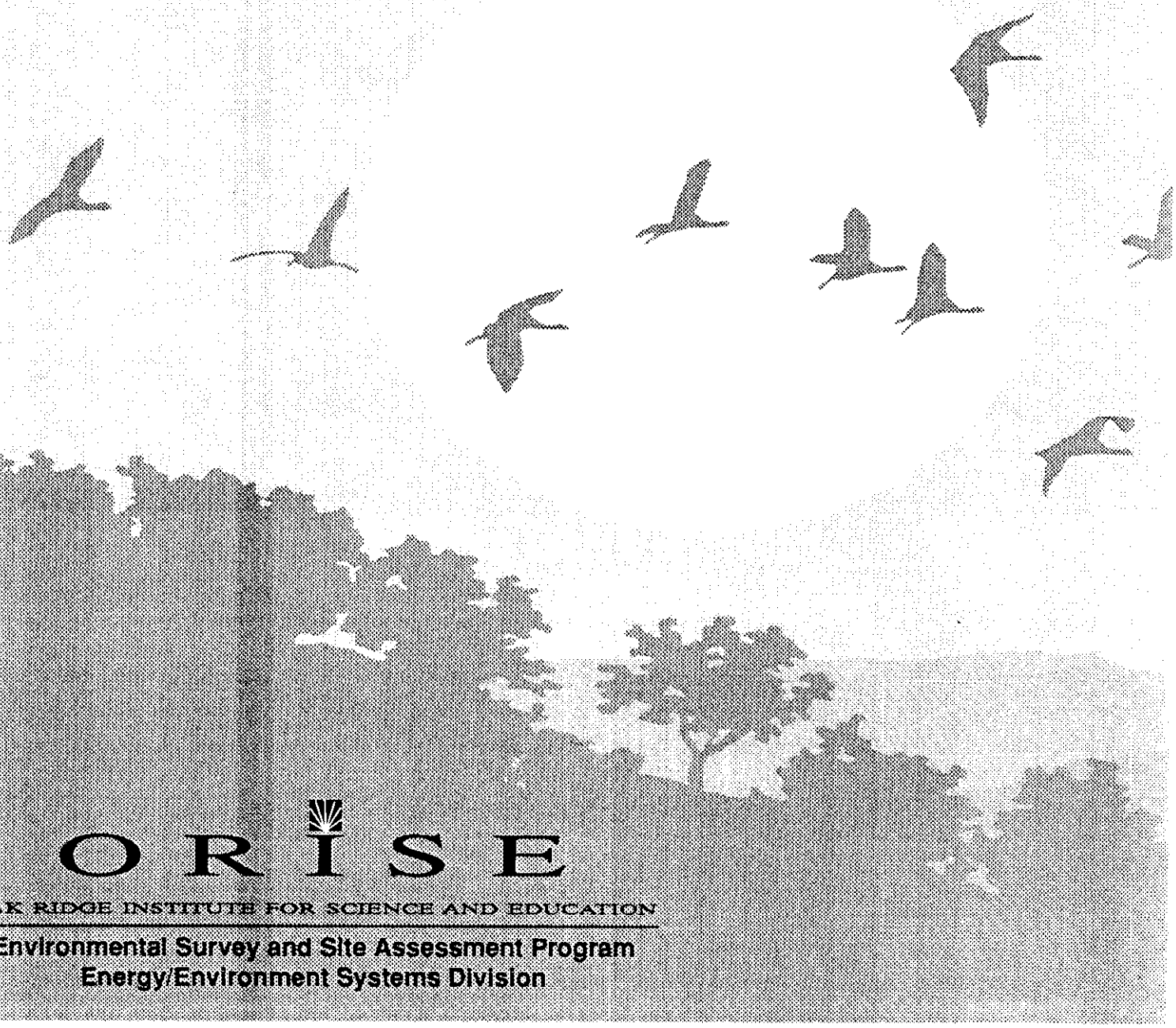
VERIFICATION SURVEY OF THE BAKER AND WILLIAMS WAREHOUSES BUILDING 521-527 NEW YORK, NEW YORK

J. D. BERGER, P. R. COTTEN, AND J. L. PAYNE

Prepared for the Office of Environmental Restoration
U.S. Department of Energy



ORISE
OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION
Environmental Survey and Site Assessment Program
Energy/Environment Systems Division

Wiston
75:24/ NY.61

Department of Energy
Washington, DC 20585

JAN 0 1 1992

Mr. Nick Proto
Ralph Ferrara, Inc.
601 West 26th Street
New York, New York 10001

Dear Mr. Proto:

I am enclosing a copy of the final report from Oak Ridge Associated Universities (ORAU) for the results of the radiological characterization survey in March 1991, at your company's warehouse at 521-527 West 20th Street in Manhattan. During this survey, areas in the building were identified for subsequent remedial action.

As I mentioned in my letter to you dated September 23, 1991, two additional reports relating to your company's property are being prepared by ORAU. One of these reports addresses the verification of the remedial activities in building 521-527. It is the policy of the Department of Energy to independently verify that remedial action has met the appropriate cleanup guidelines. The second report is for the radiological survey in building 513-519. This survey identified some areas in building 513-519 where uranium is present and will require remedial action.

The reports for these surveys will also be sent to you when they are published in final form. In the meantime, if you have any questions, please feel free to call me at 301-903-8149.

Sincerely,

W. Alexander Williams, PhD
Designation and Certification Manager
Division of Off-Site Programs
Division of Eastern Area Programs
Office of Environmental Restoration

Enclosure

cc:
R. Kirk, OR

FILE COPY

bcc:
Weston
EM-40 (2)
EM-42 (3)
Williams Reader

EM-421:wagoner:djn:903-8145:12/30/91:proto2.waw

P. Hevner Review: ____

Williams for AC
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12/31/91

Wagoner
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Weston
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Department of Energy
Washington, DC 20585

FEB 07 1992

Dr. Paul J. Merges, PhD
Director, Bureau of Radiation
New York Department of Environmental Conservation
50 Wolf Road
Albany, New York 12233-7255

Dear Dr. Merges:

For your information, I am forwarding two final reports of radiological surveys at the Baker and Williams Warehouse Site in New York City. These documents are entitled:

- CHARACTERIZATION SURVEY OF THE BAKER AND WILLIAMS WAREHOUSES BUILDING 521-527 NEW YORK, NEW YORK. NOVEMBER 1991; and
- RADIOLOGICAL SURVEY OF THE BAKER AND WILLIAMS WAREHOUSES BUILDING 513-519 NEW YORK, NEW YORK. DECEMBER 1991.

If you have any questions related to the subject documents, please contact me at (301) 903-8149.

Sincerely,

W. Alexander Williams, PhD
Designation and Certification Manager
Division of Off-Site Programs
Office of Eastern Area Programs
Office of Environmental Restoration

2 Attachments

cc:
R. Kirk, DOE-OR
J. Patterson, DOE-HQ

bcc:
C. Hickey, BNI
Weston
EM-40 (2)
EM-42 (3)
Williams Reader

EM-421:wagoner:djn:903-8145:2/6/92:merges2.jep

P. Hevner Review: _____

Williams
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2/6/92

Patterson
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2/6/92

Wagoner
EM-421
2/7/92

Weston

7894 NY.61

Department of Energy
Washington, DC 20585

FEB 11 1992

Mr. James D. Berger
Environmental Survey and
Site Assessment Program
Oak Ridge Associated Universities
Post Office Box 117
Oak Ridge, Tennessee 37831-0117

Dear Mr. Berger:

The report titled, Verification Survey of the Baker and Williams Warehouses Building 521-527 New York, New York, has been reviewed. The enclosed comments are enclosed for your use in preparing the final report.

The section entitled "Document Review" on page 7, questions the adequacy of the cleanup and documentation. If the deficiencies (which are not identified in detail) place conditions on the findings and results, further explanation is needed. This explanation should define the deficiencies and assess their impact on the overall findings of the survey. It is extremely important that the deficiencies cited be identified and resolved prior to publication of the final report. Consideration may be given to the revision of the section if the issues are resolved to your satisfaction. I ask you to reach such resolution prior to final publication; alternatively, further discussion of the deficiencies and their impact on the findings must be presented. In the latter case, please furnish the revised language for review prior to final publication.

If you have any questions, please call me at FTS 233-8149.

Sincerely,

W. Alexander Williams, PhD
Designation and Certification Manager
Off-Site Branch
Division of Eastern Area Programs
Office of Environmental Restoration

Enclosure

cc:
W. Seay, OR
R. Kirk, OR
J. Patterson, EM-421

FILE COPY

bcc:
Weston
EM-40 (2)
EM-42 (3)
Williams Reader

EM-421:wagoner:djn:2/10/92:903-8145:b&wverif.waw

P. Hevner Review: _____

Williams
EM-421
2/12/92

Wagoner
EM-421
2/10/92

Comments on the Draft Report - Verification Survey of the Baker and Williams Warehouses, Building 521-527, New York, New York

Appendix C, title page - The guidelines presented are not current. The currently applicable requirements for residual radioactivity are found in DOE Order 5400.5, Chapter IV, "Residual Radioactivity."

Page 2, first paragraph, third sentence - This sentence should be changed to read as follows: "The purpose of the radiological survey is to obtain sufficient radiological measurements such that DOE Headquarters can determine whether a site should be designated for remedial action or eliminated from FUSRAP."

Page 3, first line - Change to read "...was to confirm that..."

Page 3, third paragraph, first sentence - "Contact" should be changed to "contract."

Page 4, third paragraph, last sentence - DOE Order 5400.5 should also be cited as a reference.

Page 7, second paragraph - The deficiencies noted in this section should be listed. It is not clear if the locations cited where the guidelines were exceeded are the only deficiencies in the Post Remedial Action Report. Also, evidence of the resolution of each deficiency should be included in this section.

Page 7, third paragraph, first sentence - The "elevated direct radiation" levels should be quantified.

Page 9, fourth paragraph, last sentence - It is not clear if the three locations of elevated activity were the only deficiencies noted in the Post Remedial Action Report. The clarification made in the Document Review section should be reflected in this section. Also, the word "site" should be deleted from this sentence.

