WORK PLAN
FINAL

ALAMEDA NAVAL AIR STATION, BUILDINGS 5 AND 400 RADIOACTIVELY CONTAMINATED DRAIN PIPING/WALL/FLOOR REMOVAL

WP NO. NASA-1
REVISION 2

SSPORTS Environmental Detachment
Code 120 PO Box 2135
Vallejo, CA 94592-0135

6/3/98

SSPORTS REVIEW AND APPROVAL

FINAL WORK PLAN FOR

ALAMEDA NAVAL AIR STATION, BUILDING 5 AND 400 RADIOACTIVELY CONTAMINATED DRAIN PIPING/WALL/FLOOR REMOVAL

WP NO. NASA-1

Rev. 2

Prepared by: Date: 6/3/98

Project Engineer
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Reviewed and Approved by: 6/3/98

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SSPORTS Director

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List of Revisions

REVISION	DESCRIPTION	APPROVAL	DATE
1	Incorporate Department of Health Services (DHS), Department of Toxic Substances Control (DTSC) and Alameda Industrial Hygienist comments to Rev 0.		4/8/98
2	Incorporate DHS, DTSC and Engineering Field Activity WESTDIV comments and to correct administrative errors contained in Rev. 1.		MAY 98

1.0 BACKGROUND/PURPOSE

1.1 The purpose of this work plan (WP) is to provide instructions for radiological and production personnel to accomplish the removal of surface contamination and radioactively contaminated piping within site IR-5 (Building 5)(see Enclosures 1 through 5) and IR-10 (Building 400) (see Enclosures 6 through 10). This will include removal and disposal of contaminated flooring, wall coverings and exposed (not buried within the building floor slab) piping. One exception is the potentially contaminated piping manifold located in the north east corner of the Small Parts Paint Shop in Building 5, which will be included in the work package for the underground radioactive piping remediation.

Piping removed from Building 400 will be replaced as necessary to allow the building to remain functionally operational. Piping removed from Building 5 will not be replaced.

Building 5: The Bearing Shop, rooms 223 and 227, is located on the second floor of Building 5. Room 227C has floor and wall contamination and contains piping leading to the Small Parts Paint Shop on the first floor. Rooms 223D and 227B contain sinks with piping also leading to the piping on the first floor. Piping in the first floor paint shop runs from the ceiling area to the lower north wall, out to a central corridor and into a sump tank. The first floor has high ceilings.

Building 400: Rooms 203, 204, 211, 213 and 214 are located on the second floor of Building 400 with piping leading to a large room on the first floor. Piping in the first floor is located in a very high (approximately 25 feet above the floor) ceiling areas with difficult to reach areas above sub-ceilings, ventilation and structural members. Room 210 has no piping, but has reported floor contamination.

The work areas (potentially contaminated floors, walls and piping) will be sampled for Ra-226 during the process. If contamination is discovered, the contaminated materials will be removed to a radiological staging area on the first floor of building 5; Small Parts Paint Shop, pending shipment for disposal.

2.0 REFERENCES

1. OPNAVINST 5100.23D, Navy Occupational Safety and Health Program Manual
2. 29 CFR 1910, General Industry Standards
3. 29 CFR 1926.500. Fall Protection Standards
4. U.S. Atomic Energy Commission, Regulatory Guide 1.86
5. 29 CFR 1910.1200, Hazard Communication Standard
6. NAVSEA S0420-AA-RAD-010 (RAD 010), Radiological Affairs Support Program Manual
7. OP-105.7-5081, Standard Operating Procedure, Laboratory Counting Facility
8. OP-105.7-5125, Operating Procedures, Abacus Sample Counter
9. EM 385-1-1, Safety and Health Requirements Manual

3.0 GENERAL NOTES

3.1 On-Site Organization.

Position	Personnel (list by name)	Code	Phone
SSPORTS Representatives*			
Project Team Leader	Fred Lawrence	120	(707) 480-9467
Health and Safety Coordinator	Andy Rutkovskis	120	(707) 562-3464
Project Engineer	Hugh Alsworth	120	(707) 562-3467
Data/Record Keeper	Personnel		
On-Site Workers	Personnel		
Safety & Environmental Engineer	Andy Rutkovskis	120	(707) 562-3467
Other Site Representatives (not on-site)			
Project Manager	Ron Leneker	120	(707) 562-3464
Occupational Safety, Health and Environment	Greg Rodgers John Bouldt	120	(707) 562-3245 (707) 562-3200

The above personnel assignments are in effect as of the issue date of this work plan. The On-Site Health and Safety Coordinator (OSHC) and Data/Record Keeper personnel names shall be entered into the field copies of the work plan prior to start of work. Any changes in the above assignments after issue of the work plan shall be annotated on the field copies of this work plan and signed by the Project Team Leader and the Project Engineer.

3.3 General Notes.

3.3.1 TRAINING: Workers participating in the clean-up shall be currently qualified in Hazardous Waste Operations and Emergency Response (HAZWOPER) in accordance with 29 CFR 1910.120 (40 hour training), HAZCOM training in accordance with reference 2.5, and qualified in CPR and First Aid. In addition, workers operating condor/man-lift require course YJ-8276 and training in Fall Protection in accordance with reference 2.3 and 2.9 and workers operating forklifts require course YJ-C230.

3.3.2 HAZARDS: Appendix A

3.3.3 PERSONAL PROTECTIVE EQUIPMENT: Appendix A

3.3.4 COMMUNICATION AND RESPONSE TO SPILLS: Appendix A

3.3.5 STORAGE AND DISPOSAL: Properly contain, store and label of materials resulting from removal and sampling in accordance with references 2.6. Removed material will be stored in the small parts paint shop, building 5, 1st floor designated Radioactive Material Storage Area (RMSA) (see figure 2 for location) pending disposal. Guidelines for establishing and maintaining the RMSA are in reference 2.6. Post area with "Radioactive Material Located

Inside" sign if radiation levels exceed 0.02 mR/hr in accordance with reference 2.6. Disposal of radiological and hazardous waste will be performed by a Naval Sea Systems Detachment - Radiological Affairs Support Office (NAVSEADET RASO) designated contractor. Contact RASO at (757) 887-4692 (fax # (757) 887-3235) to arrange for waste disposal.

3.3.6 SAFETY MEETING: Conduct a safety meeting before pipe removal begins and hold subsequent safety meetings on a daily basis.

3.3.7 Use chain of custody forms for all solid samples and maintain accountability through the life of the sample.

3.3.8 The analysis of solid samples will be performed either by SSPORTS laboratory using the guidance in EPA-QA/G-5 or by a certified outside laboratory.

3.3.9 Do not dispose of any solid samples until specifically authorized.

4.0 PREREQUISITES

4.1 **Site field Log.** Maintain a site field log. Entries should include a brief of each day's activities, unusual events, a listing of all individuals (name and agency) that enter the site for any reason. Copies of Site Log and Daily Activity Site Report sheets are in Attachment 2.

4.2 **Storm Sewer Protection.** N/A

4.3 **Notifications.**

Prior to the start of work notify the Fire Department at their non-emergency number, (510) 748-4601, and inform them that work will commence at building 5 or 400, the approximate duration, and the name and phone number (cellular) of the Project Team Leader.

4.4 **On-Site Controls.**

A controlled area surrounding the remediation areas shall be established during removal activities to prevent unauthorized entry. The boundaries of this controlled area shall be agreed upon by the OHSC and the Project Engineer. Boundaries may be established by traffic control markers, plastic caution tape, ropes, warning signs, and/or other devises as approved by the Project Team Leader.

4.5 **Radiological Controls**

Operations performed per this work instruction that will result in initial and all subsequent breaches of drain piping integrity will be performed under the direction of SSPORTS Radiological personnel. Locations of "hot -spot" areas will be confirmed prior to each piping section removal. Personnel handling drain piping during actual removal operations or, whenever internal piping surfaces are exposed, will wear "Tyvek" suits and rubber gloves . Personnel will avoid contact

with internal piping surfaces as much as practicable. Seal all piping ends securely as soon as possible to minimize time spent with drain piping internals exposed to atmosphere. Utilize catches/drapes as necessary beneath piping sections to be removed to contain debris and residual liquid that may be encountered. SSPORTS Radiological personnel shall monitor radiation levels using μR meter during all work evolution's and shall ensure workers are wearing dosimeters.

4.6 Residual Water

Prior to breaking into piping systems, ensure all potential sources of water input to the system are secured. This includes restroom facilities, water fountains, air conditioning condensate. For building 5 the only known source of water for piping system to be removed is a air conditioning unit discharging which is currently directed to the sump pump tank in the central passageway. For building 400, multiple drain lines from the second floor of the building enter the main 5" piping that will be removed. Utilize piping diagrams prior to breaking into piping system to aid in locating and securing water sources.

4.7 ASBESTOS

Buildings where work is to be performed per this WP have been inspected for asbestos by SSPORTS Asbestos Branch and known asbestos has been removed and assumed assbestos has been sampled negative in areas of concern.

4.8 Equipment.

a. Rigging equipment (eg., rope, nylon strap, chain fall, "come-along", etc.)
b. Pipe cutting equipment (non dust, particle, or flame producing) suitable to cut 1" - 7" iron piping - Rotating Pipe Cutter - Mechanical
c. Pipe capping/plugging materials for 1" - 7" pipe (eg., aluminum caps, expandable plugs, "no-hub" caps, taper plugs, etc)
d. Basic hands tools for hanger disassembly, interference removal, etc.
e. Strap and chain wrenches
f. Chisel and prybars
g. Herculite sheeting and PVC bags (various sizes)
h. Plastic buckets with resealable lids
i. Tape (black "pipe-wrap" and cloth back waterproof)
k. HEPA Vacuum
l. Forklift
m. Condor/Man-Lift
n. Cart/dolly for transporting piping sections to Building 5 staging area on 1st floor, Small Parts Paint Shop
o. absorbent cloth/paper material
p. personnel protective equipment ("Tyvek suits, rubber gloves, HEPA Respirators)
q. Marinelli containers, "Millipore" Petri dishes and radon canisters
r. "Polaroid" camera and film
s. Survey instruments (Eberline Model E600 digital counter scalars)

t. Gamma detectors (Eberline Model SPA-3 NaI scintillation probes)
u. Beta-gamma detectors (Eberline Model SHP-360 "pancake" probes)
v. Sample counting equipment: EG&G Ortec Model 92X Spectrum Masters with Gamma Vision software (at Mare Island Bldg 132)
w. Beta-Gamma Frisker (Ludlum Model #12)
x. Alpha-beta swipe counting equipment (Xetex Model 560A Abacus counters)
y. Alpha probe
z. Metal Extension ladder
aa. Fall Protection equipment
ab. Fire Extinguisher (20 BC rated)
ac. 1", 2", 3", 4", 5", 6" and 7" steel piping and fittings for restoration of piping removed.

5.0 PROCEDURES

5.1 BUILDING 5

5.1.1 Piping Removal

5.1.1.1 Prior to removal of any piping sections and sinks, ensure the affected piping run is adequately supported and drained through existing drain plugs or clean-outs. Use straps, ropes, chain falls, etc as necessary. Avoid destructive removal of piping and sinks (ie., separate sections at existing sealed joints where possible and perform "clean" cuts in other areas as necessary. Joints must be broken with mechanical means other than power tools or heat producing tools.). Remove piping in manageable lengths such that substantial rigging efforts are not required. Removal of interference may be performed as necessary.

5.1.1.2 Utilize Enclosure 1 to record work progress/status, problems/resolutions, etc. Utilize figures 2 and 3 general piping arrangement sketches and floor plans for information regarding location of piping sections and sinks to be removed and spaces to be surveyed. Perform all piping and sink removal operations under the direction of SSPORTS Radiological personnel. Prior to removal, mark /label, using indelible ink pen, each piping section, floor covering, sink, etc (ie., 5-11,-12...) and indicate its installed location (ie., 1st. floor, 2nd floor Rm 223D, etc.) in Table 1 of enclosure 2. After removal of each piping section, move pipe or sink to a predetermined low background area and survey using the NaI probe, at a distance of <1/2" from the piping, and record highest level noted for each section in Table 1 of Enclosure 2.

5.1.1.3 Prior to breaking first joint upstream of any previously installed pipe cap where water buildup is suspected, install sleeving directed to a suitable container, slowly loosen pipe cap and collect residual water. After removing each previously installed pipe cap, survey each open ended pipe using the "pancake" probe and alpha probe at a distance of <1/2" and <1/8" respectively, from the openings. Do not insert the probe within the openings. Record information and survey results in Enclosure 3. Collect one solid material sample from each of the remaining pipe ends using a suitable length stiff metal rod with wire brush or scraper attached as necessary. If possible, collect sufficient material from each remaining pipe end to fill two "Millipore" Petri dishes. Label samples and record "chain-of-custody" information as required. Intent of these surveys and samplings is to eliminate the possibility of unnecessary piping removal (ie., if

"pancake" readings at open ended pipe are noted to be indistinguishable from general area background levels the associated piping section should not be removed until sample results confirm contamination levels above acceptable limits still remain). Take swipe samples and alpha surveys of remaining pipe ends and record in Enclosure 3.

5.1.1.4 Prior to breaking each horizontal joint install a herculite catch under the joint, taped or tied to piping at both ends. Catch may be open at top but sides must be maintained at an elevation such that all debris and possible small amounts of liquid will be contained. Prior to breaking non-horizontal joints, tape herculite to piping below the joint and tape seal the vertical seam to form a catch. Place absorbents in the bottom of all catches. Direct residual liquid that may be collected to a suitable container (eg., plastic bucket with sealable lid).

5.1.1.5 In areas where accessible tailpiece caps, cleanout plugs, etc. are present, caps or plugs may be removed to allow survey and sampling prior to associated piping section removal. Utilize catches, absorbents, etc. as described above if this option is used. Describe such actions in Enclosure 1.

5.1.1.6 Seal all open ended piping as sections are being removed with waterproof cap or plugs. Before sealing piping that is to remain installed survey the open ended pipes using the NaI probe and the "pancake" probe at a distance of <1/2" from the openings. **Do not insert the probes within the openings.** Record information and survey results for piping to remain installed in Table 2. of Enclosure 2. Collect one solid material sample from the end of piping that will remain installed using methods described in para. 5.1.1.3 above. Ensure ends of piping that are to remain installed are securely sealed to prevent leakage from upstream or downstream areas.

5.1.1.7 Transport removed piping sections, sinks, residual liquid that may have been collected and any contaminated waste generated to Building 5, 1st floor RMSA for later disposal. Residual liquids must be stored in bermed containment. Record dimensional information for piping removed in Enclosure 5. Restore all affected areas to as received cleanliness conditions.

5.1.1.8 Perform analysis of samples collected per paras. 5.1.1.3, 5.1.1.5 and 5.1.1.6 in accordance with references 2.7 or 2.8 in parallel with piping removal operations or upon return to Mare Island and attach results to respective Enclosures 4. **Note: Action level for solid samples is 5 pCi/g.**

5.1.2 Floor/Wall Material Removal

5.1.2.1 Utilize Enclosure 1 to record work progress/status, problems/resolutions, etc. Utilize Figure 3 sketches and floor plans and Appendix B for information regarding location of wall/floor sections to be removed and spaces to be surveyed. Perform all wall/floor material removal operations under the direction of SSPORTS Radiological personnel. Prior to removal mark /label, using indelible ink pen, each wall/floor section, (ie., 227A-S-) and indicate its location (ie., 2nd floor Rm 227A, etc.) in Table 1 of Enclosure 2.

5.1.2.2 Perform NaI, beta/gamma pancake and alpha/beta surveys to confirm location of contamination on wall or floor. Record results in Enclosure 3. Remove surface of contaminated area with scrabbler or other suitable means. Vacuum debris with HEPA vacuum. Resurvey area

of removal and record in Enclosure 3. Collect all residual materials in a suitable container and store in the 1st floor Small Parts Paint Shop RMSA.

5.2 BUILDING 400

5.2.1 Piping Removal

5.2.1.1 Prior to removal of any piping sections ensure the affected piping run is adequately supported and drained through existing drain plugs and clean-outs. Use straps, ropes, chain falls, etc as necessary. Avoid destructive removal of piping (ie., separate sections at existing sealed joints where possible and perform "clean" cuts in other areas as necessary. Joints must be broken with mechanical means other than power tools or heat producing tools.). Remove piping in manageable lengths such that substantial rigging efforts are not required. Removal of interference may be performed as necessary.

Portions of the piping system that connect to systems not removed per this procedure may require replacement to enable the remaining systems to be operational. These include 6 branches off the 5" main on the first floor. Prior to or after the removal of each piping section, measure length and diameter of section so replacement sections can be fabricated and installed. **Note: No replacement piping shall be installed until final confirmation surveys of piping sections to remain in place are complete and have been verified by signature in enclosure 7, table 2 by the Project Manager.**

5.2.1.2 Utilize Enclosure 6 to record work progress/status, problems/resolutions, etc. Review building piping plan and figures 4 and 5 general piping arrangement sketches and floor plans for information regarding location of piping sections to be removed and spaces to be surveyed. Ensure all water discharges to the system have been secured Perform all piping removal operations under the direction of SSPORTS Radiological personnel. Prior to removal mark /label, using indelible ink pen, each piping section, floor covering, etc (ie., 400-11,-12...) and indicate its installed location (ie., 1st. floor, 2nd floor Rm 213, etc.) in Table 1 enclosure 7. After removal of each piping section, move pipe to a predetermined low background area and survey using the NaI probe, at a distance of <1/2" from the piping, and record highest level noted for each section in Table 1 of Enclosure 7.

5.2.1.3 Prior to breaking first joint upstream of any previously installed pipe cap where water buildup is suspected, install sleeving directed to a suitable container, slowly loosen pipe cap and collect residual water. After removing each previously installed pipe cap, survey each open ended pipe using the "pancake" probe and alpha probe at a distance of <1/2" and <1/8" respectively from the openings. Do not insert the probe within the openings. Record information and survey results in Enclosure 8. Collect one solid material sample from each of the remaining pipe ends using a suitable length stiff metal rod with wire brush or scraper attached as necessary. If possible, collect sufficient material from each remaining pipe end to fill two "Millipore" Petri dishes. Label samples and record "chain-of-custody" information as required. Intent of these surveys and samplings is to eliminate the possibility of unnecessary piping removal (ie., if "pancake" readings at open ended pipe are noted to be indistinguishable from general area background levels the associated piping section should not be removed until sample results

confirm contamination levels above acceptable limits still remain). Take swipe samples and alpha surveys of remaining pipe ends and record in Enclosure 8.

5.2.1.4 Prior to breaking each horizontal joint install a herculite catch under the joint, taped or tied to piping at both ends. Catch may be open at top but sides must be maintained at an elevation such that all debris and possible small amounts of liquid will be contained. Prior to breaking non-horizontal joints, tape herculite to piping below the joint and tape seal the vertical seam to form a catch. Place absorbents in the bottom of all catches. Direct residual liquid that may be collected to a suitable container (eg., plastic bucket with sealable lid).

5.2.1.5 In areas where accessible tailpiece caps, cleanout plugs, etc. are present, caps or plugs may be removed to allow survey and sampling prior to associated piping section removal. Utilize catches, absorbents, etc. as described above if this option is used. Describe such actions in Enclosure 6.

5.2.1.6 Seal all open ended piping as sections are being removed with waterproof cap or plugs. Before sealing piping that is to remain installed survey the open ended pipes using the NaI probe and the "pancake" probe at a distance of <1/2" from the openings. **Do not insert the probes within the openings.** Record information and survey results for piping to remain installed in Table 2. of Enclosure 7. Collect one solid material sample from the end of piping that will remain installed using methods described in para. 5.2.1.3 above. Ensure ends of piping that are to remain installed are securely sealed to prevent leakage from upstream or downstream areas.

5.2.1.7 Transport removed piping sections, residual liquid that may have been collected and any contaminated waste generated to Building 5, 1st floor RMSA for later disposal. Residual liquids must be stored in bermed containment. Record dimensional information for piping removed in Enclosure 10. Restore all affected areas to as received cleanliness conditions.

5.2.1.8 Perform analysis of samples collected per paras. 5.2.1.3, 5.2.1.5 and 5.2.1.6 in accordance with references 2.7 or 2.8 in parallel with piping removal operations or upon return to Mare Island and attach results to respective Enclosures 9. **Note: Action level for solid samples is 5 pCi/g.**

5.2.2 Wall/Floor Material Removal

5.2.2.1 Utilize Enclosure 1 to record work progress/status, problems/resolutions, etc. Utilize Figure 5 sketches, floor plans and Appendix B for information regarding location of floor sections to be removed and spaces to be surveyed. Perform all wall/floor material removal operations under the direction of SSPORTS Radiological personnel. Prior to removal mark/label, using indelible ink pen, each wall/floor section, (ie., 204-S-) and indicate its location (ie., 2nd floor Rm 204, etc.) in Table 1 of enclosure 7

5.2.2.2 Perform NaI, beta/gamma pancake and alpha/beta surveys to confirm location of contamination on wall or floor. Record results in Enclosure 8. Remove surface of contaminated area with scrabbler or other suitable means. Vacuum debris with HEPA vacuum. Resurvey area

of removal and record in Enclosure 8. Collect all residual materials in a suitable container and store in Building 5 in the 1st floor Small Parts Paint Shop RMSA.

6. DECONTAMINATION

6.1 Equipment

Equipment leaving the controlled area will be surveyed with using the "pancake" probe and alpha probe at a distance of <1/2" and <1/8" respectively. The average/maximum radiation/contamination levels associated with surface contamination resulting from alpha/beta-gamma emitters shall not exceed the applicable standards listed References 2.4 and 2.6 (table 1). Contamination in excess of limits is not expected. However, if equipment contamination exceeds limits specified in table 1, wipe clean with damp cloth, control as radioactive material and dispose of as radioactive waste.

6.2 Personnel

Personnel decontamination is covered in Health and Safety Plan, Appendix A.

7.0 DISPOSAL

7.1 Hazardous waste will be disposed of by NAS Alameda personnel. Radioactive waste will be disposed of by RASO designated contractor.

Potentially/known radioactive material shall be double bagged/wrapped in 6 mil plastic or, with pipes, the ends will be capped, and labeled as radioactive material. Material shall be transported to Building 5, 1st floor Small Parts Paint Shop for storage pending disposal.

8.0 WORK PLAN COMPLETION

8.1 Return the original Work Plan, site and daily activity reports and a copy of Sample Data Sheets for review to SSPORTS Radiological Project Group, Bldg. 132.

