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NAVAL NUCLEAR PROPULSION PROGRAM (NNPP) RADIOLOGICAL FINAL REPORT FOR  
DECOMMISSIONING VOLUME II SECTION C THRU SECTION E CNC CHARLESTON SC  
4/1/1996  
RADIOLOGICAL ENGINEERING DIVISION

NAVAL NUCLEAR PROPULSION PROGRAM (NNPP)  
RADIOLOGICAL FINAL REPORT  
FOR THE DECOMMISSIONING OF  
CHARLESTON NAVAL SHIPYARD

(VOLUME II)  
SECTION C  
THRU  
SECTION E

Prepared by  
Radiological Engineering Division  
Charleston Naval Shipyard  
Charleston, South Carolina

April 1, 1996

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THRU  
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**1. Building 13/13A****a. Introduction:**

Building 13 is located in grid C-7 of the Charleston Naval Shipyard map (Figure 10). Building 13 is a rectangular three story brick building. A three story addition, known as the Building 13 Annex, was made to the building in the 1950's. The first floor of Building 13 contains the non-destructive test (NDT) laboratory, the second floor contains the chemistry lab, and the third floor contains office spaces. The third floor of the Annex contains the radiochemistry facility.

**b. Use:**

Building 13 was built in 1906 and served as a uniform manufacturing plant during World War I. Later, this building housed the shipyard's quality assurance office, chemistry laboratory, and NDT laboratory. When the need arose for a radiochemistry laboratory, an area in Building 13 was chosen. In addition to these laboratories, Building 13 was used for a wide variety of purposes including an optical shop, electrical shop, and office space for administrative and production personnel.

**c. Radiological History:**

**First, second, and third floors general area-** No radioactive material was ever found, and no radiological work was performed here. Contamination levels were always less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**Non-destructive test area First floor-**Non-destructive testing was performed on radioactive material in this area. Material tested had loose contamination levels less than 450  $\mu\text{Ci}/100\text{cm}^2$ , and low radiation levels. CSCAs, radiation areas, and radioactive material storage areas were established for this work. While in use as a radiochemistry laboratory, the area was established as a CSCA. Analysis of radioactive samples of activated corrosion products and resin with contamination levels exceeding  $1 \times 10^6 \mu\text{Ci}/100\text{cm}^2$  was performed in this area. Occasionally loose surface contamination in the tens of thousands of  $\mu\text{Ci}/100\text{cm}^2$  were found on the surfaces of this room. All surfaces were decontaminated to less than 450  $\mu\text{Ci}/100\text{cm}^2$ . The area of the old radiochemistry laboratory was released from radiological controls in 1970 per the NAVSEA requirements of that time. Because the release requirements have changed since 1970, the area was resurveyed to meet the current requirements. Since the radiochemistry facility was removed, contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**First floor annex-** Radiological work was performed in a herculite tent containment. No radioactivity was found on the surfaces of this area outside the tent. The area was released from radiological controls in 1970 per NAVSEA requirements of that time. Because the release requirements have changed since 1970, the area was resurveyed to meet the current

**1. Building 13/13A**

requirements. Contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**Radiographic Rooms 1, 2, and 5, First Floor-** These areas were established as radiation areas and radioactive material storage areas during non-destructive testing operations and while radioactive material was present. Contamination levels were always less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**Microscope Room First Floor, Room 119 First Floor, X-Ray Room Second Floor Annex-** These areas were established as radiation areas and radioactive material storage areas during analysis of radioactive material. Contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**General Area, Third Floor Annex-** The southwest corner of this room was used as a frisk area for personnel entering and exiting the radiochemistry laboratory. While in use as a frisk area the area was controlled as a radioactive material storage area and a control point area. In the mid 1980s this area was surveyed and the walls were torn down. Contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**Water Room, Third Floor Annex-** This area was established as a radiation area and radioactive material storage area. All materials that were stored in this room were completely contained. Contamination levels were always less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**Counting Room, Third Floor Annex-** This area was established as a radiation area and radioactive material storage area. Samples containing activated wear products and resin with contamination levels greater than  $1 \times 10^6 \mu\text{Ci}/100\text{cm}^2$  were stored in this area. Sealed sources that contained the isotopes Co-60, Cs-137, Na-22, C-14, H-3, and a Sr-90/Y-90 mix were stored in locked cabinets in this room. All materials and samples that were stored or used in this room were completely contained. Contamination levels were always less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**Radiochemistry Laboratory, Third Floor Annex-** This area was established as a CSCA while in use as a radiochemistry facility. Analysis of radioactive samples of activated corrosion products and resin with contamination levels exceeding  $1 \times 10^6 \mu\text{Ci}/100\text{cm}^2$  was performed in this room. Occasionally loose surface contamination in the tens of thousands  $\mu\text{Ci}/100\text{cm}^2$  was found on the surfaces of this room. All surface contamination was decontaminated to less than 450  $\mu\text{Ci}/100\text{cm}^2$ . In 1970 the sink drain piping was removed, pipe going into the building sewage system showed no residual radioactivity. Contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$  in this room.

**Radiochemistry Laboratory Overhead-** A 12' by 8' area was established as a CSCA for the replacement of the ventilation HEPA filters. This work involved

**1. Building 13/13A**

contamination levels of several thousand  $\mu\text{Ci}/100\text{cm}^2$ . Although this area was also established as a high airborne radioactivity work area during this maintenance, no airborne radioactivity was ever detected. Contamination levels were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$  in this room.

**d. Survey Requirements:**

**Group 1**

Building 13 first floor General Areas, and the entire second and third floor .

Building 13A first and second floor General Areas and Polarographic Room.

**Group 2**

Building 13 20' perimeter.

Building 13A third floor General Areas.

**Group 3**

Building 13 Non-Destructive Test Area and Room; Radiography Rooms 1, 2, and 5; Microscope Room; Room 119.

Building 13A first floor Radiological Work Area, the second floor X-ray Room, the third floor Counting Room, the Water Room and one grid in the third floor General Area.

**2. Building 13 Group 1 and 2 Areas****a. Report:****(1) Description:**

Building 13 Group 1 survey areas consisted of the first floor General Area (all areas except group 3 as shown on site map for group 3 areas) and the entire second and third floors.

Building 13 Group 2 survey area consisted of a 20' perimeter around Building 13 and Building 13 A. Material present is dirt and grass, concrete, and asphalt.

**(2) Discussion:**

Group 1 surveys were performed in the first floor General Area and the entire second and third floors in accordance with localized survey instructions. Surveys using the IM-253/PD (HV-1 PHA and HV-2 GROSS) were performed in selected locations within these areas. Any significant indications above background were thoroughly investigated by performing additional surveys with the IM-247/PD and in some cases removing solid material from the suspect area.

The Group 2 survey areas were divided into 384 10' by 10' grids. Where physically possible each of these grids were subdivided into two 3' by 3' subsections. These subsections were located in the area of highest potential for contamination. Each grid had its own unique designator. One subsection per grid received a survey with the IM-247/PD and the other subsection of each grid received a survey with the IM-253/PD (HV-1 PHA). Solid material samples were taken from grids resulting in greater than 450  $\mu\text{Ci}/20 \text{ cm}^2$  using the IM-247/PD or greater than twice background using the IM-253/PD (HV-1 PHA).

Individual backgrounds were used for Building 13 Group 2 areas. For the dirt and grass areas, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 200, and 8500 counts per minute were based on background radiation levels obtained from Building 681. For the cement areas, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 45, 375, and 8000 counts per minute were based on background radiation levels obtained from Building 245. For the asphalt areas, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 80, 500, and 15000 counts per minute were based on background radiation levels obtained from Building 220 north walk.

A total of 28 solid material samples were taken. Only naturally occurring radionuclides were identified by radioanalysis.

**2. Building 13 Group 1 and 2 Areas****(3) Summary:****Group 1**

Surveys and investigations performed in accordance with the Group 1 survey requirements did not detect any radionuclides other than those occurring due to natural radioactivity.

**Group 2**

Surveys performed with the IM-247/PD detected 24 areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected 28 areas greater than or equal to twice background.

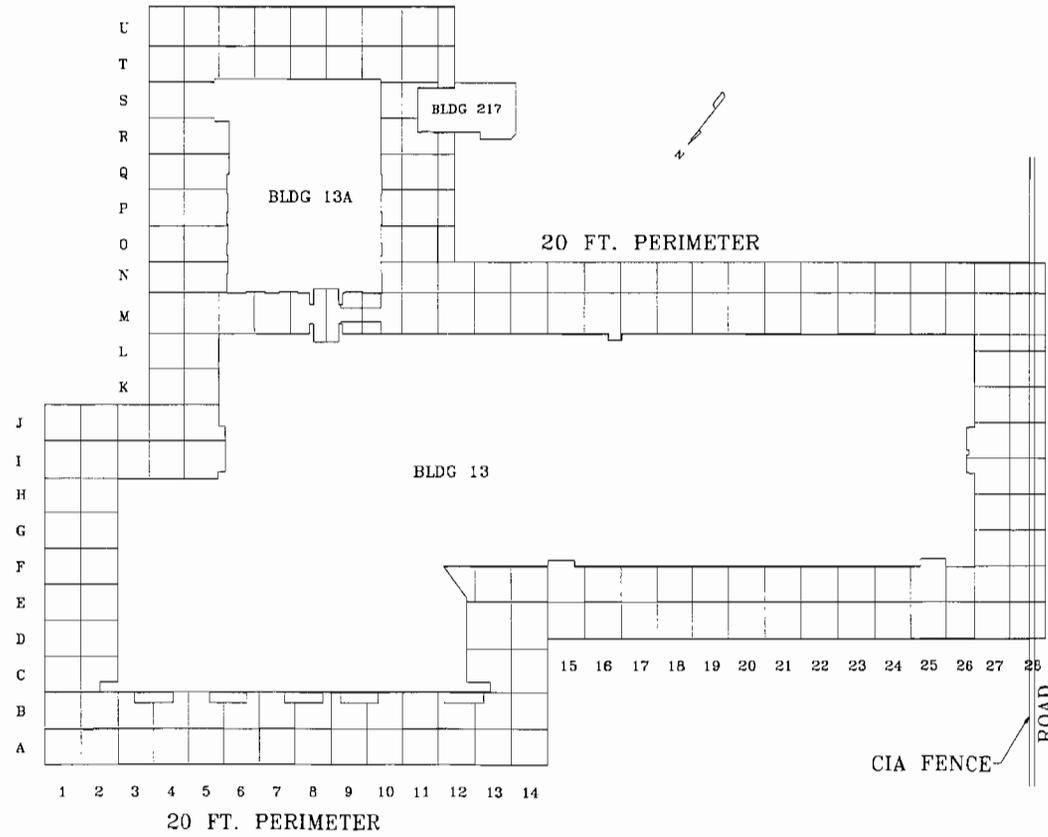
Surveys performed with the IM-253/PD (HV-2 GROSS) detected 28 areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than minimum detectable activity of 0.30 pCi/g to a high of 7.59 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples were less than 1 pCi/g.

2. Bldg. 13 Group 1 and 2 Areas

d. Site Map, Group 2 Areas

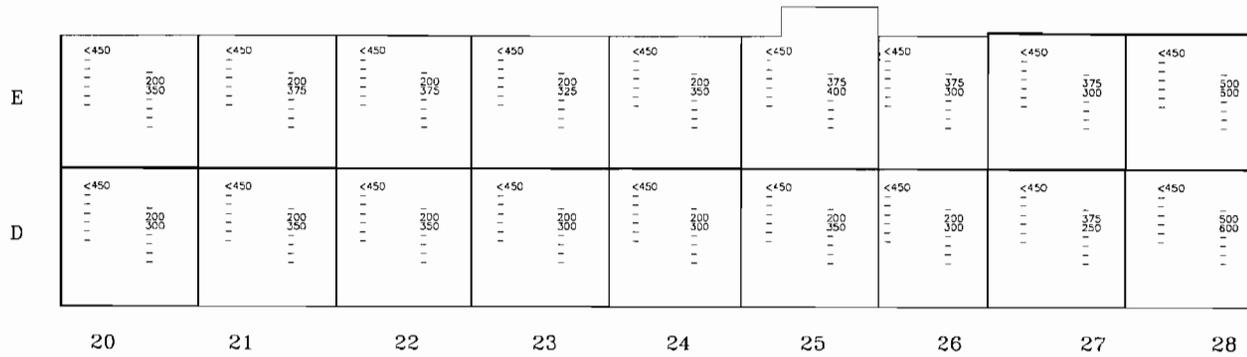






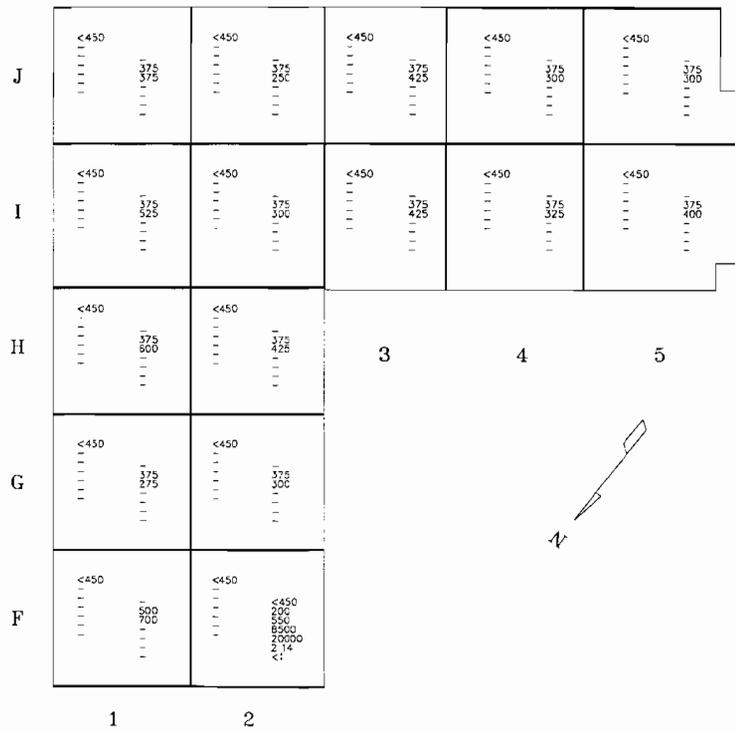
2. Bldg. 13 Group 1 and 2 Areas

e. Localized Grid Maps, Perimeter



2. Bldg 13 Group 1 and 2 Areas

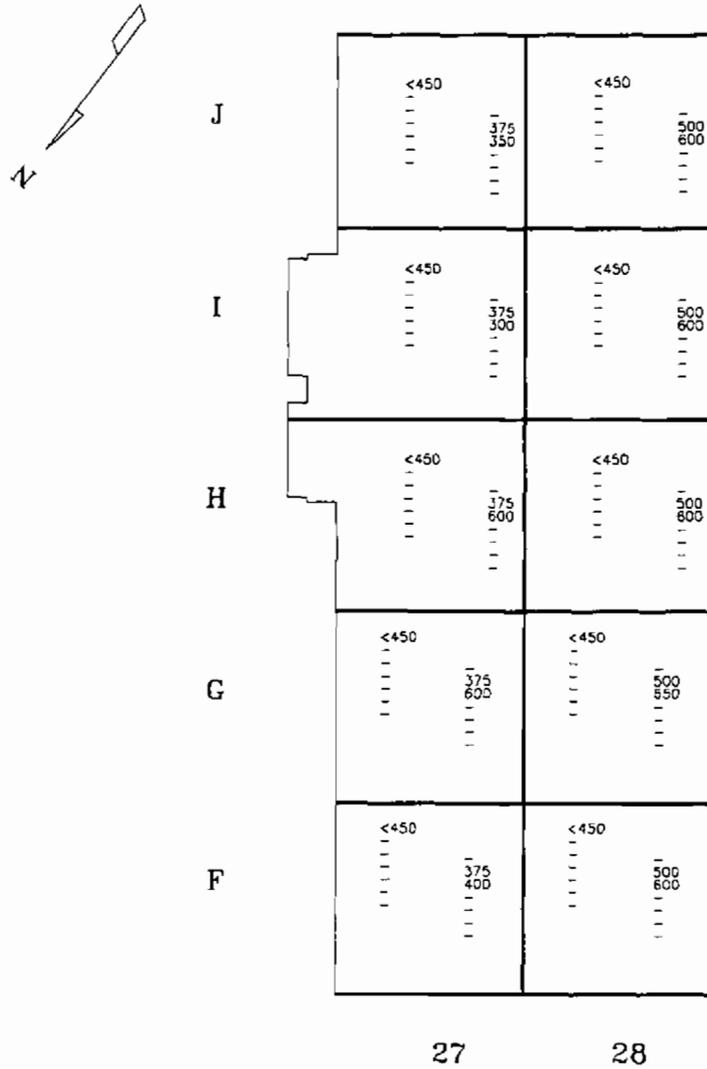
e. Localized Grid Maps, Perimeter



2. Bldg 13 Group 1 and 2 Areas

e. Localized Grid Maps, Perimeter

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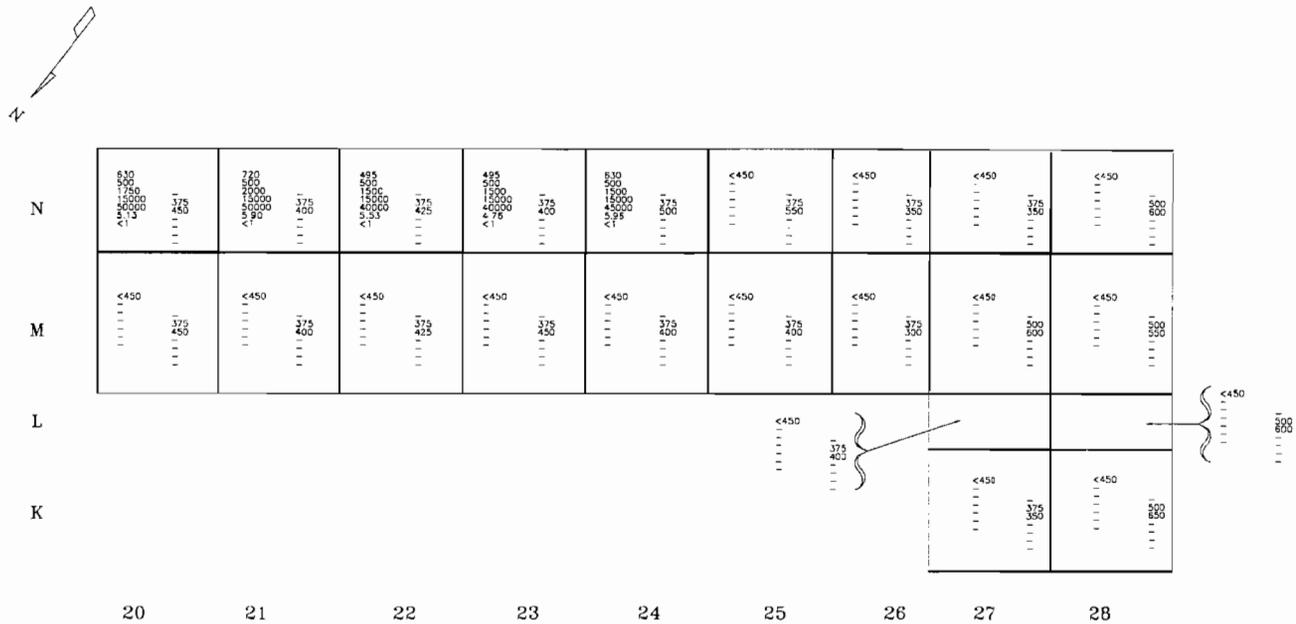






2. Bldg 13 Group 1 and 2 Areas

e. Localized Grid Maps, Perimeter



Notes:

(1) Areas surveyed with an IM-247/PD, indicating detectable activity greater than or equal to 450µCi/20cm<sup>2</sup> were sampled and analyzed by spectral analysis. In these cases, analysis of the spectrum indicated only photopeaks of naturally occurring isotopes not associated with the Naval Nuclear Propulsion Program. These natural isotopes include K-40, Ra-226, Pb-212, Bi-214, Be-7, Tl-208 and Ac-228.

