NOTE: Actual Sampling Plan on 3-shelf bookcase. (Emb)

4712

CONCURRENCES
RTG SYMBOL CE-541
INITIALS/SIG. KDLawver
DATE 10/ /88
RTG SYMBOL CE-541
INITIALS/SIG. RRNelson
DATE 10/ /88
RTG SYMBOL
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DATE

October 7, 1988

ADDRESSEES

BUILDING CHARACTERIZATION SAMPLING PLAN

Enclosed is Revision 0 of the "Building Characterization Sampling Plan" for the Weldon Spring Site. No comments were received on this plan during the review process and we are proceeding with sampling activities as described in the enclosure.

If you have any questions concerning this sampling plan, please call Ken Lawver at (314) 441-8978.

Sincerely,

ORIGINAL SIGNED BY
KENNETH D. LAWVER

for R. R. Nelson
Project Manager
Weldon Spring Site
Remedial Action Project

Enclosure:
As stated

cc w/o enclosure:
Honorable Gerald Ohlms
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A. P. Avel, CE-53
R. E. Hlavacek, MK-Ferguson

CE-541:KDLawver:x852:mw:10/7/88: (c:BldgChar.SP)

DOE F 1325.10
(7-79)

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St. Peters, Missouri 63376

WSSRAP Public Document Room
Route 2, Highway 94 South
St. Charles, Missouri 63303

Administrative Record
MK-Ferguson Company
Route 2, Highway 94 South
St. Charles, Missouri 63303

DOE/OR/21548-021

United States Department Of Energy

BUILDINGS CHARACTERIZATION SAMPLING PLAN

REV. 0

WELDON SPRING SITE REMEDIAL ACTION PROJECT

BUILDINGS CHARACTERIZATION SAMPLING PLAN WELDON SPRING SITE

PREPARED FOR
U.S. DEPARTMENT OF ENERGY

PREPARED BY
MK-FERGUSON COMPANY

WSSRAP

AUGUST, 1988

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Buildings Characterization Sampling Plan

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Abbreviations

ACM	Asbestos-Containing Material
AEC	Atomic Energy Commission
AHF	Anhydrous Hydrofluoric Acid
BNI	Bechtel National, Incorporated
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	Chain of Custody
DA	Department of the Army
DOE	Department of Energy
dpm	degradation per minute
EP	Extractable Procedure
EPA	Environmental Protection Agency
eV	electron volt
G-M	Geiger-Mueller
HF	Hydrofluoric Acid
keV	thousand electron volts (ev x 1000)
MPC	Maximum Permissible Concentration
NRC	Nuclear Regulatory Commission
PCB	Polychlorinated Biphenyl
pCi	picoCuries
PIC	Pressurized Ion Chamber
PMC	Project Management Contractor
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
R	Roentgen
RETA	Ryckman, Edgerly, Tomlinson and Associates
TBP	Tributylphosphate
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leach Procedure
Th	Thorium
U	Uranium
uCi	micro Curies
WSCP	Weldon Spring Chemical Plant
WSCPS	Weldon Spring Chemical Plant Site
WSRP	Weldon Spring Raffinate Pit
WSS	Weldon Spring Site
WSQ	Weldon Spring Quarry
WSSRAP	Weldon Spring Site Remedial Action Project

SECTION 1 INTRODUCTION

1.1 Purpose

The purpose of the Buildings Sampling Plan is to provide a systematic approach to characterizing radiological, asbestos and chemical contamination in and around the buildings and structures at the Weldon Spring Chemical Plant Site (WSCPS). The Buildings Sampling Plan is designed to determine the magnitude of radiological, asbestos and chemical contamination in and around the buildings and structures at the WSCP; document uncontaminated areas; and identify radiological, asbestos and chemical concentrations in qualitative and quantitative terms. This information will be used to plan salvage, removal or disposal options for the structures and equipment at the WSCPS.

This sampling plan is intended for use by the Department of Energy (DOE), its contractors and subcontractors, and the Environmental Protection Agency (EPA) and its contractors.

1.2 Scope

This sampling plan reviews historical information; identifies data needs; and outlines sampling procedures, quality assurance, data documentation and reporting requirements for the buildings and equipment characterization at the Weldon Spring Site (WSS).

The scope of this plan is limited to the buildings, structures, and equipment from the previous operation of the WSCPS.

Report Structure

The Buildings Sampling Plan is divided into nine sections: introduction, background, data needs and sampling plan objectives, sampling rationale and procedure, sample analysis, quality assurance, data documentation, reporting requirements, and references. The data needs, sampling rationale and procedures and sample analysis sections of this work plan are subdivided into radiological, asbestos and chemical sections. Because different sampling techniques and analyses will be required for radiological, asbestos and chemical contamination, separate subsections are used. The investigations for each contaminant will be conducted independently. Similar historical and descriptive information is repeated in the subsections, but the perspective and information vary slightly.

SECTION 2 BACKGROUND

2.1 Site History

In 1956, the Atomic Energy Commission (AEC) acquired approximately 89.1 ha (220 acres) of the original Weldon Spring Ordnance Works from the Department of the Army (DA) for use as a uranium feed materials plant. The AEC operated the plant as an integrated facility for the conversion of uranium ore concentrates to pure uranium trioxide, intermediate compounds, and uranium metal. A relatively small amount of thorium was also processed. Wastes generated during these operations were stored in the four raffinate pits in the Weldon Spring Raffinate Pit (WSRP) area. The feed materials plant ceased operations in 1966.

In 1958, the AEC acquired title to the Weldon Spring Quarry (WSQ) from the DA. The WSQ had been used earlier by the DA for disposal of trinitrotoluene (TNT)-contaminated rubble during the operation of the Weldon Spring Ordnance Works. The AEC used the WSQ as a disposal area for a small amount of thorium residue, but most of the material disposed of there consisted of uranium- and radium-contaminated building rubble and soils from the demolition of a uranium ore processing facility in St. Louis.

Following the shutdown of the feed materials plant in 1966, the AEC returned the facility to the DA in 1967 for planned use as a defoliant production plant (to be known as the Weldon Spring Chemical Plant; WSCP). The WSCP comprises 13 major buildings and approximately 31 smaller buildings. Of the former, five were used as process buildings, and eight were major support buildings. The Army started removing equipment and decontaminating the buildings in 1968. Approximately 4,220 cubic meters (5,555 cubic yards) of contaminated material were hauled to the WSQ. In addition, an undetermined amount of contaminated piping, ducting, drums, and other scrap were dumped into Pit 4 at the WSRP.

The defoliant project was cancelled in 1969 before any process equipment was installed for herbicide production. The DA retained the responsibility for the land and the facilities at the WSCP, but the 21.1-ha (52-acre) tract encompassing the raffinate pits was transferred back to the AEC. The 3.6-ha (9-acre) WSQ also remained under the control of the AEC. The AEC contracted with National Lead Company of Ohio (NLO) to periodically visit the WSRP and WSQ sites to perform environmental monitoring, maintain the pit embankments, and perform maintenance and surveillance tasks as necessary. In October 1981, Bechtel National Incorporated (BNI), under contract to DOE (successor to AEC), assumed management responsibility for the WSRP and WSQ from NLO. BNI managed these facilities in caretaker status until 1986.

In November 1984, DOE was directed by the Office of Management and Budget to assume custody and accountability for the WSCP from the DA. This transfer occurred on October 1, 1986.

In February 1985, DOE proposed designating the control and decontamination of the WSRP, WSCP, and WSQ as a major project. Designation was effected by DOE Order 4240.1E dated May 14, 1985. A Project Management Contractor (PMC) for this Weldon Spring Site Remedial Action Project was selected in February 1986. In July 1986, a DOE Project Office was established on site. The PMC, MK-Ferguson Company, assumed control of the WSS on October 1, 1986.

Figures 2-1 and 2-2 indicate the geographic location of the WSS. Figure 2-3 shows the location of the major structures at the WSCP.

2.2 Previous Studies

Since shutdown of the feed materials plant in 1966, several surveys or studies have been performed regarding the radiological, chemical and asbestos contamination at the WSCP. Data from previous studies at the WSCP have been used to identify areas in buildings most likely to contain contaminated materials. New data generated during the characterization will be compared with the previous reports for consistency. Some of the previous studies also document decontamination efforts.

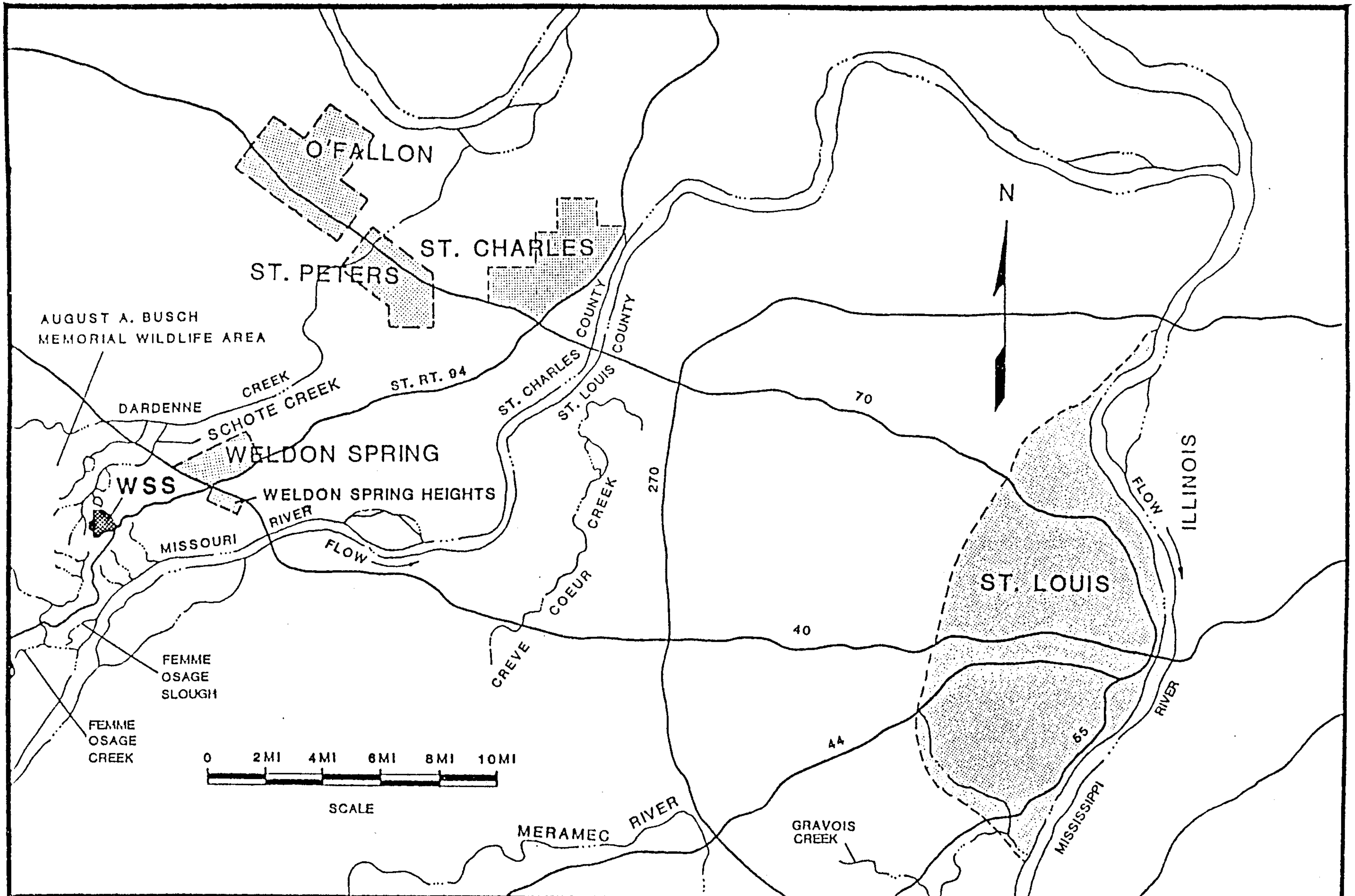


FIGURE 2-1

LOCATION OF THE WSS

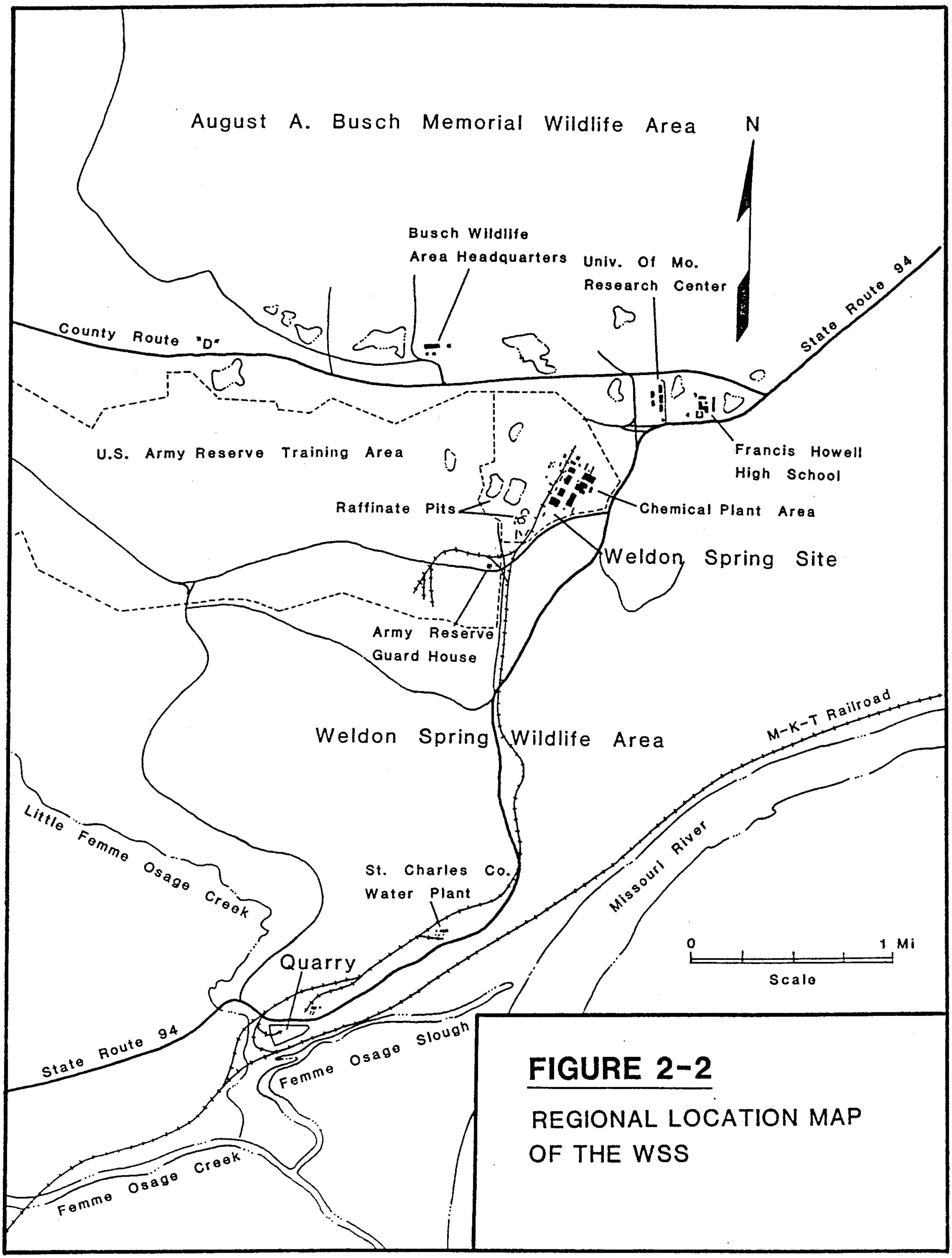
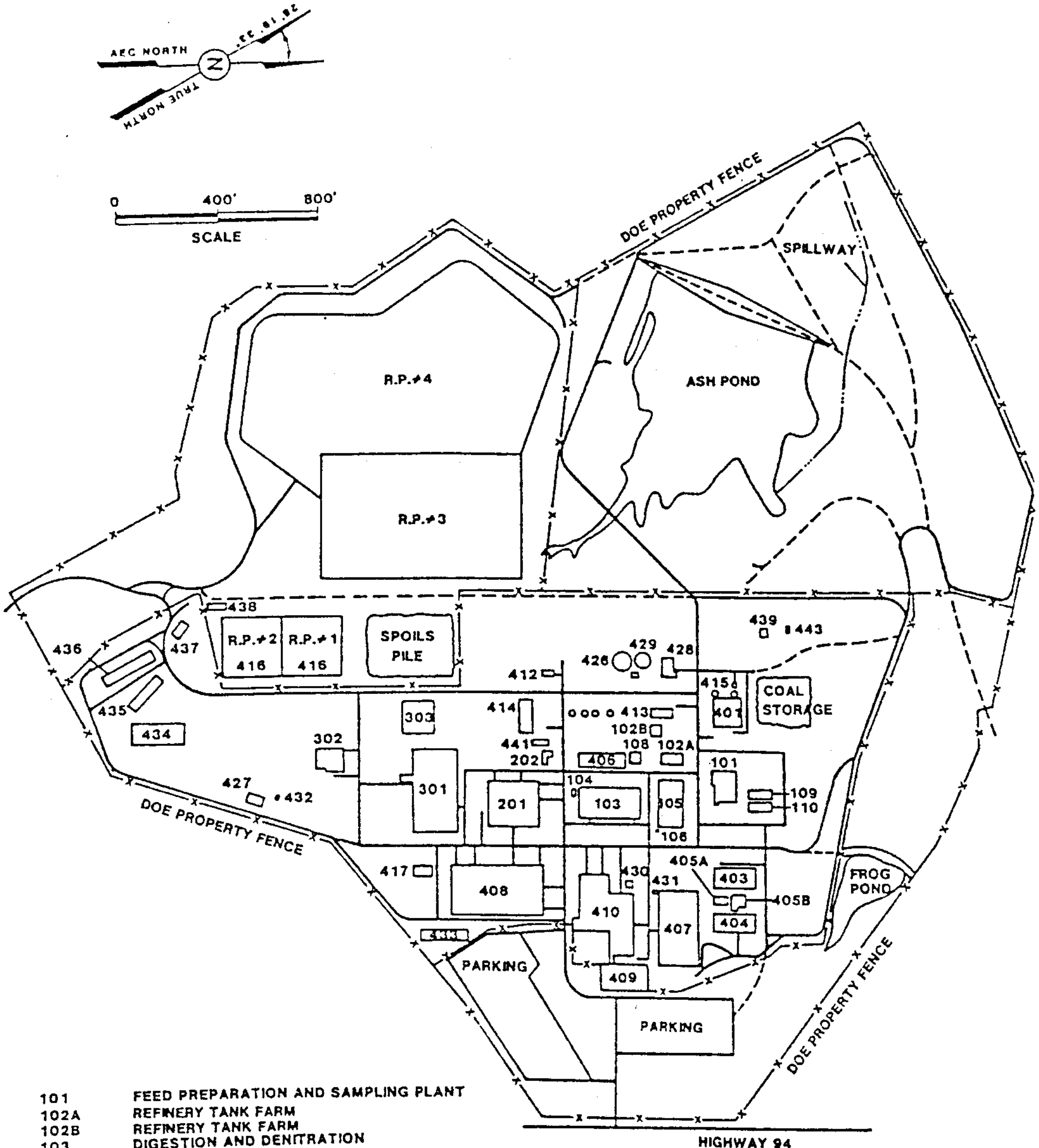


FIGURE 2-2

REGIONAL LOCATION MAP
OF THE WSS



101	FEED PREPARATION AND SAMPLING PLANT
102A	REFINERY TANK FARM
102B	REFINERY TANK FARM
103	DIGESTION AND DENITRATION
104	LIME STORAGE
105	TBP AND ETHER EXTRACTION
106	PROOF SAMPLER
108	NITRIC ACID RECOVERY
109	DRUM STORAGE
110	DRUM STORAGE
201	GREEN SALT PLANT
202	GREEN SALT TANK FARM
301	METALS PLANT
302	MAGNESIUM STORAGE BUILDING
303	CHIP STORAGE
401	STEAM PLANT
403	CHEMICAL PILOT PLANT
404	METALLURGICAL PILOT PLANT
405A	PILOT PLANTS AXILARY
406	WAREHOUSE
407	LABORATORY
408	MAINTENANCE AND STORES
409	ADMINISTRATION
410	SERVICES
412	ELECTRICAL SUBSTATION
413	COOLING TOWER AND PUMP HOUSE
414	SCRAP CLASSIFICATION AND EQUIPMENT STORAGE
415	CLAY BRICK INCINERATOR
416	RAFFINATE PITS 1 & 2
417	PAINT SHOP
426	ELEVATED WATER TANK
427	PRIMARY SEWAGE TREATMENT PLANT
428	PROPANE AND BUTANE GAS PLANT
429	RESERVE WATER FACILITIES
430	AMBULANCE GARAGE
431	PROOF SAMPLER
432	PROOF SAMPLER
433	STORAGE
434	STORAGE
435	STORAGE
436	STORAGE
437	STORAGE
438	STORAGE
439	FIRE TRAINING
441	CYLINDER STORAGE
443	FIRE TRAINING STORAGE

FIGURE 2-3

MAJOR STRUCTURES AT THE WSCP

A detailed scope and findings of each study is provided below in sections 2.2.1.1 through 2.2.1.4.

2.2.1 Radiological Contamination Studies

Four studies have addressed radiological contamination within the WSCP buildings. These four studies are each summarized below.

The fourth study was conducted by the current Project Management Contractor (PMC). The data from this study has not been published. Additional unpublished radiological data exists regarding airborne concentrations of radionuclides and surface contamination levels in buildings. These unpublished data were collected by the present Project Management Contractor (PMC) as part of routine health and safety studies conducted for the WSSRAP.

2.2.1.1 Department of Army Letter Report to William L. Hungate

This section summarizes a report transmitted by Colonel Walter J. Davies, Acting Commander of Weldon Springs Site to William L. Hungate, House of Representatives, on October 7, 1969 (Reference 5).

This report focused on structures that might be used for the herbicide production facility and did not include every structure at the Weldon Spring Site, nor were all included buildings surveyed to the same degree. The report gives a brief description of the construction, type of decontamination efforts previously performed, and estimates of radioactive contamination in the different buildings.

A total of 29 buildings were included in the survey. Eleven of these buildings were considered grossly contaminated and the remaining 18 were contaminated to a limited degree or were considered free of radioactive contamination. It was estimated that buildings 202, 302, 401, 406, 409, 410, 412, 413, 414, 417, 429, 433, 436, 437 and 438 were free of radioactive contamination or could be cleaned to meet AEC guidelines. (It should be stated that no information is provided in the report concerning the actual AEC guidelines that were applied). Buildings 103 and 105 would require some work to be decontaminated to AEC guidelines. The refining facilities, buildings 101, 108, 201, 301, 403, 404, 405 A&B, 407 and 434, were so highly contaminated that economical decontamination of these buildings was not considered feasible.

Complete survey data are not available for all facilities since those not intended for use in the herbicide project received only a cursory initial survey. In these cases only the author's estimates of contamination, based on his professional judgement and experience, are available. Only in the case of buildings 101, 103, 105 and the surrounding concrete pads are specific measurement locations and results available. However, due to the unquantifiable changes in site conditions since these measurements were made, this data is no longer considered representative of the presently existing radioactive contamination levels. This report will be used to determine where decontamination efforts may have concealed or altered contamination.

In 1967, when the site was selected by the Army for conversion to a herbicide production facility, some decontamination work was done in some of the buildings. The following text details these efforts, as described in the subject report. Information was not always available regarding the type of decontamination procedures employed.

Regarding Building 101, all of the equipment except the floor plate and the calciner was removed from the building, and the building was decontaminated to levels below AEC guidelines with the following exceptions: 1) no attempt was made to decontaminate the six roof levels; 2) some wall areas were not completely decontaminated; 3) no attempt was made to decontaminate the calciner or calciner rooms; 4) some floor plating was not completely decontaminated; and 5) portions of the first floor and outside pad were not completely decontaminated.

In regard to the process areas of Building 103, all of the equipment, electrical circuits and piping was removed from the center and south process sections, and all of the piping and some of the equipment and floor plate was removed from the north process section. The building was decontaminated to levels below AEC guidelines or the radiation levels reduced to AEC guidelines by the application of shielding as noted: 1) The main floor in the center and south sections including annexes was decontaminated and a large portion of the floor area removed. When this failed to reduce the radioactivity to below guidelines, a coating of tar was applied to the excavated area and four to six inches of reinforced, high density concrete poured over the tar. This brought the floor surface contamination levels down to the AEC guidelines. The curbings around the floors were not included in this decontamination effort and so remain contaminated in excess of AEC guidelines; and 2) The floor in the southwest corner of the north section was covered with a layer of tar.

All of the equipment, floor plate and piping was removed from Building 105. The building was decontaminated to levels below AEC guidelines with the following exceptions: 1) Decontamination of the floor area in the southwest section was not successful and a coating of tar was applied. The tar failed to reduce the levels below AEC guidelines in some areas and so plywood was placed over these areas as temporary shielding; 2) a few sections of the cinderblock wall between the southwest and northwest sections were not successfully decontaminated; 3) in the east section, the concrete beneath some walkways was not decontaminated; 4) interior curbings were not decontaminated; 5) the lower three or four feet of a southeast wall was not completely decontaminated; 6) a few spots on the floor of the east section could not be decontaminated and were tarred over; 7) the beams in the east section require further decontamination; 8) the lower three feet of the north-south cinderblock wall in the east section was not successfully decontaminated; and 9) the outside footings on the east side were not successfully decontaminated.

Some decontamination, to levels below AEC guidelines, was performed in the warehouse area of Building 302.

Building 406 was decontaminated or radiation levels reduced below AEC guidelines. Some floor areas were chipped out and concrete repoured. In other areas the concrete was covered with a dense epoxy paint.

According to the report, decontamination efforts were made to the interior of Building 408 and to the exterior concrete pads. The report mentioned that information on the outcome of the decontamination was not available.

The southern outside pad of Building 414 was originally used to store equipment. The equipment was removed, and the concrete pad was decontaminated to meet 1969 AEC guidelines. The report stated that the final degree of contamination was unknown.

2.2.1.2. RETA Report Phase III

A survey was performed by Ryckman, Edgerly, Tomlinson, and Associates (RETA), a division of Envirodyne Engineers, contracted by the Department of the Army (Reference 9). RETA was to determine if the buildings, equipment and realty of the WSCP could be released for public or private use where contamination was not detrimental to such a use, or decontaminated for unrestricted use. If unrestricted use was not feasible, the Army was interested in identifying alternatives to maximize both the site's utility and compatibility with surrounding land uses. RETA ranked several recommended actions. The following was first: "Remove equipment, demolish buildings, partially decontaminate land. Cost: $ 27.69 million. Eliminates potential migration of radioactivity and most of the perpetual care costs. Prepares the site for eventual complete decontamination pending action by the DOE to remove raffinates."

Each building and its contents were surveyed during the fall of 1977 using various radiation monitoring techniques to detect alpha, beta/gamma, and gamma radiation. These methods are described in detail in the subject report. The primary contaminant was found to be uranium, although several buildings contained significant radium and thorium activity.

Some 9,600 radiation measurements were made on buildings and equipment during the course of the survey. The specific measurement results were documented in a separate document which cannot be located at this time. In the subject report these measurements were grouped according to building and level of radiological contamination. These levels of contamination were defined by six categories, as outlined in table 2-1. Category 1 is the lowest level of contamination and Category 6 is the highest.

Measurements that fell into Category 1 were defined as releasable and/or background measurements. The areas/items that fell into this category were considered likely to be releasable even if radium was present. Category 2 measurements were defined as likely to be releasable in the absence of a significant amount of radium. Category 3 measurements were defined as likely to be releasable in the absence of a significant amount of radium or thorium, i.e., uranium only. Category 4 was the first to be considered as not releasable and indicates a moderate level of contamination. Category 5 and 6 indicated a high level of contamination, and inclusion in Category 6 suggests the possibility of recoverable quantities of uranium.

Two types of radiation measurements are incorporated into table 2-1. "Loose" contamination was defined as that contamination which adheres to a surface wipe. "Total" contamination includes

TABLE 2-1

RADIOLOGICAL CONTAMINATION CATEGORIES

Category Number	Category Description	Type of Loose Contamination (DPA)[a]	Measurement Total Contamination (DPA)[a]
1	Releasable	R(Result)<20	R<300
2	Releasable (if no radium present)	20<R<200	300<R<1000
3	Releasable (if no radium or thorium present)	200<R<1000	1000<R<5000
4	Moderate Contamination	1000≤R	5000<R<15000
5	High Contamination		15000<R<0.1 lbs. uranium equivalent
6	High Contamination (potential uranium recovery)		0.1 lbs uranium equivalent≤R

NOTES: (a) DPA - Disintegrations per minute per $100cm^2$

"loose" plus "fixed" contamination, where fixed contamination was interpreted to be that which could be swept up with a broom as well as that which would require more vigorous decontamination methods.

The subject radiological survey revealed that the surfaces that most often exhibit contamination are horizontal, i.e., floors, ledges and platforms. Vertical surfaces (including walls, doors, windows, etc.) were generally considered uncontaminated for release purposes or could be decontaminated with a general wash down. A major exception occurred on wall surfaces adjacent to equipment which processed radioactive material in such a way that dust or material were sprayed onto the wall surface. For this reason, the discussion of buildings in the subject report generally focused upon floor surfaces.

Four test methods were utilized to measure radiological contamination. One test method measured gross alpha emissions from loose contamination collected on wipes and counted in a laboratory. Three other methods were used to monitor total contamination. A portable gross alpha detecting instrument was used to measure total alpha contamination. A portable beta-gamma detecting instrument utilizing a thin end window G-M probe was used for total beta/gamma levels, and a portable 2-in. x 2-in. NaI (Tl) probe was used to measure gross gamma radiation. The subject report details items such as instrument types, daily performance checks, quality assurance methods, and survey methods used in the radiological characterization.

The layout of buildings at WSCP is shown in figure 2-3. A summary of all radiation measurements by building and contamination category (1-6) is present in table 2-2. Any building on-site outside the jurisdiction of the Department of the Army was not surveyed; e.g. 429 and 434. For each category, the number of measurements in that category is shown.

In addition to the four measurement types mentioned above, the structures and the equipment in and around the buildings were subjected to gamma and alpha spectroscopy measurements. The samples collected for the alpha and gamma spectroscopy measurements were swipes and residue. The spectroscopy results were used to indicate the type and extent of contamination present.

Certain buildings were found to have airborne particulate radioactivity levels that were likely to be a substantial fraction of, or even exceed, the Maximum Permissible Concentration (MPC) for a mixture as defined by the U. S. Nuclear Regulatory Commission.

TABLE 2-2

WELDON SPRING CHEMICAL PLANT
RADIATION CATEGORY SUMMARY FOR BUILDINGS

	Presence of		Number of Radiation Measurements in Each Group						
			1	2	3	4	5	6	
BLDG NO.	Radium	Thorium	****** *	********	******	******	******	******	TOTAL
101	yes		41	41	90	60	90	4	326
102	yes		12	24	31	14	27	20	128
103	yes		84	63	68	57	62	10	344
104			7	2	7	1	0	0	17
105	yes	yes	22	18	31	22	19	4	116
106			0	5	2	0	17	2	26
108	yes	yes	22	6	26	20	25	10	109
109/110			10	4	28	22	14	0	78
201	yes	yes	20	74	72	37	76	9	288
202			35	11	8	2	0	0	56
301	yes		8	49	106	59	44	13	279
302			53	16	8	5	0	0	82
303			2	6	4	0	0	0	12
401			209	32	10	0	0	0	251
403	yes	yes	15	39	28	51	153	64	350
404	yes		45	34	41	33	64	23	240
405	yes		5	9	11	16	11	20	72
406			84	25	34	12	7	0	162
407	yes	yes	938	386	500	185	257	45	2311
408	yes	yes	331	125	104	20	16	1	597
409			865	99	63	2	2	0	1031
410		yes	856	221	222	23	6	4	1332
412			37	6	1	0	0	0	44
413			56	13	23	8	2	0	102
414			41	9	16	2	2	0	70
415			4	1	2	1	1	0	9
417			13	10	7	6	18	1	55
426			2	0	3	0	0	0	5
427			28	5	5	2	15	1	56
428			4	3	8	3	2	1	21
429			2	1	5	0	0	0	8
430			8	4	2	0	1	0	15
431			2	0	7	3	2	0	14
432			5	1	3	0	0	0	9
433			47	16	22	2	2	2	91
435			15	9	10	18	48	5	105
436			26	3	2	14	11	4	60
437			36	8	5	0	0	0	49
439			6	1	0	0	0	0	7
441			3	3	11	3	0	0	20
443			5	1	2	0	0	0	8
TOTAL									8954

The three identified potential components of the building air were thoron (radon-220) daughters, short-lived radon (radon-222) daughters and uranium. The relative amounts of these components varied substantially from building to building, but where air activity was highest, the thoron daughter component was dominant.

In descending order, Buildings 403, 301, 404 and 405 were found to have especially elevated airborne activity. However, Buildings 103, 105, 108 and 407 were also found to exhibit significant levels of activity. The data from this monitoring program is unavailable. Efforts have been made by the Department of the Army and RETA to locate the original data, but neither party has succeeded.

Table 2-3 summarizes the contamination found on the different structural materials. It lists the total area or volume of that material (i.e., concrete floors, structural steel, and wall materials); the next column lists the volume of that material that is contaminated.

An engineering and radiological survey of process, utility, maintenance, and laboratory equipment was also conducted. The engineering survey included inspection of equipment items for general salvageability and tagging of items for identification. A total of 921 items were inspected and tagged. The inspection and tagging effort was not an exhaustive inventory of plant

TABLE 2-3

BUILDING CONTAMINATION SUMMARY, RETA

Building Number	Concrete Floors Total Area (sq.ft.)	Concrete Floors Area w/ Contamination (sq.ft.)	Structural Steel Total Quantity (tons)	Structural Steel Contaminated Quantity (tons)	Wall Materials Total Area (sq.ft.)	Wall Materials Contaminated Area (sq.ft.)
101	97,100	97,100	350	350	34,000	34,000
102	12,190	12,190				
103	58,876	58,876	625	625	108,300	108,300
105						
106	42,436	42,436	531	531	52,160	52,160
108	2,925	2,925	--	--	--	--
109						
110						
201	69,160	69,160	1,287	1,287	32,200	32,200
202	8,000	--	88	--	4,130	4,130
301	136,000	136,000	1,300	1,300	101,900	101,900
302	9,200	9,200	47	47	--	--
401	17,475	--	1,610	--	--	--
403	17,800	17,800	259	259	34,400	34,400
404	12,400	12,400	257	257	30,500	30,500
405	5,515	5,515	11	11	4,600	4,600
406	16,018	--	--	--	--	--
407	53,950	53,950	--	--	--	--
408	70,678	3,530	410	21	4,300	860
409	37,732	--	195	--	--	--
410	52,100	21,400	220	90	3,390	3,390
414	30,000	15,000	--	--	--	--
417	2,772	2,772	13	13	--	--
426	1,000	--	--	--	--	--
427	500	--	--	--	--	--
428	1,000	--	--	--	--	--
429	1,000	--	--	--	--	--
430	300	--	--	--	--	--
431	100	100	--	--	--	--
432	100	--	--	--	--	--
433	7,850	--	--	--	--	--
435	8,000	8,000	--	--	--	--
436	8,600	8,600	--	--	--	--
437	1,800	1,800	--	--	--	--
439	1,800	--	--	--	--	--
441	1,000	--	--	--	--	--
443	23,550	--	--	--	--	--
Totals	808,927	576,954	7,203	4,791	429,880	406,440

equipment but focused on major items and items offering the greatest potential for salvage and recovery.

The radiological survey of equipment throughout the plant revealed that 21 percent of the items surveyed exhibited no contamination. Table 2-4 contains the percentage of measurements made on equipment in each building according to level of contamination.

Due to the lack of information regarding specific measurement results and locations, this report is of limited usefulness. Additionally, the age of the data limits its utility when considering the unquantifiable changes in site conditions that have occurred since this survey was performed. However, the report is considered to adequately indicate the overall picture of relative degrees of contamination in and between buildings and equipment. The indication of the presence or absence of specific nuclides is also considered useful.

TABLE 2-4

PERCENTAGE OF RADIOLOGICAL MEASUREMENTS
ON EQUIPMENT BY CONTAMINATION LEVEL

Contamination Building	Level of Contamination		
	Releasable (percent)	Moderate Contamination (percent)	High (percent)
102A	60	10	30
102B	50	10	40
108	3	62	35
201	4	7	89
301	1	3	97
401	100	0	0
403	0	10	90
404	20	10	70
405	0	0	100
406	0	100	0
407 (Est)	0	50	50
408	38	24	38
410	71	21	8
417	0	100	0
433	5	25	70
435	10	10	80
436	0	0	100
Average	21%	26%	53%

2.2.1.3 Bechtel National Inc. Radiological Survey

Beginning in March 1986, Bechtel National Inc. (BNI) began detailed radiological characterizations of the structures at the WSCP. The principal objective of BNI's efforts was to determine the radiological status of each WSCP structure, and to describe the location and magnitude of contamination on the structure itself as well as on equipment within the structure (Reference 1).

Based on information from previous radiological surveys (Reference 9) the structures at the WSCP were categorized by BNI according to general level of contamination. A list of the WSCP structures and the categories under which they fall is presented in table 2-5. Survey measurements for structures were made in accordance with the structure's contamination category. The measurement schedules for the structures surveyed by BNI are presented in table 2-6. Measurements made but not described in table 2-6 include long-lived gross alpha airborne radioactivity and radon and thoron working levels.

TABLE 2-5

LEVELS OF RADIOACTIVE CONTAMINATION IN AND ON WSCP STRUCTURES

Probably Releasable (N)		Moderate Contamination (M)		Heavy Contamination (H)	
No.	Function	No.	Function	No.	Function
104	Lime Storage	109	Open Shed	101	Sampling Plant
303	Chip Storage	110	Open Shed	102A&B	Refinery Tank Farm
401	Steam Plant	202	Green Salt Tank Farm	103	Digestion and Denitrification
409	Administration	302	Magnesium	105	Extraction Plant
412	Substation	406	Warehouse	106	Bldg. 105 Proof Sampler
413	Cooling Tower/Pump House	407	Laboratory	108	Nitric Acid Plant
414	Salvage	408	Maintenance	201	Green Salt Plant
415	Incinerator	410	Services	301	Metals Plant
430	Ambulance Garage	417	Paint Shop	403	Chemical Pilot Plant
433	Warehouse	427	Primary Sewage Plant	404	Metallurgical Pilot Plant
437	Records Retention	428	Fuel Gas Plant	405A	Pilot Plant Maintenance
439	Storage	431	Laboratory Sewer Sampler	405B	Pilot Plant Dust Collectors
441	Cylinder Storage	432	Main Sewer Sampler		
443	Fire Training Storage	435	Storage		
	Septic Tank Filters	436	Storage		
		438	Storage		

TABLE 2-6

RADIOLOGICAL SURVEY PLANS FOR WSCP BUILDINGS

BNI, Characterization, 1986

Survey Area	Surface Alpha Radiation Measurements[a]	Surface Beta-Gamma Dose Rate Measurements[a]	Gamma-Ray Exposure Rate Measurements	Surface Swipe Samples[b]	Bulk Samples of Loose Surface Debris
Floors	1-m intervals from wall to wall (or obstruction) in X, Y directions	2-m intervals from wall to wall (or obstruction) in X, Y directions	4-m intervals from wall to wall (or obstruction) in X, Y directions	4-m intervals from wall to wall (or obstruction) in X, Y directions	1 sample from 6-m x 6-m grid block[c] if available
Walls (interior only)	4-m intervals from floor to ceiling and wall to wall in high bay areas. For single-story areas, measure 3 points (bottom, mid, top) from floor to ceiling and laterally at 4-m intervals from wall to wall (or obstruction)	4-m intervals from floor to ceiling and wall to wall in high bay areas. For single-story areas, measure 3 points (bottom, mid, top) from floor to ceiling and laterally at 4-m intervals from wall to wall (or obstruction)	Not Applicable	4-m intervals from floor to ceiling and wall to wall in high bay areas. For single-story areas, measure 3 points (bottom, mid, top) from ceiling and laterally at 4-m intervals from wall to wall (or obstruction).	Not Applicable
Ceiling[d]	4-m intervals from wall to wall in X, Y directions	4-m intervals from wall to wall in X, Y directions	Not Applicable	4-m intervals from wall to wall in X, Y directions[e]	Not Applicable
Roofs[f] (flat only)	2-m Intervals from edge to edge in X, Y directions	2-m intervals from edge to edge in X, Y directions	4-m intervals from edge to edge in X, Y directions	4-m intervals from edge to edge in X, Y directions	1 sample per 6-m x 6-m grid block[c] if available

[a] Measurements will start and end at floor-wall, or floor-obstruction intersections in X and Y directions.

[b] Swipe samples will start and end at floor-wall, or floor-obstructions intersections in X and Y directions, and biased samples will be taken at 25% of all measurement points where alpha or beta-gamma radiation levels exceed total radiation guideline values for release as uncontaminated.

[c] Based on collecting a minimum of 30 samples per 10-cm^2 surface area.

[d] Measurements will be made on horizontal and vertical surfaces of structures near ceiling at each point.

[e] Swipe samples will be collected on horizontal surfaces only.

[f] Because of poor structural condition of some roofs, measurements will be made only if it is determined to be safe.

For purposes of the characterization activities, a grid system of mutually perpendicular lines was established in all areas of each structure and in accordance with table 2-6. There was a single grid system for each structure as well as a separate grid for each individual room. For the structure and for each room the grid origin for floor surfaces was placed at the southwest corner. For walls, the origin was placed in the lower left corner of the wall as one faces the wall. Documentation of the structure grid systems and floor plans is presented in the BNI reports.

Samples of airborne particulates were collected with a high volume air sampler at several grid locations within each structure. Individual breathing zone samples were collected using low volume personnel sampling pumps.

For each grid-plane (i.e. wall, floor, etc.) alpha and beta-gamma radiation was measured directly on surfaces at grid points. Alpha measurements were made with a portable alpha scintillation detector coupled to a digital ratemeter/scaler and counts were recorded on 0.5-minute intervals. Beta-gamma radiation measurements were made with a thin-window Geiger-Mueller counter on 0.5-minute intervals. Gamma-ray exposure rates were measured one meter above the floor at several grid point locations in each structure. Gamma-ray exposure rate measurements were made using a portable gamma-ray scintillation detector with the response calibrated in micro-Roentgen per hour (uR/h) against a sealed Ra-226 source.

Transferable radioactivity was determined by wiping surface areas of approximately 100 cm^2 using 47mm-diameter cloth swipes. These samples were sent to an off-site laboratory and analyzed for alpha and beta activity.

Measurement results were interpreted relative to the DOE guidelines listed in table 2-7. The long-lived gross alpha airborne radioactivity measurements were interpreted relative to DOE derived concentration guidelines for radium, uranium, and thorium (table 2-8). Samples of residue and scale were collected from areas in each structure that exhibited elevated radiation readings. The results of gamma-ray spectrometry analyses of these samples were used to indicate the appropriate DOE air concentration guideline to apply to a particular structure.

Quality control measurements were also made. As a rule, approximately five percent of the surface measurements were repeated in order to verify original measurements. About 10 percent of swipe samples were recounted. Comparison of this information with appropriate sample results revealed reasonable, acceptable agreement.

TABLE 2-7

SUMMARY OF RESIDUAL CONTAMINATION GUIDELINES FOR THE WSCP, 1986

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 (MAXIMUM LIMITS FOR UNRESTRICTED USE)

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 (MAXIMUM LIMITS FOR UNRESTRICTED USE)

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 are intended for unrestricted use; structures that will be demolished or buried are excluded. The applicable generic guideline (40 CFR 192) is: In an 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 to be released for unrestricted use shall not exceed the background level by more than 20 uR/h.

Indoor/Outdoor Structure Surface Contamination

Radionuclide[f]	Allowable Surface Residual Contamination[e] ($dpm/100\ cm^2$) 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	220

TABLE 2-7 (cont.)

Indoor/Outdoor Structure Surface Contamination cont.

Radionuclide[f]	Allowable Surface Residual 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 alpha	15,000 alpha	1,000 alpha
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000 beta/gamma	15,000 beta/gamma	1,000 beta/gamma

[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 unrestricted-use 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 over a 100-m^2 area is not exceeded.

[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 x 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 that 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

T A B L E 2-8

PERMISSIBLE CONCENTRATION IN AIR FOR 40-HOUR WORK WEEK*

Radionuclide	concentration(uCi/ml)
U -238	7 X E-11
Th-232	3 X E-11
Ra-226	3 X E-11

* All BNI air concentration measurements (long-lived gross alpha activity) were compared to one of these values depending on which radionuclide was present in more significant concentrations in scale and residue samples. The concentration of Ra-226 was never significant compared to U-238 or Th-232. The concentration of any other isotope(s) in the scale or residue samples was never determined.

The BNI reports also review pertinent historical information about the site as well as the specific structures. Structural design and current structural status are described and, finally, each report includes a written list and photographic inventory of equipment in each structure.

The BNI characterization activities began in March 1986 and were terminated in May 1986. At that time radiological surveys had been initiated for only six structures at the WSCP. The structures surveyed by BNI are 201, 301, 403, 404, 405 A, and 405 B. The survey reports are in various degrees of completeness depending on the stage of the survey when BNI's activities were halted. Even though the characterization was halted before completion; the data revealed significant contamination of the buildings. This was expected; Buildings 201, 301, 403, 404, 405 A and 405 B processed uranium. The following text describes BNI's radiological survey results for each of the six structures surveyed.

Building 201

A grid system was marked on the floor, walls and ceiling of this building in accordance with table 2-6 (gross floor area 69,160ft^2). There were six distinct areas within Building 201; warehouse, production area, non-production upper levels, maintenance area, service area and office area. Over two hundred pieces of equipment were identified and tagged, but were not surveyed. No subsurface investigations were performed. The results of gamma-ray spectrometry analyses of scale and residue samples revealed that the principal radionuclide present is uranium-238. This was expected as no thorium was processed in this building.

Results of the radiological survey are summarized as follows: 1) the general work area air monitoring range was 1E-13 to 4E-12 uCi/ml; 2) the breathing zone air monitoring range was 6E-12 to 2E-11 uCi/ml; 3) gamma-ray exposure rates 1 meter above the Building 201 floor ranged from 6 to 175 uR/h; 4) transferable alpha and beta activity on structure surfaces ranged from <5 to 28,000 dpm/100cm2 respectively; 5) directly measured alpha radiation on building surfaces ranged from 34 to 118,000 dpm/100cm2; and 6) directly measured beta-gamma dose rates on building surfaces ranged from 0.02 to 50 mrad/h. Concentrations of radon daughters and thoron daughters were each less than 0.02 WL.

The results of 54 swipe sample analyses of the warehouse floor were all less than 1000 dpm/100cm^2 alpha and beta. Based on directly measured alpha levels only 75 percent of the floor measurements were below guidelines; of 212 measurement results, 50 were greater than 5000 dpm/100cm^2 alpha (13 greater than 15000 dpm/100cm^2 alpha) and 53 greater than 1.0 mrad/h. The walls and ceilings of this room were not surveyed. One grid location exceeds the gamma-ray exposure rate guideline with a reading of 49 uR/h.

For the production area and non-production area upper levels, 95 percent (280 total measurements) of the floor measurements were below guidelines for transferable radioactivity. However, only 17 percent of the floor measurements were below the guidelines for direct radiation levels. The walls and ceiling surfaces were not surveyed. Many measurements of gamma-ray exposure rate exceeded the guidelines; the maximum was 175 uR/h.

All but one of the 166 transferable radioactivity measurements on the floor of the maintenance and service areas are below guideline values. One measurement exceeded 1000 dpm/100cm^2 transferable beta activity. In regard to 560 direct measurements, 459 and 413 of the floor measurements are below the guidelines for alpha and beta, respectively. Only a small fraction of the total wall and ceiling surface for these areas was surveyed; therefore, no definite statements can be made about the surface radioactivity with respect to guideline values. All measurements of gamma-ray exposure rate in this area were below guidelines.

All floor, wall, and ceiling measurements in the office area, both direct (total 268) and transferable (total 107) are below guideline values. All measurements of gamma-ray exposure rate in this part of the building were below guidelines.

Building 301

A grid system was marked on the floor, walls and ceiling of this building (gross floor area 68,000 ft^2). The building was divided into two distinct areas for the survey, the production area and the office area. No equipment was inventoried or surveyed and no subsurface investigations were performed. The results of gamma-ray spectrometry analyses of scale and residue samples revealed that the principal radionuclide present is uranium-238. Significant, but much lower concentrations of Th-232 were detected. This was expected as thorium processing occurred in this building.

Results of the survey are summarized as follows: 1) general work area airborne concentrations of long-lived gross alpha activity ranged from 8E-14 to 6E-13 uCi/ml; 2) breathing zone airborne activity ranged from 2E-12 to 9E-12 uCi/ml; 3) gamma ray exposure rates 1 meter above the floor ranged from 6 to 355 uR/h; 4) transferable alpha and beta radioactivity on structure surfaces ranged from <5 to 1000 dpm/100cm^2 respectively; 5) directly measured alpha radiation on surfaces ranged from <144 to 43,000 dpm/100cm^2; and 6) directly measured beta-gamma dose rates ranged from 0.02 to 12 mrad/h. Radon daughter and thoron daughter concentrations ranged from <0.01 to 0.02 WL and 0.04 to 0.1 WL respectively.

The main plant walls, the ceiling, and the upper floors were not surveyed. Results of the 52 transferable radioactivity measurements made on the lower floor and inside partition walls were all below alpha and beta guidelines. Regarding the 133 direct alpha radiation measurements, 99 were greater than guidelines and nine measurements were greater than 15000 dpm/100 cm^2. In regard to beta/gamma dose rate, only three of 133 measurements were below guidelines. Approximately one-half of the 172 gamma-ray exposure rate measurements were greater than guidelines.

In the office area, all measurements of direct and transferable radioactivity on the floor, walls and ceiling of the first level were below guidelines. All gamma-ray exposure rate measurements were below guidelines. No measurements were made on the second level of the office area.

Building 403

A grid system was marked on the floor, walls, and ceiling of this building (gross floor area 17,800 ft^2). The building was divided into two sections, the extraction area and the non-extraction area. More than one hundred pieces of equipment were tagged and surveyed. No subsurface investigations were performed. The results of gamma-ray spectrometry analyses of scale and residue samples revealed that the principal radionuclide was U-238. Much smaller but significant quantities of Th-232 were also present.

Results of the survey are summarized as follows: 1) general work area air monitoring 1E-13 to 1E-11 uCi/ml; 2) breathing zone air monitoring 5E-12 to 6E-11 uCi/ml; 3) gamma-ray exposure rates 1 meter above the building 403 floor ranged from 15 to 694 uR/h; 4) transferable alpha and beta activity on structure surfaces ranged from <11 to 8,900 dpm/100cm^2; 5) directly measured beta-gamma dose rates on building surfaces ranged from 0.02 to 30 mrad/h; and 6) radiation measurements on 113 identified pieces of equipment revealed that most of these items were contaminated in excess of DOE guidelines. Radon daughter and thoron daughter concentrations were measured as high as 0.1 and 2 WL, respectively.

For the extraction area, of 55 swipe analyses of the floor, only one measurement exceeded guidelines. Only one of 78 wall and ceiling measurements exceeded guidelines. Each of the two measurements just mentioned that exceed guidelines do so for both alpha and beta dpm/100 cm^2. Of the 143 direct floor measurements, 83 exceeded alpha guidelines and 124 exceeded the beta dose-rate limit. Of the 89 wall and ceiling measurements, 14 exceeded alpha guidelines and 24 exceeded the beta-dose rate limit. Twenty-four of thirty-two gamma-ray exposure rate measurements exceeded guidelines. All radon daughter and thoron daughter concentrations were less than 0.01 and 0.06 respectively.

In the non-extraction area, 31 of 98 swipe analyses of the floor and four of 206 measurements of the walls and ceiling exceed guidelines. In regard to directly measured alpha radiation, 311 of the 356 floor measurements, and 41 of the 230 wall and ceiling measurements exceed guidelines. For beta-gamma radiation, 326 of the 356 floor measurements and 60 of the 230 wall and ceiling measurements exceed guidelines. All eighty of the non-office space gamma-ray exposure rate measurements exceeded guidelines. Radon daughter and thoron daughter concentrations in the non-office area were measured as high as 0.1 and 2 WL, respectively. The small amount of office space within the extraction area meets all release criteria.

Building 404

For the characterization of Building 404 a measurement grid system was marked on the floor and walls of the main plant and eleven rooms in the building. One hundred and fifteen pieces of equipment were tagged and surveyed. From the residue and scale samples analyzed, it was determined that the principal radionuclide present was U-238.

Results of the survey are summarized as follows: 1) concentrations of airborne radioactivity in the breathing zone samples ranged from 7E-13 to 6E-10mCi/ml, while the activity of the long-lived gross alpha concentration in the general work area ranged from 1E-13 to 5E-12mCi/ml; 2) gamma-ray exposure rates 1 meter above the floor in Building 404 ranged from 6 to 94 uR/hr; 3) transferable alpha and beta activity on the structure surface ranged from 11 to 1200 dpm/100cm^2, and from 4 to 3550 dpm/100cm^2 respectively; 4) direct measurements of alpha activity on building surfaces ranged from 88 to 89,000 dpm/100cm^2; 5) directly measured beta/gamma dose rates on building surfaces ranged from 0.02 to 309 mrad/h; 6) radiation measurements on 115 pieces of equipment in the building revealed that most of the items were contaminated in excess of DOE guidelines; and 7) the concentration of airborne radon daughter concentrations were <0.01 WL and thoron daughter concentrations ranged from <0.01 to 0.02 WL.

For the purpose of the survey, Building 404 was subdivided into the main plant area (first and second levels) and eleven individual rooms. Based on the measurements made in the main plant, the following conclusions can be drawn. Using the guidelines for uranium, swipe sample analyses show that 44 percent (158 total alpha and beta measurements) of the floor and all of the wall and ceiling surfaces are below guidelines. Based on guidelines for direct alpha measurements, 183 of 287 total floor measurements and 151 of 155 total wall and ceiling measurements were below guidelines. Based on beta/gamma radiation level, 236 of the 287 floor measurements and 150 of the 155 wall and ceiling measurements were below guidelines.

When the eleven other rooms were surveyed, the following conclusions were reached. Based on guidelines for transferable radioactivity (alpha and beta), 85 percent of the floor (92 total measurements), 84 percent of the wall (612 total measurements), and all of the ceiling measurements (60 total) were below guidelines. With regard to direct alpha, 63 percent of the floor, 84 percent of the wall, and all of the ceiling measurements--113, 307, and 30 total measurements, respectively--were below guidelines. Beta/gamma radiation measurements (same totals as direct alpha measurements) indicate that 70 percent of the floor, 91 percent of the wall, and 91 percent of the ceiling surfaces were below guidelines.