8.2 All Work Plan tasks have been completed including the submittal of all required documentation.

YES ____ NO ____ On Site-Project Team Leader _____ Date _____

8.3 Conduct review of Work Plan. All required documentation has been submitted and accepted.

YES ____ NO ____ Project Manager _____ Date _____

TABLE 1 Radiological Standards for Surface Contamination

APPLICABLE STANDARDS FROM REFERENCES 2.4 and 2.6	DETECTION METHOD	MINIMUM REQUIRED DETECTION LIMIT	INSTRUMENT TO BE USED
The surface contamination activity for Ra-226 shall not exceed:			
20 dpm/100 cm^2 removable	Contamination swipe samples	5 dpm/100 cm^2	Xetex Model 560A
100 dpm/100 cm^2 average	Direct surface scan	50 dpm/100 cm^2	Ludlum Model 2224-1 with 43-89 Detector or equivalent
300 dpm/100 cm^2 maximum	Direct surface scan	50 dpm/100 cm^2	Ludlum Model 2224-1 with 43-89 Detector or equivalent
APPLICABLE STANDARDS FROM REFERENCE 2.4			
The average/maximum radiation levels associated with surface contamination resulting from Beta/Gamma emitters should not exceed 0.2 mrem/hr at 1 cm, and 1.0 mrem/hr at 1 cm, respectively, measured through not more than 7 mg/cm^2 of total absorber.	Ion Chamber Direct surface scan	0.1 mrem/hr	Ludlum Model 19, or equivalent

ACRONYMS

CFR	Code of Federal Regulations
CPR	Coronary Pulmonary Resuscitation
dpm	disintegration per minute
HAZCOM	Hazard Communication
HEPA	High Efficiency Particulate Air filter
RMSA	Radioactive Material Storage Area
MCA	Multi Channel Analyzer
NaI	Sodium Iodide
NASA	Naval Air Station Alameda
NRC	Nuclear Regulatory Commission
NUREG	Nuclear Regulations
OHSC	Occupational Health and Safety Coordinator
pCi	pico Curies ($1x10^{-12}$ Curies)
PVC	Poly Vinyl Chloride
Ra-226	Radium 226
RASO	Radiological Affairs Support Office
REV	Revision
SSPORTS	Supervisor of Shipbuilding Portsmouth
TSI	Thermal Shielding Insulation
uR/hr	micro Roentgen/hour
WP	Work Plan

FIGURES

FINAL WORK PLAN
BUILDINGS 5 AND 400
RADIOACTIVELY CONTAMINATED DRAIN
PIPING/WALL/FLOOR REMOVAL

DATED 03 JUNE 1998

FIGURE 1

AREA MAP

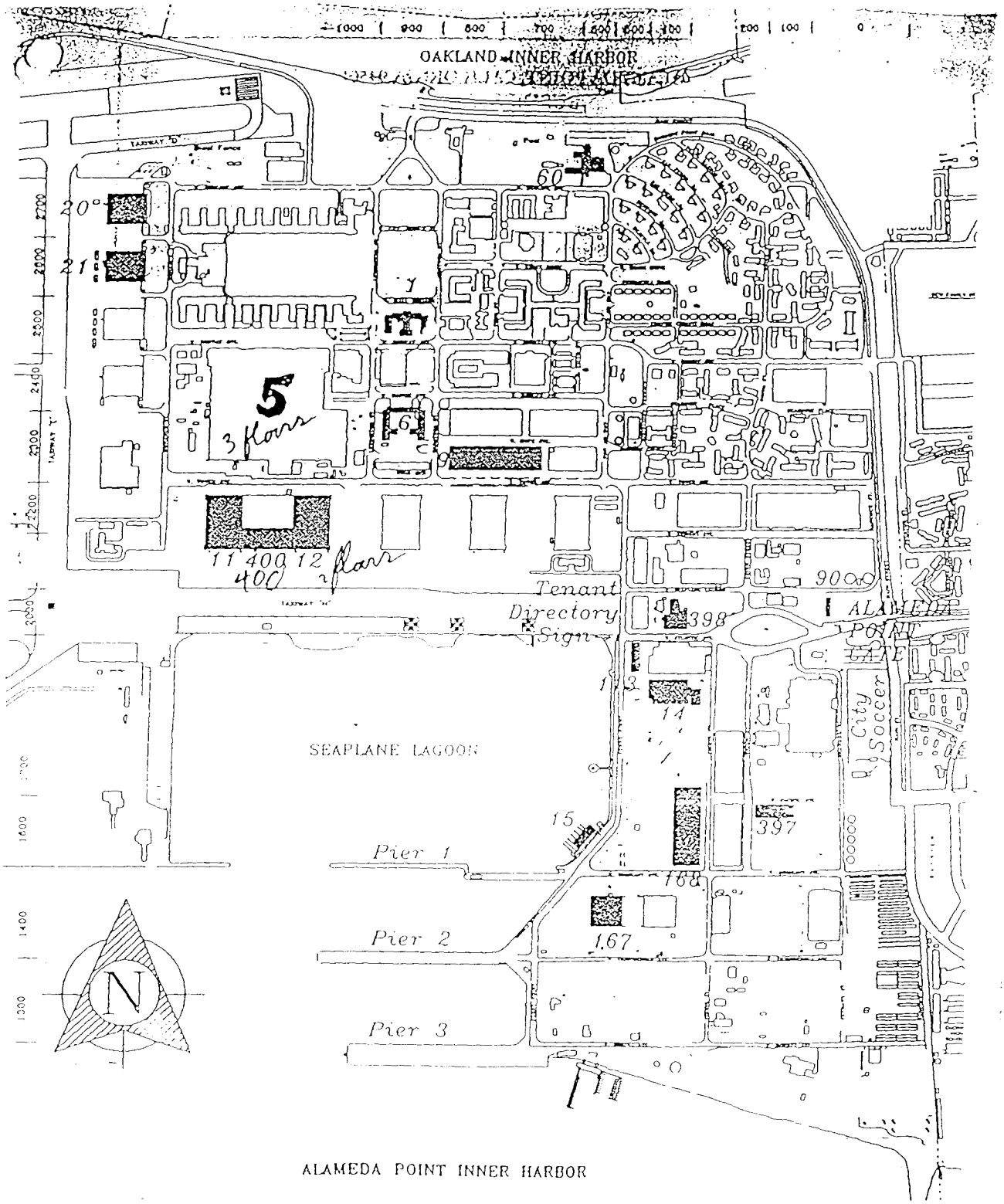

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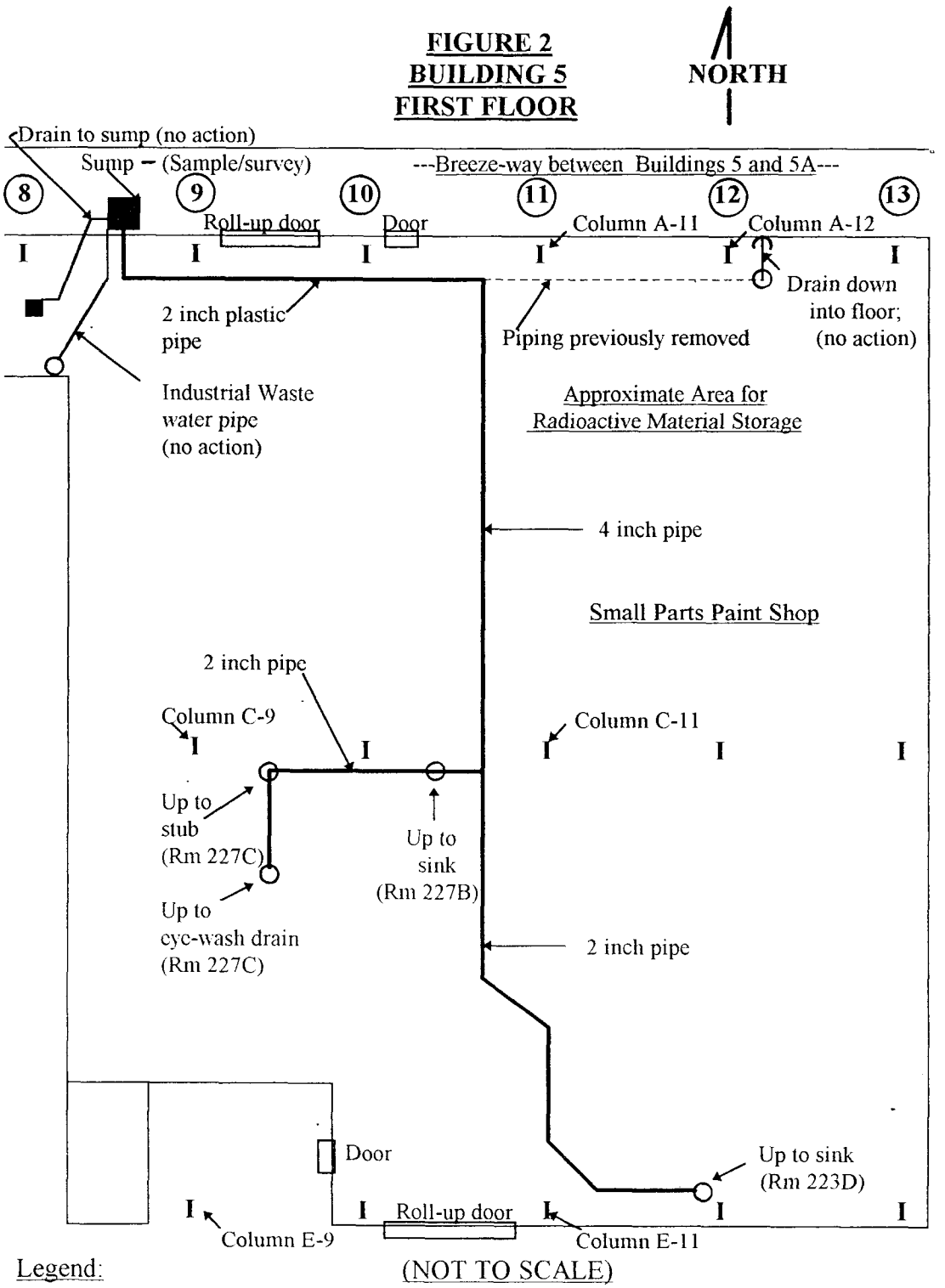
FIGURE 2
BUILDING 5
FIRST FLOOR



Legend: (NOT TO SCALE)

——— Piping to be removed (radioactively contaminated)

——— Piping to be surveyed/sampled (no removal action planned)

- - - - - - Removed piping

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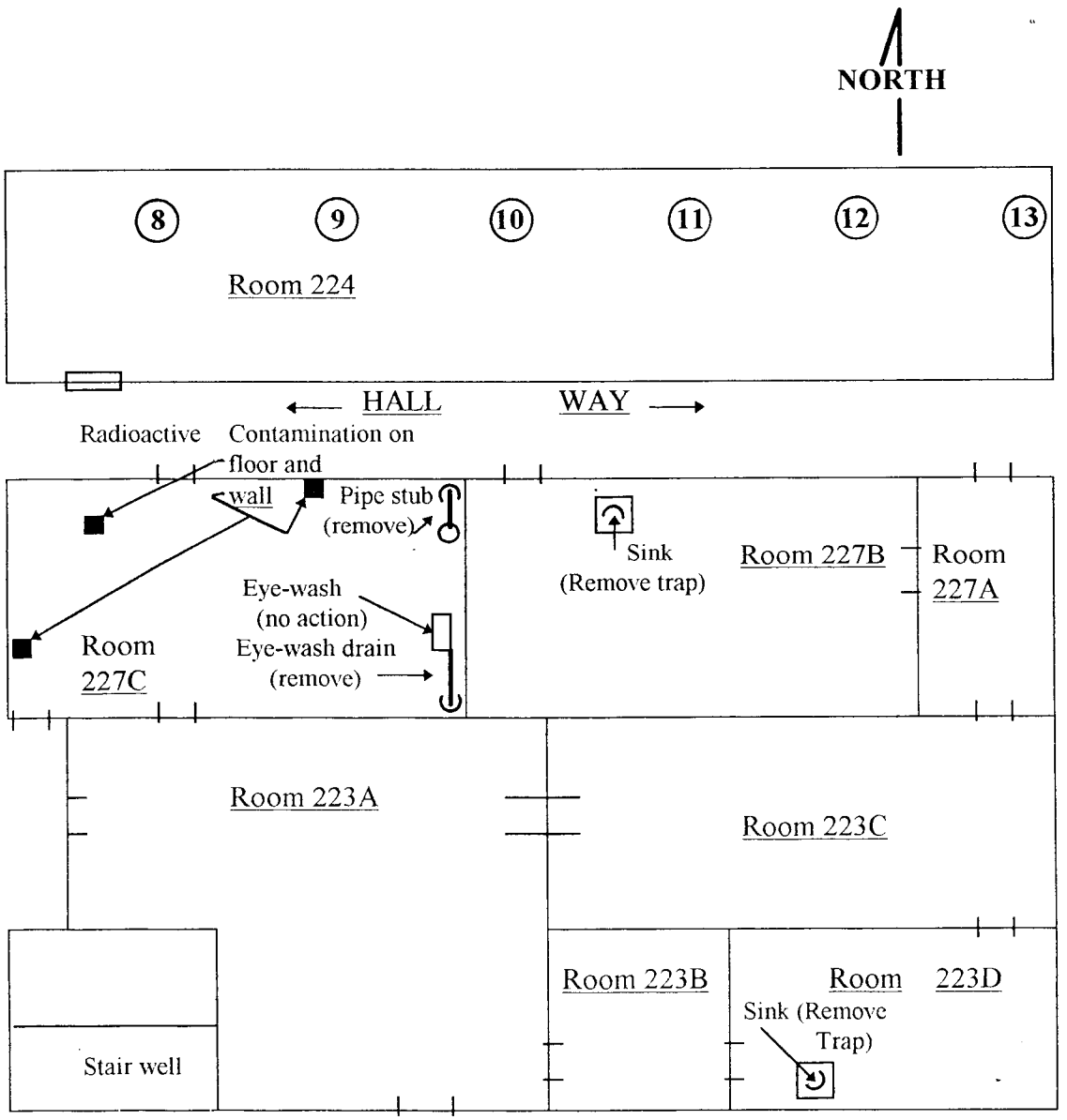
FIGURE 3
BUILDING 5
SECOND FLOOR



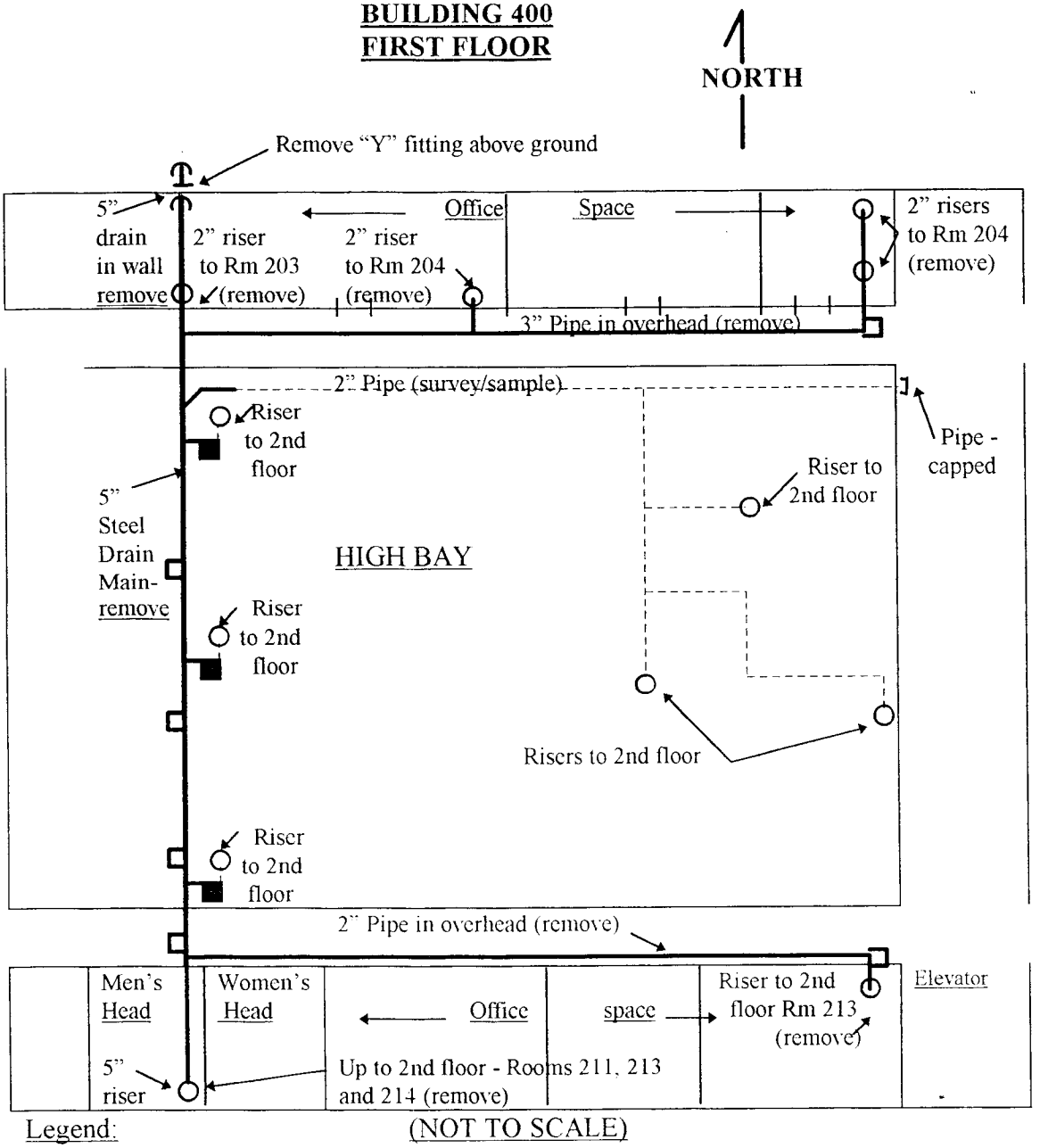
(NOT TO SCALE)

Legend:

——— Pipe to be removed (radioactively contaminated)

■ Surface Contamination (refer to Figures 4-14 and 4-15 in Appendix B)

FIGURE 4
BUILDING 400
FIRST FLOOR



Legend: (NOT TO SCALE)

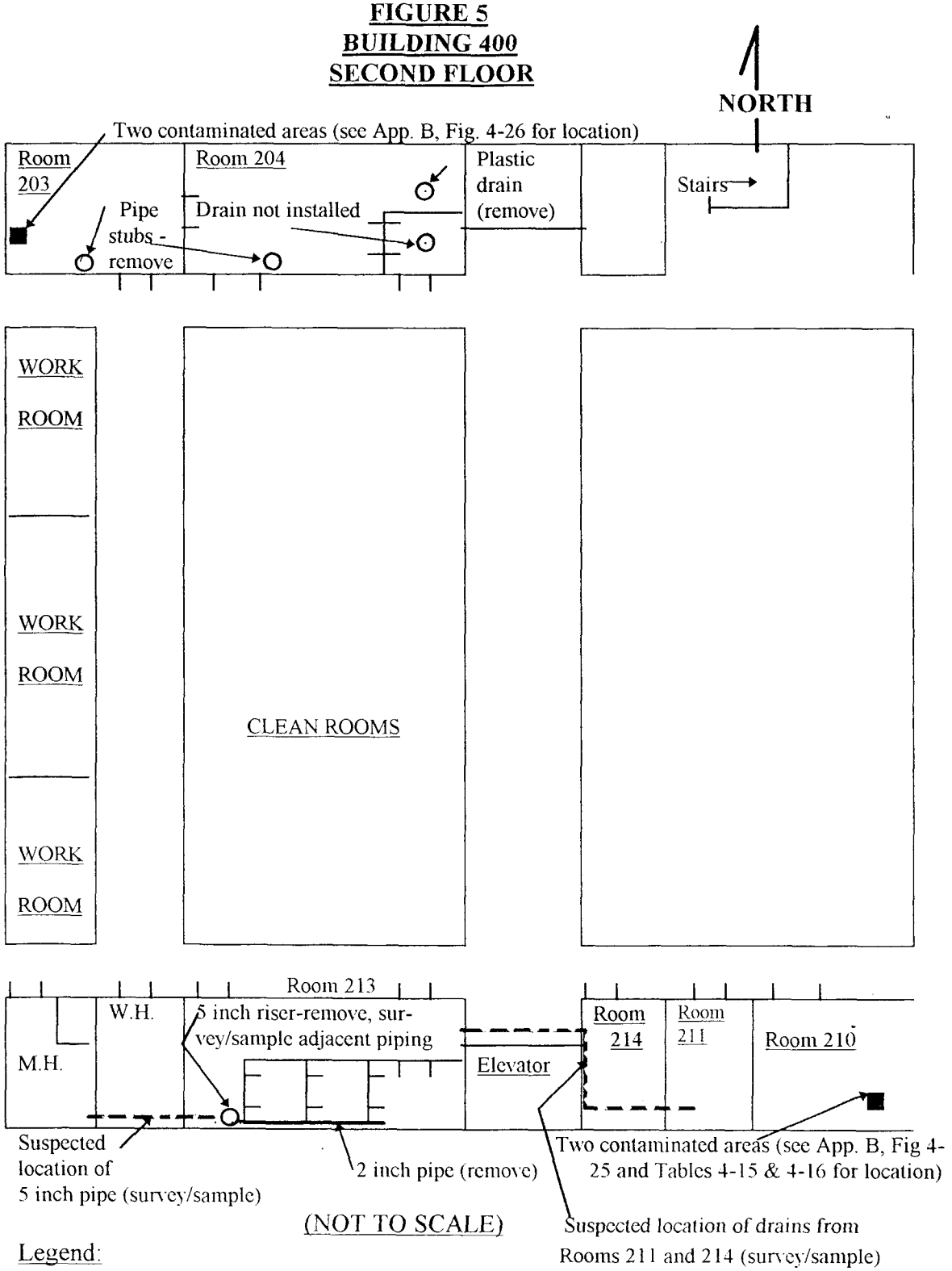
——— Piping to be removed (radioactively contaminated)

- - - - - - - Potentially contaminated piping (survey/sample at connection to contaminated piping)

■ Drain pipe trap with cleanout (use as drain and take survey/sample)

□ Drain pipe cleanout (use as drain)

FIGURE 5
BUILDING 400
SECOND FLOOR



(NOT TO SCALE)

Legend:

——— Piping to be removed (radioactively contaminated)

– – – – Piping to be surveyed/sampled (exact pipe location unknown)

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ENCLOSURES

FINAL WORK PLAN
BUILDINGS 5 AND 400
RADIOACTIVELY CONTAMINATED DRAIN
PIPING/WALL/FLOOR REMOVAL

DATED 03 JUNE 1998

ENCLOSURE 1

NASA DRAIN PIPING/WALL/FLOOR REMOVAL DAILY WORK LOG
BUILDING 5

PIPING SECTIONS WALL/FLOOR MATERIAL REMOVED (USE ENCL. 2 I.D.#), OTHER WORK ACCOMPLISHED, PROBLEMS ENCOUNTERED/PROBLEM RESOLUTIONS, ETC.	SIGNATURE/DATE

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

Enclosure 1, Page ____ of _____

ENCLOSURE 2
NASA BUILDING DRAIN PIPING, WALL & FLOOR MATERIAL REMOVAL SURVEY/SAMPLE RESULTS
BUILDING 5

TABLE 1
PIPING, WALL & FLOOR MATERIAL REMOVED

PIPING,WALL & FLOOR I.D. # & LOCATION (i.e. 1st fl, 2nd FL RM 234, etc)	HIGHEST NaI DETECTOR LEVEL NOTED DURING SURVEY Model S/N Probe S/N	ALPHA SURVEYS (CPM) Model S/N Probe S/N	SWIPE SAMPLES (pCi/100 cm^2)	SIGNATURE/DATE

(See attached isotropic analysis results for samples obtained per para. 5.1.1.8 from ends of piping remaining installed)
Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

ENCLOSURE 2
NASA BUILDING DRAIN PIPING, WALL & FLOOR MATERIAL REMOVAL SURVEY/SAMPLE RESULTS
BUILDING 5

TABLE 2
PIPING, WALL & FLOOR MATERIAL REMAINING INSTALLED

REMAINING PIPE END, WALL & FLOOR ADJACENT TO REMOVED SECTION I.D. #	HIGHEST NaI DETECTOR LEVEL NOTED DURING SURVEY Model S/N Probe S/N	HIGHEST PANCAKE PROBE LEVEL NOTED DURING SURVEY Model S/N Probe S/N	ALPHA SURVEYS (CPM) Model S/N Probe S/N	SWIPE SAMPLES (pCi/100 cm^2)	SIGNATURE/DATE

(See attached isotropic analysis results for samples obtained per para. 5.1.1.8 from ends of piping remaining installed)

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

ENCLOSURE 3						
BUILDING 5						
BUILDING I\PIPINGWALL/FLOOR IN-PROCESS SURVEYS						
		Alpha - cpm		Beta - cpm		NaI Gamma - cpm
Background		Alpha Reading cpm		Beta Reading cpm		Gamma Reading cpm
		Model:		Model:		Model:
Piping/Wall/Floor Section I.D. # & Location		S/N:		S/N:		S/N:
		Probe:		Probe:		Probe:
		S/N:		S/N:		S/N:

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

ENCLOSURE 4
NASA BUILDING DRAIN PIPING SAMPLE RESULTS
BUILDING 5

PIPING SECTION I.D.	ADJACENT TO:	LOCATION	SAMPLE GEOMETRY	INST ID NUMBER	RESULTS
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

* Attach copy of isotopic analysis sheet.