Page 12, Figure 2 and page 14, Figure 4 - The difference in the figures, both of the ground level, should be addressed in the text.

Weston
RC44

Department of Energy
Washington, DC 20585

NY.61

APR 22 1992

Mr. Jonathan S. Sigall
Editorial Director
Bold Information System
Brownstone Publishers, Inc.
304 Park Street South
New York, New York 10010

Dear Mr. Sigall:

On April 15, 1991, you requested information from the U.S. Department of Energy (DOE) pursuant to the Freedom of Information Act (FOIA), 5 U.S.C. 552. Your request asked for:

1. "Radiological surveys and reference information for sites designated for cleanup by the Department of Energy's Formerly Utilized Sites Remedial Action Program (FUSRAP)"; and

2. "Any and all documents, forms, and memos -- including, but not limited to, radiological surveys and reference information -- indicating sites under evaluation by the Department of Energy to determine whether a FUSRAP designation should be made."

This request was restricted to sites within New York City and the Counties of Nassau, Suffolk, Rockland, Westchester, Orange, Dutchess, Sullivan, and Putnam.

In a response dated July 22, 1991, DOE agreed to furnish to you radiological survey reports that were then under preparation. I am enclosing for your information two reports prepared by DOE's contractor, Oak Ridge Associated Universities:

- Characterization Survey of the Baker and Williams Warehouses, Building 521-527, New York, New York; and

- Radiological Survey of the Baker and Williams Warehouses, Building 513-519, New York, New York.

There is one additional report under preparation for the verification of the remedial action in Building 521-527 of the Baker and Williams Warehouse site. This report will be sent to you at no cost when it is published.

Sincerely,

W. Alexander Williams, PhD
Designation and Certification Manager
Division of Off-Site Programs
Office of Eastern Area Programs
Office of Environmental Restoration

Enclosures

bcc:
Weston
EM-40 (2)
EM-42 (3)
Williams Reader

EM-421:wagoner:djn:903-8145:4/22/92:boldl.waw

Williams
EM-421
4/27/92

Wagoner
EM-421
4/22/92

ORISE 92/E-41

VERIFICATION SURVEY OF THE BAKER AND WILLIAMS WAREHOUSES BUILDING 521-527 NEW YORK, NEW YORK

Prepared by

J.D. Berger, P.R. Cotten and J.L. Payne

Environmental Survey and Site Assessment Program
Energy/Environment Systems Division
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Prepared for

Department of Energy
Office of Environmental Restoration

FINAL REPORT

MAY 1992

This report is based on work performed under contract number DE-AC-05-76OR00033 with the U.S. Department of Energy.

VERIFICATION SURVEY
OF THE
BAKER AND WILLIAMS WAREHOUSES
BUILDING 521-527
NEW YORK, NEW YORK

Prepared by: James D Berger Date: 5/6/92
J. D. Berger, Program Director
Environmental Survey and Site Assessment Program

Reviewed by: Clayton F. Weaver Date: 5/7/92
C. F. Weaver, Laboratory Manager
Environmental Survey and Site Assessment Program

Reviewed by: Michael R Landis Date: 5/8/92
M. R. Landis, Project Manager
Environmental Survey and Site Assessment Program

Reviewed by: W L Beck Date: 5/7/92
W. L. Beck, Assistant Program Director
Environmental Survey and Site Assessment Program

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VERIFICATION SURVEY
OF THE
BAKER AND WILLIAMS WAREHOUSES
BUILDING 521-527
NEW YORK, NEW YORK

INTRODUCTION AND SITE HISTORY

During the early 1940's, the Manhattan Engineer District (MED), predecessor to the Atomic Energy Commission (AEC) and the Department of Energy (DOE), shipped uranium concentrates to the former Baker and Williams Warehouses on West 20th Street, in New York, New York. The warehouses were used for short-term storage of the uranium that was later distributed to various U.S. Government facilities. According to historical information, approximately 99,430 kg (219,000 lbs) of orange and yellow sodium uranate was delivered in 1942, and approximately 39,000 kg (86,000 lbs) of orange and yellow sodium uranate, 10,000 kg (22,000 lbs) of sodium uranyl carbonate, and 9,080 kg (20,000 lbs) of black uranium oxide were delivered to the Baker and Williams Warehouses in 1943. Since the 1940's, the warehouses have been leased by several businesses and are currently owned by Ralph Ferrara, Inc.

The Baker and Williams Company owned three adjacent warehouse buildings at 513-519, 521-527, and 529-535 West 20th Street. Records identify the shipping address as the Shipping and Receiving office in Building 529-535; however, the uranium concentrate shipments may have been received, unloaded, and/or stored at either of the adjacent warehouse buildings. Adjoining doorways between Buildings 521-527 and 529-535 allowed convenient access between the two buildings.

In 1989, DOE reviewed available historical documentation, describing MED/AEC activities conducted at this facility, and, based on this information, determined that the potential for radioactive material to be present as a result of the past activities was low. However, the available information was not sufficient to demonstrate that radiological conditions of the site, following termination of MED/AEC activities, satisfied current criteria for use without

restrictions. DOE decided that a radiological survey should be performed to determine whether additional investigations were warranted under the Formerly Utilized Sites Remedial Action Program (FUSRAP). The purpose of the radiological survey was to obtain sufficient radiological measurements such that DOE Headquarters could determine whether the site should be included for remedial action or eliminated from FUSRAP[1]. DOE obtained consent to enter the property at 529-535. A preliminary site visit was performed by the Environmental Survey and Site Assessment Program (ESSAP) of Oak Ridge Associated Universities (now Oak Ridge Institute for Science and Education (ORISE)), and it was determined that Building 521-527 would be included in the survey, based on visual inspections and accessibility to the adjoining 529-535 building.

In August 1989, ESSAP conducted a radiological survey of the interior surfaces of Buildings 521-527 and 529-535. Areas of elevated direct radiation in excess of DOE guidelines for residual surface contamination were detected on the floor of the West Bay on the Ground Level of Building 521-527 and in several small areas on the floor and lower walls in the East Bay in the Basement[2]. No contamination was detected on the remaining floors in 521-527 or in Building 529-535. As a result of the ESSAP survey findings, the Baker and Williams Warehouses were designated by DOE to be addressed under the proposed expedited protocol for remedial actions at small FUSRAP sites. Under the expedited protocol, the contractor who performs the radiological designation activities also performs the characterization and verification for the project. DOE requested that ESSAP conduct a radiological characterization of the East and West Bays of the Basement and the Ground Level of Building 521-527.

Results of the March 1991 characterization survey[3] were used to plan and implement remedial actions, which were conducted in April 1991. A verification survey was conducted by ESSAP in parallel with the remedial actions in April. The purpose of the verification survey was to confirm that the remedial actions were successful in meeting the established guidelines. This report describes the results of the verification survey of Building 521-527 of the Baker and Williams Warehouses.

PROJECT ORGANIZATION AND RESPONSIBILITY

Headquarters of DOE provides overview and coordination for all FUSRAP activities. The Oak Ridge Field Office of DOE Oak Ridge (DOE-OR) is responsible for implementation of FUSRAP and the Former Sites Restoration Division of DOE-OR, manages the daily activities.

Under the FUSRAP protocol, an initial investigation or designation survey of a potential site is performed by Oak Ridge Institute for Science and Education or Oak Ridge National Laboratory (ORNL) under contract to DOE Headquarters. If appropriate, DOE Headquarters designates a site into FUSRAP, based upon the results provided by the initial investigation. DOE's Project Management Contractor (PMC) for FUSRAP is Bechtel National, Inc. (BNI). BNI is responsible for planning and the implementation of FUSRAP activities and managing the site characterization and remedial actions. The final phase for a FUSRAP site is independent verification which is provided by ORISE or ORNL after remedial action is complete. The verification survey confirms that remedial actions at the site have been effective in meeting current guidelines and assures that documentation accurately and adequately describes the post-remedial action radiological condition of the site. DOE Headquarters uses the information developed by the remedial and verification activities to certify that a site can be released for unrestricted use.

The Baker and Williams Warehouses were selected for remediation under the proposed expedited protocol within FUSRAP. In contrast to the standard protocol, under the proposed expedited protocol, the designation contractor for this site, ORISE functions as the organization responsible for the designation, characterization, and verification activities, while BNI is responsible for conducting the remedial action and post-remedial action survey.

FACILITY DESCRIPTION

The Baker and Williams Warehouses are located on the west side of Central New York

City, in the borough of Manhattan (Figure 1). Building 521-527 has 10 levels with approximately 855 m^2 (9200 ft^2) of storage space per level. Figures 2 and 3, illustrate the floor plans for the Ground Floor and Basement, respectively. Fireproof materials such as steel, concrete, and brick were used in the construction of the building. The floors are concrete and the interior walls are constructed of masonry brick. The Basement ceiling is constructed of concrete; however the West Bay ceiling has been covered with a 3-4 inch overlay of cork and stucco. Most of the walls in the Basement have been painted.

An asphalt layer, several inches thick had been used to surface the Ground Level floor. Some of the walls had been resurfaced and recently painted. In a small portion of the Ground Level West Bay, a four room Vault had been constructed over the asphalt material. Concrete blocks and cork paneling were used to construct the walls of the Vault; a concrete floor was poured in Rooms 1 and 2, and a wood floor was installed in Rooms 3 and 4 over the original floor. To access original surfaces, for survey and remediation, as necessary, the wall that separated Rooms 1 and 2, all of the paneling from the walls and the wood floor in Rooms 3 and 4, and the east and north walls of Room 3 were removed.

PROCEDURES

During the period between April 22-30, 1991, ORISE/ESSAP performed an independent verification survey of the Basement and the West Bay of the Ground Level in Building 521-527. The survey was conducted in accordance with a plan[4] prepared by ESSAP and approved by DOE/EM; this plan was modified during the remediation activities to accommodate a change in the technique, used by the PMC for decontamination of the asphalt floor covering.