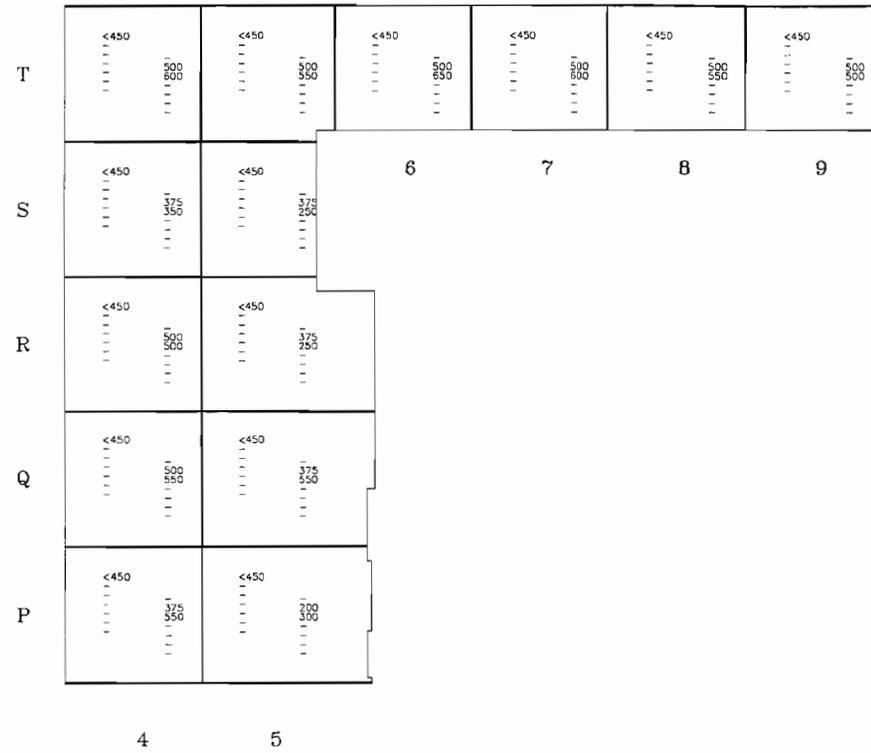
(2) High activity readings with the IM-247/PD and the IM-253/PD in grids with low gross gamma solid surface sample results were investigated. Core samplings were taken in areas where high readings were noted. Core sample results indicated high natural radioactivity levels in the aggregates and soil beneath the areas sampled.

Sample Data

<450 -- IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 -- IM-253/PD (HV-1 PHA) [d/g]  
 300 -- IM-253/PD (HV-1 PHA) [cpm]  
 7000 -- IM-253/PD (HV-2 GROSS) [d/g]  
 7300 -- IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 -- MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 -- MCA Specific Co-60 Results [pCi/g]

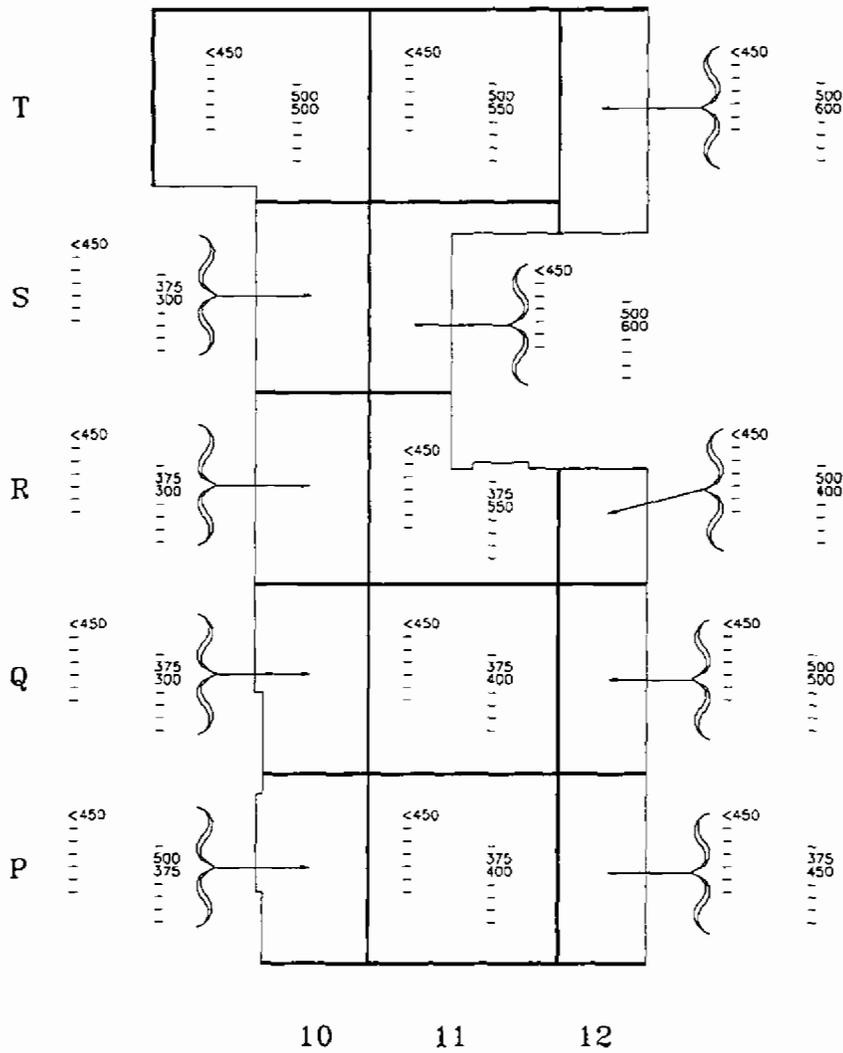
2. Bldg 13 Group 1 and 2 Areas

e. Localized Grid Maps, Perimeter



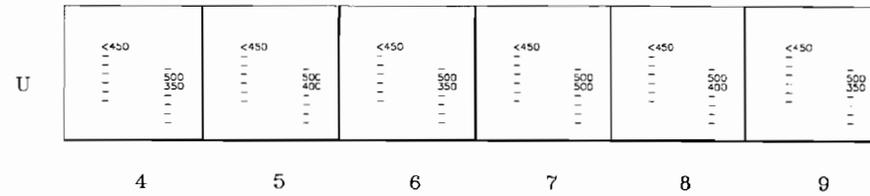
2. Bldg 13 Group 1 and 2 Areas

e. Localized Grid Maps, Perimeter



2. Bldg 13 Group 1 and 2 Areas

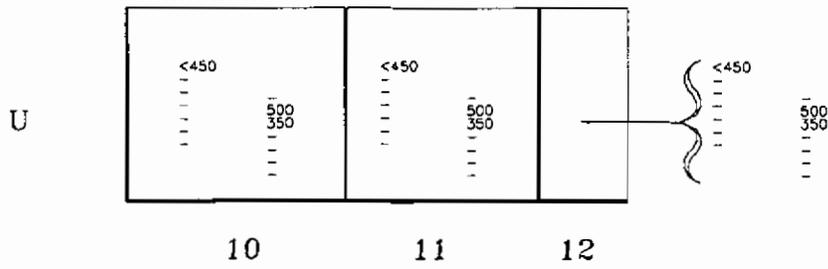
e. Localized Grid Maps, Perimeter



2. Bldg 13 Group 1 and 2 Areas

e. Localized Grid Maps, Perimeter

---



2. Bldg 13 Group 1 and 2 Areas

f. During Photograph, perimeter

---



Northwest side looking south.

- 2. Bldg 13 Group 1 and 2 Areas
    - g. After Photograph, perimeter
- 



Southwest side looking southeast.

2. Bldg 13 Group 1 and 2 Areas

g. After Photograph, perimeter

---



Southeast side looking northeast.

2. Bldg 13 Group 1 and 2 Areas

g. After Photograph, perimeter

---



Southwest side looking southeast.

- 2. Bldg 13 Group 1 and 2 Areas
    - g. After Photograph, perimeter
- 



Southeast side looking northeast.

2. Bldg 13 Group 1 and 2 Areas

g. After Photograph, perimeter

---



Northeast side looking northwest.

2. Bldg 13 Group 1 and 2 Areas

g. After Photograph, perimeter

---



Northeast side looking west.

2. Bldg 13 Group 1 and 2 Areas

g. After Photograph, perimeter

---



Northwest side looking east.

### 3. Building 13 Group 3 Areas

#### a. Report:

##### (1) Description:

Building 13 Group 3 survey areas consist of the Non-Destructive Testing Area; Radiography Rooms 1, 2, and 5; Microscope Room; Room 119; and NDT Room. Construction material present is concrete, brick, cinder block, sheetrock and wood.

##### (2) Discussion:

The floors of the Non-Destructive Test Area; Radiography Rooms 1, 2, and 5; Microscope Room and Room 119 were divided into 381 grids: 187 floor grids, 177 wall grids, and 17 column grids. The floor grids were approximately 5' by 5' and the wall grids were approximately 5' wide by 6' high. Each grid had its own unique designator.

One hundred percent of all grids were surveyed with the IM-247/PD and IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid.

A total of 381 solid material samples were taken from the Group 3 Areas. Each solid material sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material samples: lead 212, lead 214, and potassium 40.

Individual backgrounds were used for Building 13 Group 3 areas. Due to variations in natural radioactivity among construction materials, different background levels exist. For the concrete floors, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 400, and 15000 counts per minute were based on radiation levels obtained from Building 417 deck. For the brick walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 60, 600, and 15000 counts per minute were based on background radiation levels obtained from Building M1123 wall. For the wood and sheetrock walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 400, and 12500 counts per minute were based on radiation levels obtained from Building 27 Supply Trailer wall. For the concrete walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 500, and 13250 counts per minute were based on background radiation levels obtained from Building 1079 wall.

Removal of light fixtures, electrical cabling and services, fixed cabinets, and other fixed equipment was not required.

**3. Building 13 Group 3 Areas****(3) Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected nine areas greater than or equal to twice background.

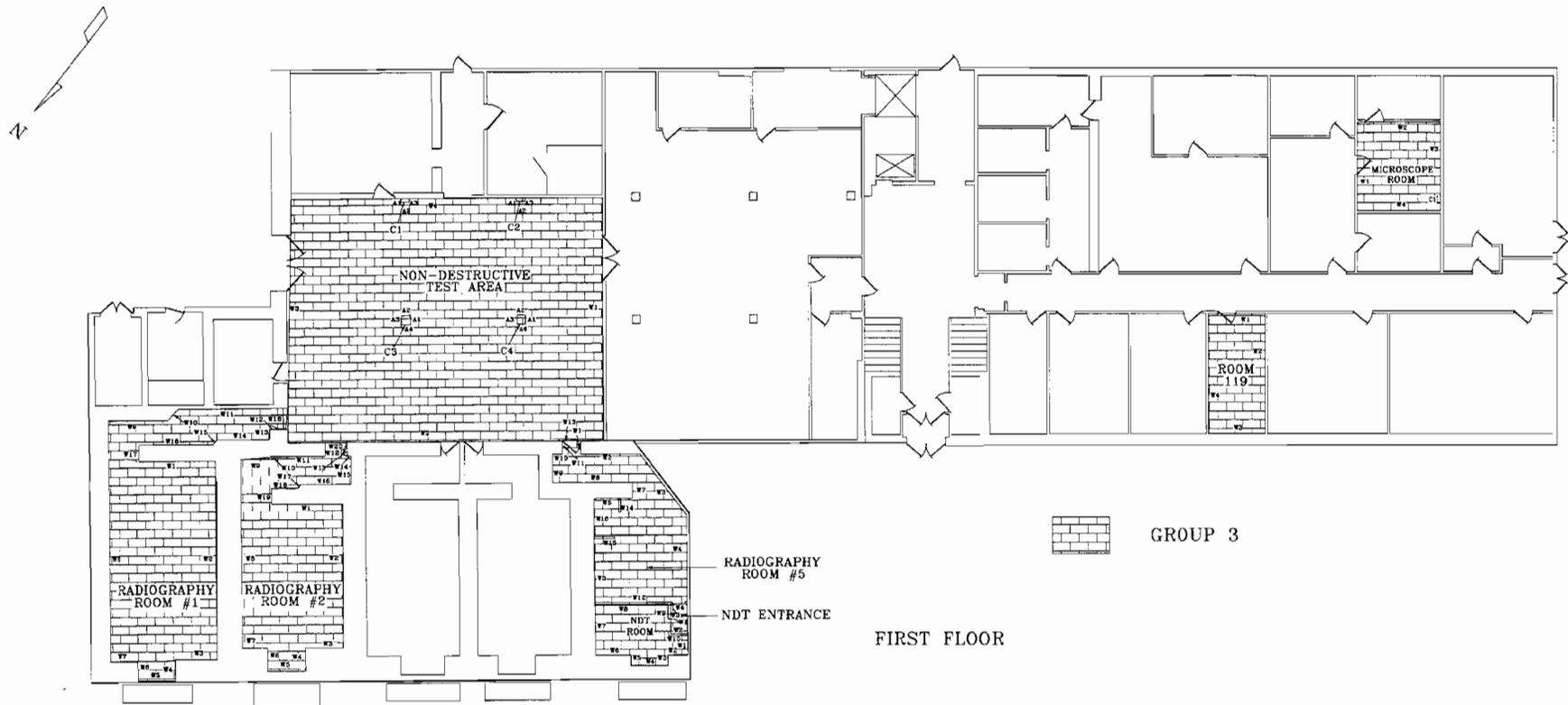
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than minimum detectable activity of 0.16 pCi/g to a high of 8.96 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples were less than 1 pCi/g except for paint samples that were less than 3 pCi/g. The following had paint samples: Radiography Room 5, grid W13-A1; Non-Destructive Test Area, grids C1-A1, C1-A2, and C1-A3.

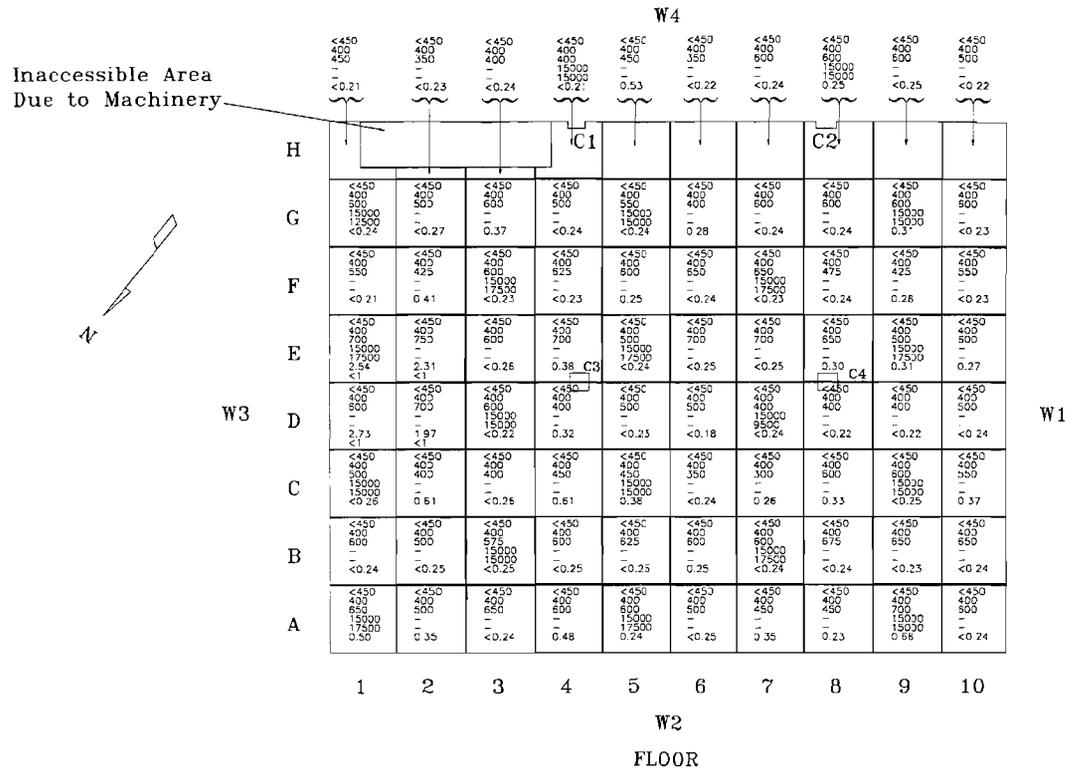
3. Building 13 Group 3 Areas

d. Site Map, Group 3 Areas



3. Building 13 Group 3 Areas

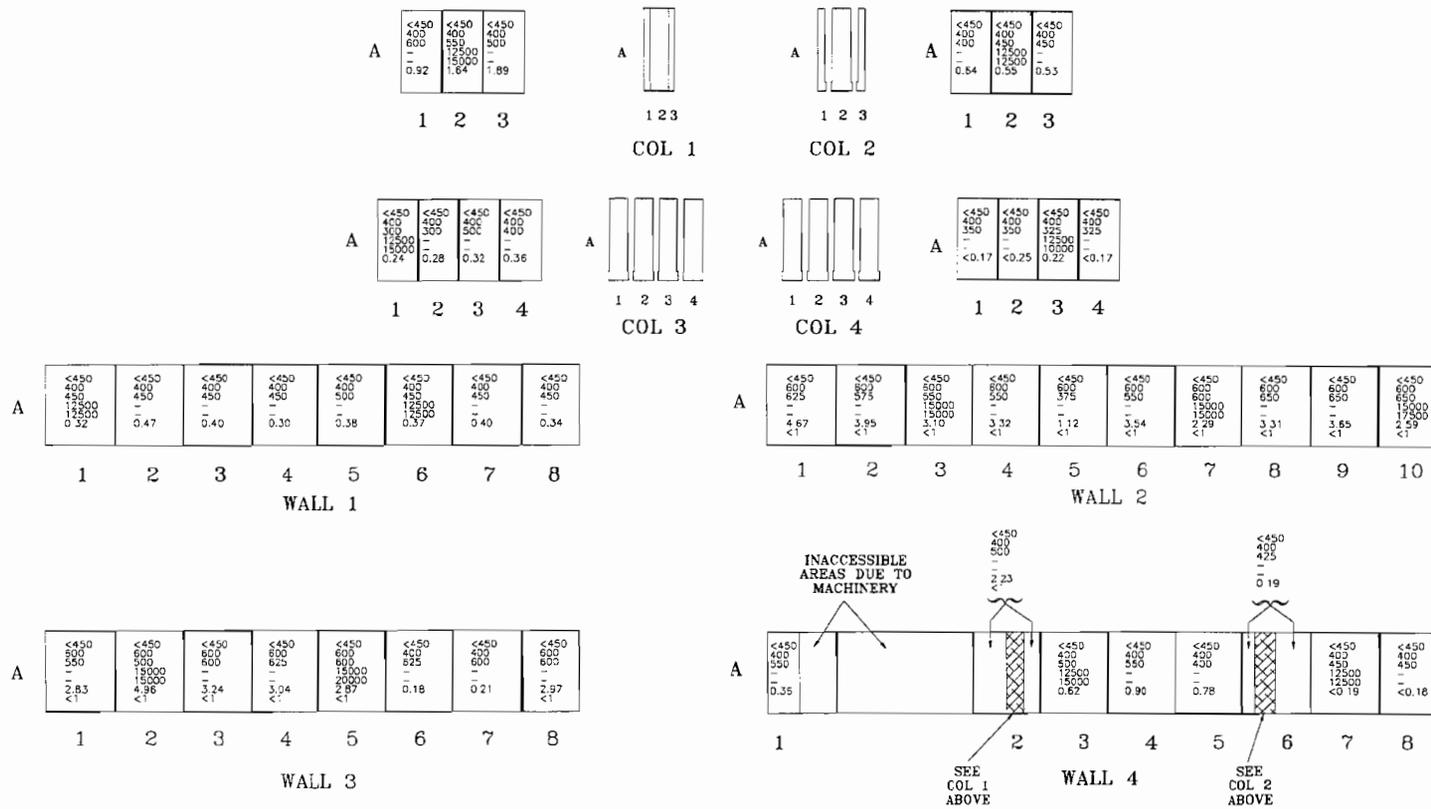
e. Localized Grid Maps, Non-Destructive Test Area



Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [pCi]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [pCi]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3. Building 13 Group 3 Areas

e. Localized Grid Maps, Non-Destructive Test Area

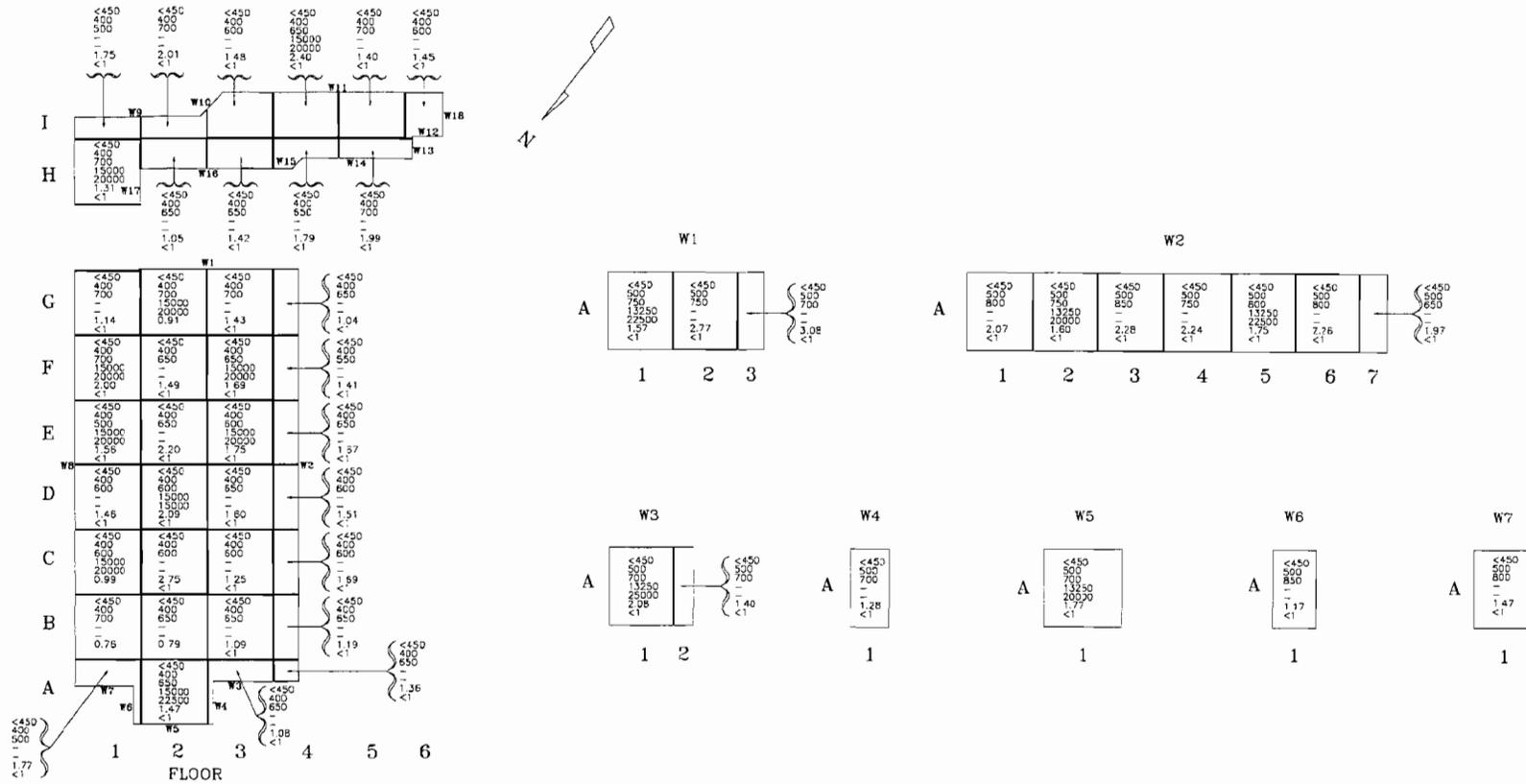


**Note**  
 Samples taken from grids C1-A1, C1-A2, and C1-A3 consist of paint and have a limit of 3 pCi/g.

**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq/g]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq/g]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3. Building 13 Group 3 Areas

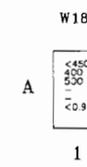
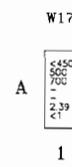
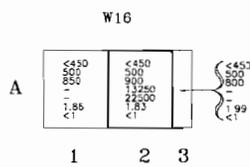
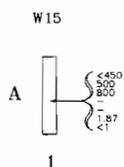
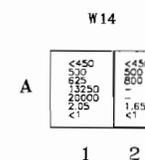
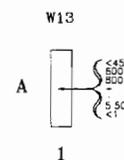
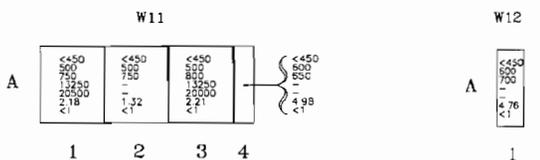
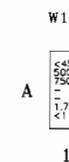
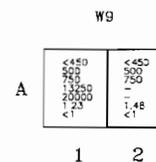
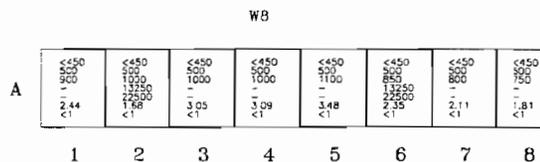
e. Localized Grid Maps, Radiography Room #1



**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bqg]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bqg]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 82 - MCA Gross Gamma Ec. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3. Building 13 Group 3 Areas

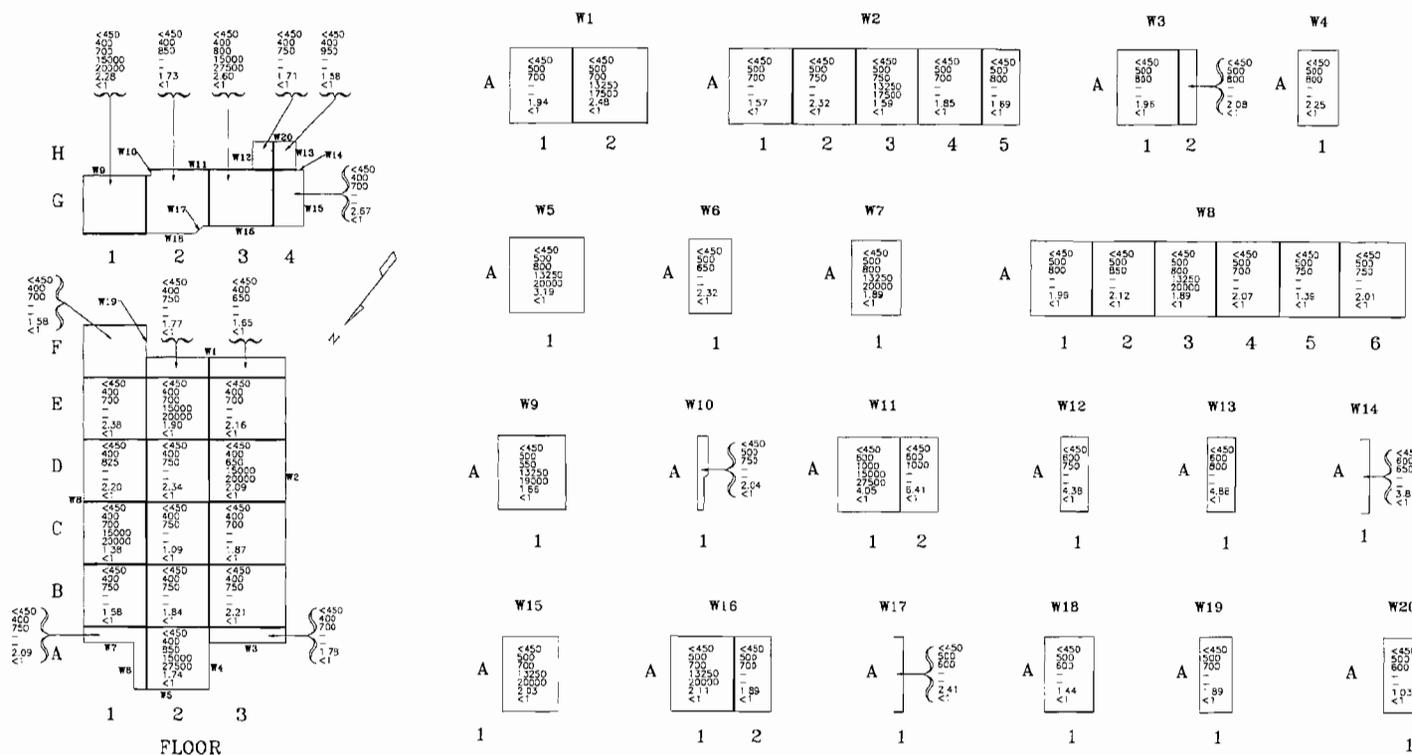
e. Localized Grid Maps, Radiography Room #1



**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq.g]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq.g]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 82 - MCA Gross Gamma Eq, Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3. Building 13 Group 3 Areas

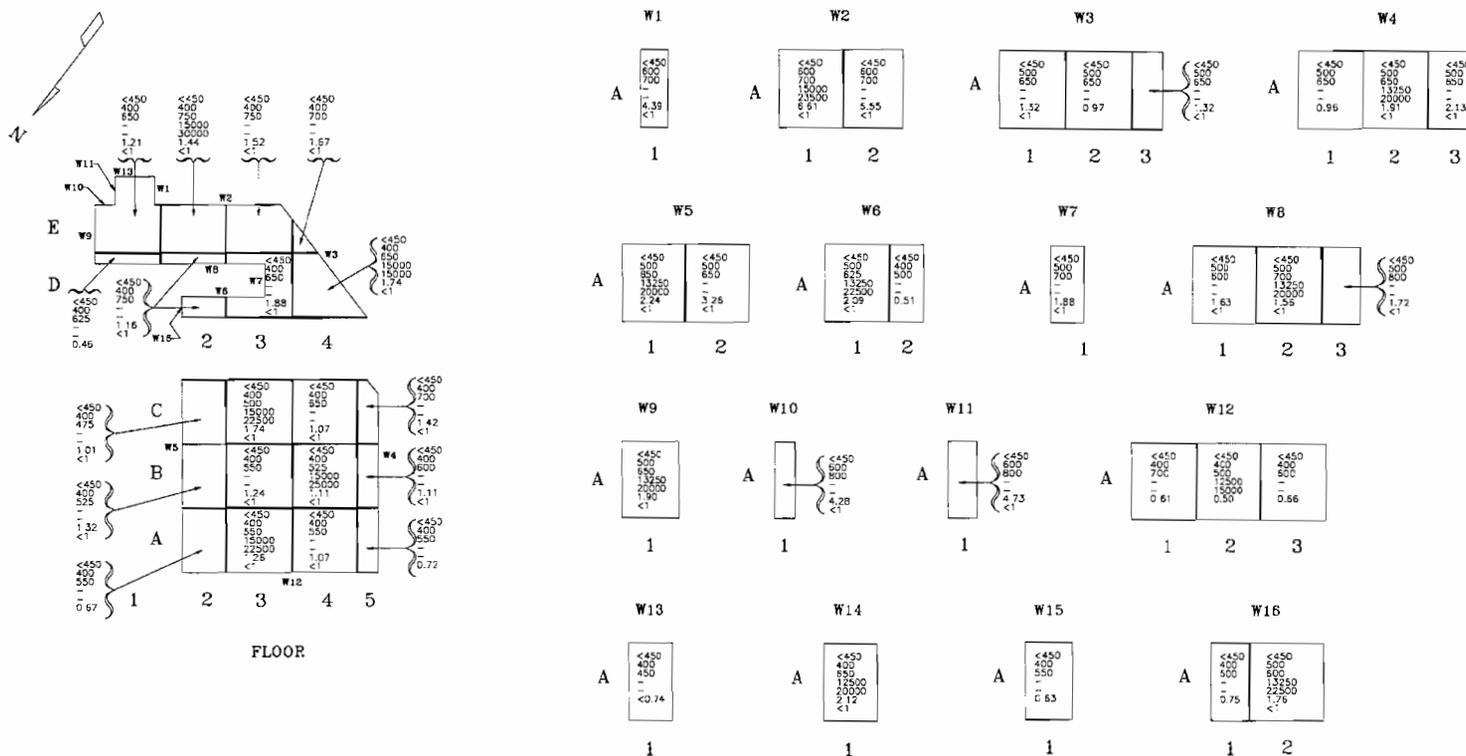
e. Localized Grid Maps, Radiography Room #2



Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [bkg.]  
 500 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3. Building 13 Group 3 Areas

e. Localized Grid Maps, Radiography Room #5

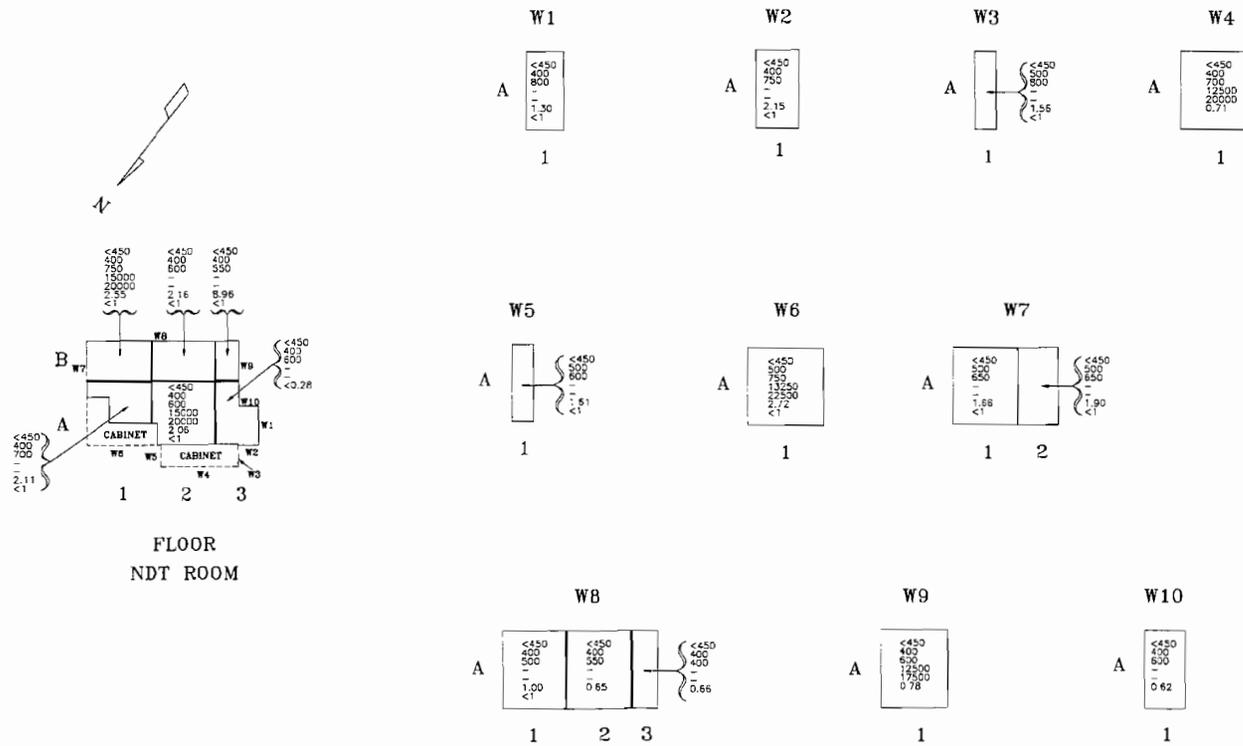


Note  
Sample taken from grid W13-A1  
consists of paint and has a limit of 3 pCi/g.

Sample Data  
<450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
200 - IM-253/PD (HV-1 PHA) [pk/g]  
300 - IM-253/PD (HV-1 PHA) [cpm]  
7000 - IM-253/PD (HV-2 GROSS) [bkp/g]  
7300 - IM-253/PD (HV-2 GROSS) [cpm]  
1.32 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
<1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3. Building 13 Group 3 Areas

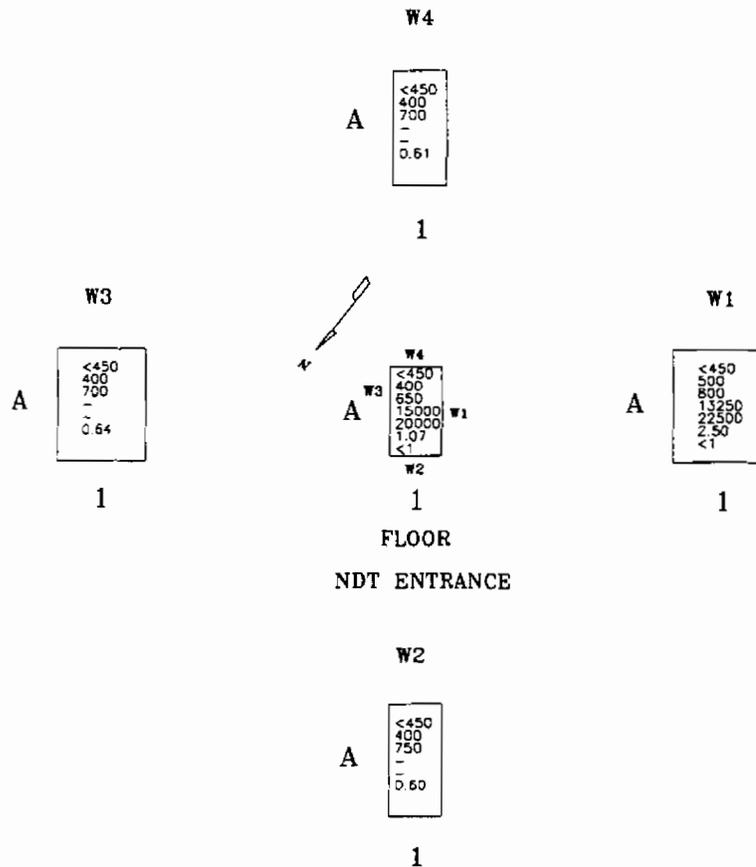
e. Localized Grid Maps, NDT Room



**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [bkg.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3. Building 13 Group 3 Areas

e. Localized Grid Maps, NDT Entrance

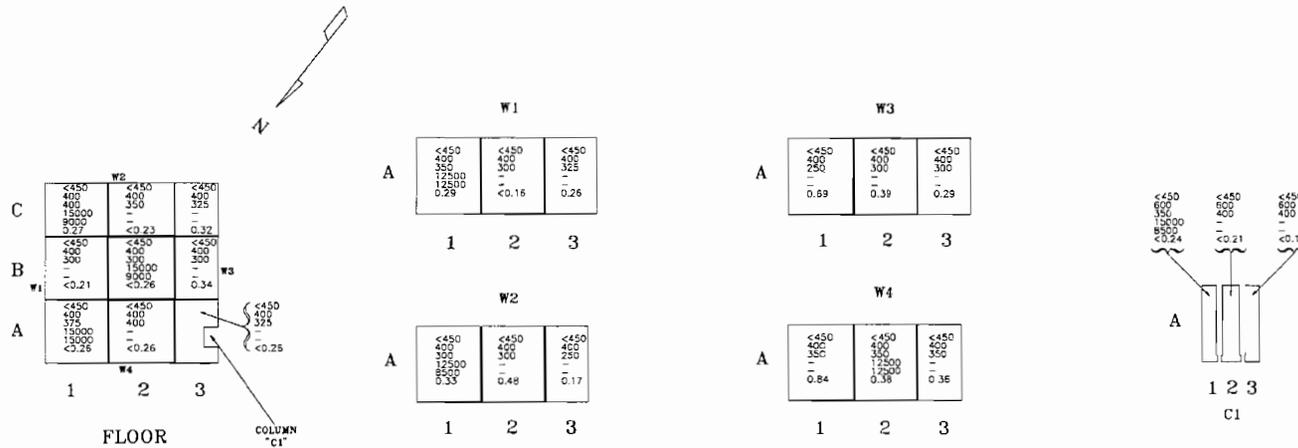


**Sample Data**

- <450 – IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]
- 200 – IM-253/PD (HV-1 PHA) [bkg.]
- 300 – IM-253/PD (HV-1 PHA) [cpm]
- 7000 – IM-253/PD (HV-2 GROSS) [bkg.]
- 7300 – IM-253/PD (HV-2 GROSS) [cpm]
- 1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
- <1 – MCA Specific Co-60 Results [pCi/g]

3. Building 13 Group 3 Areas

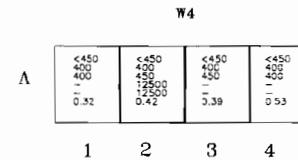
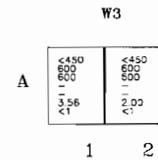
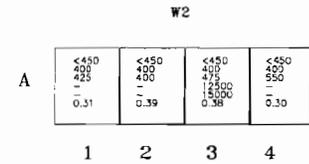
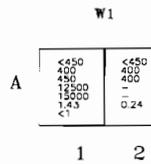
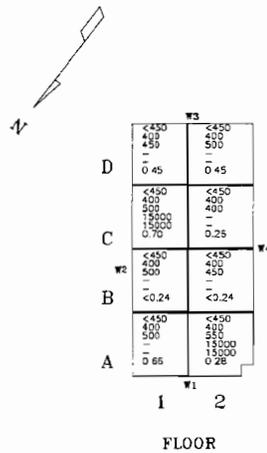
e. Localized Grid Maps, Microscope Room



**Sample Data**  
 <450 — IM-247/PD Results [ $\mu\text{Ci}/200\text{m}^2$ ]  
 200 — IM-253/PD (HV-1 PHA) [dkg]  
 300 — IM-253/PD (HV-1 PHA) [cpm]  
 7000 — IM-253/PD (HV-2 GROSS) [dkg]  
 7300 — IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 — MCA Gross Gamma Eq. Co-60 [pCi/g]  
 < — MCA Specific Co-60 Results [pCi/g]