N/A blocks not required

ENCLOSURE 5

NASA BUILDING DRAIN PIPING REMOVED
DIMENSIONAL INFORMATION
BUILDING 5

PIPING SECTION I.D.	ORIGINAL LOCATION	TYPE OF PIPE (Steel, Plastic, etc)	DIAMETER	COMPOSITE LENGTH
Total length of piping per this WP _____ linear feet				

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

ENCLOSURE 6

NASA DRAIN PIPING/WALL/FLOOR REMOVAL WORK LOG
BUILDING 400

PIPING SECTIONS WALL/FLOOR MATERIAL REMOVED (USE ENCL. 2 I.D#), OTHER WORK ACCOMPLISHED, PROBLEMS ENCOUNTERED/PROBLEM RESOLUTIONS, ETC.	SIGNATURE/DATE

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

ENCLOSURE 7
NASA BUILDING DRAIN PIPING, WALL & FLOOR MATERIAL REMOVAL SURVEY/SAMPLE RESULTS
BUILDING 400

TABLE 1
PIPING, WALL & FLOOR MATERIAL REMOVED

PIPING,WALL & FLOOR I.D. # & LOCATION (i.e. 1st fl, 2nd FL RM 234, etc)	HIGHEST NaI DETECTOR LEVEL NOTED DURING SURVEY Model S/N Probe S/N	ALPHA SURVEYS (CPM) Model S/N Probe S/N	SWIPE SAMPLES (pCi/100 cm^2)	SIGNATURE/DATE

(See attached isotropic analysis results for samples obtained per para. 5.2.1.8 from ends of piping remaining installed)

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

ENCLOSURE 7
NASA BUILDING DRAIN PIPING, WALL & FLOOR MATERIAL REMOVAL SURVEY/SAMPLE RESULTS
BUILDING 400

TABLE 2
PIPING, WALL & FLOOR MATERIAL REMAINING INSTALLED

REMAINING PIPE END, WALL & FLOOR ADJACENT TO REMOVED SECTION I.D. #	HIGHEST NaI DETECTOR LEVEL NOTED DURING SURVEY Model S/N Probe S/N	HIGHEST PANCAKE PROBE LEVEL NOTED DURING SURVEY Model S/N Probe S/N	ALPHA SURVEYS (CPM) Model S/N Probe S/N	SWIPE SAMPLES (pCi/100 cm^2)	SIGNATURE/DATE **(Project Manager Signature Required for Piping per Paragraph 5.2.1.1)**

(See attached isotropic analysis results for samples obtained per para. 5.2.1.8 from ends of piping remaining installed)

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

ENCLOSURE 8								
BUILDING 400								
BUILDING I\PIPINGWALL/FLOOR IN-PROCESS SURVEYS								
		Alpha - cpm			Beta - cpm			NaI Gamma - cpm
Background		Alpha Reading cpm			Beta Reading cpm			Gamma Reading cpm
		Model:			Model:			Model:
Piping/Wall/Floor Section I.D. # & Location		S/N:			S/N:			S/N:
		Probe:			Probe:			Probe:
		S/N:			S/N:			S/N:

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

ENCLOSURE 9
NASA BUILDING DRAIN PIPING SAMPLE RESULTS
BUILDING 400

PIPING SECTION I.D.	ADJACENT TO:	LOCATION	SAMPLE GEOMETRY	INST ID NUMBER	RESULTS
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm
			Swipe		pCi alpha pCi beta
			MCA *		pCi/g Ra-226
			α Survey		cpm

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* Attach copy of isotopic analysis sheet.
N/A blocks not required

ENCLOSURE 10

NASA BUILDING DRAIN PIPING REMOVED
DIMENSIONAL INFORMATION
BUILDING 400

PIPING SECTION I.D.	ORIGINAL LOCATION	TYPE OF PIPE (Steel, Plastic, etc)	DIAMETER	COMPOSITE LENGTH
Total length of piping per this WP _____ linear feet				

Note: Reproduce as necessary to add additional pages as required. Annotate on this page the page number and the number of additional pages.

APPENDIX A

HEALTH AND SAFETY PLAN FOR SSPORTS ENVIRONMENTAL DETACHMENT RADIOLOGICAL GROUP RELATED SURVEY, SAMPLING AND REMEDIATION WORK FOR ALAMEDA NAVAL AIR STATION, BUILDING 5 & 400 PIPING/WALL/FLOOR REMOVAL

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May 27 , 1998

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REFERENCES

1. OPNAVINST 5100.23D, Navy Occupational Safety and Health Program Manual
2. NAVSEA Technical Manual S6470-AA-SAF-010, Gas Free Engineering Program
3. 10 CFR, Chapter 1, Part 20, Standards for Protection Against Radiation
4. NAVMED P-5055, Radiation Health Protection Manual
5. NAVSEA S0420-AA-RAD-010 (RAD-010), Radiological Affairs Support Program Manual
6. NEHC-TM92-6, Prevention and Treatment of Heat and Cold Stress Injuries
7. 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response
8. 29 CFR 1910, General Industry Standards
9. 29 CFR 1926.500, Fall Protection Standards
10. EM 385-1-1, U.S. Army Corps of Engineers, Safety and Health Requirements Manual

LIST OF ATTACHMENTS

Attachment 1 Health & Safety Plan Acceptance Form /Safety Meeting Sign-off Sheet

Attachment 2 Site Log

A. PURPOSE

The purpose of this Health & Safety Plan is to provide guidance for personnel health and safety while accomplishing the removal of surface contamination and contaminated piping within site IR-5 (building 5) and IR-10 (building 400). This will include removal and disposal of contaminated flooring, wall coverings and exposed (not buried within the building floor slab) piping. Piping will be replaced as necessary to allow the building to remain functionally operational.

B. SITE DESCRIPTION

Description: The bearing shop is located on the second floor of building 5 with piping leading to the small parts paint shop on the first floor. Room 227B contains a sink with piping also leading to the piping in the first floor small parts paint shop. Piping in the first floor paint shop extends from the ceiling area penetrations along the lower wall and out to the central corridor to a sump pump which drains into the industrial sewer. The first floor has high ceilings. Rooms 203, 204, 210, 213 and 214 are on the second floor of building 400 with piping leading to a large room an first floor (Radar Test Facility). Piping in the first floor is located in very high ceilings areas with difficult to reach areas above sub-ceilings.

Existing hazards: Chemical: lead, silca dust; Physical: falling; Biological: sewer waste; Radiological: Radium 226;.

Surrounding population: Both buildings 5 and 400 are currently unoccupied

General topography: N/A

Climate: Indoors in unheated building. Average annual temperature outdoors 58°F.

Location and area affected:

Building 5

a) Small Parts Paint Shop overhead piping extending to lower wall (figure 2)
b) Room 223D sink and piping (figure 3))
c) Room 227B sink and piping (figure 3))
b) Room 227C piping, floor and walls (figure 3))

Building 400

a) Radar Test Facility overhead piping extending to floor and outside of building, consists of 2", 3" and 5" piping with several 2" and 3" pipes connecting into system from areas other than rooms 203, 204, 210 and 213.
b) Room 203, 2" piping in floor extending to first floor overhead area.
b) Room 204, 2" piping in floor extending to first floor overhead area.
b) Room 210, floor contamination
b) Room 213, 2" piping in floor extending to first floor overhead area.

C. KEY PERSONNEL AND RESPONSIBILITIES

Radiological Project Manager: Ron Leneker (phone (707) 562-3464) has overall responsibility for the technical administration of the radiological work.

Health & Safety Engineer: Hugh Alsworth (phone (707) 562-3467) has overall responsibility for the development and maintenance of the site-specific Health and Safety plan for work involving radiological considerations.

Occupational Safety, Health & Environment : Greg Rodgers (phone (707) 562-3245) or John Bouldt (phone (707) 562-3200 serves as the Health and Safety Officer and OSH Specialist for the SSPORTS organization at Mare Island, and has overall responsibility for the industrial health and safety program.

On-Site H&S Coordinator: Hugh Alsworth (phone (707) 562-3468) has overall responsibility for the implementation and enforcement of the Health and Safety plan for work involving radiological considerations.

Emergency Coordinator: The site specific Fire Chief (phone (510) 784-4601) or his designee has overall responsibility for coordinating fire emergencies, and hazardous spill management.

Project Team Leader: Fred Lawrence (phone (707) 480-9467) has overall responsibility for directing and controlling radiological site specific work projects.

D. ON-SITE CONTROLS

This Health and Safety Plan applies to all workers and visitors who require access to the work site. Changes to the H&S Plan must be in writing, and will require written approval of the Occupational Safety, Health and Environment Office prior to implementation. A copy of this H&S Plan will be kept at the job site. All personnel working the site must be familiar with this H&S Plan and shall sign the Safety Meeting Sign-off Sheet , see Attachment 1.

The On-site Health & Safety Coordinator (OHSC) shall be responsible for ensuring that all personnel entering an active work area comply with the Health & Safety Plan, medical and training requirements for the site, and have the required level of Personal Protective Equipment (PPE). Only authorized personnel will be allowed in active work areas. Daily site safety meetings will be held each morning before work begins, and workers shall acknowledge their attendance by signing the Safety Meeting Sign-off Sheet(Attachment 1). The Project Team Leader shall maintain a Site Log for the purpose of recording events (Attachment 2).

A marked-off area shall be established to manage access control and security for sites involving surveys and minor radiological sampling. Access gates shall be securely locked at the conclusion

of work each day for major radiological remediation sites. The safe perimeter boundary is designated as the outer wall. No unauthorized access is permitted within the boundary. The decontamination station, command station and staging areas shall be located at the entrance to each work area. Site maps are included in figures 1-5 of the Work Plan.

E. HAZARD EVALUATION

Potential chemical hazards include, but are not limited to possibility of lead based paint on walls and pipes and silca dust. Potential physical hazards include, but are not limited to falling. Potential biological hazards include, but are not limited to sewage in pipes (building 400 only). Potential radiological hazards include radium 226.

CHEMICAL HAZARDS:

Lead Based Paint Painted walls and pipes are assumed to contain lead based paint on the surfaces. Wet controls shall be used when removing wall material and cutting pipes or any othe painted surfaces.

Silca Dust During any removal of radiologically contaminated concrete surfaces control for airborne dust will be implemented including wet methods and the use of a 600 cfm spot sucker at the point of removal.

PHYSICAL HAZARDS:

Fall Hazards This Work Plan requires the removal of piping in buildings 5 and removal and replacement of piping in building 400, much of which is greater than 6 feet above the floor. The piping removal involves the breaking or cutting of steel pipe ranging in size of 1.5" to 5" in diameter into manageable lengths, and rig the removed sections to the floor. For building 400, removed sections of piping will need to be restored to operational conditions by rigging and installing new steel pipe. These operations require the use of scaffolding and/or manlifts and the use of cranes or hoists. which present the hazard of personnel falling from scaffolding/manlifts and material/equipment falling on equipment or personnel.

Fall Protection is required when working on/removing pipes on walls and ceiling areas, building 5 small parts paint shop and building 400 radar test room, above 6 ft.. Work performed in elevated areas needs to comply with the equipment and personnel requirements of reference 9 and 10. When operating manlifts a full body harness shall be worn and a lanyard attached to the boom or basket. Personnel working in elevated areas above 6 feet shall have completed course YJ-C230.

Rigging

Prior to use, rigging equipment shall be inspected as specified by the manufacturer, by a qualified person, before use in each shift and as necessary during its use to ensure that it is safe.

Whenever heavy or bulky material is moved (i.e. piping removal and installation in overhead areas in building 5 small parts paint shop and building 400 radar test room), the material handling needs shall be evaluated in terms of weight, size, distance, and path of movement.

Materials will not be moved over or suspended above personnel unless positive precautions have been taken to protect the personnel from falling objects

Riggers shall be qualified personnel trained per OSHELINK Course 56. Specific requirements are in reference 10, section 15.

Slipping or tripping on uneven ground can cause a twisted ankle in any environment.

Specific precautions shall be taken when working on/climbing onto/descending from above ground.. Always be aware of horizontal overhead staging supports to avoid potential head injuries due to bumping or scraping.

Should dizziness or light headiness occur, immediately notify the on site supervisor to assist in getting off the staging or scaffold. Always maintain good housekeeping. The work area shall be inspected daily for proper housekeeping. Keep all passageways free of materials, supplies, and obstructions

Tools, materials, extension cords, hoses, or debris shall not be placed where they may cause tripping or other hazards. Tools. materials and equipment subject to falling shall be properly captivated to prevent falling.

Physical injury from, broken glass, protruding nails, etc. can easily occur if care is not taken while climbing over, leaning against, kneeling on, or crawling on horizontal or upright surfaces in the building. If skin is broken by an injury, have it checked by a local medical clinic to see if a Tetanus vaccination is recommended.

Heat stress will occur when the body's natural cooling mechanism (perspiration) has not cooled the body's internal temperature sufficiently. Drink plenty of fluids to prevent dehydration when working in high temperatures. Monitoring for heat stress shall occur when ambient temperature exceeds 70 °F per reference 6.

Cold stress (hypothermia) will occur during cold weather if the body's temperature drops below normal. Prepare for cold, windy or wet weather. Clothing may include wool socks, thermal underwear, insulating coat or pants, insulated hat and wool undergloves. Wear head covering. Drink plenty of fluids. Stay active to maintain a high metabolism and body heat. If shivering starts, move inside, **before** the condition becomes serious.

Noise levels above 84 dBA may cause temporary impairment of hearing. Prolonged and repeated exposure to such noise levels may cause permanent hearing damage. Adequate hearing protection shall be specified whenever excessive noise levels are anticipated such as when operating forklifts and condors/man-lifts. For levels above 84 dBA, hearing protection with a minimum noise reduction ratio of at least 25 shall be specified. Rule of thumb: If you must raise

your voice within one arms length of the person you are conversing with, you are exceeding 84 dBA.

Electrical Shock - If employees use electrical appliances in wet locations, all circuits shall be protected by Ground Fault Circuit Interrupters. Employees shall inspect electrical cords and appliances daily for external defects prior to each use.

BIOLOGICAL HAZARDS:

Flying insects such as mosquitoes, wasps, hornets, and bees are often encountered at various sites. Bite reactions to these insects vary from person to person. Violent reactions may occur from wasp, hornet, and bee stings. If the person is allergic, nausea, shock, constriction of the airway can result. Death may result. Mosquito bites can transmit encephalitis and other diseases. Use insect repellent when required and avoid disturbing any wasp, hornet, or bee nest and walk slowly, if flying wasps, hornets, or bees are encountered.

Mammal bites, from dogs, cats, bats, opossum, raccoons, skunks, rodents, or others may cause a puncture, laceration, or avulsion (tear). All animal bites carry a risk of infection. Many mammals can transmit rabies in a bite through infected saliva. Medical attention should be sought and the animal detained, if possible.

Spider bites are usually not poisonous, however, **Black Widow** and **Brown Recluse** spiders inflict **poisonous** bites that cause localized as well as systemic effects that can be serious, painful and occasionally cause death. Identification of the spider involved is important in diagnosing health effects and prescribing treatment.

Microbial Hazards can result in infection. These hazards may be encountered during opening and removal of piping that may contain residual sewage. A face shield shall be used in addition to required PPE during initial breakthru of piping systems. Disease producing microbial agents may spread to humans via contaminated food or water, insect transmission, environmental dispersal, or direct contact with contaminated materials. Personal cleanliness is especially important in preventing ingestion and infection.

Indoor hazard, including hazards listed above and below, can exist in any habitat where there is an unused building or attic. Loose or deteriorated structures can fall or cave in causing severe injuries. Follow the Buddy system, use a flashlight and take care when entering a dark area. Buildings vacant for several months can be potential sources of a virus that causes **Hantavirus Pulmonary Syndrome (HPS)**, a serious respiratory illness. Transmission of the virus to humans occurs when dried deer mice feces, urine or saliva becomes airborne and inhaled. When entering a space that has been vacant for extended periods of time try to identify the presence of rodents . Look for droppings, nests, gnaw marks, live or dead rodents. Avoid contact with rodents and their droppings if found. Use levels D PPE with respirator during dust generating operations or spray area with a disinfectant (3 tbsps bleach with 1 gallon water). Decontaminate PPE after use with disinfectant

RADIOLOGICAL HAZARDS:

Radioactive materials were used for various processes such as luminescent painting and wing counterweights. The use of Radium 226 for painting meter/gage dials and various equipment knobs, normally encountered whole body radiation exposure levels expected at the sites are below levels requiring personnel exposure monitoring or control. Unnecessary lingering at these sites shall be avoided to maintain exposure to radiation as low as reasonably achievable (ALARA). All eating, drinking, chewing. or smoking shall be avoided at the sites, especially during dust generating evolutions. The on-site health & safety engineer shall ensure that the exposure controls of reference 3, paragraphs 20.1101 through 20.1601, reference 4, Chapter 4, and reference 5, Section II are met by conducting appropriate surveys, prior to allowing personnel entry onto the particular site of concern. During work operations, work and material storage areas will be survey to verify radiation levels using a μR meter. Post storage area with "Radioactive Material Located Inside" signs. Ensure workers are wearing dosimetry (DT-648 worn on waist).

Surface sampling and radiological surveying will be conducted following the guidelines of references 6 applicable to work document. PPE for sampling shall be level D and may be changed as deemed necessary by the on site health and safety engineer. All collected samples shall be strictly controlled using the chain of custody forms. No sample shall be discarded unless specifically so authorized by written documentation from the SSPORTS Radiological/lead base paint group. Do not perform operations which could cause airborne dust particles without taking necessary preventive measures (spraying with water mist, using hepa vacuum or 600 cfm spot ventilation). Avoid cutting or grinding operations which could generate airborne contamination unless adequate containment actions are taken (installing glove bag around area to be cut).

F. PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

Based on the evaluation of potential hazards for the site, the following levels of personal protection have been designated for applicable work areas or tasks.

Location	Job Function	Level of Protection
Building 5, Rms 227C and Building 400, Rms 203, 204, 210 and 213	Floor and Wall Contamination Removal	D
Building 5 and 400	Piping Removal	D with faceshield during initial breakthru

Equipment requirements for this level of protection are as follows:

(To be completed on-site by the Project Team Leader or On-Site Health & Safety Coordinator) Place a circle to indicate required PPE.

Level D PPE **may** include, but is not committed or limited to, the following as appropriate:

- ☐ Coveralls. (Tyvek, disposable)
- ☐ Cotton & Rubber gloves
- ☐ Boots/shoes, chemical-resistant, steel toe and shank.
- ☐ Rubber shoe covers with booties
- ☐ Safety glasses/face shield
- ☐ Hard hat and hearing protection.

It is not anticipated that Level A, B or C PPE will be required for any radiological projects, unless specific site conditions should arise which could change the requirements. PPE requirements will be changed on a case basis as required. Respirators will be required if the potential for dust producing evolution's are encountered. If respirators are used, follow the requirements listed below:

RESPIRATOR SELECTION, USE, AND MAINTENANCE

All personnel taking part in site activities must fulfill worker provisions outlined in OSHA 29 CFR 1910.134 and reference 6 and 9 concerning the use, maintenance, and limitations of air-purifying respirators. All site personnel must be trained and medically qualified for respirator use and must have completed a qualitative fit test for the respirator used at the site.

All personnel shall have a current SSPORTS respirator card in their possession.

Only NIOSH approved air purifying respirators of full-face, half face or hood (negative pressure or powered air purifying (PAPR) shall be used. Respirators shall be equipped with NIOSH approved filter cartridges selected for protection against the contaminant(s) of concern. Only NIOSH approved respiratory assemblies will be used. Air-purifying respirators of the appropriate type will be selected by the Site Safety Officer in conjunction with the OSHE office based upon knowledge of the substances that may be present and the concentrations of compounds previously encountered at the site. The requirement for breathing zone air monitoring shall be determined by the OSHE office. Air-purifying respirators will be used only when they provide protection against the substances encountered on site.

Factors preventing the use of air-purifying respirators are as follows:

- Oxygen-deficient atmosphere (less than 20.0 percent oxygen)
- Concentrations of substances that may be immediately dangerous to life and health (IDLH)
- Confined or unventilated areas that may contain airborne contaminants not yet characterized
- Unknown contaminant concentrations or concentrations that may exceed the maximum use level for the designated cartridges, in accordance with the selected cartridge manufacturer's instructions
- Unidentified contaminants
- High relative humidity (which reduces the sorbent life of the cartridges)
- Identified substances with inadequate warning properties (for example, they are tasteless, odorless, and invisible)

Respirators will be inspected daily and exchanged at the tool room every 30 days and if found to be damaged or in need of repair. Respirators will be cleaned and disinfected in the support zone at least weekly. Cleaned respirators will be placed in clean plastic bags and stored in the support zone in a manner to prevent contamination, distortion or damage. The following respirator inspection and cleaning procedures will be followed whenever respirator protection is used:

- Daily Inspection and Checkout Procedures:
  - Visually inspect the entire unit for obvious damage and deteriorated rubber.
  - Inspect the face piece harness for damage.
  - Inspect the lens for damage, and make sure the face piece has the proper seal.
  - Pull off the plastic cover of the exhalation valve, and check the valve for debris and tears in the neoprene that could cause leakage.
  - Unscrew the cartridges of both inhalation valves, and visually inspect the neoprene valves for tears. Make sure the inhalation valves and cartridge receptacle gaskets are in place.
  - Make sure a protective cover is attached to the lens.
  - Make sure the speaking diaphragm retainer ring is hand-tight.
  - Don the respirator, and perform a negative and positive pressure test fit check.
  - If cartridge change-out is needed -disassemble the respirator in the support zone by removing the cartridges, damaging them to prevent accidental reuse, and discarding them.

- Procedures to Follow after Routine Use in the Exclusion Zone:
  - Wash and rinse the respirator in the support zone with soap and warm water.
  - At a minimum, wipe the respirator with manufacturer approved disinfectant wipes. Allow the respirator to air dry in the support zone.

The effectiveness of the respiratory protection program will be continuously monitored by the OSHE office. Monitoring of worker stress levels during activities that require respiratory protection will be performed by the Site Safety Officer or the designee.

If there are unanticipated changes in site conditions, the H&S Coordinator may upgrade the PPE and the decontamination requirements, if appropriate.

In addition to personal protective clothing and equipment, field personnel having duties in or near the work zone must have ready access to the following:

- An eyewash kit (must provide 15 minutes of flushing)
- At least 3 gallons of potable water in a container to permit decontamination in the event of accidental skin or eye contact with chemicals or radioactively contaminated soil or objects.
- Field instrumentation as applicable for potential hazards, including oxygen level, combustible gas, carbon monoxide, and radiological survey/frisking instruments.
- Potable water for employees (drinking)

G. SITE WORK PARTY

It is anticipated that the size and makeup of a specific site work party will vary greatly during different phases of each project. The Project Team Leader shall ensure that each worker records his name and job function in the daily Site Log and HASP sign-off form (attachment 1).

H. COMMUNICATIONS PROCEDURES

Internal and external communications are to be in effect whenever a site entry is to be made. Internal communications requires that the field team members be able to communicate with each other at all times. Methods of communication may be via radio, verbal, hand signals, or other viable means. The method of choice must be understood by all members and tested to determine its effectiveness.

An external communications system is required to call for off-site emergency assistance and to handle administrative tasks. Alternatives which meet the requirements are a telephone, cellular telephone or radio communications system. Every team member must be aware of the location of the nearest external communications system and be competent in its use.

Other communications systems which may be appropriate for special circumstances include, but are not limited to, sirens, horns, whistles and flags. All team members must be briefed on the purpose of each.

Communications systems for this site are:

(Blanks to be completed on-site by On-Site Project Team Leader or On-Site H&S Coordinator)

EXTERNAL: Cellular Phone INTERNAL: Verbally & Hand Signals
Air Horn

Applicable telephone numbers or radio channels are: (707) 480-9467

EXTERNAL: N/A
INTERNAL: N/A
Other signals: Air Horn

The following standard hand signals shall be used in case of radio/telephone failure:

Hand gripping throat ----------	Out of air or can't breathe
Grip partner's wrist or hands around waist----------	Leave area immediately
Hands on top of head ----------	Need assistance
Thumbs up ----------	OK, understand, am all right
Thumbs down ----------	No, negative

I. ROUTINE EXITING DECONTAMINATION PROCEDURES

1. Personnel Decontamination (Radiological)

During radiological surveying or sampling, if personnel contamination exceeds levels specified in reference 5 and listed in section M (Monitoring), decontaminate with masking tape and/or wipe with a damp cloth. Verify the contamination has been removed by scan survey of the effected area with beta-gamma and alpha-beta probes held within 1/8" of the effected area. Repeat decontamination efforts until no detectable contamination is detected. Notify the Project Management. Dispose of decontamination materials as radioactive waste. Radiological waste will be disposed of by a RASO designated contractor.

2. Equipment Decontamination (Radiological)

During radiological surveying or sampling, if personnel contamination exceeds levels specified in table 1, decontaminate with masking tape and/or wipe with a damp cloth or dispose of as radioactive waste. Verify the contamination has been removed by scan survey of the effected area with beta-gamma and alpha-beta probes held within 1/8" of the effected area. Notify the Project Management. Dispose of decontamination materials as radioactive waste. Radiological waste will be disposed of by a RASO designated contractor.

2. Personnel Decontamination (Chemical)

Chemical decontamination is not anticipated.