Building 405A

For purposes of this characterization, a grid system was established on all interior surfaces of the building (gross floor area 1900 ft^2). This building consists of a large maintenance area and a small storage room. Nineteen pieces of equipment were tagged and surveyed in this building. No subsurface investigations were performed. Gamma-ray spectrometry analyses of a single sample of bulk material collected from this building indicated that the principal radionuclide present is uranium-238.

Results of the survey are summarized as follows: 1) general work area air monitoring, 2E-13 to 2E-12 uCi/ml; 2) breathing zone air monitoring, 1E-12 to 2E-11 uCi/ml; 3) gamma-ray exposure rates 1 meter above the floor ranged from <10 to 27 uR/h; 4) transferable alpha and beta activity on structure surfaces ranged from <11 to 400 dpm/100cm^2, and <4 to 500 dpm/100cm^2 respectively; 5) directly measured alpha radiation on building surfaces ranged from 80 to 50,000 dpm/100cm^2; 6) directly measured beta-gamma dose rates on building surfaces ranged from 0.02 to 13 mrad/h; and 7) radiation measurements on 19 identified pieces of equipment revealed that 12 of these items were contaminated in excess of DOE guidelines. The radon daughter and thoron daughter concentrations averaged 0.001 and 0.002 WL, respectively.

Transferable activity analyses indicate that all surfaces (floor, wall, ceiling--18, 53, 16 total measurements respectively) in each room meet guidelines. Based on guidelines for directly measured alpha radiation levels, 48 of the floor measurements, 57 of the interior wall measurements, and all ceiling measurements were less than guidelines (62, 58 and 19 total measurements respectively). In regard to surface beta-gamma dose rate limits, only seven of the floor measurements meet guidelines. Unlike the floor, 52 of the wall and 17 of the ceiling measurements are less than the beta-gamma dose rate limits. The total number of measurements of beta-gamma dose rate were the same as for directly measured alpha radiation.

Building 405B

Area 405B is an open pad (gross area 4000 ft^2) which provides a location for dust collectors and vacuum cleaning system for buildings 403 and 404. The dust collectors and vacuum unit are still present on the pad. A grid system was marked on the concrete pad, and three pieces of equipment were tagged and surveyed. No subsurface investigations were performed. Gamma-ray spectrometry analyses of a bulk sample collected from each of the dust collectors indicated that the principal radionuclide present is uranium-238.

Results of the survey are summarized as follows: 1) the concentration of airborne radioactivity in the breathing zone ranged from 2E-12 to 4E-12 uCi/ml; 2) gamma-ray exposure rates 1 meter above the Area 405B pad ranged from 14 to 74 uR/h; 3) transferable alpha and beta activity on the pad ranged from <11 to 377 $dpm/100cm^2$, and <4 to 688 $dpm/100cm^2$ respectively; 4) directly measured alpha radiation on the pad surface ranged from 170 to 14,281 $dpm/100cm^2$; 5) directly measured beta-gamma dose rates on the pad surface ranged from 0.06 to 2.4 mrad/h; and 6) radiation measurements on three identified pieces of equipment revealed that all of these items were contaminated in excess of applicable DOE guidelines. No measurements were made of radon daughter or thoron daughter concentrations.

All measurements (23) of transferable radioactivity on the concrete pad were below guidelines. As for directly measured alpha radiation, 13 of 93 measurements were below guidelines. Regarding directly measured beta-gamma dose rates, 41 of 93 measurements were below guidelines. Directly measured alpha and beta-gamma levels inside the dust collectors exceed guidelines ranging from 1954 to 84107 dpm/100 cm^2 and 0.1 to 296 mrad/h respectively.

2.2.1.4 WSSRAP Area 408 Radiological Survey, July 1987

The scope of the survey was to determine the levels of fixed versus removable alpha activity on the floors, walls and equipment, and to determine beta and gamma radiation dose rates in Building 408. The survey was conducted by the current PMC in July 1987 (Reference 23). The intent of the survey was to evaluate whether the building could be used for storage and warehousing for the WSSRAP. The building was determined to be radiologically suitable for storage; but PCB's were later found to be present in the building, rendering it unsuitable.

Building 408 is located in the east central area of the WSCP. This building is a one-story cinder block building divided into six sections. The east half of the building was a receiving warehouse. The west half is a collection of various maintenance shop areas. There is also a garage area, firefighting equipment storage area, office area and a small-parts decontamination bay. The total floor area of the building is 68,400 sq. ft. Numerous pieces of equipment, machinery, shelving, benches, desks, and small pieces of hardware remain in the building.

A grid system was established to aid in the characterization (figure 2-4). The building was divided into 112 grid blocks. There were 14 grid points along the north-south Y-axis and eight along the west-east X-axis. The points on the Y-axis were numbered one through 14 and the points along the X-axis were labeled with letters of the alphabet (A-H). All measurements were made at the center of four grid blocks, resulting in a total of 56 measurement locations on the floor. The coordinates of the wall grid system were the same as the floor. Readings on the floor were designated with an F and on the wall with a W.

Alpha and beta measurements were made at 56 locations on the floor and 36 on the wall. Alpha swipes were made at these same locations. Alpha measurements were made on the wall at three feet above the floor. Beta measurements were made with the probe being held three feet (one meter) from the surface being measured.

The direct alpha measurements were made with a Ludlum Model 43-5 Alpha Scintillation probe connected to a Model 2220 Ratemeter

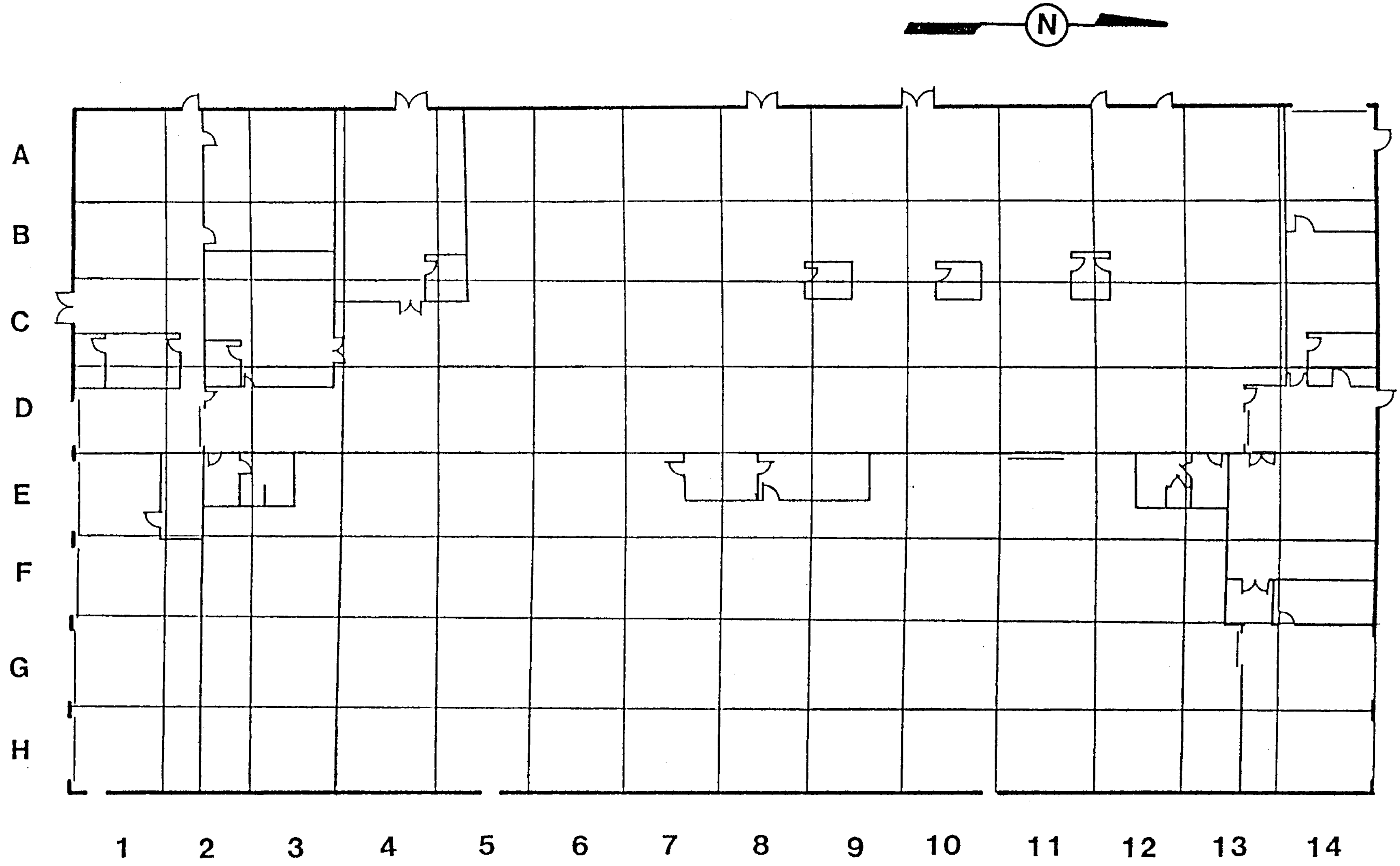


FIGURE 2-4

BUILDING 408 MEASUREMENT LOCATION GRID

Scaler. The response of the instrument was checked daily with a Th-230 source. The alpha swipes were counted on a Ludlum Model 43-10 alpha counter, connected to a Ludlum Model 2000 scaler. Both instruments were source-checked daily with a Th-230 source. The beta-gamma measurements were made with a Ludlum Model 44-40 shielded pancake probe hooked to a Ludlum Model 2220 ratemeter/scaler. The instrument response was source-checked daily with a SrY-90 source. All the detectors and meters were calibrated semi-annually.

The gamma response measurements were made with a 2 in. X 2 in. NaI detector Ludlum Model 44-10-2 used with a Ludlum Model 2220 ratemeter scaler. The detector was cross-calibrated with a pressurized ion chamber (PIC), for gamma exposure.

Most of the large pieces of equipment and machinery in the building were surveyed using the shielded pancake probe Model 44-40 with the Ludlum Model 3 ratemeter.

The results of the direct alpha survey on the floor had a mean of 792 dpm/100cm^2 with a standard deviation of 822. The removable alpha-activity smears had an average of 50 dpm/100cm^2 with a standard deviation of 50. The direct alpha survey measurements of the walls had an average value of 558 dpm/100cm^2 with a standard deviation of 1322. The 31 alpha swipe samples had an average of 37 dpm/100cm^2 with a standard deviation of 81.

The 56 beta survey measurements three feet from the floor surface had an average of 42 cpm with a standard deviation of 37. The 36 measurements on the walls gave a mean reading of 37 cpm with a standard deviation of 72 cpm. The 28 gamma exposure measurements gave a mean value of 7 uR/hr, with a standard deviation of one. The maximum exposure reading was 12 uR/hr.

The survey of the equipment indicates that most of the equipment in the building is contaminated. The only survey done on the equipment is done with a beta-gamma detector. All equipment with greater than 100 cpm beta has been tagged, giving the maximum and average counts for that piece of equipment. These equipment measurements are useful (i.e. need not be repeated) since they were made in accordance with the specifications of Section 4 of this sampling plan.

The measurements of structural contaminants in Building 408 show the contamination to be random. Only one location surveyed had fixed activity greater than 4000 dpm/100cm^2; at 9AW, the reading was around 7000 dpm/100cm^2 direct and 400 dpm/100cm^2 removable.

The data collected for this report is valid but there is no information about the structural steel or the exterior of the building. Also, since all beta-gamma measurements on the walls and floors were made at three feet from the wall surface, the walls and floor need to be resurveyed with the detector held at contact with the surface being measured.

2.2.2 Asbestos Contamination Studies

This section provides a brief summary of previous studies for interior asbestos-containing material (ACM) at the WSCP. Two investigations to identify ACM at the WSCP have been conducted. These investigations found ACM to be present in all pipe insulation sampled and in some siding. Studies have also identified ACM present in the insulation on outdoor overhead utilities; these studies will be discussed only briefly here, however, because outdoor utilities are not in the scope of this plan.

Sampling for preliminary identification of interior asbestos-containing materials (ACM) was conducted in August 1986 (Reference 6) and May 1987 (Reference 7). The objective of the interior bulk sampling was to identify typical building materials which contain asbestos such as equipment insulation rather than to conduct a comprehensive survey of the site for ACM (Reference 6). Bulk samples were collected from Buildings 101 (feed sampling and preparation), 401 (steam plant), 407 (laboratory, 409 (cafeteria) and 410 (administration). Materials sampled were pipe insulation (101), steam valve insulation (401), corrugated siding (101, 401), floor tile (407, 410), duct insulation (409/410) and acoustical ceiling tile (407, 409, 410). A single sample was taken of each material listed above.

Results of sample analysis are shown in table 2-9. The investigation found that ACM was present as pipe insulation, steam valve insulation, heating duct insulation, and corrugated siding. Asbestos concentrations in these materials ranged from 15-30 percent in pipe insulation to 50-75 percent in duct insulation. Any material containing more than one percent asbestos by weight is defined as asbestos-containing material.

Further investigations will be needed to quantify the amount of ACM inside the buildings at the WSCP since the original studies were not comprehensive and did not estimate volumes. A detailed outline of sampling locations and procedures is presented in sections 4.1.2 and 4.2.2.

A survey to determine the asbestos content of insulation on outdoor overhead utilities was conducted in November 1986 (Reference 18). The objective of the exterior bulk sampling was to characterize the presence of ACM on outdoor overhead utility pipe lines. Samples were collected from 10 locations within the chemical plant complex (see figure 2-5). The sampling locations were selected so that insulation on all types of pipe (steam, raffinate, ethylene glycol, and process) and all sizes of pipes of each type could be sampled. In total, 42 samples were

Table 2-9
INTERIOR ASBESTOS-CONTAINING MATERIALS (ACM)

Location Sampled	Material	Date	Results	Source
Bldg. 101	Pipe Insul.	8/86	15-40%	1
Bldg. 101	Pipe Insul.	8/86	30-55%	1
Bldg. 101	Siding	8/86	15-30%	1
Bldg. 401	Steam Valve Insul.	8/86	15-30%	1
Bldg. 401	Siding	8/86	15-30%	1
Bldg. 407	Floor Tile	8/86	0	1
Bldg. 407	Ceiling Panel	8/86	0	1
Bldg. 408	Pipe Insul.	5/87	20-30%	2
Bldg. 408	Ceiling Panel	5/87	0	2
Bldg. 408	Ceiling Panel	5/87	0	2
Bldg. 408	Ceiling Panel	5/87	0	2
Bldg. 409	Ceiling Panel	8/86	0	1
Bldg. 409/410	Duct Insul.	8/86	50-75%	1
Bldg. 410	Floor Tile	8/86	0	1
Bldg. 410	Floor Tile	8/86	0	1
Bldg. 410	Ceiling Panel	8/86	0	1

Sources:

MK Ferguson, 1986, (reference 6)
metaTRACE, 1987, (reference 7)

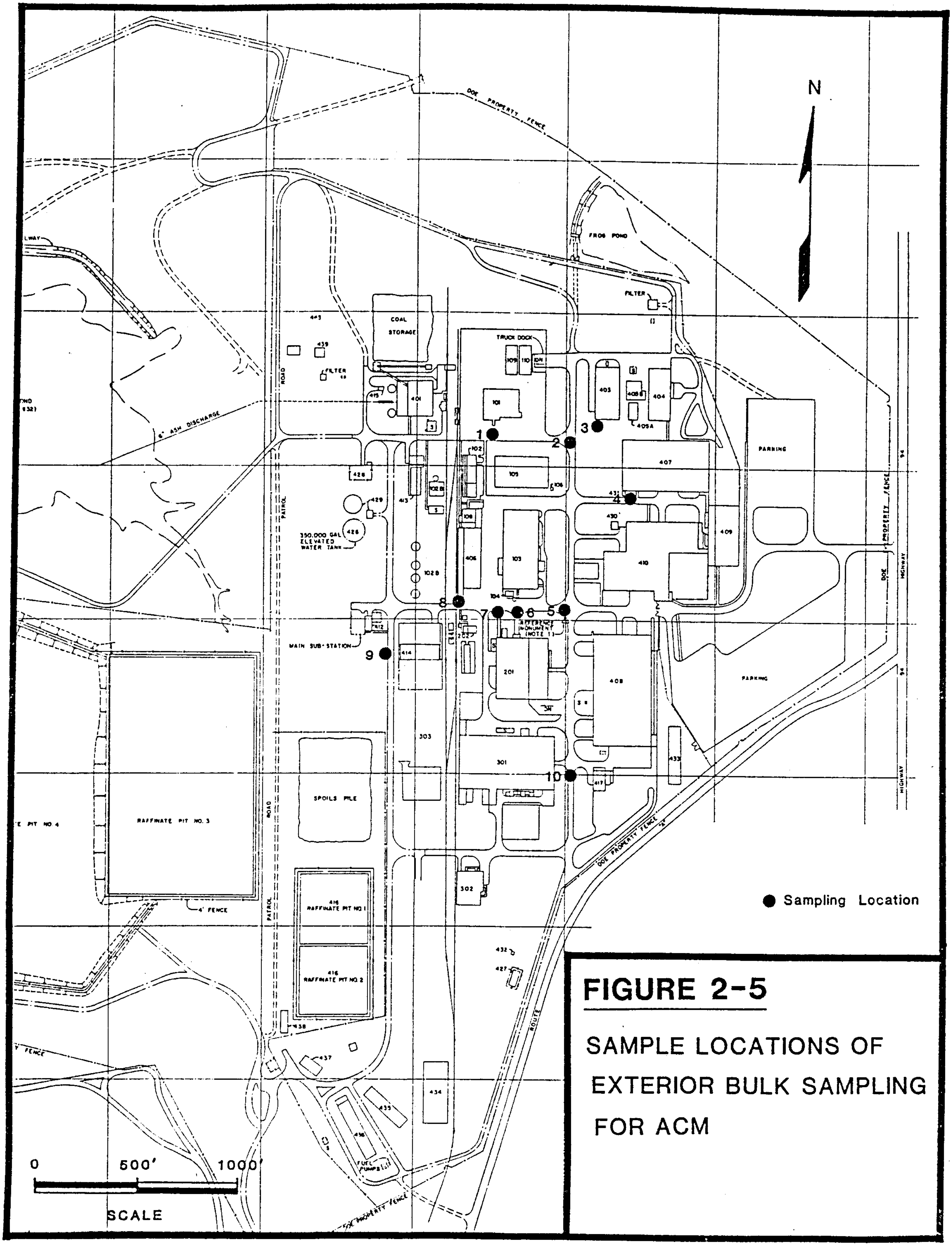


FIGURE 2-5

SAMPLE LOCATIONS OF EXTERIOR BULK SAMPLING FOR ACM collected. Each sample was a complete cross-section of the pipe insulation including sheathing.

Results of sample analysis are shown in table 2-10. Asbestos was present at more than one percent in all but one insulation sample from steam pipes. Asbestos was also present in all samples from raffinate pipes and process piping. Twelve ethylene-glycol line samples were collected; four were analyzed. All four analyzed were positive for asbestos; three of the four contained more than one percent asbestos.

The level of asbestos in these samples ranged from trace amounts (0.1% or less) in two of the samples to 50-60 percent. Of 31 samples analyzed, two had trace amounts, three had 1-5 percent and all of the rest (26) had more than 10 percent.

The results of sampling for ACM show that asbestos is present at varying levels in many forms throughout the chemical plant complex. Extrapolating from the pipe insulation sampled, it can be concluded that all interior steam, raffinate, process and ethylene-glycol pipe insulation contains asbestos, and additional sampling of these lines is unnecessary; all insulation on these lines will be considered ACM.

Table 2-10
ASBESTOS CONTENT OF
PIPE INSULATION ON OVERHEAD UTILITIES
(All Samples Collected on 11/17-18/86)

Location	Pipe Type	Results
NW Corner Bldg. 105	steam	40-50%
	ethylene glycol	not analyzed
	ethylene glycol	trace
	ethylene glycol	not analyzed
	ethylene glycol (elbow)	20-30%
	ethylene glycol	5-10%
	ethylene glycol	not analyzed
NE Corner Bldg. 105	steam	45-50%
	process	40%
	process	20-30%
	process	not analyzed
	process	30%
	process	not analyzed
	ethylene glycol	not analyzed
	ethylene glycol	not analyzed
NW Corner Bldg. 403	steam	35-40%
	ethylene glycol	not analyzed
	ethylene glycol	1-2%
	process	40-50%
	process	10-20%
	process	1-2%
	process	10-20%
Bldg. 407-410	ethylene glycol	not analyzed
	ethylene glycol	not analyzed
	process	20-30%
NE Corner Bldg. 201	raffinate	25-30%
	raffinate	20%
	steam	40-60%
N. Center Bldg. 201	process	25-30%
	raffinate	40-60%
	raffinate	20-30%
	steam (elbow)	trace
	steam (elbow)	40-60%
NE Corner Bldg. 201	raffinate	20-30%

Table 2-10 (cont.)

Location	Pipe Type	Results
SW Corner Bldg. 406	steam	25-30%
W. Center Bldg. 406	raffinate	50-60%
	raffinate	20-30%
	raffinate	30-50%
	raffinate (elbow)	not analyzed
E. Center Bldg. 301	steam	1-2%
	steam	45-50%
	steam	40-50%

Source: Weldon Spring Site Remedial Action Project, 1987

When present at a high concentration, asbestos is distinctive in appearance. Visual inspection of interior piping has shown that insulation on hot water, condensate, city water, freon and service water lines probably contains asbestos. Other asbestos-containing materials observed include boiler jackets, gaskets, cord, tape, reactor insulation bricks and insulating blankets. Transite (a mixture of cement and asbestos) siding was used on the exterior of many buildings.

Review of building specifications indicates that vinyl asbestos tile was used on the floors in some buildings. Finally, common building materials from the era when the plant was built typically contain asbestos. These include caulk, cold-applied adhesive, roofing asphalt, and mastics.

In summary, it is known that asbestos is present in a very high proportion of the insulating materials found at the WSCP. The presence of asbestos is questionable in only a few categories of insulation materials. These cases will be addressed in Section 4.1.2.

2.2.3 Previous Chemical Studies of Buildings

Bechtel National, Inc. (BNI) produced the only known chemical characterization study of the buildings at the WSCP (reference 1). To date no other reports on the chemical characterization of the buildings have been discovered.

From March to May 1986, BNI was contracted under the DOE to chemically and radiologically characterize the WSCP. The contract was prematurely terminated before BNI could complete the characterization. Brief chemical characterization surveys of Buildings 201, 301, 403 and 404 are included in the report submitted November 1986. The usefulness of the data acquired from BNI's chemical characterization is limited: only pH and combustible gas measurements were taken and only in a few locations. The pH of all fluids and materials tested was 7 and no combustible gases were detected using an Enmet CG-100 combustible-gas indicator.

The following is a summary of BNI's measurements.

Seven pH samples were taken from the interior of the Green Salt Plant, Building 201: sumps in rooms 103 and 107, a paste of white powder in room 107, a wipe of yellow powder in room 111, the inside flange on the top of an anhydrous HF tank on the second level of Building 201 and a pool of standing water in room 105.

Water in a canal in the floor of Building 301, the Metals Plant, had a pH of 7. The air in Building 301 was monitored for combustible gases, and none were detected.

Six floor sumps in the non-extraction section of Building 403, the Chemical Plant, were inspected. The water in all six pumps was tested with litmus paper. An Enmet (CG-100) combustible gas indicator did not produce any positive readings from the head spaces above the sumps.

The head spaces above the floor sumps in Building 404, the Metallurgical Pilot Plant, were monitored for combustible gases. None were detected.

SECTION 3 DATA NEEDS/WORK PLAN OBJECTIVES

3.1 Radiological

This work plan is intended to set forth the method by which the buildings at the WSCP will be radiologically characterized. The plan describes the areas to be investigated, and the sample collection and analytical methods to be employed.

The widespread use of uranium and thorium at the WSCP gives rise to the need to radiologically characterize the WSCP buildings. This characterization effort will include building exteriors, building interiors, and equipment within the buildings. The characterization results will be considered in regard to both salvage operations and disposal plans. No characterization measurements will be made on structures or equipment identified by previous studies as being contaminated in excess of surface contamination guidelines.

Some previous effort (RETA, 1978; BNI, 1986; recent WSSRAP site efforts) has been made with regard to radiological characterization of the structures at the WSCP. The results of these efforts are summarized in Section 2 of this work plan. Generally, these reports indicate that buildings 201, 301, 403, 404, 405A, and 405B do not need further characterization because they contain contamination in excess of surface contamination guidelines.

Building 408 requires characterization of interior floors, walls, interior ceilings, some equipment, and all exterior surfaces. The necessary radiological characterization efforts required in Building 408 are described more completely in Section 4.2.1 of this work plan.

All other buildings (and interior equipment) need to be subjected to a full radiological characterization effort. This effort is described, in general and per building, in Section 2.2.1 of this work plan.

Other efforts required for all buildings except 201, 403, 404, 405A and 405B are the collection of residue sample(s) to identify the contaminating radionuclides and a comprehensive inventory of equipment within each building. A requirement for all buildings is the collection of concrete samples to indicate the depth of potential concrete contamination.

3.2 Asbestos - Containing Materials

An extensive inspection conducted during the preparation of this work plan has shown that asbestos-containing insulation materials are ubiquitous inside and outside the chemical plant buildings. Additional data are needed only to characterize the presence of asbestos in selected building materials found in the chemical plant buildings and to estimate the quantity of asbestos requiring removal.

To provide for safe removal and disposal of ACM from all buildings on the site, it is necessary to determine whether asbestos is present in those types of insulating materials as yet uncharacterized in each building. The objective of this work plan is to describe the areas to be investigated, the sample collection and analytical methods to be employed, and to estimate quantities of ACM.

The characterization of asbestos-containing materials will consist of the following subtasks: 1) collection of bulk samples of selected building materials; 2) analysis of samples; and 3) estimation of extent of ACM.

3.3 Chemical

The preliminary nature of previous studies on chemical characterization of the buildings indicates that additional data will be required to locate and to identify chemically contaminated areas and equipment.

Existing chemical data covers only four of the buildings. Since this data is very preliminary, it is necessary to identify the presence of chemical contamination in the tanks, process equipment, process piping, sumps, and spillage areas.

The chemical portion of the work plan consists of specific descriptions of the following: 1) sampling rationale; 2) sampling procedures; 3) sample analysis; 4) quality assurance; 5) data documentation; and 6) reporting requirements.

SECTION 4 SAMPLING

4.1 Sampling Rationale

This section is divided into three subsections--radiological, asbestos-containing materials and chemical. Each subsection presents the rationale for performing the required characterization.

4.1.1 Radiological

This plan describes the methods that will be used to determine which buildings and equipment in buildings at the WSCP can be released for unrestricted use. The release criteria considered here are relative only to radioactive contamination.

The primary objective in characterizing the structures at the WSCP is to determine the current radiological status of each structure. Additionally, a comprehensive inventory will be made of equipment and materials associated with each structure. The characterization results will describe the location and magnitude of contamination of the structure and equipment within the structure.

Based on the characterization results, building structural material and interior equipment will be segregated by level of radioactive contamination, i.e. whether contamination is above or below release guidelines, and recommendations made as to what type and what volume of items could be released for unrestricted use. The feasibility of decontaminating materials and equipment to meet release guidelines is not within the scope of this sampling plan.

This sampling plan is applicable to all the structures at the WSCP but not to the same degree for each structure. Some structures have been previously characterized well enough to make further efforts redundant and/or unnecessary. Other buildings are known to be extensively contaminated above release guidelines and there is no need for further documentation. An example is Building 108 which has not been formally characterized in regard to radioactive contamination levels but historical surveys and recent measurements have shown that the surfaces of equipment and materials are contaminated with uranium and thorium at levels well above release guidelines. This type of situation is addressed in Section 2.2 and in the specific building descriptions in Section 4.2.1.

This characterization effort will allow a statistical measurement of surface radioactivity rather than a labor-intensive scan of the surface of large items or materials. The statistical characterization effort will be applied to items of large surface area such as walls, floors, roofs, and large pieces of equipment. Items such as chairs, tools, office equipment, etc. will have their entire surface scanned 100 percent. Small items of little value (nuts, bolts, bricks, splintered lumber, etc.) of such size that they can be picked up in one hand will not be surveyed but will be assumed to be contaminated. Measurement results will be interpreted as described below and eventually compared with Surface Release Criteria (as shown in table 4-1) in order to estimate what items might be released for unrestricted use or disposal.

The radioactivity of the interior surfaces of pipes, drain lines or ductwork will be determined by making measurements at traps and other appropriate access points, provided contamination at these locations is likely to be representative of contamination on the interior of these items. Any item or structure of such size, construction or location as to make the surface inaccessible for measurement will be assumed to be contaminated in excess of the limits in table 4-1. No covering (painting, plating or other material) will be applied to a surface in order to reduce surface contamination levels.

Before conducting the characterization survey of a structure, a series of inspections and observations will be made. Inspections will include photographs and in-situ radiological measurements to indicate the general extent and type of radioactive contamination. The exterior of each structure will be included in this inspection.

This inspection will be specific to each process area or work section of a structure. It will also initially categorize populations within each room or section of a structure; e.g. types and amount of equipment, structural items such as beams, walls, etc. The term population refers to items that fit into

TABLE 4-1

SURFACE CONTAMINATION GUIDELINES

Radionuclides[b]	Allowable Total Residual Surface Contamination (dpm/100 cm^2)[a]		
	Average[c,d]	Maximum[d,e]	Removable[d,f]
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
U-Natural, U-235, U-238, & associated decay products	5,000	15,000	1,000
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above	5,000	15,000	1,000

a) 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 measured by an apprcpriate detector for background, efficiency, and geometric factors associated with the instrumentation.

b) Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for each should apply independently.

c) Measurements of average contamination should not be averaged over an area of more than 1 m2. For objects of less surface area, the average should be derived for each such object.

d) The average and maximum dose rates 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.

e) The maximum contamination level applies to an area of not more than 100 cm^2.

f) 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 same general use or function category. The items within a population would be expected to exhibit similar contamination characteristics. The general rules used to segregate items into survey populations are as follows:

1) Separate rooms or operating levels within a structure where evidence (either historical or determined by recent measurements) indicated that different processes were in effect which would cause different contamination characteristics.

2) Horizontal versus vertical surfaces. Contamination accumulates more easily on horizontal surfaces. Examples are structural steel beams versus columns and floors versus walls. The exception to this rule is that ceilings are generally included with walls due to lack of settling on an upside-down surface.

3) High traffic/use areas such as stairways or handrailings would be expected to exhibit different contamination characteristics than other nearby areas of a structure.

4) Previous decontamination efforts would tend to spread out and make more uniform the level of contamination.

5) Different structural materials--for example porous materials like concrete versus nonporous materials

such as metals--would be expected to exhibit different contamination characteristics.

6) Depending on the location of the point of release of radioactivity to the atmosphere and the prevailing wind direction, different sides of the exterior of structures would be expected to exhibit diffierent contamination characteristics.

The proposed characterization effort requires a measurement regime that provides 90 percent confidence of determining the true mean surface contamination levels to within plus or minus 20 percent for all material that exhibits contamination levels less than residual contamination criteria and that may be released from the WSS for unrestricted use. This degree of confidence will be achieved by making 30 evenly spaced measurements on a surface. These exploratory measurements will be used to determine whether the population of measurements is normally distributed and then, if normalcy is confirmed, to estimate the number of additional measurements needed to achieve the required accuracy in determining the true mean surface contamination level.

The determination of whether the measurements are normally distributed will be done by fitting the measurement data to the functional form describing the normal distribution. The data will be assumed to be normally distributed if, after performing a chi-square goodness-of-fit test, it can be concluded with 95 percent confidence that there is no reason to suspect that the measurement data do not fit the functional form of the normal distribution. If the measurement data is determined not to be normally distributed then the set of exploratory measurements will be evaluated to segment the surface being measured into different areas or populations, i.e. where the measurements on each area would be expected to be normally distributed. A second set of 30 evenly spaced measurements will be collected on each area and the normalcy check on the measurement data will be repeated.

This population resegregation will include consideration of the benefit gained by redefining survey areas. If an area contaminated above guidelines cannot be segregated from an uncontaminated area in terms of reuse or disposal, the entire area will be considered contaminated and no further measurements will be made.

To compute the number of additional measurements needed to determine the true mean surface contamination levels for each area or population, the following formula will be used:

$N \geq (ts/rx)^2$, where

N = required number of measurements,

t = the t statistic for 90 percent confidence and 29 degrees of freedom (1.699),

r = acceptable relative error (0.20),

x = the average surface radiation level,

s = standard deviation of average surface radiation level.

If N is computed to be less than 30 (the number of exploratory measurements), no further measurements will be required. If N is greater than 30, then N minus 30 additional evenly spaced measurements will be made. In addition, the initial 30 exploratory measurements will be evaluated, assuming data normalcy, with regard to the lower bound of the 90 percent confidence interval. If this lower bound does not encompass the average or removable values (listed in table 4-1) for direct or swipe results respectively, the surface or equipment will be considered contaminated and no further measurements will be made.

The equipment populations within each structure will be radiologically surveyed to estimate the extent of contamination. Only five percent of each equipment population will be surveyed. Generally, as a minimum, the lesser of either ten items in each equipment population or the entire population will be surveyed. During the survey, all of the equipment will be inventoried. The inventory will be subsequently reviewed, with the radiological survey results, for salvageable items and/or to estimate what items might be released off-site.

For both initial and additional exploratory measurements, a population will be gridded into 30 segments. Measurements will be made in the center of each segment.

In regard to building exteriors, the wall(s) facing any particular direction will be evaluated independently from the wall(s) facing any other particular direction. The same practice will hold for exterior pitched roofs. Recent measurements by WSSRAP have indicated that specific exterior portions of a structure are more or less likely to be contaminated depending on the location of the structure, in terms of distance and direction relative to the main refinery area.

When applying the proposed measurement regime it is prudent to survey the areas of a structure first that are most likely to be contaminated. Then if this area is contaminated above guidelines it may not be necessary to survey other areas. For example, if a wall interior is contaminated above release guidelines then it would be pointless to survey the wall exterior before a decontamination/release decision is made.

The surface contamination guidelines for uranium and thorium apply to alpha radiation. Experience on the WSSRAP, however, has shown that measurements of alpha radiation on weathered, rusted, porous, or corrugated surfaces are biased low. The uranium and thorium and associated decay products (which emit alpha particles that travel only a few microns in solids) have been driven into or have migrated into the subsurface of the materials in question and cannot be effectively detected with alpha radiation detectors. The uranium and thorium decay products also emit one or more beta particle or gamma ray per decay. These daughter products are always present with the parent nuclide(s). For this reason Geiger-Mueller (G-M) detectors, which respond to the more penetrating beta and gamma radiation as well as alpha radiation, will be used for the measurements instead of standard-type alpha radiation detectors. Measurements of removable radiation levels on surfaces will be made with cloth or paper swipes at each G-M measurement location. These measurement results will then be evaluated relative to the guidelines in table 4-1.

Implicit in the interpretation of the measurement results is the assumption that only the surface of the material is contaminated and the radionuclide(s) present on the material are identified. Materials with nonporous surfaces, nonweathered vertical surfaces and porous surfaces that were not spilled upon are expected to have only surface contamination. Evaluation of the degree of non-surface contamination on porous surfaces will be provided by scraping or coring the surface and measuring the level of radioactivity on the newly exposed surface. Additionally, swipes, bulk samples of residues, and scraping/corings will be analyzed by either alpha or gamma spectroscopy to identify the radionuclides present.

4.1.2 Asbestos-Containing Material

Generally, ACM is grouped into three categories:

1) Sprayed-on or troweled-on materials on ceilings, walls, and other surfaces

2) Insulation on pipes, boilers, tanks, ducts, and other equipment

3) Other miscellaneous products (see table 4-2).

At the WSCP site, all ACM is either type 2 or type 3.

Material in the first two categories can be friable (can be crumbled, pulverized, or reduced to powder by hand pressure). Most ACM in the third category is non-friable. The vast majority of ACM that has been identified to date on the site is friable. When friable ACM is damaged or disturbed, asbestos fibers are released. These fibers create a potential hazard for building occupants and, if released from the building, to people outside. At WSCP, there are many instances of badly damaged ACM.

None of the buildings of the WSCP are now occupied nor will they ever be. However, in order to provide safe working conditions during the demolition of the WSCP, the ACM must be identified and controlled. Similarly any damaged, friable ACM that poses a threat to human health outside the WSCP buildings must be identified and controlled.

When the concentration of asbestos in friable materials exceeds one percent by weight, handling and disposal of the material (including demolition) is subject to USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS, 40 CFR 61, Subpart M). As remedial action proceeds at the plant, proper handling and disposal of ACM is necessary. Thus, building

TABLE 4-2

BUILDING INTERIOR ASBESTOS SAMPLING PLAN SUMMARY

	Material to be sampled							
Bldg No.	Pipe Valve Insul.	Boiler/ Vessel Insul.	Duct Insul.	Exterior Siding(s) or Roof(R)	Floor Tile	Ceiling	Inter. Wall	Debris
101	B	A	X	S-B R-X	--	--	--	--
103	A	--	X	--	X	--	--	--
104	A	--	--	--	--	--	--	--
105	A	--	--	--	X	--	--	--
106	A	--	--	--	--	--	--	--
108	X	X	--	--	--	--	--	--
109	--	--	--	--	--	--	--	--
110	--	--	--	--	--	--	--	--
201	A	A	X	S-A R-X	X	X	X	X
202	A	--	--	R-X S-A	--	--	--	--
301	A	A	X	S-A R-X	X	--	--	--
302	A	--	--	R-X	--	X	--	--
403	X	X	X	S-A	X	X	--	--
404	A	A	X	--	--	--	X	--
405A	A	--	--	R-X	--	--	--	--
405B	--	--	--	--	--	--	--	--
406	A	--	--	R-X	--	X	--	--
407	A	--	X	S-A R-X	C	C	A	--
408	B	--	X	R-B	X	X	--	A
410	A	A	C	R-X	B	C	A	--
412	--	--	--	S-A R-X	--	--	--	--
413	A	--	--	S-A	--	--	--	--
414	A	--	--	--	--	--	A	--
415	--	--	--	--	--	--	X	--
417	A	--	--	R-X	--	--	--	--

Key:

X Not previously sampled, sampling required
-- Not present
A Based on visual inspection, classified as ACM
B Some previously sampled, additional sampling not required
C Some previously sampled; additional sampling is required

TABLE 4-2 (cont.)

Material to be sampled

Bldg No.	Pipe Valve Insul.	Boiler/ Vessel Insul.	Duct Insul.	Exterior Siding(s) or Roof(R)	Floor Tile	Ceiling	Inter. Wall	Debris
428	A	--	--	S-A	--	--	--	--
429	A	--	--	--	--	--	--	--
430	A	--	--	--	--	--	--	--
431	--	--	--	--	--	--	--	--
432	--	--	--	--	--	--	--	--
433	A	--	--	R-X	--	--	--	X
434	--	--	--	R-X	--	--	--	--
435	--	--	--	R-X	--	--	A	A
436	--	--	--	R-X	--	--	--	X
437	--	--	--	R-X	--	--	A	--
438	--	--	--	R-X	--	--	--	--
439	--	--	--	--	--	--	--	--
441	--	--	--	--	--	--	--	--
443	--	--	--	--	--	--	--	--

Key:

X Not previously sampled, sampling required
-- Not present
A Based on visual inspection, classified as ACM
B Some previously sampled, additional sampling not required
C Some previously sampled; additional sampling is required

materials containing more than one percent asbestos will require personnel protection and engineering controls during removal and disposal.

A preliminary survey of the buildings was conducted to identify potential ACM to be sampled. The preliminary survey showed that, based on visual inspection, the vast majority of pipe, boiler, and vessel insulation contains high concentrations of asbestos. Therefore, it is recommended that, when at least 90 percent of a given type of insulation, e.g. pipe insulation, in a building appears to contain asbestos, all the insulation of that type will be considered as ACM. In this situation, visual inspection of that material is all that is required in that building. Only those other insulating and building materials with unknown asbestos content will be sampled. The results of the preliminary survey and the recommended sampling program are summarized in table 4-2. The objective of the sampling program described herein is to identify the location and volume of ACM in all site buildings. The detailed location of ACM and number of samples required in each building are shown in the tables and figures of Appendix 1. In many cases no samples are required because visual inspection is all that is needed to confirm the presence of ACM. At other locations the characterization requires collection of the specified number of samples and the estimation of the total volume of ACM requiring removal. All locations where visual inspection and/or sampling is required within the buildings are marked with spray paint.

Building 101 Feed Preparation and Sampling Plant

The building interior has been dismantled. The exterior siding is corrugated transite. The only insulating materials remaining are very small lengths of duct, pipe, roof insulation and insulating materials in the calciner shed. In 1986, the pipe insulation and siding were sampled. Both contained high concentrations of asbestos. Based on visual inspection, the pipe insulation is all considered to be ACM and no sampling is required. Sampling of duct insulation on fiber brick is necessary as detailed in Appendix 1.

Building 102A & B Refinery Tank Farm

All structures have been removed, leaving only concrete pads. No potential ACM is present, and no sampling is required.

Building 103 Digestion and Denitration Building

Much of the interior of this building has been dismantled. Some potential ACM remain in the office portion of the building as duct and steam pipe insulation, and in a small area of the process portion of the building as pipe insulation. All the pipe insulation is considered to be ACM based on visual inspection. Materials that will be sampled are the duct insulation and the floor materials in the office end of the building.

Building 104 Lime Storage

This building consists of a storage hopper over a shed. The only potential ACM present are a few feet of pipe insulation inside the shed and some on the outside of the hopper. All pipe insulation is consider to be ACM and no sampling is required.

Building 105 TBP and Ether Extraction Building

The equipment and much of the interior structure of the building has been entirely dismantled. The only potential ACM present are insulated pipe, and a section of the floor. All pipe insulation is considered to be ACM. Samples of the floor material should be collected as detailed in Appendix 1.

Building 106 Proof Sampler

This building contains two segments of insulated pipe. This material is considered to be ACM and no sampling is required.

Building 108 Nitric Acid Recovery

This building was not inspected during the preliminary survey due to health and safety restrictions caused by high airborne contaminations of Rn-220 daughter products. No assessment of potential ACM has been made; table 4-2 shows the minimum sampling required.

Buildings 109 & 110 Drum Storage

These buildings are open-sided sheds on concrete pads. There is no potential ACM and no sampling is required.

Building 201 Green Salt Plant

Most of the process equipment and piping are still in place in this building. There is insulation on piping, valves, heat exchangers, reactors, and ducts. Floor, ceiling, and roofing materials may also contain asbestos. Portions of the exterior walls are transite. There are many instances of severely deteriorated insulation which is now lying in loose piles on floors, piping, and other surfaces. When the insulation contains asbestos, such piles are sources of airborne asbestos fibers. Based on visual inspection, all insulation on pipes, valves, heat exchangers, and reactors is considered to be ACM. Duct insulation, roofing, and other materials must be characterized as detailed in Appendix 1.

Building 202 Green Salt Tank Farm

The tank and compressor buildings both have cement-asbestos walls. Some pipe insulation is still present. Roof insulation may contain asbestos. Based on visual survey, the pipe insulation is asbestos and no sampling is required. Samples of the roof insulation and exterior siding should be collected as detailed in Appendix 1.

Building 301 Metals Plant

The building is generally undisturbed and insulating materials are in place. Potential ACM present are insulation on pipe, tanks, ducts, cable; seals on the furnaces; floor tile, roofing, and transite siding. The pipe, cable, and tank insulation, furnace seals, and transite are considered to be ACM. The other materials are to be characterized.

Building 302 Magnesium Storage

There is a small amount of insulated piping on the east loading dock. Other potential ACM are the ceiling panels and roofing. All pipe insulation is considered to be ACM. Samples of ceiling panels and roof insulation should be collected as detailed in Appendix 1.

Building 303 Chip Storage

The structure has been removed, leaving only a concrete pad. No potential ACM is present and no sampling is required.

Building 403 Chemical Pilot Plant

This building was not inspected during the preliminary survey due to health and safety restrictions resulting from high airborne concentrations of Rn-220 daughter products. No assessment of potential ACM has been made; table 4-2 shows the minimum sampling required.

Building 404 Metallurgical Pilot Plant

Some equipment has been removed but much remains. Most of the potential ACM present is pipe insulation. The other potential ACM is duct insulation. Transite is present as the walls of a small shed. All pipe insulation and transite are considered to be ACM. Duct insulation should be sampled as detailed in Appendix 1.

Building 405A Pilot Plant Auxiliary

This building has been completely emptied of equipment. Potential ACM is now limited to four lengths of insulated pipe and the built-up roofing material. The pipe insulation is all considered to be ACM. Samples of the built-up roofing material should be collected as detailed in Appendix 1.

Building 405B Pilot Plant Auxiliary

This building consists of an exposed metal framework supporting air filters. There are no visible insulating materials or likely ACM. No sampling is needed.

Building 406 Warehouse

Use of insulating materials is limited to pipe insulation (two instances), ceiling, and built-up roofing. Pipe insulation is considered to be ACM. Samples of built-up roofing should be collected as detailed in Appendix 1.

Building 407 Laboratory

This building is largely undisturbed and has extensive insulation and other potential ACM. Many insulated pipes are present in most of the more than 50 rooms of the building. The heating and ventilation system which serves each room is highly branched and each segment is insulated. There are three types of ceiling tile, two kinds of floor tile and a built-up roof. Support structures appended to the exterior are of transite. There is a boiler room on the roof. Hoods in the laboratories are of transite. Most of the building materials are in good condition.

All pipe insulation and transite will be assumed to be ACM. Duct insulation will be characterized. Prior sampling of floor and ceiling materials found no asbestos in the types of materials sampled. However, there are more types of floor and ceiling material present than those sampled. Therefore, these materials will be sampled to determine if there is any type present that contains asbestos.

Building 408 Warehouse

This building has not been disturbed. There are many insulated pipes. Office areas have duct insulation, acoustical ceiling tile, and floor tile. The building has a built-up roof. Pipe insulation has been sampled and found to contain a high concentration of asbestos. The roof was also sampled and found not to contain asbestos. No further sampling of the roof or of pipe insulation is required. Overhead ceiling insulation, overhead acoustical tile, floor tile, and duct insulation should be sampled as detailed in Appendix 1.

Building 410 Services

This building has not been altered. There are more than 50 rooms, including a laundry, large change rooms with showers, and a large kitchen and food service facilities. The building has self-contained boilers. Most pipe in the building is insulated. There is a heating/ventilation system with extensive, branched, insulated duct work. Transite is used in laboratory fume hoods and at primary entrances. There is a built-up roof. Acoustical tile and floor tile are used throughout the building. The roof has collapsed in several places, causing localized deterioration of roofing materials, ceiling materials, duct insulation and pipe insulation.

Two types of floor tile and one type of ceiling panel were sampled previously. None of these materials contained asbestos. However, there are three types of ceiling panel in the building. Thus, all types of ceiling panel will be sampled to determine if there is any type present that contains asbestos; no additional sampling of floor tile is necessary.

Duct insulation in the passageway between 409 and 410 was sampled and found to contain a high concentration of asbestos; in fact, it had the highest concentration of any material previously sampled. Several additional samples of duct insulation will be taken to determine if this material is present throughout the building. This insulation is in poor condition throughout the building.

Pipe and boiler insulation have been visually classified as ACM and no sampling is required.

Building 412 Electrical Substation

This building has no piping. It has a built-up roof, and walls of the meter room are of transite. Only the roofing materials require characterization.

Building 413 Cooling Tower and Pump House

The chlorine tank building has one length of insulated pipe. The lower portion of the exterior walls is transite. Both materials have been visually classified as ACM.

Building 414 Scrap Classification and Equipment Storage

There is a small amount of insulated pipe in the heating system. The furnace room walls are transite. The furnace exhaust has two gaskets that appear to be ACM. All these materials are classified as ACM.

Building 417 Paint Shop

This building has small amounts of insulated pipe and a built-up roof. The insulation is considered to be ACM. The roof should be characterized as detailed in Appendix 1.

Building 428 Propane and Butane Gas Plant

This building is now empty. There are two lengths of insulated pipe. The exterior walls are transite. These materials are classified as ACM.

Building 429 Reserve Water Facilities

This building is empty. There are three short segments of insulated pipe. This material is classified as ACM.

Building 430 Ambulance Garage

This building is empty. The only insulation is an insulated pipe to the heater. The insulation is considered to be ACM.

Building 431 Proof Sampler

There is no potential ACM and no sampling is required.

Building 432 Proof Sampler

There is no potential ACM and no sampling is required.

Building 433 Storage

There are several segments of insulated pipe. Some pipe insulation has deteriorated and disintegrated. There is a built-up roof. Several cartons of supplies contain firebrick which may contain asbestos. The pipe insulation is considered to be ACM; the other materials will be sampled.

Building 434 Storage

The only potential ACM is in the layers of the built-up roof. This material should be sampled as detailed in Appendix 1.

Building 435 Storage

The walls of the fume hood are transite and the roof is built-up materials. Several cartons contain transite panels. The build-up roofing should be sampled as detailed in Appendix 1.

Building 436 Storage

The roof is built-up materials. There are cartons of firebrick and ceiling panels that could contain asbestos. All these materials should be sampled.

Building 437 Storage

Wall panels at the north end of the building may be made of transite, and there is a built-up roof. These materials should be sampled.

Building 438 Storage

The only potential ACM are in the built-up roof which should be sampled.

Building 439 Fire Training

There are no potential ACM and no sampling is necessary.

Building 441 Cylinder Storage

There are no potential ACM and no sampling is necessary.

Building 443 Fire Training Storage

There are no potential ACM and sampling is not necessary.

4.1.3 Chemical

The purpose of this section is to identify hazardous substances that were used in the buildings and to point out specific areas where they may remain. There are two general categories of hazardous substances that may exist in the Chemical Plant buildings: bulk materials that remain in the equipment, tanks and piping; and trace contaminants in both process and non-process related buildings.

An example of types of bulk material are solid sodium hydroxide and liquid sulfuric acid. The determination of waste characteristics of bulk materials requires sampling of the interiors of those tanks and piping still in place for which there is no documented evidence that the bulk material has been removed. The sampling plan has been developed on the assumption that all containerized chemicals have been either removed from the site or have been identified, stabilized and stored as part of the containerized chemical removal subcontract which will be performed prior to execution of this sampling plan. No sampling provisions have been incorporated in the waste characteristics sampling plan for containerized chemicals.

The second category is trace contaminants that may occur in the buildings, not only in the processing areas and equipment, but also in non-process related areas. Such areas would be, for example, transformer pads and equipment maintenance areas. The existence of trace contaminants in the Chemical Plant requires that a program of surface sampling be implemented. Surface sampling will detect those substances that have release criteria which affect their release from the site. At present, the only chemical species for which surface release criteria apply are PCB's. Radionuclides also have release criteria, but are discussed in the radiological portions of this sampling plan.

For each major area potentially containing hazardous substances, a preliminary inspection was conducted. The purpose of this preliminary inspection was to develop the following information:

1) The location and extent of visible deposits of chemical substances on the process equipment or within the area.

2) The location and condition of process equipment and piping that contained hazardous substances. This inspection

provided field verification of equipment and process piping as shown on existing drawings.

The results of this preliminary investigation are presented in sections 4.1.3.1 and 4.1.3.2 for the process-related areas and non-process related areas respectively. This information is combined with the assessment of existing drawings and literature to specify a sampling procedure for each applicable building or area. The Buildings Waste Characteristics--Chemical Sampling Procedures, Section 4.2.3, defines where sample collection is required and specifies the number of samples.

4.1.3.1 Process-related Areas

The sampling rationale for determining waste characteristics of the bulk materials still remaining in the Chemical Plant buildings is based on the different operations that were carried out in each major process building. For example, crushing and sampling were done in Building 101 while purification by solvent extraction was done in Building 105. This separation of unit operations indicates that each building may have its own unique group of process-related contaminants. The exceptions to this rationale would be the pilot plants and general chemical storage buildings where a variety of materials were stored and used.

The first step in establishing the details of the chemicals and reagents used in a particular building was to make a detailed examination of the engineering process flow diagrams for the

Chemical Plant. These diagrams show the reactants and products that were involved in each part of the process. The diagrams also assisted in clarifying which buildings or areas were used for each process step. The information from the process flow diagrams was supplemented from a second source, the Chemical Plant's History and Completion Report (Reference 10). The listed contents of each building were compared with the EPA designation of hazardous substances under CERCLA (Reference 20) to determine those substances that are considered hazardous.

Chemical sampling requires procedures and protective equipment to ensure the safety and health of workers involved in the sampling program. These requirements are discussed in the appendices to the Quality Assurance Program Plan (Reference 24).

The sampling rationale for the Chemical Plant trace contaminant characterization is focused on those areas where PCBs may be found. PCBs were commonly used as oil substitutes and additives, and may logically be expected in areas containing metal machining tools, equipment maintenance areas and electrical transformer pads. Equipment storage areas may contain PCBs as the result of oil leakage from stored equipment.

The previous utilization of process-related buildings and areas, and the chemicals that may remain in them are described in the following sections.

4.1.3.1.1 Feed Preparation and Sampling Plant

The Feed Preparation and Sampling Plant (Building 101) is a five-story building located on the feed material storage pad. It contained approximately 28,300 square feet of gross floor area, with equipment for crushing, milling, screening, calcining, and sampling the ore concentrates to be processed at the Weldon Spring Chemical Plant. Material to be processed at other facilities may have been sampled at the Feed Preparation and Sampling Plant. The storage pad is a concrete paved area covering approximately 68,800 square feet.

The structural surfaces of the building may be contaminated with sodium and ammonium diuranates. These will be surveyed in accordance with the radiological portion of the building waste characteristics sampling plan.

A preliminary field investigation revealed that the entire contents of the building have been removed. All that remains is the shell of the building. Since no bulk materials remain in this area, no bulk chemical samples will be taken.

4.1.3.1.2 Refinery Tank Farm

The Refinery Tank Farm (Area 102) included five 19,000-gallon tanks for storage of caustic soda solution, sulfuric acid, ether and hexane; and seven 25,000-gallon tanks to store concentrate and dilute nitric acid. The CERCLA hazardous substances that may be present in this area are nitric acid, sulfuric acid and caustic soda.

The preliminary field investigation indicates that these tanks have been removed. There is no evidence of their location elsewhere on the site and no process piping remains. Soil samples were taken from the soil surrounding the area. The soils sampling program is discussed in the "Soil Investigation Work Plan" prepared for the DOE under WSSRAP. This area will not be directly sampled as part of the building waste characteristics program.