3. Building 13 Group 3 Areas

e. Localized Grid Maps, Room 119



**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [d/g]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [d/g]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.E2 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3. Building 13 Group 3 Areas

f. Prior Photograph, Non-destructive Test Area

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South corner of room looking north

3. Building 13 Group 3 Areas

f. Prior Photograph, Non-destructive test area

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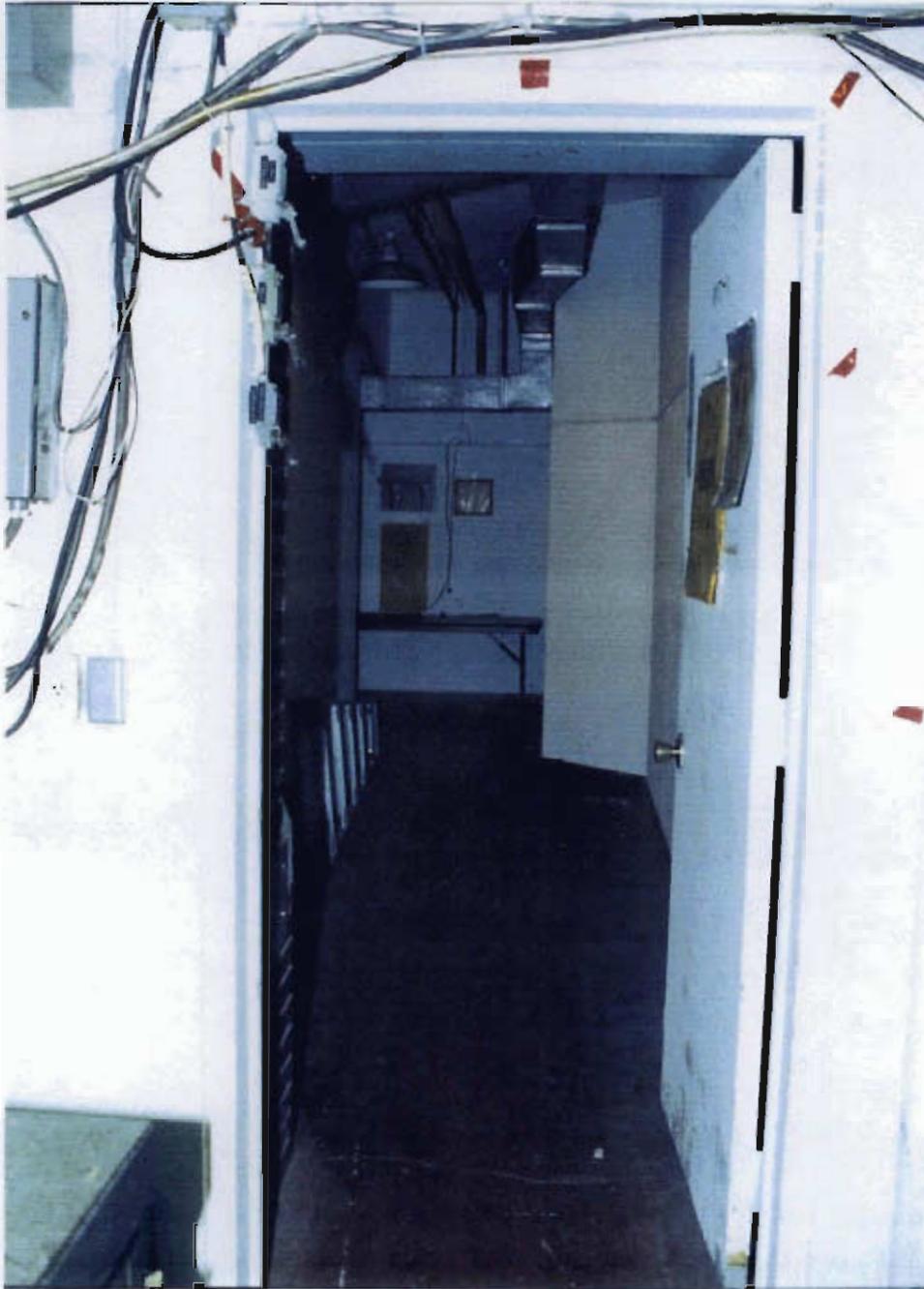


South corner of room looking northeast

3. Building 13 Group 3 Areas

f. Prior Photograph, Radiography Room #1 Hallway

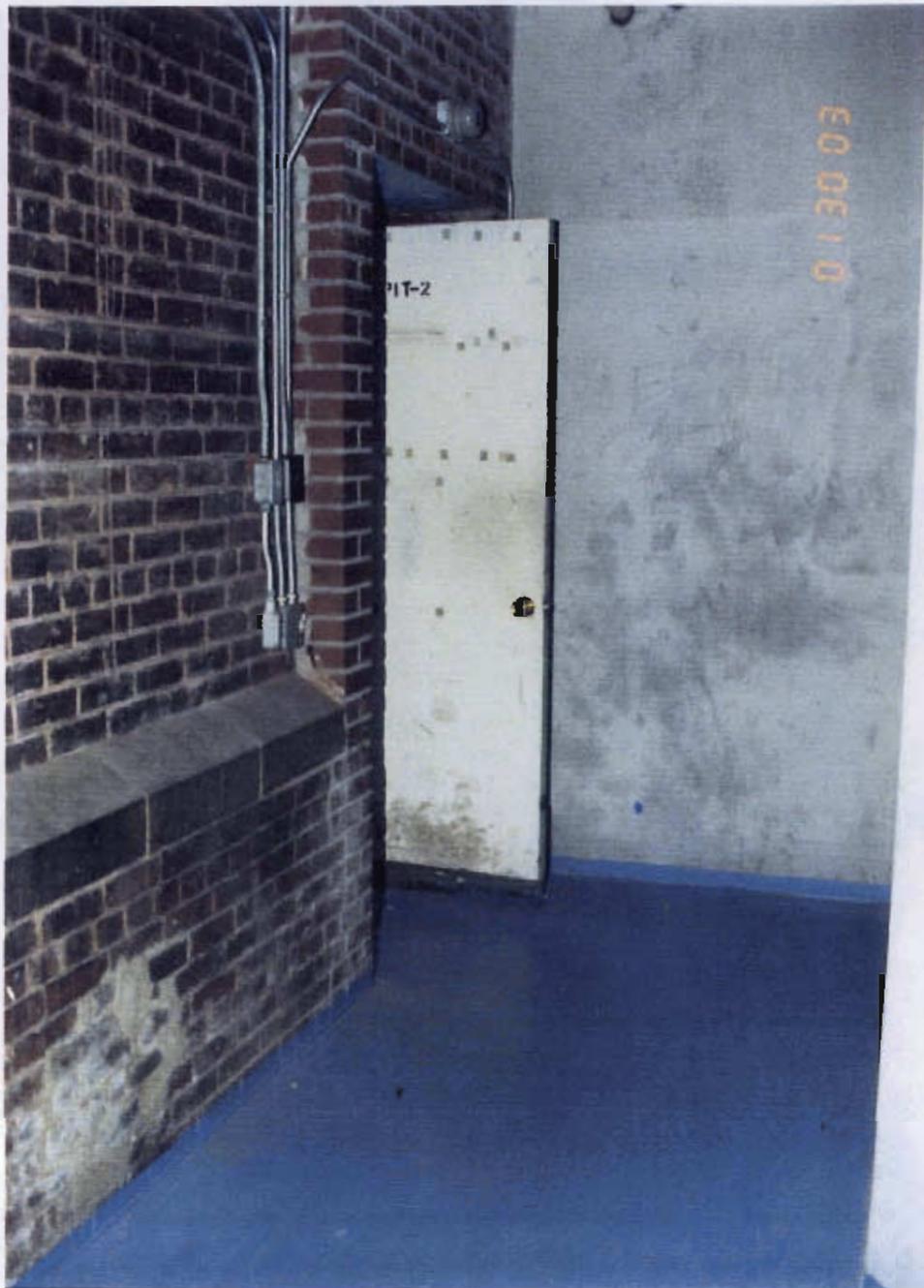
---



Entrance to hallway looking northeast

3. Building 13 Group 3 Areas

f. Prior Photograph, Radiography Room #2 Hallway

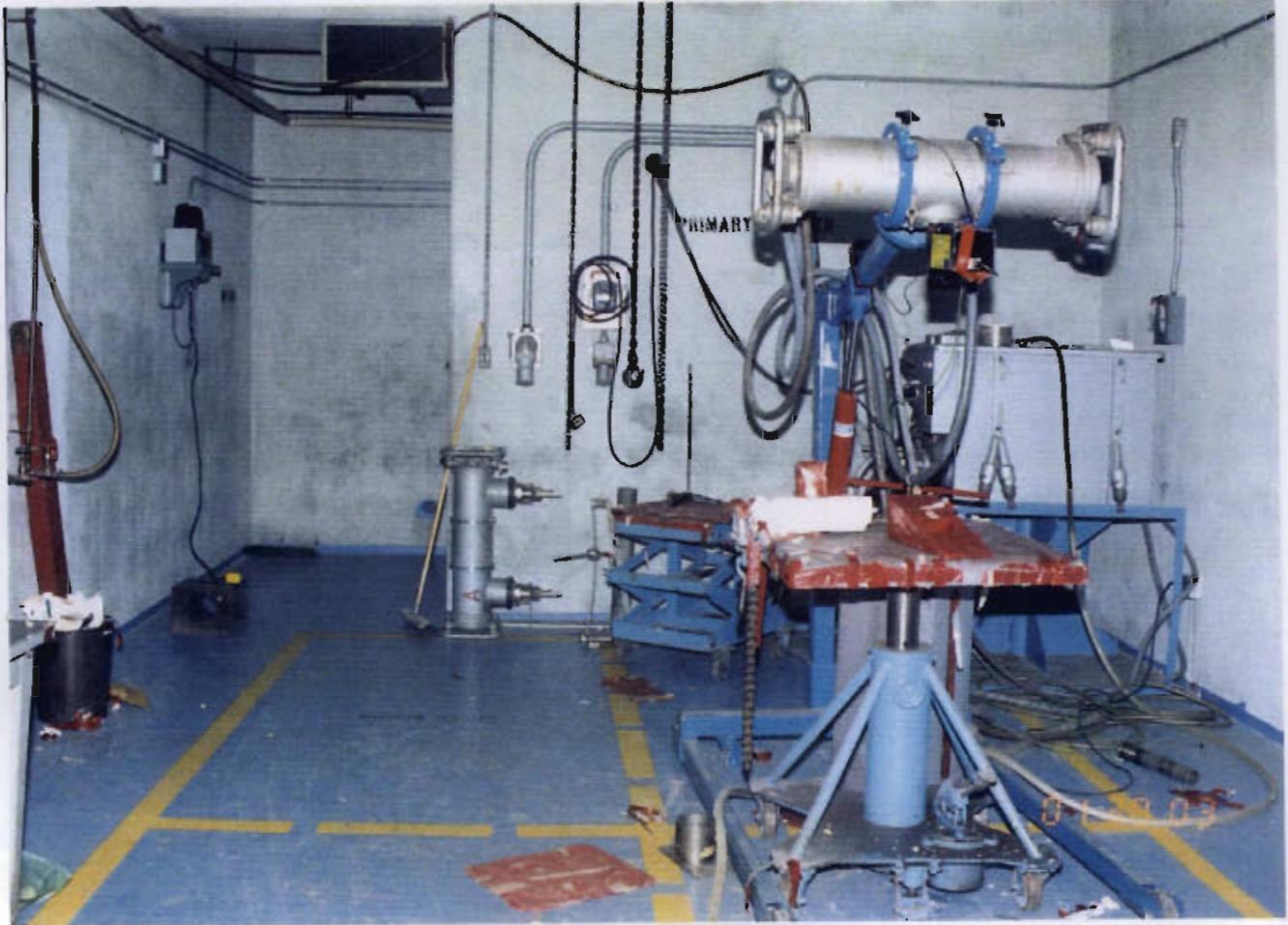


Entrance, looking northeast.

3. Building 13 Group 3 Areas

f. Prior Photograph, Radiography Room #2

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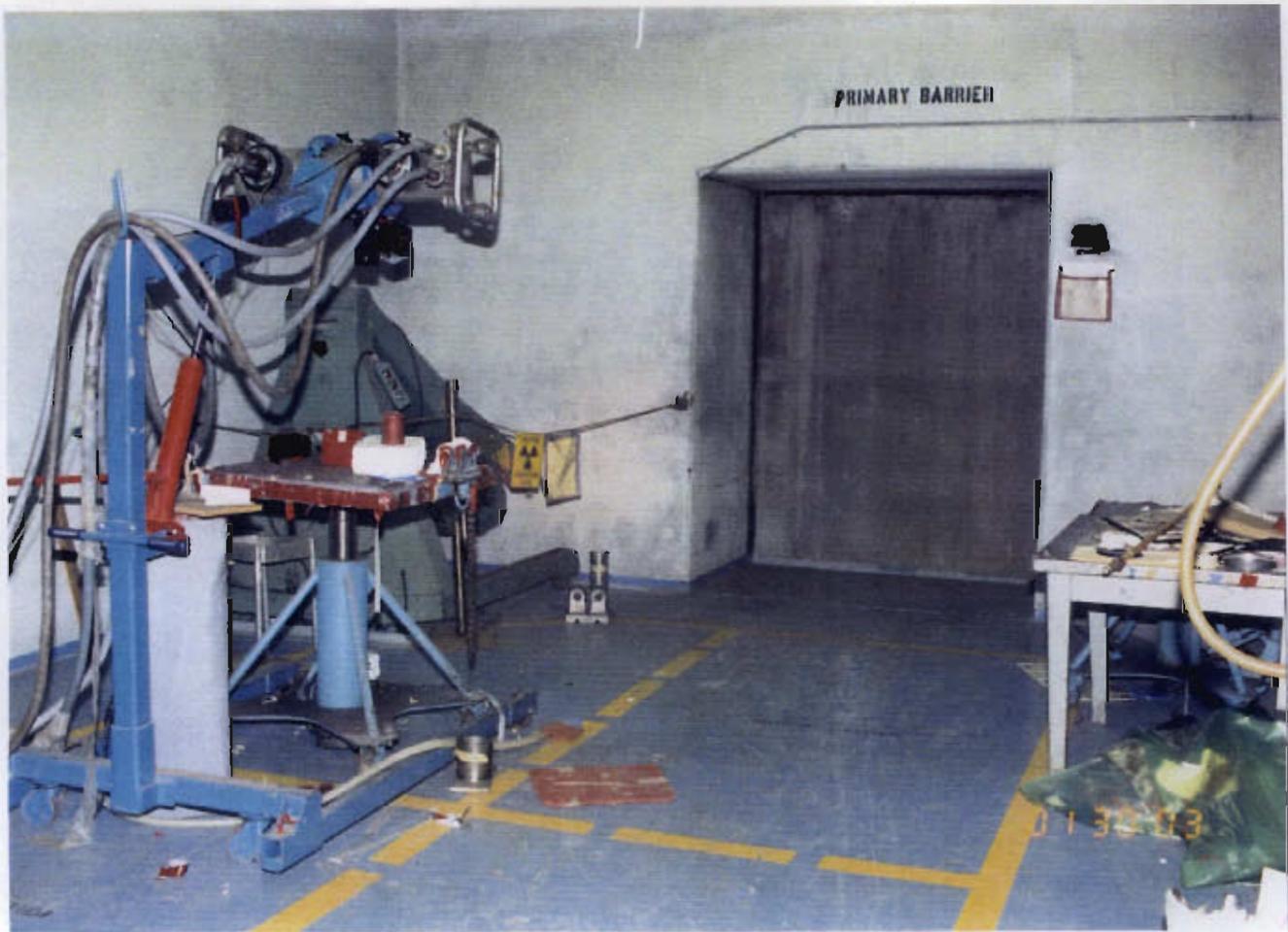


Center of room looking southeast

3. Building 13 Group 3 Areas

f. Prior Photograph, Radiography Room #2

---



Entrance, looking northwest

3. Building 13 Group 3 Areas

g. After Photograph, Non-destructive Test Area

---



North corner of room, looking south

3. Building 13 Group 3 Areas

g. After Photograph, Non-destructive Test Area

---



South corner of room looking north

3. Building 13 Group 3 Areas

g. After Photograph, Radiography Room #1

---



Northwest end of room looking southeast

3. Building 13 Group 3 Areas

g. After Photograph, Radiography Room #1

---



Entrance looking northwest

3. Building 13 Group 3 Areas

g. After Photograph, Radiography Room #1 Hallway

---



Entrance to hallway looking northeast

3. Building 13 Group 3 Areas

g. After Photograph, Radiography Room #2 Hallway

---



Entrance, looking northeast

3. Building 13 Group 3 Areas

g. After Photograph, Radiography Room #2

---



Entrance to room, looking northwest

3. Building 13 Group 3 Areas

g. After Photograph, Radiography Room #2

---



Center of room looking southeast

3. Building 13 Group 3 Areas

g. After Photograph, Radiography Room #5 Hallway

---



Entrance, looking southwest

3. Building 13 Group 3 Areas

g. After Photograph, Radiography Room #5

---



West corner of room looking east

3. Building 13 Group 3 Areas

g. After Photograph, Radiography Room #5

---



Entrance to room looking northwest

3. Building 13 Group 3 Areas

g. After Photograph, NDT Room

---



Entrance to room looking northeast

3. Building 13 Group 3 Areas

g. After Photograph, NDT Entrance

---



Entrance to room looking northwest

3. Building 13 Group 3 Areas

g. After Photograph, Microscope Room 104

---



Looking northeast to wall 1

3. Building 13 Group 3 Areas

g. After Photograph, Microscope Room 104

---



Looking southeast to wall 2

3. Building 13 Group 3 Areas

g. After Photograph, Microscope Room 104

---



Looking southwest to wall 3

3. Building 13 Group 3 Areas

g. After Photograph, Microscope Room 104

---



Looking northwest to wall 4

3. Building 13 Group 3 Areas

g. After Photograph, Room 119

---



Entrance to room looking northwest

3. Building 13 Group 3 Areas

g. After Photograph, Room 119

---



Looking southeast to entrance

**4. Building 13A Group 1 and 2 Areas****a. Report:****(1) Description:**

Building 13A Group 1 area consisted of the first and second floor General Areas and Polarographic Room on the third floor. The Group 2 areas consisted of the third floor General Area. Construction material present in the Group 1 and 2 areas is tile and sheetrock.

**(2) Discussion:**

Building 13A Group 1 surveys were performed in accordance with localized survey instructions. Surveys using the IM-253/PD (HV-1 PHA and HV-2 GROSS) were performed in selected locations within these areas. Any significant indications above background were thoroughly investigated by performing additional surveys with the IM-247/PD and in some cases removing solid material from the suspect area.

Building 13A Group 2 areas were divided into 6 10' by 10' grids. Each of these grids was subdivided into two 3' by 3' subsections. These subsections were located in the area of highest potential for contamination. Each grid had its own unique designator.

One subsection per grid received a survey with the IM-247/PD and the other subsection of each grid received a survey with the IM-253/PD (HV-1 PHA).

The construction material present in Building 13A was tile and sheetrock. For the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) a background of 40, 250, and 10000 counts per minute were based on radiation levels obtained from Building 1123.

**(3) Summary:****Group 1 Summary**

Surveys and investigations performed in accordance the Group 1 survey requirements did not detect any radionuclides other than those occurring due to natural radioactivity.

**Group 2 Summary**

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas

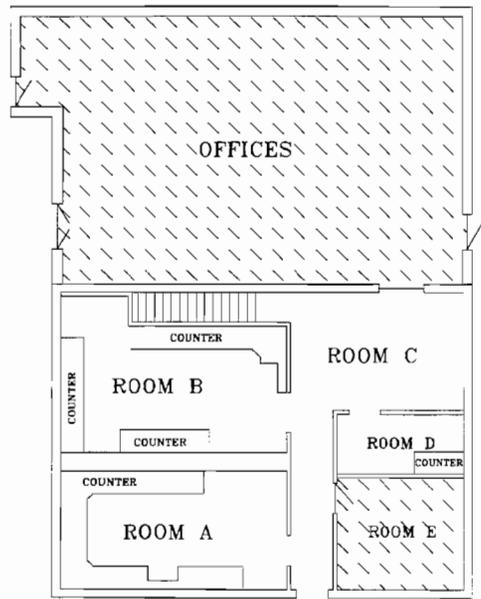
**4. Building 13A Group 1 and 2 Areas**

greater than or equal to twice background.