Additional information, concerning major instrumentation and survey and analysis procedures, is provided in Appendices A and B.

OBJECTIVE

The objective of the survey was to verify that the survey, sampling, analyses, and supporting documentation developed by DOE's PMC, provided an accurate and complete description of the radiological condition of the building, relative to DOE Order 5400.5, Chapter IV, and FUSRAP guidelines. (Appendix C).

SURVEY PROCEDURES

Gridding

The West Bay of the Ground Level was partitioned into six areas for identification and gridding purposes (Figure 2). A separate 1 m x 1 m alphanumeric reference grid system was established on the floors and lower walls (up to 2 m) in Areas 11, 2, and 4. Area 7 (offices and elevator access areas) was not gridded. The 1 m x 1 m alphanumeric reference grid system established in the Basement area during characterization survey activities was re-established (Figure 3). Measurements were referenced to the grid systems or to prominent building features (where grid systems were not established).

Surface Scans

Surface scans were performed at the remediated locations, where contamination had been identified at the time of the characterization survey, in order to detect residual surface activity. Scans were also performed at selected vicinity locations to insure that contamination was not dispersed during the remediation. Gamma scans were performed using NaI(Tl) gamma scintillation detectors. Alpha-beta scans of the floors were performed using large-area gas-proportional detectors. Areas with limited accessibility, such as overhead piping and ledges, were scanned using ZnS scintillation detectors and GM "pancake" detectors. All detectors were coupled to instruments with audible indicators. Locations of elevated direct radiation, suggesting the presence of surface contamination, were marked and identified for further investigation.

Measurements of Surface Activity Levels

On the Ground Level, West Bay, direct measurements for total surface activity were performed at the center and four points, midway between the center and block corners, of 88 randomly selected grid blocks. Twenty-eight additional measurements were performed on the Ground Level of the West Bay, at locations previously identified by the characterization survey as requiring remediation; at locations of elevated direct radiation, identified by surface scans; on walls and overhead surfaces; and on the floor of Area 7. Figures 4-9 indicate locations of direct measurements on the Ground Level.

On the Basement level, direct measurements for surface activity were performed at four locations on upper surfaces in the West Bay (Figure 10). In the East Bay, measurements were performed in eight grid blocks and at 19 additional locations, including remediated areas, locations of elevated direct radiation identified by surface scans, and representative overhead surfaces (Figure 11).

Smears for removable activity were obtained at the location in each grid block, exhibiting the highest direct activity level, and at each single-point measurement location.

Exposure Rate Measurements

Exposure rates were measured at 1 meter (3.3 ft) above the surface at a minimum of one location in each room where remedial action was performed (Figures 4-11). Background measurements were obtained at four representative building locations of similar construction and without a history of radioactive materials use. A pressurized ionization chamber was used to obtain these measurements.

Sample Analysis and Data Interpretation

All samples and data were returned to the ESSAP laboratory for analysis and interpretation. Total surface activity levels were converted to units of disintegrations per minute per 100 cm^2 (dpm/100 cm^2). Smears were analyzed for gross alpha and gross beta activity and results also converted to units of dpm/100 cm^2. Findings were compared to the DOE guidelines, which are provided in Appendix C.

DOCUMENT REVIEW

The PMC's Post-Remedial Action Report and supporting documentation[5,6] were reviewed for general thoroughness, accuracy, and consistency. Data were evaluated to assure that areas exceeding guidelines were identified and remediated.

FINDINGS AND RESULTS

SURFACE SCANS

Surface scans identified two small isolated locations of elevated direct radiation in the West Bay, Ground Level, and one small location of elevated direct radiation in the East Bay of the Basement. The PMC immediately performed additional remediation and reduced the activity levels to within guideline values. Follow-up monitoring, performed by ESSAP, did not identify any additional residual activity.

SURFACE ACTIVITY LEVELS

Results of total and removable surface activity measurements are summarized in Table 1. The highest average grid block total activity levels were 230 dpm/100 cm^2, alpha, and 2900 dpm/100 cm^2, beta. Individual total activity measurements ranged from <66 to

380 dpm/100 cm^2, for alpha, and from <970 to 13,000 dpm/100 cm^2, for beta. Highest levels were on horizontal surfaces of overhead piping. Removable alpha and beta activity ranges were <6 to 15 dpm/100 cm^2 and <13 dpm/100 cm^2, respectively.

EXPOSURE RATES

Background exposure rates ranged from 11 μR/h to 13 μR/h. Exposure rates in remediated portions of Building 521-527, summarized in Table 2, ranged from 8 to 12 μR/h in the Basement and from 7 to 11 μR/h on the Ground Level.

COMPARISON OF RESULTS WITH GUIDELINES

DOE guidelines for release of facilities for unrestricted use are included as Appendix C. The principle radionuclide of concern at this site is processed (separated) uranium in its natural isotopic abundances. The DOE surface contamination guidelines values for uranium are:

Total Activity

5,000 dpm α/100 cm^2, averaged over a 1 m^2 area

15,000 dpm α/100 cm^2, maximum in a 100 cm^2 area

Removable Activity

1,000 dpm α/100 cm^2

Processed natural uranium in equilibrium with its short halflife daughter radionuclides, Th-234, and $Pa\text{-}234^m$, emits both alpha and beta radiations at an approximate ratio of 1:1. The uranium surface activity guidelines specify alpha activity; however, because rough, dirty, or damp surfaces may selectively attenuate alpha radiation, beta activity was measured and used for comparison with guidelines.

Two locations on the upper surface of overhead piping in the Basement had total surface activity levels above the 5000 dpm/100 cm^2 guideline value for average residual contamination, but below the 15,000 dpm/100 cm^2 maximum guideline value for small areas of residual activity. This latter (higher) guideline value is applicable to the small surface area represented by the piping. In addition, averaging the elevated activity over the contiguous 1 m^2 areas of surface, result in average activity levels well below the 5000 dpm/100 cm^2 guideline value. Therefore, all measurements satisfied the guideline values for total and removable surface activity.

Exposure rate measurements were well within the guideline value of 20 μR/h above background.

SUMMARY

During the period of April 22-30, 1991, ESSAP performed a radiological verification survey in the East and West Bays of the Basement and the West Bay of the Ground Level in Building 521-527 of the former Baker and Williams Warehouses. The verification activities included surface scans, measurements of total and removable surface activity, and exposure rate measurements. Three small locations of residual activity, exceeding guideline values were identified and remediated, and follow-up surveys indicated that DOE guideline values had been met.

Documentation, prepared by the PMC, adequately describes the procedures and results of the remediation and the post remedial action survey. Data, presented in the report and supporting documents, confirm that the remediation efforts were successful in satisfying the established guideline values for this project.