TABLE 1 Radiological Standards for Surface Contamination

APPLICABLE NRC STANDARDS FROM NUREG 1.86	DETECTION METHOD	MINIMUM REQUIRED DETECTION LIMIT	INSTRUMENT TO BE USED
The surface contamination activity for Ra-226 shall not exceed:			
20 dpm/100 cm^2 removable 100 dpm/100 cm^2 average	Contamination swipe samples	5 dpm/100 cm^2	Xetex Model 560A
300 dpm/100 cm^2 maximum	Direct surface scan	50 dpm/100 cm^2	Ludlum Model 2224-1 with 43-89 Detector
	Direct surface scan	50 dpm/100 cm^2	Ludlum Model 2224-1 with 43-89 Detector
The average/maximum radiation levels associated with surface contamination resulting from Beta/Gamma emitters should not exceed 0.2 mrem/hr at 1 cm, and 1.0 mrem/hr at 1 cm, respectively, measured through not more than 7 mg/cm^2 of total absorber.	Ion Chamber Direct surface scan	0.1 mrem/hr	Ludlum Model 19, or equivalent

J. EMERGENCY RESPONSE

Emergency and general safety equipment shall be available at the site and shall be properly inspected and maintained. Qualified Fire Department EMTs are available for emergency response actions in 5 to 7 minutes. The following safety equipment shall be staged in a location familiar to all personnel:

- Supply of clean water
- Fire extinguisher (rated 20BC minimum)
- Portable eyewash unit (rated 15 minutes minimum)
- Air horn
- First Aid Kit with CPR mouthpiece

(Blanks to be completed on-site by Site Foreman or On-Site H&S Coordinator)

Emergency equipment is available on-site at the following locations:
(include size or quantity, as appropriate)

Emergency eyewash At job site
Emergency shower N/A
Fire extinguisher At job site
Air horn At job site

Local ambulance service is available through Central Dispatch at telephone number 911. Response time to the site is 7 minutes

Seriously injured personnel will be evacuated to the nearest Emergency Room located at Alameda Hospital at 2070 Clinton Ave. (see figure 1). From building 5 parking area on east side of building, go out to Second St. (Lexington Ave.) and turn right, proceed to Avenue F (Tower Ave.)(about 1 block) and then turn left. From building 400 parking area on north side of building, go out to Avenue F (Tower Ave) and turn right. Turn right on Ferry Point Rd. (0.3 miles) and proceed to Atlantic Ave. (0.2 miles) and turn left and exit gate (0.4 miles). Turn right on Main St. and proceed to Central Ave. (0.25 miles). Head south on Central till it splits off to the right to Encinal Ave. (1.8 miles), proceed on Encinal Ave. toWillow St. (0.8 miles). Turn right on Willow st. and proceed to Clinton Ave. (0.2 miles) Alameda Hospital will be on the opposite corner of Willow st. and Clinton Ave. The telephone number to this facility is (510) 522-3700 or (510) 523-4357.

EMERGENCY TELEPHONE NUMBERS

Service	When calling from a base telephone	When calling from a cellular phone	Point of Contact
Fire/Police	9911	(510) 748-4601	Central Dispatch
Ambulance	9911	(510) 248 0770	Central Dispatch
Spill Team	9911		
H&S Specialist	1-707-562-3245 (primary) or 1-707- 480-7920 (cell ph.)		Greg Rodgers
Env Compliance Spec	1-707-562-3200 (primary) or 1-707-480-7920 (cell ph.)		John Bouldt

Caution: "911" calls from a cellular phone are routed through the CHP dispatch center, which will take additional time. Use only if all else fails.

EMERGENCY PROCEDURES (may be modified as required for incident)

The following standard emergency procedures shall be used by on-site personnel. The On-site Health and Safety Coordinator shall be notified of any on-site emergencies and shall be responsible for ensuring that appropriate procedures are followed.

Fire/Explosion: Upon notification of a fire or explosion at the site, the designated emergency signal two long air horn blasts shall be broadcast and all site personnel shall assemble at the decontamination line. The fire department shall be notified and all personnel will be directed to a safe area of the site by the Project Team Leader.

Personal Protection Equipment Failure: If any site worker experiences a failure or displacement of PPE which affects the level of protection required for the task which is being performed, that person and his/her partner shall put the work in a safe condition, (if it is possible to do so without adverse effect on health and safety), and immediately proceed to the decontamination area. Reentry shall not be permitted until the appropriate level of protection is reestablished.

Other Equipment Failures: Any other equipment failures will be addressed by the project team leader and Site Health & Safety Coordinator to determine the effects on continuing operations on site. If the failure is determined to have adverse effects on the safety of personnel on site or completion of the Work Plan tasks, all personnel shall leave the Exclusion Zone until the problem is remedied or appropriate actions to circumvent the problem have been implemented.

The following emergency escape routes are designated for use when egress from the Exclusion Zone cannot occur through the decontamination line and exiting the area is necessary due to an emergency: To be discussed at the daily safety meeting ('tail-gate' meeting).

In all situations of on-site emergency resulting in the evacuation of personnel from the Work Zone, personnel shall not reenter the area until:

1) The condition or conditions resulting in the emergency have been cleared.
2) Hazards have been reassessed.
3) Site Safety Plan has been reviewed.
4) Site personnel have been briefed on any changes to the Site Safety Plan.

ACCIDENT/INCIDENT REPORTING

Whenever an employee, subcontractor, or member of the public is injured at the work site, the Project Manager, in coordination with the Safety Engineer, must prepare a written accident/incident report in accordance with 29 CFR 1904.8 and NAVFACINST 5100.11. In addition, an incident report shall be prepared for "near misses" and minor injuries not requiring medical evaluation. The purposes of the accident/incident report are to document fully what happened and to assess the accident/incident for "lessons learned." Attachment 6 shows the report form to be used for documentation of an accident or incident. The report shall be forwarded to EFA West via the cognizant Remediation Project Manager (RPM). The

accident/incident report must be prepared in addition to any reports required by OSHA or Worker's Compensation Insurance claims offices. While much of the information requested is the same, the accident/incident report will provide a much more detailed account of the conditions at the time of the accident/incident and the actions taken at the time of discovery. The OSH Specialist and the Project Manager shall review these reports and may institute corrective or preventive actions to reduce the likelihood of future occurrences. These actions may include making changes in procedures or equipment, retraining personnel, or communicating cautionary warnings to personnel.

K. TRAINING REQUIREMENTS

General site workers engaged in hazardous substance removal or other activities which expose, or potentially expose, workers to hazardous materials and health hazards shall receive, as a minimum, Hazard Communication (HAZCOM) training in accordance with reference 7. Additionally, workers and supervisors shall receive HAZWOPER training as required by reference 7, Red Cross certified training in CPR and First Aid, course YJ-8276 and training in Fall Protection in accordance with reference 9 and 10 and for workers operating condor/man-lift and workers operating forklifts require course YJ-C230.

Training for specific hazards is covered in the next section. This includes training for: Asbestos removal and Radiological Survey, Sampling, and Remediation work.

L. SITE-SPECIFIC SAFETY PROCEDURES

1. ASBESTOS

Flooring and wallboard in areas requiring removal of radiological contamination that were assumed to contain asbestos in inspections performed by the SSPORTS Asbestos Branch have been sampled and tested negative for asbestos. Whenever insulation materials are found, such as tank liners, membranes, or pipe lagging, contact the Occupational Safety, Health and Environment Specialist, Greg Rodgers at 1-707-562-3245 or Cirilo Lacson 1-707-562-3222. Piping flange gaskets will be assumed to contain asbestos. Sampling for asbestos shall be done by asbestos-qualified building inspectors. Only qualified asbestos workers shall remove asbestos, in accordance with procedures approved by the Health and Safety Specialist, and meeting the requirements of 29 CFR 1926.1101. Proposed asbestos removal procedures for EFA West controlled sites shall be submitted to EFA West for acceptance, prior to field implementation.

2. HOT WORK

Cutting of pipes should not be done with heat producing tools if possible. The internals of piping systems shall be gas tested if the use of spark-producing tools or a torch is required on structures, see (reference 2), Chapter 5. Notify the on-base Fire Department before any hot work is started.

3. NOISE HAZARDS

All heavy equipment operators shall wear single hearing protection (plugs and/or muffs) whenever the equipment is posted with noise hazard notices. Hilti operators shall use double hearing protection. Additional hearing conservation measures shall be employed as described in (reference 1), Chapter 18.

4. PLUMBING SYSTEM Prior to opening plumbing system verify using building piping drawing and personnel observation that all water to system is secure from restrooms, water fountains, air conditioning units, etc. Stage a portable eyewash at the site to be opened in the event residual water splashes on worker during initial breakthru. Wear face shields during initial breakthru.

5. RADIOLOGICAL SURVEYING, SAMPLING, & REMEDIATION

Prior to starting any radiological work, the pre-entry safety survey must be completed and reviewed by the OHSC. PPE as specified during the pre-shift briefing will be worn, unless specifically deleted by the OHSC. Material removed from the work site will be controlled in accordance with the requirements of references 4 and 5, unless specifically released from controls by the OHSC. Transporting of any controlled material will be performed following Department of Transportation (DOT) instructions 49 CFR, Chapter 1.

M. MONITORING

1. RADIATION (IONIZING) LEVEL MONITORING

Radiation levels shall be frequently monitored when changing conditions exist, i.e. equipment/objects are moved exposing previously inaccessible areas, pipes are cut open, etc..

• Instrument	Eberline E600 survey meter with SHP-360 beta/gamma pancake probe or SHP-380 alpha/beta probe or equivalent (personnel decontamination and monitoring) Ludlum Model 19 or equivalent Micro-R meter and IM 648 dosimeters worn on waist. (personnel exposure monitoring)
• Activity	Initial site survey, subsequent periodic surveys as site conditions change and personnel decontamination
• Monitoring Frequency	As deemed necessary by the OSHC
• Action Levels:	> 100 CPM above background for beta/gamma pancake probe > 14 CPM above background for Alpha/Beta probe > 20 micro-R for personnel exposure control

2. USE AND MAINTENANCE OF MONITORING EQUIPMENT

Specific monitoring equipment used for this site includes:

(Blanks to be completed on-site by the Site Foreman or H&S Coordinator)

	Equipment Description / Ser #	Calibration Due Date
(1)	_____	_____
(2)	_____	_____
(3)	_____	_____
(4)	_____	_____

3. MEDICAL MONITORING

If it is determined by the Project Team Leader and the Site Health & Safety Coordinator that heat or cold stress or temperature monitoring is required (mandatory if ambient temperature exceeds 70° F and personnel are garbed in impermeable protective clothing), see reference 6 for procedures.

N. MEDICAL SURVEILLANCE REQUIREMENTS

All personnel performing work at the site shall be enrolled in, as a minimum, a medical surveillance program designed for the HAZWOPER Hazardous Waste Worker. Other programs for specific hazards of this site are listed below:

- Forklift and heavy equipment medical programs for those operating heavy equipment.
- Respirator (Health) surveillance.
- Asbestos worker surveillance *

*(required only if Action Level is exceeded for 30 or more days per year or 10 days per quarter)

O. GENERAL SAFETY RULES

The following safety guidelines are instrumental in maintaining a proper and safe work environment for all personnel. Employees assigned to work on this project shall familiarize themselves with these instructions.

- Refrain from any horseplay, scuffling, and other acts which tend to endanger the safety or well-being of your fellow employees.
- Do not eat, drink, smoke or apply cosmetics while inside the site.
- Walk, do not run. Concentrate on what you are doing at all times.

- Promptly report unsafe conditions and practices to your supervisor if available, or to any supervisor.
- Consider the safety of your fellow employees; warn or advise them of dangerous situations in the work area; do not assume that unsafe conditions are obvious to them.
- Be alert for moving vehicles or cranes when walking around the site. Stand clear of any suspended load.
- Do not remove safety/warning devices or tags.
- Pick up debris. Practice good housekeeping habits to prevent trip and fall hazards.
- Do not enter compartments, tanks, voids or trenches until they have been tested and approved for entrance by the Confined Space Program Manager or his designated representative.
- Keep off all equipment and material handling vehicles unless authorized.
- For your own protection, don't use any tool or equipment which you have not been authorized or properly trained to operate.
- Size up loads prior to attempting to lift them. Always use the muscles in the legs to lift objects and not the weaker muscles of the back.
- Do not enter a restricted area without the required PPE, including as a minimum, a hard hat, safety shoes, eye protection, and hearing protection (if appropriate).
- Be aware of protruding edges, such as nails or sharp metal that could puncture protective clothing.
- Be aware of slippery or uneven surfaces that could cause falls, slips, and trips.
- All equipment must maintain at least a 10' clearance from overhead power lines. Avoid standing in water when operating electrical equipment.
- Use the Buddy System. Do not work alone.
- Do not do close-up sniff testing of soil, piping, or tank components, as they are potentially hazardous.

P. ILLUMINATION

Artificial light, either incandescent or fluorescent lighting system capable of producing a minimum of 5 foot-candles, must illuminate the general work site when working indoors or working outdoors after sunset.

Q. SANITATION

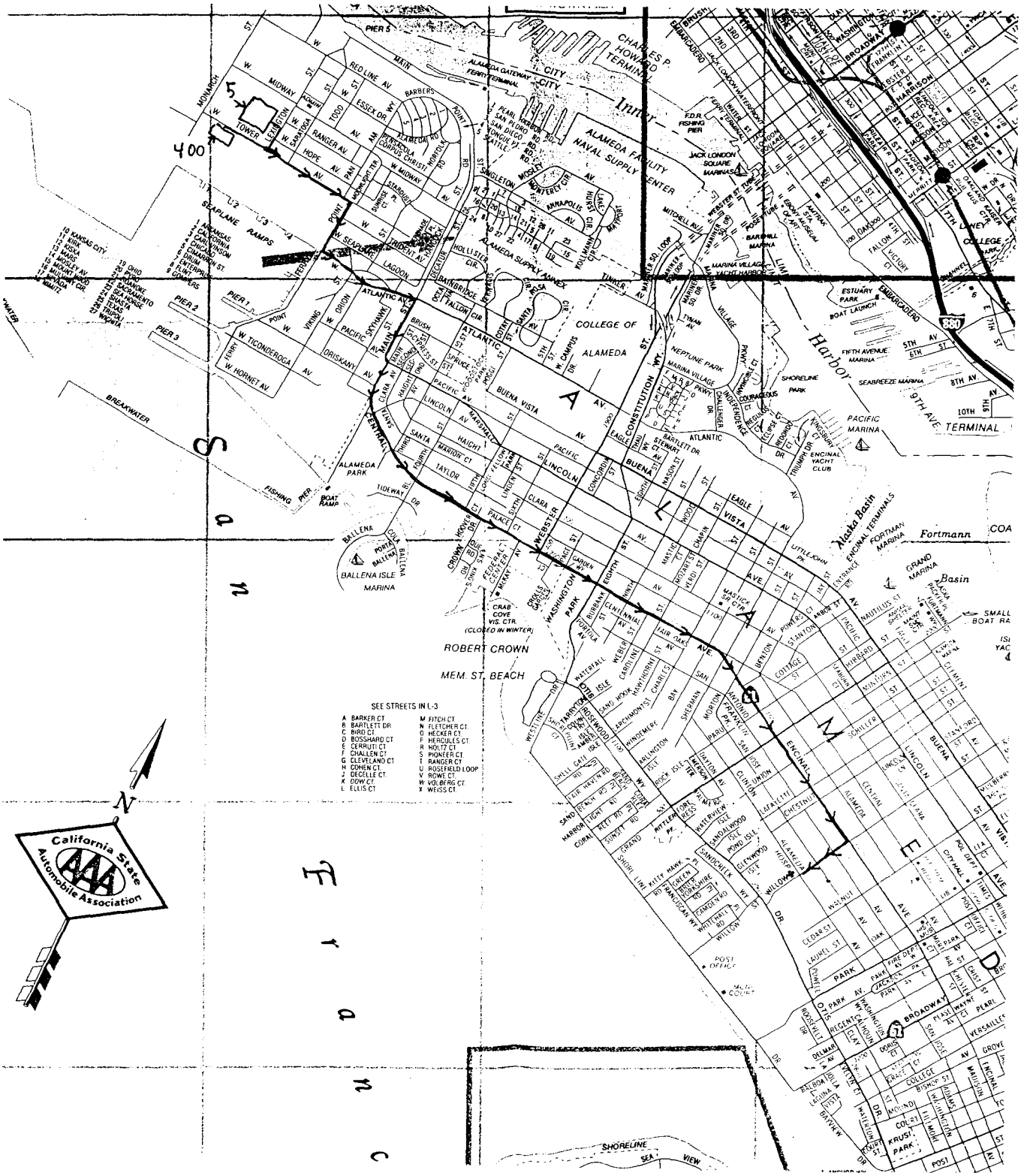
Provide the workers at the site with the following:

- Adequate supply of potable water and facilities with warm water for workers to wash their hands and face at the end of the work shift.

- Drinking water in containers capable of being tightly closed, and equipped with a tap. Clearly mark drinking water containers and do not use them for any other purpose.
- Trash cans.
- Portable toilet facilities
- Portable eyewash (15 minute water supply).
-

All personnel shall thoroughly wash their hands and face with soap and water prior to eating, drinking, smoking, chewing gum/tobacco products, applying cosmetics, and using sanitary facilities

FIGURE 1
HOSPITAL MAP



ACRONYMS

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
CHP	California Highway Patrol
CPR	Coronary Pulmonary Resuscitation
dBA	Decibles
DOT	Departemnt of Transportation
EFA West	Engineering Field Activity - West
EMT	Emergency Medical Technician
H&S	Health and Safety Plan
HAZCOM	Hazard Communication
HEPA	High Efficiency Particulate Airfilter
HMSA	Hazardous Material Storage Area
IDLH	Immediately Dangerous to Life and Health
NIOSH	National Institute of Occupational Safety and Health
NRC	Nuclear Regulatory Commission
OHSC	Occupational Health and Safety Coordinator
pCi/g	pico Curies/gram
PPE	Personnel Protection Equipment
PVC Poly Vinyl Chloride	Poly Vinyl Chloride
RASO	Radiological Affairs Support Office
RPM	Remediation Project Manager
SSPORTS	Supervisor Shipbuilding Portsmouth
uR/hr	micro Roentgen/hour
WP	Work Plan
REV	Revision
CPM	Counts Per Minute

Attachment 1
Safety Meeting Sign-Off Sheet
(Sheet 1 of 2)

Meeting Information:

Site: _____

Date: _____ **Time:** _____

Meeting held by: _____
Name (Print)

_____ _____
Signature Date

Items Discussed:

Hazard Evaluation:

Toxic Vapors	Yes _____	No _____
Radioactivity	Yes _____	No _____
O_2 Depletion	Yes _____	No _____
Physical Hazards	Yes _____	No _____
Other (list):		
_____	Yes _____	No _____
_____	Yes _____	No _____
_____	Yes _____	No _____
_____	Yes _____	No _____
Personal protection to be worn and equipment to be used:	Yes _____	No _____
Decontamination Procedures:	Yes _____	No _____

Emergency Information:

First aid:	Yes _____	No _____
Hospital Route:	Yes _____	No _____
Poison Control Center:	Yes _____	No _____
Eye rinse/Shower locations:	Yes _____	No _____
Water faucet locations:	Yes _____	No _____
Fire extinguisher locations:	Yes _____	No _____
Fire hydrant locations:	Yes _____	No _____

Attachment 1
Safety Meeting Sign-Off Sheet
(Sheet 2 of 2)

Instructions: This form is to be completed by all persons prior to beginning work at the site.
(Note: The completed form is to be returned to the On-site Health and Safety files.)

Project _____

By my signature below, I acknowledge that I have read and understand the contents of the Health and Safety Plan for this project. I agree to perform my work in accordance with the Health and Safety Plan.

Attendees:

Team Members:

Name (Print)	Signature	Date

Visitors:

Name (Print): _____ Affiliation: _____
Signature: _____ Date: _____

Name (Print): _____ Affiliation: _____
Signature: _____ Date: _____

APPENDIX A – HEALTH AND SAFETY PLAN

ATTACHMENT 2 – SITE LOG

FINAL WORK PLAN
BUILDINGS 5 AND 400
RADIOACTIVELY CONTAMINATED DRAIN
PIPING/WALL/FLOOR REMOVAL

THE ABOVE IDENTIFIED ATTACHMENT IS NOT AVAILABLE.

EXTENSIVE RESEARCH WAS PERFORMED BY NAVFAC SOUTHWEST TO LOCATE THIS ATTACHMENT. THIS PAGE HAS BEEN INSERTED AS A PLACEHOLDER AND WILL BE REPLACED SHOULD THE MISSING ITEM BE LOCATED.

QUESTIONS MAY BE DIRECTED TO:

DIANE C. SILVA
RECORDS MANAGEMENT SPECIALIST
NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST
1220 PACIFIC HIGHWAY
SAN DIEGO, CA 92132

TELEPHONE: (619) 532-3676

APPENDIX B

EXCERPTS FROM
RADIATION SURVEY REPORT
1995 SURVEY DATA
PRC ENVIRONMENTAL MANAGEMENT, INC
NAVAL AIR STATION, ALAMEDA
BUILDINGS 5 AND 400

Note: Items that have been lined out do not apply to building 5 and 400 or are irrelevant to the work being performed in this Work Plan.

RADIOACTIVE CONTAMINATION REPORTED ON THE FLOORS AND WALLS OF ROOMS IN BLDG 5 AND 400 AT ALAMEDA PT.

(Based on Tetra-Tech EMI Reports)

1. TWD/RAP OF NOV. 97 - PG. 2-7: PARA 2.2.2 - DURING 1996 SURVEYS IN BLDG 5, ELEVATED RADIOLOGICAL READINGS WERE DETECTED ON THE FLOOR AND WALL SURFACES IN BEARING SHOP ROOM 227C ON THE 2ND FLOOR. THE IMPACTED SURFACES WERE NOT REMOVED. **RADIATION SURVEYS OF SOME ROOMS IN BLDG 5 REMAIN TO BE PERFORMED.**

DURING 1996 SURVEYS IN BLDG 400, FLOOR, WALL AND EQUIPMENT SURFACES IN SOME OF THE ROOMS ON THE 2ND FLOOR HAD ELEVATED RADIOLOGICAL ACTIVITY. EQUIPMENT WAS DECONNED OR REMOVED. IMPACTED SURFACES WERE NOT REMOVED AND **RADIATION SURVEYS OF SOME PARTS OF ROOMS 203, 210 AND 213 REMAIN TO BE PERFORMED.**

2. RAD SURVEY REPORT OF JAN 1998 - PAGE 2-3, PARA 2.5 - ONLY ANOMALIES IN BLDG 5 WERE AREAS OF ELEVATED BETA ACTIVITY ON THE FLOOR AND NORTH WALL OF ROOM 227C. OILY SLUDGE-LIKE MATERIAL COVERS FLOOR IN AREA OF ELEVATED MEASUREMENTS.

BUILDING 5

NO GROSS ALPHA ACTIVITY OF GAMMA RADIATION ASSOCIATED WITH DECAY OF RADIUM-226 WAS DETECTED. ANOMALIES ON THE WALL WERE NOT COVERED WITH OILY MATERIAL, BUT MAY BE COVERED BY THE PAINT ON THE WALLS.

PAGE 4-11, PARA 4.5, PRIOR TO THE SURVEY OF THE ROOMS, A 1 METER GRID WAS OUTLINED ON THE FLOORS AND UP TO 2 METERS ON THE WALLS. BEARING SHOP AREA SURVEYS UTILIZED STATIC ALPHA AND GAMMA COUNTS AND GAMMA EXPOSURE RATES AT EVERY 4TH GRID NODE; FOLLOWED BY ALPHA AND BETA SCANS.

SURVEY ANOMALIES

PAGE 4-12, PARA 4.5.2.1 - THE ONLY ANOMALIES WERE DETECTED IN ROOM 227C; PRIMARILY BETA-GAMMA EMITTING ANOMALIES WERE IDENTIFIED ON THE FLOOR AND ON THE NORTH AND WEST WALLS.

PAGE 4-13 - SEVERAL AREAS HAD LEVELS IN EXCESS OF THE 1,000 DPM/100CM2 (AVERAGE) RELEASE LIMIT FOR BETA CONTAMINATION, **AND IN ONE AREA (B5-F-O), A LEVEL OF 3,400 DPM/100CM2 WAS FOUND,** WHICH EXCEEDS THE 3,000 DPM/100CM2 (MAXIMUM) RELEASE LIMIT. LOCATIONS OF THE FLOOR AND WALL ANOMALIES ARE SHOWN IN FIGURES 4-14 AND 4-15 RESPECTIVELY.

WALL ANOMALY B5-W-B, LOCATED ON THE NORTH WALL OF ROOM 227C IS THE ONLY WALL ANOMALY (4,752 DPM/100CM2) WITH LEVELS GREATER THAN THE MAX OF 3,000 DPM/100CM2 AND WILL REQUIRE REMEDIATION. ALL OTHER WALL LOCATIONS MEET THE RELEASE CRITERIA OF 1,000 DPM/100CM2 WHEN AVERAGED OVER 1 SQUARE METER FOR BETA EMITTING ISOTOPES.