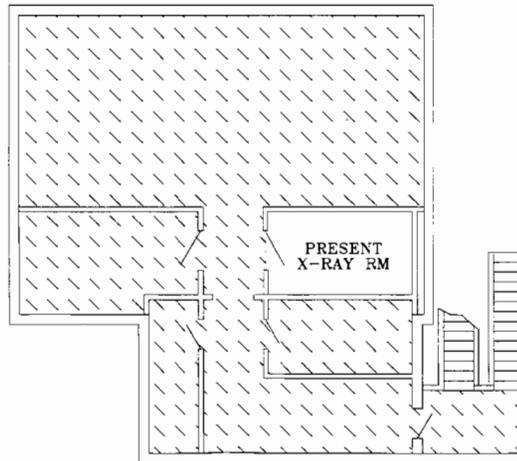
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

4. Building 13A Group 1 and 2 Areas

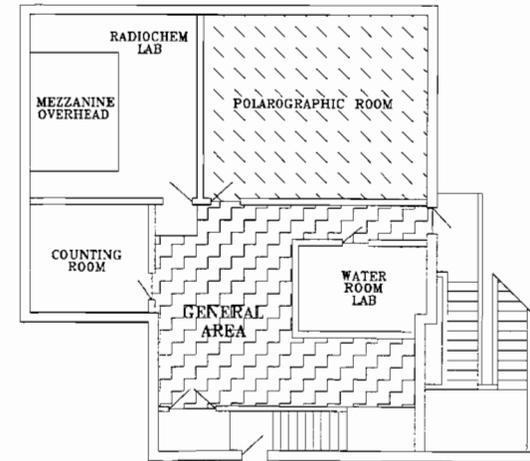
b. Site Map, Groups 1 and 2



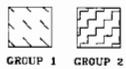
FIRST FLOOR



SECOND FLOOR

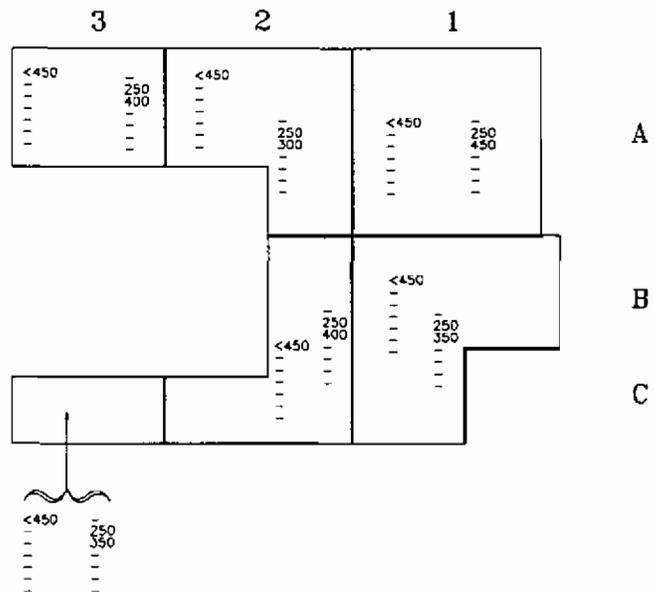
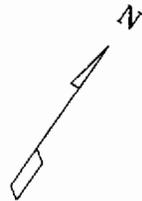


THIRD FLOOR



4. Building 13A Group 1 and 2 Areas

c. Localized Grid Maps, Third Floor General Area



FLOOR

**Sample Data**

- <450 – IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]
- 200 – IM-253/PD (HV-1 PHA) [bkg.]
- 300 – IM-253/PD (HV-1 PHA) [cpm]
- 7000 – IM-253/PD (HV-2 GROSS) [bkg.]
- 7300 – IM-253/PD (HV-2 GROSS) [cpm]
- 1.82 – MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]
- <1 – MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

4. Building 13A Group 1 and 2 Areas

d. Prior, General Area

---



Prior Photo, east to Wall 1 and Wall 2

4. Building 13A Group 1 and 2 Areas

e. After Photograph of General Area

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After Survey photo, East to Wall 1 and Wall 2

**5. Building 13A Group 3****a. Report:****(1) Description:**

The Building 13A Group 3 areas consisted of the first floor Radiological Work Area, the second floor X-ray Room and the third floor Counting Room and Water Room, and one grid in the southeast corner of the third floor General Area. The construction material present in the Group 3 areas was concrete, brick, and wood.

**(2) Discussion:**

The Group 3 areas were divided into 176 grids. The floor grids were approximately 5' by 5' and the wall grids were approximately 5' wide by 6' high. Each grid had its own unique designator.

One hundred percent of all grids were surveyed with the IM-247/PD and IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid with the exception of grids that covered unpainted metal surfaces. The third floor Water Room counter grids C1-A1, C1-B1, and C1-B2 and the first floor Radiological Work Area Room C floor grids F-1 and F-2 were not sampled due to being unpainted metal surfaces.

A total of 171 solid material samples were taken from the Group 3 areas. Each solid material sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material samples: lead 212, lead 214, bismuth 214, thallium 208, potassium 40.

The construction material present in the Group 3 areas was concrete, brick and wood. For the Radiological Work Area and the second floor X-ray Room, the following backgrounds were used: the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 400, and 15000 counts per minute used for the concrete floors were based on background radiation levels obtained from Building 417; the backgrounds of 40, 400, and 12500 counts per minute used for the wood walls were based on the background radiation levels obtained from Building 27 Supply Trailer; and, the backgrounds of 60, 600, and 15000 counts per minute used for the brick walls were based on background radiation levels obtained from Building M 1123. For the third floor Counting Room, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 375, and 10000 counts per minute used for the walls and floor were based on background radiation levels obtained from Building 89. For the third floor Water Room, the

**5. Building 13A Group 3**

IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 400, and 9000 counts per minute used for the metal walls and wood floor were based on background radiation levels obtained from the trailer outside of Building 27 and the wood on the rail line outside of Building 1628 respectively. For the one grid in the southwest corner of the third floor General Area, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 250, and 10000 counts per minute used for wood were based on background radiation levels obtained from Building 1123.

Removal of light fixtures, electrical cabling and services, fixed cabinets, and other fixed equipment was not required.

**(3) Summary:****Group 3 Summary**

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

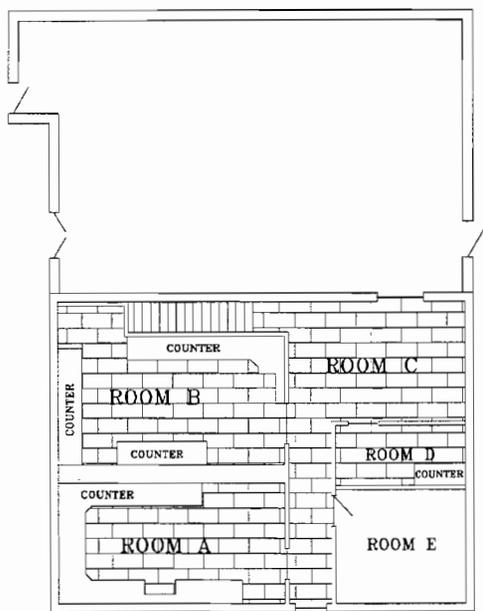
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than a minimum detectable activity of 0.21 pCi/g to a high of 4.65 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples were less than 1 pCi/g and paint samples were less than 3 pCi/g. The following grids had paint samples: 13A-WAT-S1-A1, 13A-WAT-S1-B1, 13A-WAT-S2-A1, 13A-FFA-CW1-A1, 13A-FFA-CW4-A7.

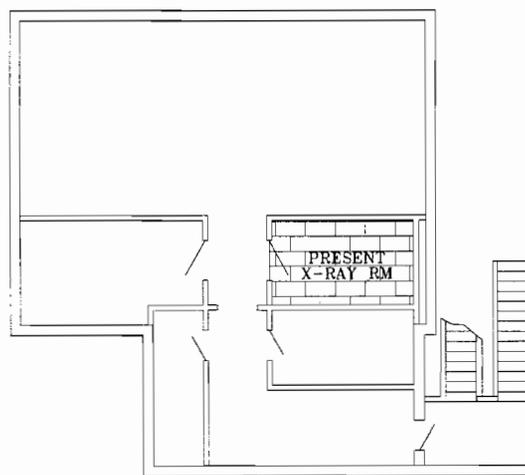
5. Building 13A Group 3

b. Site Map



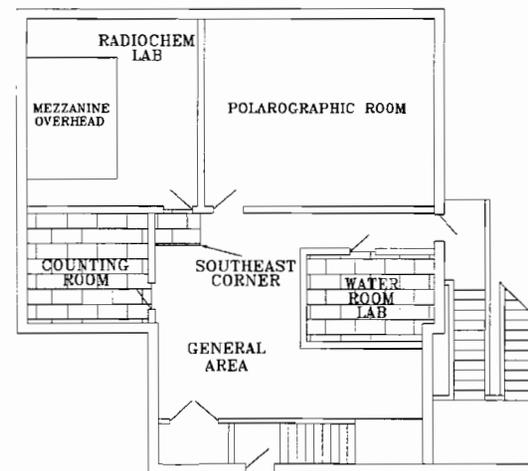
(See detail map on next page)

FIRST FLOOR



(See detail map on next page)

SECOND FLOOR



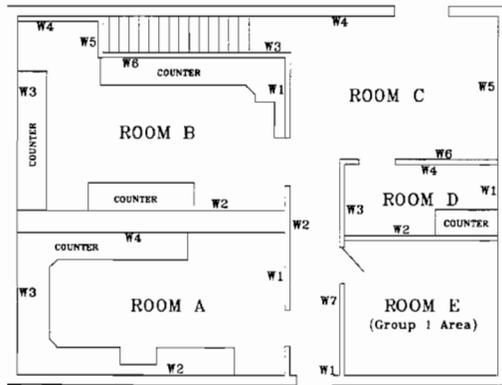
(See detail map on next page)

THIRD FLOOR

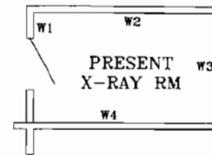


5. Building 13A Group 3

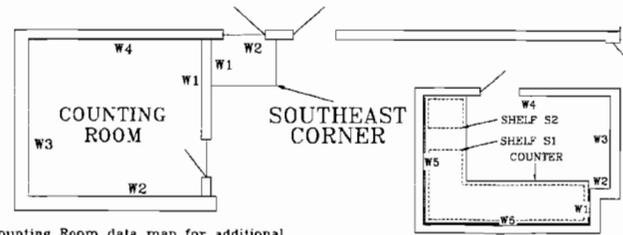
b. Site Map



FIRST FLOOR DETAIL



SECOND FLOOR DETAIL

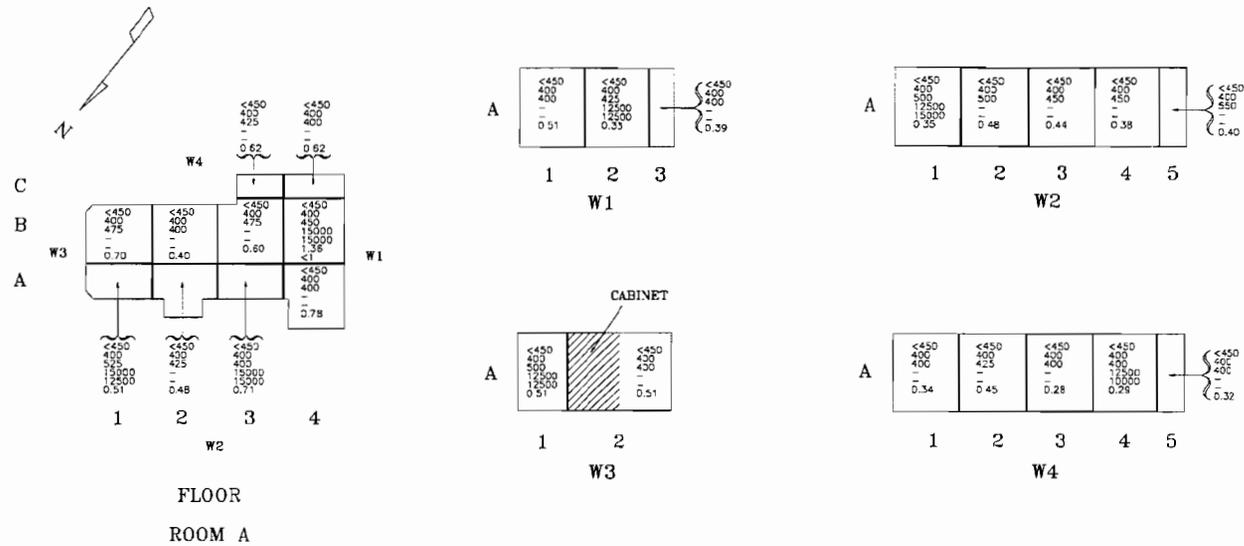


(See Counting Room data map for additional detail on top and bottom shelves)

THIRD FLOOR DETAIL

5. Building 13A Group 3

c. Localized Grid Maps, First Floor Annex Room A

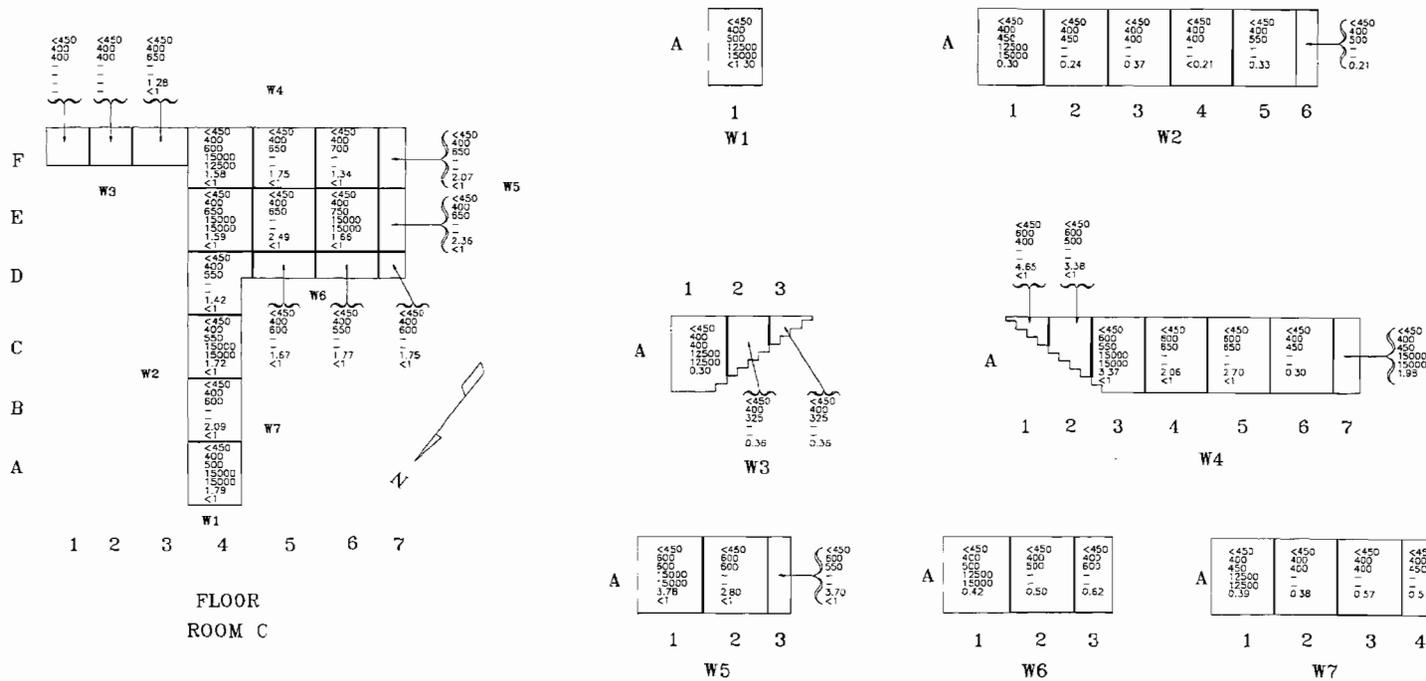


**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]



5. Building 13A Group 3

c. Localized Grid Maps, First Floor Annex Room C

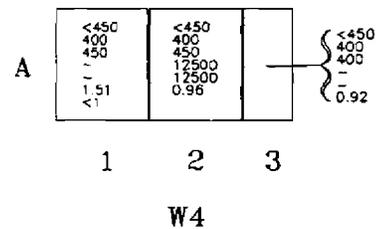
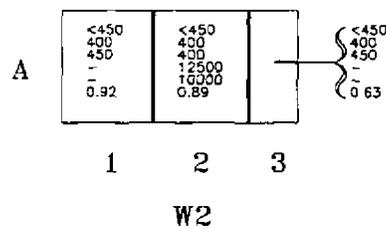
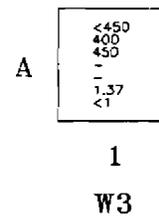
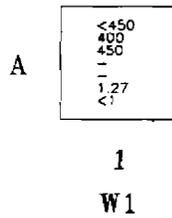
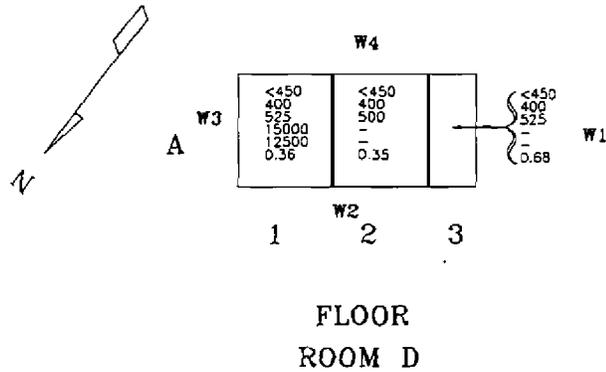


**Note**  
Samples taken from grids W1-A1 and W4-A7 consist of paint and have a limit of 3 pCi/g.

**Sample Data**  
<450 - IM-247/PD Results [ppCi/20cm²]  
200 - IM-253/PD (HV-1 PHA) [Bq/g]  
300 - IM-253/PD (HV-1 PHA) [cpm]  
7000 - IM-253/PD (HV-2 GROSS) [Bq/g]  
7300 - IM-253/PD (HV-2 GROSS) [cpm]  
1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
<1 - MCA Specific Co-60 Results [pCi/g]

5. Building 13A Group 3

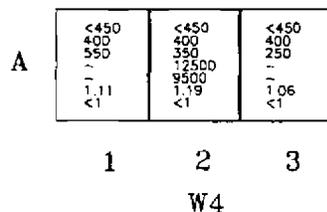
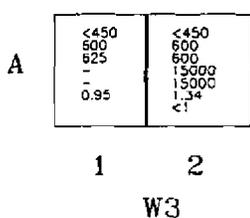
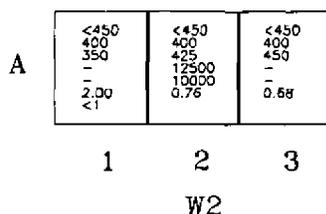
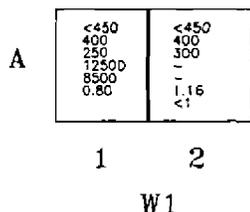
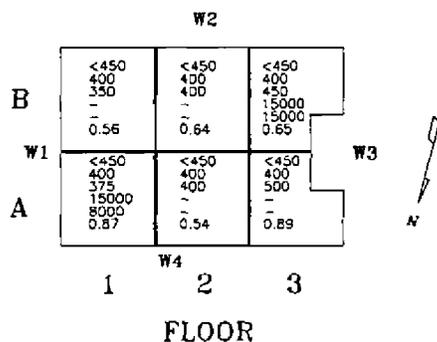
c. Localized Grid Maps, First Floor Annex Room D



**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [bkg.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

5. Building 13A Group 3

c. Localized Grid Maps, Second floor Annex X-ray Room

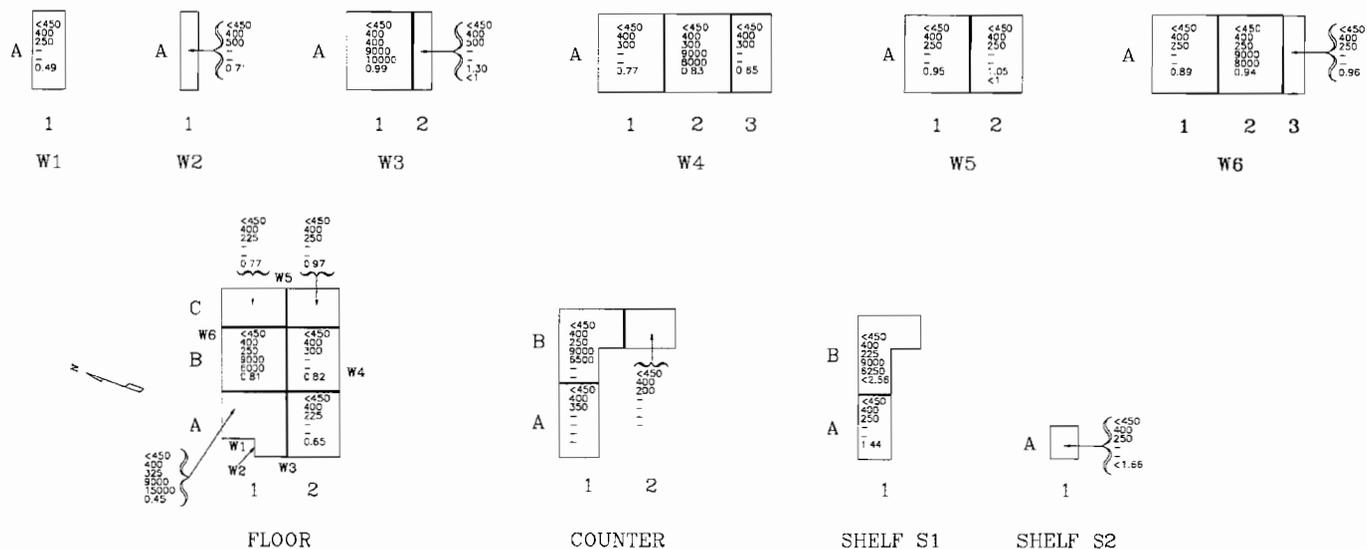


**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [bkg.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci}/\text{g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci}/\text{g}$ ]