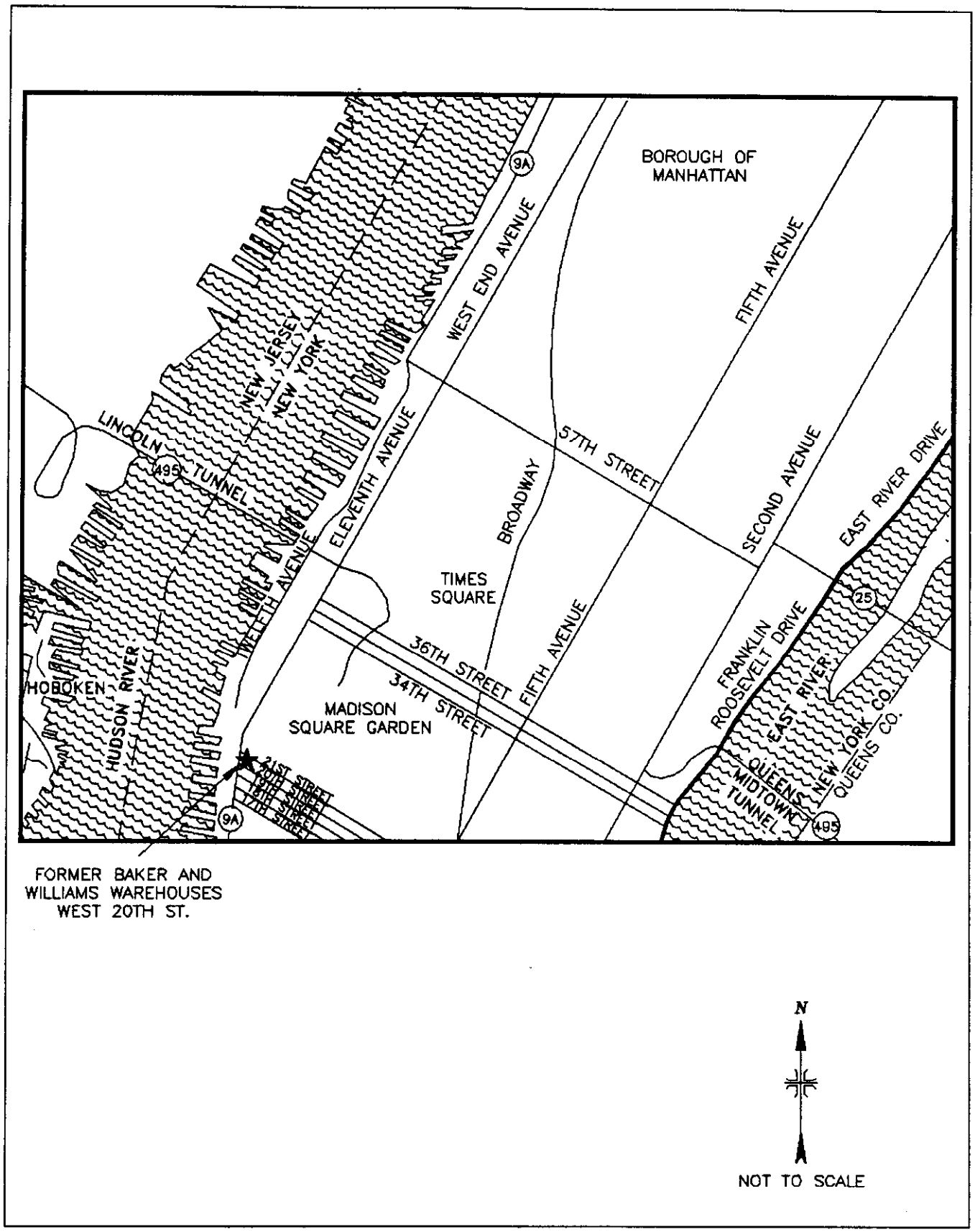

FIGURE 1: Location of the Baker and Williams Warehouses

BWW7a

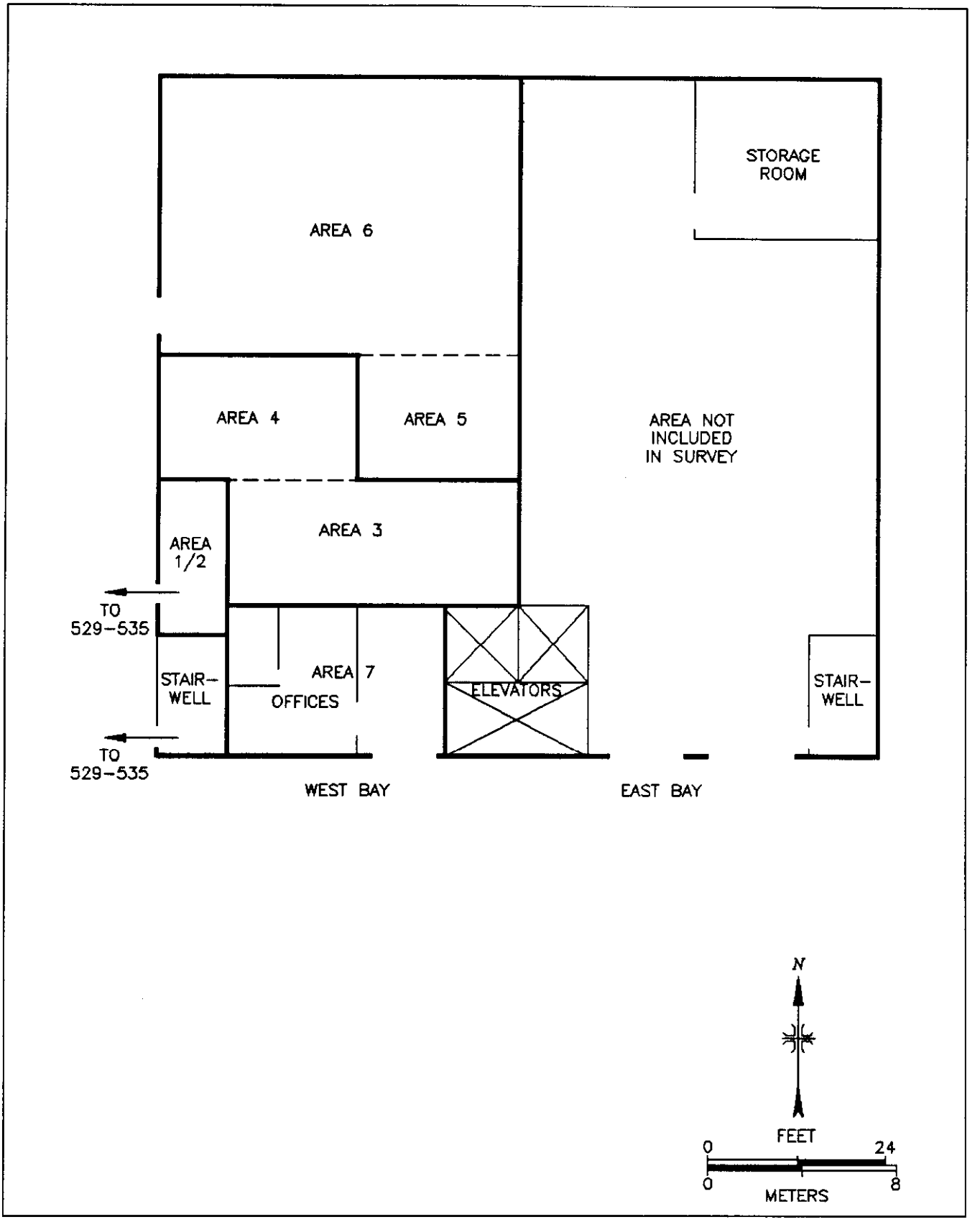

FIGURE 2: Floor Plan of Building 521-527 Ground Level

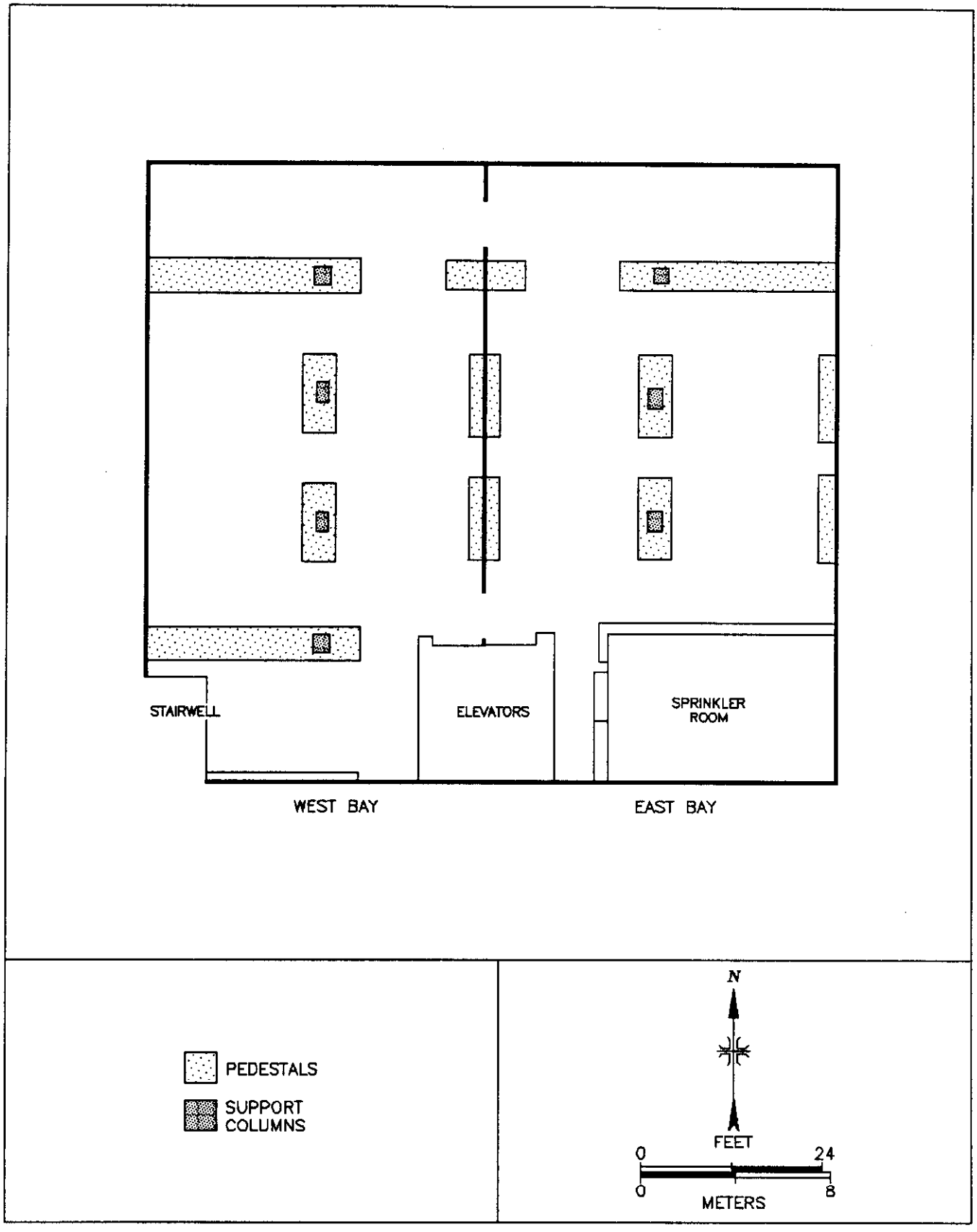

FIGURE 3: Floor Plan of Building 521–527 Basement Level

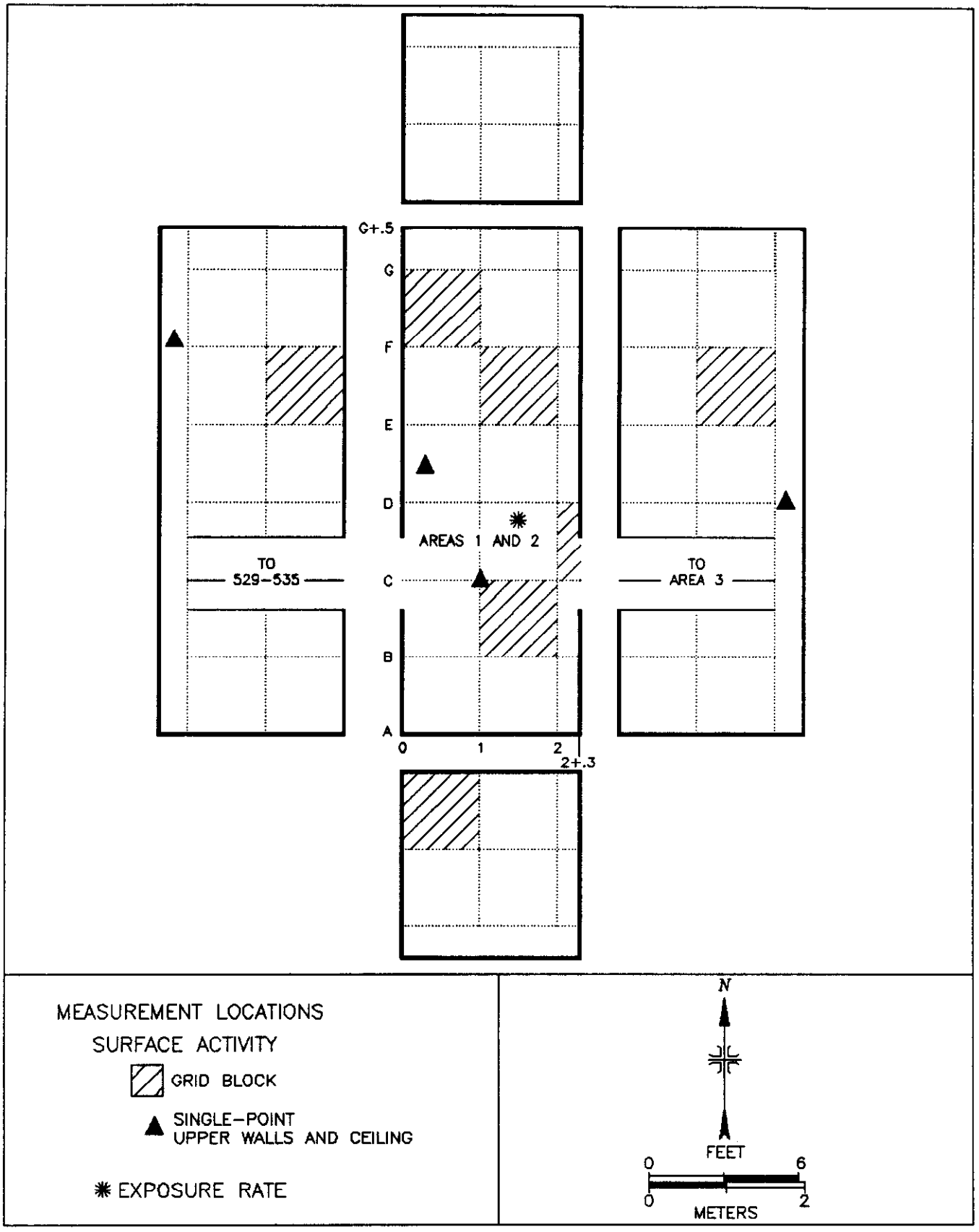

FIGURE 4: Areas 1 and 2 – Measurement Locations

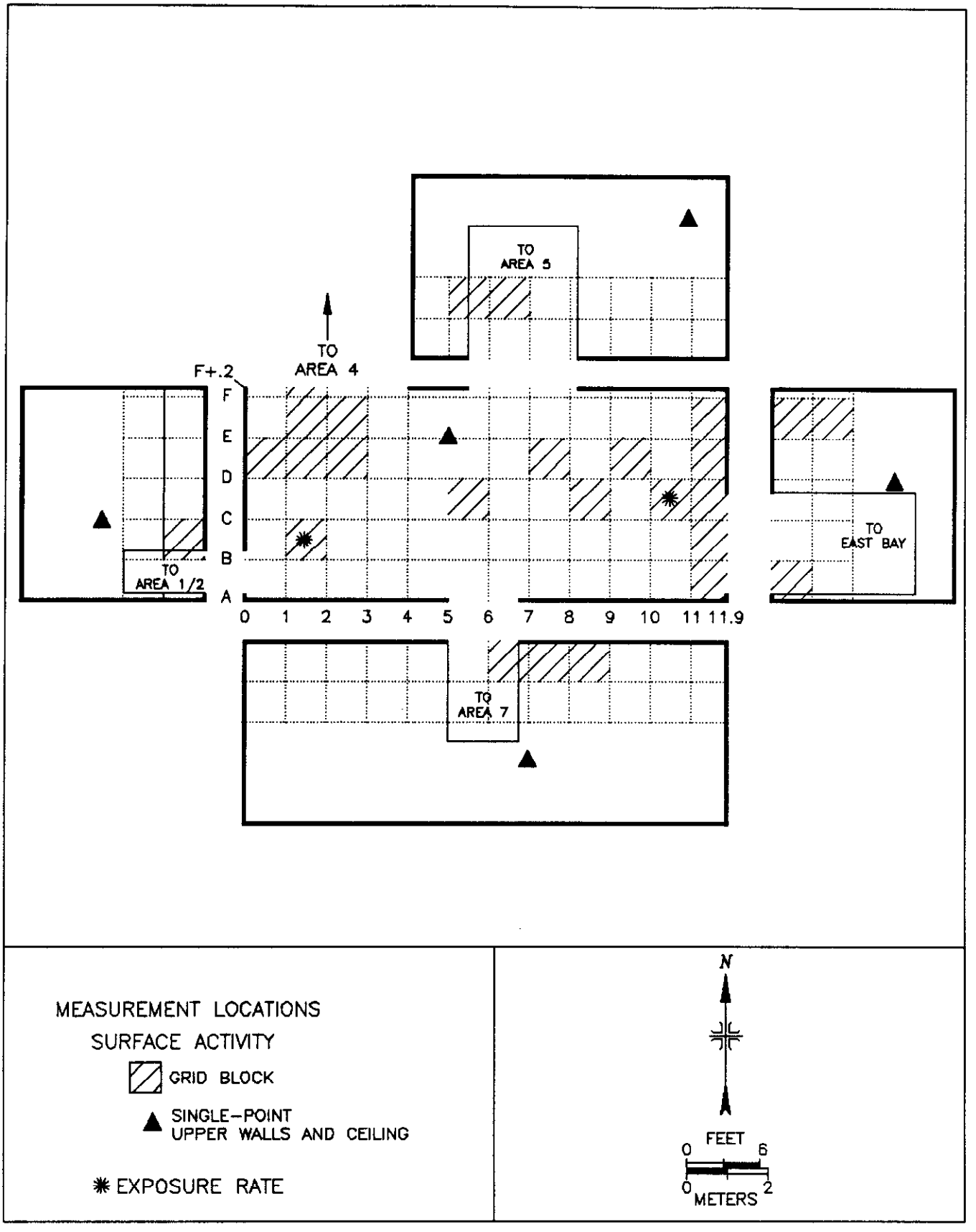

FIGURE 5: Area 3 – Measurement Locations