FLOOR ANOMALY B5-F-O, LOCATED IN THE NORTH WEST CORNER OF ROOM 227C (9 FEET FROM THE WEST WALL AND 6 FEET FROM THE NORTH WALL) AT 3,400 DPM/100CM2, EXCEEDS THE 3,000 DPM/100CM2 MAX RELEASE LIMIT. **IN ADDITION, 24 READINGS LOCATED WITHIN A ONE SQUARE METER AREA ALL READ GREATER THAN 1,000 DPM/100CM2 WHEN AVERAGED OVER ONE SQUARE METER. THIS AREA WILL REQUIRE REMEDIATION.** OTHER AREAS IN THE NORTH-WEST CORNER WERE NOT REPORTED AS HAVING REPORTABLE ANOMALIES.

BUILDING 400

PAGE 2-4, PARA. 2.6 - ALPHA CONTAMINATION WAS IDENTIFIED ON FLOORS OR WALLS IN ROOMS 203, 204, 210 AND 213. SLIGHTLY ELEVATED LEVELS OF GAMMA RADIATION WERE MEASURED IN THE DEPLETED URANIUM (DU) BOOTH IN ROOM 204.

PAGE 4-24, PARA. 4.6.3.3 - ALPHA SURVEY ANOMALIES GREATER THAN THE RELEASE LIMIT OF 300 DPM/100CM2 MAXIMUM ARE SHOWN IN TABLE 4-15.

SURVEY ANOMALIES

ROOM 204 HAS FOUR LOCATIONS EXCEEDING 300 DPM/100CM2 (LOWER BEAM - 01 [1,006 DPM/100CM2], CONCRETE LEDGE - 02 [669 DPM/100CM2] NORTH WALL - 03 [1,613 DPM/100CM2] AND NORTH WALL - 04 [1,607 DPM/100CM2]). **ROOM 210 HAS TWO ANOMALIES EXCEEDING 300 DPM/100CM2** (FLOOR - D [467 DPM/100CM2] AND FLOOR - G [370 DPM/100CM2]).

PAGE 4-25, PARA 4.6.4- LOOSE ALPHA CONTAMINATION LEVELS GREATER THAN THE RELEASE LIMIT OF 20 DPM/100CM2 WERE FOUND IN ROOMS 204 AND 210 AS REPORTED IN TABLE 4-16. THREE SWIPES WERE #400-R210-26 (40 DPM/100CM2), #400-R204-31 (29 DPM/100CM2) AND #400-R210-K ("23" DPM/100CM2).

Radioactive anomalies that were detected and not recovered during the survey will be addressed as part of this removal action. Figures 2-3 and 2-4 show the surveyed areas of Sites 1 and 2, respectively, and the anomalies that were detected.

2.2.2 Sites 5 and 10 (Buildings 5 and 400)

During the 1996 radiation survey at IR Site 5, areas of elevated radiological readings were detected on the floor and wall surfaces in Bearing Shop Room 227C on the second floor of Building 5. The source of radiological activity is believed to be from the radioluminescent paints containing radium-226 that may have been used or disposed of in these areas. The impacted surfaces in Bearing Shop Room 227C were not removed. Radiation surveys of some parts of the Bearing Shop rooms in Building 5 (Figure 2-5) remain to be performed.

At IR Site 10, areas of elevated radiological activity were detected on the floor, wall and equipment surfaces in some of the rooms on the second floor of Building 400. During the 1996 surveys, the equipment was either decontaminated or the contaminated parts of the equipment were removed. The materials were properly labeled, secured, and stored in Building 5. The impacted surfaces in the second floor rooms of Building 400 were not removed, and radiation surveys of some parts of rooms 203, 210, and 213 (Figure 2-6) remain to be performed.

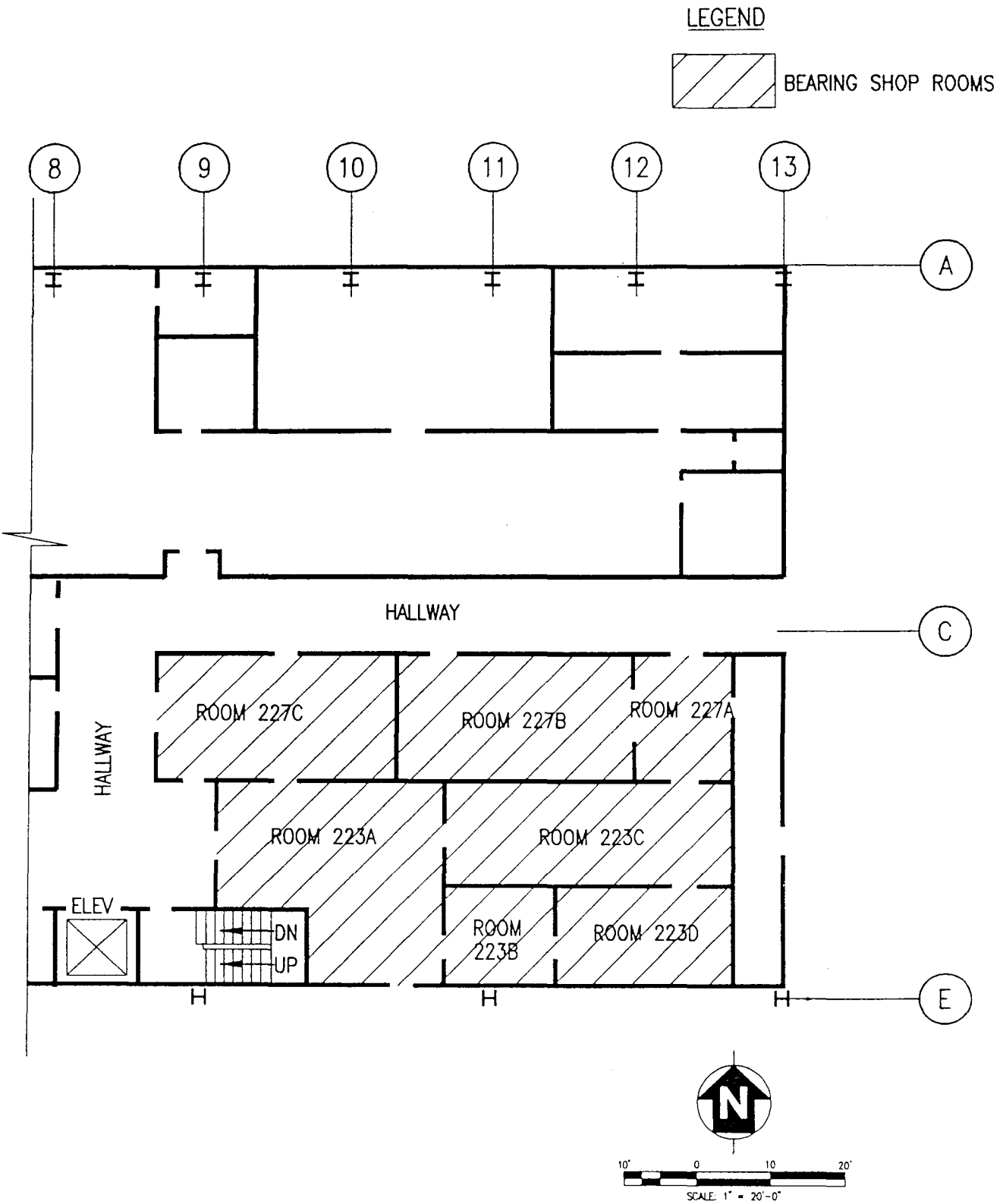
The interior drain lines and exterior storm drain lines and sewers associated with IR Site 5 and 10 (Buildings 5 and 400) were also surveyed. Figure 2-7 shows the exterior storm drain lines and sewers in which elevated levels of radiation were detected. The interior and exterior drain lines and sewers with elevated levels of radiation will be addressed as part of the removal action.

2.3 ROLE OF NAVY, STATE, AND LOCAL AUTHORITIES

This section describes the current and future environmental management roles.

2.3.1 Department of Navy Authority

Federal Executive Order 12580 delegates to the DoD the President's authority to undertake CERCLA response actions. Congress further outlined this authority in its Defense Environmental Restoration



DATE: 11/05/97

WG/0147_2-5.DWG

FILENAME: P:/4545/

ALAMEDA POINT, ALAMEDA, CALIFORNIA

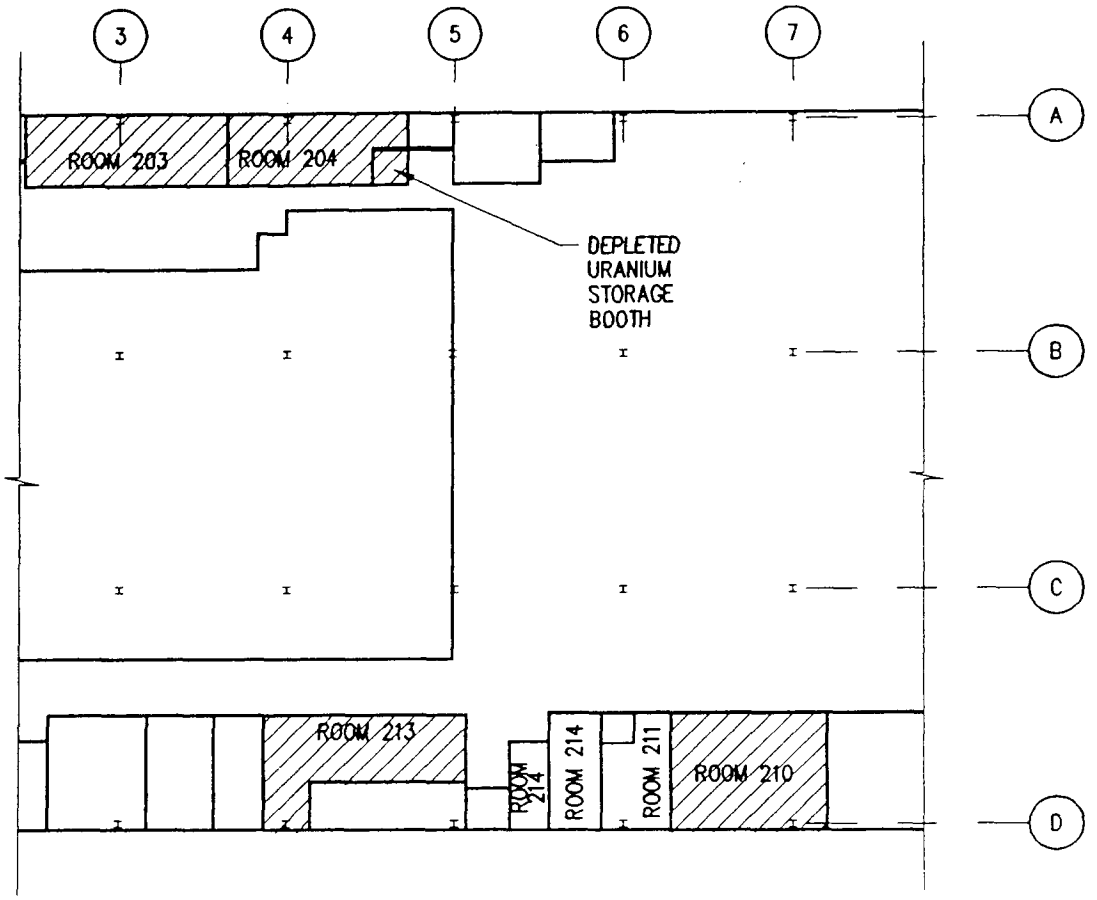
FIGURE 2-5

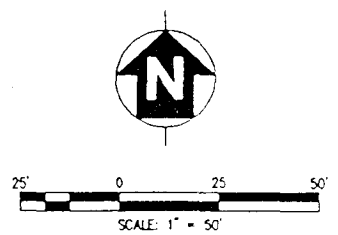
SITE 5
BUILDING 5
SECOND FLOOR PLAN – BEARING SHOP

PROJECT NO.:	ORGINATOR:	CHECKER:	DATE:
4545-0147	ALM	KN	11/97

LEGEND

AREAS OF POTENTIAL CONTAMINATION





ALAMEDA POINT, ALAMEDA, CALIFORNIA

FIGURE 2-6

SITE 10
BUILDING 400
SECOND FLOOR PLAN

PROJECT NO.:	ORGINATOR:	CHECKER:	DATE:
4545-0147	ALM	KN	11/97

FILENAME: P:/4545/DWG/0147_2-6.DWG DATE: 11/05/97

small pieces of gravel and rock. Limited amounts of vegetation are present on these trails. The upper Site 2 jogging trail, on top of the berm surrounding the Site 2 landfill, is also compacted dry sand and fill; however, most of the trail is covered with short grass.

2.4 FORMER RADIOACTIVE WASTE STORAGE SHACK AREA

Gamma scintillation detectors were used to scan the area of the former radioactive waste storage shack located in Site 2. At the time of the survey, the floor of the shack was removed and the grasses in the immediate area were trimmed to allow for a more complete survey of the area. Several anomalies were identified within the perimeter of the old fence posts and several sources were recovered and placed in a waste drum for storage.

Although the radiation sources were removed, several of the anomalous locations continue to indicate elevated levels of gamma radiation, suggesting that contamination has become dispersed in the soil. Two soil samples were collected at one anomalous location. Laboratory gamma spectroscopic analysis confirmed the presence of radium-226 decay products with activities of approximately 2,400 and 3,000 pCi/g for the two samples. No anomalous reading were recorded outside the perimeter of the old fence posts or along the path leading to the area.

2.5 BUILDING 5

The areas in and adjacent to the old Bearing Shop located on the second level of Building 5 were surveyed for residual alpha, beta, and gamma radioactivity. Surveyed areas include Rooms 223B, 223C, 223D, and 227B (laboratory/clean rooms), Room 223A (an office room), Room 227A (an eating/break room), and Room 227C (a cleaning room), as well as the hallways and the five restrooms in the area.

The only anomalies detected in the Bearing Shop area were areas of elevated beta activity on the floor and on the north wall of Room 227C. An oily sludge-like material covered the floor in the area of the elevated measurements. A sample of this material was collected and analyzed by a radiochemical laboratory. The laboratory results confirmed the presence of potassium-40 at levels above background concentrations; however, gross beta results indicate that one or more beta-emitters remain unidentified.

Strontium-90 was not detected by radiochemical analysis at a detection limit of 2 pCi/g. No gross alpha activity or gamma radiation associated with the decay of radium-226 was detected in the sample. The anomalous locations on the walls were relatively clean and were not covered with the same oily material. The radioactive source material is likely covered by the paint on the walls.

The floors in the surveyed areas of Building 5 are mostly covered by 1/8-inch-thick sheet linoleum floor covering. The sheets are 3 feet wide with a length equal to the width of the room. Approximately 10 to 15 percent of the floor covering in Room 227C is gone, exposing the concrete floor below.

The walls in the Bearing Shop rooms are plaster or sheet rock. Several of the walls between the rooms contained large glass windows. Rooms 223D and 227B each contained one sink and several other exposed plumbing and air/gas connections.

2.6 BUILDING 400

Several areas on the second floor of Building 400 were surveyed for alpha, beta, and gamma radiations. Surveyed areas include Rooms 203, 204, 210, and 213, as well as Room 211 (the men's restroom) and Room 214 (the women's restroom). The equipment that was located in these rooms was also surveyed for alpha contamination. Alpha contamination was identified on several pieces of equipment and on the floors or walls in Rooms 203, 204, 210, and 213. Slightly elevated levels of gamma radiation were measured in the depleted uranium (DU) removal booth in Room 204. ~~The exterior and interior of the DU removal booth are shown in photographs 13 and 14 of Appendix B, respectively.~~ 6/24/93

The Building 400 survey areas contain several types of floor and wall coverings. Rooms 203 and 210 has 12-inch square linoleum tiles on the floor. Room 213 has sheet linoleum and linoleum tiles in the photo shop rooms, while the screen printing room floor is mostly painted concrete. The floor in Room 204 is mostly bare concrete, and the floor covering in the DU removal booth was typical kitchen-type sheet vinyl (this floor covering was removed along with the equipment). The floors in the restrooms are glazed brick. The walls in the various rooms are painted plaster or sheet rock with three exceptions: the north wall in Rooms 203 and 204 (wall is common to both rooms), the north wall in

Room 210, and the restroom walls are comprised of different materials. The north wall in Rooms 203 and 204 is made of a pressed fiber-board material. The surface is very rough and is painted. The north wall in Room 210 is covered with wood paneling. The walls in the restrooms are partially covered with ceramic tiles. ~~Photographs 5 through 14 in Appendix B show the types of floor and wall coverings in the survey areas of Building 400.~~ YA 6/24/93

Prior to the room surveys in Building 400, the equipment in the rooms was surveyed for alpha surface contamination. Several pieces of equipment were found to be contaminated above release limits. These pieces of equipment were isolated, labeled, and placed in the Small Parts Paint Shop of Building 5 for storage. Most of the non-contaminated equipment was removed from the affected rooms and relocated to non-affected areas of Building 400. ~~Photographs 3 through 14 also show much of the equipment that was surveyed.~~ YA 6/24/93

2.7 DRAIN LINES, STORM SEWER LINES, AND STORM SEWER MANHOLES YA 6/24/93

PRC procured the services of a subcontractor to survey the interior or exterior surfaces of drain lines, storm sewer lines, and storm sewer manholes associated with areas of contamination in Buildings 5 and 400. New World Technology Inc. (NWT) of Livermore, California was contracted to perform gamma surveys using gamma scintillation detectors (see Attachment A for details describing NWT's surveys). Several areas of elevated activity were identified in drain lines located inside Building 400 and outside Buildings 5 and 400. The maximum gamma count rate of 5,900,000 cpm (a point-source equivalence of 470 μCi) was measured inside a section of storm sewer line F west of Building 5, between manholes 6F and 5F.

Several manholes associated with storm sewer lines F, FF, and R, as well as five background manholes, were also surveyed. The maximum activity measured was found in the bottom of manhole 6F-1. The activity measured was about 3 μCi (point-source equivalent). Photographs 15 through 18 (Appendix B) show NWT personnel engaged in survey activities.

orage shack area. Table 4-6 summarizes the net count rates and exposure rates at each anomaly location. The table also indicates whether or not a source was recovered from the anomalous location and any changes in the radiological conditions.

As shown in Table 4-6, radioactive sources were recovered from six of the eight anomalous locations. However, as seen in the recovery of some Site 1 sources, the count rate does not always decrease when a source is recovered. Continued elevated count rates may indicate the presence of another discrete radioactive source or dispersed activity in the soil.

Two sources were recovered from anomalous location SS05 which resulted in a drop from an initial net count rate of 104,000 cpm to a net count rate of 60,349 cpm. In addition, two 500 ml soil samples were collected from this anomalous location. After removing the soil samples, the activity at the anomalous location dropped from 60,349 net cpm to 11,292 net cpm. The soil samples were sent to Berringer Laboratories in Golden, Colorado for a gamma spectroscopic analysis. The laboratory results, summarized in Table 4-7, confirmed the presence of radium-226. The field count rate measurements taken in contact with the surface of the sample container are also given in Table . A copy of the complete laboratory report is included as Appendix G.

The soil samples were sealed prior to analysis so that any radon produced from the decay of radium-226 would be contained. The samples were also stored for 11 days to allow the radium-226 decay products to approach equilibrium. The analysis of the soil samples shows a high concentration of residual radioactivity in the soil at anomaly SS05. Based on the data presented, it can be concluded that the concentration of radium-226 in the soil samples is, at a minimum, equivalent to the reported lead-214 concentrations. The exact radium concentration depends on the initial state of equilibrium in the soil samples. The sample radium-226 concentrations are presented in Table 4-8.

An inventory of all recovered sources from the former radioactive waste storage shack area is provided in Appendix F.

4.5 BUILDING 5 BEARING SHOP SURVEY

The Building 5 Bearing Shop survey was performed during the weeks of July 15 and July 22, 1996. The rooms comprising the Building 5 Bearing Shop are located on the second level of Building 5,

approximately in the center of the building, directly above the Small Parts Paint Shop. The rooms that comprise the Bearing Shop are Rooms 223A, B, C and D, and Rooms 227A, B, and C. Figure 4-12 shows the layout of the rooms that constituted the survey area. The sections of hallway and the restrooms that were surveyed are also shown on the figure. Prior to the survey of the rooms, a 1 meter grid was outlined on the floors and up to 2 meters on the walls.

The survey of the Bearing Shop area was performed in three steps. First, static alpha and gamma counts, along with gamma exposure rates, were measured on the floors and walls at every fourth grid node. Second, the floors and walls were scanned for alpha and beta activity and third, the surrounding hallways and restroom drain lines were scanned. Background measurements were also taken as a part of each step.

4.5.1 Grid Node Survey

Total alpha activity and gamma count rates were measured on the floor and wall surfaces within the Bearing Shop rooms, at a minimum of every fourth grid node. The count rates were measured with the detectors in contact with the floor and wall surfaces. The alpha measurements were taken using the 100 cm^2 alpha scintillation detector. A 10-minute background measurement produced 15 counts, giving an average alpha radiation background of 1.5 cpm. At the grid nodes, gross gamma counts were recorded for 0.2 minute using a 2x2 NaI gamma scintillation detector. The average background count rate at five locations was 1,147 cpm. Gamma exposure rates were measured at every fourth grid node using a μR exposure rate meter at 1 meter above the floor surface.

jma 6/24/93

~~The data produced during the Building 5 grid node survey are presented in Appendix H~~. No alpha or gamma radiation anomalies were identified during the grid node survey. However, the data show variations in gamma count rates where different surfaces or construction materials are present. For example, the lowest count rates were typically measured on glass or metal surfaces, while the highest count rates were measured near or on the east walls of the three rooms located on the east side of the survey area. These walls are constructed of concrete cinder blocks. The gross gamma count rates ranged from 900 to 2,130 cpm. The distribution of the gross gamma node measurements is presented on Figure 4-13.

Total alpha activity for each node was below the detection limit of 16 dpm/100 cm^2. Gross alpha count rates ranged from 0 to 5 cpm. Gamma exposure rates ranged from 5 μR/hr to 8 μR/hr. ~~These survey data are also presented in Appendix H.~~ 6/24/99

4.5.2 Scanning Surveys

The scanning surveys were performed using large-area gas proportional detectors that were operated in the alpha/beta mode, ~~as described in Section 3.5.~~ The walls inside the Bearing Shop rooms were scanned from the floor, to a level 2 meters above the floor, using a hand held detector. The floors inside the Bearing Shop rooms and the floors in the hallway outside the rooms were also scanned. The detector used to scan the floors was mounted on a cart, approximately 0.5 inches above the floor surface. The scanning speed for both detectors was about one-half a detector's width per second.

The exterior of the drain lines in the five restrooms near the Bearing Shops were also scanned using a gamma detector. The detector was kept as near to the exterior surface of the drain lines as possible. The scanning speed was no greater than 1 meter per second. No areas of elevated activity were identified.

4.5.2.1 Bearing Shop Rooms

~~The data collected during the scanning survey of the Building 5 Bearing Shop are also provided in Appendix H~~. No anomalies were detected in six of the seven rooms comprising the Bearing Shop survey area. The only anomalies were detected in Room 227C. Primarily beta-emitting anomalies were identified on the floor and on the north and west walls of the room. 6/27/99

The anomalous area on the floor in Room 227C was covered with a layer of an oily, sludge-like material. A sample of this material was collected and placed in a plastic zipper bag. The sample also demonstrated elevated beta activity when surveyed with the GM detector. From the plastic bag, the sample was transferred into a glass jar and sent to a radiochemical laboratory for gross alpha/beta, total strontium, and gamma spectroscopic analyses.

Table 4-9 presents the activities measured with the GM detector on the floor around the location with the highest activity. Figure 4-14 shows the locations of these measurements. These measurements were taken a month after the scanning survey was performed because it was discovered that a portion of the floor covering had been removed during cleaning operations. All of the removed floor covering was placed into waste barrels and left in the room. Activity measurements were not elevated in the areas where the floor covering was removed.

The activity of 3,400 $\pm$700 dpm/100cm^2 for measurement B5-F-O is greater than the release limit of 3,000 dpm/100cm^2 maximum for some beta-emitting isotopes (U.S. NRC 1974). The average beta activity for the approximate 1-square-meter area surveyed around the "hot spot" is also greater than the release limit of 1,000 dpm/100cm^2 average for some beta-emitting isotopes (U.S. NRC 1974).

The anomalous areas on the walls did not have the same type of oily material covering the areas. The anomalous areas were not visually different from areas measuring no greater than the background. The majority of the anomalies on the walls were located on the base of the wall near the floor. Figure 4-15 shows the locations of the wall anomalies.