4.1.3.1.3 Digestion and Denitration Building

The Digestion and Denitration Building (Building 103) is a three-story building with high bay areas, with approximately 58,900 square feet of gross floor area. The building contained equipment for the digestion of feed materials. It provided for the preparation and handling of acid slurry, disposal of raffinate, concentration of uranyl nitrate hexahydrate (UNH), denitration and packaging of uranium trioxide (UO_3).

The chemicals used in this building were sodium and ammonium diuranates, uranium trioxide, uranyl nitrate hexahydrate, nitric acid, and trace quantities of tributyl phosphate and hexane. The chemicals on the CERCLA hazardous substances list that may be present in this building are nitric acid and uranyl nitrate.

Uranyl nitrate will be sampled in accordance with the radiological portion of this work plan.

The preliminary field investigation revealed the following:

1) Virtually all the process equipment has been removed from the building. All acid-proof brick has been removed from the floors. Some green-painted piping near the ceiling in the south half of the building is a water line and as such will not be sampled. The piping remaining in the north half of the building has been disconnected and the low points in the line remain open. It will not be sampled, since no bulk materials remain.

2) Two red tanks in the north portion of the north half of the building have been previously sampled and have a tag from the containerized chemical inventory. The tanks are empty, with all fittings removed and their tank drains are open; therefore, they will not be sampled.

3) Two sump-liquor hold tanks on the south wall of the northern section of the building have no tags from the containerized chemical inventory. These will not be sampled since the tank drains are open and no bulk materials remain.

4) All five stainless steel tanks in the ore digestion section of the north half of the building have disconnected

outlets. They will not be sampled since no bulk materials are present.

5) Two stainless steel tanks in the northwest ore digestion section are disconnected at the bottom, but mixers remain connected at the top flanges. These tanks will not be sampled since no bulk residual materials are present.

4.1.3.1.4 TBP and Ether Extraction Building

The TBP (Tributyl Phosphate) and Ether Extraction Building (Building 105) is a three-story building with approximately 42,400 square feet of gross floor area. The equipment included extraction columns, process vessels, evaporators and auxiliary equipment for producing a highly purified uranyl nitrate hexahydrate solution.

The chemicals used in this building were tributyl phosphate, hexane, uranyl nitrate, nitric acid, potassium nitrate, sulfuric acid and caustic soda. The chemicals on the CERCLA hazardous subtances list are uranyl nitrate, nitric acid, sulfuric acid and caustic soda.

The preliminary field investigation revealed that all process piping, equipment and acid-proof brick had been removed from the building. Since the building is empty, no bulk samples will be taken.

4.1.3.1.5 Nitric Acid Recovery Plant

The Nitric Acid Recovery Plant (Area 108), occupying approximately 3,000 square feet, contains equipment for the recovery and reconcentration of nitric acid and oxides of nitrogen, plus a building for housing the motor controls and compressors. The chemicals used in this area were nitric acid and ferric nitrate. Both of these chemicals are CERCLA hazardous subtances.

The preliminary field investigation of this area revealed that the process lines connecting the nitric acid recovery area to the digestion and denitration building had been severed and removed. The ferric nitrate tank has been removed. The stack has its upper portion removed. The emergency vent blower has also been removed. The seal liquor pumps, the liquid separator and the reflex pump have been removed. Roughly 9 out of 10 valves in the process lines are in the open position, including those to the drain lines. The flanged inspection openings in the absorber and reconcentrator are held loosely in place by several bolts. Due to the above conditions, the nitric acid recovery area is not expected to contain bulk materials. No bulk samples will be taken in this area.

4.1.3.1.6 Green Salt Plant

The Green Salt Plant (Building 201) is a multi-story building, approximately 69,600 square feet of gross floor area, with equipment for conversion of uranium trioxide (UO_3) to uranium tetrafluoride (UF_4). It contains reduction and hydrofluorination reactors; blending and packaging equipment; ammonia cracking and inert gas generation facilities; pilot, re-run and reverter reactors; vaporization, dust collection and waste recovery systems.

The chemicals used in this building were uranium trioxide (UO_3), uranium dioxide (UO_2), black oxide (U_3O_8), green salt (UF_4), hydrofluoric acid (HF), ammonia (NH_3), lime ($CA(OH)_2$) and potassium hydroxide (KOH). The CERCLA chemicals on the hazardous substances list that may be in this area are hydrofluoric acid, ammonia and potossium hydroxide.

The preliminary field investigation revealed the following:

1) All of the major process equipment for handling hydrofluoric acid had been removed from the building. Only two filters remain, the HF offgas filter and the Monel Hair Filter. These filters are located on the upper level of the east end of the building, northwest of the hoist well. No samples will be taken since the piping is open at the ends and any remaining HF would be evaporated.

2) The process piping that carried hydrofluoric acid to and from the hydrofluorination reactors is still largely intact. These reactors are located on the second level in

the main part of the building. No samples will be taken since the piping is open at both ends and any remaining HF would be evaporated.

3) The hydrofluoric acid line from the reverter unit was removed evidently while the Chemical Plant was still in operation. Therefore, no sampling will be required in this area.

4) The ammonia piping around the dissociation equipment is still largely intact. Two of the five dissociators and the hydrogen combuster have been removed. The remaining dissociators and piping will not require sampling since the lines are open and bulk materials are not present.

5) One closed line in the far west end of Building 201 may contain anhydrous hydrofluoric acid (HF). This line will be sampled as described in Section 4.2.3.2.1.

6) The transformer area may contain PCBs in and around the transformers. Sampling will be in accordance with Section 4.2.3.1.2.

4.1.3.1.7 Green Salt Tank Farm

The Green Salt Tank Farm (Area 202) originally included ten 16,000-gallon tanks for storage of anhydrous hydrofluoric acid (AHF), 70 percent hydrofluoric acid (HF) and ammonia (NH_3).

The tank farm occupies approximately 8,000 square feet. The process chemicals used in this area were anhydrous hydrofluoric acid, hydrofluoric acid and ammonia. These are all CERCLA hazardous substances.

The preliminary field investigation revealed that the ammonia tanks have been removed from the north end of the tank farm. Samples from the remaining HF tanks and process piping will be collected in accordance with Section 4.2.3.2.2.

4.1.3.1.8 Metals Plant

The Metals Plant (Building 301) is a single-story structure with high and low bays, with approximately 68,000 square feet of gross floor area. It contains equipment for the thermite reduction of uranium tetrafluoride (UF_4) to uranium metal, the separation of the uranium dingots from slag, the scalping of the dingots, gamma uranium extrusion, and crushing and grinding slag. It was also provided with a maintenance area, a dust collection system, a reaction container cooling area and an electrical substation.

The process chemicals used in this area were green salt (UF_4), magnesium fluoride (MgF_2) , metallic uranium, metallic magnesium, caustic soda (NaOH) and trichloroethylene. The caustic soda and trichloroethylene are CERCLA hazardous substances.

The preliminary field investigation revealed that the tanks and process piping that contained tricholoroethylene and caustic soda are still largely intact. However, drawings and field investigations show that the caustic soda system was inactivated in order to use one of its tanks for trichloroethylene. The process equipment for the caustic soda system is empty and no samples will be taken here. The remaining piping and the degreaser, which is in a partially opened plastic foam cocoon, must be sampled for trichloroethylene as per Section 4.2.3.2.3 if bulk materials remain in them.

PCB contamination is suspected in and around the areas containing metal-working machines. Samples will be collected as per Section 4.2.3.1.2.

4.1.3.1.9 Magnesium Building

The Magnesium Building (Building 302) is a single-story structure with a high bay section. It contains approximately 9,200 square feet of gross floor area with facilities for processing, storing and repackaging ground magnesium for use in the Metals Building. The process section is separated from the storage area by a fire wall.

This building contains several thousand pounds of metallic magnesium. Since metallic magnesium is not a CERCLA hazardous substance, no bulk sampling will be done in this area.

4.1.3.1.10 Chemical Pilot Plant

The Wet and Dry Chemical Pilot Plant (Building 403) consists of a high bay, single-story building with approximately 17,800 square feet of gross floor area. It contains unit operation equipment used in conducting refinery and chemical studies. The equipment in Building 403 resembles the large-scale plant equipment. The process chemicals used in this building would be similar to those listed for buildings 101, 102, 103, 105 and 201, since the same operations were carried out here on a smaller scale.

With the exception of a caustic potash tank on the north side of the building, the preliminary field investigation revealed that the pilot scale vessels inside the building in this area were empty. In several instances, pilot scale equipment had been removed from the building. The pilot scale pumps and piping had open drain valves, or had been physically disconnected. If bulk materials remain in the caustic potash tank, samples will be collected as per Section 4.2.3.2.4. No other sampling for bulk materials will be required.

4.1.3.1.11 Metallurgical Pilot Plant

The Metals Pilot Plant (Building 404) is a high bay, single-story building containing approximately 12,400 square feet of gross floor area. The building provided facilities for metal processing studies, ceramic work, metal testing and miscellaneous short- and long-range development projects. Equipment included one large-scale dingot furnace. The process chemicals used in this building would be those listed for buildings 301 and 302, since the same operations were carried out here on a smaller scale.

The preliminary field investigation disclosed that one room inside the building was used for storing the metallic sodium-potassium alloy NaK. This alloy is hazardous because of its extremely reactive nature. No NaK containers were evident; however, this room must be thoroughly examined for the presence of NaK prior to building demolition.

4.1.3.1.12 Pilot Plants Auxiliary

An auxiliary area to the Pilot Plants (Area 405) contains a small building of approximately 1,800 square feet of gross floor area, and an adjacent concrete pad of approximately 3,700 square feet. The former furnished a maintenance work area for servicing the pilot plants, while the latter provided a paved area for reaction container cooling and a foundation for dust collection equipment.

The process chemicals used in this area were solid uranium compounds, and magnesium and magnesium fluoride as fine particles and dusts. Since these are not CERCLA hazardous substances, this area will not be sampled for bulk chemical substances.

4.1.3.1.13 Laboratory

The Laboratory Building (Building 407) is a one-story structure with penthouse for mechanical equipment, containing approximately 54,000 square feet of gross floor area. Its purpose was to provide facilities for performing control and finished product analyses, material accountability analyses, plant assistance and bench-scale development work. These laboratories were furnished for spectrographic analysis, X-ray diffraction, vacuum fusion, radio-chemistry, solvent tests, statistical analysis and other product testing procedures.

The chemicals expected to be in this building include chemical reagents and uranium compounds in solid and liquid form. Due to the small scale of the operations performed here, the contaminants would be in bottles, boxes and other containers. Since these small containers were previously characterized during the containerized chemical removal subcontract and no chemical process vessels are in this area, this area will not be included in the bulk chemical characterization of the Chemical Plant.

4.1.3.1.14 Process Sewer System

A network of underground process sewers was installed to handle large quantities of manufacturing wastes containing chemicals and small amounts of low-level radioactive materials highly diluted with water. The process sewer system conducted these wastes from various process buildings to a natural drainage ditch leading to the Missouri River. The process sewer system consisted of 6,460 lineal feet of vitrified clay pipe, ranging from 6 inches to 18 inches in diameter.

Structures required for the process sewer system, all of which are concrete, included the following:

- Neutralization pit, brick-lined
- Proof samplers (3 units)
- Flame trap
- Lift station
- Manholes (22 units total, 5 brick-lined)
- Valve pit
- Skimmer tank

Some of the manufacturing wastes from the refinery area contained acid and were conducted from the buildings through acid-proof sewers to a neutralization pit prior to their entry into the process sewer. The neutralization pit is a dual-compartment reinforced concrete structure with an acid-brick lining. Valving is provided to allow the acid waste to flow through one compartment while the other compartment is being serviced. Each compartment is divided by stainless steel overflow baffles into four limestone-filled beds.

Proof sampling stations were installed at the refinery area, the laboratory building and the outfall sewer near the Imhoff tank. The proof sampler stations consist of a reinforced concrete structure and flume below ground covered by a small prefabricated steel housing. The structures house a proof sampler enclosed in a cabinet, a storage tank and instrumentation. The concrete structures below grade house the flume, flow orifices, pumps and auxiliary instrumentation. The prefabricated steel buildings are all of similar size and design and are 12'x 12'x 14' high. While of similar design, the below-grade concrete structures varied in size for the different stations. The dimensions for these structures are tabulated on table 4-3.

These pits may contain a wide variety of hazardous substances, and the chemical sampling for these areas will be predicated on a program of analysis to determine if the pits contain corrosive or reactive materials; heavy metal salts; and hazardous organic compounds, particularly halogenated solvents. The guidelines for these analyses are given in Section 5.3 of this work plan.

TABLE 4-3

Dimensions of Proof Sampling Pits

Proof Sampling Station	Length	Width	Depth	Volume cu.ft.
Refinery area	12'-0"	12'-0"	10'-0"	1,500
Laboratory Bldg.	12'-0"	12'-0"	13'-4"	2,000
Outfall sewer	20'-4"	12'-0"	13'-3"	3,225

Prior to the shutdown of the Chemical Plant, Mallinckrodt Chemical Works wrote several detailed shutdown manuals for various areas of the plant. There appears to be no specific shutdown directive that applies directly to the process sewer system. However, the general criteria for shutdown involved preparing the plant facilities so that no excessive deterioration would occur for a period of two years and no hazard would exist for casual visitors or assigned personnel. As a result, it is possible that the process sewers were flushed clean with water. Until it has been conclusively shown that no hazard exists, the procedural guidelines for sampling as detailed in sections 4.2.3.1 and 4.2.3.2.6 of this work plan shall be in effect.

4.1.3.2 Non-Process-Related Areas

The sampling rationale for the chemical characterization of non-process-related chemicals is based on the examination of documentation concerning the nature and use of the buildings. This documentation consists of engineering and construction drawings of the buildings and also the Chemical Plant's History and Completion Report (Reference 10). The drawings and completion report give the nature and location of ancillary facilities using chemicals and solvents plus the location of electrical equipment which may contain PCB's. These chemicals and solvents were then compared with the EPA designation of hazardous substances under CERCLA (Reference 21) to determine which chemicals and solvents are considered hazardous. The chemical sampling plan takes into account any hazardous substances which may be present in a building or area.

The buildings and areas which may contain chemical contaminants are described in the following sections.

4.1.3.2.1 Warehouse

The Warehouse (Building 406) consists of a one-story concrete block structure, containing approximately 16,000 square feet of gross floor area, with loading dock facilities for both truck and railroad shipments. It contains storage areas for dry chemicals, special uranium feed materials, and miscellaneous materials; offices; and locker and utility rooms.

The chemicals expected in this building are dry chemicals and uranium compounds that were stored in containers and bins. The contents of these containers were characterized in the containerized chemical removal subcontract; therefore, they will not be included in the chemical characterization of the Chemical Plant. No other bulk chemical sampling is required.

4.1.3.2.2 Maintenance Stores

The Maintenance and Stores Building (Building 408) is a single-story, concrete block structure containing approximately 70,700 square feet of gross floor area. It had facilities for machining, millwright, sheet metal, utility, pipe fitting, welding, instrument repair, carpentry and electrical work. Areas and facilities were provided for storage of maintenance materials and supplies; decontamination, degreasing, and cleaning; and automotive service and repair, together with a garage for fire trucks. The chemical contaminants that may be present in this building include degreasing and cleaning solvents, sulfuric acid and caustic soda. The CERCLA hazardous substances are sulfuric acid, caustic soda and halogenated solvents. In addition, PCBs should be sampled in areas where oily residues remain on the floor and walls. Sampling will be in accordance with Section 4.2.3.2.6.

4.1.3.2.3 Cooling Tower

The Cooling Tower (Area 413), constructed of redwood lumber, was designed to handle 12,000 GPM. It cooled the water from 110^{O}F to 90^{O}F at a wet-bulb temperature of 78^{O}F. A steel frame building with corrugated asbestos siding was constructed adjacent to the cooling tower to house the pumping and chemical treatment facilities, and the electrical equipment necessary for the operation. A 12-inch electric exhaust fan was installed to provide special ventilation for the 8′ x 9′ chlorine room. The process chemical used in this building was chlorine, which is a CERCLA hazardous substance.

The preliminary field investigation showed that the chlorine tanks in the room in the northwest corner of the steel frame building have been removed. A small amount of chlorine piping remains, but no bulk material containers remain, and therefore no samples will be taken.

4.2 Sampling Procedures

This section consists of three subsections--Radiological, Asbestos-Containing Materials and Chemical. Each subsection describes the measurement methods, sample collection procedures, locations for sampling or measuring, and the number of samples or measurements required.

4.2.1 Radiological

Radiological measurements of structures and equipment will be performed in accordance with WSSRAP standard operating procedures. The measurements of building structural material will be made with a handheld Geiger-Mueller (G-M) meter and swipes at predetermined locations: see Section 4.1.1 and sections 4.2.1.1 through 4.2.1.42. Locations such as ceilings, light fixtures, overhead conduit and piping, etc. will be surveyed with the aid of ladders or manlift devices. The equipment and material inventory will be made simultaneously with the measurements.

Each G-M measurement will be made with the detector held at contact with the surface being measured. The detector response will be integrated for one minute. The count rate of the detector will be corrected for detector area and efficiency to yield measurement results in disintegrations per minute per 100 square centimeters ($dpm/100cm^2$).

Measurement of removable radiation levels on surfaces will be made with cloth or paper swipes. The swipes will be wiped with moderate pressure over a surface area of approximately 100 cm^2. Swipes will be analyzed for one minute on a bench-top alpha scintillation detector. The count rate results will be corrected for detector efficiency to yield measurement results in $dpm/100cm^2$.

Equipment in buildings will be individually surveyed with a G-M meter until a location exceeding release criteria is found or the item is 100 percent surveyed, whichever occurs first. The term 100 percent coverage implies the literal definition for smaller equipment but only concerns critical areas or measurement grid points of extremely large equipment. Only five percent of an equipment population, but at least ten items will be surveyed, or the entire population if there are fewer than ten items in the population.

Specific populations to be surveyed for each building are detailed in the following sections. The descriptive text indicates structural and historical characteristics relevant to segregating the initial populations. The accompanying table in each subsection lists the initial populations. The explanatory text following each table covers special cases or exceptions-to-the-rule regarding population segregation.

Equipment and structural material to be tested is listed in the following text. However, some population segregation will be made in the field just prior to measurements. Further population segregation will be required pending results of the detailed equipment inventory.

4.2.1.1 Building 101-Feed Preparation and Sampling Plant

This facility was designed to process approximately 75 tons per day of low assay ore concentrates. The plant consisted of equipment and facilities for drying, grinding, screening, blending and sampling of both wet and dry ore concentrates and process residues. The incoming ore concentrates and residues were stored in drums on a 250 ft. X 300 ft. storage pad on the northern side of the building. Concrete pads also exist on the other three sides of this building. The building is 100 ft. X 120 ft. with a 30 ft. X 30 ft. annex, and varies from one to six operating levels in height. The overall height of the building is 100 ft.

This building has been gutted (Section 2.2) and so no process equipment remains except the calciner. Other equipment present includes a personnel elevator and protective screen enclosing the elevator shaft, a portable fan, two wooden tables and two wooden chairs.

A radiological characterization has been performed for this building by a previous contractor of the DA (Reference 9). The results of the study indicated that the structure and/or materials within this building are radiologically contaminated in excess of residual contamination guidelines. Additional data are not needed as part of the remedial investigation; therefore no additional measurements or samples will be collected on the building interior or exterior. Section 1.1.2 includes a better description of contamination levels.

No reliable data exists for the concrete pads surrounding Building 101. In regard to the ore storage pad located on the north side of Building 101, the portion beneath structures 109 and 110 will be included with the survey of these two structures. The remaining concrete pad areas around Building 101 will require 30 exploratory measurements. Refer to the summary table for an itemization of these populations.

Summary Table - Building 101

Population	No. Measurements
Concrete pad surrounding the building except the pad beneath Buildings 109 and 110	30

4.2.1.2 Area 102 - Refinery Tank Farm

The Refinery Tank Farm, Area 102, provided facilities for unloading, storing, and transferring liquid process materials required in the refinery operation that were supplied or handled in tank car or tank truck quantities. This tank farm is divided into Area 102A and Area 102B. Other facilities that were installed in this area were unloading docks, transfer pumps, and drum-filling equipment.

Tank Farm 102A, located near the north end of the site on the east side of the main site railroad tracks, contained four nitric acid tanks, two caustic soda tanks, one sulfuric acid tank, one hexane tank, and one ether tank. Tank Farm 102B contained three nitric acid tanks and was located on the west side of the main site railroad tracks directly across from Area 102B.

The gross ground area covered by Tank Farms 102A and 102B is 9990 square feet and 2200 square feet, respectively. There are no buildings in either area. All equipment was located in the open on concrete saddle pedestals surrounded by concrete dikes with earth bottoms for the acid tanks and concrete floor for the ether and hexane tanks.

The concrete pedestals and dikes remain. No piping remains; however, much of the scaffolding used to support transfer lines, catwalks, and other equipment is still present. The electric control boxes of the transfer equipment are still in place. Also remaining is a seriously rusted 4500-gallon tank lying on a concrete pad and a 25,000-gallon steel silo tank on a concrete base (with no dike). One measurement will be taken on the interior of the drain valve on each tank to determine if the tanks are contaminated.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 102

Population	No. Measurements
Concrete dikes and pedestals	30
Scaffolding/control boxes	30
4500-gallon rusted tank--drain valve[a]	one
4500-gallon rusted tank--exterior	30
25000-gallon silo tank--drain valve[a]	one
25000-gallon silo tank--exterior	30

a) Fill point included if different than drain valve.

4.2.1.3 Building 103 - Digestion and Denitration

Refinery Building 103 is composed of three major sections, namely the northern digestion section, the middle denitration section and the office section. In the first section sampled ore concentrates were digested and transferred as a slurry to Refinery Building 105 where the uranium solution was purified by solvent extraction. The second section of Refinery Building 103 then received the purified uranium nitrate solution and denitrated it to yield the refinery product, uranium trioxide. The third section housed office space for building personnel.

Based on previous data (Reference 9) and recent measurements, this building is moderately contaminated in the process area and lightly contaminated in the office area. The contamination is due to thorium as well as uranium (Reference 9). Contamination is present in all areas of the process section and is uniform within rooms or bays. The contamination in the office area is generally confined to the floor and is uniform throughout the office area. Since the majority of this building is contaminated in excess of residual contamination guidelines, no additional measurements or samples will be collected.

4.2.1.4 Building 104 - Lime Storage

This structure stored and distributed lime for acidity neutralization of raffinate solution. This facility delivered a lime slurry to raffinate concentrator tanks where the lime was mixed with the raffinate solution. The resultant slurry was transferred to the raffinate storage pits.

This structure consists of three sections stacked on each other. The entire structure rises about 50 feet above grade. The bottom section is a prefabricated steel housing with a poured concrete floor. The bottom section houses assorted piping, a pump and motor, a large metal bin, and electrical and mechanical instrumentation. The middle section of this structure is a large steel hopper about 20 feet high and about 10 feet in diameter. The hopper has a cone-shaped bottom. A prefabricated steel shed sits above the hopper. The upper shed has dimensions of 10 ft. X 10 ft. X 12 ft. high.

Previous data (Reference 9) indicate minimal to lack of contamination of the lower structure and the exterior of equipment inside. No data is available regarding contamination of the hopper or upper shed.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 104

Population	No. Measurements
Lower shed	
floor	30
interior walls and ceiling	30
structural steel	30
equipment	scan
Upper shed	
floor	30
interior walls and ceiling	30
structural steel	30
equipment	scan
Lime storage hopper interior	2
Exterior of sheds and hopper (including hopper support system)	
N-facing sides	30
S-facing sides	30
E-facing sides	30
W-facing sides	30
Roof of upper and lower sheds	30

4.2.1.5 Building 105-TBP and Ether Extraction

The extraction facilities were designed to remove uranium from the digest slurry received from the digestion section of the Digestion and Denitration Building (Building 103) and return the uranium as purified uranyl nitrate solution to the denitration section of Building 103. The process called for a two-stage solvent extraction operation in which TBP-hexane is used as the first stage solvent and diethyl ether as the second stage solvent. Early operation indicated a high degree of recovery with the first stage extraction system. As a consequence, while the construction of the ether section of the extraction building was completed, it was not put into operation.

The impurities contained in the digest slurry are concentrated and removed as raffinate from the TBP-hexane extractors in the form of an acid slurry. This slurry is transferred to the raffinate neutralization system prior to disposal to residue pits.

A radiological characterization has been performed for this building by a previous contractor of the DA (Reference 9). The results of the study indicated that the structure and/or materials within this building are radiologically contaminated in excess of residual contamination criteria. Additional data are not needed as part of the remedial investigation; therefore no additional measurements or samples will be collected.

4.2.1.6 Building 106 - Refinery Proof Sampler

This building is associated with the WSCP process sewer system. It served as a sampling station for the process stream wastes from the WSCP refinery area. The process stream wastes contained large quantities of manufacturing wastes including chemicals and small amounts of radioactive material highly diluted with water.

This proof sampling station consists of a concrete structure and flume below ground covered by a prefabricated steel housing. The structure houses a proof sampler enclosed in a cabinet, a storage tank, instrumentation, and an electric heater. The concrete structure below grade houses the flume, flow orifices, pumps, and auxiliary instrumentation. The steel building is 12 ft. X 12 ft. X 14 ft. high. The below grade structure 12 ft. X 12 ft. X 10 ft. deep.

Previous data (Reference 9) and recent measurements indicate extensive, high levels of fixed radioactive contamination at some locations in the above-ground structure. Additional measurement is not necessary of items that are obviously contaminated in excess of residual contamination guidelines. Other items that do not exhibit obvious contamination will be surveyed on a case-by-case basis.

No entry was made into the below-grade section of Building 106 for health and safety reasons associated with entry of a confined space. Inventory of any equipment and the required characterization measurements must be made at the time of execution of this work plan. Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 106

Population	No. Measurements[b]
Above ground	
concrete floor	30
all interior walls and interior roof	30
all beams	30
all columns	30
N-facing exterior wall	30
S-facing exterior wall	30
E-facing exterior wall	30
W-facing exterior wall	30
exterior roof	30
each equipment item	scan
Below ground	
concrete floor	30
all interior walls and interior roof	30
each equipment item[a]	scan

a) Inventory of equipment and required characterization measurements will be made at the time of execution of this work plan.

b) Measurements required on a case-by-case basis.

4.2.1.7 Building 108 - Nitric Acid Recovery Facility

The Nitric Acid Recovery Plant was designed to recover for reuse the bulk of the nitric acid required for digestion. Nitrogen oxides from the refinery area were compressed and absorbed in water or weak nitric acid. Further reconcentration was performed, then the acids were collected and stored in the tank farm. A stack was provided for the disposal to the atmosphere of vent gases from this facility and those from both the Digestion and Denitration Plant (Building 103) and the Tank Farm (Area 102).

Previous data (Reference 9) and recent measurements indicate that the facility is heavily contaminated. The contamination is mainly concentrated in the compressor area and process piping. The contamination is almost exclusively thorium with small amounts of radium and uranium. The facility is marked as an airborne radioactivity area due to high levels of thoron (Rn-220) present in the structure. Additional data are not needed for the remedial investigation; therefore, no additional measurements or samples will be collected.

4.2.1.8 Building 109, 110 - Drum Storage

These two structures are roof-only storage sheds. They are located side-by-side on the storage pad of Building 101. All drum handling operations for Building 101 took place by forklift on this pad. Buildings 109 and 110 were used to shelter drums stored on the pad from the weather. The stored drums contained wet and dry ore concentrates and process residues.

The two sheds are open-sided steel-beam structures with sheet-metal roofs. The sheds are positioned on a large poured concrete pad. Each shed has dimensions of 40 ft. X 80 ft. for a total covered area of 6400 sq. ft. Lighting was furnished by single bulb hanging lamps. No plumbing was supplied to these structures.

The types of equipment present at this structure include assorted small metal sheds (4 ft. X 6 ft. X 6 ft. high), about a dozen gas cylinders, a piece of rolled chain-link fence and a small amount of miscellaneous debris. None of the equipment or structural material is known to be contaminated. The metal sheds and cylinders are not suspected to be contaminated based on recent measurements.

Refer to the summary table for itemization of structural and equipment populations. The concrete pad underneath the two sheds will be considered a single population because similar contamination characteristics are expected. Note that the sheds are surrounded by a much larger concrete pad area. The survey of this surrounding concrete pad area is described in Section 4.2.1.1. The structural steel beams of the two sheds will be considered the same population as the interior roofing of the two sheds. A decision on the characterization measurements

Summary Table - Building 109, 110

Population	No. Measurements
Covered portion of concrete pad[a]	30
All exterior roofing of both sheds	30
All interior roofing and beams of both sheds	30
All columns	30
Hanging lamps	scan
All interior wall and interior roof of all small sheds	30
All exterior roofs of all small sheds	30
All exterior walls of all small sheds	30
All gas cylinders	scan
Rolled fence	scan

a) Remainder of pad included with Building 101 (Section 4.2.1.1) required on the miscellaneous debris will be made after the equipment inventory is completed.

4.2.1.9 Building 201 - Green Salt Plant

The Green Salt Plant was designed to convert uranium trioxide ($UO3$ or orange oxide), the product of the refinery, to uranium tetrafluoride (UF_4, or green salt). Orange oxide was received from Refinery Building 103 in portable hoppers that were elevated into charging position at the green salt plant by a bridge crane. The oxide was fed to a reduction reactor where the uranium trioxide was reduced at an elevated temperature to uranium dioxide (UO_2 or brown oxide) with hydrogen gas. The uranium dioxide was then converted to uranium tetrafluoride by contacting it countercurrently at high temperature with hydrogen fluoride (HF) gas in three hydrofluorination reactors operating in series. The Green Salt Plant is a multi-story building, approximately 74 feet high, consisting of five floor levels.

A radiological characterization has been performed for this building by a previous contractor of the DOE (reference 8). The results of the study indicated that the structure and/or materials within this building are radiologically contaminated in excess of DOE residual contamination guidelines. Additional data are not needed as part of the remedial investigation; therefore, no additional measurements or samples will be collected.

4.2.1.10 Area 202 - Green Salt Tank Farm

The Green Salt Tank Farm is divided into three sections: the anhydrous hydrofluoric acid section, the 70 percent hydrofluoric acid section, and the anhydrous ammonia section. The Green Salt Tank Farm provided for tank car unloading and storage of anhydrous hydrofluoric acid and anhydrous ammonia, both utilized in the Green Salt Plant (Building 201). In addition, storage and tank-car-loading facilities are installed for the 70 percent hydrofluoric acid recovered in the green salt process.

The anhydrous hydrofluoric acid tanks are located within an insulated enclosure. Other tanks are not housed, but each group of tanks is located in a concrete-diked area. Unloading pumps for the anhydrous hydrofluoric acid and a loading pump for 70 percent hydrofluoric acid are installed. A compressor house is provided for the ammonia unloading compressor.

The total diked area is 8,000 square feet of which 3,080 square feet are under roof. The building housing the anhydrous hydrofluoric acid has a structural steel frame with insulated asbestos-cement wall panels. The roof is a poured gypsum deck covered with rigid insulation and built-up roofing. A corrugated translucent cantilevered roof extends over scale beams on the east side of the building. A concrete curb encloses the building. A steel liner covers the floor and is brought up over the curb.

An asphalt plank is installed on the section of the roof used for walkways and provides access to tank valves. Tank nozzles extend through the roof. An observation penthouse of similar construction to that of the building is provided at the southwest corner.

Steel steps and handrailings are located on the east and west sides of Building 202. Both stairways provide access to the building roof. A steel stairway with handrailing leads from the building roof to a steel walkway between Buildings 202 and 201. Other equipment in the hydrofluoric acid tank building consists of an emergency ventilation (emergency exhaust) system, a cooling system, safety showers and eyewash fountains. Also, carbon steel piping for acid, steam, water, air, and nitrogen and copper pipe and tubing for the cooling system remain inside and outside the building. Five carbon steel tanks (eight-foot diameter, 40 feet long) mounted on beam scales and pumps for loading and transfer of acid remain in the building.

The 70 percent hydrofluoric acid tanks are enclosed by a common dike. A grating walkway provides access to all nozzles. The grating for the platforms and walkways is aluminum. A corrugated translucent cantilevered roof is extended over scale beams on the east side of the tanks.

Associated with the 70 percent hydrofluoric acid are three carbon steel tanks (eight feet diameter, 40 feet long) mounted on beam scales. External water spray system for cooling, pumps for acid transfer, structural steel support for the piping, and the acid, steam, water, air and nitrogen piping remain in the area.

The ammonia compressor house also has a structural steel frame with insulated asbestos cement siding. It has a flat roof of gypsum deck, covered with rigid insulation and built-up roofing. The building has a curbed concrete floor. The compressor, electric power boxes and carbon steel piping remain in and around the structure.

The ammonia storage tanks were enclosed by a common dike. A walkway was provided above the ammonia tanks to give access to tank nozzles. These tanks and walkway have been removed. The dike structure is still present.

Refer to the summary table for an itemization of structural and equipment populations. Structural steel beams and columns are flush with the interior and exterior walls of the anhydrous hydrofluoric acid building. For this reason the interior-facing and exterior-facing sides of these structural members are considered separate populations. The east exterior wall of the anydrous hydrofluoric acid building, the east wall that supports the corrugated translucent cantilevered roof over the scale beams, the east wall of the penthouse and the east wall of the ammonia compressor house will share 30 exploratory measurements. Similarly, the exterior roof of the anhydrous hydrofluoric acid building, the two cantilevered roofs, the exterior roof of the compressor and the penthouse roof will share 30 exploratory measurements. All metal grating steps, metal grating catwalk floors and metal grating above tanks will share 30 exploratory measurements made on the upper surfaces. Measurements on the lower surfaces of grating are unnecessary. All handrailings associated with stairways, catwalks and gratings will share 30 exploratory measurements. Each separate pipeline will be cut at a low point and one measurement will be made of the pipe interior at each cut. The north-facing and south-facing sides of the structural steel and piping of the walkway between Buildings 201 and 202 will each require 30 exploratory measurements.

Summary Table - Building 202

Populations	No. Measurements
Anhydrous HF Section	
structural steel beams interior	30
structural steel columns interior	30
structural steel beams exterior	30
structural steel columns exterior	30
interior walls and interior roof	30
all N-facing exterior walls	30
all S-facing exterior walls	30
all E-facing exterior walls/underside of all corrugated translucent canti-levered roof, east side of wall associated with cantilevered roof at 70 percent HF section	30
all W-facing exterior walls/west side wall associated with cantilevered roof at 70 percent HF section	30
all exterior roof/upper side of all corrugated translucent cantilevered roof/asphalt walkway plank	30
interior steel floor liner (top only)	30
tank nozzles	scan

Summary Table - Building 202 (cont.)

Population	No. Measurements
Anhydrous HF Section (cont.)	
penthouse	
interior walls and interior roof	30
interior floor	30
emergency ventilation system	scan
cooling system	scan
safety showers & eyewash fountains	scan
exterior surface of all interior carbon steel piping	30
exterior surface of all interior copper pipe and tubing	30
all carbon steel tanks, interior pumps, interior scales	30
70 Percent HF Storage Tanks	
exterior of all carbon steel HF tanks and associated beam scales, overhead piping, structural steel supports	30
Anhydrous Ammonia Section	
compressor house	
all interior walls and interior roof	30
interior floor	30
interior equipment	scan

Summary Table - Building 202 (cont.)

Population	No. Measurements
Other	
all concrete diking and curbing	30
all stairway steps, walkway floors and grating	30
all handrailing	30
north-facing structural steel and piping of walkway between Buildings 201 and 202	30
exterior surface of each separate pipeline	number depends on inventory results
south-facing structural steel and piping of walkway between Buildings 201 and 202	30

4.2.1.11 Building 301 - Metals Plant

The Metals Plant was designed to convert uranium tetrafluoride (UF_4) to metal as one of the main units in the feed material preparation chain. The conversion is accomplished by a batch process, involving a thermite-type reduction of the uranium tetrafluoride with magnesium to uranium metal.

A radiological characterization has been performed for this building by a previous contractor of the DOE (Reference 8) and DA (Reference 9). The results of the studies indicated that the structure and/or materials within this building are radiologically contaminated in excess of the DOE residual contamination guidelines. Additional data are not needed for the remedial investigation; therefore, no additional measurements or samples will be collected.

4.2.1.12 Building 302 - Magnesium Building

The Magnesium Building serves as an auxiliary facility to the Metals Plant (Building 301). It provides facilities (1) for unloading magnesium metal chips received by rail or truck in returnable 22-gallon drums; (2) for pelletizing and storing an inventory of drums in carload lots; and (3) for processing the magnesium through a magnetic separator and repackaging it in weighed lots in 55-gallon drums for use in the metals plant. This building is isolated from other operating areas due to the fire hazards involved in storing large quantities of finely divided magnesium.

The Magnesium Building consists of a steel frame supported by concrete foundations with concrete block curtain walls and a flat built-up roof. Siding and framing are concrete block set in a metal frame. The floor of the entire building is poured concrete and is above grade at the level of a standard rail car platform. Concrete stairways lead to the first floor at various points on the building exterior. An asphalt driveway is located on the east side of the building.

There are four rooms comprising the magnesium building: the process room, the warehouse, the battery charging room and the restroom. All rooms are separated by fire-resistant wall without penetrations; i.e. no rooms are internally connected. There is also a lighted truck dock and a lighted train dock on opposite sides (east and west, respectively) of the building. Large electrical switch panels are located on the west exterior wall. The process area is 22 feet wide, 48 feet long and 30 feet high. The process equipment is arranged to permit gravity flow of material from a dumping station to a storage hopper, through a magnetic separator and sampling apparatus to a drum and filling and weighing station. Equipment is provided for heating and lighting. Additional equipment includes drums, large iron cartridges or molds, and a quantity of carbon plates in opened and unopened boxes.

The warehouse encloses 4800 square feet and is 12 feet high. This room is empty except for a cabinet, a water heater and some steam piping.

The battery charging room measures about 12 ft. X 12 ft. X 12 ft. high. It was used to charge the battery-powered forklifts. This room contains four large iron cartridges, steam piping and electrical conduit.

The restroom is about 36 square feet in area. This room includes the usual porcelain fixtures as well as an assortment of utility piping.

Refer to the summary table for an itemization of structural and equipment populations. The north wall of Building 302 has a large glass area. No measurements will be made on the glass. Building 302 will be divided into three sections: the process area and warehouse, the battery charging room and restroom, and the east and west loading docks. Each of these sections exhibits or is expected to exhibit similar contamination characteristics.

Summary Table - Building 302

Populations	No. Measurements
Process and warehouse areas	
all interior floors	30
all interior walls and interior roof	30
all steel beams	30
all steel columns	30
interior of dump station/storage hopper/ magnetic separator/drum fill station/ sampling station	30
exterior of dump station/storage hopper/ magnetic separator/drum fill station/ sampling station	30
drums	scan
carbon plates	scan
all large cartridges	30
light fixtures, heating units	scan
cabinet, water heater, steam piping	scan
Battery charging and restroom	
all interior floors	30
all interior walls and interior roof	30
all steel beams	30
all steel columns	30
all large cartridges	30

Summary Table - Building 302 (cont.)

Populations	No. Measurements
Battery charging and restroom (Cont.)	
steam and utility piping /electrical conduit	30
usual porcelain fixtures	scan
Truck and train docks	
all floors and ramp	30
light fixtures	scan
electrical switch panels	scan
Other	
all concrete stairs	30
all handrailing	30
asphalt drive	30
all N-facing exterior walls	30
all S-facing exterior walls	30
all E-facing exterior walls	30
all W-facing exterior walls	30
all exterior roof	30

4.2.1.13 Area 303 - Chip Storage

This area is immediately east of Building 301 and is labeled the Chip Storage Area. The area was used to store drums of clean, chipped magnesium. At present this area consists of a 75 ft. X 110 ft. concrete pad, a 25 ft. X 75 ft. (about two feet high) concrete foundation structure just north of the pad, and a small pile of wood beams. No process equipment is present in this area. General observations and measurements indicate that the concrete is lightly contaminated.

Refer to the summary table for an itemization of structural and equipment populations. The wood beams will be removed prior to the survey.

Summary Table - Area 303

Population	No. Measurements
Concrete pad	30
Concrete foundation	30

4.2.1.14 Building 403

The Wet and Dry Chemistry Building (Building 403) was designed to house pilot plant equipment for performing operations similar to those carried out in the digestion, extraction, and denitration areas of the operating plant. The equipment in the building was later modified and changed as the process requirements changed. At some time during the operation of the plant the building was renamed the Scrap Plant. The facility may then have been used to process scrap materials for the recovery of uranium and return of a uranium-bearing solution to the Digestion Plant (Building 103).

In the last few years of the operation of this plant, there was an increased interest in the production of thorium (Th-232). Mallinckrodt did some work in this area, and many of the facilities in Building 403 formerly used for uranium production were converted for thorium production. The building was partially cleaned and decontaminated by removing visible contamination; then the plant was shut down. The only section of the building that has not been partially decontaminated is the stack and the attached blower.

Bechtel National Inc. did a survey of the building and the equipment in March of 1986. The measurements made in the building by Bechtel provided adequate and reliable data which showed that the building is radiologically contaminated in excess of the DOE's residual contamination criteria. The data collected were adequate to show the extent and type of contamination present in most areas of the building. The isotopes present are uranium and thorium. The data from this study are summarized in Section 2.2.1.3. Additional data collection is not necessary as part of this remedial investigation; therefore, no additional measurements or samples will be collected.

4.2.1.15 Building 404

The Metals Pilot Plant (Building 404) houses the metallurgical pilot plant and includes other equipment such as blenders, jolters, breakout equipment, reduction furnaces, vacuum casting equipment and a small ceramics laboratory. Bechtel National made measurements in the building in the spring of 1986. The equipment and surfaces were surveyed and the results of the survey can be found in Section 2.2.1.3. Although the results of the study indicated that the structure and/or materials within this building may not be radiologically contaminated in excess of the DOE's residual contamination criteria, recent PMC measurements indicate widespread contamination. Additional data are not necessary for the remedial investigation; therefore no additional measurements or samples will be collected.

4.2.1.16 Building 405A

Building 405A is an auxiliary support building for the pilot plants (403 and 404). The building was used for storage of spare pilot plant equipment. It is located between Buildings 403 and 404. The interior walls, floor and equipment of the building have been characterized by Bechtel National Inc. The report which discusses the results is summarized in an earlier section (2.2.1.3). The results of the study indicated that the structure and/or materials within this building are radiologically contaminated in excess of residual contamination guidelines. Additional data are not needed for the remedial investigation; therefore, no additional measurements or samples will be collected.

4.2.1.17 Building 405B

Area 405B is a concrete pad where the dust collectors and a vacuum cleaning system for buildings 403 and 404 are located. It has three Mikro dust collector units and a Hoffman vacuum unit. The dust collector units were moved here from a uranium processing facility in St. Louis. The dust collectors had filling stations where the uranium-bearing dust was removed from each unit and put in barrels. This material was then returned to the process area. Although this system served both pilot plants, most of the ducts leading into the collectors originated from the three dust collection systems in Building 404. At the present time there are no connections between the dust collectors and Building 403, but there are numerous ducts coming out of Building 403 that could have been connected to the dust collectors at some point in time.

This area has been characterized by Bechtel National during March and April of 1986. The data collected by Bechtel are adequate to outline the extent of contamination and type of contamination present in area 405B. The different measurements taken are summarized in an earlier section (2.2.1.3). The results of the study indicated that the structure and/or materials within this building are radiologically contaminated in excess of residual contamination criteria. Additional data are not needed for the remedial investigation; therefore no additional measurements or samples will be collected.

4.2.1.18 Building 406

This warehouse is a 194 ft. X 78 ft. cinderblock building divided into five interconnecting areas which contain 15,132 square feet of floor area. It includes loading-dock facilities for both truck and railroad shipments; storage areas for dry chemicals, special uranium feed materials and miscellaneous materials; offices; and locker and utility rooms (Reference 11). Some concrete floor areas were either chipped out and repoured or covered with a dense epoxy paint during attempted decontamination.

Moderately contaminated areas (10 percent) are generally confined to the areas around miscellaneous pumps in the miscellaneous storage room and the concrete pad and loading dock outside the building (Reference 9). The building is currently used by the WSSRAP Project Management Contractor for storage of radioactive trash. The drum material storage area is currently empty except for two ladders and some lockers. The dry chemical storage area now contains numerous barrels of highly contaminated materials. In addition there are two instrument shelters, fire equipment, pallets, metal blocks, and lighting fixtures. There are several patches of treated floor in front of the north wall of the room. The miscellaneous storage area contains numerous electric motors, two drums (to be removed prior to the survey), a ladder and several light fixtures. Room 102 is the trash storage area. Rooms 105 and 108 are empty. On the east side of the building are a loading dock and scale house. The west side loading dock has several manholes and a scale.

Refer to the summary table for an itemization of structural and equipment populations. The three storage areas will be treated as different populations because of their uses and decontamination efforts. Rooms 102, 105, 108, utility room and the restroom will be considered in the same population because all are expected to exhibit similar contamination characteristics.

Summary Table--Building 406

Population	No. Measurements
Drum material storage area	
structural steel beams	30
structural steel columns	30
ladders	scan
lockers	scan
walls and ceiling	30
floor	30
Dry chemical storage area	
structural steel beams	30
structural steel columns	30
floor	30
walls and ceiling	30
metal blocks	scan
instrument shelters	scan
other equipment	scan
Miscellaneous storage area	
motors	scan
light fixtures	scan
ladder	scan
walls and ceiling	30
floor	30
heaters	scan

Summary Table--Building 406 (cont.)

Population	No. Measurements
Room 102, 105, 108, utility room, and restroom	
floor	30
walls and ceiling	30
heater (restroom)	scan
East and west loading docks	
floor	30
ceiling and walls	30
scale	scan
manholes	scan
Exterior roof	30
Exterior N-facing walls	30
Exterior S-facing walls	30
Exterior W-facing walls	30
Exterior E-facing walls	30

4.2.1.19 Building 407 - Laboratory Building

Building 407, the laboratory, is located near the main plant entrance on the east side of the building site. It has a gross area of 53,850 square feet. The building is a one-story structure, consisting of a structural steel frame with concrete block exterior walls. The roof is made of corrugated metal and a light-weight concrete roof and deck, topped with rigid insulation and built-up roofing. The floor-to-roof height is nineteen feet with a suspended ceiling nine feet above the floor. Fire walls of masonry construction divide the building into four sections.

Building 407 contains a control laboratory, chemical development laboratories, library and offices. The building has two penthouses with 13-foot-high roofs that house the electrical substation and heating and cooling equipment. The building had two dust collection systems, one on the roof and one located on the south side of the building.

Some areas of the building are contaminated according to previous studies (references 5 and 9). The areas that are most contaminated are the countertops and fume hoods in lab areas. Some drains also show elevated contamination levels. The office area and the library are free of contamination. Previous data collected is not well documented; therefore, this building must be resurveyed with the exception of areas known to be highly contaminated. If initial measurements on a survey population show that it is obviously contaminated above residual contamination criteria, no further measures will be needed.

For the purpose of characterization the building will be divided into 26 different sections, based on the level of activity and type of work conducted in a given area.

Generally, all cabinets and drawers that are sealed will be opened. All contents will be emptied out and surveyed in accordance with guidelines in Sections 4.1.1 and 4.2.1. All glassware and other similar small items in the drawers and cabinets will not be surveyed. They will be treated as contaminated and disposed of accordingly.

All fume hoods that are not obviously contaminated in excess of DOE residual contamination criteria will be treated as a separate population. All hoods will be opened and emptied before they are surveyed. All equipment retrieved from the hood will be treated in accordance with the guidelines in Sections 4.1.1 and 4.2.1. Care will be taken when dealing with perchloric acid fume hoods because of the hazard of detonating perchlorate which may be present. All hoods such as the large walk-in and the small walk-in will be treated as a single population. The distillation hoods will be treated as a single population.

All the dust collection hoods, tables and vents within a given section will be grouped together as one population. Refer to the summary table for an itemization of structural and equipment populations.

Section 1--Office Area

This area is located in the southwest corner of the building. It is assumed to be uncontaminated. It is comprised of rooms 1-15. This area is structurally intact. The partition walls between offices are mainly glass and wood panels while the exterior walls of the building are insulated with styrofoam panels. Room 13 and the northwest corner of room 15 have numerous pieces of office furniture.

Section 2

This area consists of five rooms or areas: rooms 16, 21, 22, 23 and the spectrograph laboratory passage. All these rooms are empty except for one or two items of furniture and they are suspected to be uncontaminated. For the purpose of the survey they can be all grouped together in a single population. In the dark room (room 21) there are a sink, floor drains, counter, and a compressor. Room 22 has two tables: a drafting table and a large table holding the spectrograph.

Section 3

This area is made up of rooms 24, 25 and 26. All the rooms are laboratories and have hoods with the potential for contamination. Floor drains, sinks and countertops, cabinets and drawers are present. The initial survey indicated that the southwest corner in room 25 as well as the sink in room 26 may be contaminated above residual contamination criteria.

Section 4--X-ray Area

This area is made up of rooms 27, 28, 29, 30 and 31. These rooms made up the X-ray spectrography area. Most of the area is suspected of being uncontaminated. Countertops, cabinets, shelves and drawers are present in each room. There are a dryer and compressor in room 37, compressor and lead safe in room 27 and transformers in room 29.

Section 5--Room 34

This room is stacked from the floor to the ceiling with all kinds of equipment which will have to be removed from the room prior to the survey. The contamination level in general is suspected of being low.

Section 6--Laboratory Service Room

This room was used to supply glassware to the different labs. It consists of rows of storage racks and a long counter with drawers and cabinets. Some of the shelves still have glassware on them.

Section 7--Sample Storage Vault (Room 39)

This room was utilized for the storage of uranium ore before it was tested in the lab. It contains metal shelves. The floor and ceiling are both made of concrete. Lighting is incandescent. The area is suspected of exhibiting low or no contamination.

Section 8--Dish Washing (Room 37)

This room was used for washing lab glassware. The preliminary survey indicates that the countertops show moderate to high contamination, probably in excess of residual contamination criteria. A sink, floor drains, and a dust collector are present.

Section 9--Rooms 44, 45, 46, 66, 67, 69, 70, 73 and 74

These rooms are empty offices. The initial survey indicates there is no or very low contamination. All the rooms will be grouped together for the survey.

Section 10--Rooms 47, 48, 49, 50 and 51

These rooms were laboratory space or office space. They all exhibit low contamination and so can be grouped together. Rooms 47 and 51 have hoods. Other equipment in the room are counters with drawers and cabinets.

Section 11--Fluorometry Lab (Room 53)

This room is surveyed separately because of its location. The room has one hood and counters with drawers.

Section 12--Rooms 56-63

These rooms are located in the southwest corner of the building. They are all labs. The equipment in most of the areas is the same, i.e. counters, fume hoods, cabinets and shelves. The contamination in the whole area appears to be low to moderate. There are several dust collectors and there is an air conditioner in room 56A.

Section 13--Room 64

Room 64 is now identified as the Thermo-balance Room (as built drawing shows this room as the Boron Lab). This room contains a thermo-balance, one hood, one dust collector, counters and some small equipment. It appears to be moderately contaminated.

Section 14--Rooms 71 - 72

This section is made of up rooms 71 (Counting Room) and 72 (Tracer Lab). Room 71 contains several tables. Room 72 contains one hood, three sinks, one cabinet and one counter. The drawers hold glassware.

Section 15--Room 75

Room 75 (Ether Lab) contains vapor-proof lights, two hoods and two counters. Only the vent of a dust collector remains. Drawers are mostly empty; there is some glassware. There are hot spots on the counters.

Section 16--Rooms 76 - 77

For the purpose of the survey rooms 76 and 77 will be grouped together. Room 76 (Balance room) contains two lab tables. Room 77 (Prep. Room) contains a dust collector table.

Section 17--Room 78

Room 78 (Accountability Lab) contains several perchloric acid hoods and lab tables. Most drawers contain glassware. The southeast corner of the room shows an elevated level of contamination.

Section 18--Rooms 81-85

All the rooms exhibit low to moderate levels of contamination. Counters and drawers are present in each room. Equipment items are the electron microscope in Room 81, the control panel in Room 83, the spectrograph and assorted scientific apparatus in Room 85 and compressor in Room 82.

Section 19--Rooms 86 and 87

These two rooms are adjacent to each other with a connecting door between them, and exhibit about the same level of contamination. There are counter tops, sealed cabinets and areas of marked elevated contamination. Equipment items are assorted scientific apparatus in room 86, and two process hoods, two walk-in hoods, an electric furnace, and transformers in room 87.

Section 20--Rooms 102 and 103

These rooms are the grinding and polishing rooms. They have numerous dust collectors and polishing tables. The polishing tables will be treated in the same manner as dust collection tables.

Section 21--Rooms 98-101 and 104

This section is made up of rooms 98-101 and room 104. These rooms have been grouped together since all the rooms exhibit the same level of contamination and are in the proximity with each other.

Section 22--Rooms 92, 93 and 95

These rooms are located in the northeast corner of the building. They are assumed to be clean and uncontaminated (RETA 1978, Army

1974). The rooms were the library, reading room and conference room. The library has a few bookcases, a few file cabinets and a wood model of the chemical plant. The conference room has numerous items of furniture.

Section 23--Restrooms

This section includes rooms 32, 33, 80 and 94. Room 80 has a shower facility and room 32 is a vestibule between the women's locker room and restroom.

Section 24--Corridors, Passageways and Change Vestibules

This section includes areas 105-113. All these areas are empty except for some shelving located in the north corridor. Ceiling measurements will be made near any vents from the rooms. There are electrical panels and pipes on the walls, as well as occasional cabinets, shelves and tables.

Section 25--First Floor Roof

On the roof there are two equipment penthouses, exhaust vents and blower motors for all the hoods, extensive piping, ductwork and gravel. There are two types of fume hood exhausts: perchloric acid and non-perchloric acid. Perchloric acid exhausts are made of stainless steel and so can be differentiated from the other exhausts.

Section 26--Rooms 38, 40, 41, 42, 52, 65, 68, 89, 90 and 97

All these rooms have some items that are contaminated in excess of residual contamination criteria (reference 5, reference 9). A quick scan of these rooms will be made to verify which items are obviously contaminated in excess of residual contamination guidelines. Items not exhibiting high levels of contamination will be surveyed on a case-by-case basis.