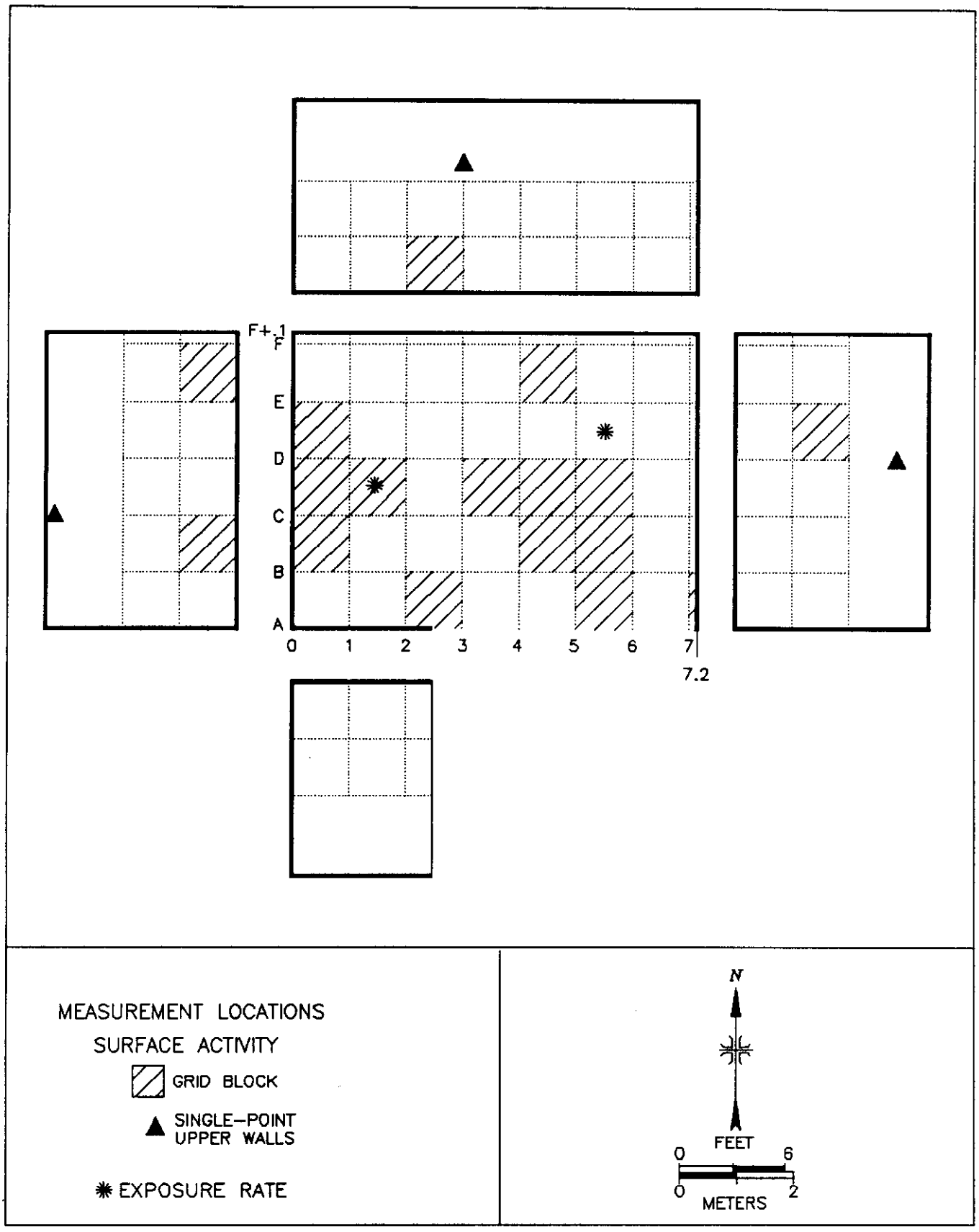

FIGURE 6: Area 4 — Measurement Locations

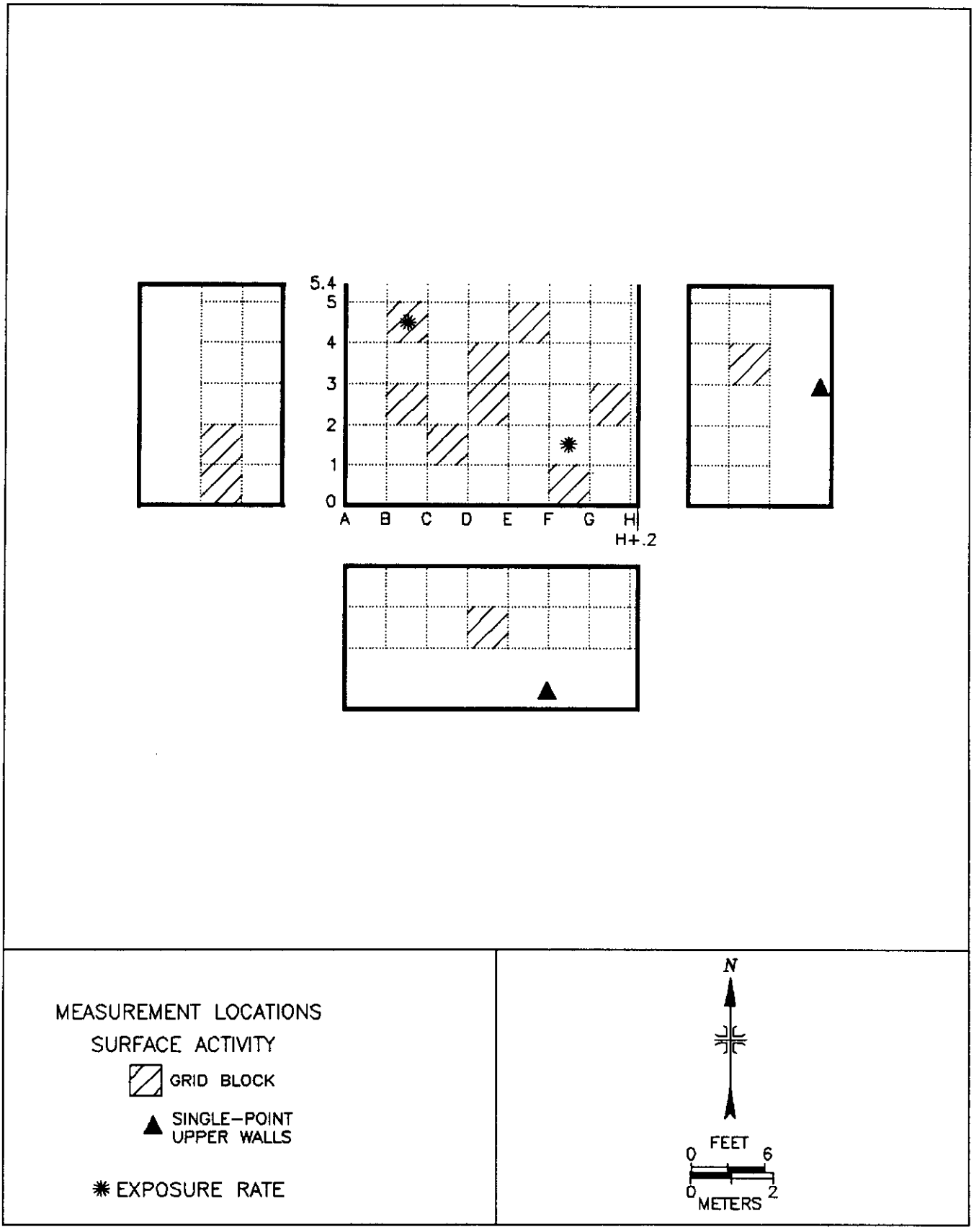

FIGURE 7: Area 5 – Measurement Locations

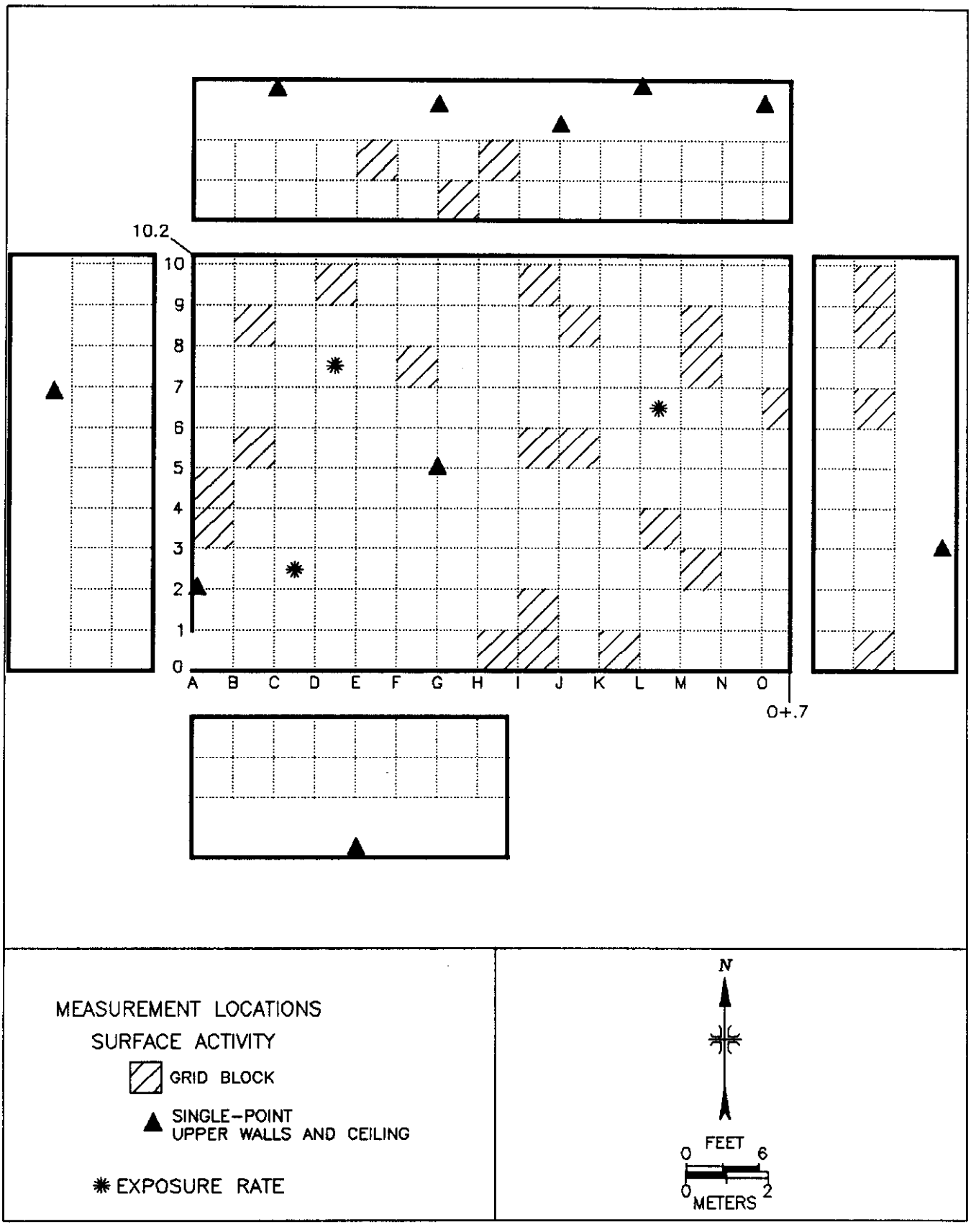

FIGURE 8: Area 6 – Measurement Locations

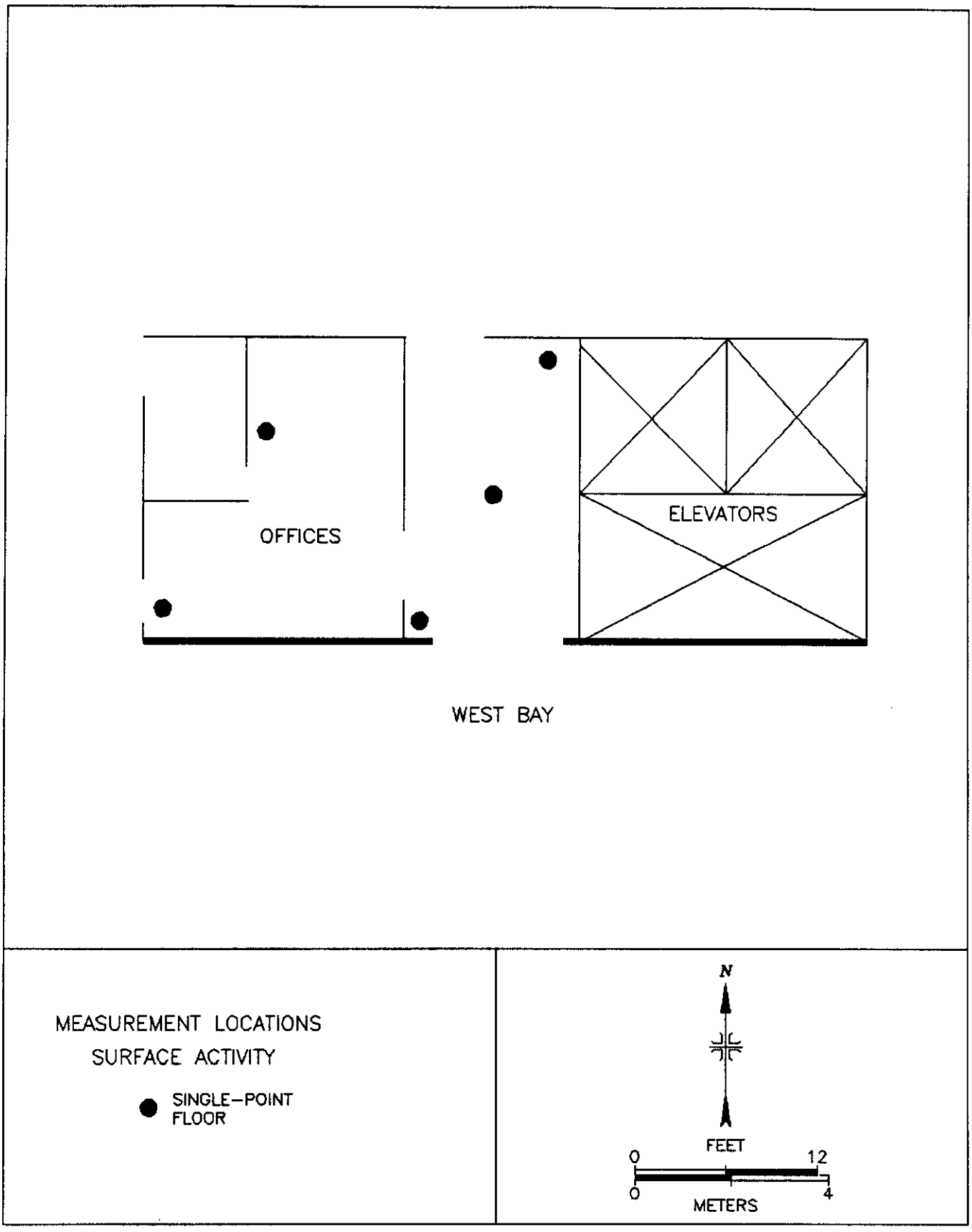

FIGURE 9: Area 7 – Measurement Locations

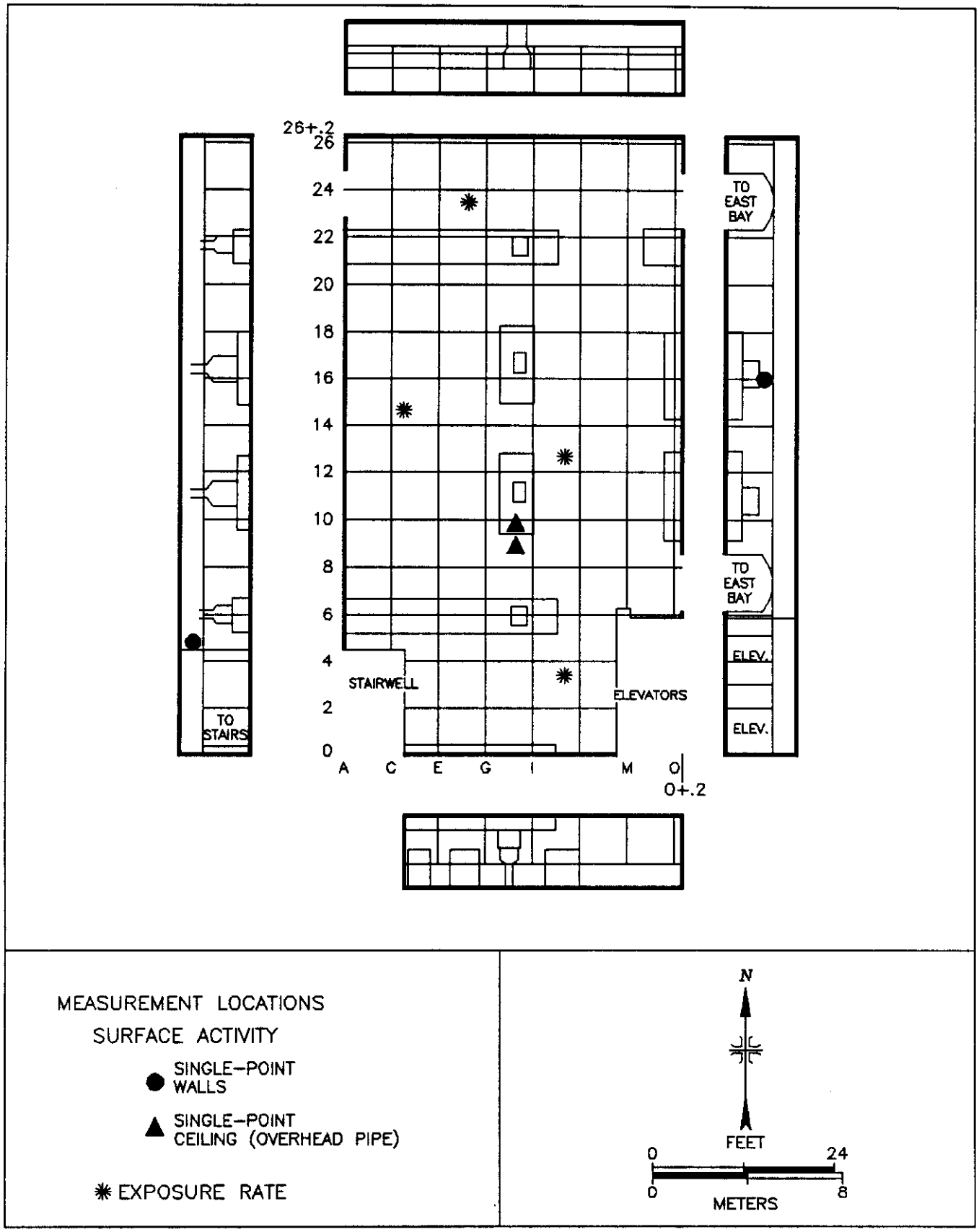

FIGURE 10: West Bay Basement – Measurement Locations

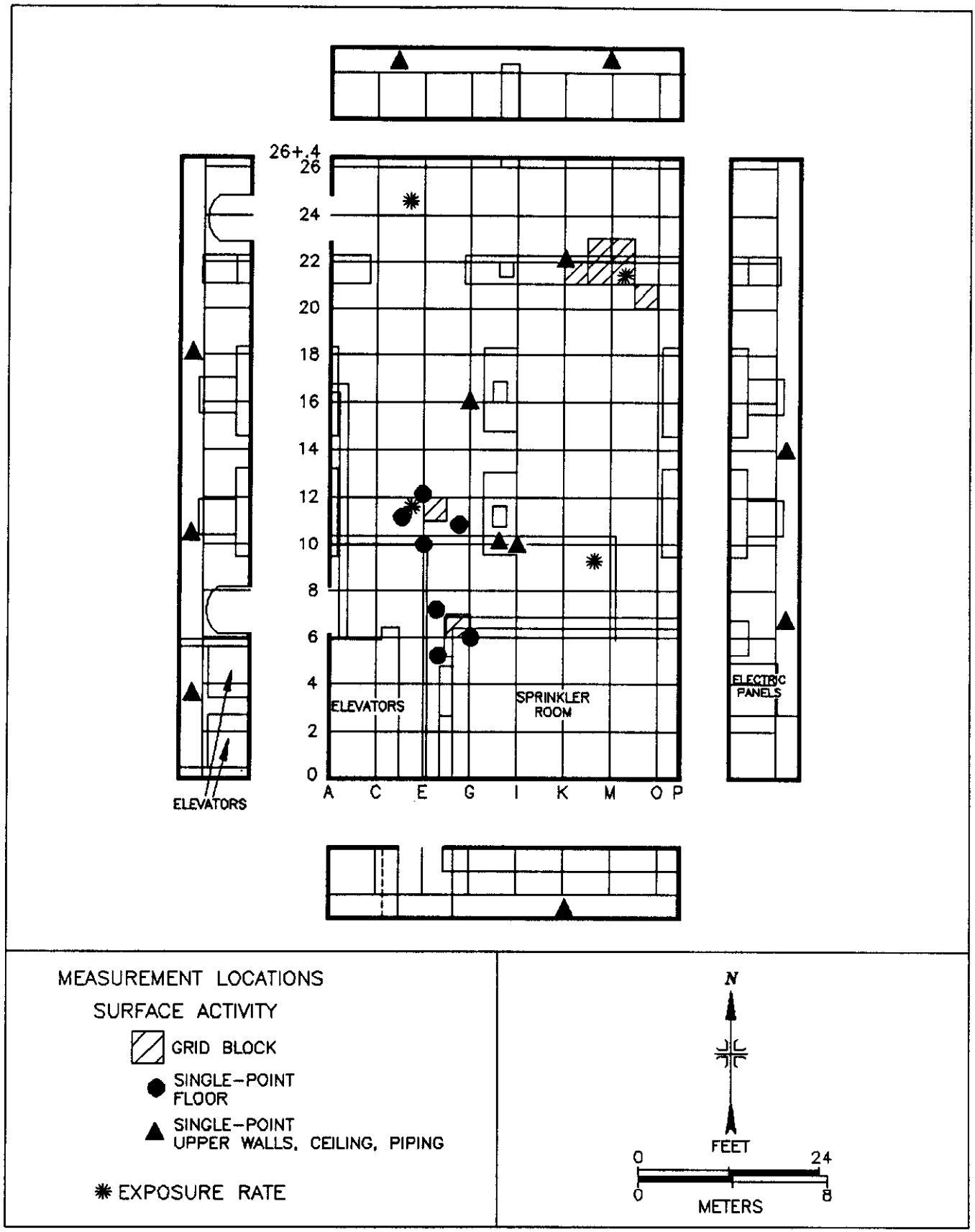