Table 4-10 presents the beta activities measured on the wall using the gas proportional detector in contact with the contaminated surface. The table also presents the beta activities measured using the GM detector. The detector was used in an attempt to pinpoint the locations of greatest activity and to collect a static measurement at that point. ~~Survey reports for the Building 5 grid node measurements and anomaly measurements are presented in Appendix I.~~ 6/24/99

Anomaly B5-W-B, located on the north wall of Room 227C, is the only wall anomaly whose beta surface activity is greater than the 3,000 dpm/100cm^2 maximum release limit. With this exception, all other anomalous locations meet the release criteria of 1,000 dpm/100cm^2 averaged over 1 square meter for some beta-emitting isotopes.

Analysis of the sludge-like material removed from the floor of Room 227C was performed by Berringer. Table 4-11 summarizes the results of the analyses. ~~The complete results are presented in Appendix G.~~ 6/24/99

The laboratory results show that the sample contains about 1,300 pCi/g of beta-emitting radionuclides. The analysis also shows that, of the 1,300 pCi/g, about 270 pCi/g is potassium-40. However, the remaining gross beta concentration, about 1,030 pCi/g, has not been identified. Analysis for strontium, a likely contaminant, was negative, and no gross alpha radiation or gamma radiation associated with the decay of radium-226 was detected.

4.5.2.2 Hallways and Restrooms

The hallways outside of the Bearing Shop rooms we scanned with the floor monitor operated in the alpha/beta mode. The areas surveyed are shaded on Figure 4-12. The survey data for the Building 5 hallways near the Bearing Shop are presented in Appendix H. No anomalies were detected in the hallway areas.

The the exterior of the accessible drain lines in the five restrooms near the Bearing Shop were surveyed using a 2x2 NaI gamma scintillation detector. Exposure rates were also measured using the μR exposure rate meter. The restrooms surveyed were the Women's Restroom 13, Men's Restroom 10, Women's Restroom 11, Men's Restroom 11, and the men's restroom next to the freight elevator (not numbered). No anomalies were detected in the restrooms. The survey data for the Building 5 restrooms near the Bearing Shop are also presented in Appendix H.

4.6 BUILDING 400 SURVEYS

The Building 400 radiation surveys consisted of the following:

- Survey of all equipment in Rooms 203, 204, 210, and 213 as well as wall fixtures (to a level 2 meters above the floor)
- Isolation or decontamination of contaminated materials
- Removal of most of the equipment from the rooms
- Grid node surveys in Rooms 203, 204, 210, and 213
- 100 percent survey of the floors and walls (to a level of 2 meters above the floor) in Rooms 203, 204, 210, and 213
- Swipe sampling of equipment and floor and wall surfaces for removable alpha contamination

- Survey of the exteriors of the accessible drain lines and sink drains in Rooms 211 and 214 (the men's and women's restrooms near room 210)

Figure 4-16 shows the layout of Rooms 203, 204, 210, and 213 and the original position of the equipment in those rooms. The equipment that are shown shaded on the figure are those pieces on which alpha radiation was detected. ~~These anomalies are discussed in Section 4.6.1.2. The equipment numbers correspond to the equipment list provided in Appendix J.~~ 6/24/98

The surveys of the affected areas in Building 400 were performed using alpha scintillation detectors with 50 cm^2 and 100 cm^2 surface areas, 2x2 NaI gamma scintillation detectors, large surface area gas proportional detectors, and a pancake-style GM detector. Each of these detectors was operated coupled to Ludlum model 2221 ratemeters.

Each of the following sections discuss a portion of the Building 400 surveys. Summaries of the survey results are also presented in the following sections. ~~Complete data sets for the Building 400 surveys are presented in Appendix K.~~

4.6.1 Equipment Survey

6/24/98

PRC conducted the equipment survey according to the following schedule:

Gamma radiation scans and preliminary alpha scans	April 24 through April 26, 1996
Alpha radiation scans	May 29 and May 30, 1996
Alpha radiation scans	June 11 through June 13, 1996
Final alpha scans and equipment removal	August 21 through August 23, 1996

The purpose of the equipment survey was to determine if any of the individual pieces of equipment, in part or in whole, were contaminated with radium-226 above release criteria. It was necessary to remove the equipment from the rooms so that the floors and walls of the rooms could be surveyed. If a piece of equipment showed levels of gross alpha radiation, either fixed or removable, below the established release limits (U.S. NRC 1974), then the piece was considered free of contamination and was removed form the room.

the surface was wiped with a wet cloth. If the alpha contamination was found on a painted metal surface, attempts were made to decontaminate the surface by removing the paint with a commercial paint stripper. Also, if contamination was found on a removable part of a piece of equipment, such as a masonite table top, the contaminated part was removed from the piece of equipment without performing any decontamination activities.

All contaminated parts which were removed from the equipment, or pieces of equipment which were not able to be decontaminated, were wrapped in a layer of heavy sheet plastic (except for three table support legs) and labeled as radioactive material. Small contaminated parts were also labeled as radioactive material and placed in the radioactive waste storage drum along with decontamination materials (such as shop rags and nitrile gloves). During the survey, this material was stored in Room 210 of Building 400. After the equipment survey was completed, these materials were moved to the Small Parts Paint Shop in Building 5.

All pieces of equipment removed to Building 5 for storage do not show contamination levels above the established release limits (U.S. NRC 1974). Because the activity and error calculations were not performed in the field, it was determined that separating all equipment with anomalous measurements was prudent. Table 4-14 is an inventory of materials that are contaminated with low levels of alpha radiation that were identified during the Building 400 equipment survey. The maximum activity detected on each piece of equipment or material is also provided in the table.

4.6.1.4 Gamma Radiation Survey

Prior to performing the alpha radiation survey, all pieces of equipment were scanned for gamma radiation. This survey was conducted using 2x2 NaI gamma scintillation detectors. The equipment was scanned at a rate of about 1 meter per second while keeping the detector as close to the equipment surface as possible. This method was used to identify any obvious anomalies which would immediately classify an object as contaminated.

Only one anomaly was identified during this survey. This anomaly was located in the DU removal booth inside Room 204. An area under the fume hood cabinet (see Figure 4-16, Room 204, equipment number 1a) was identified with gamma activities about twice the background levels. Because the fume

hood could not be moved at the time of the survey, it could not be determined if the anomaly was in the cabinet, under the cabinet, or under the vinyl floor covering. Later, upon removal of the cabinet and floor covering, it was determined that the anomaly was located on the concrete floor, around a hole where an old sink drain used to pass through the floor. The details of this anomaly are discussed in Section 4.6.3.3.

4.6.2 Final Equipment Survey and Removal of Clean Equipment

PRC subcontracted Advanced Technology Group (ATG) to remove the uncontaminated equipment from Rooms 203, 204, 210, and 213. ATG subcontracted an electrician and plumber to break all electrical and plumbing connections associated with any equipment in the rooms. ATG provided health and safety and radiation protection support for its personnel and subcontractors. PRC provided oversight for the removal operations and performed a final alpha survey of the previously inaccessible parts of the equipment, prior to removing any equipment from the rooms.

All equipment assessed to be free of anomalous alpha activity were removed from the rooms and placed in non-affected areas of Building 400. Several large, heavy pieces of equipment were not removed from the rooms. The subcontractor moved this equipment to new locations within the rooms to allow access to the walls and floor previously inaccessible to the surveyors. The equipment was only moved to locations previously surveyed and determined to be within the criteria for free release.

In addition to the removal of the fume hood in the DU removal booth, ATG also performed the removal of the vinyl floor covering from the room. Upon removal, PRC scanned the top and bottom surfaces of the floor covering for alpha surface contamination. No anomalies were identified.

4.6.3 Floor and Wall Survey

The survey of the floor and walls in the affected area of Building 400 was performed during the weeks of August 19 and 29, 1996. The survey was designed to be final status survey for the purpose of determining that release limits for fixed and removable alpha surface contamination are met. The survey was not designed to determine the presence of residual alpha activity below the linoleum floor coverings (specifically in Rooms 204, 210 and 213). Although it is possible to detect significant

amounts of radium-226 through the linoleum by beta-gamma counting, this approach is not suitable for a final status survey where both the alpha and beta limits must be independently satisfied.

The floor and wall survey was conducted using alpha scintillation detectors, a pancake-style GM detector, large-area hand-held and cart mounted gas proportional detectors, 2x2 NaI gamma scintillation detectors, and a μR exposure rate meter. The survey included both static and scanning measurements. The scanning survey provided 100 percent coverage of the floors and walls (up to a level of 2 meters above the floors).

The room survey in Building 400 was performed in two steps. First, static alpha, beta, and gamma counts, along with gamma exposure rates, were measured at every fourth grid node on the floors and walls. Static beta counts were taken only on floor surfaces that were not covered with linoleum (Rooms 203, 204, and the front part of room 213). Second, the floors and walls were scanned for alpha and beta activity. Background measurements were also taken as a part of each step.

4.6.3.1 Grid Node Survey

Alpha surface activity was measured on the floors and walls of the rooms, using the 100 cm^2 alpha scintillation detector, at a minimum of every fourth grid node. Counts were taken with the detectors in contact with the floor and wall surfaces. The measured background was 0.8 cpm. Gross gamma counts were taken using a 2x2 NaI gamma scintillation detector. The average gamma background was 998 cpm. Gamma exposure rates were measured at 1 meter above the floor surface using a μR exposure rate meter. Exposure rates were recorded at every fourth grid node.

Beta measurements were also taken on walls and floors (not covered with linoleum) in Rooms 203, 204, and 213 using the pancake-style GM detector. The GM detector was coupled to a ratemeter so that 1 minute gross beta counts could be recorded. The high voltage was set to 900 volts, the threshold was set to 300, and the window function was disabled. A 10-minute background measurement produced 364 counts, giving an average background of 36 cpm.

~~The data produced during the Building 400 floor and wall grid node survey are presented in Appendix K.~~ No new gamma radiation anomalies were identified during the grid node survey; however, the

presence of the anomaly in the DU removal booth in Room 204 was confirmed. The data shows some variations in gamma count rates where different surfaces or construction materials are present. For example, the lowest count rates were typically measured on glass or metal surfaces, while the highest count rates were measured near or on walls constructed of concrete cinder blocks. The gross gamma count rates ranged from 655 to 1,450 cpm, excluding the measurements near the DU removal booth anomaly. Gamma exposure rates at measured at 1 meter above the floor surfaces ranged from 5 μR/hr to 9 μR/hr. The distribution of the gross gamma node measurements is shown on Figure 4-23.

Alpha activity measurements ranged from the detection limit of 42 dpm/100cm^2 to 120 dpm/100cm^2. ~~Survey reports for alpha activity measurements collected during the grid node survey are presented in Appendix M.~~ The grid node survey identified one anomaly in room 204 on the north wall, grid node 1A13. The alpha activity at this grid node is 120 dpm/100cm^2.

Elevated beta counts were detected at several grid nodes. Beta activity measurements ranged from the detection limit of 386 dpm/100cm^2, to 405 dpm/100cm^2. ~~Survey reports for beta measurements are also presented in Appendix M.~~ The distribution of the gross beta node measurements is shown on Figure 4-24.

4.6.3.2 Scanning Survey

The scanning survey was performed using large-area gas proportional detectors. The walls inside the rooms were scanned from the floor to 2 meters above the floor using a hand-held gas proportional detector. The floors inside the rooms were scanned using a cart mounted version of the same detector. The cart mounted detector was set up approximately 0.5 inches above the surface of the floor. The high voltage setting for the detectors was adjusted to detect surface alpha and beta radiation. The surfaces were scanned at about one-half a detector's width per second. Scanning methods were similar to those described in Section 4.5.2. ~~Scanning data for the Building 400 floor and wall survey are presented in Appendix K.~~

Several alpha-emitting anomalies were identified during the scanning survey. At least one anomaly was located in each of the four rooms surveyed. The majority of the anomalies were located on the floor in

Room 210 and the north wall in Room 204. These anomalies are discussed in detail the following section.

The exterior surfaces of the drain lines in Rooms 211 and 214 and the restrooms near Room 210 were scanned for gamma radiation using a 2x2 NaI gamma scintillation detector. The detector was kept as near to the exterior surfaces of the drain lines as possible. The drain line surfaces were scanned at 1 meter per second. No anomalies were identified in the restrooms.

4.6.3.3 Survey Anomalies

~~Survey reports for the alpha survey performed in Building 400 are presented in Appendix M.~~ A summary of the anomalies which are greater than the release limit of 300 dpm/100cm^2 for maximum alpha surface activity is presented in Table 4-15. Figures 4-25 through 4-28 show the locations of the anomalies. Figure 4-29 shows the north wall of Room 204 in more detail. It should be noted that the areas of alpha activity on the north wall of Room 204 also exceed the release limit of 100 dpm/100cm^2 average in 1 square meter.

Figure 4-30 shows the net count rates for gamma activity in the DU removal booth. The grid size is about 2 feet square. Measurements were taken after removing the vinyl floor covering. The only remaining material on the concrete floor is the paper backing from the vinyl floor covering. The background activity measured just outside the DU room was 998 cpm.

The paper backing at the hot spot was chipped away to ensure that the elevated activity was not due to the paper. The count rate at the hot spot after the paper was removed was unchanged. The source of the elevated gamma activity is likely embedded in the concrete floor. The hot-spot activity is about 3.4 times the background at the surface. The gamma exposure rate at 1 meter above the floor is 9 μR/hr, while the background rate is 6 to 7 μR/hr.

4.6.4 Removable Contamination Survey

Removable contamination swipe samples were taken primarily at locations that exhibited elevated fixed alpha activity. Some samples were taken at random locations. The swipes were taken with 5-cm

Whatman paper filters. The swipe samples were collected by swiping a 100 cm^2 area using moderate sure. The swipe samples were counted for 5 minutes using an alpha scintillation detector placed directly on top of the swipe. The detection limits (L_D and L_C) for a 5-minute static count using the 100 cm^2 alpha scintillation detector are 8 and 3 dpm/100cm^2, respectively.

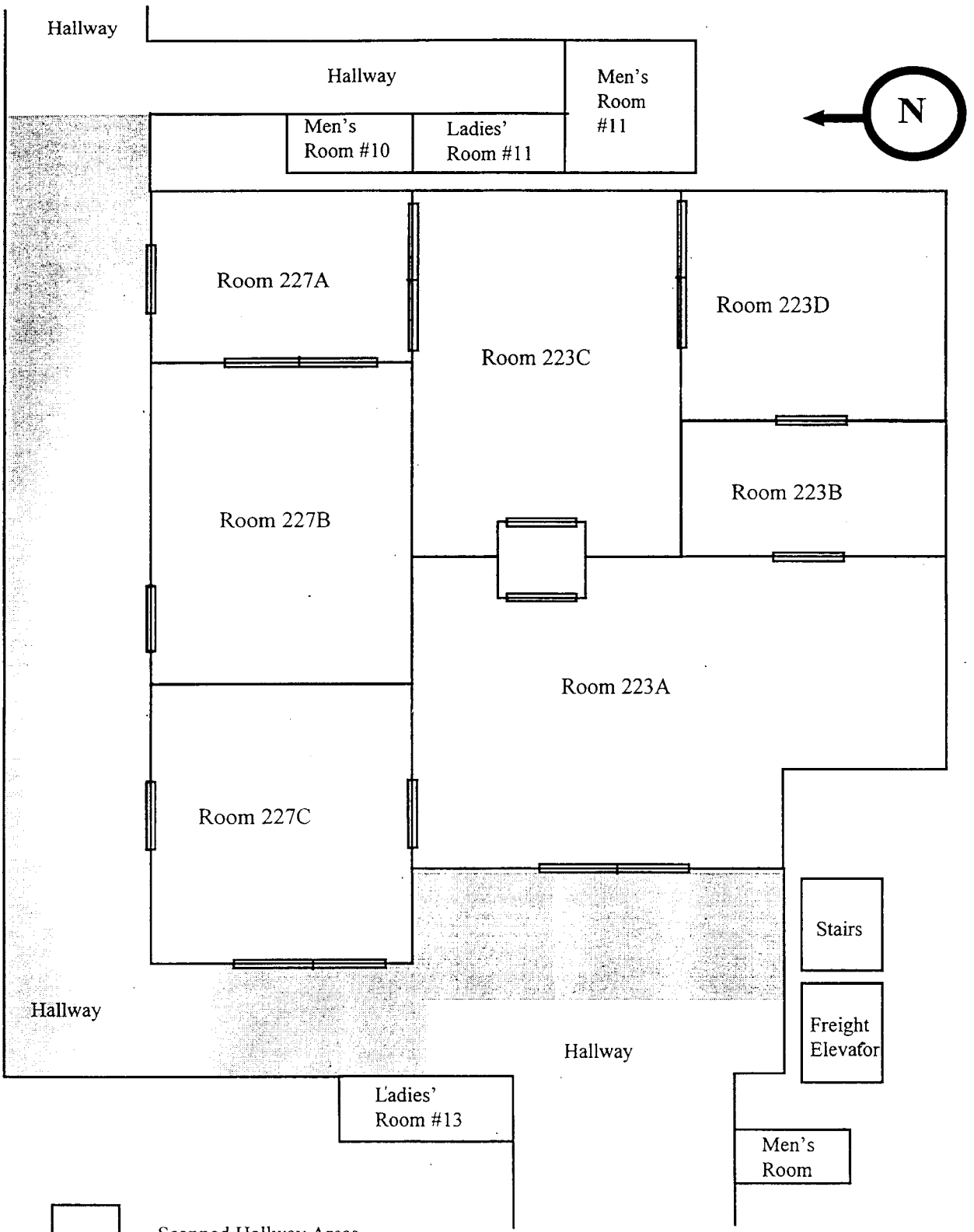
A total of 45 swipe samples were collected in Building 400, 13 from equipment and 32 from the floors and walls. Three of the swipes exhibited maximum reportable activities greater than the release limit of 20 dpm/100cm^2 for removable alpha activity. A summary of the results is presented in Table 4-16. ~~Survey reports for the removable alpha contamination swipe samples are presented in Appendix N.~~

4.7 DRAIN LINE, STORM SEWER LINE, AND STORM SEWER MANHOLE SURVEYS

The radiation characterization surveys conducted on the drain lines, storm sewer lines, and storm sewer manholes associated with affected areas in Buildings 5 and 400 were conducted by NWT under PRC solicitation No. SA966018. The surveys were performed between August 26 and September 20, 1996. The statement of work (PRC 1996c) included surveys of the following drain lines:

- All drain lines associated with Rooms 203, 204 and 213 in Building 400, beginning in the rooms and stopping where the drain lines connect to the industrial waste sewer lines on the north and south sides of the building.
- The interior of storm sewer line F and the associated drain line in Building 5, from Outfall F to the downcomer in the Small Parts Paint Shop of Building 5, or to a point in the line where the contamination is determined to be greater than 5 times background.
- Manholes associated with the storm sewer lines F, FF and R and the covered sump on the south side of Hanger 400A.
- For background data, several manholes in subsytem G that are not associated with the storm sewer lines for Buildings 5 or 400.

For the purpose of designing the characterization surveys of these lines, it was assumed that all radioactive contamination in the lines is caused by paint containing radium-226. For the purposes equipment selection, determining scanning rates, and competitive bidding, the SOW (PRC 1996c) specified a detection sensitivity of 100 nanoCuries (nCi) (1 tenth of a μCi) for a point-source in ? pipe geometry (with 95-percent confidence), using any combination of detectors.

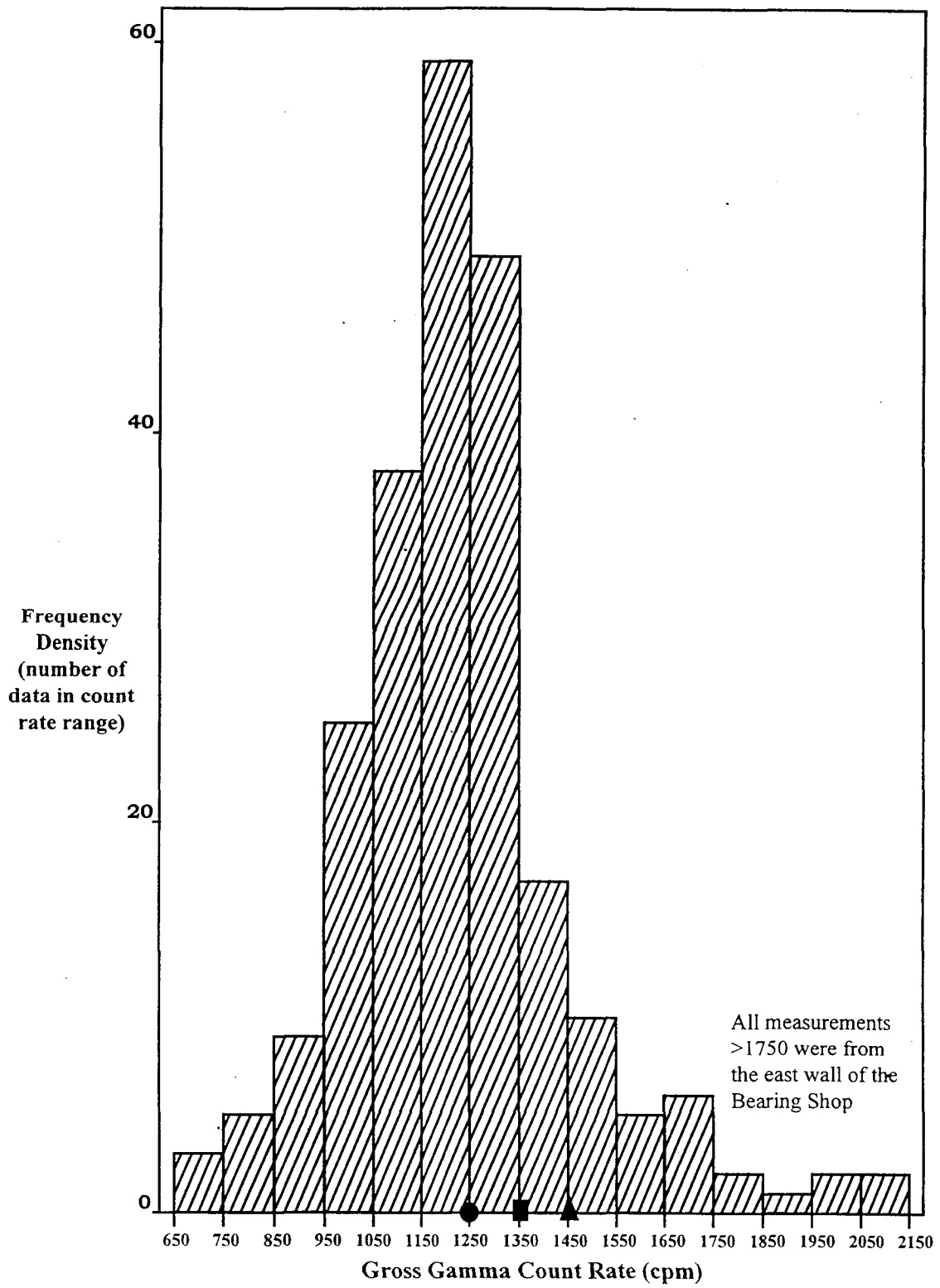


NAS ALAMEDA, CALIFORNIA

FIGURE 4-12
BUILDING 5 BEARING SHOP FLOOR PLAN AND SURVEY AREAS

PRC Environmental Management, Inc.