Summary Table - Building 407

Population	No. Measurements
Section 1	
floor	30
partition walls and ceiling	30
furniture	scan
Section 2	
floor	30
walls and ceiling	30
equipment	scan
drains	scan
Section 3	
walls and ceiling	30
floor	30
sinks	scan
counters	scan
drawers and cabinets	scan

Summary Table - Building 407

Population	No. Measurements
Section 4--X-Ray Area	
walls and ceiling	30
floor	30
cabinets and drawers	scan
shelves	scan
equipment	scan
Section 5--Room 34	
walls and ceiling	30
floor	30
lockers and benches	scan
equipment	scan
Section 6--Laboratory Service Room	
walls and ceiling	30
floor	30
shelves	scan
countertops	scan
cabinets and drawers	scan

Summary Table - Building 407

Population	No. Measurements
Section 7	
walls and ceiling	30
floor	30
shelves	scan
Section 8	
walls and ceiling	30
floor	30
countertop and sink	scan
drains	scan
dust collector	scan
Section 9	
walls and ceiling	30
floor	30
Section 10	
walls and ceiling	30
floor	30

Population	No. Measurements
Section 11	
walls and ceiling	30
floor	30
Section 12	
walls and ceiling	30
floor	30
Section 13	
walls and ceiling	30
floor	30
balance	scan
Section 14	
walls and ceiling	30
floor	30
Section 15	
walls and ceiling	30
floor	30

Summary Table - Building 407

Population	No. Measurements
Section 16	
walls and ceiling	30
floor	30
Section 17	
walls and ceiling	30
floor	30
table in southeast corner	scan
Section 18	
walls and ceilings	30
floors	30
Section 19	
walls and ceilings	30
floor	30
Section 20	
walls and ceilings	30
floor	30

Population	No. Measurements
Section 21	
walls and ceilings	30
floor	30
Section 22	
walls and ceilings	30
floor	30
Section 23 Restrooms	
walls and ceiling (rooms 33, 80)	30
floor	30
walls and ceiling (rooms 32, 94)	30
floor	30
Section 24	
tables	scan
walls and ceilings	30
floor	30
electrical panels	scan
pipes	scan
cabinets	scan
shelves	scan

Summary Table - Building 407

Population	No. Measurements
Section 25	
hood exhausts	scan
piping	scan
ductwork	scan
electrical penthouse	30
boiler penthouse	30
roof (eastern section and remainder)	30
Section 26	
survey on a case-by-case basis	
Exterior roof	30
Exterior N-facing walls	30
Exterior S-facing walls	30
Exterior W-facing walls	30
Exterior E-facing walls	30

4.2.1.20 Building 408

This Major Support Building is a 361 ft. X 193 ft. one-story structure with cinderblock exterior walls containing 70,700 square feet of gross floor area. It formerly contained a central shop, office area, garage, millwright shop, welding shop, piping shop, turners shop, utilities shop, machine shop area, carpenter shop, electrical shop, instrument shop and storage, a receiving and shipping area, a decontamination room, a large storage area and an automotive maintenance shop. The floor-to-roof height is 18 feet. The building is a structural steel frame building with 24 ft. X 36 ft. bays. A masonry wall in the north-south direction divides the building in half. The roof is supported by exposed steel beams and girders. Much equipment and furniture remains from AEC operations, ranging from loose nuts and bolts to chairs and workbenches to some large drill presses.

A preliminary radiological survey of this building was conducted in July 1987 by the current PMC. The data in this report are valid, but were used to evaluate whether the building could be used for storage and rather than to determine if the building could be released for unrestricted use. The survey revealed negligible contamination of the floors and walls; however, contaminated and discrete "hot spots" resulting from previous operations were located throughout the building. Much of the equipment that was moved into the building is significantly contaminated. The data generated by the survey for the walls and the floors were not taken in accordance with procedures in Section 4.1.1, and the survey must be repeated; however, the data for the equipment surveyed was obtained using procedures outlined in Section 4.1.1 and the equipment will not be resurveyed as part of this work plan. The equipment which was surveyed is tagged.

The following building description begins on the north end of the building and progresses counter-clockwise around the building, terminating at the decontamination room on the north end of the building.

Room 121, the truck vestibule, contains a cabinet, a shelf and miscellaneous supplies.

Room 112 was formerly a machine shop. Several large pieces of equipment remain, i.e. two drill presses, a lathe, and two milling machines, as well as work benches, cabinets, shelves and miscellaneous small items. There are two offices, not shown on the as-built drawings, which are entered from the north side of Room 112. Office 1 is empty; office 2 contains a desk, several shelves and small office equipment.

Rooms 132 and 133 are offices. Room 132 contains two blackboards and a partition; 133 contains a couch, chairs and an air conditioner.

Room 111 is the millwright shop. Contents include an electric forklift, large machine tools, a compressor, a large electric motor and junk. A small office (room 131) at the east edge of this room contains a desk, fan, insulation debris and junk.

The main hallway on this (i.e. west) side of the building contains metal shelving.

Room 110 (Welding Shop) contains equipment, i.e., a steel worker, six dust collectors, drill, a room heater and a highly contaminated tank in the southeast corner.

The office (Room 130) has chairs, file cabinet and table.

Room 109 was a piping shop with a small office (Room 129). This room contains an electrical switch cabinet, a locked shed the contents of which are unknown, metal lockers and shelving, two large work tables with drawers, several other steel tables, a truck ladder, two large valves and a pile of valve handles. The tables are contaminated.

Room 108, formerly the Tinners' Shop, now contains a large amount of furniture and equipment. Its contents are an electric cart, a payloader, a crane, two power brakes, steel angle framing, three work tables, lockers, steel shelving and cabinets, a room heater, drafting table, desk, seven chairs, two wooden tables and two doors.

Rooms 104, 105, 106, and 107 comprise an integrated area. This area contains metal piping, metal work tables, cabinets, and shelves, a work bench known to be contaminated, lockers, wooden tables and a desk, fans, battery chargers, and several toilets and other junk.

Immediately outside room 103, a structure not shown on the as-built drawings has been constructed. This structure (Room X) is a woodframe office, approximately 12 ft. X 12 ft. It contains a desk, table, blackboard and file cabinet.

Rooms 103 (Carpenter Shop) and 128 (office) are taken as a unit. Room 103 contains metal shelves, a metal cabinet, a drying oven, sawhorses, wooden work tables, hand carts, wood scrap and a grinder. There are dust collection chutes, and a network of covered floor drains that seem to be part of the dust collection system. The office contains a table and lockers.

Room 118 (Electrical Shop) contains several electric motors, a transformer, fans, spotlights, emergency lights, space heaters, and miscellaneous small electrical apparatus. There are several counters and storage shelves. The shelves are full of small parts. A small office contains a desk and chairs.

Rooms 125 and 126 are connected offices. They contain file cabinets, a desk and chairs.

Room 101 contains several metal work benches, steel shelving, and miscellaneous equipment, i.e. a scale, three liquid bath heaters and several pressure gauges.

The south truck vestibule (room 120) contains miscellaneous wire and junk.

Room 124 was a storage room. It now contains several cabinets full of small parts and equipment, a desk and miscellaneous small items.

Room 117 was formerly the auto repair shop. There are four hydraulic lifts, two chain hoists, jack, tire changer, lube station, compressor, grease guns, spray washer, a drill press, tool carts, and small miscellaneous junk. Metal shelving and work benches line the walls. There is a floor drain system and two manholes which are probably grease traps.

Room 136 was originally a smoke room and contains four benches. It now is also the foyer to an electrical equipment storage area enclosed by wire partitions. This storage area consists of rows of metal shelving filled with equipment.

Room 116 is the large storage area that comprises most of the east side of the building. This area consists of open areas with metal storage racks and shelving. The roof over this area is in poor condition. Several contaminated spots are marked on the floor in this area. Materials stored in this room include a tractor and mower, forklift, gas cylinders, freezer, sheet metal, pipe, metal siding, metal scaffolding, wire rope, lube guns, a water heater, and many small miscellaneous items.

Room 123 is on the west side of room 116. This room contains some wood shelving, two wooden tables, and an air conditioner.

Room 135 (smoke room) contains lockers. A small wood frame structure (not shown on as-built drawings) was constructed, attached to rooms 135-137 and opening into the large storage room (116). This structure contains a desk and a space heater.

Room 115 was the Receiving Dock. It now contains a scale, a space heater, barrels, concrete cylinders and gas cans.

Room 134 is a small office. It contains a desk and an air conditioner.

Room 114 is the former decontamination facility. It is equipped with an acid-resistant tile floor, (a floor drain is probably present but was not observed during the pre-survey as the floor was flooded; the presence of a drain needs to be confirmed), a walk-in hood, two exhaust ducts, a dedicated air circulation system and a stainless steel sink. Miscellaneous contents are a table, chair, ladder and small junk. The room also has a suspended ceiling.

There are several heaters suspended from the ceiling at various locations throughout the building.

The miscellaneous items will be handled in accordance with the guidelines of Sections 4.1.1 and 4.2.1.

Summary Table--Building 408

Population	No. Measurements
All Rooms[a]	
work benches	scan
cabinets and drawers	scan
shelves	scan
large equipment	scan
dust collectors	scan
floor drains and sumps	scan
heaters	scan
electric motors	scan
toilets	scan
lockers	scan
desks and tables	scan
chairs	scan
marked "hot spots"	scan
Room 121	
ceiling and walls	30
floor	30
Room 112	
ceiling and walls	30
floor	30

Summary Table--Building 408

Population	No. Measurements
Room 132-133	
walls and ceilings	30
floor	30
Room 111, 131	
walls and ceilings	30
floor	30
Main Hallway	
walls and ceiling	30
floor	30
Room 110, 130	
walls and ceiling	30
floor	30
Room 109, 129	
walls and ceiling	30
floor	30
electrical cabinet	scan

Summary Table--Building 408

Population	No. Measurements
Room 108	
walls and ceiling	30
floor	30
Rooms 104-107	
walls and ceiling	30
floor	30
Room X	
walls and ceiling	30
floor	30
Room 103, 128	
walls and ceiling	30
floor	30
Room 118	
walls and ceiling	30
floor	30

Summary Table--Building 408

Population	No. Measurements
Rooms 125-126	
walls and ceiling	30
floor	30
Room 101	
walls and ceiling	30
floor	30
Room 120	
walls and ceiling	30
floor	30
Room 124	
walls and ceiling	30
floor	30
Room 117	
walls and ceiling	30
floor	30

Population	No. Measurements
Room 136	
walls and ceiling	30
floor	30
Room 116	
walls and ceiling	30
floor	30
Room 123	
walls and ceiling	30
floor	30
Room 135	
walls and ceiling	30
floor	30
Room 115	
walls and ceiling	30
floor	30

Summary Table--Building 408

Population	No. Measurements
Room 134	
walls and ceiling	30
floor	30
Room 114	
walls and ceiling	30
floor	30
exhaust ducts	scan
air ducts	scan
walk-in hood	30
sink	scan
Restrooms	
walls, partitions, and ceilings	30
sinks	scan
toilets	scan
floor drains	scan
floor	30
All structural steel beams	30
All structural steel columns	30

Summary Table--Building 408

Population	No. Measurements
Exterior of building	
roof	30
N-facing walls	30
S-facing walls	30
E-facing walls	30
W-facing walls	30

(a) Only those items that are not tagged as previously scanned will be scanned.

4.2.1.21 Building 410

Building 410, the Services Building, is an irregularly shaped one-story structural steel frame cinderblock building with a poured concrete floor and 52,300 square feet of gross floor area. The building contained the plant security, health and safety office (including a first-aid station and x-ray facility), kitchen, dining room, contaminated laundry facility, and clean and contaminated locker rooms with shower facilities. The floor-to-roof height is 14 feet with a suspended ceiling of various heights in the kitchen, cafeteria, restrooms and the health and guard areas. The locker rooms have no suspended ceiling. The column spacing is 32 feet in the north-south direction and 26 feet in the east-west direction. A covered passageway connects directly to the administration building (east corridor).

Functionally, the building can be divided into four general areas: Medical and Health Section, Kitchen and Cafeteria, Shower and Locker Facilities, and Guard and Communications Section. For the purpose of characterization the building will be further divided into different sections according to the type of activity in a given area or according to the type and level of contamination present.

Building 410 will be divided into eleven sections: (1) guard and communications section; (2) area north of Section 1; (3) locker rooms; (4) showers, toilets and adjoining rooms and passageways; (5) boiler room; (6) the laundry room; (7) east corridor mechanical equipment rooms and south corridor; (8) kitchen and dining room areas; (9) medical facilities; (10) health physics instrumentation area; and (11) exterior roof and walls. The room numbers used for this building are the numbers found on the architectural drawings.

From previous studies (references 5 and 9) the areas of contamination have been identified. The contamination in Building 410 is confined to the shower area, laundry facility and the rooms in the northwest corner of the building around the lead vault (health physics instrumentation section). No additional measurements will be made on items that are obviously contaminated. Items that may not be contaminated will be surveyed on a case-by-case basis.

The roof of the building has deteriorated considerably with large holes in the locker room areas and the instrumentation areas. The condition of the building will impose limitations on the characterization effort. The areas under the roof breaks are covered with roofing materials and are very often under water after it rains.

Refer to the summary table for an itemization of structural and equipment populations.

Section 1--Guard and Communications Section

This area is located at the southeast corner of the building. It is currently used by the PMC as the access control point and office space. This area includes rooms 109C-121C inclusive. Structurally this area is in very good condition.

Section 2--Area North of Section 1

This area includes rooms 101C-108C and 124C and the east corridor. There are lockers and benches in rooms 108C and 102C. Room 101C has a bank of circuit breakers and electric conduits.

Section 3--Locker Rooms

This section includes rooms 105A-108A. This area is generally assumed to be clean. The ceiling in these rooms is in a state of disrepair with numerous holes. On the floor is debris that has fallen from the roof. There is about an inch of water on the floor during and after rain.

Section 4--Showers, Toilets, and Other Adjoining Rooms and Passageways

This section covers all the rooms located between rooms 108A and 105A, and between rooms 107A and 106A. This includes rooms 109A-112A, 114A, 115A, 117A-126A, 128A-133A, 135A, 141A and 142A.

Previous studies have found contamination in the showers. Due to this fact, the showers will not be surveyed. All the restrooms will be grouped together.

Section 5--Boiler Room

This room is the area where electric boilers along with the necessary electrical wiring and piping are located. There are three boilers--two large ones and a small one.

Section 6--Laundry Room

The Laundry Room was used for washing contaminated laundry used by personnel on-site. From previous studies, contamination in the form of radium has been found in the Laundry Room, but the location is not clearly defined. At the present time, the Laundry Room has three washers, one 30-inch extractor, one large washer and extractor, three dryers, a compressor, a pump and other miscellaneous equipment. The ceiling is in a state of disrepair with the floor covered with debris.

Section 7--East Corridor, South Corridor and Mechanical Equipment Room

This area covers the south corridor, the east corridor and rooms 136B and 153B. This area is generally expected to be uncontaminated. Room 153B contains two blowers, electric panels and a condenser. Room 134B has two boilers in it along with the associated piping and electrical panels.

Section 8--Kitchen & Dining Room Area

This area will be divided into two parts: the first area will be the dining room (room 149B) and dining room annex (room 140B), and the second area will be the kitchen, bake shop and serving area (rooms 147B, 146B, 135B-139B, 142B, 143B, 166B, 145B, 151B, 150B, 141B and 152B).

The area around the kitchen includes numerous small and large rooms including freezers. There are counters, shelves, exhaust hoods and other items associated with kitchen activities. From previous reports this area is probably free of any contamination.

Section 9--Medical Facilities

This area consists of several rooms that made up the medical and health facilities on-site. It includes rooms 117B-124B, the center corridor, 126B-133B, 154B and 155B. Most of these rooms are empty. The condition of the roof and floor is very poor with holes in the roof at numerous locations. Equipment and furniture is present in many of the rooms.

Section 10--Health Physics Instrumentation Area

This section occupies the northwest corner of Building 410. It is made up of rooms 101B-116B and the north corridor. Most of the area is in very poor shape structurally with large holes in the ceiling. The floor and the horizontal surfaces are covered by an inch or more of debris at many locations. Many items in this area are known to be contaminated, especially the hot box area.

The rooms still contain a lot of equipment and supplies. The hot box has a considerable amount of radioactive materials in the form of calibration sources, uranium chips, uranium fluoride powder and other miscellaneous items. The general office (room 108B) is empty except for some instrumentation racks and cabinets. Room 105B, the instrument repair room, contains a lot of equipment, mainly small items. Room 101B, the sample prep room, contains a lot of small and large equipment items. This room also has three fume hoods on the north wall; the hood in the northeast corner is a perchloric acid hood. There is a possibility of the existence of perchlorates in this hood. Most of the items in the room are small. Many items in the hot box room, 115B, are known to be contaminated.

Room 116B has a fume hood, counters and shelves. The room is potentially contaminated due to the presence of the hot box.

The supply room, 113B, is a storage room with numerous shelves. There are various items, mostly small, on the shelves. Room 112B was the fluorometry room. This room is potentially contaminated due to the type of activities in the room. Again, the small items in this room should be considered contaminated and so do not need to be surveyed. There is a fume hood. This room contains numerous samples sealed in aluminum cans and plastic containers collected and stored by a previous contractor. Some of these samples have high levels of radioactive contaminants. Before any measurements are made in the room, these samples will be removed. Room 111B and 110B are alpha counting rooms with counters and detectors mounted in racks along the walls from the floor to the ceiling. Some of the furniture in these rooms is known to be contaminated. There are small passages on either end of the rooms behind the electronic bins. Behind the main room is a small storage room. The north corridor, which runs west to east, is suspected to be contaminated (reference 5).

Section 11--Exterior Roof and Walls

All north, west, south and east facing walls will be surveyed as separate populations. The roof contains numerous exhaust ports.

Summary Table--Building 410

Population	No. Measurements
Section 1	
walls and ceiling	30
floors	30
metal ceiling framework	30
Section 2	
walls and ceiling	30
floors	30
showers--near drain	1
lockers--102C, 108C	scan
benches--102C, 108C	scan
vertical equipment--101C	scan
Section 3	
walls and ceilings	30
floors	30
columns	30
beams	30
Section 4	
walls and ceilings	30
floor	30
drains	scan

Summary Table--Building 410

Population	No. Measurements
Section 5	
boilers	scan
walls and ceiling	30
floor	30
drains	scan
beams	30
columns	30
Section 6	
survey on a case-by-case basis	
Section 7	
east and south corridor walls and ceiling	30
east and south corridor floor	30
room 153B and 134B walls and ceiling	30
room 153B blowers (exterior)	scan
room 153B and 134B floor and cement pads under boilers	30

Summary Table--Building 410

Population	No. Measurements
Section 8	
room 140B and 148B walls and ceiling	30
room 140B and 148B floor	30
kitchen complex floor	30
kitchen complex walls, ceiling	30
kitchen complex countertops, sinks, stovetops	scan
Section 9	
floor (including corridor) and 119B	30
ceiling and walls (including corridor) and 119B	30
Section 10	
survey on a case-by-case basis	
Section 11	
roof	30
exhaust ports	scan
N-facing exterior wall	30
S-facing exterior wall	30
E-facing exterior wall	30
W-facing exterior wall	30

4.2.1.22 Area 413 - Pump House and Cooling Tower

This area is made up of the Pump House (Building 413) and the adjacent cooling tower. The cooling tower is constructed of redwood lumber. This structure is built above a concrete collection basin.

Adjacent to the cooling tower is a steel frame building with corrugated asbestos and translucent plastic siding which houses the pumping facilities, the chemical treatment and electrical equipment necessary for the operation. The building has a concrete floor that is 4 feet above grade with dimensions of 29'2" x 49'8" x 23'9" high. The recirculating cooling water system supplied water to the steam plant and Buildings 103, 105, 108 and 201. The water was used for process cooling but never came in direct contact with the process materials (references 5 and 9).

The pumphouse contains two rooms. The chlorination room is located in the northwest corner of the building while the process area occupies the remainder of the building. In the chlorination room there is a steam heater and a chlorine gage. The process area contains three 150-horsepower motors, pumps, a water treatment plant and a control panel. A covered trench which contains an 18-inch main runs the entire length of the process area. Also within the pumphouse is miscellaneous equipment fixed to the walls or ceiling such as steam heaters, valves, gages, light fixtures and ventilator shafts.

Refer to the summary table for an itemization of structural and equipment populations. The exterior of the cooling tower and pumphouse are treated separately due to different construction materials. The chlorination room and process room within the pumphouse would be expected to exhibit similar contamination characteristics and will be combined as one population. The entire floor is considered a single population as well as the walls and ceiling. The walls and floor of the covered trench are considered part of the pumphouse floor.

Summary Table--Area 413

Population	No. Measurements
Exterior cooling tower	
N-facing side	30
W-facing side	30
E-facing side	30
S-facing side	30
roof	30
Pumphouse exterior	
N-facing side	30
W-facing side	30
E-facing side	30
S-facing side	30
roof	30
Pumphouse interior (both rooms)	
beams	30
columns	30
interior walls and ceiling	30
floor	30
treatment tank, influent/effluent points	2
steam heater	scan
chlorine gage	scan

Summary Table--Area 413

Population	No. Measurements
Pumphouse interior (cont.)	
three 150-horsepower motors	scan
18-inch main	scan
pumps	scan
water treatment plant	scan
control panel	scan
miscellaneous equipment	scan
Interior cooling tower	
collection basin walls and floor	30

4.2.1.23 Building 414 - Scrap Classification and Equipment Storage Facility

This minor support building is a one-story structural steel building with corrugated aluminum siding measuring 20 ft. X 60 ft. on a 150-ft. X 200-ft. storage pad. It served as a salvage shop and equipment storage space. The area was used for storage of large pieces of equipment that were not being used often and for salvage from equipment or materials that were no longer needed on the project. In later years this area was used for storing yard maintenance and other large equipment. The building is being used at present by the WSSRAP PMC as a storage and maintenance area for groundskeeping equipment and also as a storage area for new equipment and furniture.

From previous studies (references 5 and 9) the building and concrete in area 414 shows minimal or no contamination. The south storage pad was decontaminated by the Army in 1969 (Reference 5). The status of the north storage pad is unknown.

The interior of the building is divided into two sections by a wall that runs north-south. Besides such equipment as tractors and mowing equipment belonging to the PMC, the building has a heater, a blower and a cabinet for drying fire hoses. In the southwest corner of the building there is some old furniture. There are also numerous work benches along the eastern wall.

Refer to the summary table for an itemization of structural and equipment populations. The two rooms in the interior of the building are expected to exhibit similar contamination characteristics; therefore, they will not be separated into two populations.

4.2.1.24 Building 415 - Incinerator

Building 415 is the incinerator. It was used for burning trash and classified documents. It is located on the west side of Building 401. The incinerator is a brick structure with approximate dimensions of six feet (wide), seven feet (high) and ten feet (long). The brick structure is held together by a steel frame. The steel frame also supports a counterweighted steel door. There are three openings on the south face of the incinerator for fuel. The incinerator is connected to the north stack of the steam plant. The incinerator chamber is lined with fire-bricks. The approximate dimensions of the chamber are 4 ft. X 5 ft. X 5 ft.

Refer to the summary table for an itemization of structual and equipment populations.

Summary Table--Building 414

Population	No. Measurements
Building 414, exterior	
N-facing wall	30
S-facing wall	30
W-facing wall	30
E-facing wall	30
roof	30
Building 414, (both rooms)	
interior floor	30
interior walls and ceiling	30
heater and blower	scan
cabinet--firehoses	scan
miscellaneous furniture	scan
South outside concrete pad	30
North outside concrete pad	30

Summary Table - Building 415

Population	No. Measurements
Structure exterior	30
Structure interior	30
Exhaust duct	scan
Structural steel components (frame, door, counterweight,...)	scan
Surrounding pad	30

4.2.1.25 Building 417 - Paint Shop

Building 417, the Paint Shop, is part of the maintenance facilities. It is a one-story structure of steel frame and concrete block construction with a concrete floor and flat-poured gypsum concrete roof deck. The gross area of the building is 2772 square feet.

The building is divided into three sections: the general work area, the spray-painting area and the flammable material storage room. The original blueprints only show two areas; a room was added later on the east side and the spray booth was moved into it.

The grounds surrounding Building 417 show elevated radiation levels. On the north side of the building some of the gravel shows visible uranium oxide contamination. The interior of the building, except for certain areas, is relatively uncontaminated. Any of the contamination inside the building is probably a result of tracking exterior contamination to the interior. Since no radioactive materials were processed in this building, there is no reason to suspect the three sections of the building to exhibit different contamination characteristics.

All the rooms in Building 417 contain materials such as paint cans, thinners, lubricants and related equipment. All containers with chemicals present inside will be removed prior to the survey.

The general work area located in the north and west part of Building 417 was used for storage of paint cans and equipment used in the paint shop. There are numerous small and large pieces of equipment in this area. Furniture such as lockers, tables, chairs and workbenches is also present.

The equipment in the spray-painting room includes the spray-painting booth, lubricant containers, cabinets and firefighting equipment.

The flammable material storage area is a room located on the south side of the building. There are numerous barrels of lubrication oil. Other equipment such as carts and barrel stands, tables and steam heaters are also present.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table--Building 417

Population	No. Measurements
Exterior building	
N-facing side	30
S-facing side	30
E-facing side	30
W-facing side	30
roof	30
Interior building	
beams	30
floor	30
columns	30
walls and ceiling	30
furniture	scan
process equipment	scan
other miscellaneous equipment	scan

4.2.1.26 Building 426 - Water Tower

An elevated water tank, Area 426, was installed west of the building area to assure adequate pressure and supply to meet process and fire requirements. The elevated tank is ellipsoidal in shape with a capacity of 350,000 gallons and is constructed to give an elevation at the normal full-level of 175 feet above grade. The height of the structure is 186 feet above grade; it is fabricated from structural steel. A concrete valve pit associated with the tower is approximately 10 ft. X 20 ft. X 6 ft.

The tank was never used to store or handle radioactive materials. Airborne radioactive particles may have come into contact with the exterior of the structure during plant operations. The interior of the tank presently contains potable water for the county of St. Charles.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 426

Population	No. Measurements
Water tower exterior	30
All concrete	30
Valves, piping, etc...in pit	scan

4.2.1.27 Building 427 - Imhoff Tank

A primary sewage treatment plant was installed near the south boundary line of the site. It was sized to handle sewage wastes for approximately 1300 persons per day. An Imhoff tank design for sludge settling and digestion was used. A comminutor and bar screen structure was provided for handling the influent while a sludge sump structure was installed for sludge removal.

Overall dimensions of the comminutor and bar screen structure are 9 ft. X 5.4 ft. X 4.5 ft. with a volume of 220 cubic feet. Construction is of reinforced concrete with wood timber cover. The overall dimensions of the Imhoff tank are 54.7 ft. X 21.1 ft. X 26.0 ft., providing a volume of 30,000 cubic feet. The overall dimensions of the sludge sump are 8.7 ft. X 5.3 ft. X 14.0 ft. resulting in a volume of 650 cubic feet. Both the Imhoff tank and the sludge sump are also constructed of reinforced concrete.

There is no reason to suspect different contamination characteristics between the comminutor and bar screen, Imhoff tank and sludge sump. The equipment are a bar screen, valves and interior pipes or transfer lines. The sludge contained within these items is suspected to be slightly radiologically contaminated.

All sludge must be removed prior to characterization activities. Refer to the summary table for an itemization of structural and equipment populations.

Summary Table--Building 427

Population	No. Measurements
Comminutor, Imhoff tank, and sludge sump	30
Bar screen	scan
Valves	scan
Interior pipes/transfer lines	scan
Interior pipes/transfer lines, effluent/ influent points	6

4.2.1.28 Building 428 - Gas Plant

A propane gas plant was installed near the west side of the building area to supply fuel gas to the various plants for process heating. The gas plant was designed to supply a propane-air mixture at a pressure of 3 lbs per square inch gauge at the vaporizer house. Two 30,000-gallon storage tanks were provided.

The building is fabricated with an asbestos material. There are numerous transfer lines of different sizes in the building. The approximate dimensions of the structure are 12 ft. X 15 ft. X 15 ft. The two 30,000-gallon tanks are adjacent to the structure in a fenced-in area.

All exterior structural surfaces and tanks will be divided into two separate populations due to the difference of construction materials. Refer to the summary table for an itemization of structural and equipment populations.

Summary Table--Building 428

Population	No. Measurements
Building 428, exterior	
N-facing side	30
S-facing side	30
W-facing side	30
E-facing side	30
roof	30
Propane tanks (2), exterior	30
Building 428, interior	
floor	30
walls and ceiling	30
Pipes/transfer lines	scan

4.2.1.29 Building 429 - Reserve Water Facility

The reserve water facilities, Building 429, were installed adjacent to the elevated water tank, Building 426. The reserve water facilities consist of a 700,000-gallon ground storage tank and a pumphouse containing a 4,000-gallon per minute gasoline-powered water pump and an electrically driven 200 gallon per minute excess water pump. The pumphouse is a standard prefabricated steel building erected on a reinforced concrete slab and measures 28 ft. X 24 ft. X 17 ft. high. A reinforced concrete valve pit was installed under the tank having dimensions of 15.7 ft. X 12.1 ft. X 8.0 ft.

The tank was never used to store or handle radioactive materials. The exterior surface, however, may have come into contact with airborne radioactive particles released during plant operations.

Refer to the summary table for an itemization of structural and equipment population.

Summary Table - Building 429

Population	No. Measurements
Concrete floor of building	30
Concrete valve pit	30
Top exterior of water tank	30
Exterior sides of water tank	30
N-facing exterior wall of building	30
S-facing exterior wall of building	30
E-facing exterior wall of building	30
W-facing exterior wall of building	30
Exterior roof of building	30
All interior walls and interior roof of building	30
All equipment (pumps, valves, pipe, switches,...)	scan

4.2.1.30 Building 430 - Ambulance Garage

The Ambulance Garage, Building 430, was installed west of Building 410 adjacent to the medical facilities so that medical personnel could promptly respond to emergencies and other medical needs in the process plant area.

The structure consists of cinderblock walls with an aluminum corrugated ceiling and garage door. Cabinets and miscellaneous debris are present in the garage. The approximate dimensions of the garage are 20 ft. X 20 ft. X 15 ft.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 430

Population	No. Measurements
Concrete floor	30
All interior walls and interior ceiling	30
Interior exposed structural steel	30
N-facing exterior wall	30
S-facing exterior wall	30
E-facing exterior wall	30
W-facing exterior wall	30
Exterior roof	30
Debris inside structure	scan

4.2.1.31 Building 431 - Laboratory Proof Sampler

This building served as a sampling station for the process stream wastes from the WSCP laboratory. The process stream wastes consisted of large quantities of laboratory wastes containing chemicals and small amounts of radioactive material highly diluted with water.

This proof sampling station consists of a concrete structure and flume below ground covered by a prefabricated steel housing. The structure houses a proof sampler enclosed in a cabinet, a storage tank, instrumentation and an electric heater. The concrete structure below grade houses the flume, flow orifices, pumps and auxiliary instrumentation. The steel building is 12 ft. X 12 ft. X 14 ft. high. The below-grade structure has dimensions 12 ft. X 12 ft. X 13 ft. deep.

Previous data (Reference 9) indicate moderate levels of radioactive contamination in the above-ground structure. The below-grade structure and equipment is expected to exhibit similar levels of contamination. No additional measurements will be made on items obviously contaminated above residual contamination criteria.

Refer to the summary table for an itemization of structural and equipment populations. No entry was made into the below-grade section of Building 431 for health and safety reasons associated with entry of a confined space. Inventory of any equipment and

Summary Table - Building 431

Population	No. Measurements[b]
Above ground	
Concrete floor	30
All interior walls and interior roof	30
All beams	30
All columns	30
N-facing exterior walls	30
S-facing exterior walls	30
E-facing exterior walls	30
W-facing exterior walls	30
Exterior roof	30
Each equipment item	scan
Below ground	
Concrete floor	30
All interior walls and interior roof	30
Each equipment item[a]	scan

a) Inventory of equipment and required characterization measurements will be made at the time of execution of this work plan.

b) Measurements made only as necessary on a case-by-case basis the required characterization measurements must be made at the time of execution of this work plan.

4.2.1.32 Building 432 - Outfall Sewer Proof Sampler

This building is associated with the WSCP process sewer system. This building served as a sampling station for the process stream wastes from the WSCP. The process stream wastes consisted of large quantities of manufacturing wastes and laboratory wastes containing chemicals and small amounts of radioactive material highly diluted with water.

This proof sampling station consists of a concrete structure and flume below ground covered by a prefabricated steel housing. The structure houses a proof sampler enclosed in a cabinet, a storage tank, instrumentation and an electric heater. The concrete structure below grade houses the flume, flow orifices, pumps, and auxiliary instrumentation. The below-grade structure has dimensions 20 ft. X 12 ft. X 13 ft. deep.

Previous data (Reference 9) indicate very low or nonexistent levels of radioactive contamination in the above-ground structure. The below-grade structure and equipment are expected to exhibit similar levels of contamination.

Refer to the summary table for an itemization of structural and equipment populations. No entry was made into the below-grade

Summary Table - Building 432

Population	No. Measurements
Above ground	
Concrete floor	30
All interior walls and interior roof	30
All beams	30
All columns	30
N-facing exterior walls	30
S-facing exterior walls	30
E-facing exterior walls	30
W-facing exterior walls	30
Exterior roof	30
Each equipment item	scan
Below ground	
Concrete floor	30
All interior walls and interior roof	30
Each equipment item[a]	scan

a) Inventory of equipment and required characterization measurements will be made at the time of execution of this work plan.

section of Building 432 for health and safety reasons associated with entry of a confined space. Inventory of any equipment and the required characterization measurements must be made at the time of execution of this work plan.

4.2.1.33 Building 433 - Storage

The building construction is of the industrial prefabricated steel design; i.e. steel beam frame with sheet metal exterior. The floor is a paved concrete slab. The building is rectangular with 7400 square feet of floor area. It is a single-story structure divided into five separate sections. The building was used for the storage of maintenance vehicles and smaller mechanical components.

Starting with the northernmost section (Section 1), the contents include: cabinets and shelves; four tractors and a forklift; miscellaneous equipment such as hoses, buckets, and tools; two smaller rooms with shelves and work benches and numerous items of mechanical components.

The second section (south of Section 1) has a number of scales, plumbing supplies, shelves and assorted plumbing/piping equipment.

The third section (south of Section 2) has numerous shelves full of "nut & bolt" type supplies, numerous buckets and jars and small surplus mechanical parts.

The fourth section (south of Section 3) has two trucks, pieces of scaffolding parts, numerous equipment parts, barrels, lockers and shelves. There is a small room in the southwest corner that has miscellaneous junk on the floor.

A number of items in this building are contaminated and could be from anywhere on-site. Since this building was used as a warehouse and the contamination is from the equipment stored in this building, the five sections will not be treated as separate populations. Refer to the summary table for an itemization of structural and equipment populations. The lighting fixtures and control panels will be included with the equipment.

Summary Table--Building 433

Population	No. Measurements
Structure, exterior	
N-facing sides	30
S-facing sides	30
W-facing sides	30
E-facing sides	30
roof	30
Structure, interior	
floor (all five sections)	30
walls and ceiling	30
all columns	30
all beams	30
Equipment	
cabinets and shelves	scan
tractors and fork lifts	scan
workbenches and lockers	scan

Summary Table--Building 433(cont.)

Population	No. Measurements
Equipment (cont.)	
scales	scan
plumbing supplies	scan
buckets, barrels, and jars	scan
trucks	scan
scaffolding parts	scan
miscellaneous	scan

4.2.1.34 Building 434 - Storage Building

This building was used by the AEC as a storage building for high-value ore concentrates. The ore concentrates were packaged in 55-gallon drums and stacked in the building. No process operations ever existed within this structure.

The building construction is of the industrial prefabricated steel design; i.e. steel beam frame with sheet metal exterior. The floor is paved concrete slab. The building is a single-story structure with 19,200 square feet of floor space.

At this time, the building is empty except for a 16-foot wooden step ladder, a small wooden stool and a metal desk. Interior lighting was furnished by single-bulb hanging lamps. Electrical wiring is housed within steel conduit fastened to walls and support beams. The only interior piping is associated with a deluge type sprinkler system. A large valve assembly associated with the sprinkler system is housed in a 3 ft. X 6 ft. X 8 ft. closet within the building.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 434

Population	No. Measurements
Interior concrete floor (excluding metal closet)	30
All interior walls and ceiling (excluding metal closet)	30
All beams	30
All columns	30
All walls and ceiling and floor of metal closet	scan
N-facing exterior wall	30
S-facing exterior wall	30
E-facing exterior wall	30
W-facing exterior wall	30
E-facing exterior pitched roof	30
W-facing exterior pitched roof	30
All equipment (lights, sprinkler system, ladder,...)	scan

4.2.1.35 Building 435

Building 435 is a butler building. The dimensions of the building are 140 ft. X 40 ft. It is divided into five rooms. The building was built during plant construction; later it was used for storage and other miscellaneous activities. The building itself does not seem to be contaminated, but contains numerous pieces of equipment that show elevated contamination levels.

Starting with the north end of the building, the first room has been designated as the electrical shop. At the present time, this room contains numerous cabinets, work benches and other work tables. The furniture displays low or no contamination.

The next room south (second) contains various chemicals in containers. There are numerous bags and fiber barrels of various types of water treatment chemicals. There are some metal barrels, some of which show radioactive contamination. The chemicals and containers will be removed prior to the survey.

The center (third) room has numerous items of furniture. There is one large table, numerous small tables, shelves, file cabinets, pallets, a room heater and a map stand.

The next room (fourth) has numerous pieces of equipment. Some of the materials stored are pieces of furniture removed from a laboratory, i.e., counters and fume hoods. There are numerous other small and large items.

The last room on the south side of the building (fifth) has numerous fire extinguishers and other firefighting equipment. There are also a number of gas cylinders. One of the pieces of firefighting equipment shows elevated radiation levels.
There are numerous shelves with various pieces of electronic and sampling equipment.

Since the contamination within this structure is a result of contaminated equipment brought into the building for storage, there is no reason to suspect that contamination characteristics are different for each of the five sections. The interior of the building will be considered the same population.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table--Building 435

Population	No. Measurements
Exterior structure	
N-facing walls	30
S-facing walls	30
W-facing walls	30
E-facing walls	30
roof	30
Interior structure	
floor	30
walls, dividers and ceiling	30
Equipment (e.g. furniture, filing cabinets, pallets, room heaters, fume hoods, etc.)	scan
columns	30
beams	30

4.2.1.36 Building 436

Building 436 is a steel frame butler building, 240 ft. X 44 ft. It is divided into two sections. There is an enclosed office area in the northeast corner of the building.

The building at the present time is used for storage. In the southern half of the building there are numerous items, such as sinks, toilets, urinals and different items of furniture. Also stored in this part of the building are freezers and numerous pipe fittings. Between the north and south rooms is a restroom.

The north room, like the south room, has various items stored in it. In the southeast corner of the room is a fan which is highly contaminated. Other items in this area include fire-bricks, a chlorine trailer, electric motors and cast metal in crates. Initial survey indicates that the casting is contaminated. Other materials stored include fire extinguishers, furniture, ladders, fixtures and items removed from other buildings.

Since the contamination within this structure is a result of contaminated equipment brought into the building for storage, there is no reason to suspect that contamination characteristics are different for the north and south sections and restroom. The interior of the building will be considered the same population.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table--Building 436

Population	No. Measurements
Exterior structure	
N-facing side	30
S-facing side	30
W-facing side	30
E-facing side	30
roof	30
Interior structure	
floor (all 3 sections)	30
wall, dividers and ceilings	30
columns	30
beams	30
Equipment (e.g. toilets, sinks, furniture, freezers, pipe fittings, fan, bricks, motors, crates, etc.)	scan

4.2.1.37 Building 437

Building 437 is a single-story brick building on a concrete foundation. This building was part of the previous ordnance works, and was later used as storage space for reports, files, etc. The building is empty except for some file cabinets, barrels, office furniture, furnace and other debris. The building is comprised of seven rooms or areas including one restroom. Initial surveys show little or no contamination. The building is equipped with fluorescent hanging lights and a burglar alarm system. The entire building interior will be considered the same population for the purpose of characterization.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 437

Population	No. Measurements
All interior walls and interior roof	30
All floors	30
N-facing exterior wall	30
S-facing exterior wall	30
E-facing exterior wall	30
W-facing exterior wall	30
Exterior roof	30
All equipment (cabinets, barrels, furniture,...)	scan

4.2.1.38 Building 438

Building 438 is a steel frame butler building approximately 100 ft. X 30 ft. The building was erected during construction of the plant, after which it was used for storage.

The building now contains pieces of process equipment such as hoppers. Also stored in this building are scale models of different chemical plant and process areas. The building also contains chemicals such as sodium fluoride which will be removed prior to the survey.

Refer to the summary table for an itemization of structural and equipment populations. Before the survey is conducted, the hoppers will be removed as they are highly contaminated with visible uranium residue.

Summary Table--Building 438

Population	No. Measurements
Exterior structure	
N-facing side	30
S-facing side	30
W-facing side	30
E-facing side	30
roof	30
Interior structure	
floor	30
walls and ceiling	30
columns	30
beams	30
Equipment (e.g. process equipment, models, electric motors, lockers, etc.)	scan

4.2.1.39 Building 439 - Fire Training

The Fire Training Building, Building 439, was used to administer classroom training to site employees as part of the site safety and fire protection program.

The building is fabricated of aluminum siding with steel beam frames. The floor is concrete and has debris (wood and tires) scattered upon it. The approximate dimensions of the building are 20 ft. X 30 ft. X 15 ft. Radioactive materials were not handled or stored in this building.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 439

Population	No. Measurements
All interior walls and interior roof	30
Concrete floor	30
All beams	30
All columns	30
N-facing exterior wall	30
S-facing exterior wall	30
E-facing exterior wall	30
W-facing exterior wall	30
Exterior roof	30
Debris	scan

4.2.1.40 Building 441 - Cylinder Storage

An elevated loading dock, Building 441, is located west of Building 202. Cylinders of compressed gases were stored here prior to transportation offsite.

The dock is concrete and is surrounded by a wire fence on the pad. The roof is covered with corrugated aluminum and supported by steel columns. The dock is adjacent to the railway which runs by the main process buildings. The approximate dimensions of the dock are 40 ft. X 15 ft. X 20 ft.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 441

Population	No. Measurements
Concrete floor and concrete steps of dock	30
N-facing concrete wall supporting dock floor and N-facing side of cinderblock partition on dock floor	30
S-facing concrete wall supporting dock floor and S-facing side of cinderblock partition on dock floor	30
E-facing concrete wall supporting dock floor	30
W-facing concrete wall supporting dock floor	30
All columns	30
All beams	30
Underside of roof	30
Exterior of roof	30
All fencing	30
all handrailing	30

4.2.1.41 Building 443 - Fire Training Storage

This structure is a dilapidated single-story wooden shed. The wooden floor, portions of the shingled roof and wood support structure still remain. This structure was used to store the fire protection training equipment. The approximate dimensions of this structure are 10 ft. X 20 ft. X 8 ft. high.

The equipment presently stored in this structure includes two small wooden school desks, a metal office desk, a wood burning stove and assorted wooden barrels.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Building 443

Population	No. Measurements
Wood floor	30
Wood beams	30
Wood columns	30
Underside of wood roof	30
Exterior of wood roof	30
All equipment (desks, stove, etc....)	scan

4.2.1.42 Other WSCP Structures

Electrical Substations

Primary electric power was received from the Union Electric Company's Babler Substation in St. Louis County, approximately ten miles from the plant site, and was transmitted over the utility company's transmission lines to a metering station located outside the plant area at the south end of the railroad classification yard. Transformation was made at the substation at Area 411 and power was distributed to the water plant facilities over existing lines.

The main electrical substation, Area 412, was centrally located west of the process building area. This substation has a metering and transformer yard, switchgear house and a feeder switching structure. The building for the switchgear has concrete block walls, with built-up roofing on a poured concrete roof deck, that is supported on a structural steel framework. The floor is reinforced concrete designed for a live load of 500 pounds per square foot. Overall dimensions of the building are 49′ 4" X 22′ 0" with a clear ceiling height of 12′ 4". The overall volume of the building is 13,400 cubic feet. Heating was provided by two thermostatically controlled electric unit heaters. Ventilation is accomplished by two gravity-type roof ventilators and a ten-inch electric exhaust fan located in the 14′ 0" X 6′ 6" battery room.

The metering and transformer yard was an outdoor fenced-in area with overall dimensions of 45 ft. X 81 ft. Outdoor electrical equipment consisted of three transformers with a load ratio control and an oil circuit breaker are all mounted on reinforced concrete pads. A 12-foot gate was provided for equipment replacement and a six-foot gate for personnel access. The outdoor area was covered with six inches of crushed rock fill. The switchyard was a fenced-in area with overall dimensions of 26 ft. X 26 ft. containing a four-pole terminal structure for supporting the equipment, such as cable terminals, disconnect switches, lightning arresters and associated equipment.

The main substation, Area 412, was equipped for fire protection with an automatic, electrically supervised "Fire Fog" system. The system consisted of a total of 54 fog nozzles mounted on piping around the main breaker, a metering transformer and three main transformers. It was pneumatically actuated by the operation of any one of 15 strategically located heat-sensitive devices.

Electrical equipment inside the substation consisted of ten metal-clad switchgear units. One unit contains a metering compartment and control equipment for the outdoor oil circuit-breaker. Eight units contained power-type air circuit-breakers.

There are eight unit substations located within the plant site. The unit substations are installed outdoors with the equipment mounted on reinforced concrete pads. All equipment from these substations has been radiologically surveyed by the WSSRAP with information available in on-site documents.

Refer to the summary table for an itemization of structural and equipment populations in Area 412.

Summary Table--Area 412

Population	No. Measurements
Building 412 interior	
walls and ceiling	30
beams	30
columns	30
floor	30
Building 412, exterior	
N-facing walls	30
S-facing walls	30
W-facing walls	30
E-facing walls	30
roof	30
Air-cooled pole	scan
Electric heater	scan
Exhaust fan	scan
Fencing	30

Railroad Tracks - Rails and Ties

A railroad system was installed within the plant site for transporting materials to and from the plant. The trackage connects at the south boundary line to a railroad spur line that previously served the Weldon Spring Ordnance Works. The line extends south from the plant site for a distance of approximately 3 1/2 miles to the main line of the Missouri-Kansas-Texas Railroad Company which is located along the north bank of the Missouri River.

The site railroad system consists of double tracks that pass through the building area, and terminate at track bumpers located near the north boundary line. Track turnouts are strategically located to facilitate the movement of railroad cars to and from the various buildings. Limestone ballast at a greater than normal depth was utilized on 190 feet of the track adjacent to the green salt tank farm, Area 202, in order to neutralize acid spills or drips from hydrofluoric acid unloading. Box cars were decontaminated using a reinforced concrete basin installed under the east track adjacent to the feed storage pad, Area 101. A track hopper is located under the west track adjacent to the coal storage area for unloading coal for use in the steam plant, Building 401. Major quantities involved in the installation of the system were (Reference 10):

Rail	15,880	lin. ft.
Turnouts	14	units
Road crossings	2	units
Ballast	5,265	tons

Refer to the summary table for an itemization of structural population.

Septic Tanks

It was necessary due to the topography of the site to install septic tanks and drainage fields for the steam plant (Building 401) and the pilot plants (Buildings 403 and 404) since gravity flow to the sanitary sewer system was not possible. The overall dimensions of the reinforced concrete septic tank for the steam plant are 17′ 0" X 5′ 10" X 7′ 0" deep, resulting in a volume of 700 cubic feet. The septic tank for the pilot plants is 21′ 9" X 7′ 8" X 8′ 4" deep and has a volume of 1,400 cubic feet. These tanks have since been filled with sand and drainage flow stopped.

Refer to the summary table for an itemization of structural and equipment populations.

Summary Table - Railroads

Population	No. Measurements
Rail[a] (5% of total site length)	scan
Railroad ties[a] (5% of site total)	scan
All bumpers	scan
Spikes[b]	no measurement
Ballast[c]	NA
Decon basin	
all rails	scan
all ties	scan
all concrete	30

(a) Excluding that associated with the rail car decontamination basin.

(b) Rail spikes will not be subjected to exploratory measurements as the results of the rail and tie surveys will be used to indicate potential presence of contamination.

(c) The sampling of the ballast is covered within the scope of previous PMC site characterization efforts.

Summary Table - Septic Tanks

Population	No. Measurements
Steam plant septic tank	
concrete basin	30
all pipe - interior	1
all pipe - exterior	scan
handrailing	scan
sand[a]	NA
Pilot plant septic tank	
concrete basin	30
all pipe - interior	1
all pipe - exterior	scan
handrailing	scan
sand[a]	NA

(a) The sampling of the sand is covered within the scope of previous PMC site characterization efforts.

Roads

There are four types of material used in the road system at the WSS. Roadbeds are of asphalt, concrete, gravel and dirt. The concrete roadbed is seen primarily in the main process area. Many truck docks off the main road have concrete or asphalt roadbeds leading to them. Asphalt was used for the two main parking lots and some secondary roads. Gravel and dirt roadbeds are seen primarily away from the building areas and are used as patrol roads.

The characterization of the roads will be completed as part of the WSSRAP monthly road survey.

Tanks

During the Army decontamination and decommissioning activities in the late 1960's, tanks used in the digestion, denitration and extraction processes were placed on the concrete dock north of Building 101. There are approximately 20 tanks ranging in size from about 200 gallons to 10,000 gallons. These tanks are made of agitated stainless steel and are believed to be empty of any large amount of process material. It is suspected that both interior and exterior surfaces of these tanks are contaminated. Ten of these tanks will be scanned according to the equipment sampling protocol, Section 2.1.1.

4.2.2 Asbestos-Containing Materials

At each location listed in the tables in Appendix 1, the contractor shall (a) sample the material listed as required and (b) estimate the volume of ACM present.

Taking a sample of ACM can damage the material and cause significant release of fibers. The following procedure will be used to minimize damage and fiber release.

1) Using water from a spray bottle, wet the surface of the material to be sampled.
2) Place sample container directly under area to be sampled.
3) Cut piece of material measuring at least 1/4" X 1/2". (If broken or loose material is present, it is preferable to remove a loose piece rather than cut into an undisturbed surface.) Be sure to penetrate any paint or protective coating and all the layers of the material.
4) Wet-wipe the exterior of the sample container and cap or seal it.
5) Label the container using indelible ink.
6) Wet-wipe the cutting tool.
7) Discard wet towels in a sealable plastic bag.
8) On surfacing material, use latex paint or a sealant to cover the sample area (do not use a spray-on sealant). For pipe and boiler insulation, use a non-asbestos mastic.

9) Collect at least one quality control (QC) sample per 20 samples, or 1 QC sample per building if fewer than 20 samples are taken in the building.

4.2.3 Building Waste Characteristics - Chemical Sampling Procedures

The purpose of this section is to discuss general sampling procedures, document the results of preliminary field investigations and provide specific sampling plans for each area.

4.2.3.1 General Sampling Procedures

Based upon the sampling rationale for the chemical characterization of the buildings and related areas, as described in Section 4.1.3, the processing areas will be examined for their chemical contents. Efforts shall be made in collecting samples through valves or other external locations from process vessels, equipment, lines, sumps, and sewers which may contain bulk or residual chemical substances prior to entry into such equipment.

When sampling from external locations is not possible, the atmosphere in the equipment will be monitored prior to entry for oxygen content, explosive mixtures and total ionizable organic vapors. Additional atmosphere testing for specific airborne contaminants will be performed if indicated by initial testing results or where specific air contaminants are suspected to be present based on drawings and other historical process information. The following sections describe the sampling of Bulk Materials and Trace Contaminants (PCBs).

4.2.3.1.1 Sampling of Bulk Materials

Solid and liquid bulk residues remaining in process vessels, equipment, lines, sumps and sewers will be sampled for laboratory analysis. Sample collection shall follow the guidelines established in SW-846 (Reference 17). Solid samples will be collected with a polyethylene scoop and transferred to a collection bottle. Liquid samples will be collected with a polyethylene thief or dipper, as appropriate, and transferred to a collection bottle. Both solid and liquid samples will be approximately 100 cubic centimeters in volume. Each sample from a given piece of equipment or process line shall be kept and analyzed separately; i.e. samples will not be composited across equipment items or process lines.

4.2.3.1.2 PCB Sampling Procedures (Non-bulk Materials)

Based on existing characterization data, detectable concentrations of PCBs are known to be present in several of the Chemical Plant buildings and areas in which PCB-containing transformers are present. The chemical sampling plan for PCBs on or in these buildings, equipment and piping is presented below.

1. A minimum of eight swipe samples will be collected from the floor of each building.

2. For buildings having more than one floor level, at least one swipe sample will be collected from each floor level.

3. Swipe samples will be collected from all empty fuel oil tanks, lubricating oil tanks and hydraulic fluid systems.

4. PCB sampling will be performed at each discrete location where visible oil residues are present. Where insufficient quantities exist for residue sample collection, swipe samples will be collected.

5. When swipe or residue sample analysis indicates PCB concentrations in excess of the applicable clean-up standards specified in 40 CFR Part 761, subpart G, and the PCB-containing materials are present on concrete or other porous surfaces, additional volumetric PCB analyses will be performed on the substrate material at these locations.

4.2.3.2 Sampling Requirements

The following sections detail the number and locations of samples to be collected for bulk samples. The plan for each building requiring sampling is described separately.

4.2.3.2.1 Green Salt Plant (Building 201)

In Building 201, the locations to be chemically sampled are on the line carrying anhydrous HF to the vaporizers. This line terminates in a vertical run where HF may have been trapped and accumulated. The sampling locations are in the far west end of the building on the second floor. In the central portion of the second floor, near the east wall, two sampling locations have been marked with fluorescent green paint immediately above two closed valves. Sampling for bulk materials will be collected by drilling a hole in the piping at the marked locations, and collecting a sample of bulk material for analysis. Analysis will be performed in accordance with SW-846 (Reference 17).

4.2.3.2.2 Green Salt Tank Farm (Area 202)

The chemical sampling plan for the Green Salt Tank Farm (Area 202) is as follows:

1) The 70% HF tanks are on the south end of the tank farm, with a steel walkway mounted above them. Two of the three tanks have been totally disconnected, but modified process

piping remains on the third. Locations where 70% HF is to be sampled are between closed valves, and at the bottom of vertical pipe runs. Two locations have been marked on the pipes with green fluorescent paint.

2) The anhydrous HF tanks are located just to the north of the 70% HF tanks, in a separate building. The process piping to the anhydrous HF tanks is located on top of this building. Locations where anhydrous HF piping is to be sampled are between closed valves and at the bottom of vertical pipe runs. Twenty-one locations have been marked on the pipes with green fluorescent paint.

3) The low points in both the 70% HF tanks and the anhydrous HF tanks are convex dimples on the bottom of the tanks. There are a total of seven tanks to be sampled at these dimples.

4) The sampling for HF materials in piping and tanks will consist of drilling a hole in the piping or tank at the marked or noted locations and collecting a sample of the bulk material for analysis.

Note: Although there is written evidence (Reference 9) that the interior of the HF system was emptied and neutralized, it is possible that HF may remain in the system. Samplers shall wear the protective equipment required when dealing with an HF system.