5. Building 13A Group 3

c. Localized Grid Maps, Third Floor Water Room Lab

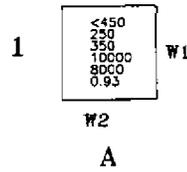
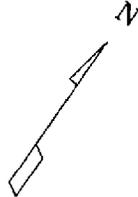


**Note**  
 Samples taken from shelf grids S1-A1, S1-B1 and S2-A1 consist of paint and have a limit of 3 pCi/g.

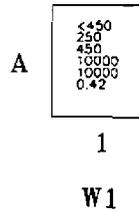
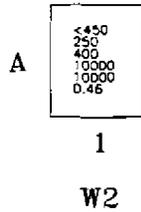
**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [pCi]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [kcp]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

5. Building 13A Group 3

c. Localized Grid Maps, Third Floor General Area Southeast Corner



FLOOR



**Sample Data**

- < 450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]
- 200 - IM-253/PD (HV-1 PHA) [bkg.]
- 300 - IM-253/PD (HV-1 PHA) [cpm]
- 7000 - IM-253/PD (HV-2 GROSS) [bkg.]
- 7300 - IM-253/PD (HV-2 GROSS) [cpm]
- 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]
- <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

5. Building 13A Group 3

d. Prior Photograph, Counting Room

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Looking East into room

5. Building 13A Group 3

d. Prior Photograph, Water Room Lab

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Looking North into room

5. Building 13A Group 3

e. After Photograph, Room A

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Facing northeast into room

5. Building 13A Group 3

e. After Photograph, Room B

---



Facing northeast into room

5. Building 13A Group 3

e. After Photograph, Room C

---



Facing southwest into room

5. Building 13A Group 3

e. After Photograph, Room D

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Southwest, facing counter

5. Building 13A Group 3

e. After Photograph, Present X-ray Room

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South to Wall 2 and Wall 3

5. Building 13A Group 3

e. After Photograph, Water Room Lab

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Facing northwest into room

5. Building 13A Group 3

e. After Photograph, Counting Room

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Facing northeast into room

**6. Bldg. 13A, Radiochemistry Lab, Third Floor Annex****a. Introduction:**

Building 13A is located in grid C-7 of the Charleston Naval Shipyard map (Figure 10). Building 13A is also known as the Building 13 Annex. This Annex is a three-story addition which was added in the 1950s. The third floor of the annex was used as a radiochemistry facility. In 1991 the radiochemistry facility was moved to Building 222 and remained there until closure.

**(1) Description:**

The Radiochemistry Lab (Rad Chem Lab) is approximately 17' wide by 19' long by 8' high. The walls and ceiling are gypsum board. The floor is wooden with a tile covering. The walls and ceiling are painted. The room was equipped with a ventilated hood, stainless steel counters and a stainless steel sink.

**(2) Brief History:**

**(a) Use:** The Rad Chem Lab was used to perform radiochemistry analysis on samples of radioactive water, resin, and other material.

**(b) Contaminated Systems:** Sample sink and ventilation system with associated hood.

**(c) Radiological History:** This area was established as a CSCA while in use as a radiochemistry facility. Analysis of radioactive samples such as radioactive liquids, activated corrosion products and resin involved the handling of contaminated samples exceeding  $1 \times 10^6 \mu\text{Ci}/100\text{cm}^2$ . Occasionally, loose surface contamination in the tens of thousands  $\mu\text{Ci}/100\text{cm}^2$  was found on the surfaces of this room. All detected surface contamination was decontaminated to less than  $450 \mu\text{Ci}/100\text{cm}^2$ . Loose surface contamination levels in the lab were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$ .

**(3) Survey Requirements:**

Group 4 surveys were performed in this work area.

**b. Discussion:**

Due to the nature of spills which occurred in the lab and the potentials for encountering asbestos materials, scoping surveys were performed prior to conducting Group 4 surveys. Scoping survey solid material samples ranged up to 118.12 pCi/g. These levels were found in floor grids E-3, E-4, E-5, F-3, F-4, F-5. Due to these findings 100% percent of the floor tiles were removed and a

**6. Bldg. 13A, Radiochemistry Lab, Third Floor Annex**

9' by 6' area of flooring was removed prior to conducting final surveys. Also, the sample sink and the ventilation system with associated hood were removed prior to conducting final closure surveys.

The Building 13A Rad Chem Lab is categorized as a Group 4 area. Group 4 refers to radiological work areas with radiological history indicating potential for contamination levels of 1000 - 10000 $\mu\text{Ci}/100\text{cm}^2$ . This area's floor, ceiling and walls were divided into approximately 3' by 3' sections where physically possible. Each grid was identified with a unique designation. One hundred percent of all 3' by 3' grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25% of all 3' by 3' grids were surveyed using the IM-253/PD (HV-2 GROSS). Solid material samples were taken from the area of highest potential within each grid. Additionally, solid material samples were taken from crevices in floor grids and wall grids below the 6' level.

The Building 13A Rad Chem Lab was divided into forty-two, 3' by 3' floor grids, forty-two, 3' by 3' ceiling grids and seventy-eight, 3' by 3' wall grids. Individual backgrounds were used for this work area. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the floor, ceiling, walls 1 and 4 were 40, 250 and 10000 counts per minute respectively. These radiation levels were based upon background levels obtained from Building 1123. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for walls 2 and 3 were 40, 450, and 15000 counts per minute respectively. These radiation levels were also based upon background levels obtained from Building 1123. Wall 2 and 3 are outside walls which have bricks in their construction material as well as sheetrock. The floor, ceiling, and walls 1 and 4 were primarily wood and sheetrock.

A total of one hundred and sixty-three, solid material samples were taken. Each solid sample was removed from the grid location indicating the area of highest potential. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212, lead 214, potassium 40 and bismuth 214.

**c. Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than 450 $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected two areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer

**6. Bldg. 13A, Radiochemistry Lab, Third Floor Annex**

(MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of <0.19 pCi/g to a high of 5.28 pCi/g.

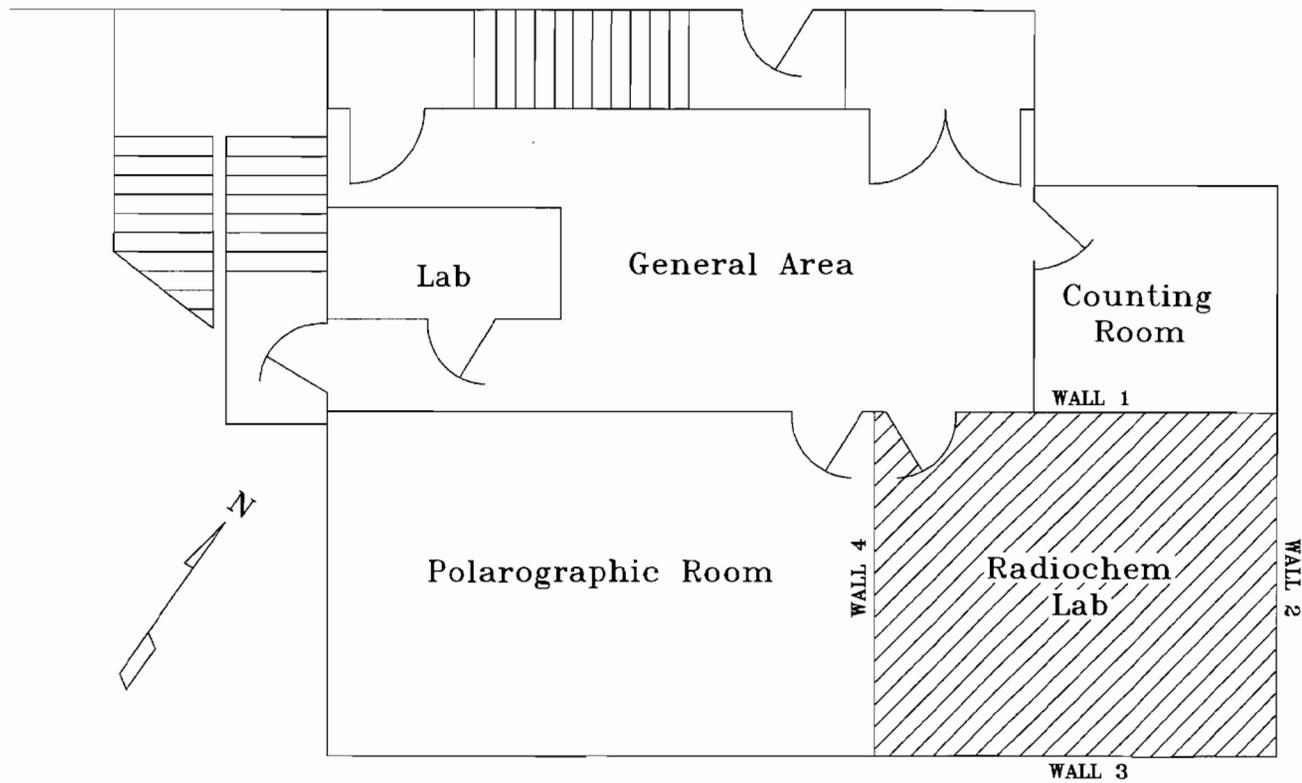
Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated solid material samples exceeding 1 pCi/g at floor grid locations C-1, C-2, D-1, D-2, E-1, E-2 and at wall grid W1-B-2. These samples ranged up to 5.06 pCi/g.

The extent of the contamination was identified by taking additional solid material samples in these locations. Remediation consisted of the removal of flooring approximately 8' by 8' and an area approximately 2' by 2' on Wall 1. Following remediation, additional solid material samples were taken on the floor and exposed wall joists. All subsequent solid material samples were less than 1 pCi/g specific Co-60.

6. Bldg. 13A, Radiochemistry Lab, Third Floor Annex

d. Site Map

Bldg. 13A Third Floor Annex/General Area



6. Bldg. 13A, Radiochemistry Lab, Third Floor Annex

e. Localized Grid Maps

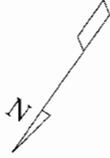
W 3

FLOOR

	<450 300 0.47	<450 250 <0.30	<450 300 0.61	<450 350 1.02	<450 350 <0.30	<450 300 <0.33
G						
F	<450 250 10000 15000 <0.33	<450 250 10000 15000 <0.34	<450 250 10000 15000 0.53	<450 250 10000 15000 <0.47	<450 250 10000 15000 <0.49	<450 250 10000 15000 <0.23
E	<450 250 10000 15000 0.31	<450 250 10000 15000 <0.28	<450 250 10000 15000 0.79	<450 250 10000 15000 0.53	<450 250 10000 15000 0.41	<450 250 10000 15000 <0.27
D	<450 250 10000 15000 0.30	<450 250 10000 15000 <0.25	<450 250 10000 15000 <0.15	<450 250 10000 15000 0.27	<450 250 10000 15000 <0.23	<450 250 10000 15000 0.56
C	<450 250 10000 15000 0.75	<450 250 10000 15000 <0.18	<450 250 10000 15000 0.88	<450 250 10000 15000 <0.39	<450 250 10000 15000 0.74	<450 250 10000 15000 <0.49
B	<450 250 10000 15000 <0.20	<450 250 10000 15000 <0.27	<450 250 10000 15000 <0.27	<450 250 10000 15000 0.52	<450 250 10000 15000 0.74	<450 250 10000 15000 <0.37
A	<450 250 10000 15000 1.75	<450 250 10000 15000 <0.38	<450 250 10000 15000 <0.32	<450 250 10000 15000 0.46	<450 250 10000 15000 0.29	<450 250 10000 15000 0.55
	1	2	3	4	5	6

W 2

W 4



W 1

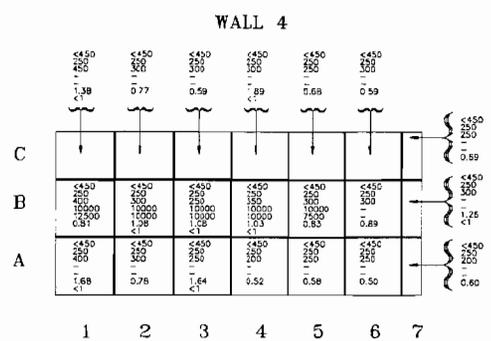
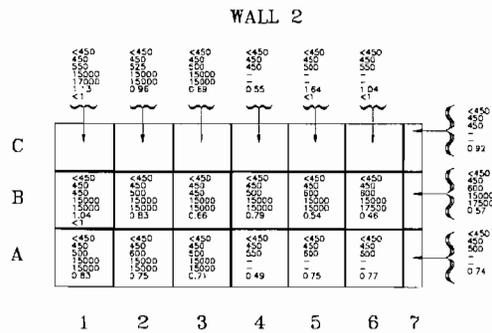
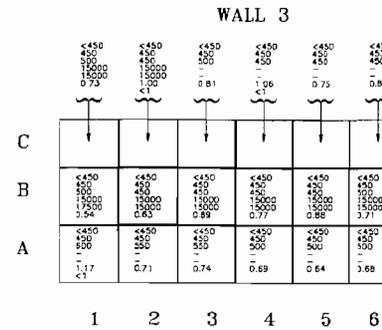
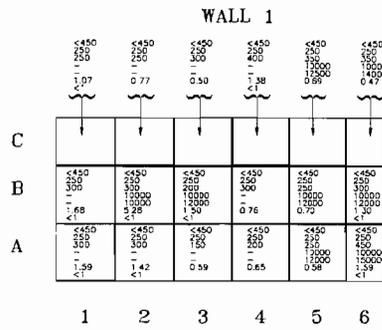
CEILING

	<450 450 0.92	<450 450 1.09	<450 450 0.46	<450 450 0.52	<450 450 0.82	<450 450 0.56
G						
F	<450 250 10000 15000 0.71	<450 250 10000 15000 0.78	<450 250 10000 15000 0.72	<450 250 10000 15000 3.54	<450 250 10000 15000 0.72	<450 250 10000 15000 0.48
E	<450 250 10000 15000 0.34	<450 250 10000 15000 0.40	<450 250 10000 15000 0.32	<450 250 10000 15000 0.32	<450 250 10000 15000 0.40	<450 250 10000 15000 0.41
D	<450 250 10000 15000 0.72	<450 250 10000 15000 0.77	<450 250 10000 15000 0.55	<450 250 10000 15000 0.66	<450 250 10000 15000 0.77	<450 250 10000 15000 0.47
C	<450 250 10000 15000 0.14	<450 250 10000 15000 0.16	<450 250 10000 15000 0.46	<450 250 10000 15000 0.65	<450 250 10000 15000 0.72	<450 250 10000 15000 0.54
B	<450 250 10000 15000 0.70	<450 250 10000 15000 0.47	<450 250 10000 15000 0.40	<450 250 10000 15000 0.33	<450 250 10000 15000 0.40	<450 250 10000 15000 0.43
A	<450 250 10000 15000 0.98	<450 250 10000 15000 1.41	<450 250 10000 15000 0.52	<450 250 10000 15000 0.38	<450 250 10000 15000 0.48	<450 250 10000 15000 0.41
	1	2	3	4	5	6

**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [blk.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [blk.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci}/\text{g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci}/\text{g}$ ]

6. Bldg. 13A, Radiochemistry Lab, Third Floor Annex

e. Localized Grid Maps



Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq]  
 500 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci}/\text{g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci}/\text{g}$ ]

6. Bldg. 13A, Radiochemistry Lab, Third Floor Annex

f. Prior to Photographs

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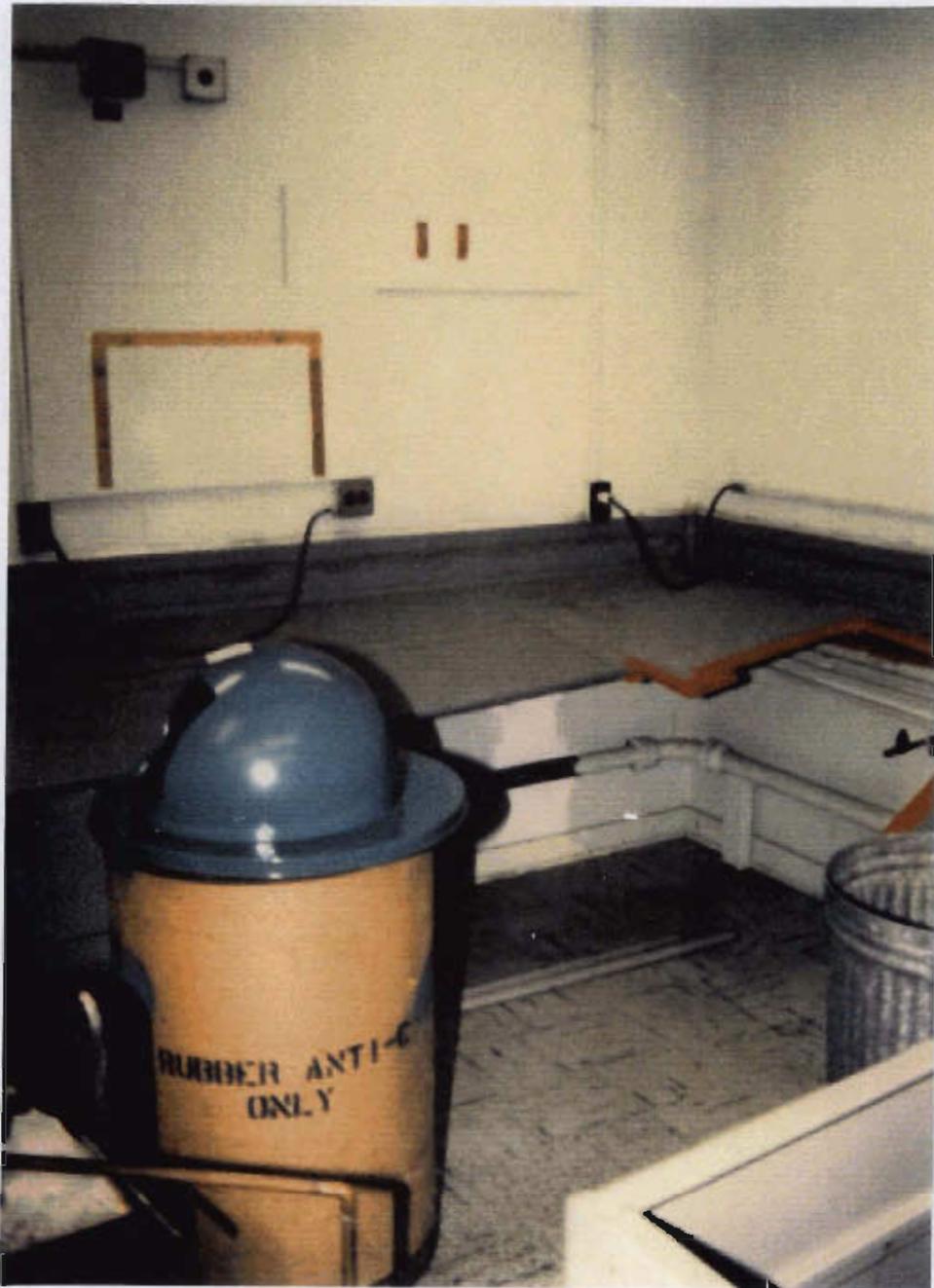


Facing south to wall 3 and Wall 4.

6. Bldg. 13A, Radiochemistry Lab, Third Floor Annex

f. Prior to Photographs

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Viewing east to wall 2 and wall 3.

6. Bldg. 13A, Radiochemistry Lab, Third Floor Annex

g. After Photographs, Radiochemistry Lab

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Facing southeast, walls 2, 3, and 4.