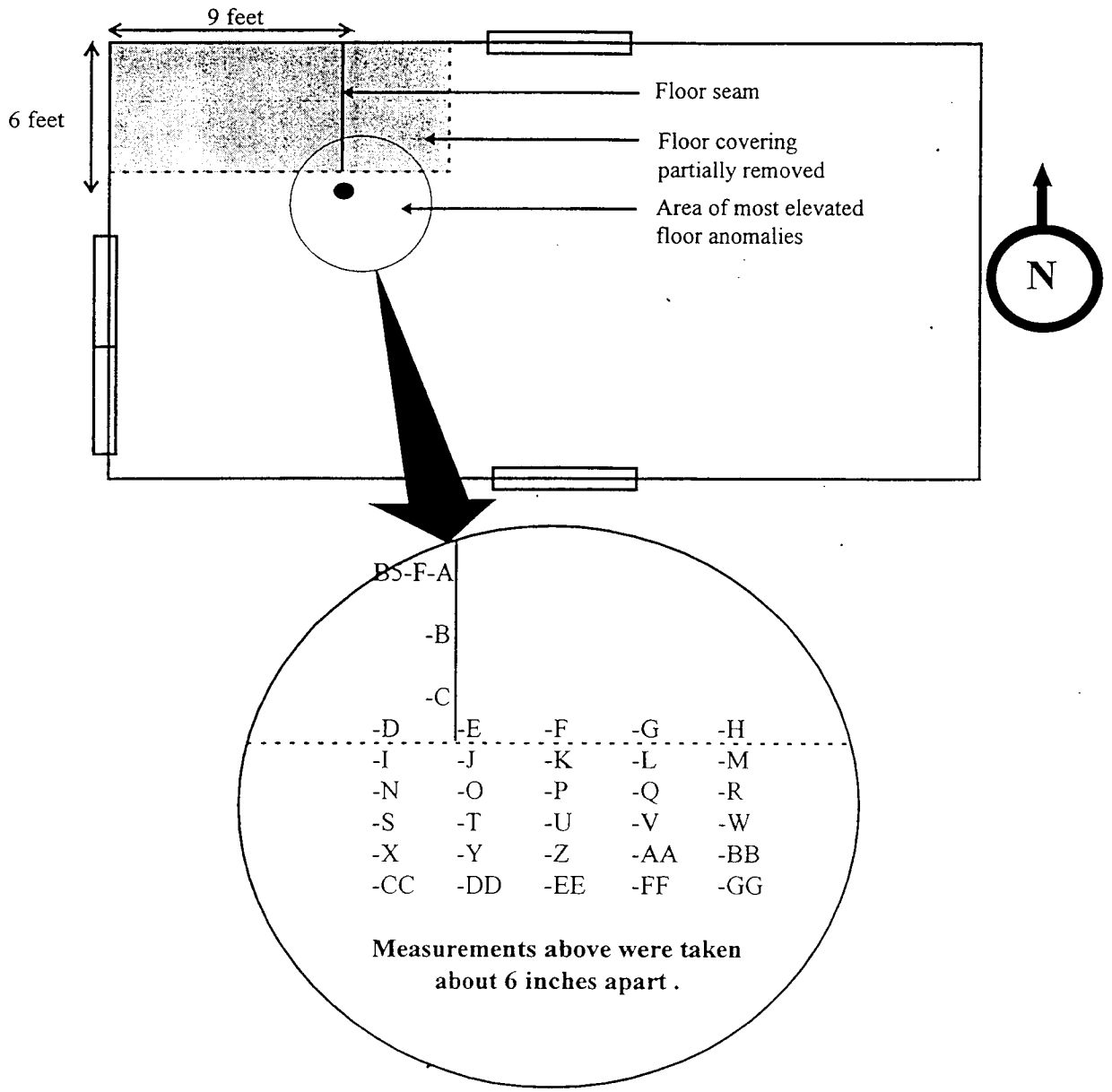
Note: Drawing Not To Scale



NAS ALAMEDA, CALIFORNIA

FIGURE 4-13
BUILDING 5 GAMMA COUNT RATE DATA DISTRIBUTION

PRC Environmental Management, Inc.

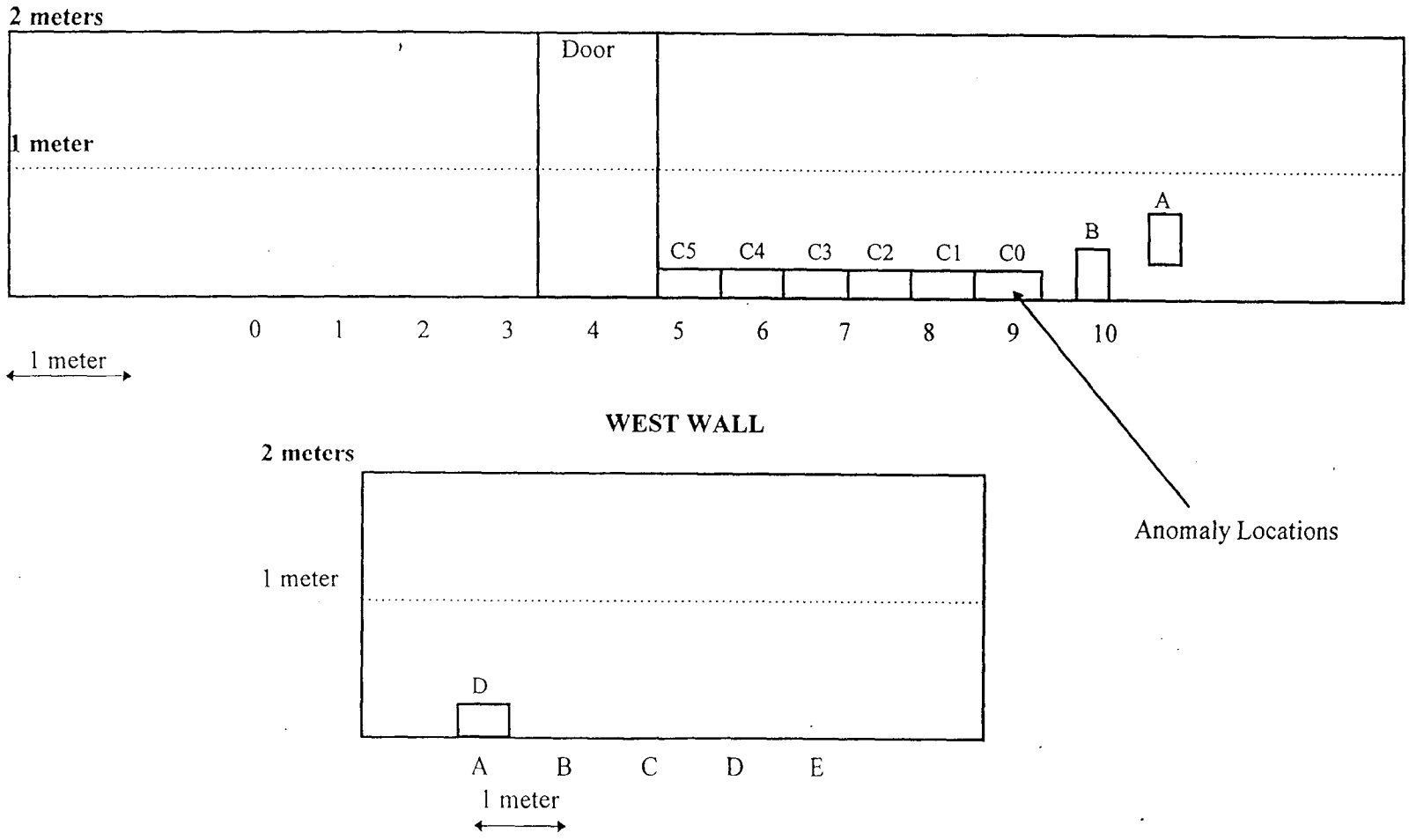


Note: Drawing Not To Scale

NAS ALAMEDA, CALIFORNIA

FIGURE 4-14
FLOOR SURVEY ANOMALIES
ROOM 227C, BUILDING 5

PRC Environmental Management, Inc.

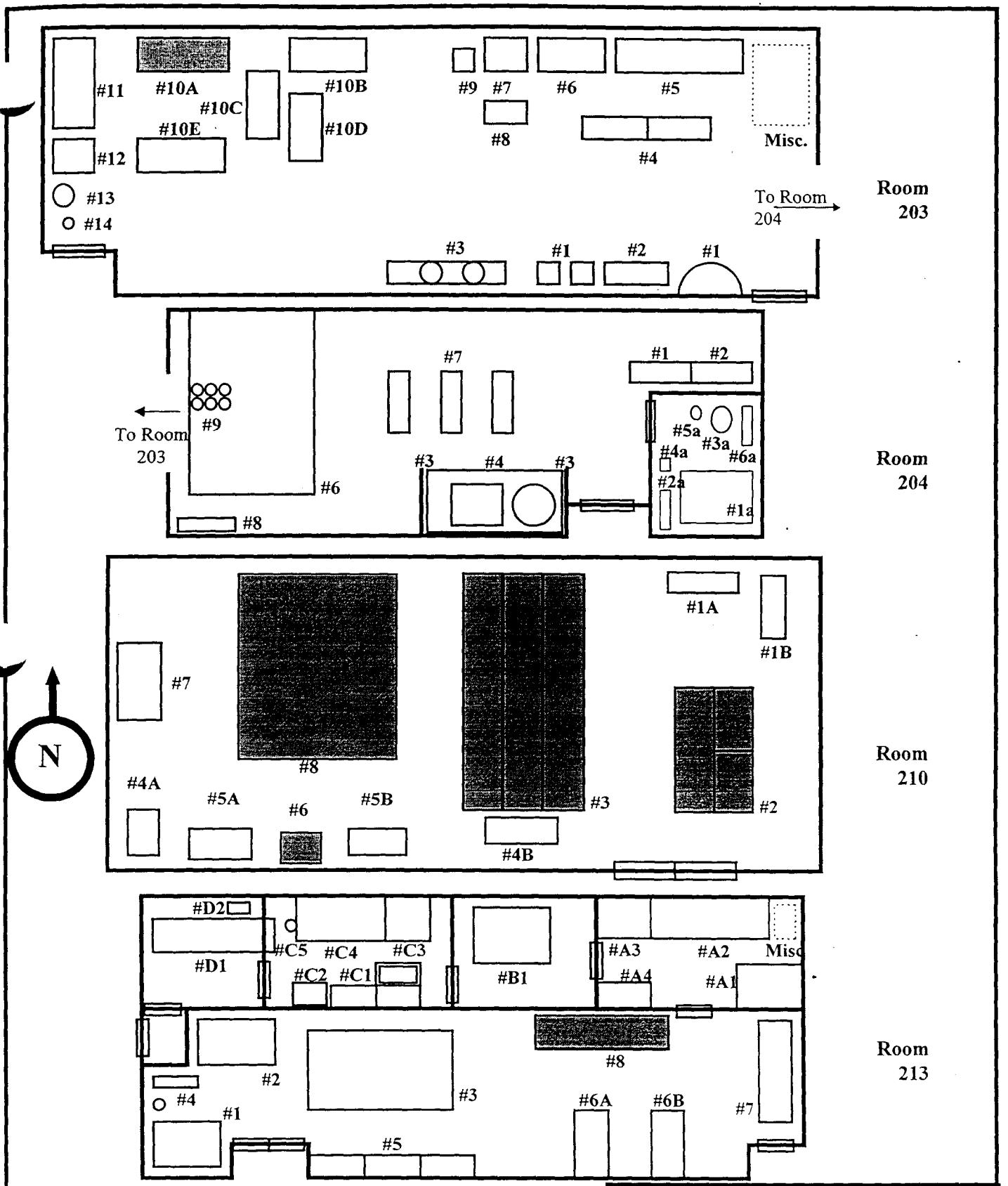


Note: Drawing Not To Scale

NAS ALAMEDA, CALIFORNIA

FIGURE 4-15
WALL SURVEY ANOMALIES
ROOM 227C, BUILDING 5

PRC Environmental Management, Inc.

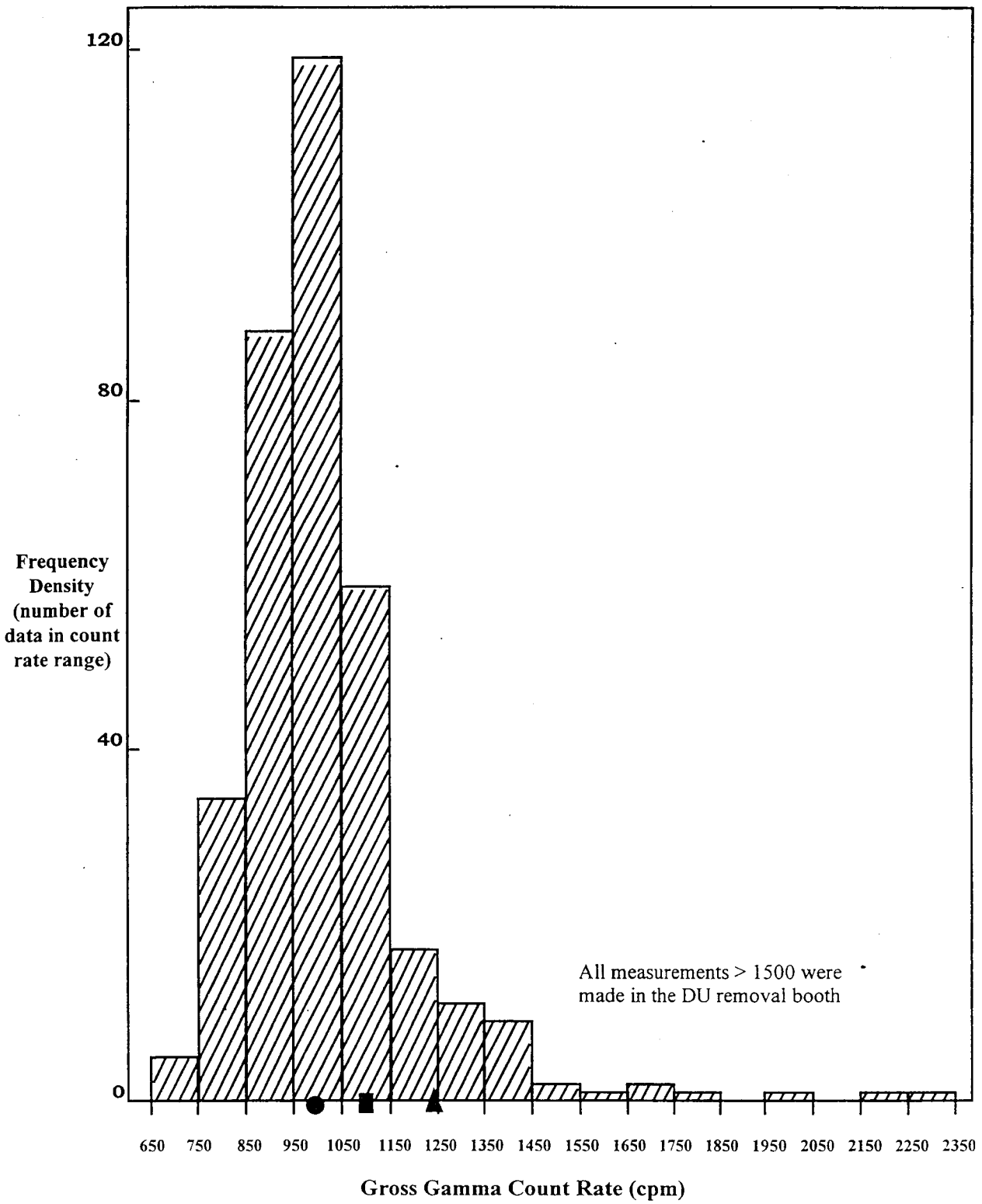


NAS ALAMEDA, CALIFORNIA

FIGURE 4-16
ROOM DIAGRAMS AND EQUIPMENT LAYOUT, BUILDING 400

PRC Environmental Management, Inc.

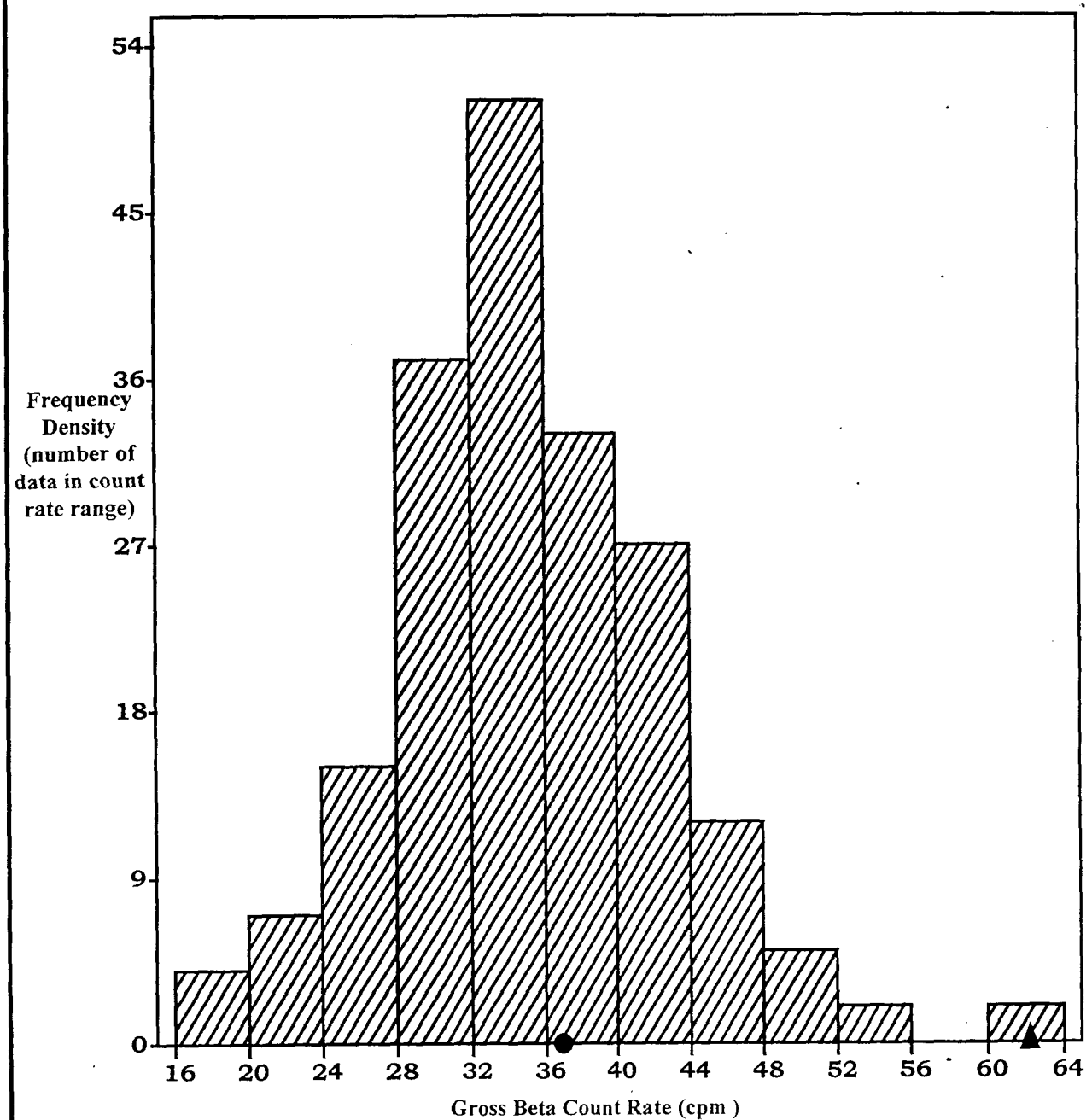
Note: Drawings Not To Scale



NAS ALAMEDA, CALIFORNIA

FIGURE 4-23
BUILDING 400 GAMMA COUNT RATE DATA DISTRIBUTION

PRC Environmental Management, Inc.



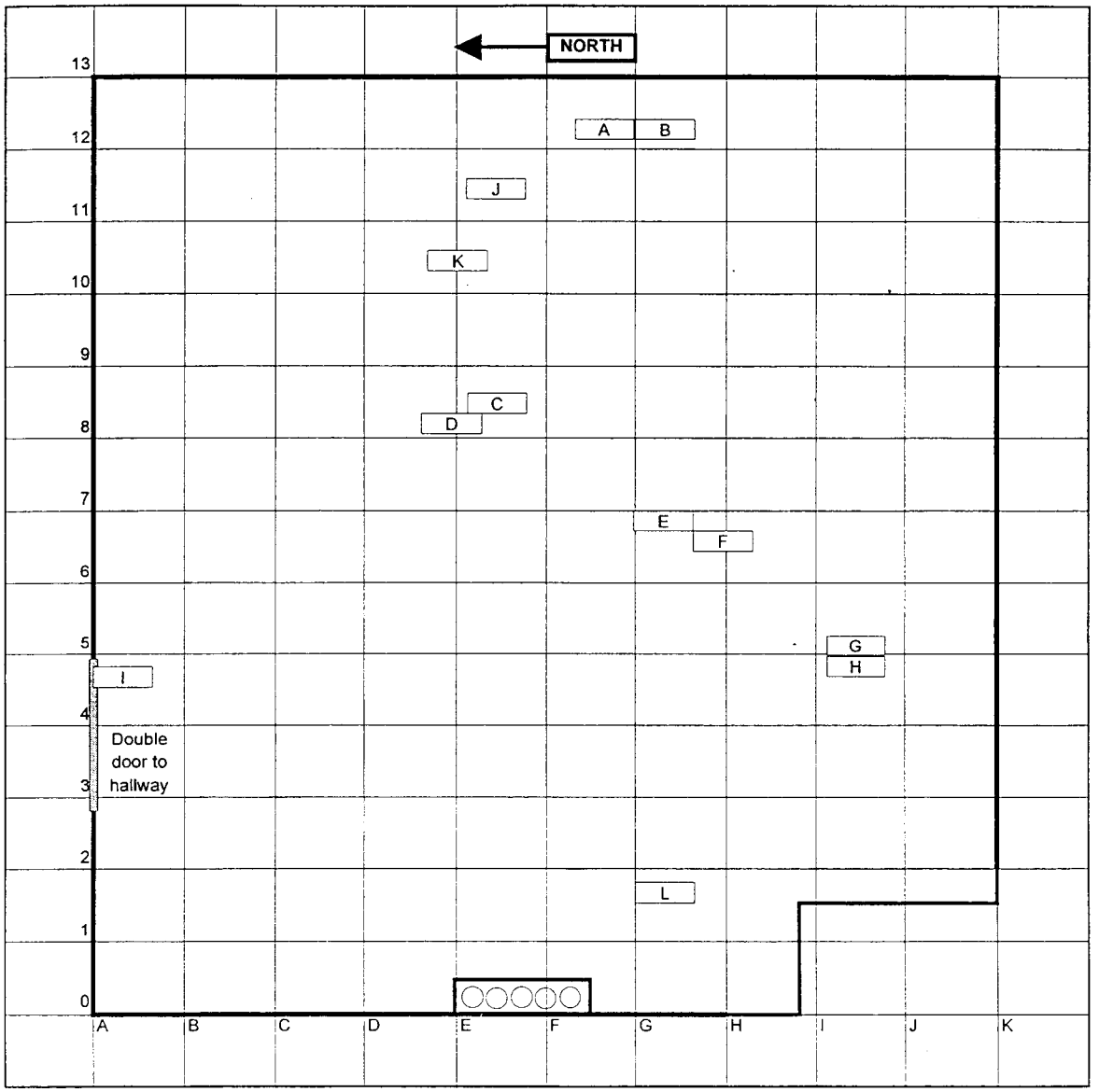
● = Background = 37 cpm

▲ = L_D = 62cpm

NAS ALAMEDA, CALIFORNIA

FIGURE 4-24
BUILDING 400 BETA COUNT RATE DATA DISTRIBUTION

PRC Environmental Management, Inc.



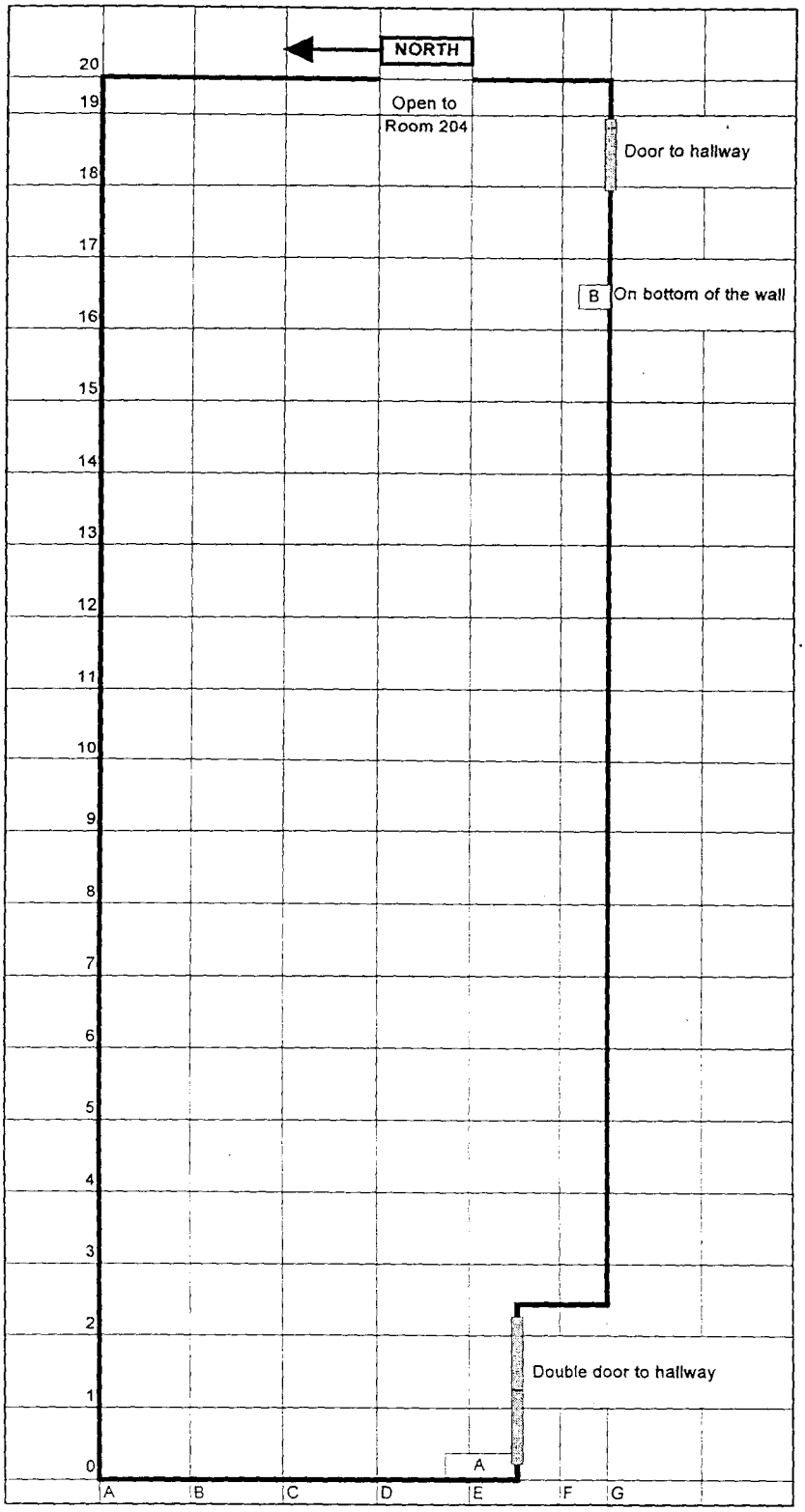
A Anomaly Location

Note: Drawing Not To Scale

NAS ALAMEDA, CALIFORNIA

FIGURE 4-25
ROOM 210 SURVEY GRID
BUILDING 400

PRC Environmental Management, Inc.