5) There is a bulk substance in a small covered rectangular tank located on a steel platform adjacent to the railroad tracks (accessible from the anhydrous HF area). The tank is marked with fluorescent green paint. A sample of the bulk material will be collected for RCRA characteristic analysis (see Section 5.3) with SW-846 (Reference 17).

4.2.3.2.3 Metals Building (Building 301)

The chemical sampling plan for Building 301 are for the locations in the process piping that carried trichloroethylene. They are vertical sections of pipe which may still contain trichloroethylene. There are three sampling points, all marked with green fluorescent paint. The first sampling point is the system fill-pipe located outside on the north side of the building, just west of a building extension. The second sampling point is reached through a man- door just west of the fill pipe mentioned above. Inside the building, south of the man-door, is a large tank, painted violet with the number 3459 on it. The sampling point is below the tank. The tank is west of cocoon 28. The cocoons, 34 in count, are groups of equipment that have been covered by a fiber or wire mesh and sprayed with a hard-setting polyurethane foam. The third sampling point is east of tank 3459 where the trichloroethylene pipe goes to the degreaser in cocoon 29. The cocoon has been painted with the words "TCE Pipe" and an arrow points upward to the point where the pipe enters the cocoon. The sampling for bulk trichloroethylene materials will consist of drilling a hole in the piping at the marked locations and collecting a sample of bulk material for analysis.

If oily residues are visible near metal-working machines, one PCB sample will be collected from each location where the residues are located.

4.2.3.2.4 Chemical Pilot Plant (Building 403)

The caustic potash tank will require sampling prior to its removal if it contains bulk materials. Sampling will consist of drilling a hole in the low point of the tank and collecting a sample of bulk material.

4.2.3.2.5 Process Sewer System

The sampling plan for the proof sampling stations is as follows:

1) When it has been determined that it is safe to enter the proof sampling stations and the below-ground structures, the proof station will be visually inspected for bulk materials. If any bulk materials are visible, they will be sampled in accordance with Section 4.2.3.1.1 of this work plan. The storage tank, flume, flow orifices and pumps will be inspected. If there are visible bulk substances in any of the four sampling locations, a sample will be taken

in that location. These samples will be analyzed in accordance with Section 5.3 of this work plan.

2) Since PCBs may have been washed into the process sewer system, a swipe sample will be tanken at each location in accordance with Section 4.2.3.1.2 of this work plan. A minimum of four samples in each proof sampler will be taken.

4.2.3.2.6 Maintenance Stores (Building 408)

The preliminary field investigation revealed that the interior of the warehouse building is now largely empty. The building has been used for a variety of storage purposes since the Chemical Plant stopped operating. This is evidenced by the fact that PCBs have been detected in the building, probably as the result of storing electrical equipment. The building will require sampling for halogenated solvents, caustic soda and sulfuric acid if visible quantities of residual materials are present.

SECTION 5 SAMPLE ANALYSIS

5.1 Radiological

The following samples will be collected and analyzed:

- o In-situ measurements of buildings and equipment
- o Air samples (particle and gaseous)
- o Miscellaneous bulk material inside buildings

The characterization activities will be subdivided into smaller tasks to accomplish these objectives. The techniques that will be used in performing these radiological characterization tasks are summarized below.

5.1.1 In-situ Measurements of Buildings and Equipment

At each sample location beta-gamma levels will be directly measured and swipe samples will be collected. Beta-gamma radiation measurements will be made with a thin-window Geiger-Mueller counter coupled to a digital ratemeter/scaler and reported in units of dpm/100 cm^2 and millirad per hour (mrad/h). Removable surface contamination will be determined using cloth or paper swipe samples taken from a surface approximately 100 cm^2 in area. These swipes will be measured with a laboratory alpha scintillometer. Data from the radiation detection instruments will be recorded on field data sheets in units of counts per minute. Calibration factors will be applied to the data so that results can be reported in the units described above. In addition to surface swipes, bulk samples will be collected from surfaces that exhibit loose debris. Isotopic analyses of these bulk samples will be performed as necessary to permit comparison of measurement results to the appropriate guidelines.

5.1.2 Air Samples

Air samples will be collected for two purposes: to determine the concentrations of airborne radionuclides in buildings and to ensure the health and safety of personnel performing characterization activities.

Samples will be collected with either high-volume air samplers or low volume personnel samplers on air-filter paper. The filter papers will be analyzed in the laboratory by an alpha scintillation detector. The results of the measurement will be converted to concentrations of short-lived daughters of radon (radon-222) and thoron (radon-220) in units of working level (WL), and/or concentrations of long-lived radionuclides in units of microcuries per milliliter of air (uCi/ml).

5.2 Asbestos

Asbestos samples will be analyzed using the phase contrast microscopy (PCM) method. The NIOSH P & CAM 239 procedure or NIOSH 7400 procedure will be followed.

5.3 Chemical Sample Analysis - Buildings

In addition to analysis for specific hazardous substances under CERCLA (reference 3), residual samples associated with the Chemical Plant buildings will be analyzed for PCB content and RCRA hazardous waste characteristics as follows:

1) All organic liquids, oils, and oil/solids mixtures will be analyzed for the following:

   - o PCBs
   - o RCRA characteristics
     --ignitability
     --E.P. toxicity metals
     --reactivity

2) All aqueous liquids, including acid and caustic solutions, will be analyzed for the following:

   - o RCRA characteristics
     --corrosivity

--E.P. toxicity metals

--reactivity

3) All bulk solids, dusts and other solid residues will be analyzed for the following:

o RCRA characteristics

--E.P. toxicity metals

--reactivity

The above sampling guidelines will not apply to substances present in large quantities. These substances will be analyzed and determined to be present as commercial chemical products.

In the course of sampling the Chemical Plant buildings for hazardous chemicals, a wide variety of chemicals are expected to be encountered. Appendix B of the WSSRAP Quality Assurance Program Plan (QAPP) outlines the methodologies and detection limits for the analytical procedures addressed in this work plan. The standard methods of analysis for the various hazardous substances which may be encountered in the sampling of the buildings are shown in table 5.1.

Table 5.1

Sample Analysis Methods for Buildings

Substance	Standard Method of Analysis
Volatile Organics	CLP
Semi-Volatile Organics	CLP
PCBs	CLP
Pesticides	CLP
Metals	SW-846
Nitrates	EPA Method 300.0
Sulfates	EPA Method 300.0
Chlorides	EPA Method 300.0
Fluorides	EPA Method 300.0
Ignitability	40 CFR 261.22
Corrosivity	40 CFR 261.22
Reactivity	40 CFR 261.22

Alternate methods for analysis of metals and inorganic nonmetals are available for use should this be required under special circumstances.

SECTION 6 QUALITY ASSURANCE

A comprehensive quality assurance (QA) program will be maintained to ensure that data collected are representative of actual conditions. Extensive data will be obtained in order to ensure accurate representation of the range of conditions. Data will be compared with historical data for each location and medium to ensure that any deviations from previous conditions are identified and explained. Samples and measurements at all locations will be collected using accepted documented procedures to ensure interpretable results and consistent collection techniques. On-site sampling and measurement instruments will be subject to daily operational checks and semi-annual calibration to ensure both accuracy and precision of results. Records and calculations will be checked for error and use of appropriate recording and calculation techniques. Laboratories will be required to verify data quality by conducting a program of analytical quality control, participating in interlaboratory crosschecks, performing replicate analyses and splitting samples with other laboratories. Chain-of-custody procedures will be implemented to maintain the integrity of samples and corresponding analytical results. This program will ensure that the characterization data can be used to accurately evaluate site conditions.

To ensure quality control, five percent of all radiological field measurements taken in the buildings will be remeasured.

Remeasurement will consist of repeating the radiation measurement in the same location with the same instrument. Five percent of all swipe samples will be reanalyzed. QC analyses of the swipes will be performed on the same equipment with the original sample.

At least one duplicate quality control (QC) asbestos sample per building or one QC sample per 20 asbestos samples, if there are more than 20 per building, will be collected. The asbestos QC sample will be taken either from the area adjoining a regular sample or by splitting a regular sample.

Field splits and blanks will be used for quality assurance in the chemical characterization of the buildings. Field splits will be used to measure analytical differences within the same laboratory. A field split will be made in the case of all samples and swipes. Blanks provide a measure of sample contamination and other errors. At a minimum, one blank will be required for every 20 chemical samples or swipes taken.

SECTION 7 DATA DOCUMENTATION

7.1 Sample Transfer

The sample taker will retain custody of the sample from the time it is collected until transfer to a laboratory.

Chain-of-custody (COC) forms will be used for all samples. A copy of the original COC will be retained by the sample taker, and the original COC will be sent to the analytical laboratory. After the analysis is completed, the COC will be returned to WSSRAP and placed in the document control files.

The sampling log will reflect chain of custody activities as required by the Quality Assurance Project Plan and the WSSRAP Procedures Manual Volume No. V - Environmental, Safety and Health.

To minimize the number of transfers to be recorded, each sample taker should prepare each day's samples for shipping daily. The following precautions will be taken when shipping samples:

1) Samples will be packed so as to prevent damage to sample containers.
2) To minimize loss, package label will be written in indelible ink.
3) To protect identity, each sample will be labelled with indelible ink.

4) Chain of custody document will accompany each shipment.

7.2 Logbooks/Data Sheets

Field logbooks will include the following:

1) Date
2) Facility name and location
3) Names and social security numbers of sampling team members
4) (a) Respiratory protection used
   (b) Other PPE
5) Location
6) Volume of areas surveyed (as applicable)
7) Repair method used (applicable to ACM only)
8) Disposal procedures for waste.
9) Sample number
10) Other comments as necessary

7.3 Photographs

Because of the number of samples to be taken in this characterization, photographs of every sample will not be required.

Extensive photographic documentation of the buildings' physical status, including equipment inventory, will be made.

7.4 Inventory Documentation

As each item of equipment or structural material is inventoried, it will be tagged to indicate the inventory number. The tag will provide necessary space to indicate if the item has been radiologically, chemically or asbestos surveyed; e.g. sample number.

SECTION 8 REPORTING REQUIREMENTS

The radiological, asbestos and chemical data generated from this work plan will be reported in Interim Response Action Reports for each building. Each report will contain the following information:

1) sampling procedures,
2) analytical results,
3) chain-of-custody forms, and
4) results of the quality assurance procedures.

Upon the completion of a report, original data for each building will be placed in the WSSRAP document control files.

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DOE/OR/21548-021

United States Department Of Energy

BUILDINGS CHARACTERIZATION SAMPLING PLAN

REV. 0

APPENDIX

WELDON SPRING SITE REMEDIAL ACTION PROJECT

APPENDIX

BUILDINGS

CHARACTERIZATION

WORK PLAN

WELDON SPRING SITE

PREPARED FOR

U.S. DEPARTMENT OF ENERGY

PREPARED BY

MK-FERGUSON COMPANY

WSSRAP

April, 1988

Appendix 1

Notes to Asbestos Characterization Tables

1. PURPOSE

The following tables and location diagrams are furnished to assist the contractor in identifying and locating known ACM and potential ACM. Each location listed on the tables and shown on the diagrams represents the presence of a major concentration of ACM. Not every location of ACM at the WSCP is listed, two buildings (108 and 403) have not been surveyed, and portions of several buildings were inaccessible. However, the tables reflect all ACM that can be identified at the site prior to the dismantling of buildings.

2. TERMS

Terms	Definition
Horizontal	Usually found between floor and eye level Usually horizontal axis but sometimes mixed horizontal/vertical, as a pipe junction
Vertical	Vertical axis Usually found between floor and eye level, occasionally below ceiling
Overhead	Horizontal or vertical axis Always found at ceiling level or higher

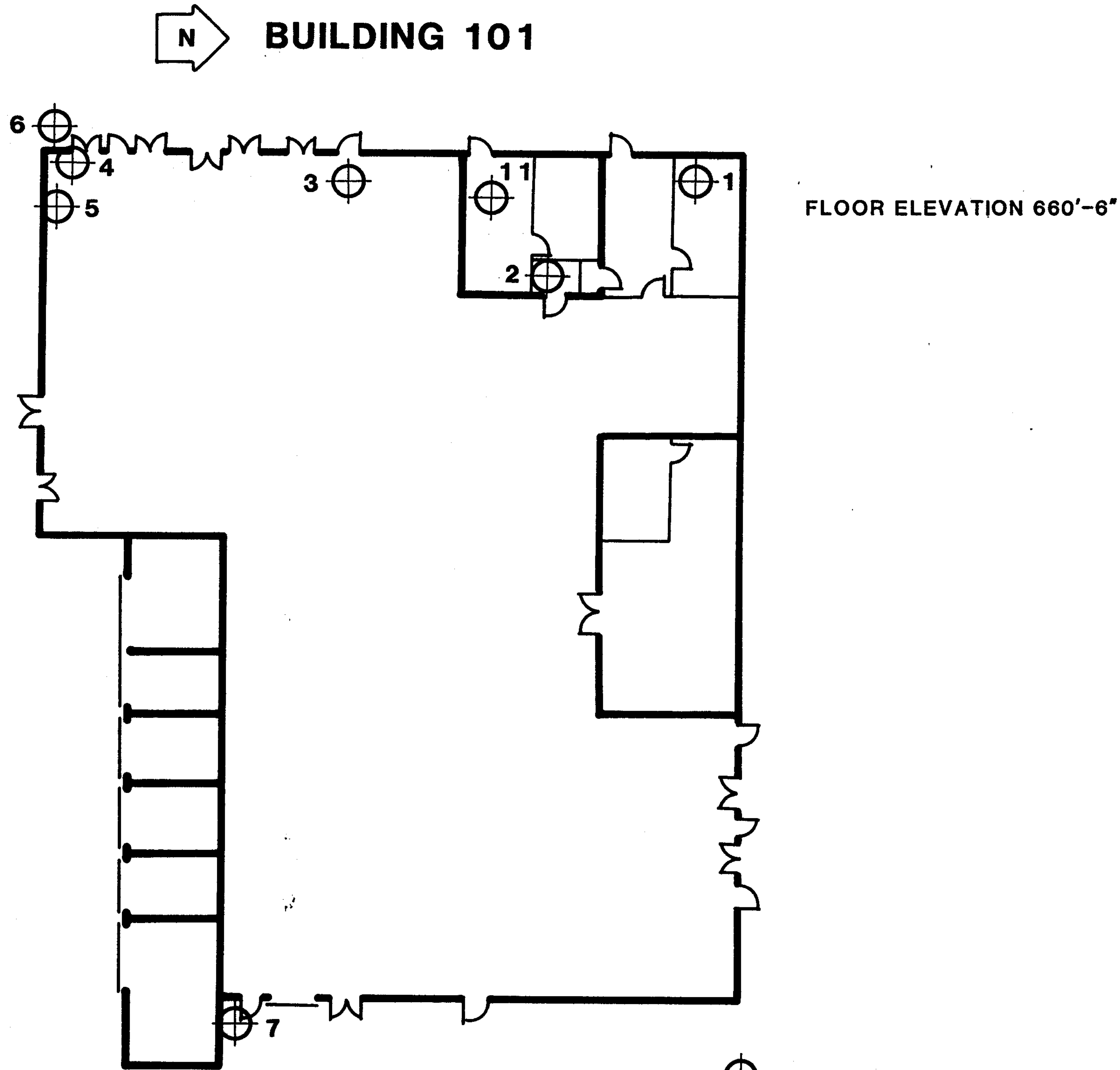
WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 101

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8101-61	1)	Supervisors Office	overhead	duct insulation	3
	2)	Vestibule	overhead	PI*	***
	3)	G3	overhead	PI	***
	4)	G1	wall	PI	***
	5)	G1	floor	PI	***
	6)	G1 Exterior	ground	PI	***
	7)	Aw2 Exterior	overhead	PI	***
			outside calciner		***
	8)	calciner	elev. 681-horizontal	PI - black	***
	9)	calciner	elev. 681-horizontal	PI -black	***
	10)	calciner	elev. 704-horizontal	firebrick	3
	11)	roof	built-up portion	3 layers	***

* pipe insulation

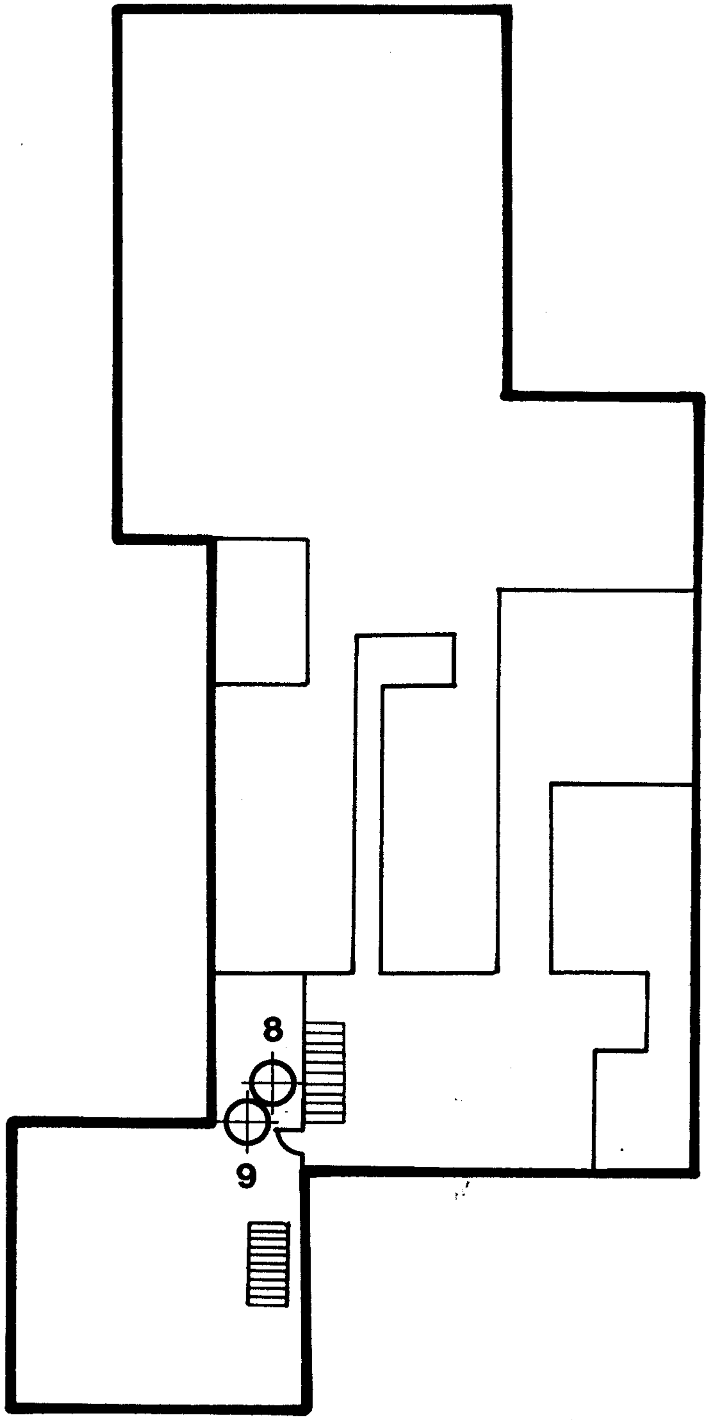
*** not required

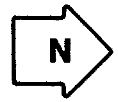
BUILDING 101



BUILDING 101

FLOOR ELEVATION 681'-9"

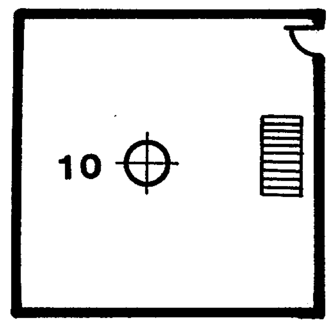




- BULK SAMPLE LOCATIONS

BUILDING 101

FLOOR ELEVATION 704'-10 1/2"



⊕ - BULK SAMPLE LOCATIONS

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 103

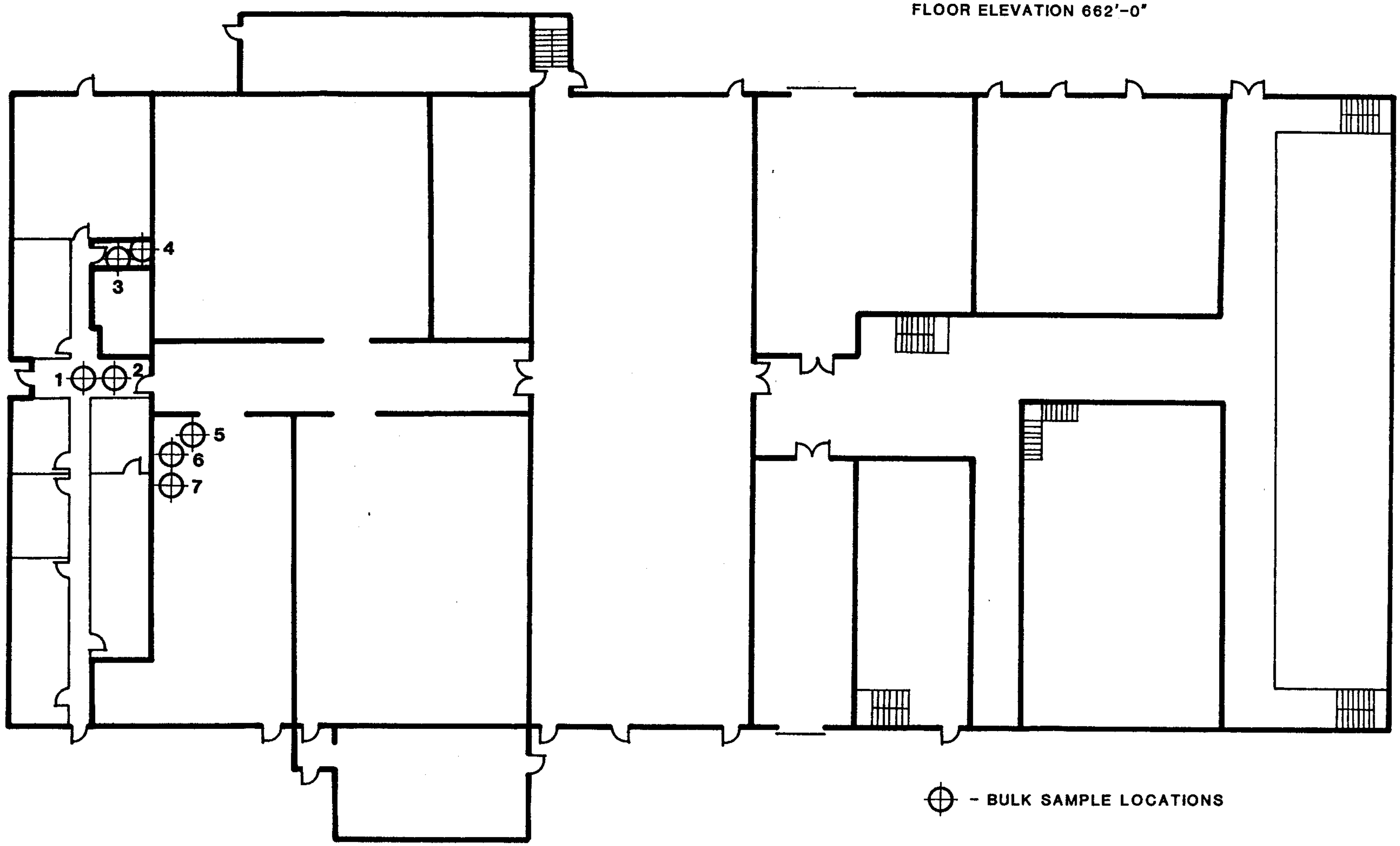
Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8103-66	1)	Vestibule	overhead	duct insulation	3
	2)	Vestibule	floor	floor tile	3
	3)	Janitor's closet	inside alum. jacket	PI*	***
	4)	Janitor's closet	inside alum. jacket	PI	***
	5)	Maintenance	vertical	PI	***
	6)	Maintenance	vertical	PI	***
	7)	Maintenance	vertical	PI	***
8103-70	8)	Operating Aisle	vertical, becoming horizontal at roof	PI	***
	9)	Operating Aisle	vertical	PI -orange 12"	***
	10)	Operating Aisle	horizontal	PI -orange 12"	***
	11)	Operating Aisle	horizontal	PI -orange 12"	***

* pipe insulation

*** not required

BUILDING 103

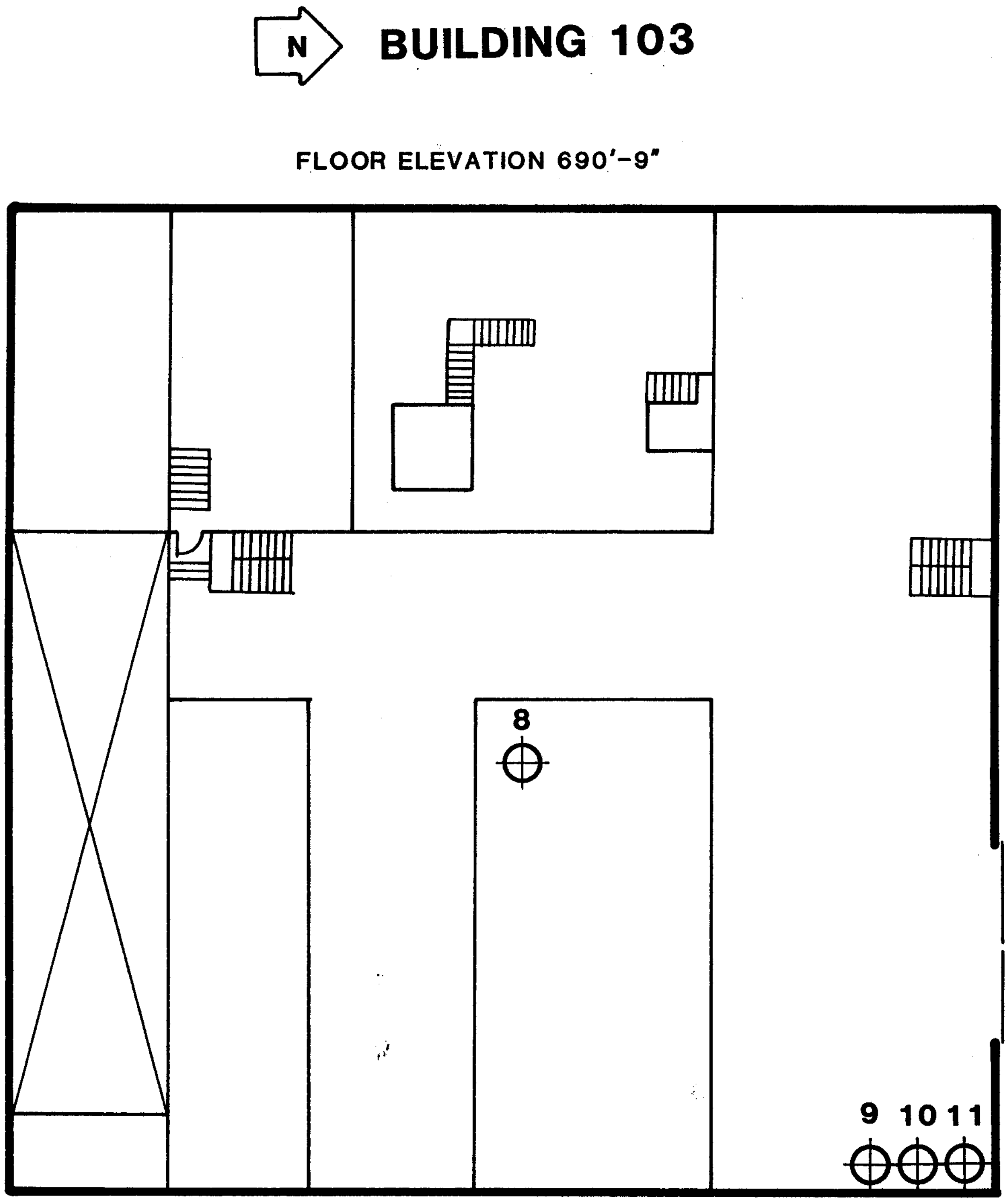
FLOOR ELEVATION 662'-0"



⊕ - BULK SAMPLE LOCATIONS

BUILDING 103

FLOOR ELEVATION 690′-9″



⊕ - BULK SAMPLE LOCATIONS

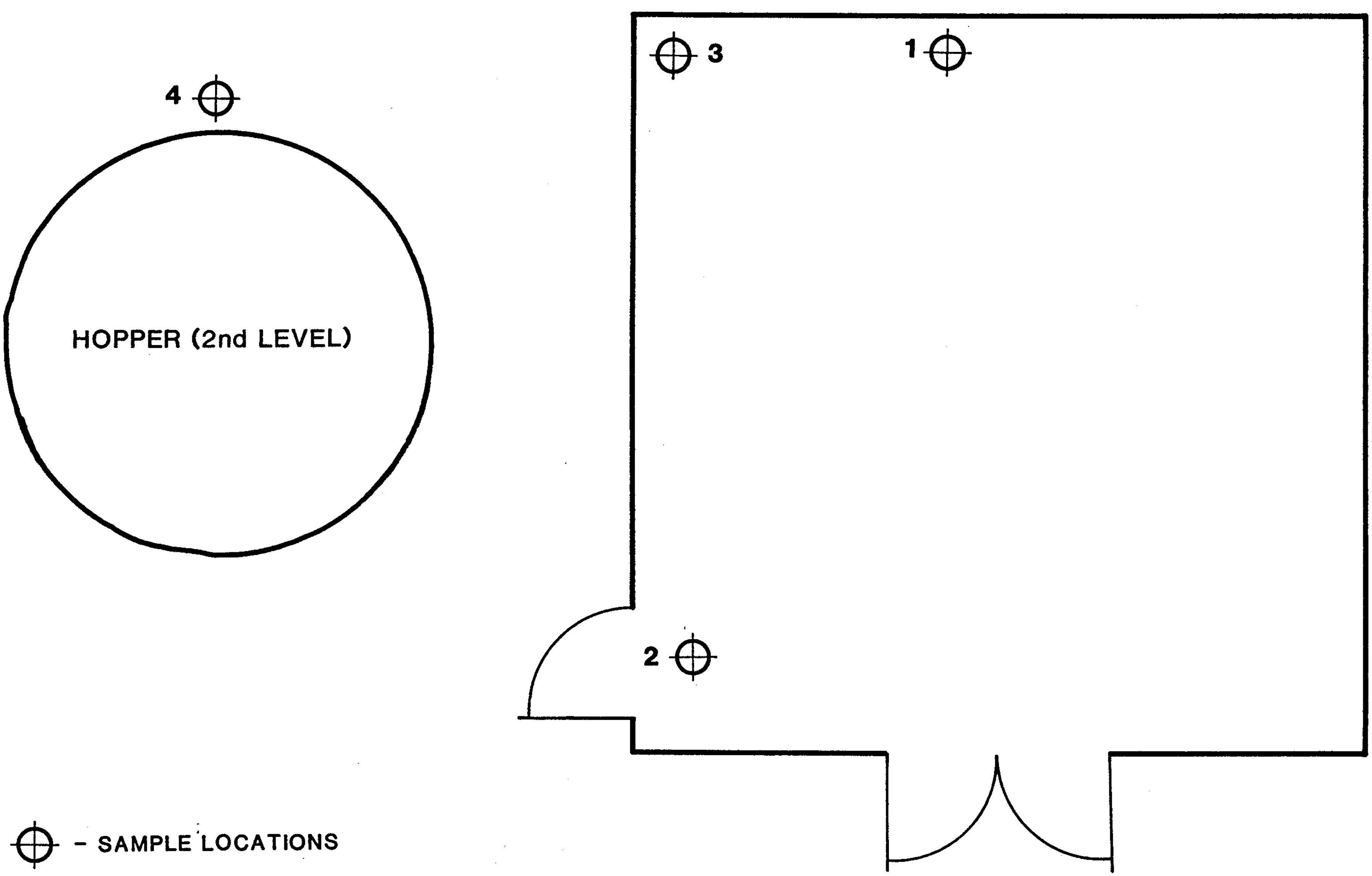
WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 104

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	North wall	overhead	PI*	***
	2)	Southwest corner	vertical from floor	PI	***
	3)	Northwest corner	overhead	PI	***
	4)	Exterior-north side	vertical on north side of hopper	PI	***

* pipe insulation

*** not required

BUILDING 104

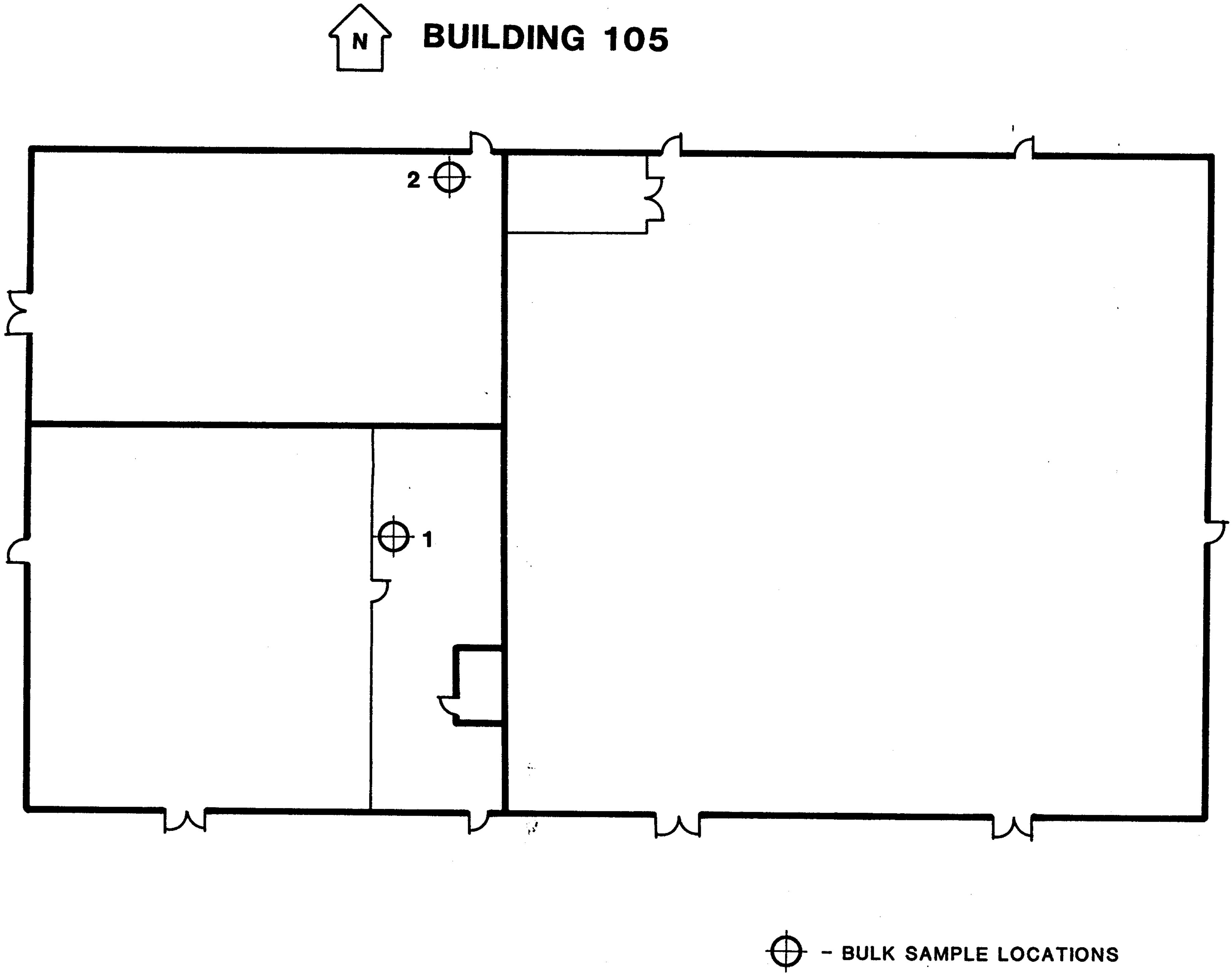


WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 105

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8105-65	1)	Deionizer Space	2nd level floor	floor under steel grid	3
	2)	Ether Extraction Area	inside alum. jacket	PI*	***

* pipe insulation
*** not required

BUILDING 105

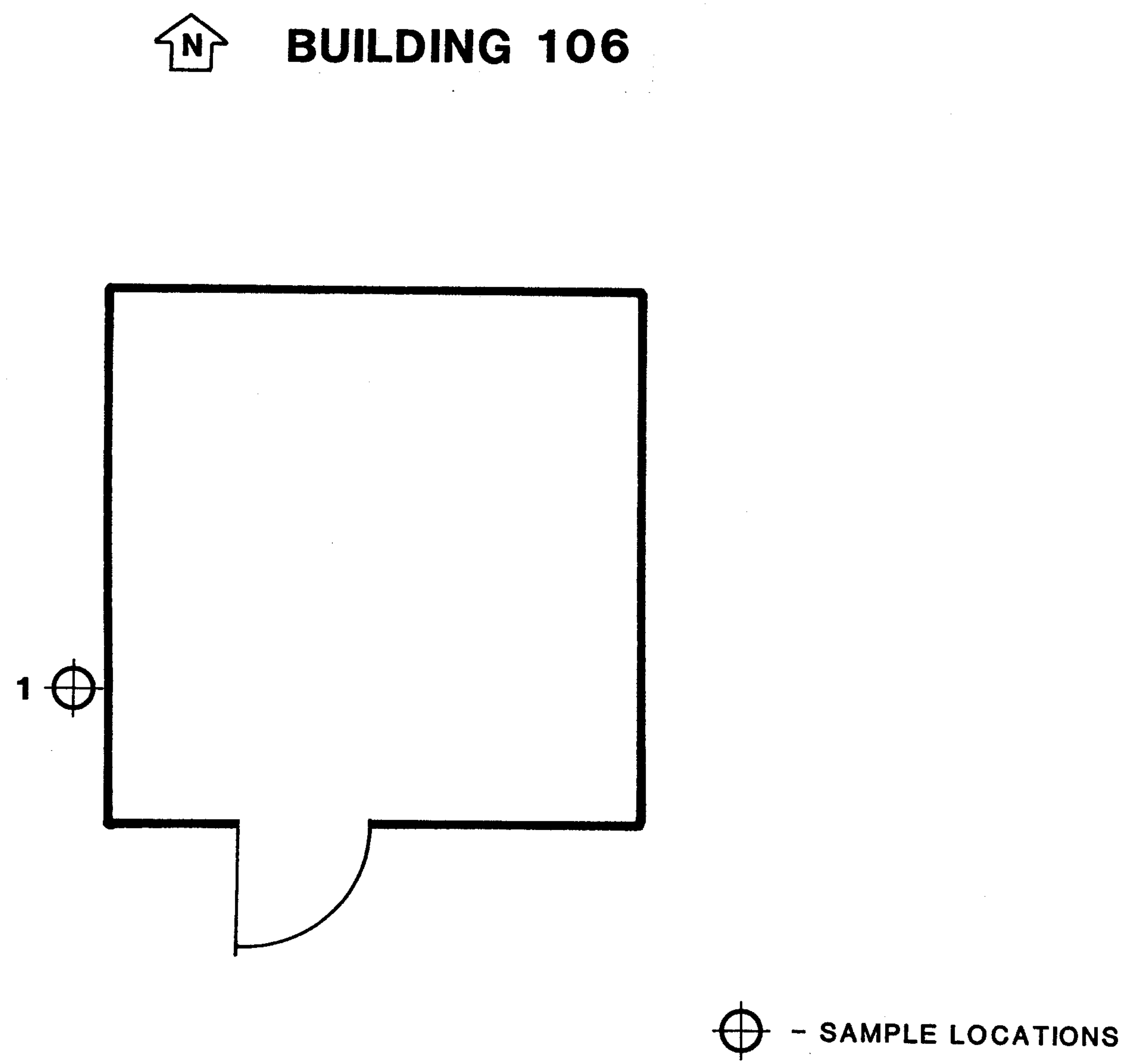


WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 106

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	Exterior	West side wall penetration at roof line	PI*	***
	2)	Exterior	Northwest corner	PI	***

* pipe insulation
*** not required

BUILDING 106



WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 109 & 110

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
				none	

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 201

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8201-61	1)	Smoking Room	overhead	PI*	***
	2)	"	overhead	PI	***
	3)	"	horizontal	PI	***
	4)	"	vertical	PI	***
	5)	"	floor	tile	3
	6)	Hall	vertical	PI	***
	7)	Dispensary	vertical	PI	***
	8)	"	vertical	PI	***
	9)	"	vertical	PI	***
	10)	"	vertical	PI	***
	11)	"	vertical	PI	***
	12)	"	overhead (fat end-left)	PI	***
	13)	"	overhead	PI	***
	14)	"	overhead	PI	***
	15)	Men's Lavatory	vertical	PI	***
	16)	"	horizontal	PI	***
	17)	"	vertical	PI	***
	18)	Janitor Closet	vertical	PI	***
	19)	"	vertical	PI	***
	20)	Women's Lavatory	vertical	PI	***
	21)	"	horizontal	PI	***
	22)	"	vertical	PI	***
	23)	"	vertical	PI	***
	24)	"	vertical	PI	***
	25)	"	overhead	PI	***
	26)	Safety Office	horizontal	PI	***
	27)	"	vertical	PI	***
	28)	"	vertical	PI	***
	29)	"	overhead-largest pipe jt.	PI	***
	30)	"	vertical	PI	***
	31)	"	overhead	PI	***
	32)	"	overhead	ceiling layers (3)	3 each layer
	33)	Personnel Mgr.	horizontal	PI	***
	34)	"	vertical	PI	***
	35)	"	overhead	PI	***
	36)	Production Supt.	vertical	PI	***
	37)	"	vertical	PI	***
	38)	Operational & Secretarial office	vertical	PI	***

* pipe insulation

*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 201

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	39)	Operational & secretarial office	horizontal	PI*	***
	40)	"	horizontal/vert.	PI	***
	41)	"	horizontal	PI	***
	42)	"	vertical	PI	***
	43)	"	vertical	PI	***
	44)	"	overhead	ceiling tile	3
	45)	Technical Staff	vertical	PI	***
	46)	"	vertical	PI	***
	47)	"	vertical	PI	***
	48)	"	vertical	PI	***
	49)	Corridor	vertical	PI	***
	50)	Equip. Cleaning Room	overhead	PI-orange	***
	51)	"	overhead	PI-green	***
	52)	"	overhead	PI-green	***
	53)	"	vertical	PI (65° water)	***
	54)	"	horizontal	PI-orange	***
	55)	Maintenance Shop	horizontal	PI-orange 12"	***
	56)	"	horizontal	PI-white ring 18"	***
	57)	"	vertical	PI-orange Low Pressure steam	***
	58)	"	horizontal-topmost	PI-orange	***
	59)	"	horizontal-4' section	PI	
	60)	"	vertical	PI low pressure steam	***
	61)	"	vertical	PI high pressure steam	***
	62)	"	vertical	PI condensate	***
	63)	"	vertical	PI	***
	64)	"	vertical	PI	***
	65)	"	horizontal	PI	***
8201-62	66)	Safety Cleaning Room	vertical	PI	***
	67)	"	vertical	PI	***
	68)	"	horizontal	PI	***
	69)	"	horizontal	PI	***
	70)	Maintenance Craneway	overhead	PI-orange	***
	71)	"	overhead	PI-orange	***
	72)	"	vertical	PI-green	***
	73)	"	vertical	PI-green	***

* pipe insulation
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 201

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	74)	Maintenance Craneway	vertical	PI* orange	***
	75)	"	overhead	PI orange	***
	76)	"	vertical	PI green	***
	77)	"	vertical	PI grey	***
	78)	"	vertical	PI orange	***
	79)	"	overhead	PI orange	***
	80)	"	overhead	PI orange	***
	81)	"	overhead	PI orange l. press. steam	***
	82)	Reactor Area	overhead	PI orange 12" " "	***
	83)	"	overhead	PI orange 12"	***
	84)	"	overhead	PI green-city water	***
	85)	"	vertical	PI orange	***
	86)	"	vertical	PI green	***
	87)	"	vertical	PI grey	***
	88)	"	vertical	PI orange	***
	89)	"	vertical	PI inside alum. casing	***
	90)	"	vertical	PI green 2"	***
	91)	"	vertical	PI green 4"	***
	92)	"	vertical	PI inside alum. casing	***
	93)	"	overhead	PI orange 10"	***
	94)	"	vertical	PI green	***
	95)	"	vertical	PI grey	***
	NOTE: 96-99 all on same pipe				
	96)	"	vertical	PI	***
	97)	"	vertical	PI	***
	98)	"	vertical	PI	***
	99)	"	vertical	PI	***
	100)	"	vertical	PI in alum. casing	***
	101)	"	vertical	PI in alum. casing	***
	102)	Exterior Room	vertical	PI green	***
	103)	"	overhead	PI black	***
	104)	"	overhead-horiz.	PI green	***
	105)	"	overhead-horiz.	PI green	***
	106)	"	vertical	PI orange	***
	107)	"	vertical	"boiler" insul. orange	***
	108)	"	horizontal	PI white	***
	109)	"	vertical	PI green	***
	110)	Dissociator Room	vertical	PI in alum. casing	***

* pipe insulation

*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 201

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	111)	Dissociator Room	vertical	PI* white	***
	112)	"	vertical	PI black	***
	113)	"	overhead	PI green 5"	***
	114)	"	vertical	PI green 2"	***
	115)	"	overhead	PI green 3"	***
	116)	"	overhead	PI orange l. press. steam	***
	117)	No name	vertical	PI 6" city water	***
	118)	"	vertical	PI 9" 65° water	***
	119)	"	vertical	PI	***
	120)	"	vertical	PI	***
	121)	"	overhead	PI	***
	122)	"	horizontal	PI	***
	123)	"	vertical	PI	***
	124)	"	horizontal	PI	***
	125)	"	vertical	PI h. press. steam	***
	126)	Equipment Storage	vertical	PI	***
	127)	No name	on floor	debris	***
	128)	"	vertical	PI "sump pump out"	***
	129)	"	vertical	PI in foil	***
	130)	"	vertical	PI in alum. jacket	***
	131)	"	vertical	PI	***
	132)	"	vertical	PI 65° water	***
	133)	"	vertical	PI condensate	***
	134)	"	horizontal	PI l. press. steam	***
	135)	"	vertical	vessel jacket	***
	136)	Service Room	horizontal	box insulation	***
	137)	"	horizontal	PI "freon gas"	***
	138)	"	horizontal	PI "freon liquid"	***
	139)	"	vertical	PI condensate	***
	140)	"	vertical	PI l. press. steam	***
8201-63	141)	No name	vertical	PI	***
	142)	"	vertical	PI	***
	143)	"	vertical	PI	***
	144)	"	vertical	PI in alum. jacket	***
	145)	"	horizontal	PI black	***
	146)	"	vertical-below 145	PI in alum. jacket	***
	147)	"	vertical	PI green outside/ black inside	***
	148)	"	vertical	PI in orange alum. jacket	***

* pipe insulation

*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 201

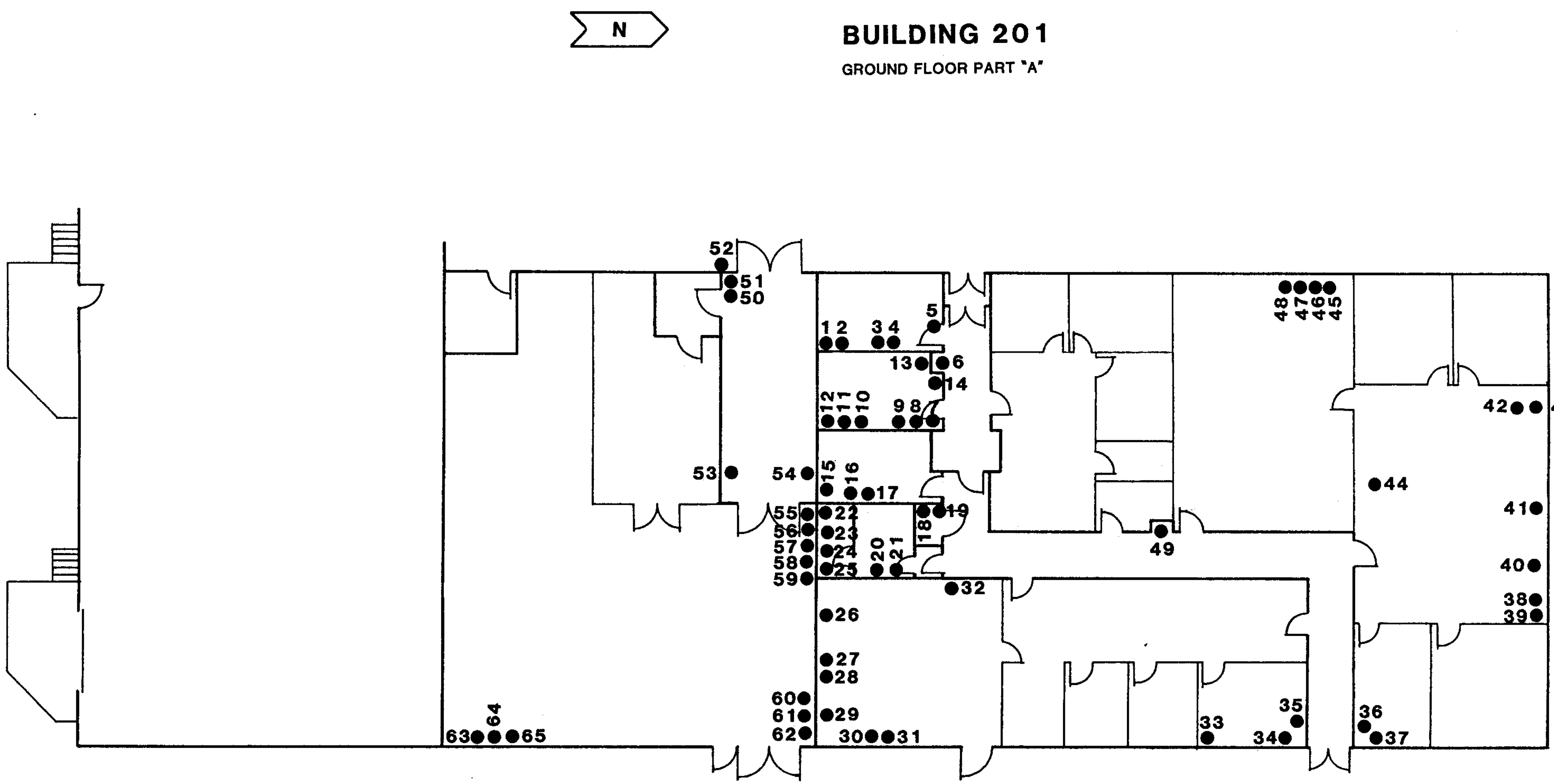
Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	149)	No name	vertical	PI*	***
	150)	"	vertical	PI city water	***
	151)	"	vertical	PI h. press. steam	***
	152)	"	vertical	PI h. press. steam	***
	153)	"	vertical	PI 65° deg. water	***
	154)	Reactor Area	vertical	PI green	***
	155)	"	overhead	PI	***
	156)	"	vertical	PI	***
	157)	"	vertical	PI l. press. steam	***
	158)	"	vertical	PI h. press. steam	***
	159)	"	vertical	PI m. press. steam	***
	160)	"	horizontal	PI over brick	***
	161)	"	horizontal	insul. brick	***
	162)	"	overhead	PI red	***
	163)	"	vertical	PI in alum. jacket	***
	164)	"	overhead	PI 12" smooth	***
	165)	"	overhead	PI 12" in alum. jacket	***
	166)	"	vertical	PI in foil	***
	167)	"	overhead	PI	***
	168)	"	vertical	PI brick	***
	169)	"	vertical	PI next level	***
	170)	"	vertical	PI next level	***
	171)	"	vertical	PI white stuff	***
8201-64	172)	Reactor Area	horizontal	trough insul.	***
	173)	"	horizontal-fattest line	PI	***
	174)	"	horizontal	PI alum. jacket	***
	175)	"	horizontal	PI alum. jacket	***
	176)	"	vertical	duct insul.	3
	177)	No name	vertical	PI 65° water	***
	178)	"	floor	debris	3
	179)	"	floor	debris	3
	180)	"	vertical	PI alum. jacket	***
	181)	"	horizontal	PI alum. jacket	***
8201-65	182)	Reactor Area	vertical	PI blanket	***
	183)	No name	vertical	PI	***
	184)	Heat & Ventil. Equip.	floor	debris	3
8201-66	185)	Stair No. 2	floor	ceiling debris	3
	186)	Roof	vertical	dust collector insul.	3
	187)	N. Side	siding	transite	1

* pipe insulation

*** not required

BUILDING 201

GROUND FLOOR PART "A"