**7. Bldg. 13A, Radiochemistry Lab Overhead, Mezz.****a. Introduction:**

Building 13A is located in grid C-7 of the Charleston Naval Shipyard map (Figure 10). Building 13A is also known as the Building 13 Annex. This Annex is a three-story addition which was added in the 1950s. The third floor of the annex was used as a radiochemistry facility. In 1991 the radiochemistry facility was moved to Building 222 and remained there until closure.

**(1) Description:**

The Radiochemistry Lab Overhead is the area above the false ceiling in the radiochemistry laboratory. The overhead is accessible by a ladder in the polarographic room. The floor of the overhead is bare plywood, and the ceiling is wood. This area contains the radiochemistry lab ventilation HEPA filter and associated ducting.

**(2) Brief History:**

- (a) Use:** The Radiochemistry Lab Overhead was used as an area for the performance of radiological surveys associated with general system maintenance, which consisted of HEPA filter replacements and system performance checks.
- (b) Contaminated Systems:** Ventilation system upstream of HEPA filters and associated ducting.
- (c) Radiological History:** An area approximately 12' by 8' was established as a CSCA and an Airborne Radioactivity Work Area for the replacement of the ventilation HEPA filters, only the east wall was affected by this work. This work involved contamination levels of several thousand  $\mu\text{Ci}/100\text{cm}^2$ . Although this area was established as a high airborne radioactivity work area during filter maintenance, airborne radioactivity was not detected. Loose surface contamination levels in the Lab Overhead were maintained less than  $450\mu\text{Ci}/100\text{cm}^2$ .

**(3) Survey Requirements:**

Group 4 surveys were performed in this work area.

**b. Discussion:**

The Building 13A Radiochemistry Lab Overhead is categorized as a Group 4 area. Prior to performing Group 4 surveys, all potentially contaminated ventilation components and associated ducting were removed and disposed of as radioactive waste.

**7. Bldg. 13A, Radiochemistry Lab Overhead, Mezz.**

Group 4 refers to radiological work areas with radiological history indicating potential for contamination levels of 1000 - 10000 $\mu\text{Ci}/100\text{cm}^2$ . The floor, ceiling and wall were divided into approximately 3' by 3' sections where physically possible. Each grid was identified with a unique designation. One hundred percent of all 3' by 3' grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25% of all 3' by 3' grids were surveyed using the IM-253/PD (HV-2 GROSS). Solid material samples were taken from the area of highest potential within each grid. Additionally, solid material samples were taken from crevices in floor grids and wall grids below the 6' level.

The Building 13A Radiochemistry Lab Overhead was divided into twelve, 3' by 3' floor grids, twelve, 3' by 3' ceiling grids and eight, 3' by 3' wall grids. Individual backgrounds were used for this work area. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the floor and ceiling, were 40, 250 and 10000 counts per minute respectively. These radiation levels were based upon background levels obtained from Building 1123. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the wall were 40, 450, and 15000 counts per minute respectively. These radiation levels were also based upon background levels obtained from Building 1123.

A total of thirty-two, solid material samples were taken. Each solid sample was removed from the grid location indicating the area of highest potential. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212.

**c. Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than 450 $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

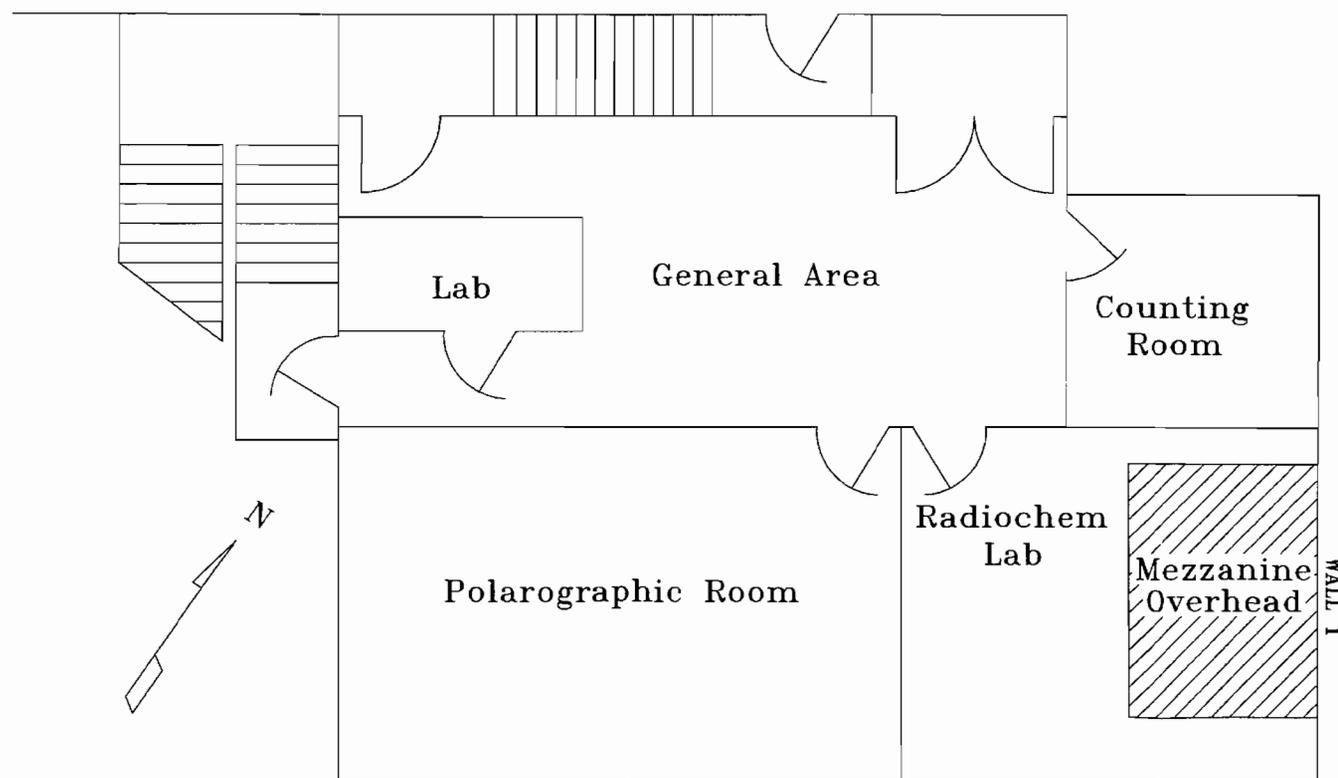
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of <0.17 pCi/g to a high of 0.76 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that all solid material samples were less than 1 pCi/g.

7. Bldg. 13A, Radiochemistry Lab Overhead, Mezz.

d. Site Map

Bldg. 13A Third Floor Annex/General Area



7. Bldg. 13A, Radiochemistry Lab Overhead, Mezz.

e. Localized Grid Maps

B	<450 450 - 0.83	<450 450 - 0.52	<450 450 - 0.55	<450 450 - 0.50
	<450 450 15000 0.72	<450 450 15000 0.75	<450 450 15000 0.64	<450 450 1500 0.71
A				
	1	2	3	4

WALL 1

D	<450 250 - 0.44	<450 250 - 0.32	<450 250 - 0.38
C	<450 350 15000 0.42	<450 350 15000 0.50	<450 350 15000 0.29
B	<450 250 15000 0.52	<450 250 15000 0.57	<450 250 15000 0.27
A	<450 250 15000 0.47	<450 250 15000 0.28	<450 250 15000 0.30
	1	2	3

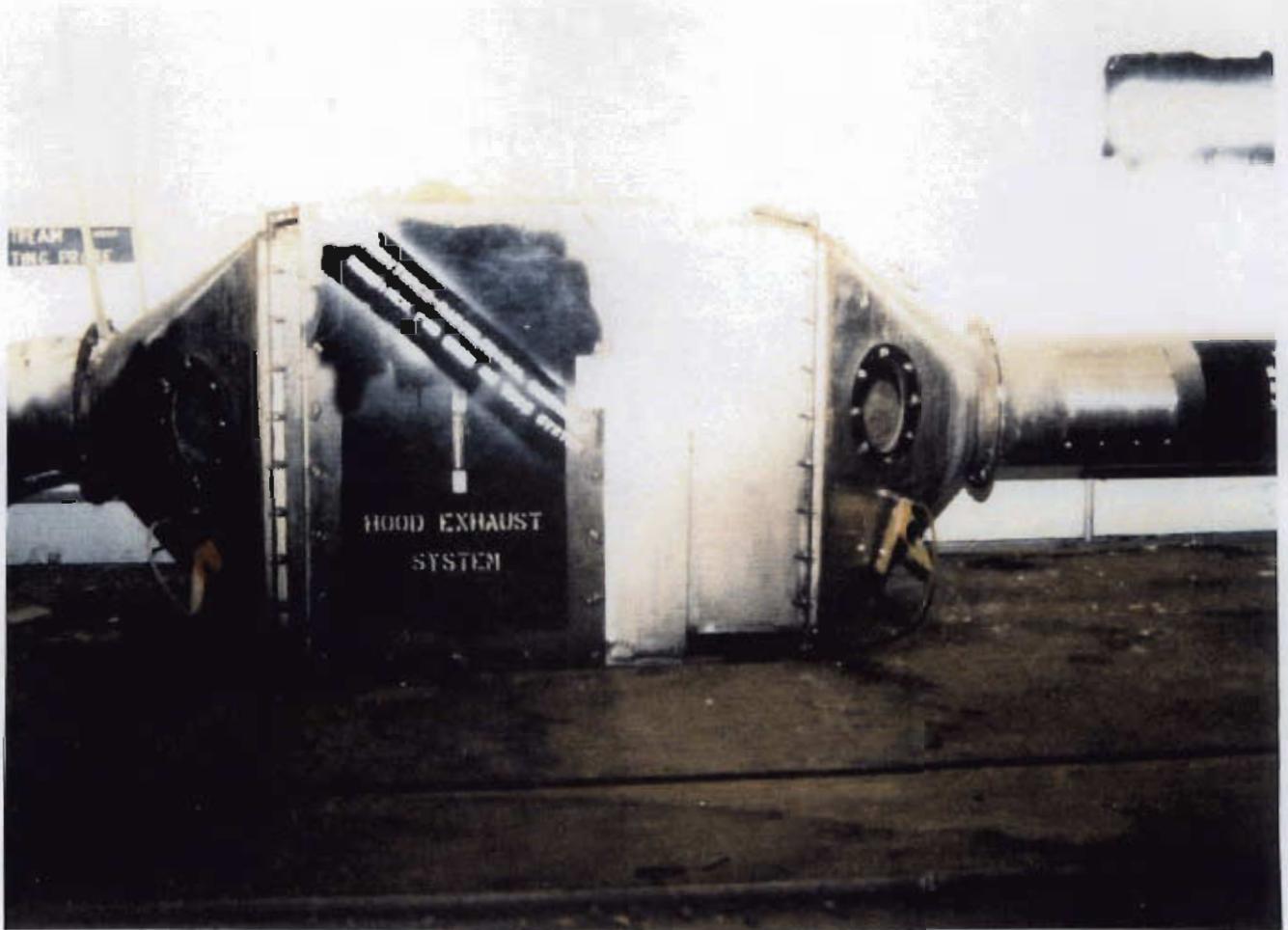
FLOOR



D	<450 250 - 0.18	<450 250 - 0.18	<450 250 - 0.17
C	<450 350 15000 0.20	<450 350 15000 0.20	<450 350 15000 0.48
B	<450 250 15000 0.19	<450 250 15000 0.16	<450 250 15000 0.27
A	<450 250 15000 0.20	<450 250 15000 0.25	<450 250 15000 0.20
	1	2	3

CEILING

- 7. Bldg. 13A, Radiochemistry Lab Overhead, Mezz.
    - f. Prior to Photographs
- 



Radiochemistry Lab hood exhaust system HEPA filter housing.

7. Bldg. 13A, Radiochemistry Lab Overhead, Mezz.

g. After Photographs, Radiochemistry Lab Overhead

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Looking northeast to wall 1.

**1. BUILDING 101 & 1426****a. Introduction:**

Building 101 was divided into seven individual areas. These areas were 101 Center Area, 101 Covered Storage Area, 101 East End, 101 Fenced Area and 20' perimeter, 101 North Storage Room, 101 South Storage Room, and 101 West End. Building 1426 is included in this report.

**b. Use:**

The Building 101 storage complex was one of the largest and most used radioactive material storage facilities at CNSY. The Building 101 Fenced Area was also the primary site for the shipment and receipt of radioactive material. Building 1426 was used for radioactive material storage and is located in the 101 complex.

**c. Radiological History:**

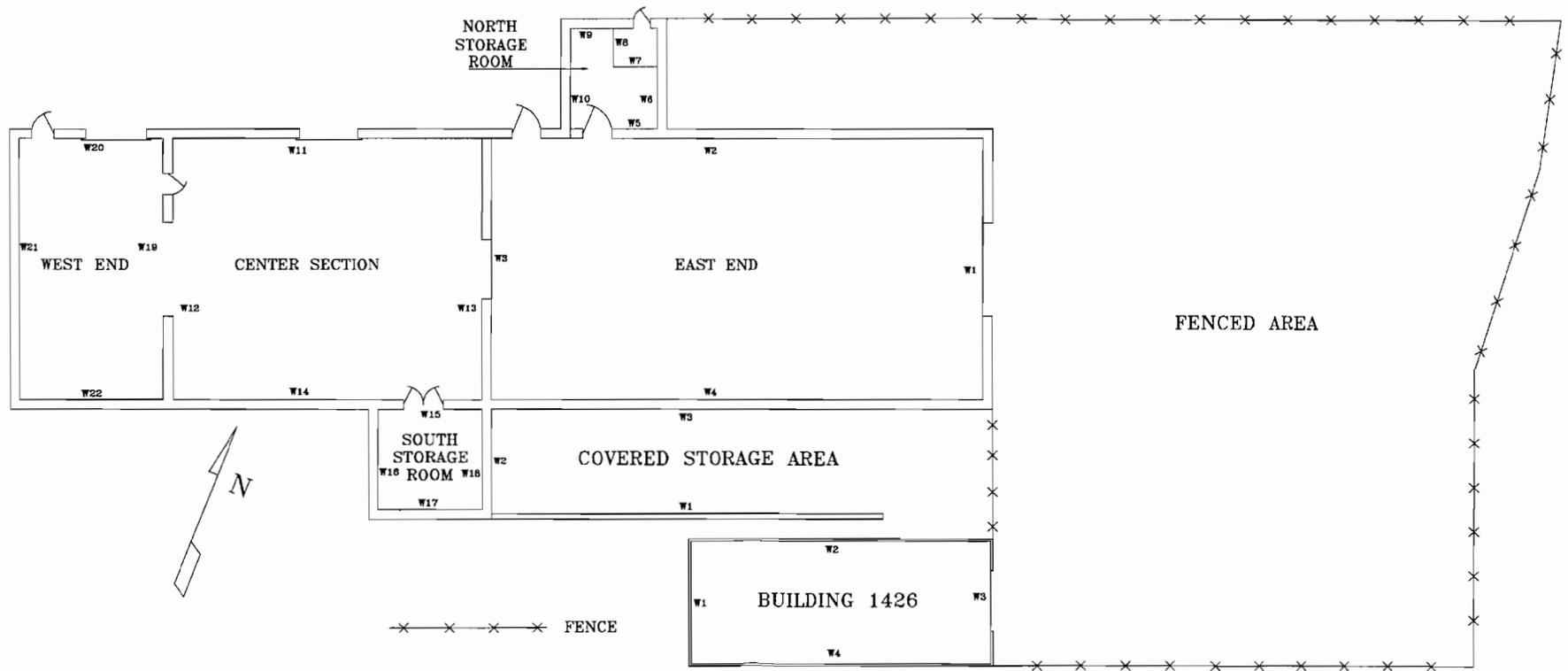
1. Radioactive liquid spills from drums, hoses and resin catch tanks.
2. Loose surface contamination detected on materials, equipment and material packaging.
3. Controlled as radiation areas, radioactive material storage areas and Controlled Surface Contamination Areas (CSCAs).
4. Storage of mixed sources containing the isotopes of plutonium and beryllium. These sources were sealed and shipyard records show no history of leakage from these sources.
5. Localized CSCAs established for minor work involving low levels of loose surface contamination.

**d. Survey Requirements:**

1. Building 101 Center Area - Group 3
2. Building 101 Covered Storage Area - Group 4
3. Building 101 East End - Group 4
4. Building 101 Fenced Area and 20' perimeter - Group 2, 3
5. Building 101 North Storage Room - Group 3, 6
6. Building 101 South Storage Room - Group 3
7. Building 101 West End - Group 3
8. Building 1426 - Group 3

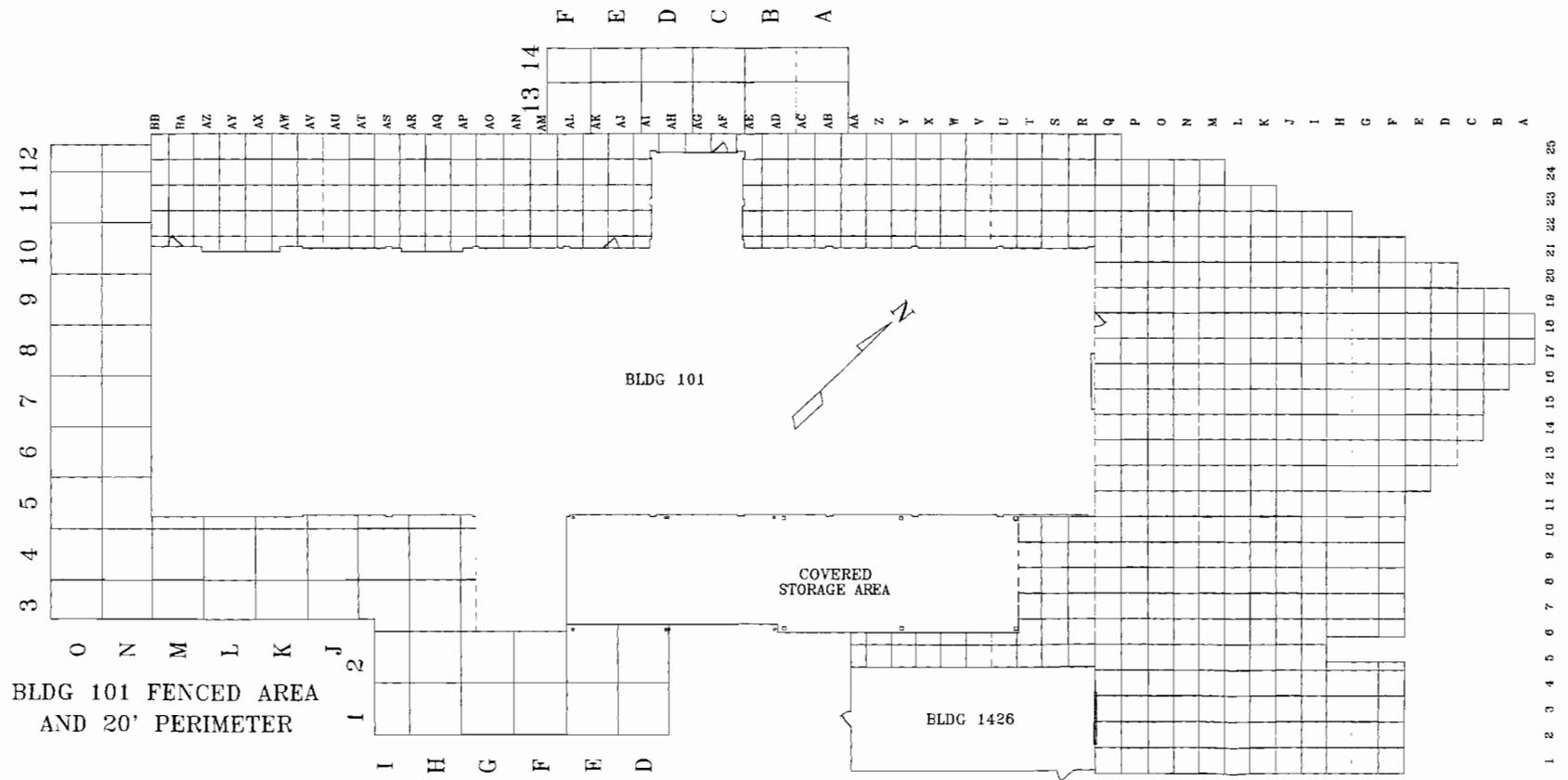
1. BUILDING 101 & 1426

e. Overall Grid Map



1. BUILDING 101 & 1426

e. Overall Grid Map (FENCED AREA & 20' PERIMETER)



## 2. BUILDING 101, CENTER AREA

### a. Introduction:

The Building 101 Center Area is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10).

#### (1) Description:

The room is approximately 50' wide by 50' long. The walls are masonry and the floor is painted concrete.