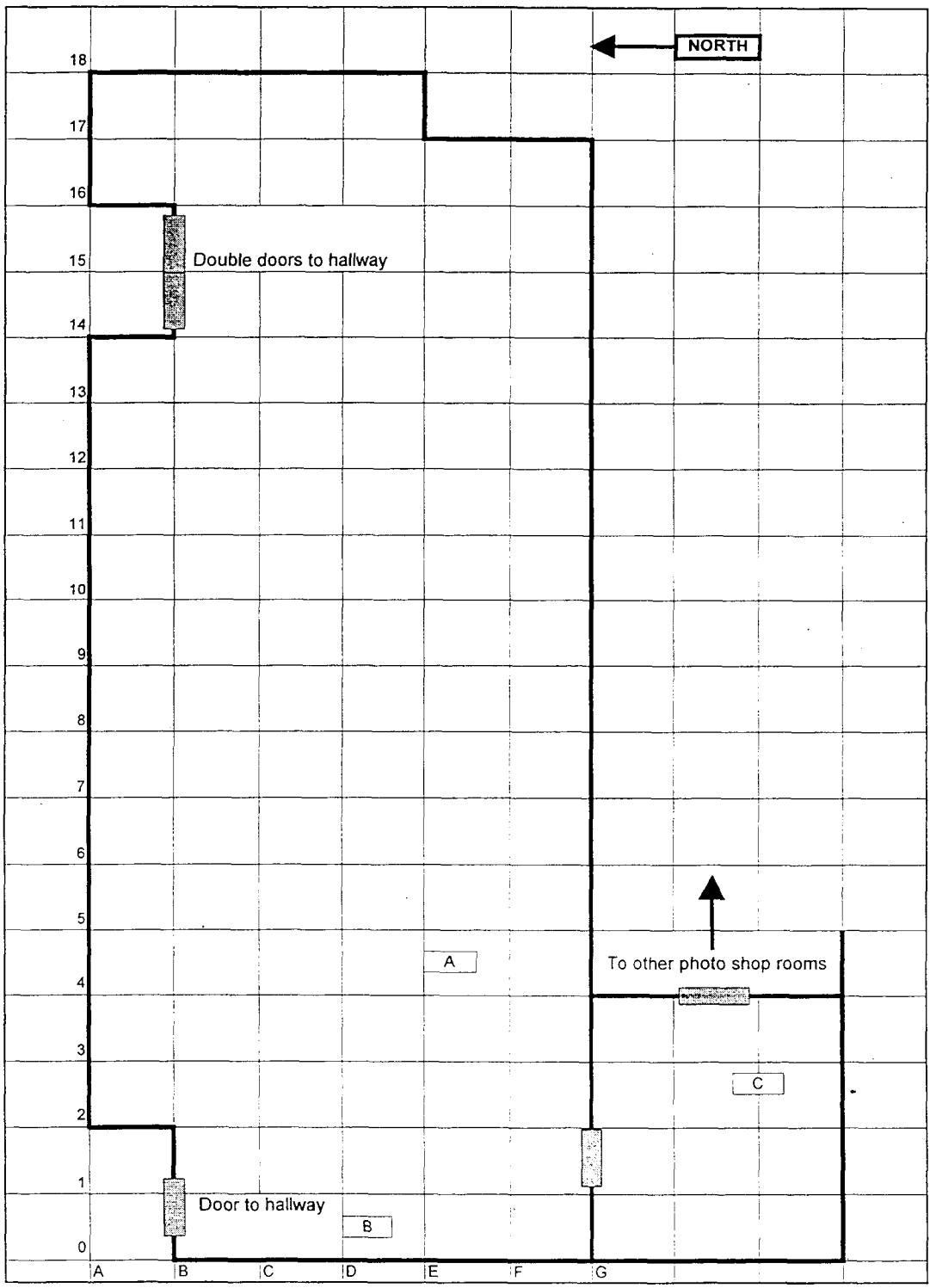
A Anomaly Location

Note: Drawing Not To Scale

NAS ALAMEDA, CALIFORNIA

FIGURE 4-26
ROOM 203 SURVEY GRID
BUILDING 400

PRC Environmental Management, Inc.



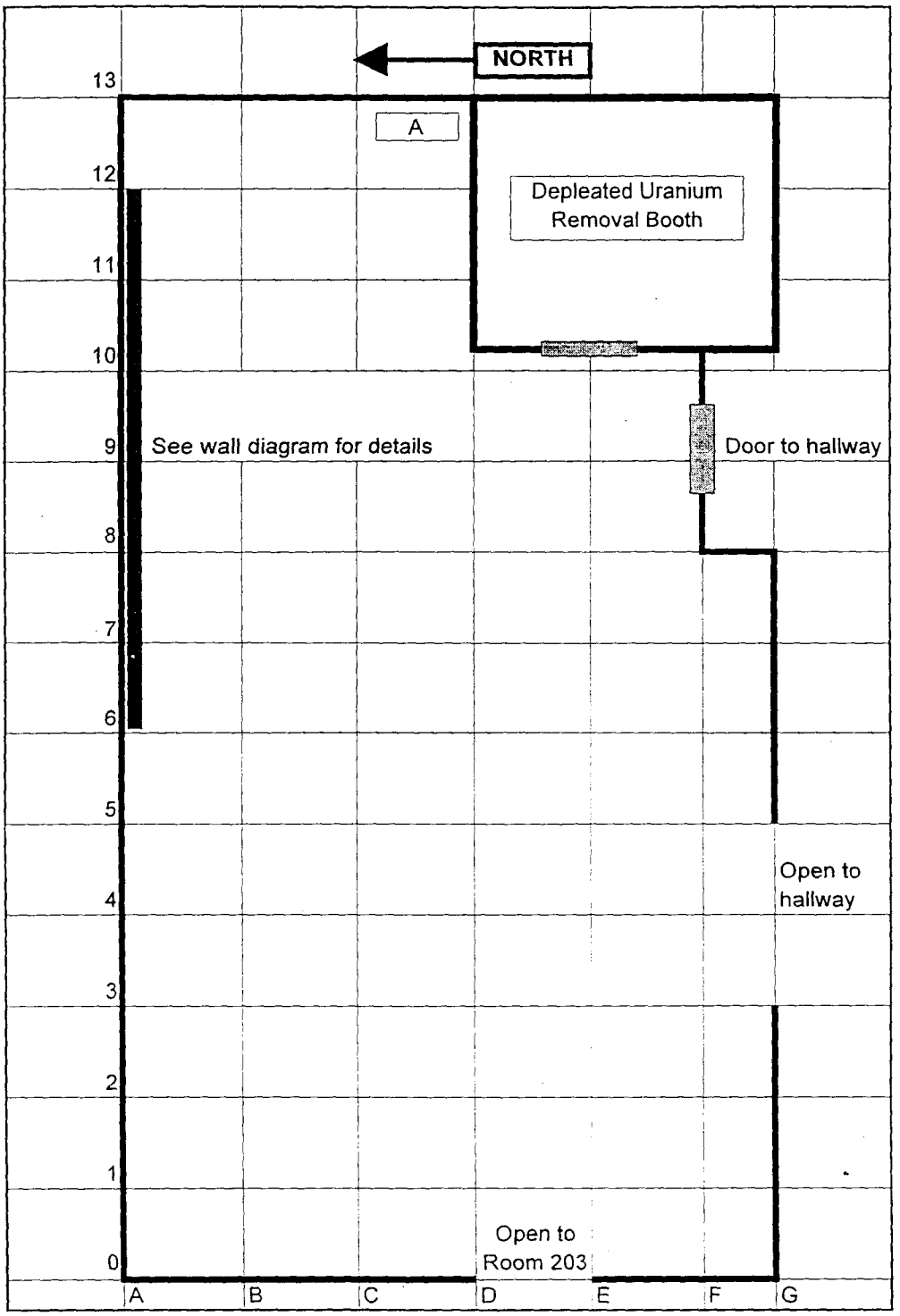
A Anomaly Location

Note: Drawing Not To Scale

NAS ALAMEDA, CALIFORNIA

FIGURE 4-27
ROOM 213 SURVEY GRID
BUILDING 400

PRC Environmental Management, Inc.



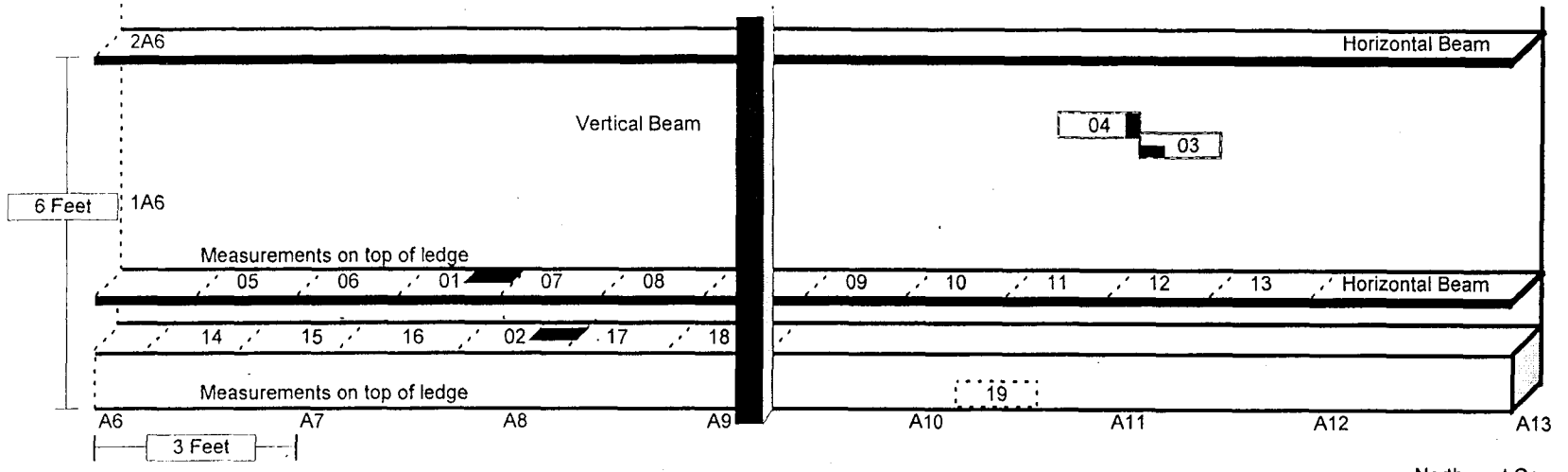
A Anomaly Location

Note: Drawing Not To Scale

NAS ALAMEDA, CALIFORNIA

FIGURE 4-28
ROOM 204 SURVEY GRID
BUILDING 400

PRC Environmental Management, Inc.



Notes: Measurement taken with a 438 cm^2 gas-flow proportional detector

Measurement taken with a 100 cm^2 alpha scintilation detector

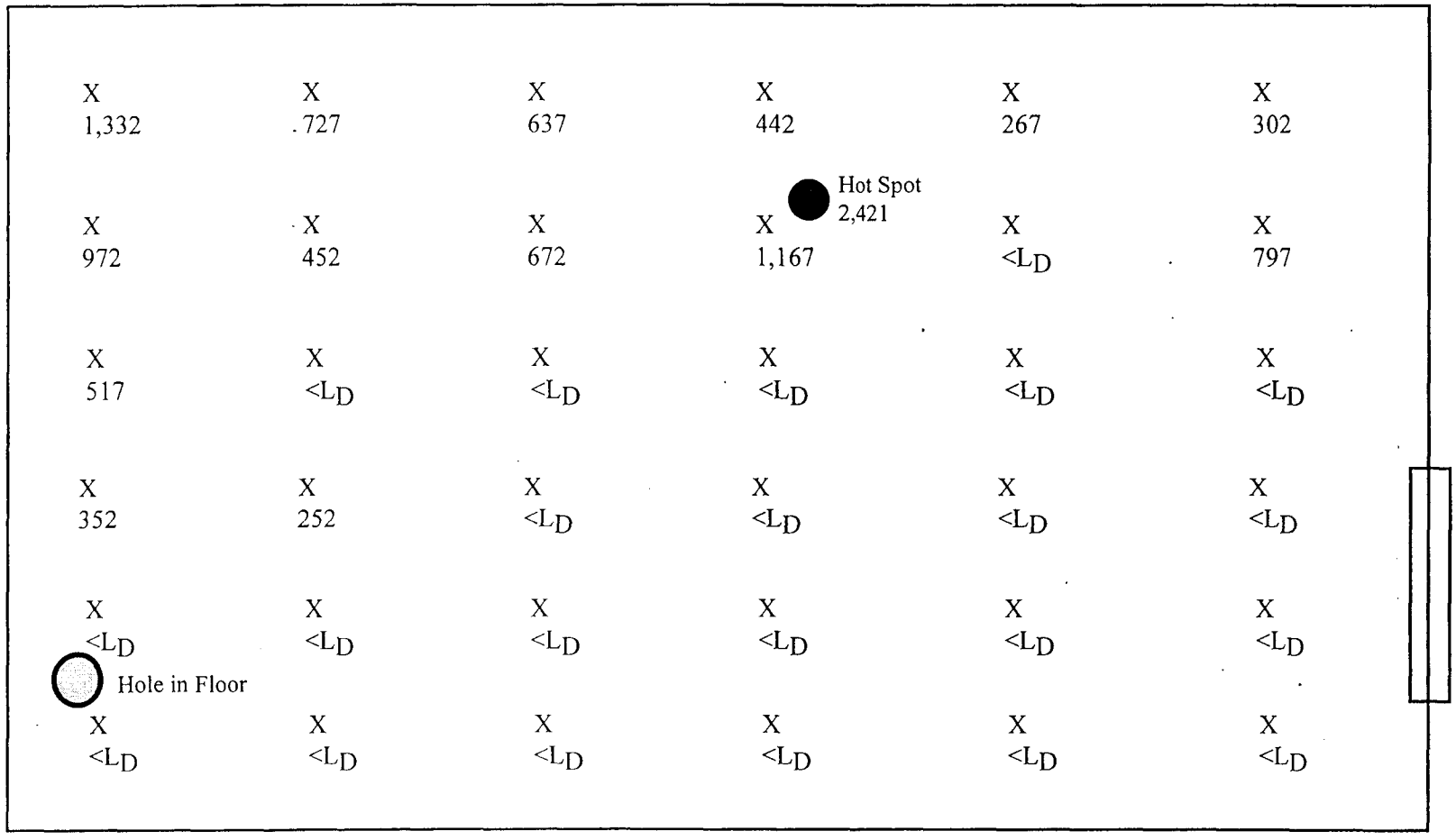
North

Note: Drawing Not To Scale

NAS ALAMEDA, CALIFORNIA

FIGURE 4-29
ALPHA RADIATION ANOMALIES
NORTH WALL , ROOM 204, BLDG. 400

PRC Environmental Management, Inc.



L_D = 250 net cpm
X - Measurement Location (count rates in cpm)

Note: Drawing Not To Scale

N

NAS ALAMEDA, CALIFORNIA

FIGURE 4-30
NET GAMMA COUNT RATES
DU REMOVAL BOOTH, ROOM 204, BLDG. 400

PRC Environmental Management, Inc.

TABLE 4-8
RADIUM-226 SOIL CONCENTRATIONS
FOR SAMPLES COLLECTED AT THE
FORMER RADIOACTIVE WASTE STORAGE SHACK AREA

Sample ID Number	Radium-226 Concentration	Typical Background
SS5-01	3,040±60 pCi/g	0.5±0.2 pCi/g
SS5-02	2,580±50 pCi/g	0.5±0.2 pCi/g

Note: pCi/g - picoCuries per gram

TABLE 4-9
BETA ACTIVITIES FOR
FLOOR ANOMALIES IDENTIFIED IN
BUILDING 5 BEARING SHOP

Location	Activity ($dpm/100cm^2$)	Location	Activity ($dpm/100cm^2$)	Location	Activity ($dpm/100cm^2$)
B5-F-A	490±370	B5-F-L	1,500±500	B5-F-W	1,500±510
B5-F-B	<470	B5-F-M	1,800±540	B5-F-X	1,200±470
B5-F-C	<220	B5-F-N	1,100±460	B5-F-Y	1,600±510
B5-F-D	<100	B5-F-O	3,400±700	B5-F-Z	1,700±530
B5-F-E	490±370	B5-F-P	2,100±580	B5-F-AA	1,400±500
B5-F-F	<440	B5-F-Q	1,500±500	B5-F-BB	1,800±540
B5-F-G	<400	B5-F-R	1,200±470	B5-F-CC	1,300±480
B5-F-H	<230	B5-F-S	1,500±500	B5-F-DD	1,000±440
B5-F-I	1,700±530	B5-F-T	2,100±570	B5-F-EE	1,300±480
B5-F-J	1,600±520	B5-F-U	1,700±520	B5-F-FF	1,900±550
B5-F-K	1,200±470	B5-F-V	1,800±540	B5-F-GG	1,400±490

Notes: $dpm/100cm^2$ - disintegrations per minute per 100 square centimeters

TABLE 4-10
BETA ACTIVITIES FOR
WALL ANOMALIES IDENTIFIED IN
BUILDING 5 BEARING SHOP

Anomaly Location	Beta Activity (dpm/100cm^2)	
	Gas Proportional Detector [a]	GM Detector[b]
B5-W-A	2,012 ± 80	2,169 ± 414
B5-W-B[c,d]	4,752 ± 116	9,939 ± 1,559
B5-W-C0	606 ± 52	1,795 ± 386
B5-W-C1	373 ± 46	330 ± 247
B5-W-C2	359 ± 45	n/a
B5-W-C3	965 ± 60	1,000 ± 318
B5-W-C4	1,010 ± 61	1,125 ± 329
B5-W-C5	423 ± 47	377 ± 253
B5-W-C6	263 ± 42	n/a
B5-W-D	293 ± 43	n/a
Bkgd.	n/a	n/a

Notes:

GM - Geiger-Mueller
dpm/100cm^2 - disintegrations per minute per 100 square centimeters
a - L_D = 58 dpm/100cm^2, assumes no shielding
b - L_D = 383 dpm/100cm^2, assumes no shielding
c - Above the 3,000 dpm/100cm^2 maximum concentration release limits for some beta-emitting isotopes (USAEC 1974)
d - A one-minute gamma count using the 2x2 NaI gamma scintillation detector at this location had a net gamma count rate of 2,145 cpm above background. The exposure rate on contact with the anomalous location was 11 to 12 μR/hr.
n/a - Not able to pin-point a small area of elevated activity; not applicable
Bkgd. - Background count rate (cpm)

TABLE 4-11
SAMPLE RESULTS FOR OILY SLUDGE
COLLECTED FROM ROOM 227C
OF BUILDING 5 BEARING SHOP

Analysis	Isotope	Concentration (pCi/g)	L_D
Gamma Spectroscopy	Potassium-40	270 ± 17	4
	Lead-210	U	- - -
	Lead-214	2.2 ± 0.8	0.8
	Bismuth-214	2.2 ± 0.7	0.7
Gross alpha	Gross alpha	28 ± 46	150
Gross beta	Gross beta	1,300 ± 90	97
Total Strontium	Strontium-89/90	0.0 ± 0.4	2

Notes: pCi/g - picoCuries per gram
L_D - lower limit of detection
U - not detected

TABLE 4-12
SUMMARY OF MAXIMUM ALPHA ACTIVITIES
FROM BUILDING 400 EQUIPMENT SURVEYS

Room Number	Equipment Number	Description	Total Activity [a] ($dpm/100cm^2$)
203	10A	Metal Drawer Housing	186 ±60
210	6D	Wooden Drawer	2,391 ±290
210	6	Wooden Cabinet	2,308 ±202
210	3	Large Work Station (metal surface)	575 ±47
210	3	Metal Storage Slot (interior surface)	3,220 ±176
210	8	Large, White Laminate-Top Work Table	638 ±121
210	2	Piece of Paper	295 ±73
210	2	Masonite-Top Work Table	57 ±24
213	3	Masonite-Top Work Table	221 ±46

Notes: $dpm/100cm^2$ - disintegrations per minute per 100 square centimeters
a - measurements taken prior to any decontamination activities

TABLE 4-14
INVENTORY OF CONTAMINATED MATERIALS
IDENTIFED DURING BUILDING 400
EQUIPMENT SURVEYS

Material	Room/Equipment Number	Maximum Total Alpha Activity (dpm/100cm^2)
Masonite table top #1	210/#3	1,700 ±120
Masonite table top #2	210/#3	580 ±75
Masonite table top #3	210/#3	91 ±30
Masonite table top #4	210/#3	70 ±26
Masonite table top #5	210/#2	120 ±34
Masonite table top #6	210/#3	50 ±22
Masonite table top #7	210/#3	20 ±14
Wooden shelf	210/#3	250 ±50
Wooden table top #1	210/#3	20 ±14
Wooden table top #2	210/#3	32 ±18
Wooden table top #3	210/#3	30 ±17
Metal storage slot	210/#3	15 ±12
Metal drawer housing	203/#10A	50 ±22
Masonite table top	213/#8	220 ±50
Wooden cabinet w/ drawers	210/#6	2,800 ± 240
Table support leg A	210/#3	170 ± 40
Table support leg B	210/#3	160 ± 40
Table support leg D	210/#3	550 ± 73
White laminate table top	210/#8	550 ± 73
Piece of paper	210/#2	350 ± 86
Other drum contents: shop rages, nitrile gloves, neoprene gloves, cleaning pads, metal brackets used to scrape painted surfaces, recovered sources from Site 1 and Site 2		

Notes: dpm/100cm^2 - disintegrations per minute per 100 square centimeters

TABLE 4-15
BUILDING 400 ALPHA ANOMALIES THAT EXCEED THE RELEASE LIMIT FOR FIXED ALPHA SURFACE ACTIVITY

Room Number	Location / ID Number [a]	Total Alpha Activity [b] (dpm/100cm^2)
210	Floor / D	467 ±74
210	Floor / G	370 ±66
204	Lower beam / 01	1,006 ±108
204	Concrete ledge / 02	669 ±89
204	North wall / 03	1,613 ±137
204	North wall / 04	1,607 ±137

Note:

dpm/100cm^2 - disintegrations per minute per 100 square centimeters
a - identified on Figures 4-25 and 4-29
b - Release limit for fixed alpha surface activity is 300 dpm/100 cm^2

TABLE 4-16
SUMMARY OF REMOVABLE ALPHA ACTIVITY DATA FOR SWIPE SAMPLES TAKEN IN BUILDING 400

Room Number	Swipe Sample Location and Identification Number	Alpha Activity (dpm/100cm^2)
210	Near floor grid node G12 at Anomalies A and B, # 400-R210-26	40 ±15
204	Lower ledge on wall at grid node A8, # 400-R204-31	29 ±13
210	Equipment #3, inside the metal cubby hole, # 400-R210-K	15 ±8

Note: dpm/100cm^2 - disintegrations per minute per 100 square centimeters