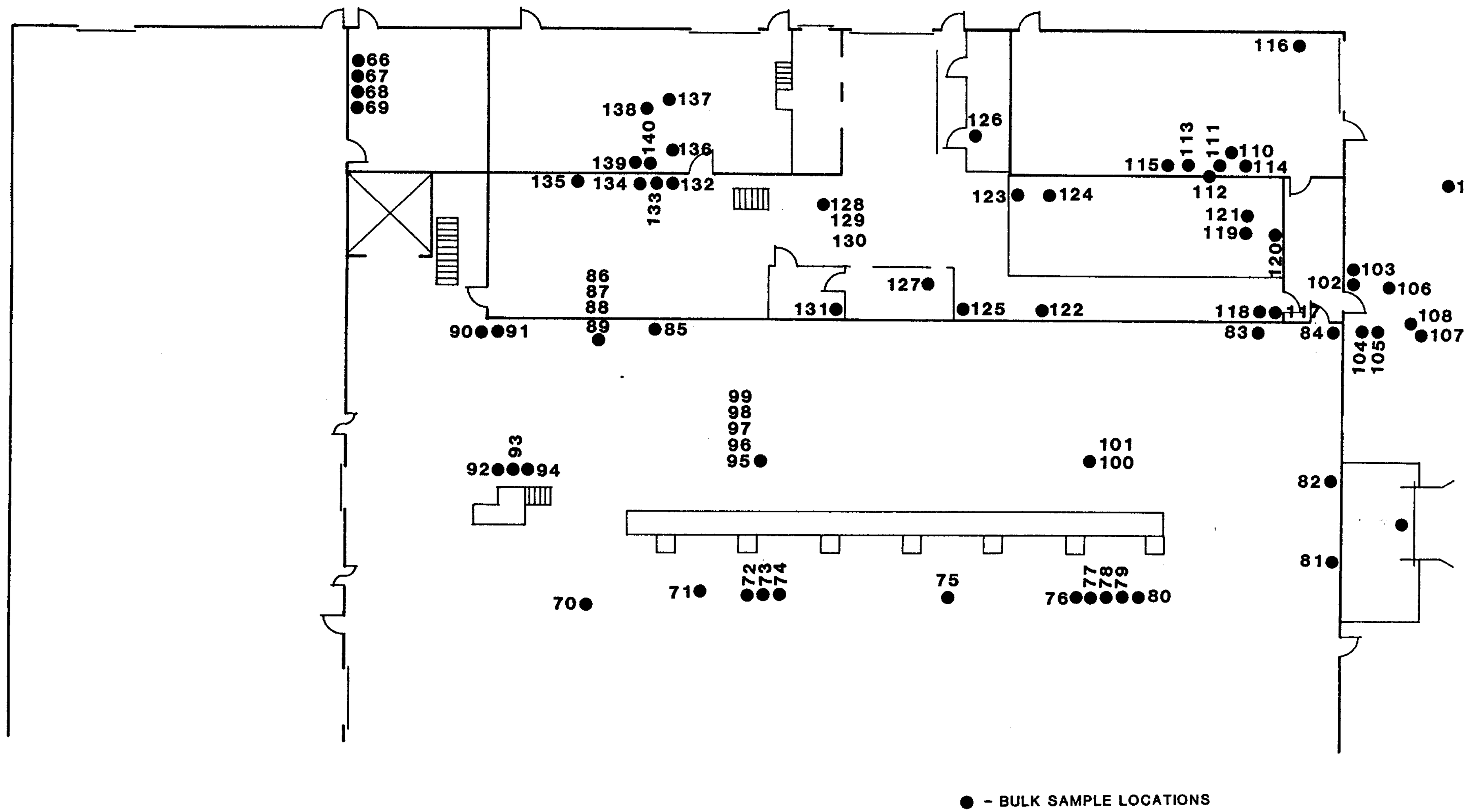


● - BULK SAMPLE LOCATIONS

N

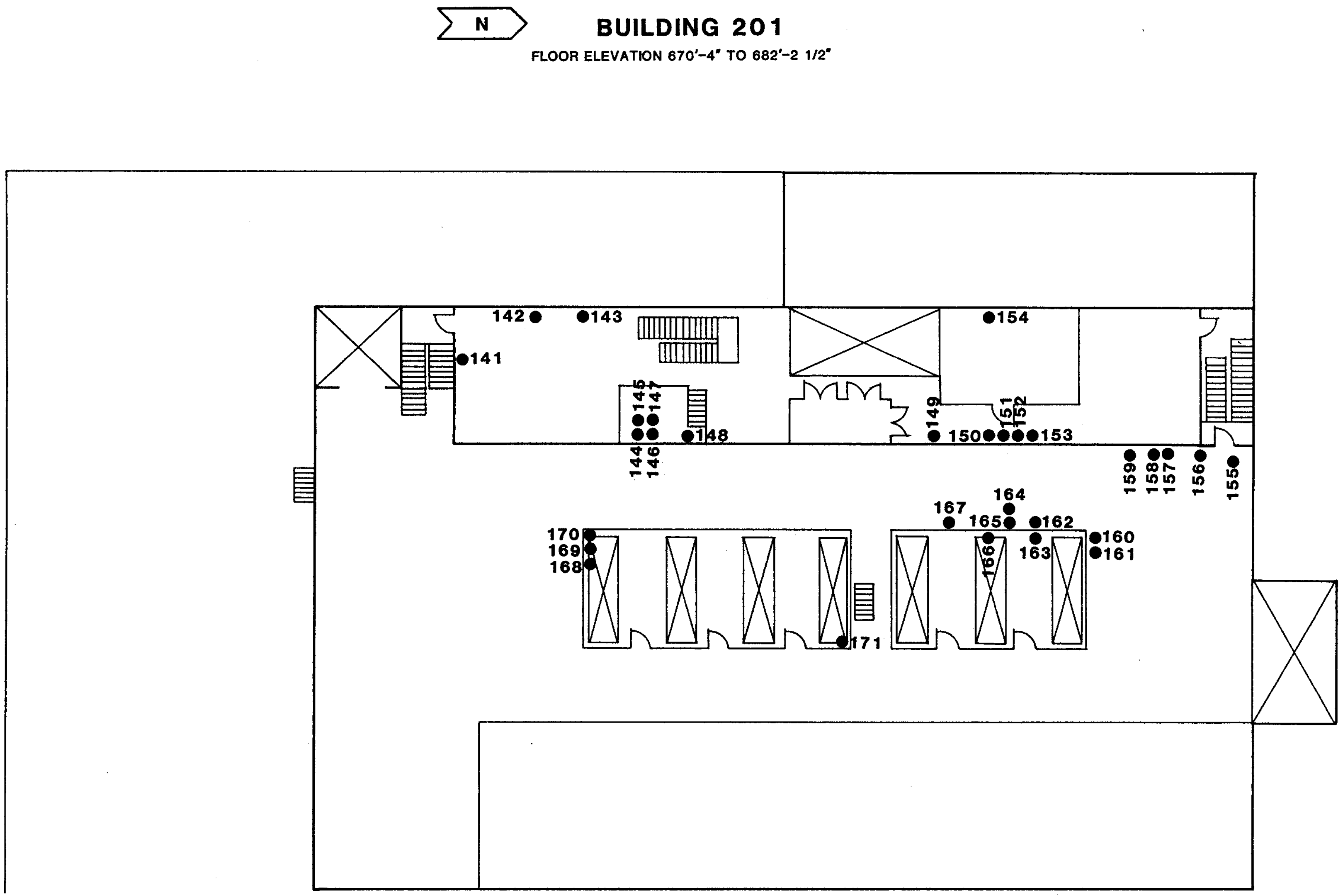
BUILDING 201

GROUND FLOOR PART "B"



BUILDING 201

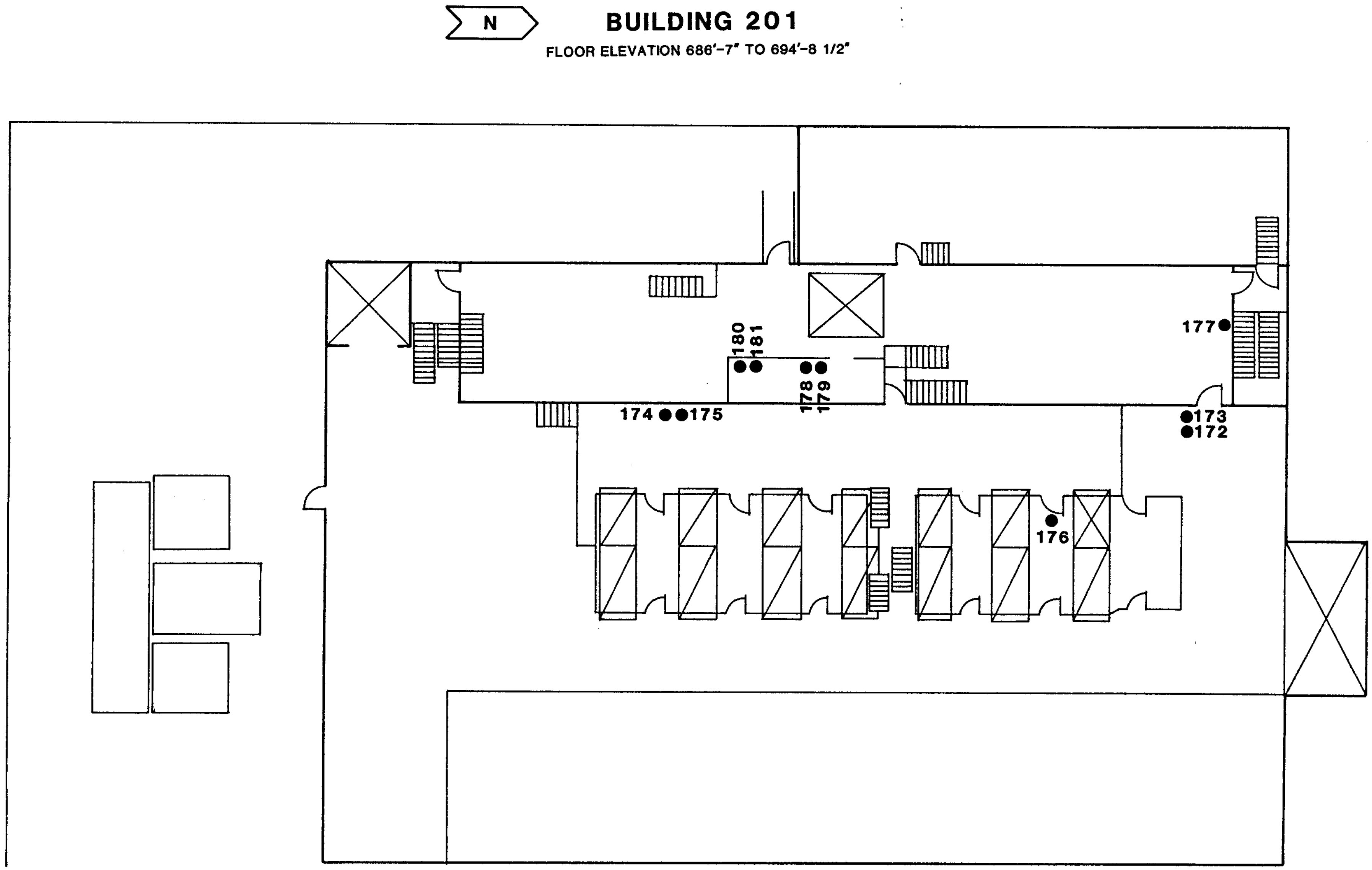
FLOOR ELEVATION 670'-4" TO 682'-2 1/2"



● - BULK SAMPLE LOCATIONS

BUILDING 201

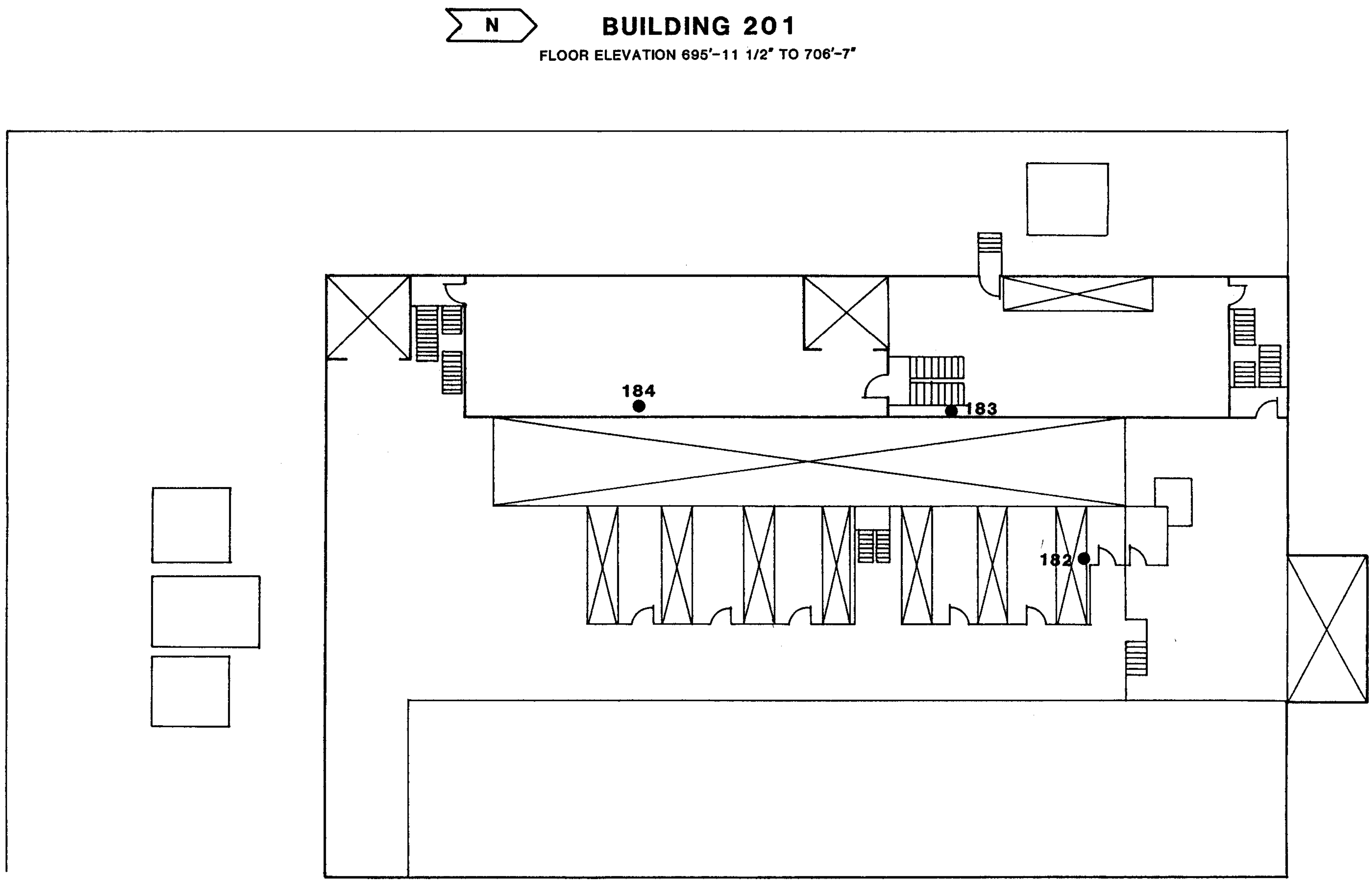
FLOOR ELEVATION 686'-7" TO 694'-8 1/2"



● – BULK SAMPLE LOCATIONS

BUILDING 201

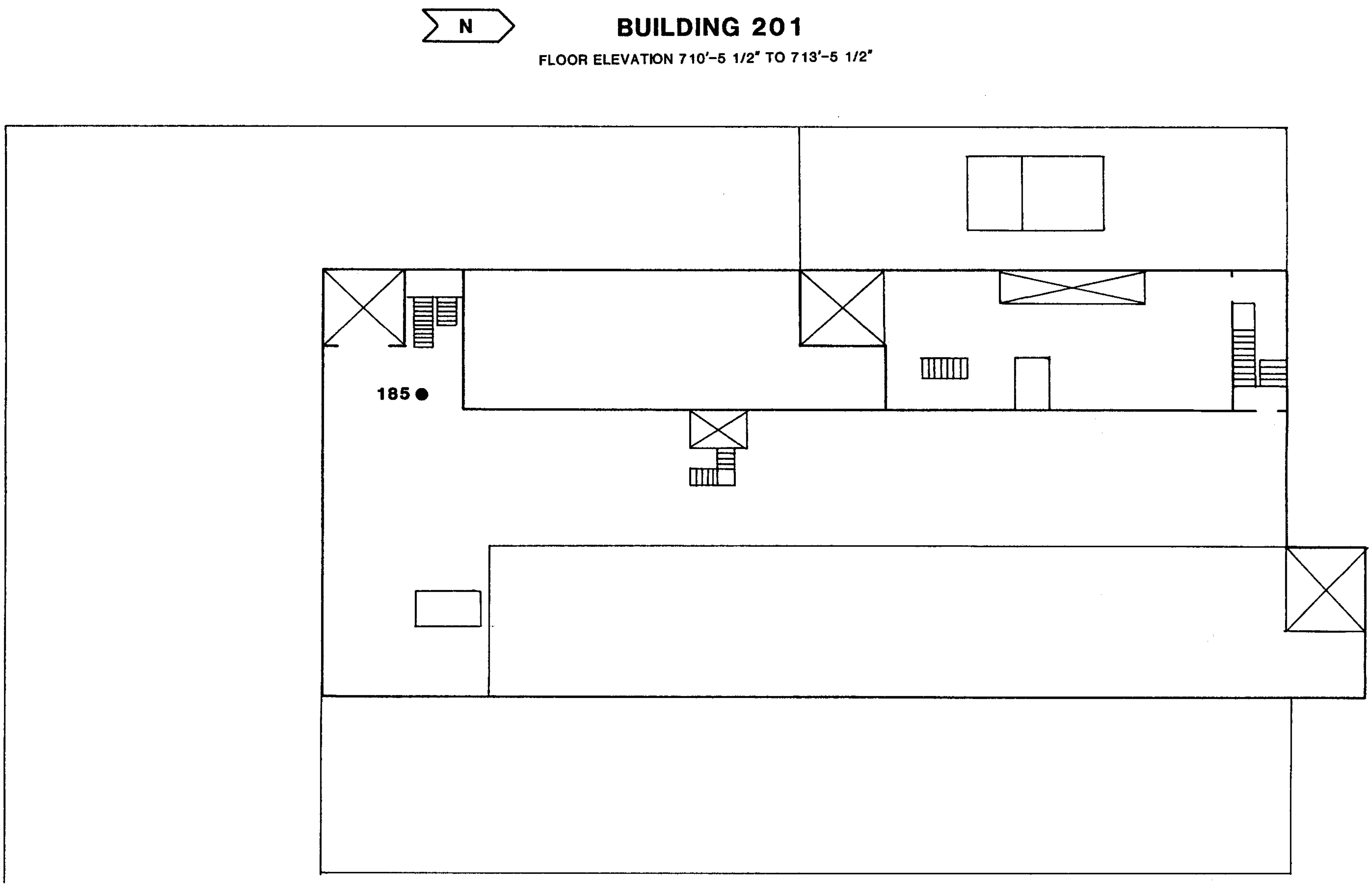
FLOOR ELEVATION 695'-11 1/2" TO 706'-7"



● - BULK SAMPLE LOCATIONS

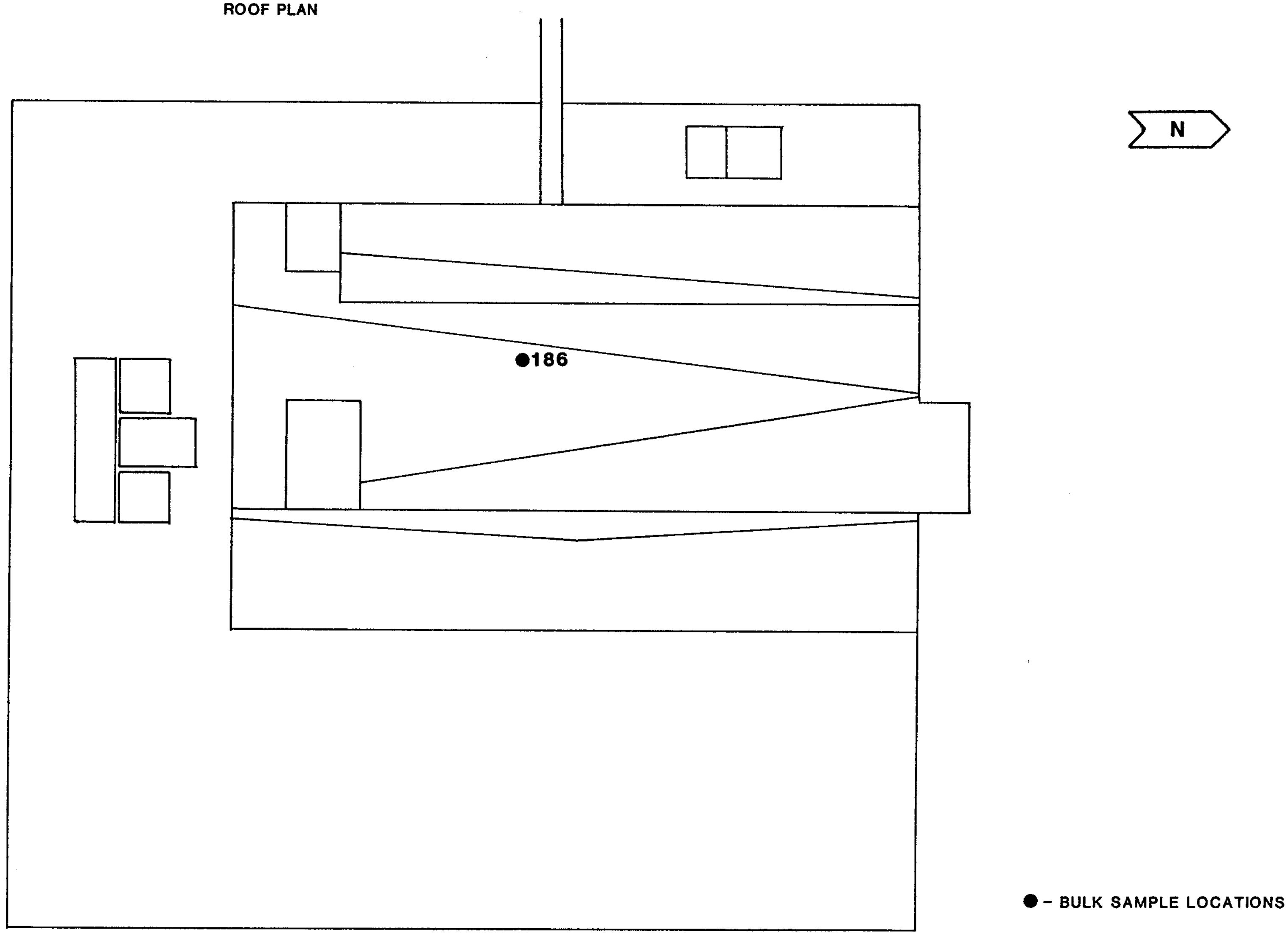
BUILDING 201

FLOOR ELEVATION 710'-5 1/2" TO 713'-5 1/2"



● - BULK SAMPLE LOCATIONS

BUILDING 201
ROOF PLAN



WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

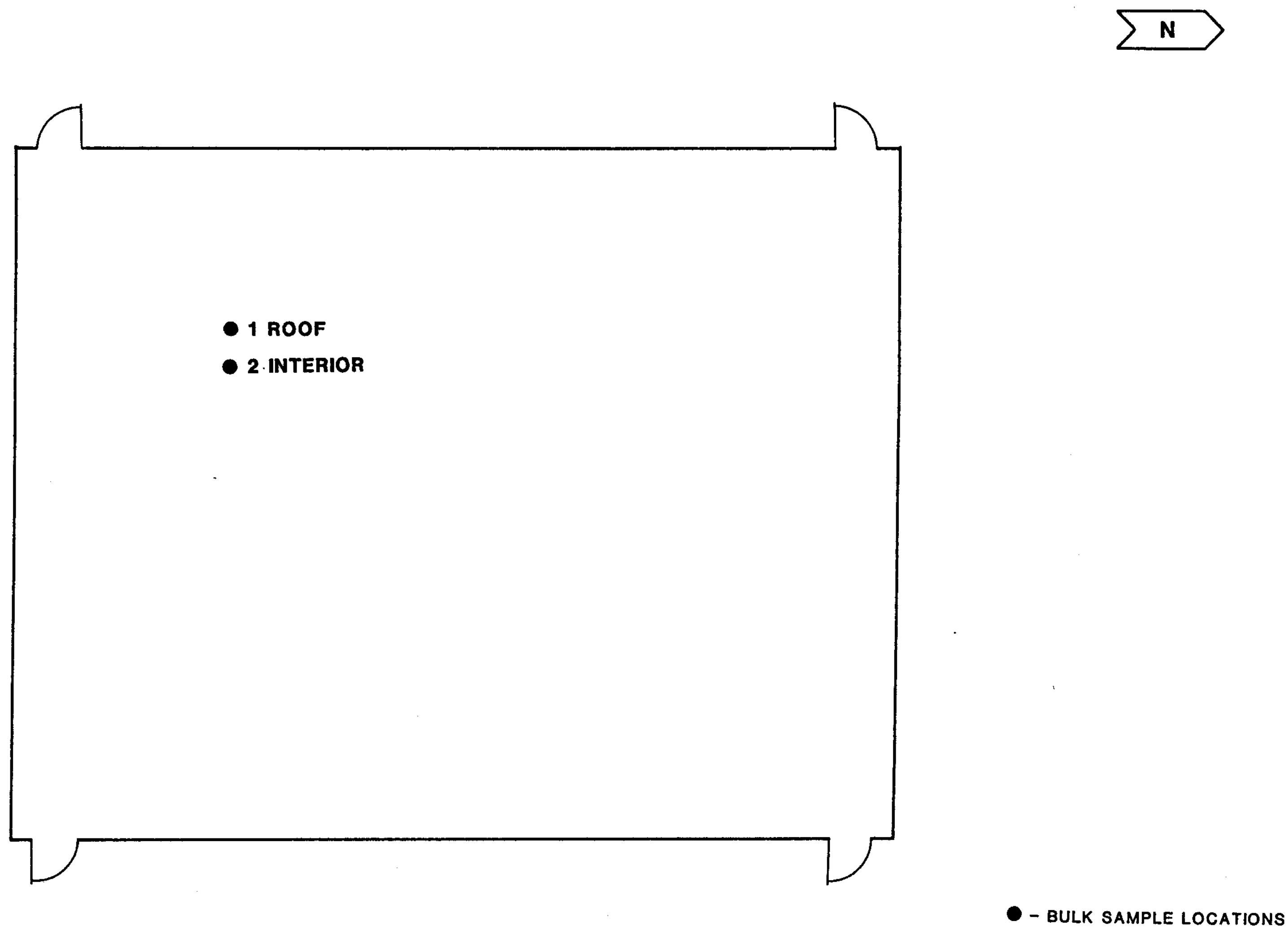
BUILDING NO. 202

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	Roof		PI*-white	***
	2)	Interior		PI-white	***
	3)	Exterior Siding		transite	1

* pipe insulation

*** not required

BUILDING 202



WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 301

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8301-67	1)	Chem. Stor. Area		PI*	***
	2)	"	"	PI	***
	3)	Metal Burning Area		PI	***
	4)	Dingot Machining Area		PI	***
	5)	Dingot Machining Area		PI	***
	6)	Dingot Machining Area		PI	***
	7)	Dingot Machining Area		PI	***
	8)	Metal Inspect & Sampling Area		PI	***
	9)	"	"	boiler insul.	***
	10)	"	"	boiler insul.	***
	11)	"	"	PI	***
	12)	"	"	PI	***
	13)	"	"	PI	***
	14)	"	"	PI	***
	15)	"	"	PI	***
	16)	Metal Forming Area			
	17)	"	"	PI	***
	18)	"	"	PI	***
	19)	"	"	PI	***
	20)	"	"	PI	***
	21)	"	"	PI	***
	22)	"	"	PI	***
	23)	Metal Forming Area-Toilet		PI	***
	24)	Tool Room		PI	***
	25)	Coordinates 6-B		PI	***
	26)	Coordinates 6-A		PI	***
	27)	"	"	PI	***
	28)	"	"	PI	***
	29)	Bomb Liner Foundation Area		PI	***
	30)	"	"	PI	***
	31)	"	"	duct insul.	3
	32)	Reduction Furnace Area		cable insul.	***
	33)	"	"	track insul.	***
	34)	"	"	duct insul.	3
	35)	"	"	seal	***
	36)	"	"	boiler insul.	***

* pipe insulation

*** not required

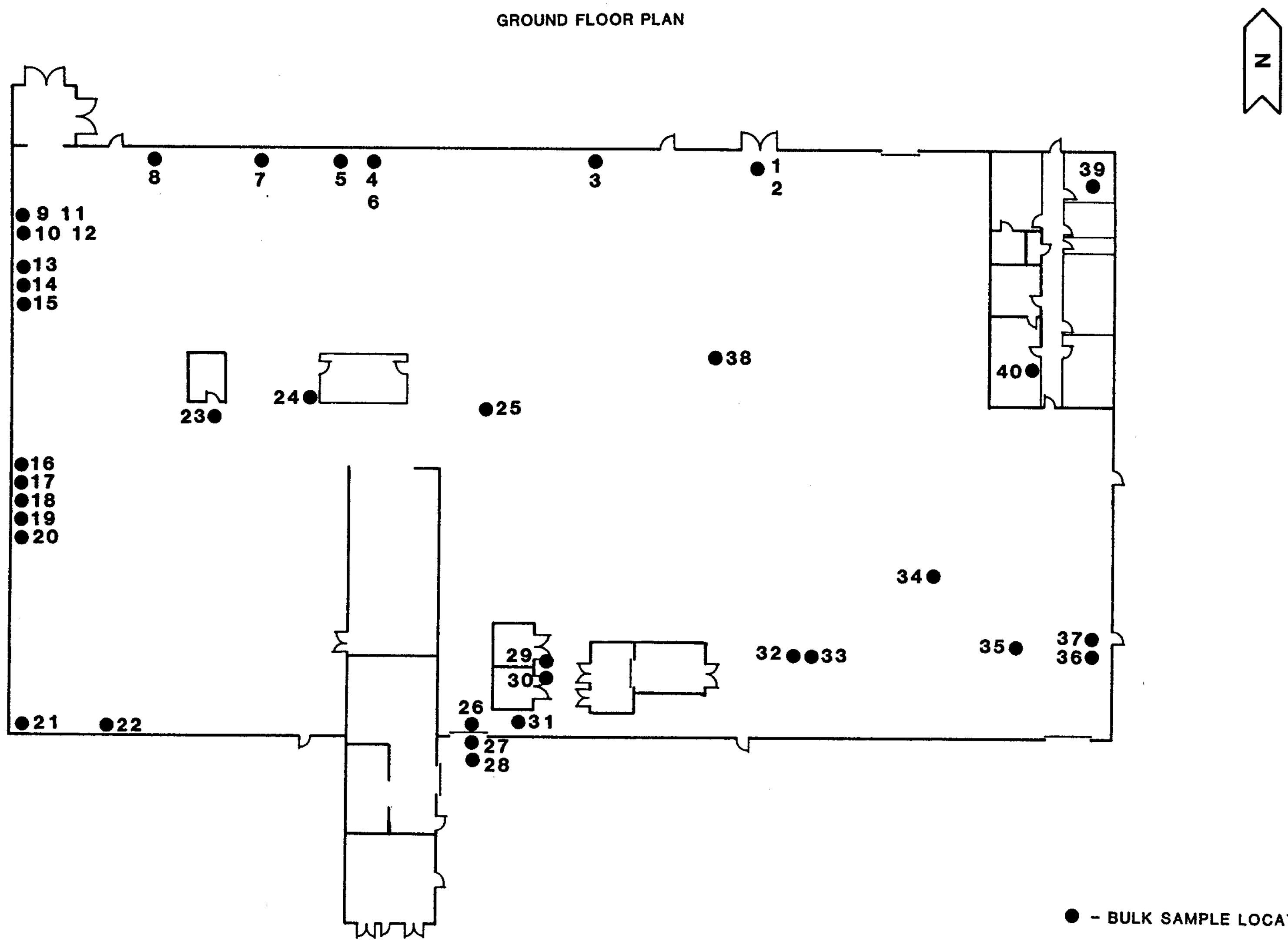
WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 301 (cont.)

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	37)	"	"	boiler insul.	***
	38)	Sump Treatment Area		tank insul.	***
	39)	Plant Supt. Office		duct insul.	3
	40)	Office Corridor		floor tile	3
	41)	Roof of offices		PI-black	***
	42)	" "		duct insul.	3
	43)	" "		PI	***
	44)	Anywhere		ceiling-3 layers	3 each layer
	45)	Exterior Siding		transite	***

* pipe insulation
*** not required

BUILDING 301

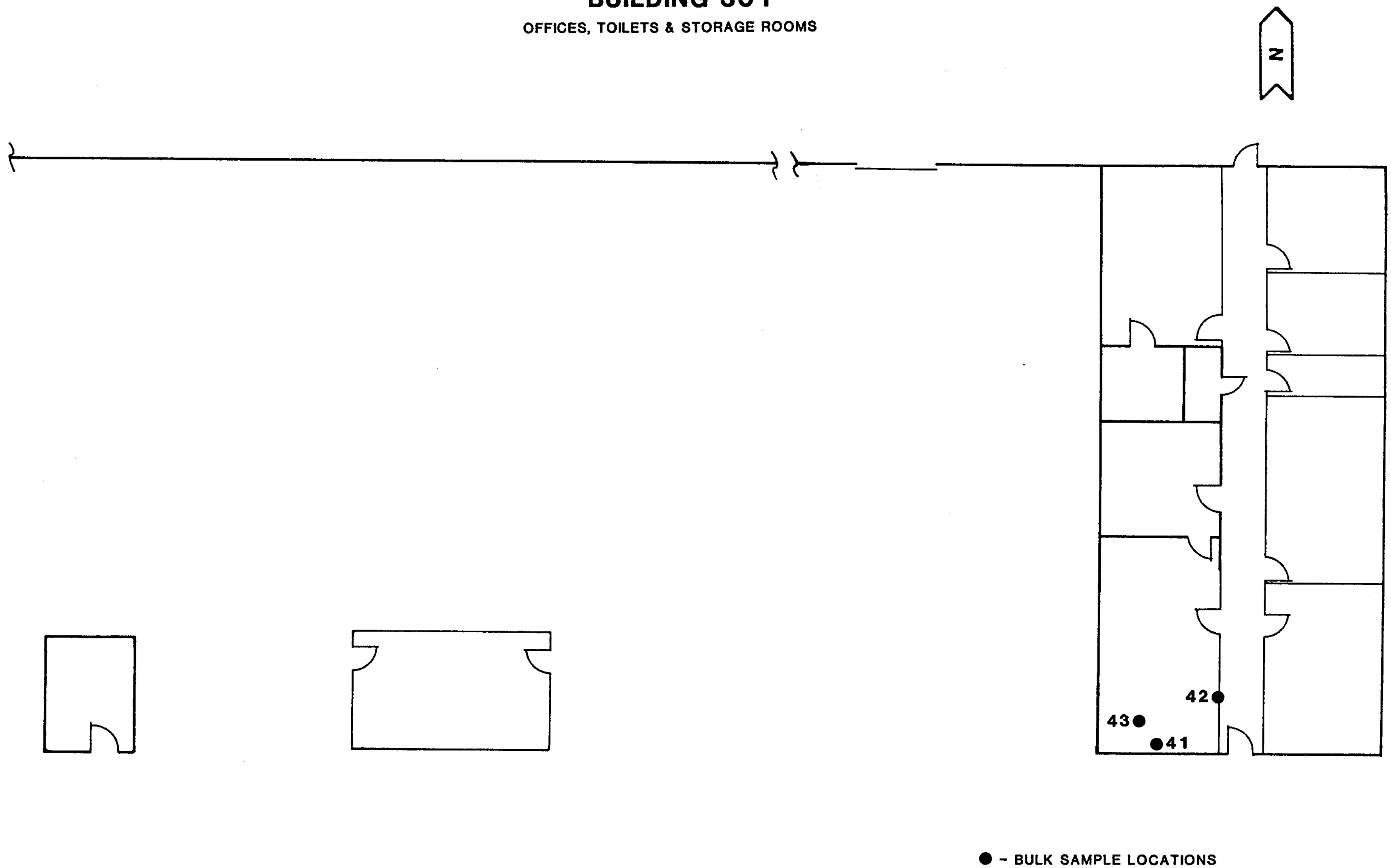
GROUND FLOOR PLAN



● - BULK SAMPLE LOCATIONS

BUILDING 301

OFFICES, TOILETS & STORAGE ROOMS



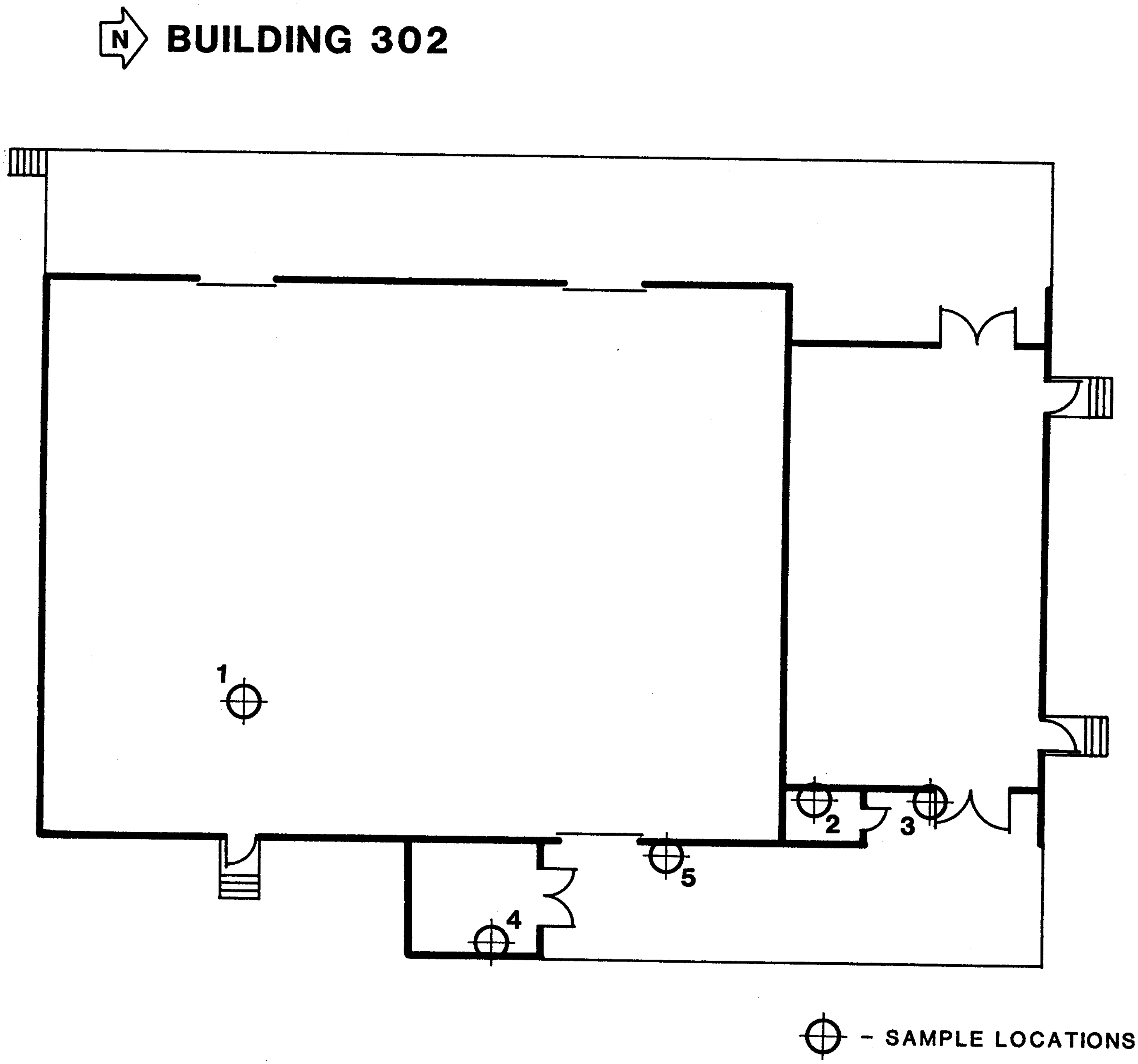
WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 302

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8302-61	1)	Room 101		ceiling	3 each layer
	2)	Room 103		PI*	***
	3)	Room 105		PI	***
	4)	Room 104		PI	***
	5)	Room 105		PI	***

*pipe insulation

*** not required

BUILDING 302



WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 303

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
Bldg. removed				none	

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 404

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	Main plant area	vertical	PI*-orange	***
	2)		vertical	PI -orange	***
	3)		vertical	PI -orange	***
	4)		vertical	PI -green	***
	5)		vertical	PI -orange	***
	6)		vertical	PI -green	***
	7)		vertical	PI -orange	***
	8)		horizontal overhead	PI -orange	***
	9)	Room 105	baseboard	PI	***
	10)		walls of shed	transite	***
	11)		horizontal	vessel jacket-black	***
	12)		vertical	PI -orange	***
	13)		overhead-horizontal	PI -green	***
	14)		vertical	PI -green	***
	15)		vertical	PI -green	***
	16)		overhead vertical end	PI -orange 9"	***
	17)		overhead vert/horiz.	PI -orange 3"	***
	18)		overhead horizontal	PI -orange 7"	***
	19)		overhead horizontal	PI -orange 12"	***
	20)		overhead vertical	duct insulation	3
	21)		overhead horizontal	PI -orange 8"	***
	22)		overhead horizontal	PI -green 7"	***
	23)		overhead horizontal	PI -green 2"	***
	24)		waist level/horiz.	PI -orange	***
	25)		overhead horizontal	PI -green 10"	***
	26)		overhead horizontal	PI -orange 14"	***
	27)		overhead horizontal	PI -orange 12"	***
	28)		waist level/horiz.	PI -green 6"	***
	29)		waist level/horiz.	PI -orange 12"	***
	30)		waist level/horiz.	PI -orange 6"	***
	31)		waist level/horiz.	duct insulation	3
	32)	just N. column 5C		valve insul.-orange	***
	33)	originating from 29		PI -orange 6"	***
	34)	Transverse from 30		PI -orange 7"	***
	35)		overhead horiz.	PI -green 4"	***
	36)		vertical	PI -orange 4"	***
	37)		vertical	PI -orange 4"	***
	38)		vertical	PI -orange 3"	***
	39)		vertical	PI -orange 3"	***

* pipe insulation
*** not required

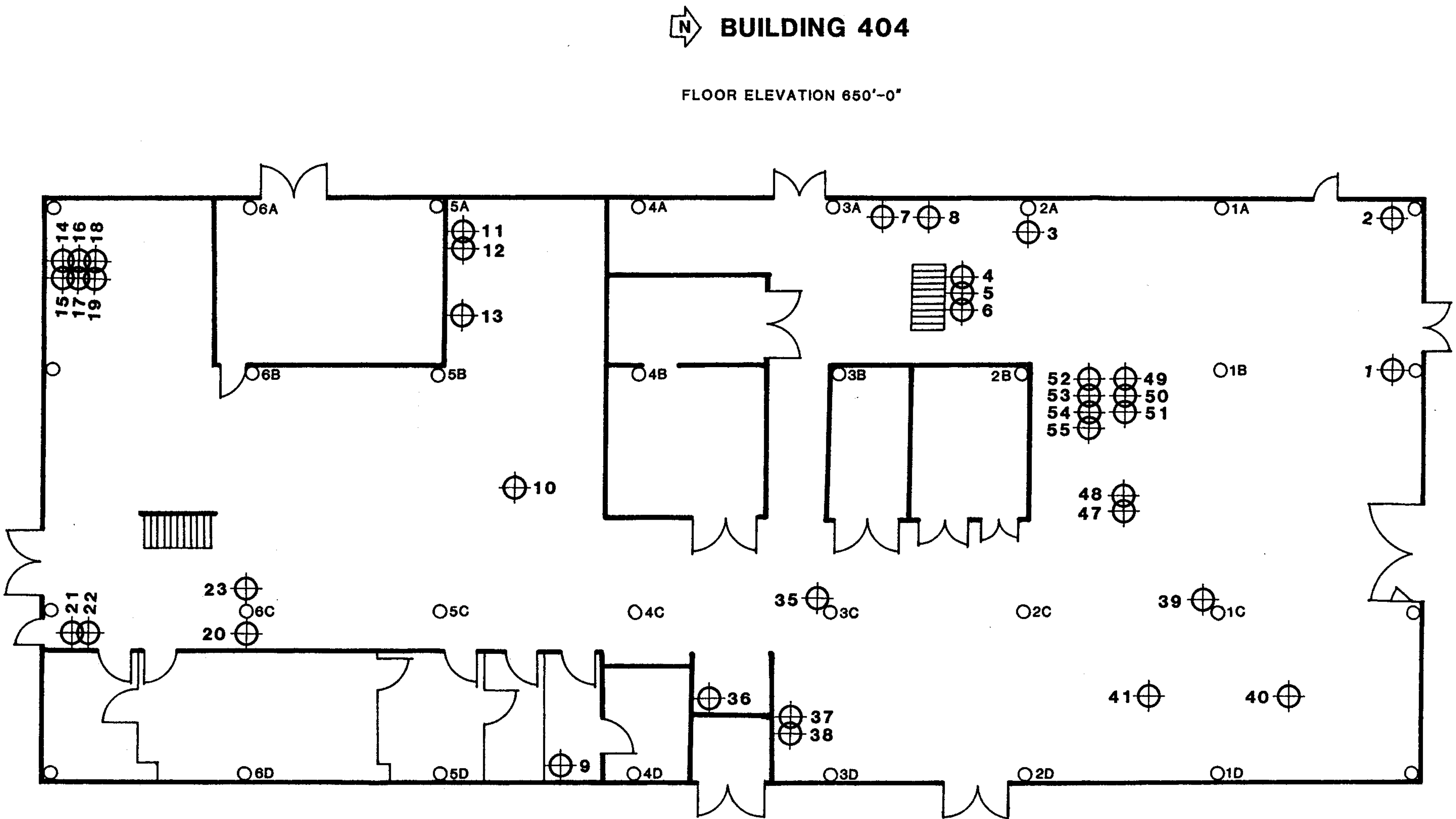
WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 404

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	40)	Pipe complex		PI -orange 7" shiny	***
	41)	Pipe complex	overhead	PI -orange 7" dull	***
	42)		vertical	PI -orange 7"	***
	43)		horizontal	PI -green 3"	***
	44)		horizontal	PI -green 4"	***
	45)		vertical	PI -orange 4"	***
	46)		vertical	PI -black 2"	***
	47)		overhead under NE corner of upper level platform, attached to platform support	PI -white wrap on 2" pipe on outermost portion	***
	48)		overhead under NE corner of upper level platform, attached to platform support	PI -inside alum. jacket on rear portion	***
	49)		vertical	PI-inside alum. jacket	***
	50)		vertical	PI grey 2"	***
	51)		vertical/horiz.	PI green 4"	***
	52)		horiz.	PI green	***
	53)		horiz.	PI green	***
	54)		horiz.	PI green	***
	55)		horiz.	PI green	***

* pipe insulation
*** not required

BUILDING 404

FLOOR ELEVATION 650'-0"

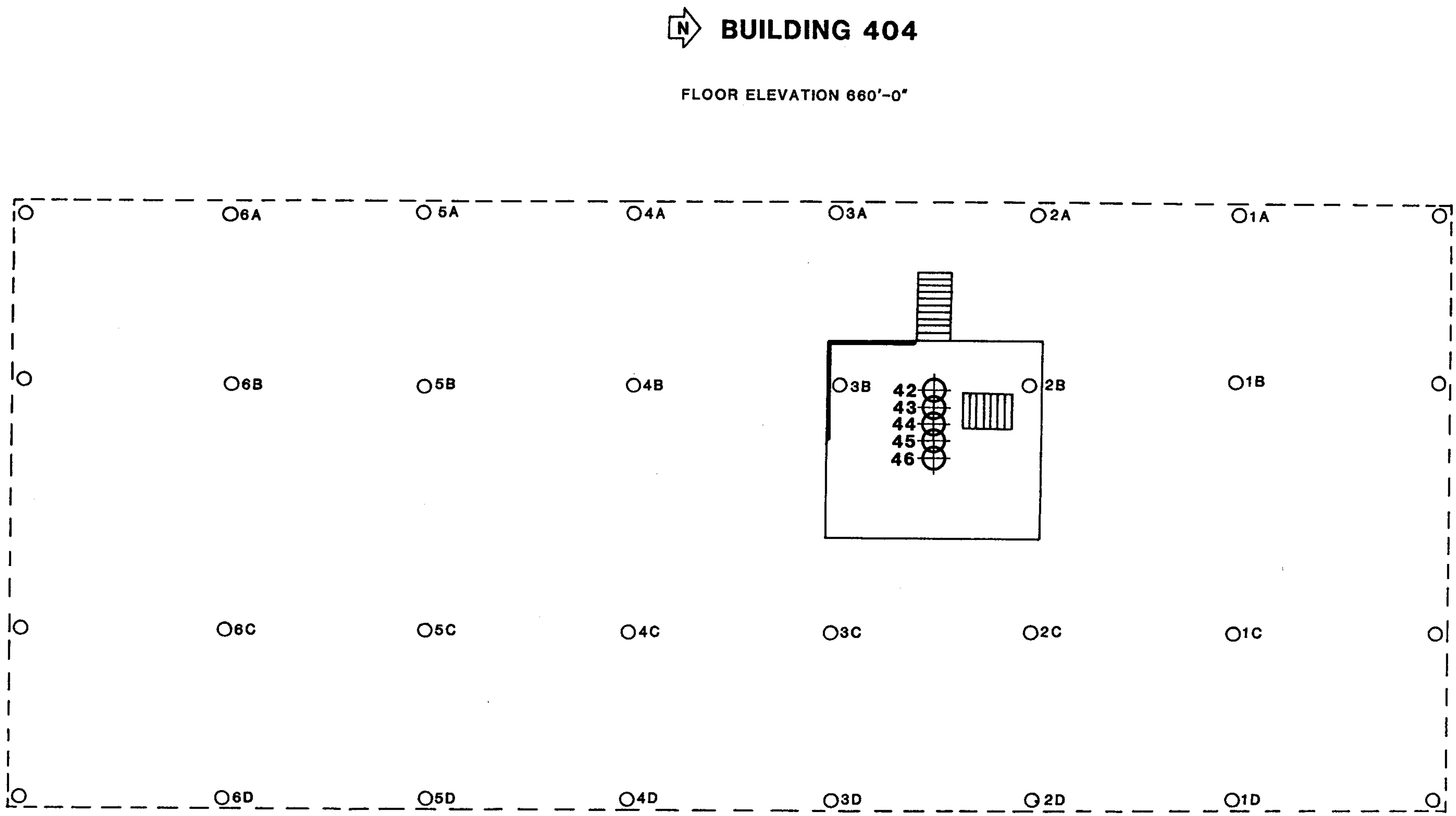


O - COLUMNS

⊕ - BULK SAMPLE LOCATIONS

BUILDING 404

FLOOR ELEVATION 660'-0"

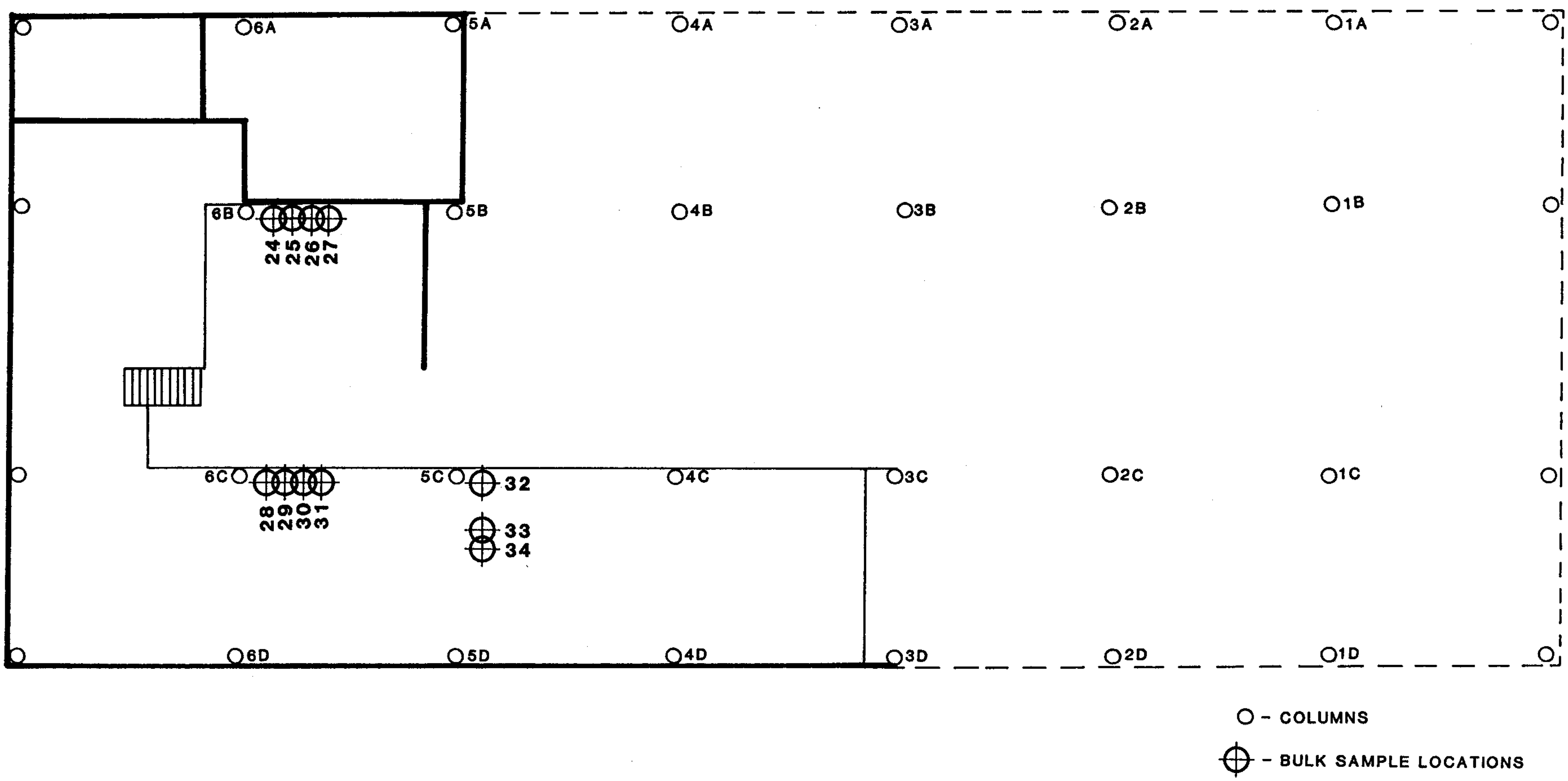


○ - COLUMNS

⊕ - BULK SAMPLE LOCATIONS

BUILDING 404

FLOOR ELEVATION 661'-0"



