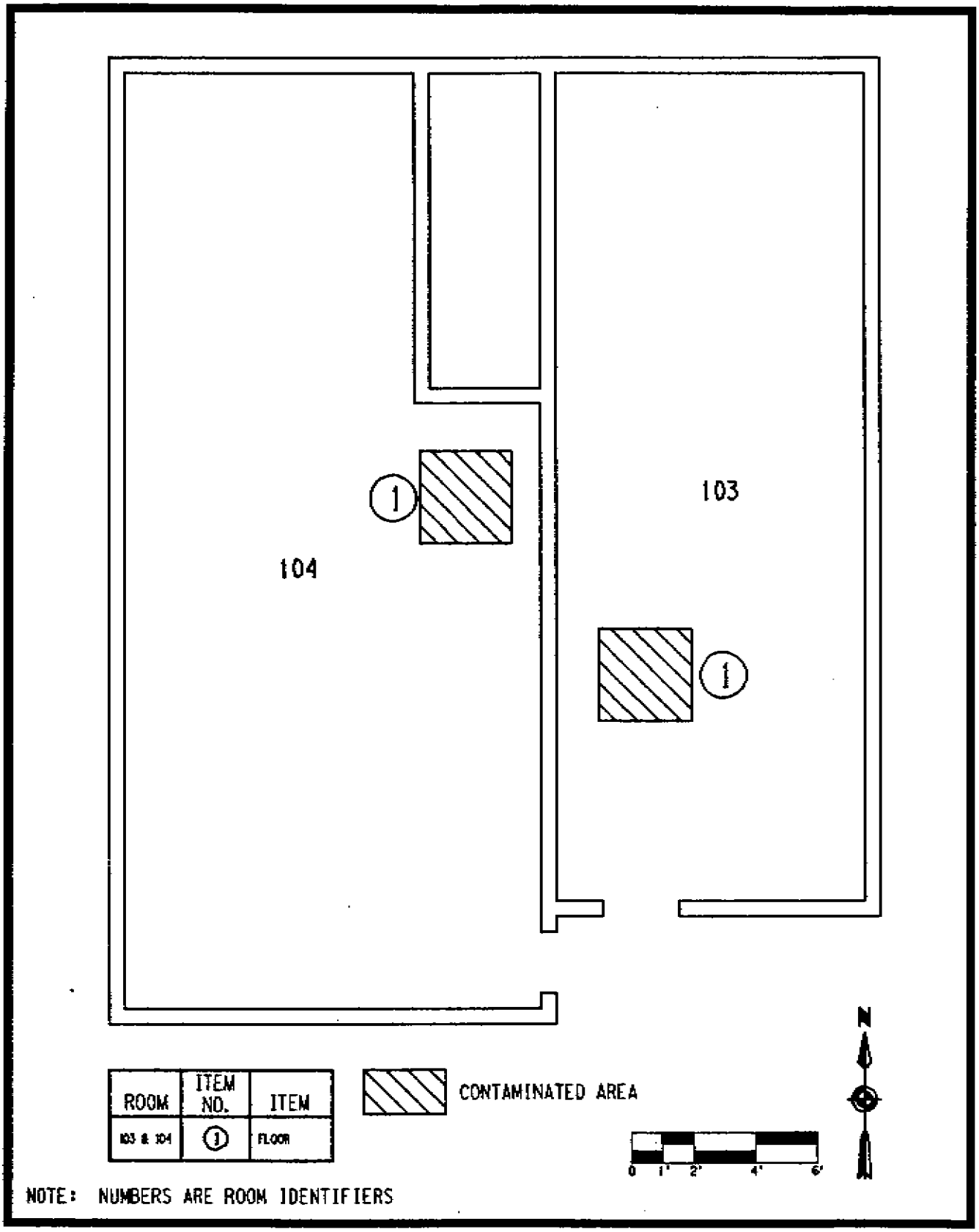


FIGURE 5-20 BUILDING 33

3: [42,1] BLDG33R.DGN

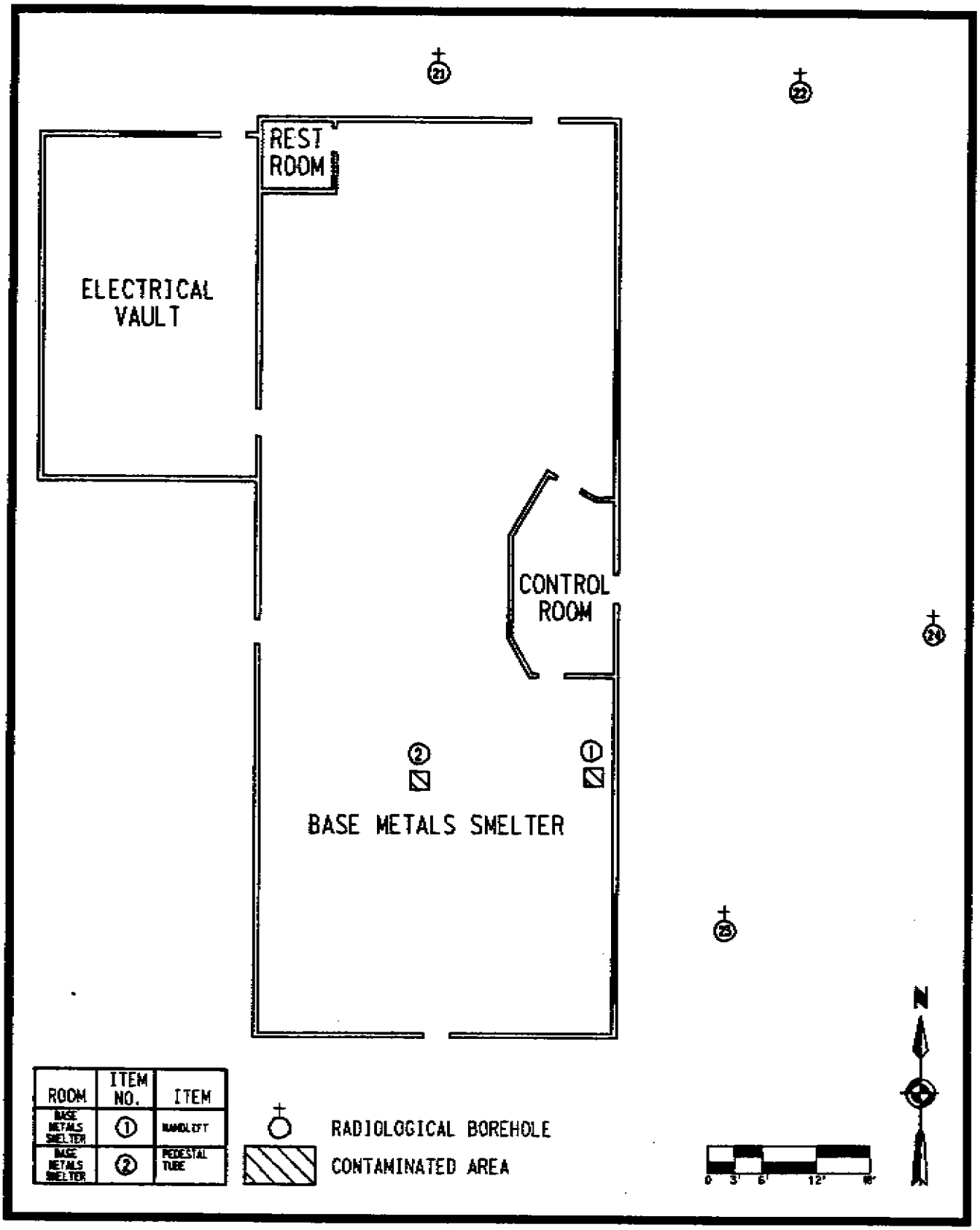


FIGURE 5-21 BUILDING 34

B: [42,1] BLDG34B.DGN

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7. Memorandum, M. D. Atwood, BNI, to C. A. Knoke, BNI, "Revision of PI:26.0 for Remedial Activities at ARC, Albany, Oregon," Oak Ridge, TN, June 26, 1987, CCN 045941.

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