FIGURE 11: East Bay Basement – Measurement Locations

TABLE 1

SUMMARY OF SURFACE ACTIVITY MEASUREMENTS
BUILDING 521-527 BASEMENT AND GROUND LEVEL AREAS
BAKER AND WILLIAMS WAREHOUSES
NEW YORK, NEW YORK

Location[a]	Number of Measurement Locations		Highest Grid Block Average (dpm/100 cm²)		Range of Total Activity (dpm/100 cm²)		Range of Removable Activity (dpm/100 cm²)	
	Single Pt.	Grid Block	Alpha	Beta	Alpha	Beta	Alpha	Beta
BASEMENT								
West Bay	4	N/A[b]	N/A	N/A	<88-230	<970-13,000[c]	<6	<13
East Bay	19	8	230	2900	<88-380	<970-8,500[c]	<6-15	<13
GROUND LEVEL								
Areas 1/2	3	7	<83	<970	<83	<970	<6	<13
Area 3	5	26	<83	2000	<66-120	<970-2600	<6	<13
Area 4	3	17	<88	2500	<88-140	<970-4,500	<6	<13
Area 5	2	12	<88	<970	<88	<970-1,900	<6	<13
Area 6	10	26	<66	<970	<66-<88	<970-2,700	<6	<13
Area 7	5	N/A	N/A	N/A	<83	<970	<6	<13

[a]Refer to Figures 4-11.
[b]N/A indicates Not Applicable.
[c]The areas of elevated activity on overhead piping satisfy the maximum surface contamination guidelines.