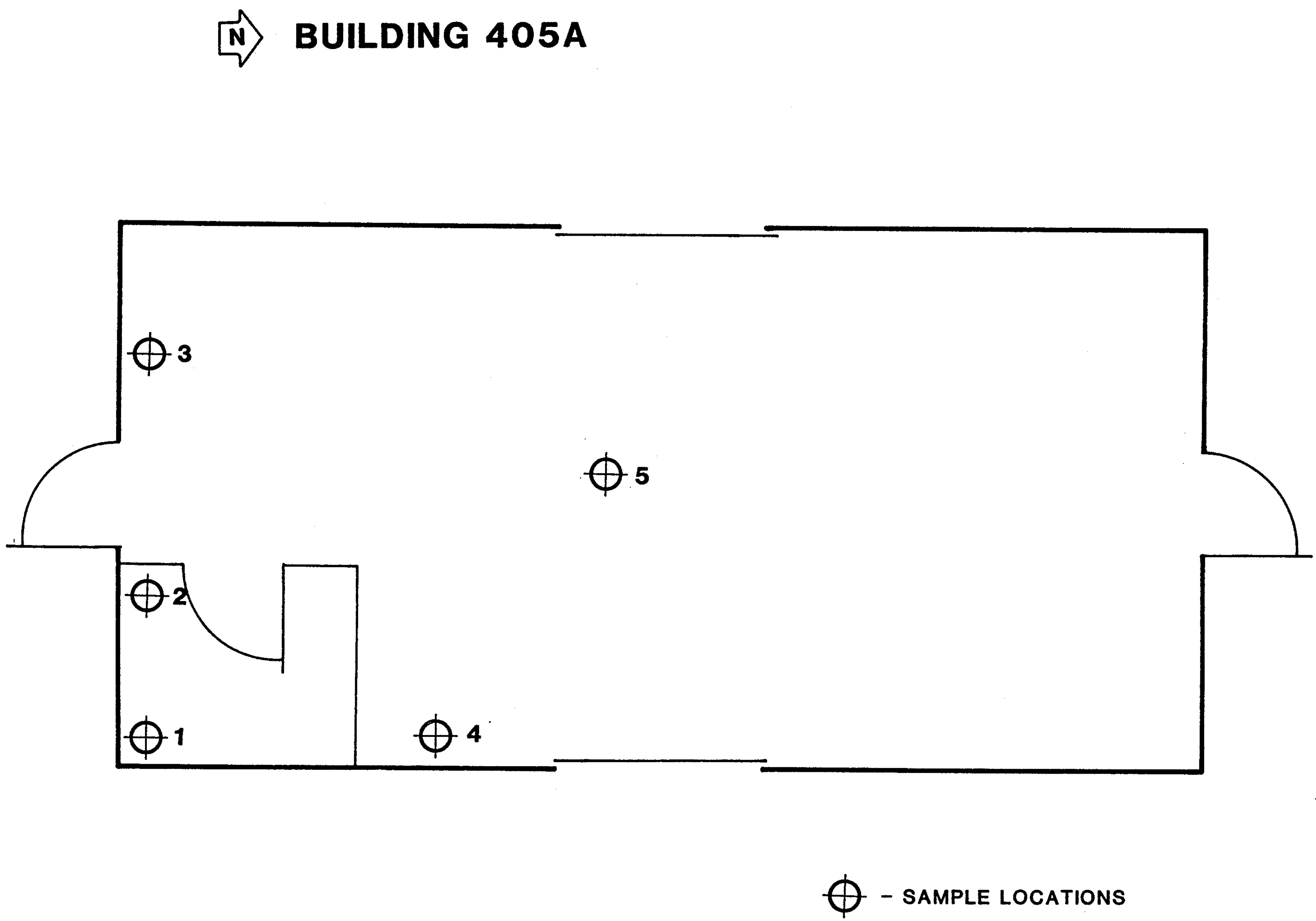
WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 405A

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	South door-Room 101		PI*	***
	2)	South door-Room 101		PI	***
	3)	South door		PI	***
	4)	South door/east wall		PI	***
	5)	Ceiling		3 layers	3 each layer

* pipe insulation

*** not required

BUILDING 405A



WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 405B

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples

none

WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

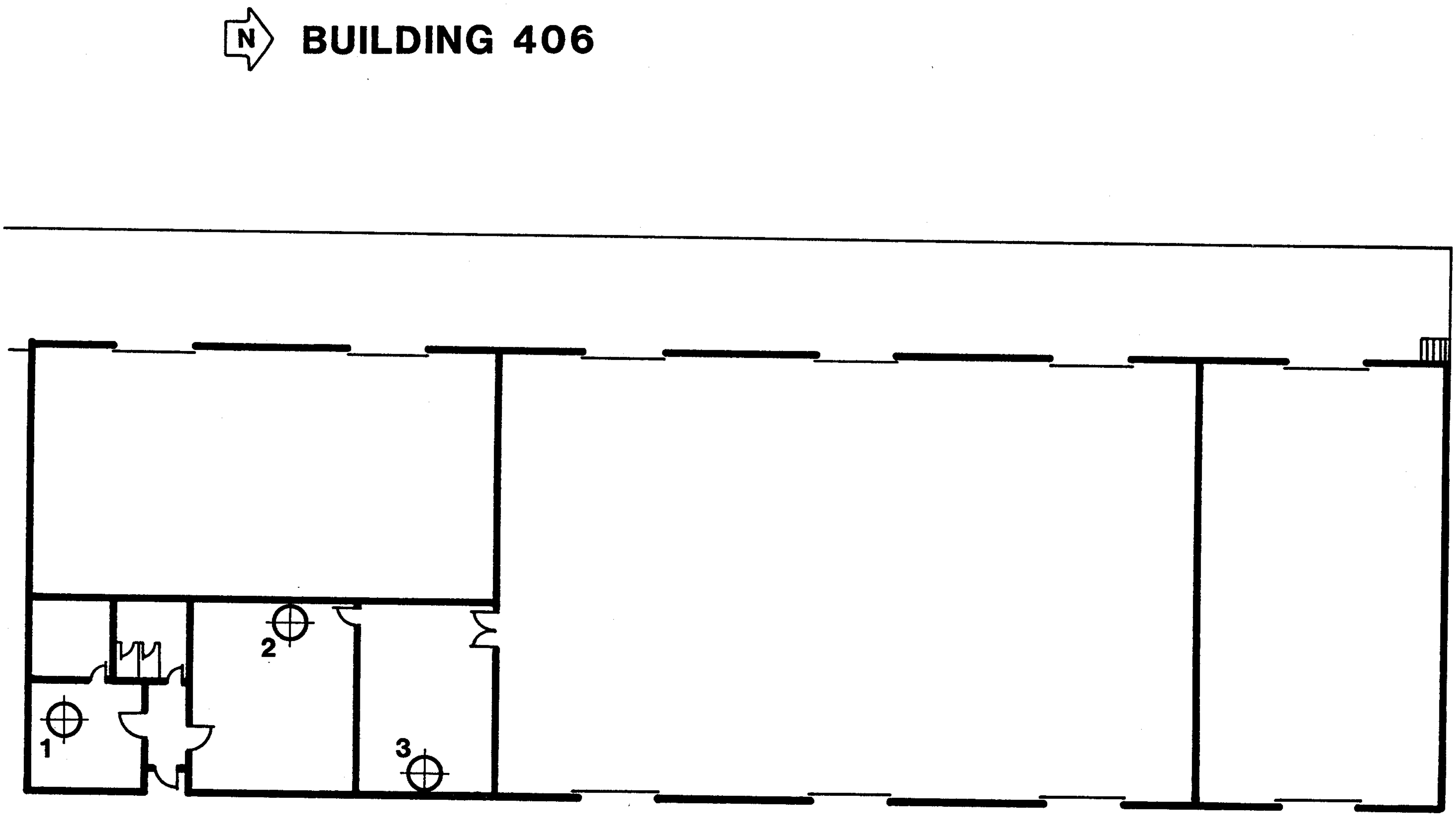
BUILDING NO. 406

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8406-61	1)	General Office (102)		ceiling layers	3 each layer
	2)	Locker Room (105)		PI*	***
	3)	Utility Room (106)		PI	***

* pipe insulation

*** not required

BUILDING 406



⊕ - SAMPLE LOCATIONS

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8407-83	1)	Library (92C)	overhead	PI*	***
	2)	"	overhead	duct insulation	3
	3)	"	overhead inside door	PI	***
	4)	Restroom (94C)	vertical	PI	***
	5)	"	vertical	PI	***
	6)	Photo Lab (101C)	vertical	PI black (upper)	***
	7)	"	vertical	PI black (upper)	***
	8)	"	vertical	PI silver (lower)	***
	9)	"	vertical	PI silver (lower)	***
	10)	Ceramics Lab (89C)	floor	floor tile	3
	11)	"	overhead	PI	***
	12)	"	vertical	PI	***
	13)	"	overhead	PI	***
	14)	"	hood	L&S**	***
	15)	"	overhead	PI	***
	16)	"	overhead-above clg.	PI 6"	***
	17)	"	overhead-above clg.	PI brown 8"	***
	18)	Metallurgical Testing Lab (90C)	overhead/vert.	PI	***
	19)	"	overhead/vert.	PI	***
	20)	"	hood	L&S	***
	21)	"	equip. piping	PI	***
	22)	"	equip. piping	PI	***
	23)	Dry Chemistry Lab (87C)	overhead	PI	***
	24)	"	overhead	PI	***
	25)	"	overhead	PI	***
	26)	"	overhead	PI white/orange 6"	***
	27)	"	overhead	PI white 6"	***
	28)	"	overhead-from 29	PI white 5"	***
	29)	"	overhead	PI brown/green 8"	***
	30)	"	vertical on outside of hood	PI	***
	31)	"	hood	L&S	***
	32)	"	vertical	PI	***

* pipe insulation
** liner & shell
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	33)	Dry Chemistry Lab (87C)	overhead	PI*	***
	34)	"	overhead	PI	***
	35)	"	floor-horiz.	PI	***
	36)	"	hood	L&S**	***
	37)	"	hood	PI	***
	38)	"	overhead	PI	***
	39)	"	overhead	PI	***
	40)	"	overhead	PI	***
	41)	"	vertical	PI	***
	42)	"	vertical	PI	***
	43)	Haz. Reaction Area (117C)	siding	transite	***
	44)	Gas Cylinder Storage Area	overhead	PI	***
	45)	Dry Chemistry Lab (87C)	overhead	PI	***
	46)	"	overhead	PI	***
	47)	"	overhead	PI	***
	48)	"	overhead	PI	***
	49)	"	overhead	PI	***
	50)	"	overhead - mark on floor in front of door	PI	***
	51)	"	hood	L&S	***
	52)	"	hood-floor-outside	PI	***
	53)	"	hood	L&S	***
	54)	"	hood-floor-outside	PI	***
	55)	"	overhead	PI	***
	56)	"	between hoods	PI	***
	57)	"	overhead-front of hoods	PI	***
	58)	"	overhead-front of hoods	PI	***
	59)	"	side of hood	PI	***
	60)	"	side of hood	PI	***
	61)	"	hood	L&S	***

* pipe insulation
** liner & shell
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	62)	Dry Chemistry Lab	overhead	PI*	***
	63)	"	overhead	PI	***
	64)	"	overhead	PI	***
	65)	"	overhead	PI	***
	66)	Vacuum Fusion Room (86C)	floor	PI	***
	67)	"	vertical	PI	***
	68)	"	vertical	PI	***
	69)	"	hood	L&S**	***
	71)	"	overhead	PI	***
	72)	"	overhead	PI	***
	73)	"	floor	PI	***
	74)	"	overhead	PI	***
	75)	Instrument Room (84C)	vertical	PI	***
	76)	"	overhead	PI	***
	77)	"	hood	L&S	***
	78)	"	overhead	PI	***
	79)	Chem Microscopy (85C)	debris	debris in sink cabinet	***
	80)	"	vertical	PI	***
	81)	"	overhead	PI	***
	82)	"	hood	L&S	***
	83)	"	overhead	PI	***
	84)	Dark Room (82C)	overhead	PI	***
	85)	Electron Microscopy (81C)	overhead	PI	***
	86)	Glass Blowing (83C)	overhead	PI	***
	87)	N. Corridor (112C)	overhead	PI	***
	87x)	Janitor's Closet (96C)	overhead	PI	***
	88)	Sample Mach. Area (97C)	overhead	PI	***
	89)	"	overhead	PI	***
	90)	"	overhead	PI	***
	91)	Film & Specimen Stg. (98C)	vertical	PI	***
	92)	"	vertical	PI	***
	93)	Grinding Area (102C)	overhead	PI	***
	94)	"	overhead	PI	***

* pipe insulation
** liner & shell
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	95)	Grinding Area (102C)	overhead	PI*	***
	96)	Polishing Room (103C)	overhead	PI	***
	97)	"	overhead	PI	***
	98)	"	overhead	PI	***
	99)	"	hood	L&S**	***
	100)	Physical Testing (99C)	overhead	PI	***
	101)	"	overhead	PI	***
	102)	Metallurgical Micro-scopy (100C)	hood	L&S	***
	103)	"	overhead	PI	***
	104)	"	overhead	PI	***
	105)	Film Dark Room (104C)	overhead	PI	***
8407-82	106)	Mens Toilet (80B)	overhead	PI	***
	107)	"	overhead	PI	***
	108)	"	overhead	PI	***
	109)	Tracer Lab (72B)	overhead	PI	***
	110)	"	overhead	PI	***
	111)	"	hood	L&S	***
	112)	"	overhead	PI	***
	113)	"	overhead	PI	***
	114)	N. Corridor (112B)	overhead	PI	***
	115)	Special Analysis Lab (65B)	vertical	PI	***
	116)	"	overhead	PI	***
	117)	"	hood	L&S	***
	118)	"	overhead	PI	***
	119)	"	hood	L&S	***
	120)	"	overhead	PI	***
	121)	"	overhead	PI	***
	122)	"	hood	L&S	***
	123)	"	overhead	PI	***
	124)	"	hood	L&S	***
	125)	"	overhead	PI	***
	126)	"	hood	L&S	***

* pipe insulation
** liner & shell
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	127)	Special Analysis Lab (65B)	overhead	PI*	***
	128)	"	vertical	PI	***
	129)	"	hood	L&S**	***
	130)	"	overhead	PI	***
	131)	"	hood	L&S	***
	132)	"	overhead	PI	***
	133)	"	hood	L&S	***
	134)	"	overhead	PI	***
	135)	"	hood	L&S	***
	136)	"	overhead	PI	***
	137)	"	hood	L&S	***
	138)	"	vertical	PI	***
	139)	"	overhead	PI	***
	140)	"	hood	L&S	***
	141)	"	overhead	PI	***
	142)	"	overhead	PI	***
	143)	"	hood	L&S	***
	144)	"	overhead	PI	***
	145)	"	hood	L&S	***
	146)	"	overhead	PI	***
	147)	"	hood	L&S	***
	148)	"	overhead	PI	***
	149)	"	vertical	PI	***
	150)	"	overhead	PI	***
	151)	"	overhead	PI	***
	152)	"	overhead	PI	***
	153)	"	overhead	PI	***
	154)	"	overhead	PI	***
	155)	"	hood	L&S	***
	156)	"	hood	L&S	***
	157)	"	overhead	PI	***
	158)	"	overhead	PI	***
	159)	"	overhead	PI	***
	160)	"	hood	L&S	***
	161)	"	overhead	PI	***
	162)	"	hood	L&S	***

* pipe insulation

** liner & shell

*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	163)	Special Analysis Lab (65B)	overhead	PI*	***
	164)	Wet Chemistry Lab (68B)	overhead	PI	***
	165)	"	hood	L&S**	***
	166)	"	overhead	PI	***
	167)	"	hood	L&S	***
	168)	"	overhead	PI	***
	169)	"	hood	L&S	***
	170)	"	hood	L&S	***
	171)	"	vertical	PI	***
	172)	"	hood	L&S	***
	173)	"	hood	L&S	***
	174)	"	overhead	PI	***
	175)	"	overhead	PI	***
	176)	"	hood	L&S	***
	177)	"	hood	L&S	***
	178)	"	hood	L&S	***
	179)	"	hood	L&S	***
	180)	"	overhead	PI	***
	181)	"	overhead	PI	***
	182)	"	hood	L&S	***
	183)	"	hood	L&S	***
	184)	"	hood	L&S	***
	185)	"	vertical	PI	***
	186)	"	hood	L&S	***
	187)	DELETED			
	188)	"	vertical	PI	***
	189)	"	overhead	PI	***
	190)	"	horizontal	PI	***
	191)	"	hood	liner only	***
	192)	"	vertical	PI	***
	193)	"	vertical	PI	***
	194)	"	vertical	PI	***
	195)	"	vertical	PI	***
	196)	"	vertical	PI	***
	197)	"	hood	L&S	***

* pipe insulation
** liner & shell
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	198)	Ether Lab (75B)	horizontal	PI*	***
	199)	"	overhead	PI	***
	200)	"	hood	L&S**	***
	201)	"	hood	L&S	***
	202)	"	overhead	PI	***
	203)	"	vertical	PI	***
	204)	Boron**** Lab (64B)	vertical	PI	***
	205)	"	vertical	PI	***
	206)	"		debris-machine insul.	***
	207)	"	hood	L&S	***
	208)	"	vertical	PI	***
	209)	"	vertical	PI	***
	210)	"	horizontal	PI	***
	211)	Accountability Lab (78B)	overhead	PI	***
	212)	"	hood	L&S	***
	213)	"	overhead	PI	***
	214)	"	hood	L&S	***
	215)	"	overhead	PI	***
	216)	"	overhead	PI	***
	217)	"	overhead	PI	***
	218)	"	overhead	PI	***
	219)	"	overhead	PI	***
	220)	"	hood	L&S	***
	221)	"	overhead	PI	***
	222)	"	hood	L&S	***
	223)	"	overhead	PI	***
	224)	"	overhead	PI	***
	225)	"	overhead	PI	***
	226)	"	hood	L&S	***
	227)	"	overhead	PI	***
	228)	"	hood	L&S	***
	229)	"	overhead	PI	***

* pipe insulation
** liner & shell
*** not required
**** Drawing identifies this room as Boron Lab; in building, door is labelled Thermobalance Lab

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8407-81	230)	Lab Service Room (35A)	hood	L&S**	***
	231)	"	overhead	PI*	***
	232)	"	overhead	PI	***
	233)	"	overhead	PI	***
	234)	Dishwashing Room (37A)	vertical	PI	***
	235)	"	vertical	PI	***
	236)	"	overhead	PI	***
	237)	"	vertical	PI	***
	238)	"	overhead	PI	***
	239)	"	overhead	PI	***
	240)	Metal Sample Room (40A)	overhead	PI	***
	241)	"	overhead	PI	***
	242)	Metal Punch Room (41A)	overhead	PI	***
		Feed Mat. Sample Prep (42A)			
		Oven Room (43A)			
	243)	"	overhead	PI	***
	244)	"	vertical	PI	***
	245)	Control Lab (46A)	vertical	PI	***
	246)	Radio-chem. Lab (54A)	overhead	PI	***
	247)	"	overhead	PI	***
	248)	"	overhead	PI	***
	249)	"	overhead	PI	***
	250)	"	vertical	PI	***
	251)	"	overhead	PI	***
	252)	"	hood	L&S	***
	253)	Methods Dev. Lab (56A)	overhead	PI	***
	254)	"	hood	L&S	***
	255)	"	overhead	PI	***
	256)	"	overhead	PI	***
	257)	Methods Dev. Lab (58A)	overhead	PI	***
	258)	"	hood	L&S	***
	259	"	vertical	PI	***
	260	"	overhead	PI	***
	261	"	hood	L&S	***
	262	"	overhead	PI	***
	263	"	overhead	PI	***

* pipe insulation
** liner & shell
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	264)	Methods Dev. Lab (58A)	hood	L&S**	***
	265)	"	overhead	PI*	***
	266)	"	overhead	PI	***
	267)	"	overhead	PI	***
	268)	"	hood	L&S	***
	269)	"	overhead	PI	***
	270)	"	overhead	PI	***
	271)	Mass Spectograph Lab (60A)	overhead	PI	***
	272)	"	hood	L&S	***
	273)	"	overhead	PI	***
	274)	Source Cleaning Room (61A)	overhead	PI	***
	275)	"	hood	L&S	***
	276)	"	overhead	PI	***
	277)	X-Ray Lab (62A)	overhead	PI	***
	278)	"	overhead	PI	***
	279)	"	overhead	PI	***
	280)	"	chest height	cord	***
	281)	Darkroom (63A)	overhead	PI	***
	282)	"	overhead	PI	***
	283)	Fluorimetric Lab (53A)	overhead	PI	***
	284)	"	hood	L&S	***
	285)	"	overhead	PI	***
	286)	Acceptance Testing Lab (52A)	overhead	PI	***
	287)	"	overhead	PI	***
	288)	"	hood	L&S	***
	289)	"	hood	L&S	***
	290)	"	hood	L&S	***
	291)	"	vertical	PI	***
	292)	"	overhead	PI	***
	293)	"	overhead	PI	***
	294)	"	overhead	PI	***
	295)	"	hood	L&S	***
	296)	"	overhead	PI	***
	297)	"	overhead	PI	***
	298)	"	hood	L&S	***

* pipe insulation

** liner & shell

*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	299)	Metal Den. Lab (51A)	hood	L&S**	***
	300)	Carbon Lab (48A)	horizontal	PI*	***
	301)	"	overhead	PI	***
	302)	"	vertical	partition thin layer	***
	303)	Nitrogen Lab (47A)	horizontal	PI	***
	304)	"	overhead	PI	***
	305)	"	hood	L&S	***
	306)	"	hood	L&S	***
	307)	"	overhead	PI	***
8407-84	308)	Infrared Lab (26D)	hood	L&S	***
	309)	"	overhead	PI	***
	310)	Sample Prep Lab (25D)	overhead	PI	***
	311)	"	hood	L&S	***
	312)	"	hood	L&S	***
	313)	"	overhead	PI	***
	314)	"	overhead	PI	***
	315)	"	overhead	PI	***
	316)	"	overhead	PI	***
	317)	"	hood	L&S	***
	318)	"	overhead	PI	***
	319)	Chem. Lab (24D)	vertical	PI	***
	320)	"	hood	L&S	***
	321)	"	hood	L&S	***
	322)	"	overhead	PI	***
	323)	"	hood	L&S	***
	324)	"	overhead	PI	***
	325)	"	vertical	PI	***
	326)	"	overhead	PI	***
	327)	Densitometer Room (23D)	vertical	PI	***
	328)	"	vertical	PI	***
	329)	"	overhead	PI	***
	330)	"	overhead	PI	***

* pipe insulation
** liner & shell
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 407

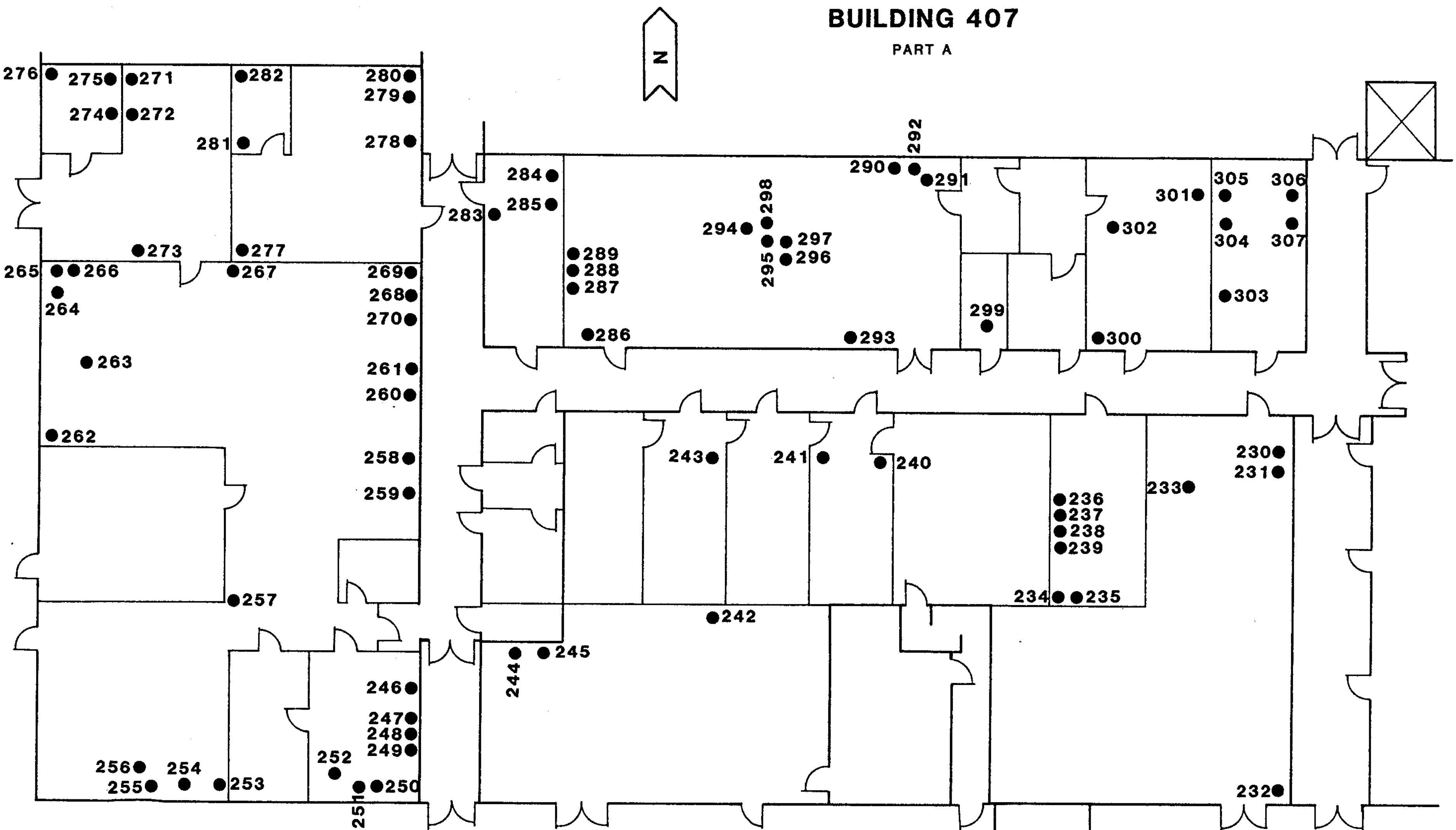
NOTE: All room numbers listed are from drawing numbers shown. Room numbers marked inside building may differ.

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	331)	Darkroom (21D)	overhead	PI*	***
	332)	"	overhead	PI	***
	333)	Womens Locker Rm (34D)	vertical	PI	***
	334)	Womens Toilet (33D)	overhead	PI	***
	335)	"	overhead	PI	***
	336)	XRay Lab Dev. (29D)	overhead	PI	***
	337)	"	overhead	PI	***
	338)	Paper Dark Room (31D)	overhead	PI	***
	339)	Darkroom (27D)	overhead	PI	***
	340)	X-Ray Sample Prep. (28D)	hood	L&S**	***
	341)		overhead	PI	***
	342)	"	vertical	PI	***
	343)	"	overhead	PI	***
	344)	Passageway (176D)	overhead	PI	***
	345)	"	overhead	PI	***
	346)	"	overhead	PI	***
	347)	"	overhead	PI	***
	348)	"	overhead	PI	***
	349)	Central corridor	overhead	acoustical tile	3
	350)	Location not important	roof - 3 layers		3 each layer
	351)	Electrical Penthouse	overhead	PI	***
	352)	"	exterior siding	transite	***
	353)	Small Penthouse		PI	***
	354)	SW corner of roof		grey insul. on rectangular boxes.	3
	355)	SW corner of roof		grey insul. on cylindrical ducts.	3
	356)	Roof	boiler room	boiler insul.	***
	357)	"	boiler room	PI-brown	***
	358)	"	boiler room	PI-black	***
	359)	"	boiler room	PI-white	***
	360)	"	boiler room	PI-silver jacketed	***
	361)	"	boiler room	duct insul.	***

* pipe insulation
** liner & shell
*** not required

BUILDING 407

PART A



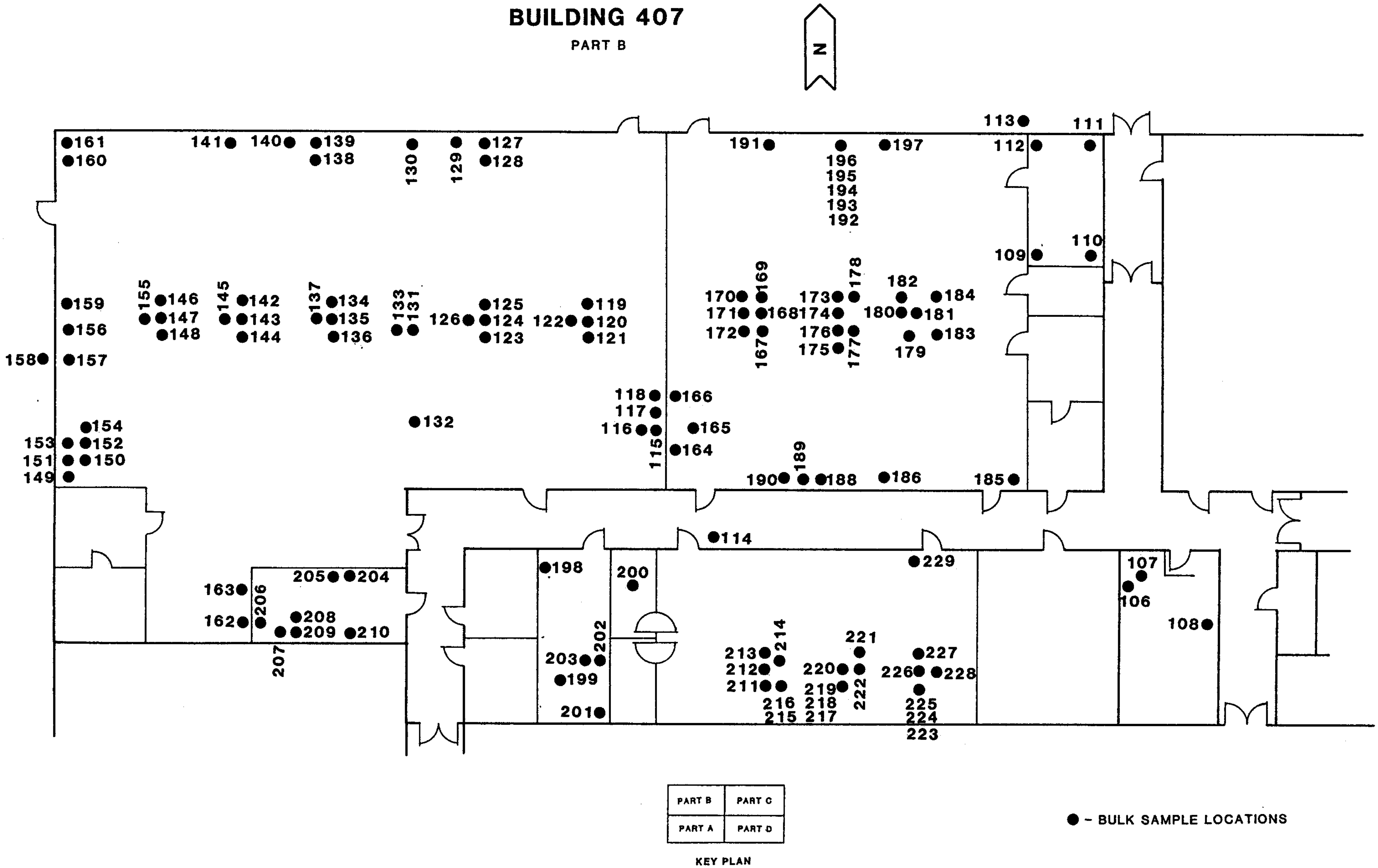
PART B	PART C
PART A	PART D

KEY PLAN

● - BULK SAMPLE LOCATIONS

BUILDING 407

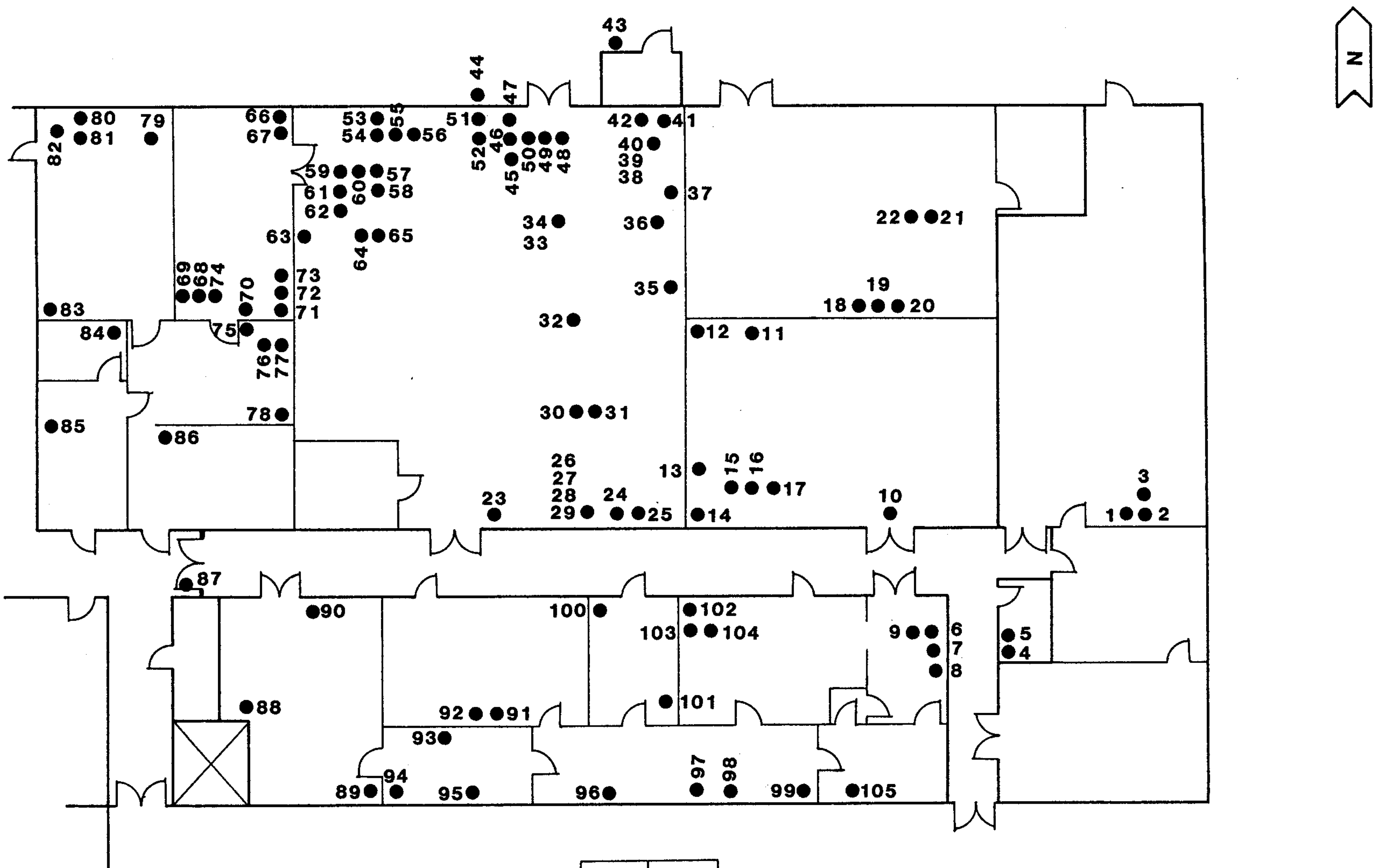
PART B

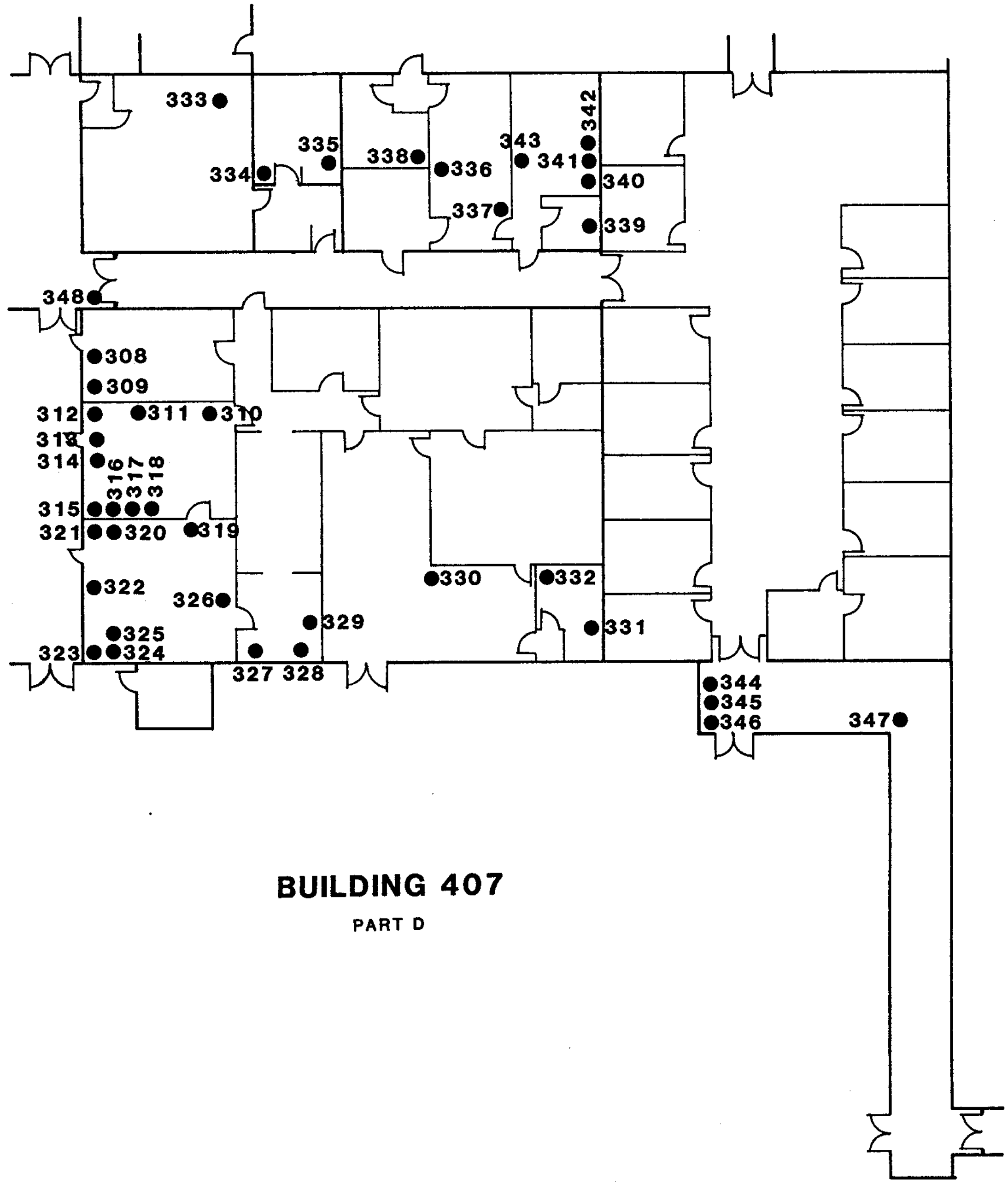


● - BULK SAMPLE LOCATIONS

BUILDING 407

PART C





BUILDING 407

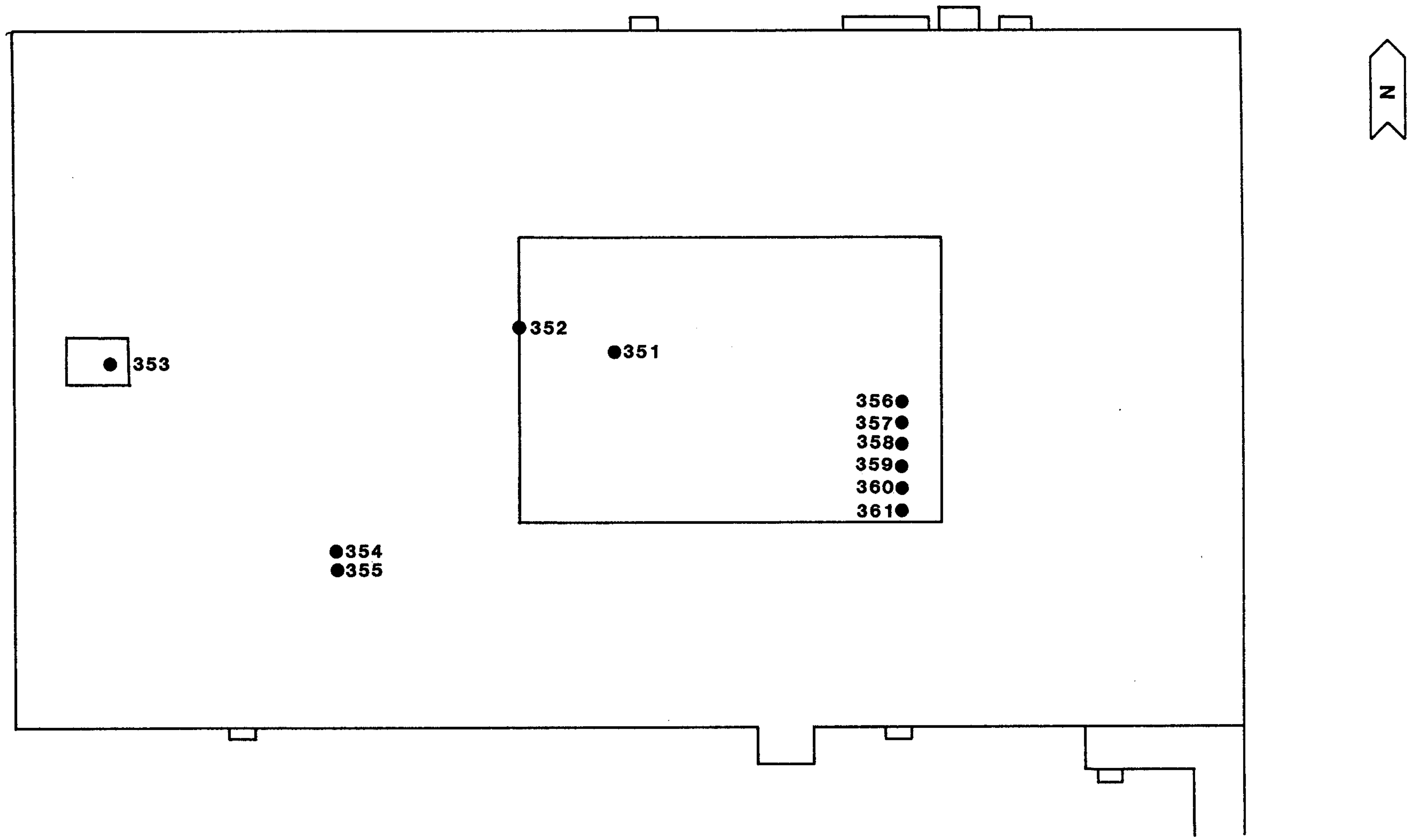
PART D

PART B	PART C
PART A	PART D

KEY PLAN

● - BULK SAMPLE LOCATIONS

BUILDING 407
ROOF PLAN



● – BULK SAMPLE LOCATIONS

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 408

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	Machine Shop (112)	ceiling	insul. layers	***
	2)	"	steam pipe over orange pipe	PI*	***
	3)	Inside Office	overhead	black ceiling insul.	3
	4)	"	overhead	acoustical tile	3
	5)	"	floor	floor tile	3
	6)	"	overhead	duct insul. over office area	3
	7)	Machine Shop (112)	vertical	PI	***
	8)	"	overhead	PI	***
	9)	Office (131)	floor	debris-fiberglass-like insul.	***
	10)	Millwright Shop (111)	overhead	PI 3rd insul. pipe from wall (5 pipes total)	***
	11)	"	overhead	PI-1st insul. pipe from wall	***
	12)	Welding Shop (110)	vertical	PI	***
	13)	"	overhead	PI	***
	14)	Piping Shop (109)	vertical	PI	***
	15)	Tinners Shop (108)	overhead	PI	***
	16)	Utilities Shop (104)	vertical	PI	***
	17)	"	floor	debris	***
	18)	Carpenter Shop (103)	vertical	PI	***
	19)	"	overhead	PI	***
	20)	Instrument Shop (101)	overhead	PI	***
	21)	"	overhead	PI	***
	22)		overhead	PI-14" - above rear of office enclosure	***
	23)	Storage (116)	overhead	PI	***
	24)	"	overhead at column B6	PI	***
	NOTE: 25) and 26) are red labeled-not yellow tag "asbestos" labeled.				***
	25)	"	vert. from office wall	PI	***
	26)	"	upper pipe from water heater	PI	***
	27)	"	S joint portion	PI	***
	28)	Decontam. Room (114)	overhead line crossing room	PI	***
	29)	Storage (116)	vertical/overhead over office	PI	***
	30)	Auto Shop (117)	horizontal into heater	PI	***
	31)	"	vertical-behind heater	PI	***
	32)	"	horiz. wall penetration	PI	***
	33)	"	corner (outside)	PI	***

* pipe insulation

*** not required

WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

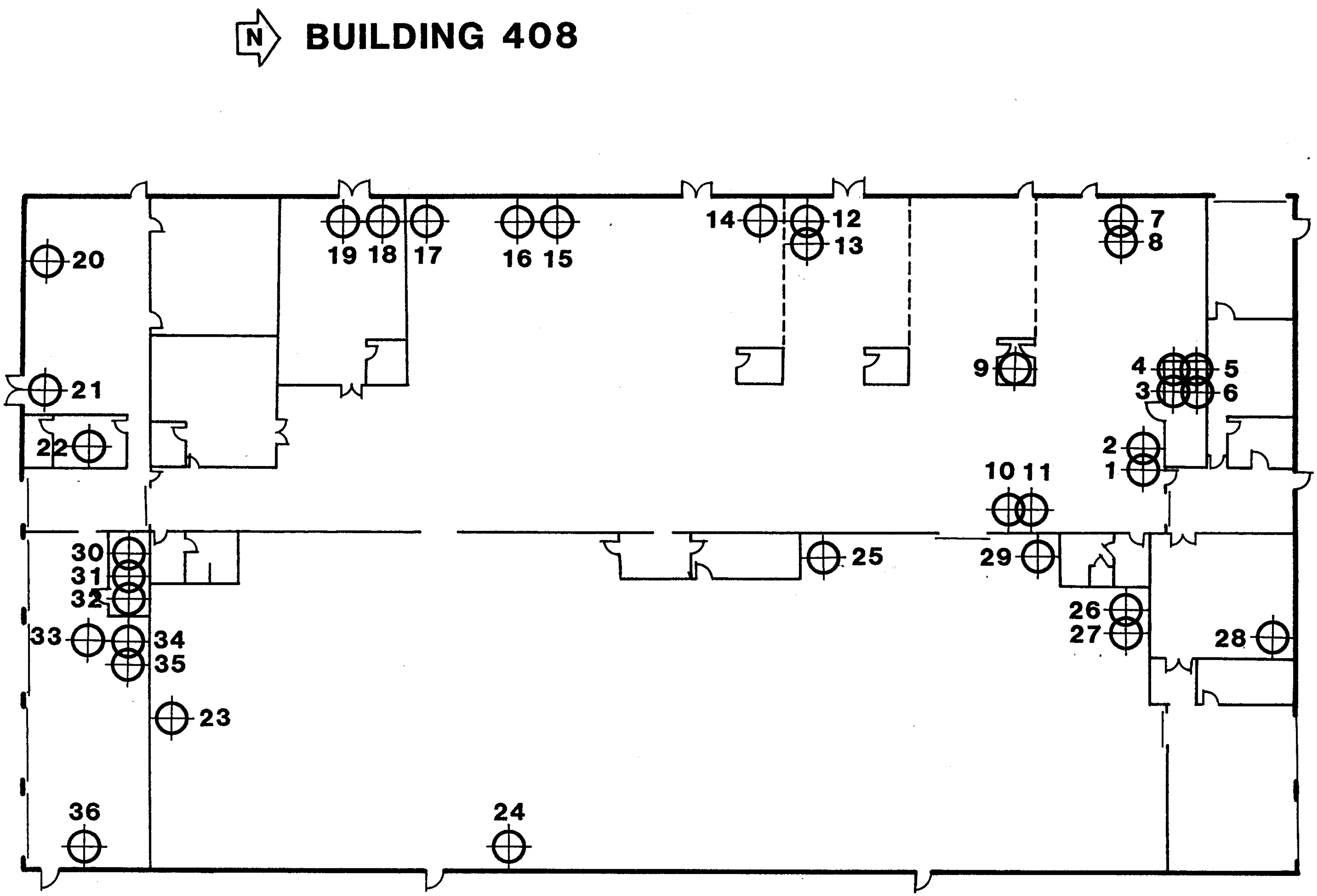
BUILDING NO. 408

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	34)	"	overhead 1st from wall	PI*	***
	35)	"	overhead 3rd from wall	PI	***
	36)	"	vertical	PI	***

* pipe insulation

*** not required

BUILDING 408



⊕ – SAMPLE LOCATIONS

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 410

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
410 - C	1)	Entrance Court	overhead - 5th in from E. wall	PI* orange 6"	***
	2)	"	overhead-7th from E.wall	PI black	***
	3)	"	overhead-8th from E.wall	PI	***
	4)	"	upper portion of walls corrugated siding	transite	***
	5)	Assembly Room (111C)	overhead	ceiling-3 layers	3 each layer
	6)	Lobby (121C)	vertical	PI black	***
	7)	East Corridor (105C)	overhead-cross hall	PI brown 7"	***
	8)	"	overhead-cross hall	PI black 12"	***
	9)	"	overhead-cross hall	PI brown 10"	***
	10)	"	overhead-down hall	PI brown 7"	***
	11)	"	overhead-down hall	PI brown 7"	***
	12)	"	overhead-down hall	PI black 4"	***
	13)	Locker Room (103C)		valve insul.	***
	14)	"		PI-fiberglass-like	***
	15)	Guards Locker Room	vertical	PI	***
	16)	"	horiz./overhead	PI	***
	17)	Drying Room (off Guard Locker Rm.)	vertical	PI	***
	18)	"	vertical	PI	***
410 - A	19)	Locker Room (106A)	overhead	duct insul.	3
	20)	"	vertical	PI	***
	21)	"	overhead	blower insul.	3
	22)	"	overhead	PI	***
	23)	"	overhead	blower insul.	3
	24)	"	vertical	PI	***
	25)	"	overhead	PI	***
	26)	Locker Room (105A)	overhead	PI	***
	27)	"	overhead	PI	***
	28)	"	overhead	PI	***
	29)	"	overhead	PI	***
	30)	Boiler Room	boiler	insul.-inside metal jacket	***
	31)	"	vertical	PI	***
	32)	"	boiler	boiler jacket	***
	33)	Laundry Room	horizontal	PI	***

* pipe insulation
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 410

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	34)	Laundry Room (cont.)	horizontal	PI*	***
	35)	"	horizontal	PI	***
	36)	"	horizontal	insul. on metal jacket	***
	37)	"	vertical/horiz. over valves	PI	***
	38)	DELETE			
	39)	Laundry Room (cont.)		tank insulation	***
	40)	"	vertical	PI	***
	41)	"	vertical	PI	***
	42)	"	overhead	PI	***
	43)	"	overhead	PI	***
410 - A	44)	Locker Room (108A)	overhead	PI	***
	45)	North Passage (141A)	overhead	PI white 12"	***
	46)	"	overhead	PI black 12"	***
	47)	Locker Room (107A)	overhead	PI	***
	48)	South Passage (142A)	overhead	PI black	***
410 - B	49)	Kitchen Area (146B)	vertical	PI	***
	50)	"	vertical	PI	***
	51)	"	vertical	PI	***
	52)	"	vertical	PI	***
	53)	"	vertical	PI	***
	54)	Root Veg Room (141B)	overhead/horiz.	PI - on left	***
	55)	"	overhead/horiz.	PI - on left	***
	56)	"	overhead/horiz.	PI - on right	***
	57)	"	overhead/horiz.	PI - on right	***
	58)	"	overhead/horiz.	duct insulation	3
	59)	Store Room (147B)	overhead/horiz.	PI black	***
	60)	Bake Shop (135B)	vertical	PI	***
	61)	"	vertical	PI	***
	62)	"	vertical-ceiling	PI	***
	63)	"	vertical-ceiling	PI	***
	64)	"	vertical	PI	***
	65)	Vestibule (137B)	overhead	duct insulation	3
	66)	"	overhead	PI	***
	67)	Trash Room (138B)	vertical	PI	***
	68)	Dishwashing (152B)	under counters	PI	***
	69)	Serving Area (148B)	vertical	PI	***
	70)	"	vertical	PI	***

* pipe insulation
*** not required

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 410

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	71)	Serving Area (148B)	ceiling	acoustic tile	3
	72)	Dining Room (149B)	ceiling	duct insul.	3
	73)	"	vertical-SW corner	PI*	***
	74)	Kitchen (146B)	ceiling	ceiling tile	3
	75)	South Corridor (153B)	ceiling	panel & covering	3
	76)	Mech. Equip. (153B)	vertical	PI	***
	77)	"	vertical	PI	***
	78)	"	vertical	PI	***
	79)	"	vertical	PI	***
	80)	"	vertical	PI	***
	81)	"	vertical	PI	***
	82)	"	vertical	PI	***
	83)	"	overhead/horiz.	PI	***
	84)	"	overhead/horiz.	PI	***
	85)	"	overhead/horiz.	PI	***
	86)	"	overhead/horiz.	PI	***
	87)	"	overhead/horiz.	PI	***
	88)	South Corridor	overhead	PI brown 12"	***
	89)	"	overhead	PI 8" brown	***
	90)	"	overhead	PI 12" black	***
	91)	"	overhead	PI 4" black	***
	92)	"	overhead	PI 10" black	***
	93)	"	overhead	PI 10" black	***
	94)	"	overhead	PI 7" brown	***
	95)	"	overhead	PI 7" white	***
	96)	"	overhead	PI 3" white	***
	97)	"	vertical	PI 3" white	***
	98)	"	corner	PI	***
	99)	"	corner	PI	***
	100)	"	corner	PI	***
	101)	"	corner	PI	***
	102)	"	corner	PI	***
	103)	"	corner	PI	***
	104)	Mech. Equip. Rm. West (134B)	vertical	PI	***
	104)	"	vertical	PI	***
	105)	"	vertical	PI	***
	106)	"	vertical	PI	***
	107)	"	vertical	PI	***
	108)	"	vertical	PI	***