TABLE 2
SUMMARY OF EXPOSURE RATES
BUILDING 521-527 BASEMENT AND GROUND LEVEL AREAS
BAKER AND WILLIAMS WAREHOUSES
NEW YORK, NEW YORK

Location[a]	Exposure Rate @ 1m above Surface (μR/h)
Background-Ground Level Truck Bay	11, 11, 11, 13
Basement-East Bay	
Grid Block 11/12, D/E	8
Grid Block 9/10, L/M	9
Grid Block 21/22, M/N	8
Grid Block 24/25, D/E	9
Basement-West Bay	
Grid Block 3/4, J/K	12
Grid Block 12/13, J/K	8
Grid Block 23/24, F/G	9
Grid Block 14/15, C/D	9
Ground Level	
Areas 1 &2, Grid Block 1/2, C/D	7
Area 3, Grid Block 1/2, B/C	9
Area 3, Grid Block 10/11, C/D	10
Area 4, Grid Block 5/6, D/E	11
Area 4, Grid Block 1/2, C/D	11
Area 5, Grid Block 1/2, F/G	11
Area 5, Grid Block 4/5, B/C	10
Area 6, Grid Block 6/7, L/M	10
Area 6, Grid Block 7/8, D/E	11
Area 6, Grid Block 2/3, C/D	10

[a]Refer to Figures 4-11

REFERENCES

1. Bechtel National, Inc., Formerly Utilized Sites Remedial Action Program, "Implementation Plan For Radiological Surveys Protocols," July 1988.

2. Oak Ridge Associated Universities, "Radiological Survey of the Baker and Williams Warehouses, New York, New York," June 1990.

3. Oak Ridge Associated Universities, "Characterization Survey of the Baker and Williams Warehouses, Building 521-527, New York, New York," November 1991.

4. Oak Ridge Associated Universities, "Proposed Radiological Survey Plan for the Baker and Williams Warehouses, New York, New York," February 27, 1991.

5. Bechtel National, Inc., "Post-Remedial Action Report for Building 521-527, Baker and Williams Warehouses Site, New York, New York," February 1992.

6. Letter from C.R. Hickey (Bechtel National, Inc.) to James D. Berger (Oak Ridge Institute for Science and Education), "Response to Meeting Held on March 23, 1992", April 30, 1992.

APPENDIX A

MAJOR SAMPLING AND ANALYTICAL EQUIPMENT

APPENDIX A

MAJOR SAMPLING AND ANALYTICAL EQUIPMENT

The display of a specific product is not to be construed as an endorsement of the product or its manufacturer by the authors or their employer.

DIRECT RADIATION MEASUREMENT

Instruments

Eberline Ratemeter-Scaler
Model PRS-1
(Eberline, Santa Fe, NM)

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

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

Ludlum Floor Monitor
Model 239-1
(Ludlum Measurements, Inc.,
Sweetwater, TX)

Reuter-Stokes Pressurized Ion Chamber
Model RSS-111
(Reuter-Stokes, Cleveland, OH)

Detectors

Eberline GM Detector
Model Hp-260
Effective Area, 15.5 cm^2
(Eberline, Santa Fe, NM)

Eberline ZnS Scintillation Detector
Model AC-3-7
Effective Area, 59 cm^2
(Eberline, Santa Fe, NM)

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

Ludlum Gas Proportional Detector
Model 43-37
Effective Area, 550 cm^2
(Ludlum Measurements, Inc.,
Sweetwater, TX)

LABORATORY ANALYTICAL EQUIPMENT

Low Background Gas Proportional Counter
Model LB-5110
(Tennelec, Oak Ridge, TN)

APPENDIX B

SURVEY AND ANALYTICAL PROCEDURES

APPENDIX B

SURVEY AND ANALYTICAL PROCEDURES

SURVEY PROCEDURES

Surface Scans

Surface scans were performed by passing the probes slowly over surfaces in and around remediated areas; the distance between the probe and the surface was maintained at a minimum-nominally about 1 cm. Identification of elevated levels was based on increases in the audible signal from the recording or indicating instrument. Scans of large surface areas on the floor of the facility were accomplished by used of a gas proportional floor monitor. Equipment and overhead surfaces were scanned using smaller, hand-held detectors. Combinations of detectors and instruments used for the scans were:

Alpha	-	ZnS Scintillation detector with ratementer-scaler.
Alpha-Beta	-	Gas Proportional detector with ratemeter-scaler.
Beta	-	GM detector with ratemeter-scaler.
Gamma	-	NaI Scintillation detector with ratemeter.

Surface Activity Measurements

Measurements of total alpha surface activity were performed using portable ratemeter-scalers with ZnS alpha scintillation detectors. Measurements of total beta surface activity were performed using portable ratemeter-scalers with thin-window "pancake" GM detectors. Count rates (cpm) were converted to disintegration rates (dpm/100 cm^2) by dividing the net rate by the 4 π efficiency and correcting for the active area of the detector. Effective window areas were 59 cm^2 for the ZnS detector and 15 cm^2 for the GM detector. The background count rate for

the ZnS detector was 1 cpm and the average background count rate for the GM detectors was 52 cpm. Efficiency factors varied with each individual detector used. The efficiency factors for the ZnS detectors ranged from 0.15 to 0.19, and for the GM detectors the efficiency factor was 0.26.

Removable Activity Measurements

Smears for determination of removable activity were performed using numbered filter paper disks, 47 mm in diameter; smears were sealed in labeled envelopes with the locations and other pertinent information recorded. The smears were returned to laboratories in Oak Ridge and counted on a low-background gas-proportional counter for gross alpha and gross beta activity.

Exposure Rate Measurements

Measurement of gamma exposure rate at the background location was performed using a Reuter-Stokes pressurized ionization chamber; the detector was placed 1 m above the floor and a series of consecutive readings obtained and averaged to determine the exposure rate.

QUALITY ASSURANCE

Analytical and field survey activities were conducted in accordance with procedures from the following documents:

- Survey Procedures Manual, Revision 6, February 1991
- Quality Assurance Manual, Revision 4, April 1991
- Laboratory Procedures Manual, Revision 6, April 1991

The procedures contained in these manuals were developed to meet the requirements of DOE Order 5700.6B and ANSI/ASME-NQA-1.

Calibration of all field laboratory instrumentation is based on NIST-traceable standards, when such standards are available. In cases where they are not available, standards of an industry recognized organization are used. Calibration of pressurized ionization chambers is performed by the manufacturer.

Quality Control procedures include:

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

APPENDIX C

SUMMARY OF U.S. DEPARTMENT OF ENERGY GUIDELINES FOR RESIDUAL RADIOACTIVE MATERIAL AT FORMERLY UTILIZED SITES

APPENDIX C

SUMMARY OF U.S. DEPARTMENT OF ENERGY GUIDELINES FOR RESIDUAL RADIOACTIVE MATERIAL AT FORMERLY UTILIZED SITES[1,2]

BASIC DOSE LIMITS

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

STRUCTURE GUIDELINES

Indoor/Outdoor Structure Surface Contamination

Radionuclides[a]	Allowable Total Residual Surface[b] (dpm/100 cm^2) 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[g]	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, and associated decay products	5,000α	15,000α	1,000α
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above[h]	5,000β-γ	15,000β-γ	1,000β-γ

External Gamma Radiation

The average level of gamma radiation inside a building or habitable structure on a site that has no radiological restriction on its use shall not exceed the background level by more than 20 μR/h and will comply with the basic dose limits when an appropriate-use scenario is considered.

SOIL GUIDELINES

Radionuclides	Soil Concentration (pCi/g) Above Background[i,j,k]
Radium-226 Radium-228 Thorium-230 Thorium-232	5 pCi/g when 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 are calculated on a site-specific basis, using the DOE manual developed for this use.

[a] 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.

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

[c] Measurements of average contamination should not be averaged over an area of more than 1 m^2. 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 a depth of 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 an area of that size 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. It is not necessary to use wiping techniques

to measure removable contamination levels, if direct scan surveys indicate that total residual surface contamination levels are within the limits for removable contamination.

[g] Guidelines for these radionuclides are not given in DOE Order 5400.5; however, these guidelines are considered applicable until guidance is provided.

[h] This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90, which has been separated from the other fission products, or mixtures where the Sr-90 has been enriched.

[i] These guidelines take into account ingrowth of radium-226 from thorium-230 or thorium-232 and radium-228 and assume secular equilibrium. If either Th-230 and Ra-226 or Th-232 and Ra-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 (1) the dose for the mixtures will not exceed the basic dose limit, or (2) the sum of ratios of the soil concentration of each radionuclide to the allowable limit for that radionuclide will not exceed 1 ("unity").

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

[k] If the average concentration in any surface or below-surface area, less than or equal to 25 m^2, exceeds the authorized limit of guideline by a factor of $(100/A)^{1/2}$, where A is the area or the elevated region in square meters, limits for "hot spots" shall also be applicable. Procedures for calculating these hot spot limits, which depend on the extent of the elevated local concentrations, are given in the DOE Manual for Implementing Residual Radioactive Materials guidelines, DOE/CH/890/. In addition, every reasonable effort shall be made to remove any source of radionuclide that exceeds 30 times the appropriate limit for soil, irrespective of the average concentration in the soil.

REFERENCES

1. "U.S. Department Of Energy Guidelines For Residual Radioactive Material At Formerly Utilized Sites Remedial Action Program And Remote Surplus Facilities Management Program Sites", Revision 2, March 1987.

2. "DOE Order 5400.5, Radiation Protection of the Public and the Environment", February 1990.