* pipe insulation

*** not required

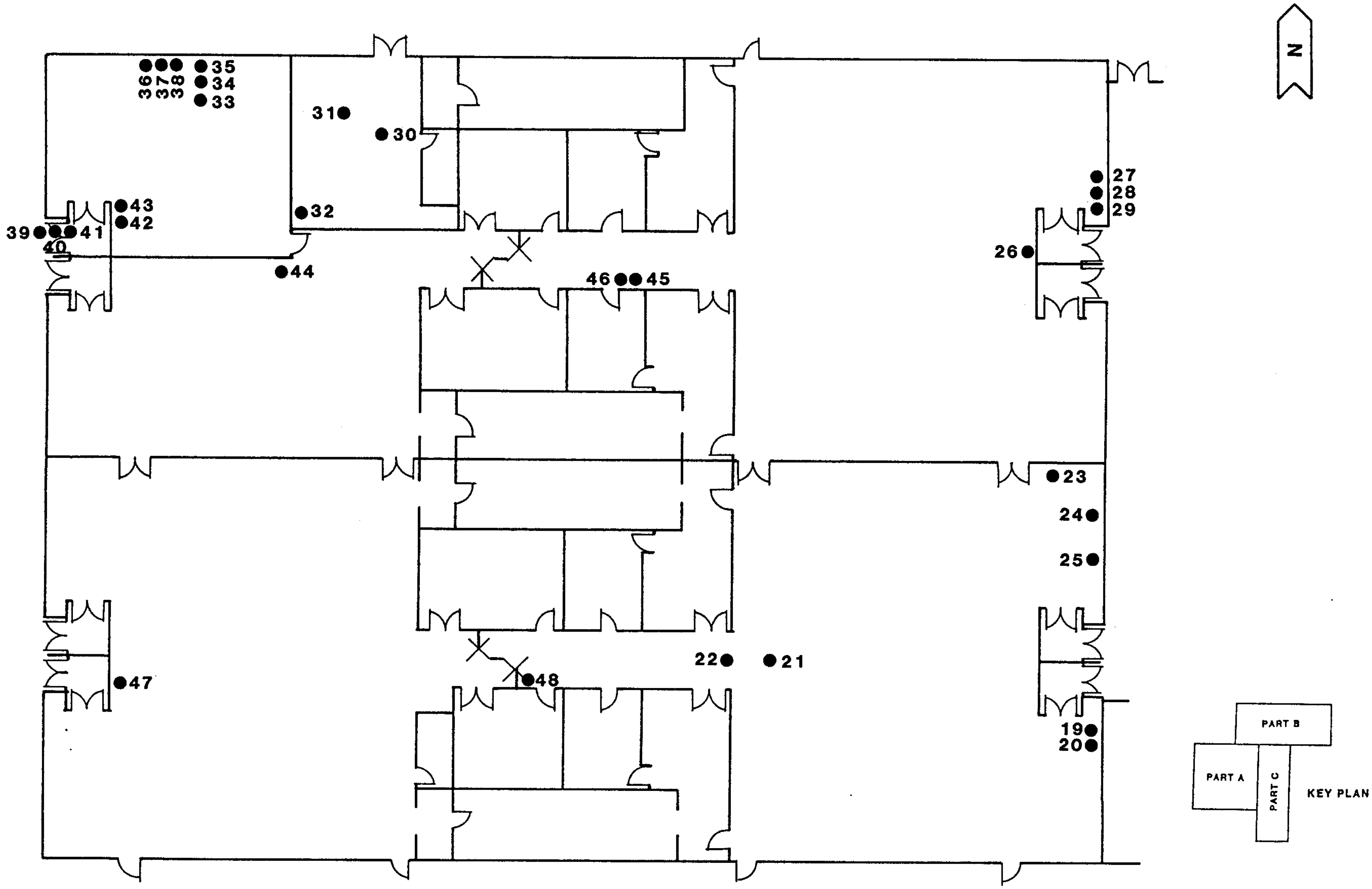
WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 410

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	109	Mech. Equip. Rm. West (134B)	vertical	PI*	***
	110	"	vertical	PI	***
	111	"	vertical	PI	***
	112	"	vertical	PI	***
	113	"	vertical	PI	***
	114	"	vertical	PI	***
	115	"	vertical	PI	***
	116	"	horizontal	boiler jacket	***
	117	"	horizontal	boiler jacket	***
	118	"	overhead	PI	***
	119	"	overhead	PI	***
	120	"	overhead	PI	***
	121	"	overhead	PI	***
	122	"	overhead	PI	***
	123	"	overhead	PI	***
	124	"	vertical from top of filter cabinet	PI	***
	125	Center Corridor	vertical from floor	PI	***
	126	"	overhead	PI	***
	127	Sample Prep Lab (101B)	fume hoods	L&S**	***
	128	East Corridor	overhead	PI	***
	129	"	overhead	duct insul.	3

* pipe insulation
** liner & shell
*** not required

BUILDING 410

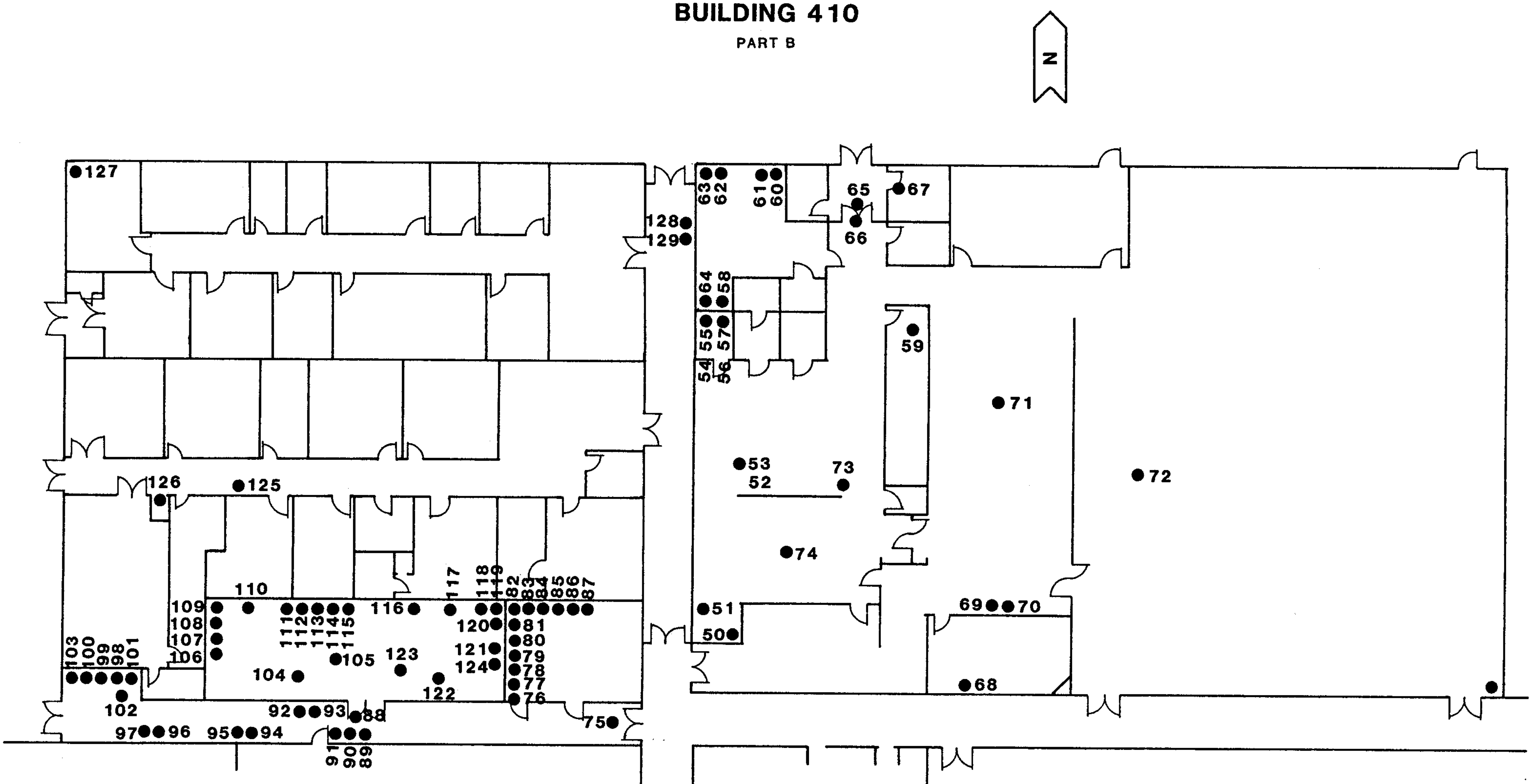
PART A



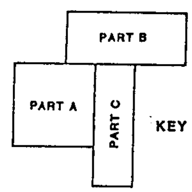
● - BULK SAMPLE LOCATIONS

BUILDING 410

PART B



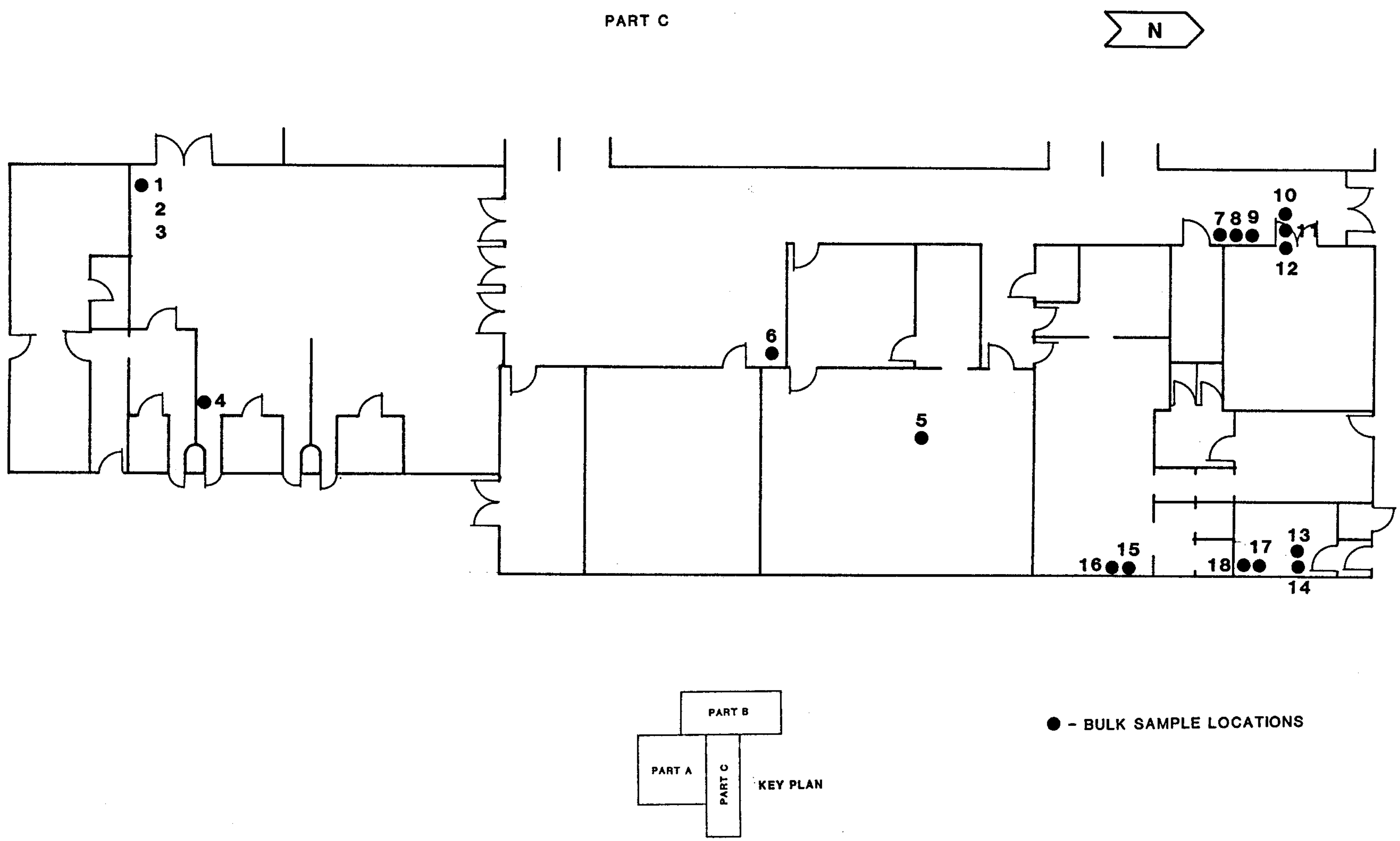
● – BULK SAMPLE LOCATIONS



KEY PLAN

BUILDING 410

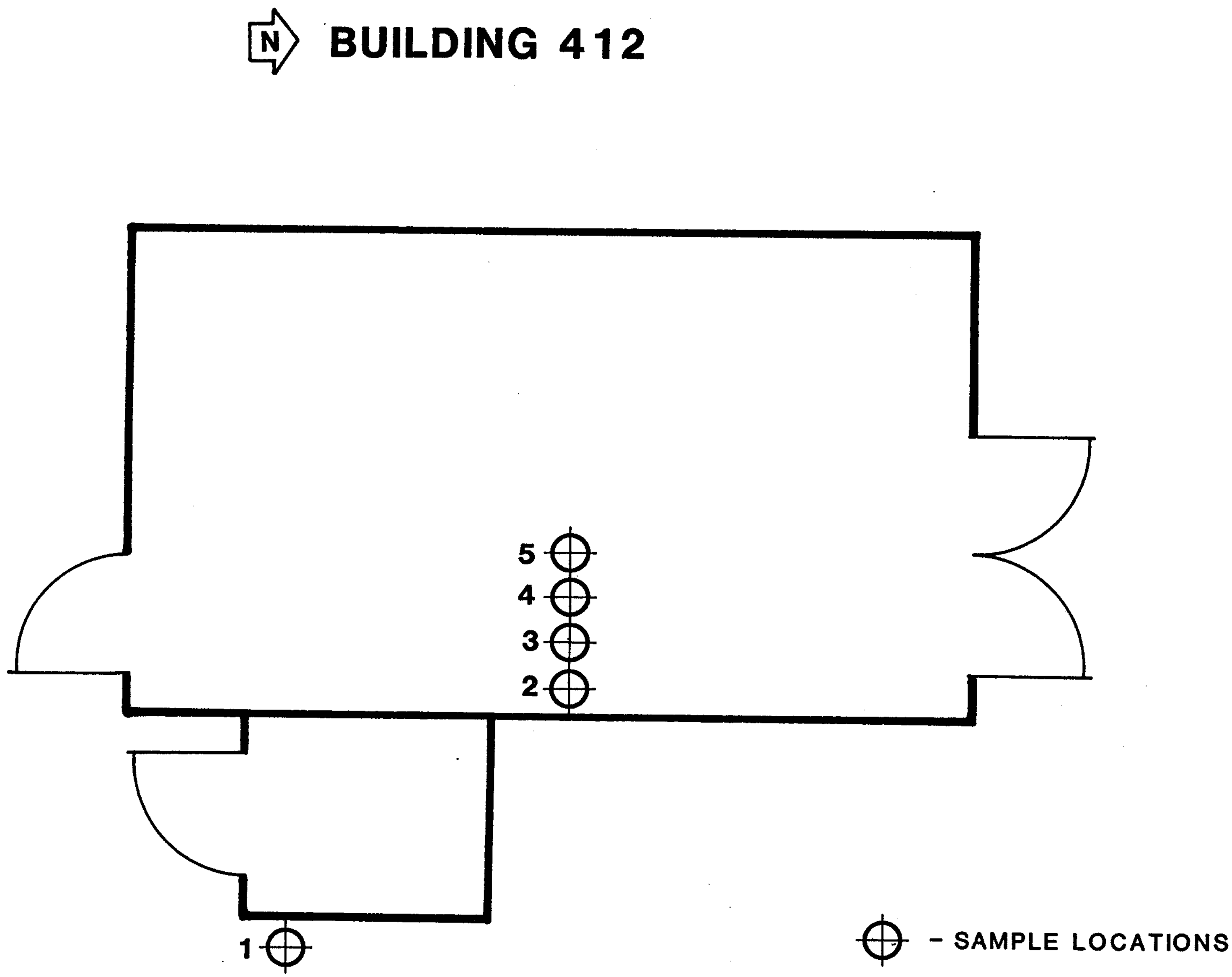
PART C



WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 412

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8412-2	1)	East side shed	roof	transite	3
	2)	East wall		debris	3
	3)	"	ceiling	3 layers	3 each layer

BUILDING 412



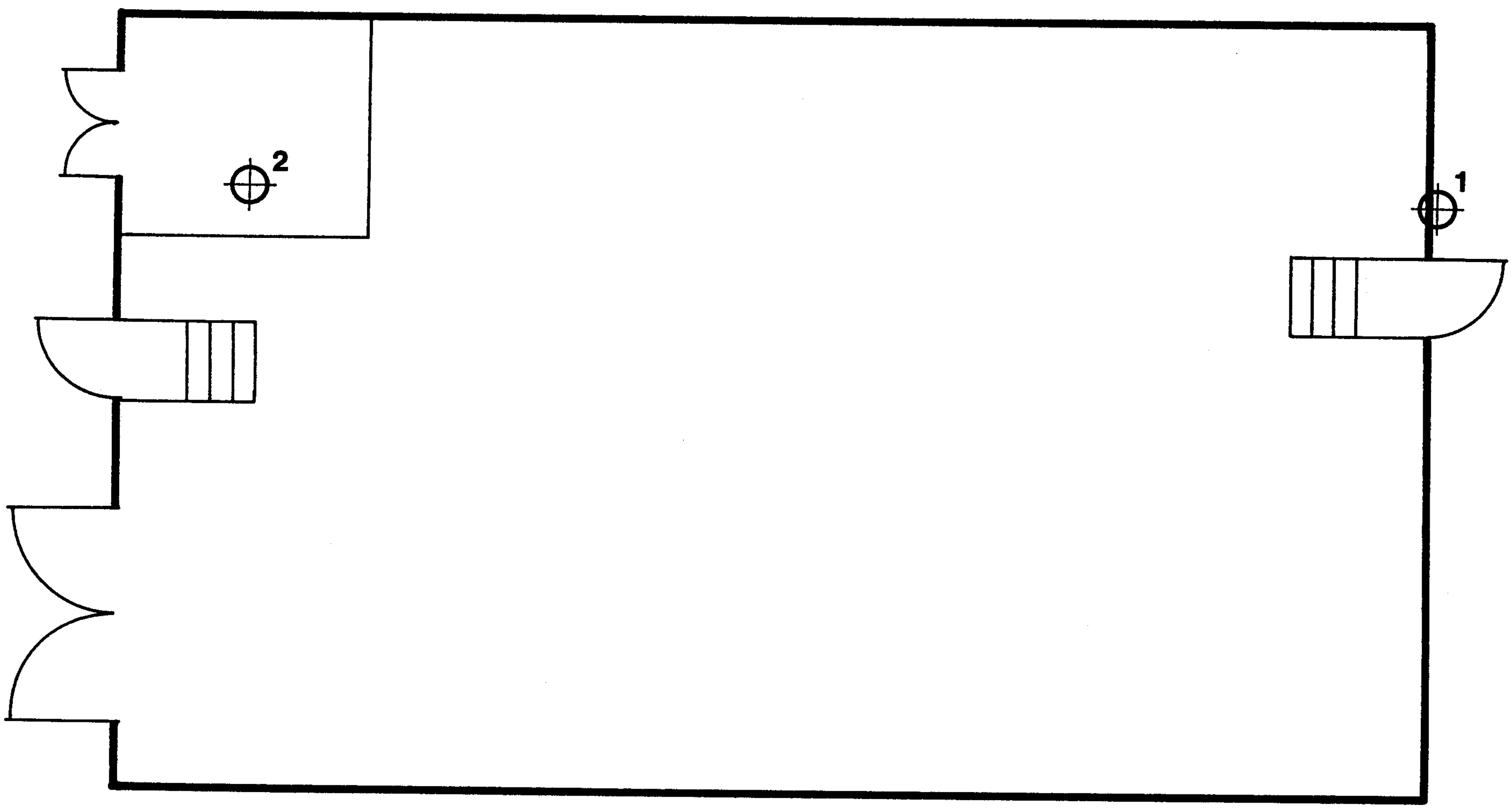
WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 413

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
2413-1	1)	Exterior	lower siding	transite	***
	2)	Chlorine Room		PI*	***

* pipe insulation

*** not required

BUILDING 413



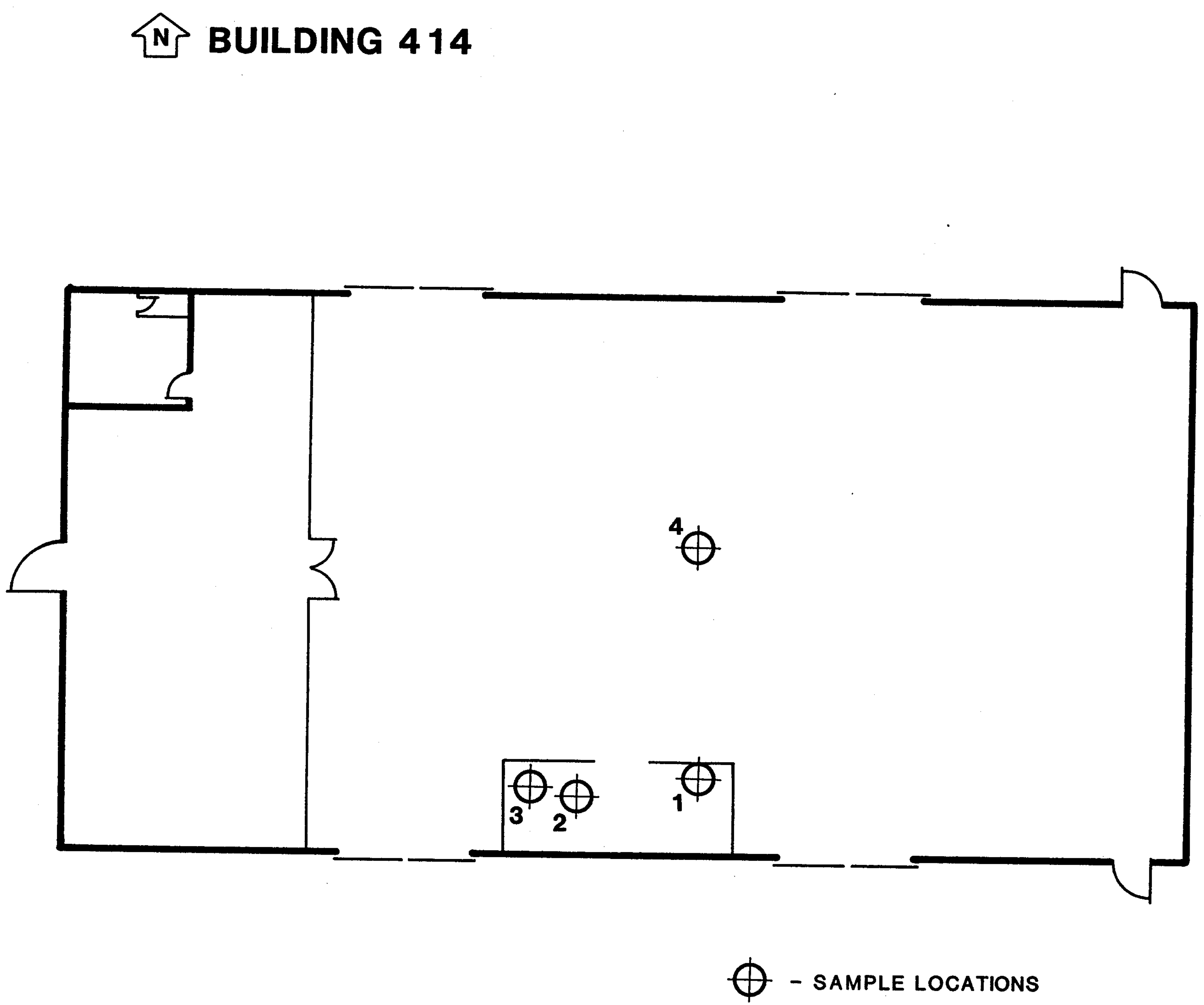
⊕ – SAMPLE LOCATIONS

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 414

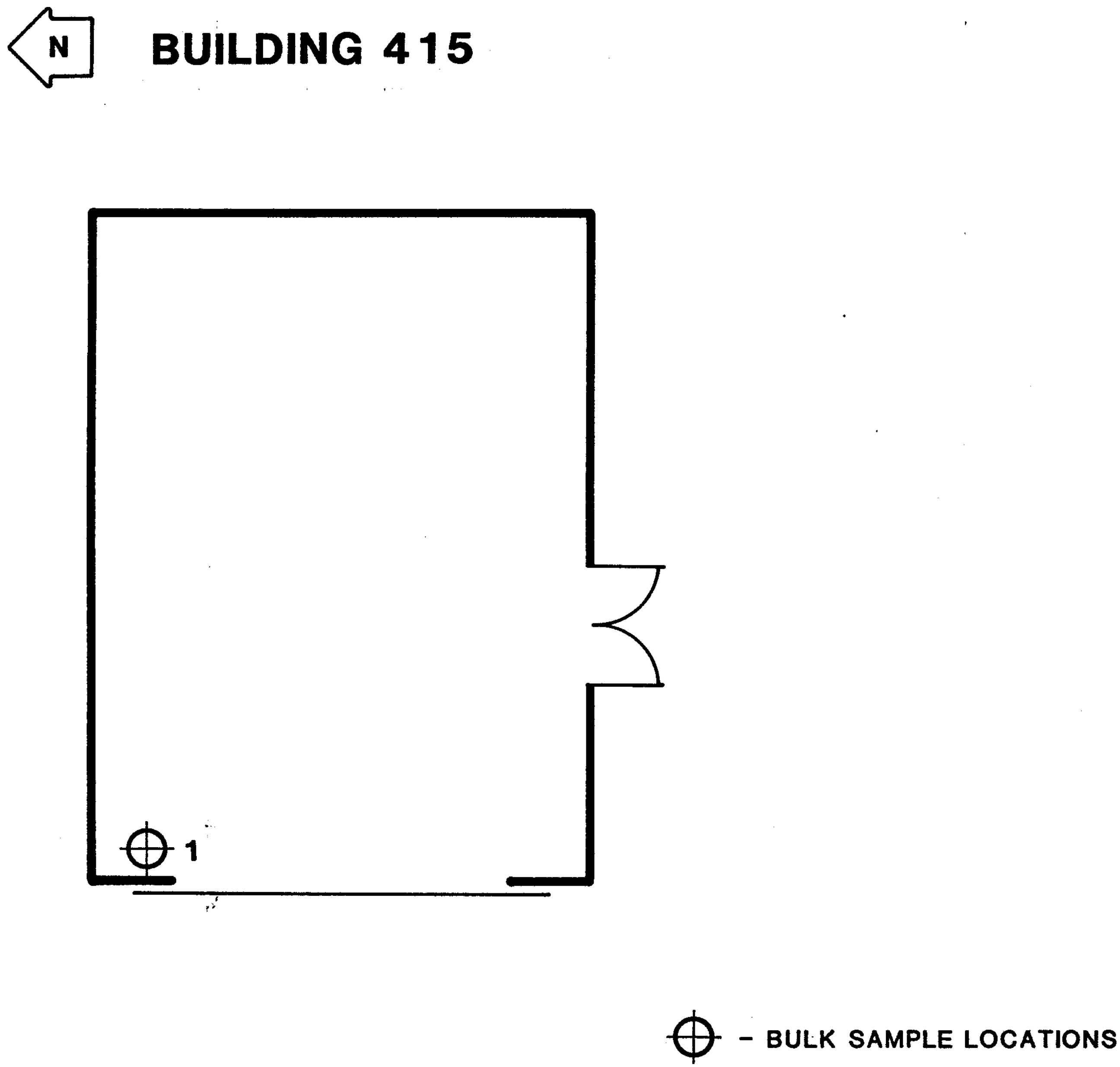
Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
2414-2	1)	Furnace Room	walls	transite	***
	4)	Salvage Shop	overhead	PI*	***

* pipe insulation
*** not required

BUILDING 414



BUILDING 415

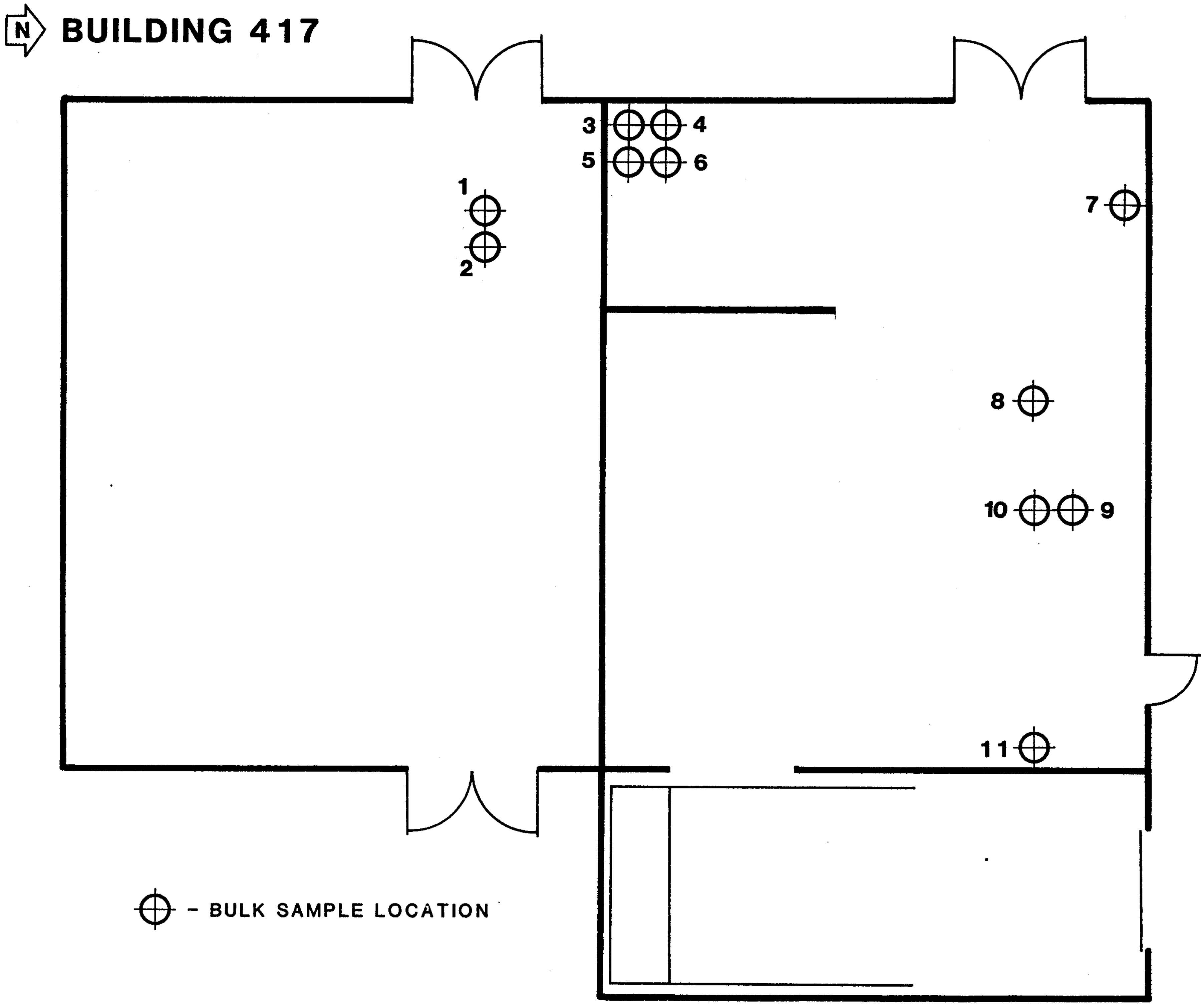


WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 417

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
8417-61	1)	Flammable Mat. Storg. Area (101)	overhead	PI*	***
	2)	"	overhead	3 ceiling layers	3 each layer
	3)	Preparation Area (103)	vertical-far left	PI orange	***
	4)	"	vertical	PI 2nd from left	***
	5)	"	vertical-far right	PI	***
	6)	"	lower left valve	PI	***
	7)	"	vertical	PI	***
	8)	General Work Area (102)	overhead	PI	***
	9)	"	overhead	PI	***
	10)	"	overhead-2 vertical pipes into ceiling	PI	***

* pipe insulation
*** not required

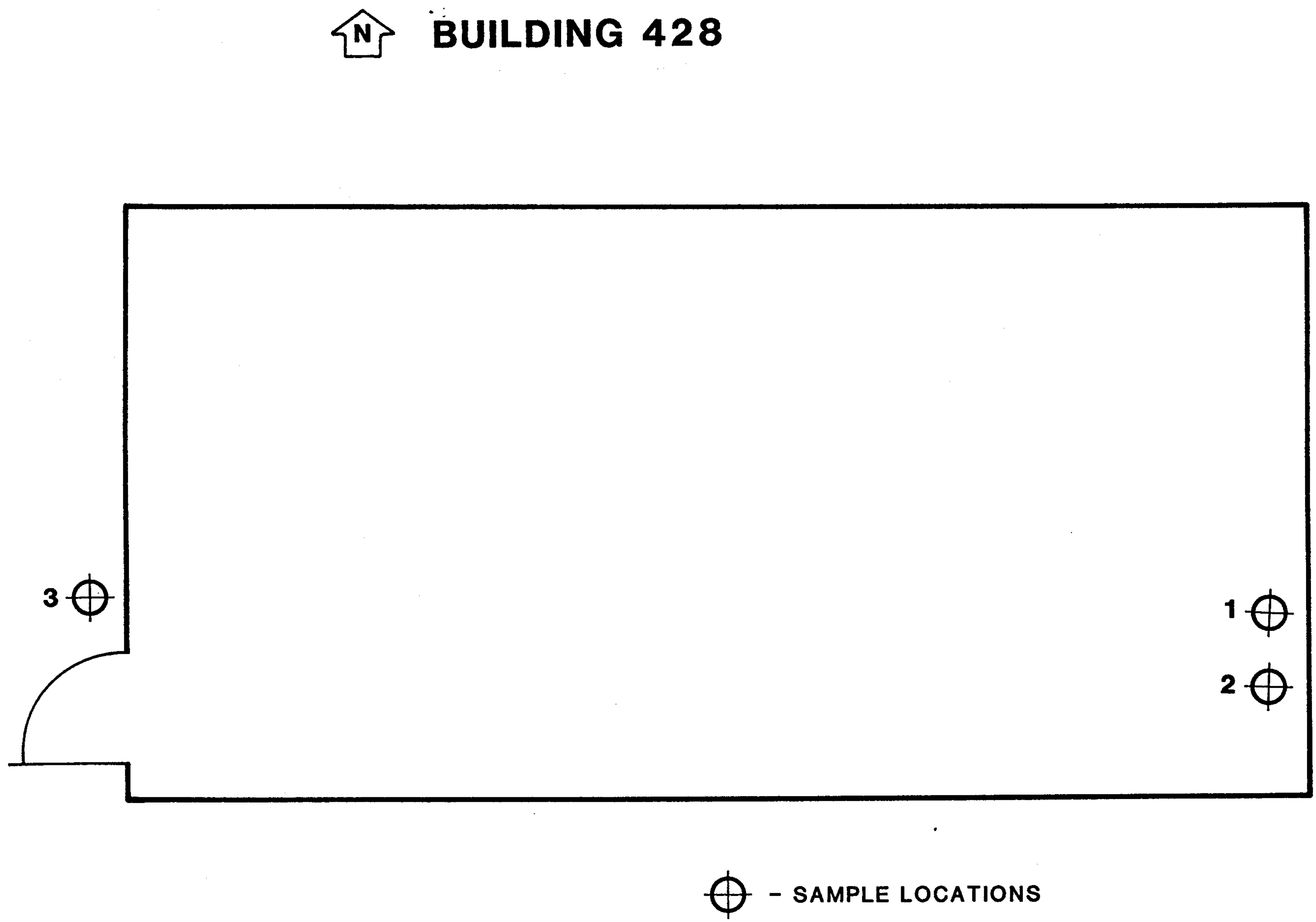
BUILDING 417



WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 428

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	East wall		PI*-yellow jacketed	***
	2)	East wall		PI-orange jacketed	***
	3)	Exterior		siding/transite	***

* pipe insulation
*** not required



N
BUILDING 428
3
1
2
- SAMPLE LOCATIONS

WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

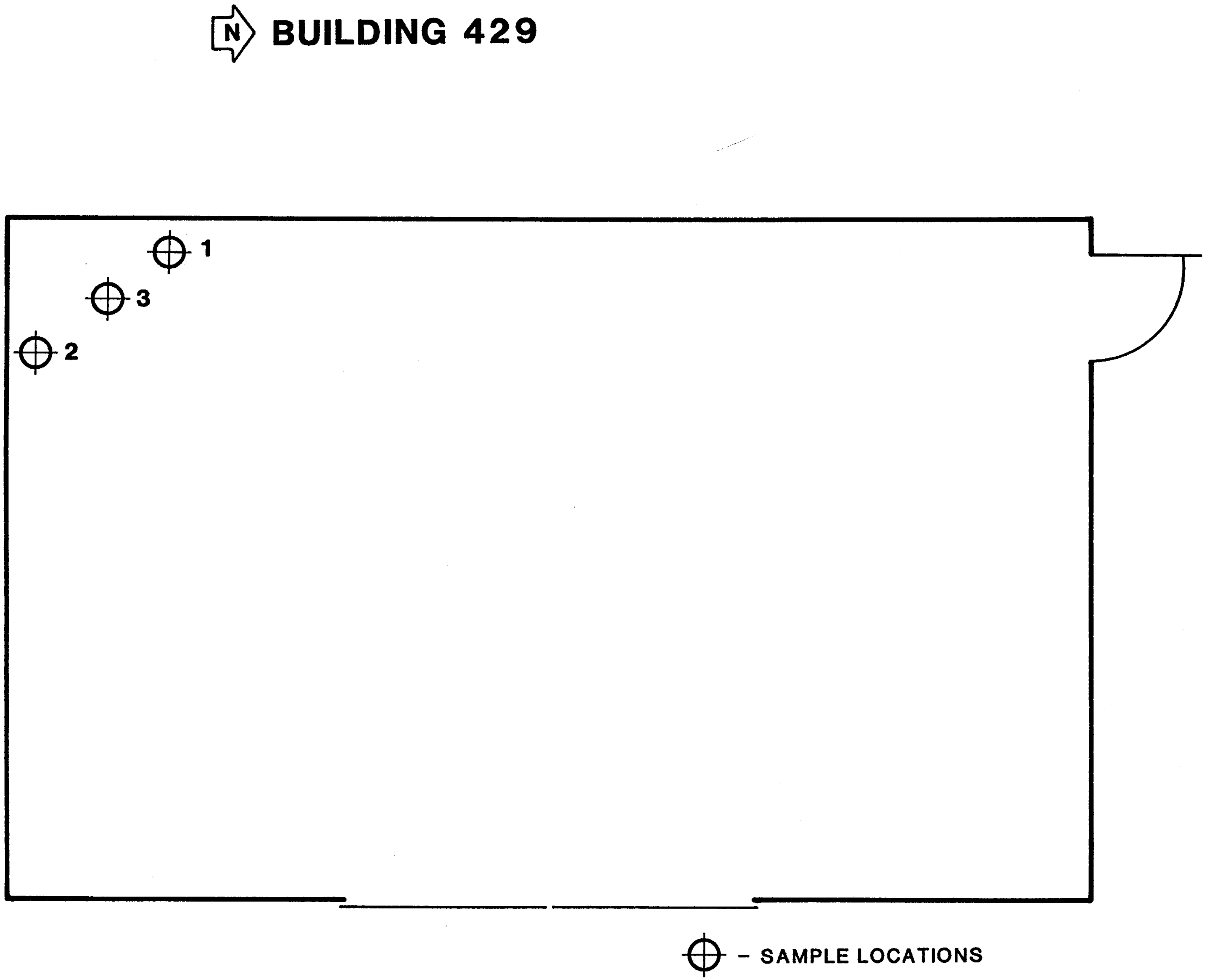
BUILDING NO. 429

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	Southwest corner	overhead	PI*	***
	2)	"	floor	PI	***
	3)	"	chest height	PI	***

* pipe insulation

*** not required

BUILDING 429

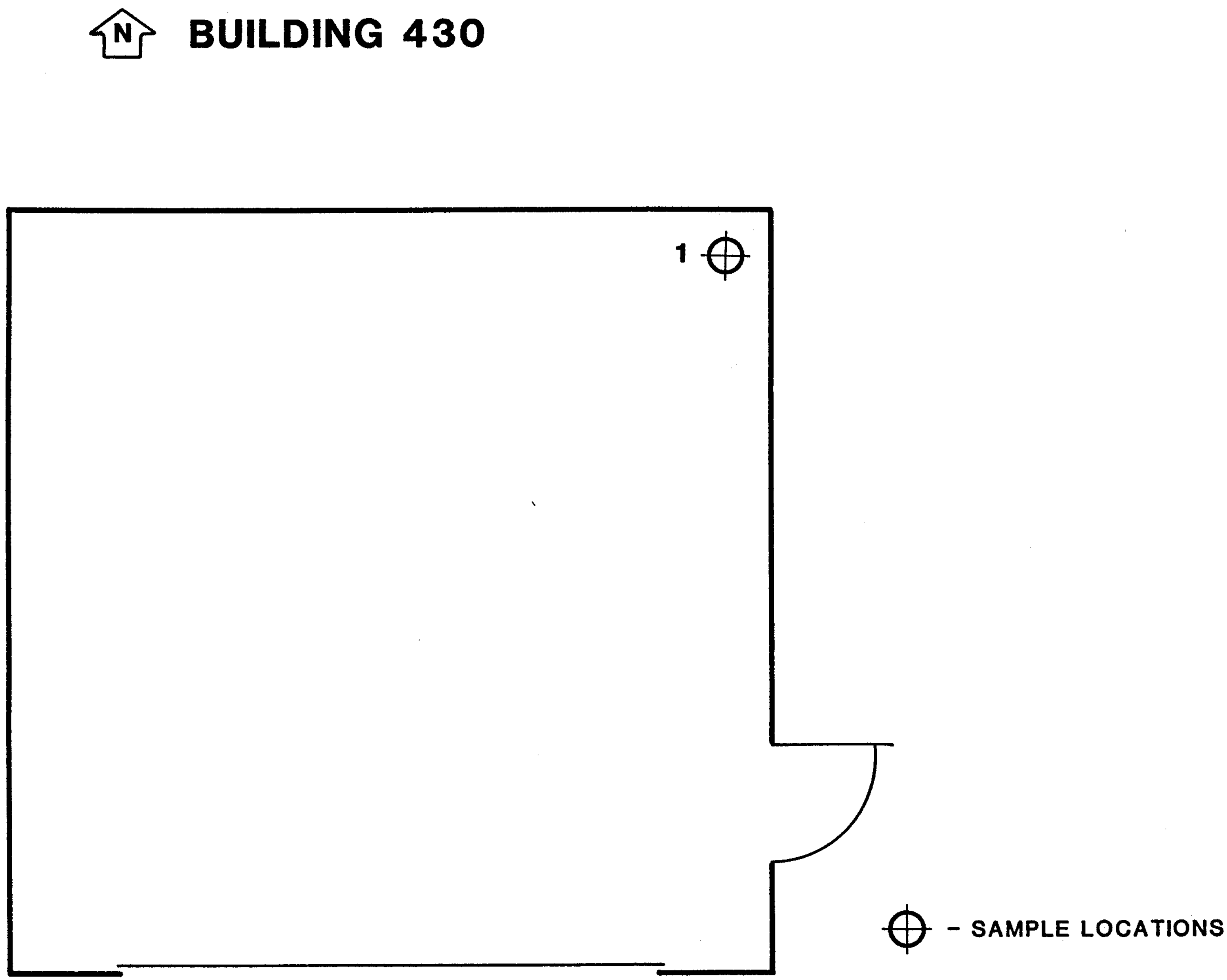


WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 430

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	Northeast corner	overhead	PI*	***

* pipe insulation
*** not required

BUILDING 430



WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 431

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples

none

WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 432

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples

none

WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

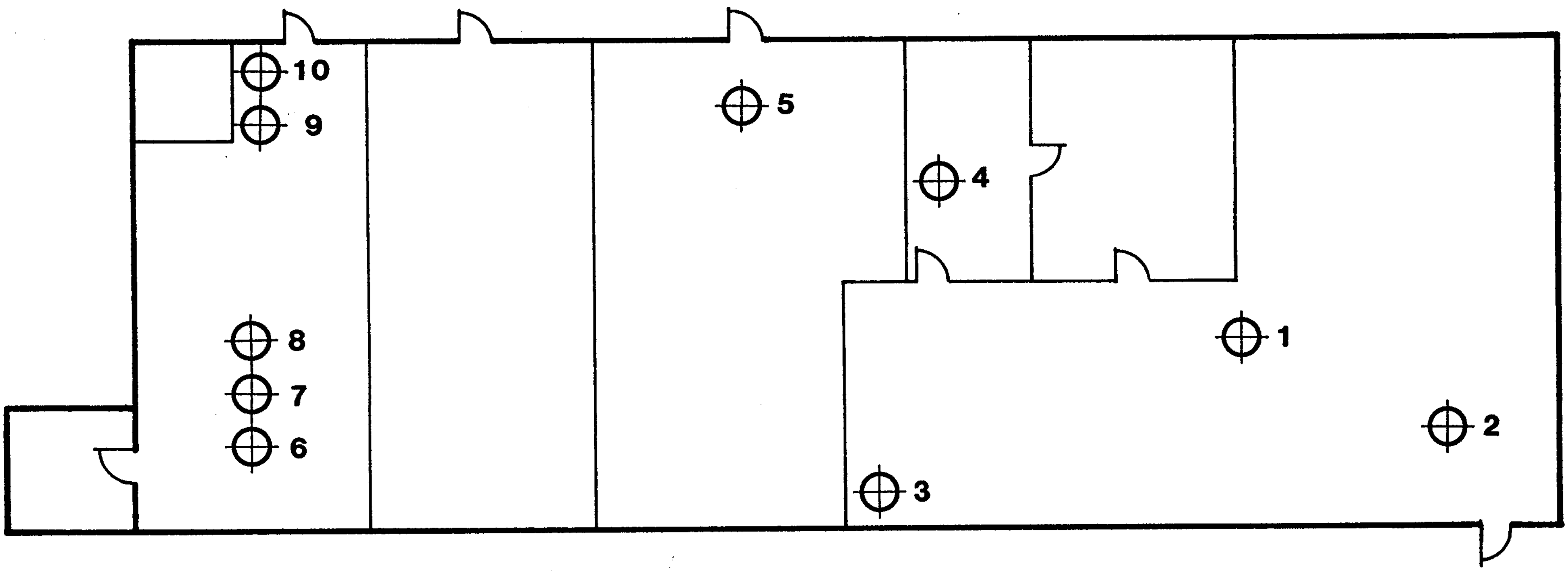
BUILDING NO. 433

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
	1)	Room 1	overhead	PI*	***
	2)	"	overhead	ceiling tile	3
	3)	"	floor	decomposed pipe cladding	***
	4)	Room 3	overhead	PI	***
	5)	Room 4	overhead	PI	***
	6)	Room 6	overhead	pipe elbows	***
	7)	"		firebrick debris	3
	8)	"	overhead	PI-inside silver wrap	***
	9)	"	overhead	PI-6" pipe on right side of heater closest to heater	***
	10)	"	overhead	roof layers	***

* pipe insulation

*** not required

BUILDING 433



WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 434

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
No dwg.	1)		overhead	3 ceiling layers	3 each layer

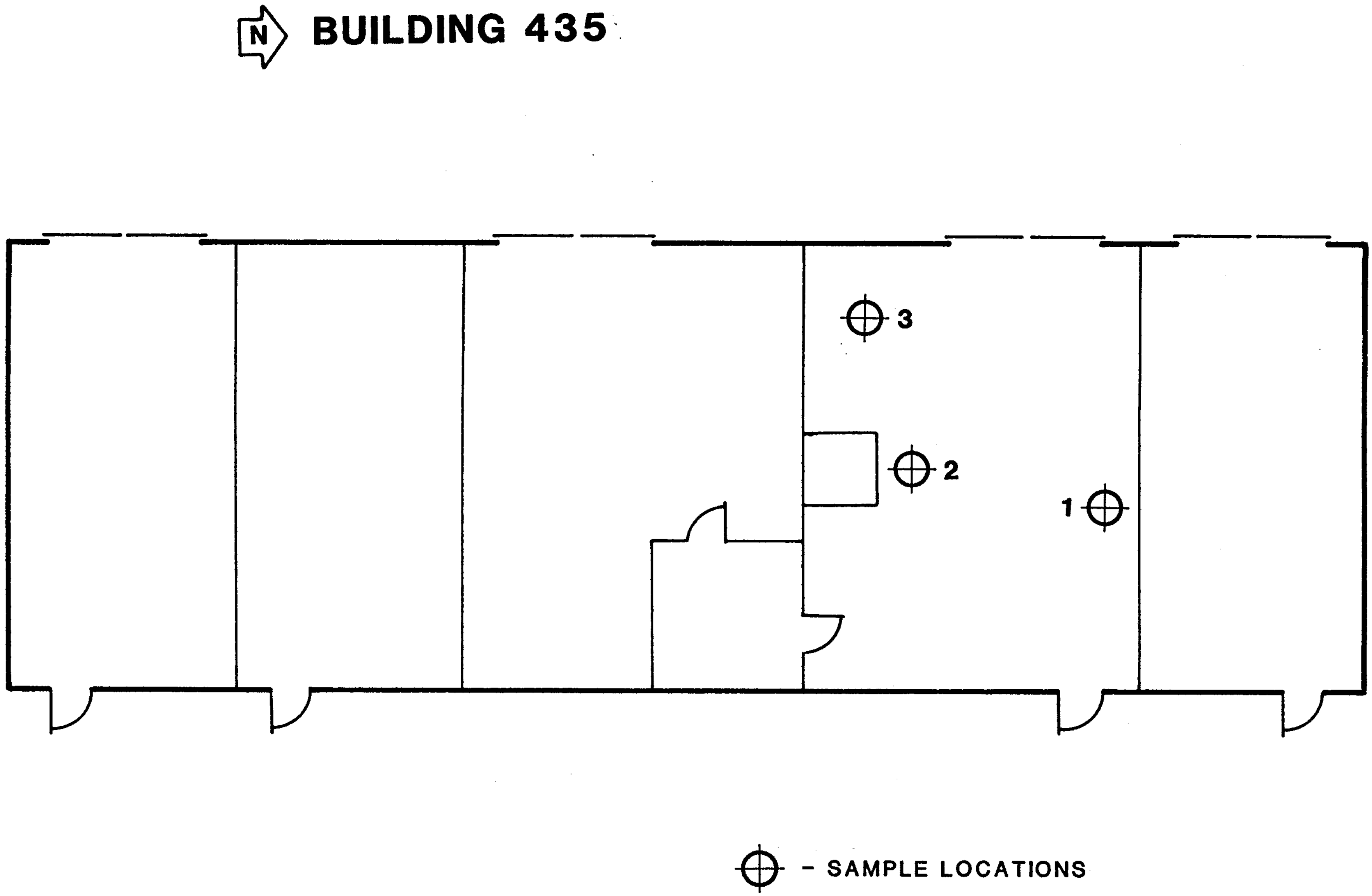
WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 435

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
no drwg.	1)	Room 4		debris possibly transite	***
	2)	"	hood	L&S**	***
	3)	"	overhead	3 ceiling layers	3 each layer

** liner & shell

*** not required

BUILDING 435



WELDON SPRING REMEDIAL ACTION PROJECT

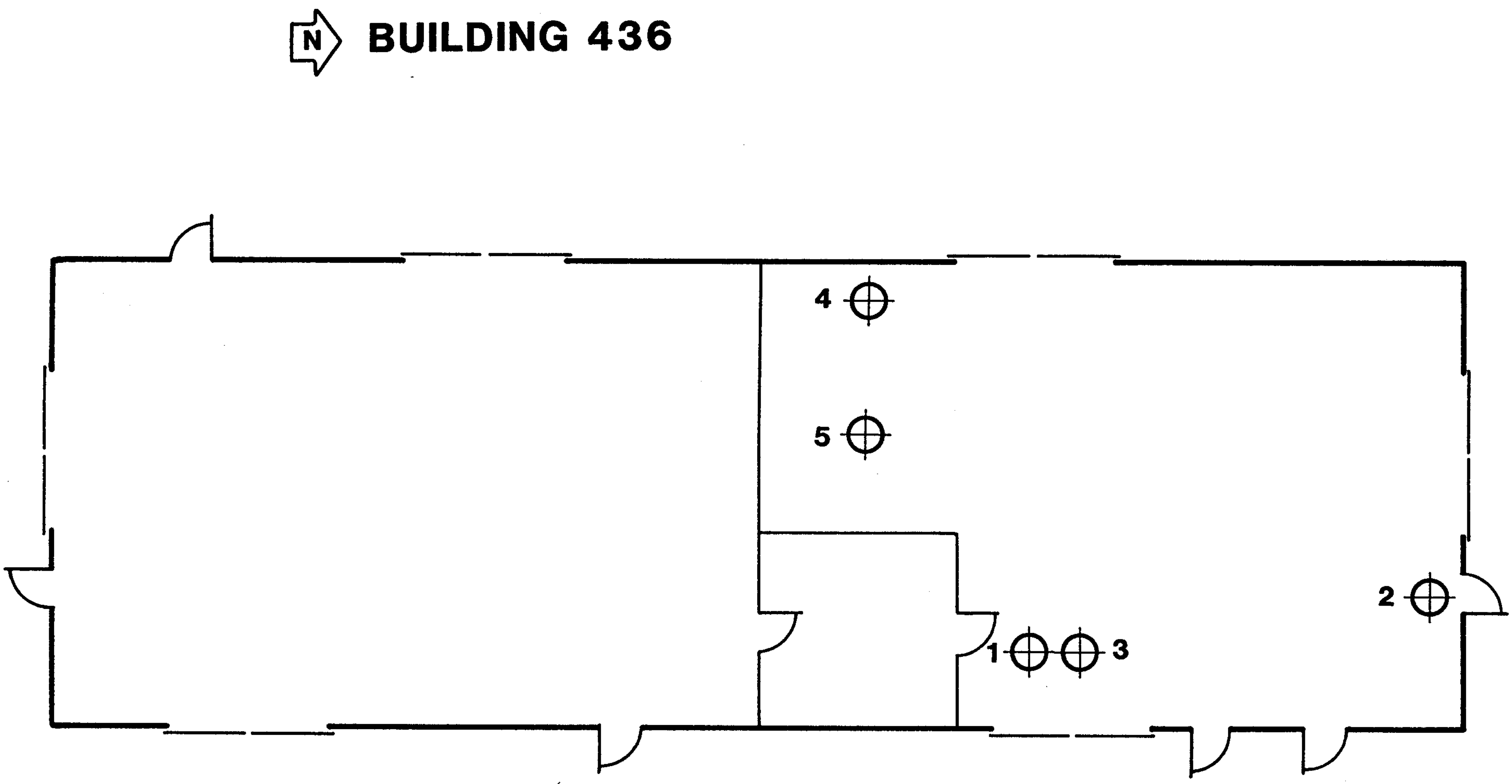
SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 436

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
no drwg.	1)	Room 2		debris-firebrick	3
	2)	"		debris-wall/ceiling panels	3
	3)	"		debris-brick	3
	4)	"		debris-brick	3
	5)	"	overhead	3 ceiling layers	3 each layer

BUILDING 436



⊕ – SAMPLE LOCATIONS

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 437

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
no drwg.	1)		overhead	3 ceiling layers	3 each layer
	2)	NW end of bldg.	office wall	wall paneling	3

WELDON SPRING REMEDIAL ACTION PROJECT
SITE CHARACTERIZATION PLAN
WASTE CHARACTERISTICS-ASBESTOS
BUILDING NO. 438

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
no drwg.	1)		overhead	3 ceiling layers	3 each layer

WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 439

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
				none	

WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 441

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
				none	

WELDON SPRING REMEDIAL ACTION PROJECT

SITE CHARACTERIZATION PLAN

WASTE CHARACTERISTICS-ASBESTOS

BUILDING NO. 443

Drawing Number	Sample No.	Area/Room	Location	Material To Be Sampled	Number of Samples
				none	