#### (2) Brief History:

(a) **Use:** This area was used primarily to store radioactive refueling equipment.

(b) **Radiological History:** This area has been controlled as a radiation area and radioactive material storage area. Localized CSCAs were established for contaminated work. Loose surface contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

#### (3) Survey Requirements:

Group 3 surveys were required for this room.

### b. Discussion:

The Building 101 Center Area was divided into 110, 5' by 5' floor grids and 42, 5' by 6' wall grids. Each grid was identified with its unique designation.

One hundred percent of all grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all grids were surveyed using the IM-253/PD (HV-2 GROSS). Additionally solid material samples were taken from each wall and floor grid with the exception of W12 A-5 and W12 A-6. These grids were not sampled due to the presence of unpainted metal surfaces.

Individual backgrounds were used for this radioactive material storage area. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete floor were 40, 225, 6,500 counts per minute respectively. These radiation levels were based upon background levels obtained from the deck of Building 233. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the block walls were 50, 400, 10000 counts per minute respectively. These radiation levels were based upon background levels obtained from Building M1116.

**2. BUILDING 101, CENTER AREA**

A total of 150 solid material samples were taken. Each solid sample was removed from the grid location indicating the area of highest potential. Solid samples taken from wall grids W13-A5 and W13-A6 consisted of paint and had a limit of 3 pCi/g. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212, lead 214, and thallium 208.

**c. Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than 450  $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

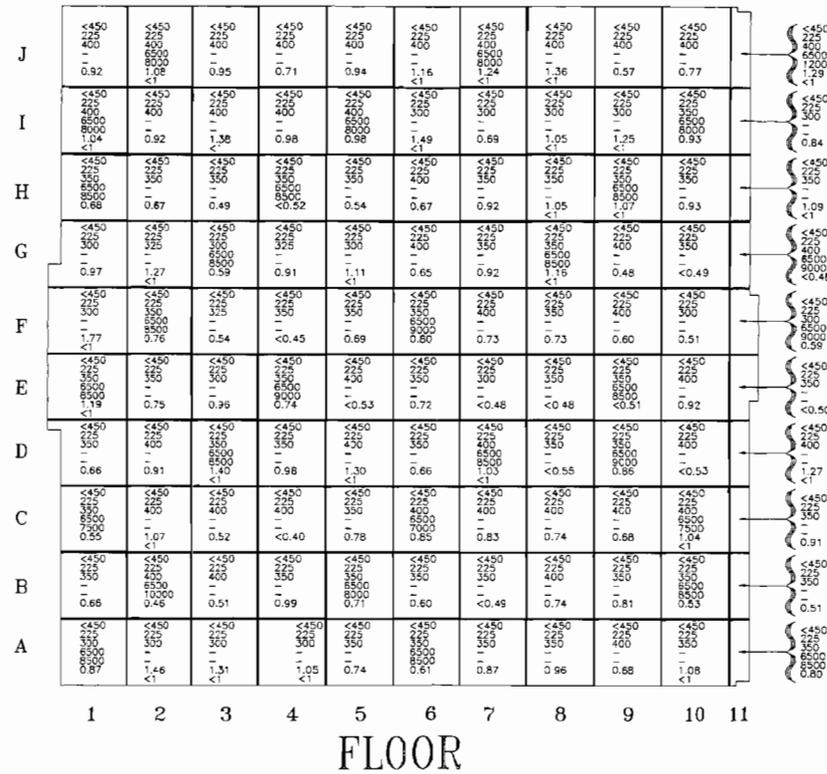
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than 0.40 pCi/g to a high of 4.98 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that solid material samples were less than 1 pCi/g for all non-paint samples and less than 3 pCi/g for all paint samples.

2. BUILDING 101, CENTER AREA

d. Localized Grid Maps



Sample Data  
<math>\leq 450</math> - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
200 - IM-253/PD (HV-1 PHA) [bkg.]  
300 - IM-253/PD (HV-1 PHA) [cpm]  
7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
7300 - IM-253/PD (HV-2 GROSS) [cpm]  
1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
<math>\leq 1</math> - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

2. BUILDING 101, CENTER AREA

e. Localized Grid Maps

W11	A	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450
		400	400	400	400	400	400	400	400	400	400
		500	500	500	500	500	500	500	500	500	500
		10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
		15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
		4.45	1.02	1.35	1.72	4.19	2.92	1.82	1.78	2.44	2.04
		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		1	2	3	4	5	6	7	8	9	10

W12	A	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450
		400	400	400	400	400	400	400	400	400	400	400
		500	450	450	350	300	300	500	550	600	400	650
		10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
		15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
		2.88	2.41	2.87	2.88	—	—	1.81	4.95	3.57	2.03	4.98
		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
		1	2	3	4	5	6	7	8	9	10	11

W13	A	<450	<450	<450	<450	<450	<450	<450	<450	<450	
		400	400	400	400	400	400	400	400	400	
		450	450	400	400	250	250	400	400	400	
		10000	10000	10000	10000	10000	10000	10000	10000	10000	
		30000	600	5000	10000	—	—	85000	—	—	
		1.24	0.60	0.76	0.61	<0.66	<0.89	1.19	1.14	1.66	
		<1	<1	<1	<1	<1	<1	<1	<1	<1	
		1	2	3	4	5	6	7	8	9	10

W14	A	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	
		400	400	400	400	400	400	400	400	400	400	
		500	500	600	600	600	600	500	400	450	500	
		10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	
		15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	
		2.34	1.35	1.40	4.41	3.81	3.07	4.02	0.90	0.94	1.16	
		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	
		1	2	3	4	5	6	7	8	9	10	11

Note: Samples taken from grids W13-A5 and W13-A6 consist of paint and have a limit of 3 pCi/g.

Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq/g]  
 300 - IM-253/PD (HV-1 PHA) [ppm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq/g]  
 7300 - IM-253/PD (HV-2 GROSS) [ppm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

2. BUILDING 101, CENTER AREA

f. Prior to Photographs

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Viewing toward east end door.

2. BUILDING 101, CENTER AREA

g. After Photographs

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Viewing toward east end door.

2. BUILDING 101, CENTER AREA

g. After Photographs

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Viewing toward west end roll-up door.

### 3. BUILDING 101, COVERED STORAGE AREA

#### a. Introduction:

The Covered Storage Area is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10). In 1987 this area was resurfaced and covered with a 15' high lean-to type structure attached to Building 101 on the north and west sides.

#### (1) Description:

The area is approximately 24' wide by 90' long. The north and west walls are masonry and the floor is asphalt covered concrete. The south wall and ceiling is constructed of unpainted corrugated metal supported by steel beams. The east end of the covered area is open.

#### (2) Brief History:

(a) **Use:** This area was used to store a variety of radioactive materials such as 55 gallon drums, shipping boxes and resin casks. The area was used as a radioactive material storage area since the 1960s.

(b) **Radiological History:** This area has been controlled as a radiation area and radioactive material storage area. On one occasion a leaking drum of radioactive liquid was discovered. Loose surface contamination levels of several thousand micro curies per one hundred centimeters squared was released as a result of this leak. Following this incident the area was decontaminated to less than 450  $\mu\text{Ci}/100\text{cm}^2$ . Loose surface contamination levels were otherwise maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

#### (3) Survey Requirements:

Group 4 surveys were required for this storage area.

#### b. Discussion:

The Building 101 Covered Storage Area was divided into 225, 3' by 3' floor grids and 30, 9' by 9' ceiling grids. The walls were divided into 268, 3' by 3' wall grids under 12' high and 20, 9' by 9' grids above 12'. Each grid was identified with its unique designation.

One hundred percent of all 3' by 3' grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all 3' by 3' grids were surveyed using the IM-253/PD (HV-2 GROSS). Twenty-five percent of all 9' by 9' grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all 9' by 9' grids were surveyed using the

**3. BUILDING 101, COVERED STORAGE AREA**

IM-253/PD (HV-2 GROSS). Solid material samples were taken from 100 percent of the 3' by 3' grids and 25 percent of the 9' by 9' grids. If the surface was unpainted metal, then no solid sample was required. Additionally, solid material samples were taken from selected structural joints and crevices. Results from these samples were incorporated into the report by utilizing the higher of the normal grid sample or the joint/crevice sample results.

Individual backgrounds were used for this radioactive material storage area. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the asphalt covered concrete floor were 80, 650, 15000 counts per minute respectively. These radiation levels were based upon background levels obtained from the roadway west of Building 236. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the block walls were 80, 650, 15,000 counts per minute respectively. These radiation levels were based upon background levels obtained from Building 1123.

A total of 390 solid material samples were taken. Each solid material sample taken was removed from the grid location indicating the area of highest potential for contamination. The majority of Wall 1 and all of the ceiling grids were unpainted metal, therefore no solid samples were required. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212, lead 214, thallium 208, potassium 40, and bismuth 214.

**c. Summary:**

Surveys performed with the IM-247/PD detected 41 areas greater than 450  $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected 90 areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) detect 102 areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than 0.32 pCi/g to a high of 7.05 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that all solid material samples were less than 1 pCi/g.

3. BUILDING 101, COVERED STORAGE AREA

e. Localized Grid Maps

W3

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1		
A	<450 850 706 — 2.84 <.1	<450 850 850 — 3.02 <.1	<450 850 15000 — 4.38 <.1	<450 850 450 — 3.19 <.1	<450 850 600 — 2.60 <.1	<450 850 500 — 3.88 <.1	<450 850 15000 — 1.70 <.1	<450 850 400 — 3.04 <.1	<450 850 600 — 3.50 <.1	<450 850 15000 — 3.57 <.1	<450 850 500 — 3.15 <.1	<450 850 15000 — 3.15 <.1	<450 850 15000 — 3.15 <.1	<450 850 15000 — 3.15 <.1	<450 850 15000 — 3.15 <.1	<450 850 15000 — 3.15 <.1	
B	<450 850 756 — 2.73 <.1	<450 850 900 — 3.02 <.1	<450 850 15000 — 2.37 <.1	<450 850 450 — 2.48 <.1	<450 850 600 — 2.99 <.1	<450 850 500 — 3.76 <.1	<450 850 15000 — 3.01 <.1	<450 850 400 — 2.80 <.1	<450 850 600 — 3.51 <.1	<450 850 15000 — 3.88 <.1	<450 850 500 — 3.40 <.1	<450 850 15000 — 3.20 <.1	<450 850 15000 — 2.88 <.1	<450 850 15000 — 3.57 <.1	<450 850 15000 — 2.92 <.1		
C	<450 850 15000 15000 2.50 <.1	<450 850 15000 15000 2.75 <.1	<450 850 15000 15000 2.75 <.1	<450 850 400 — 2.88 <.1	<450 850 500 — 2.88 <.1	<450 850 500 — 3.34 <.1	<450 850 15000 — 2.40 <.1	<450 850 15000 — 2.60 <.1	<450 850 15000 — 2.70 <.1	<450 850 15000 — 2.45 <.1	<450 850 15000 — 2.44 <.1	<450 850 15000 — 3.80 <.1	<450 850 15000 — 3.01 <.1	<450 850 15000 — 2.91 <.1	<450 850 15000 — 2.23 <.1		
D	<450 850 756 — 2.59 <.1	<450 850 800 — 2.96 <.1	<450 850 800 — 2.93 <.1	<450 850 450 — 2.90 <.1	<450 850 600 — 2.89 <.1	<450 850 500 — 1.51 <.1	<450 850 15000 — 3.34 <.1	<450 850 15000 — 2.50 <.1	<450 850 15000 — 3.08 <.1	<450 850 15000 — 3.10 <.1	<450 850 15000 — 2.78 <.1	<450 850 15000 — 2.36 <.1	<450 850 15000 — 3.38 <.1	<450 850 15000 — 3.35 <.1			
E	<450 850 756 — 2.78 <.1	<450 850 800 — 2.54 <.1	<450 850 800 — 2.44 <.1	<450 850 450 — 2.71 <.1	<450 850 600 — 2.80 <.1	<450 850 500 — 2.32 <.1	<450 850 15000 — 2.40 <.1	<450 850 15000 — 2.84 <.1	<450 850 15000 — 2.75 <.1	<450 850 15000 — 2.85 <.1	<450 850 15000 — 2.85 <.1	<450 850 15000 — 2.78 <.1	<450 850 15000 — 2.78 <.1	<450 850 15000 — 2.73 <.1	<450 850 15000 — 2.44 <.1		
F	<450 850 756 — 2.83 <.1	<450 850 800 — 2.77 <.1	<450 850 800 — 2.36 <.1	<450 850 450 — 2.73 <.1	<450 850 600 — 2.58 <.1	<450 850 500 — 2.58 <.1	<450 850 15000 — 2.77 <.1	<450 850 15000 — 2.68 <.1	<450 850 15000 — 2.61 <.1	<450 850 15000 — 2.94 <.1	<450 850 15000 — 2.85 <.1	<450 850 15000 — 2.81 <.1	<450 850 15000 — 2.87 <.1	<450 850 15000 — 2.87 <.1	<450 850 15000 — 2.40 <.1		
G	<450 850 756 — 2.04 <.1	<450 850 450 — 2.44 <.1	<450 850 450 — 2.43 <.1	<450 850 600 — 2.85 <.1	<450 850 500 — 2.47 <.1	<450 850 500 — 2.75 <.1	<450 850 15000 — 2.85 <.1	<450 850 15000 — 2.05 <.1	<450 850 15000 — 2.25 <.1	<450 850 15000 — 2.47 <.1	<450 850 15000 — 2.33 <.1	<450 850 15000 — 2.40 <.1	<450 850 15000 — 2.48 <.1	<450 850 15000 — 2.66 <.1	<450 850 15000 — 2.42 <.1		
H	<450 850 706 — 2.34 <.1	<450 850 800 — 2.50 <.1	<450 850 15000 — 2.12 <.1	<450 850 450 — 2.70 <.1	<450 850 600 — 2.14 <.1	<450 850 500 — 2.67 <.1	<450 850 15000 — 2.86 <.1	<450 850 15000 — 2.14 <.1	<450 850 15000 — 2.93 <.1	<450 850 15000 — 2.11 <.1	<450 850 15000 — 2.11 <.1	<450 850 15000 — 2.11 <.1	<450 850 15000 — 2.11 <.1	<450 850 15000 — 2.10 <.1	<450 850 15000 — 2.17 <.1		

W1

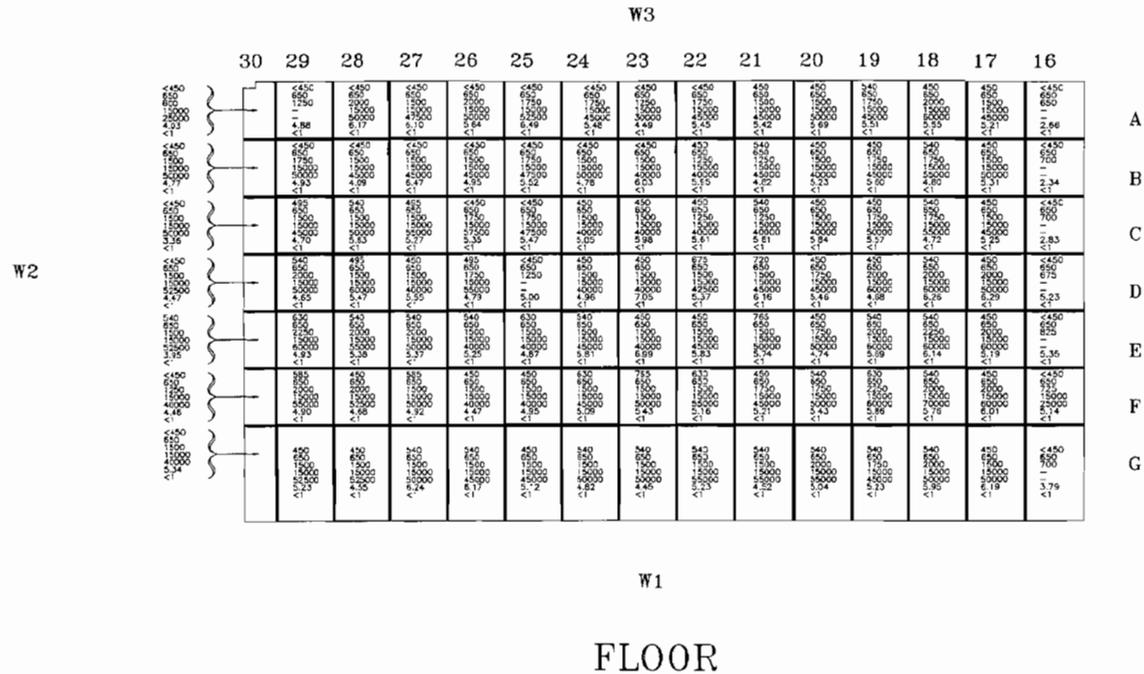
FLOOR



Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 230 - IM-253/PD (HV-1 PHA) [bkg.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci}/\text{g}$ ]  
 <.1 - MCA Specific Co-60 Results [ $\mu\text{Ci}/\text{g}$ ]

3. BUILDING 101, COVERED STORAGE AREA

e. Localized Grid Maps



**Notes:**

(1) Areas surveyed with an IM-247/PD, indicating detectable activity greater than or equal to 450  $\mu\text{Ci}/20\text{cm}^2$  were sampled and analyzed by spectral analysis. In these cases, analysis of the spectrum indicated only photopeaks of naturally occurring isotopes not associated with the Naval Nuclear Propulsion Program. These natural isotopes include K-40, Ra-226, Po-212, Bi-214, Be-7, Th-208 and Ac-228.

(2) High activity readings with the IM-247/PD and the IM-253/PO in grids with low gross gamma solid surface sample results were investigated. Core samples were taken in areas where high readings were noted. Core sample results indicated high natural radioactivity levels in the aggregates of the asphalt and the soil beneath the asphalt.

**Sample Data**

<450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 233 - IM-253/PO (HV-1 PHA) [cpm]  
 300 - IM-253/PO (HV-1 PHA) [cpm]  
 7000 - IM-253/PO (HV-2 GROSS) [bk/g]  
 7300 - IM-253/PO (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3. BUILDING 101, COVERED STORAGE AREA

e. Localized Grid Maps

W1

E	<450 650 15000														
D	<450 650 15000														
C	<450 650 15000														
B	<450 650 15000														
A	<450 650 15000														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [pkg.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [pkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

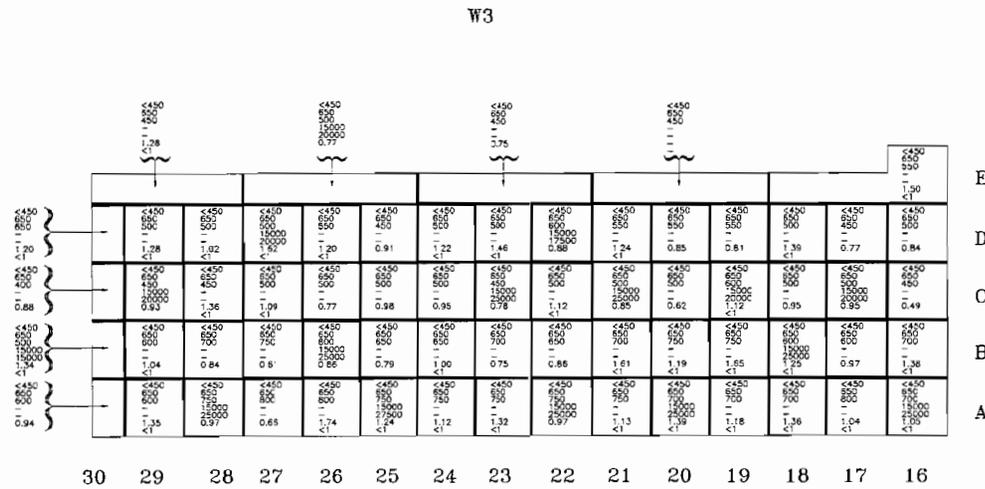






3. BUILDING 101, COVERED STORAGE AREA

e. Localized Grid Maps



**Sample Data**  
 <450 – IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 207 – IM-253/PD (HV-1 PHA) [Bq.]  
 307 – IM-253/PD (HV-1 PHA) [cpm]  
 7000 – IM-253/PD (HV-2 GROSS) [Bq.]  
 7500 – IM-253/PD (HV-2 GROSS) [cpm]  
 1182 – MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 – MCA Specific Co-60 Results [pCi/g]

3. BUILDING 101, COVERED STORAGE AREA

e. Localized Grid Maps

CEILING

10	9	8	7	6	
<450 650 650 - - -	<450 650 300 15000 10000 -	<450 650 300 15000 20000 -	<450 650 300 - - -	<450 650 300 15000 10000 -	A
<450 650 650 - - -	<450 650 675 15000 20000 -	<450 650 675 - - -	<450 650 300 - - -	<450 650 300 - - -	B
↑ ~~~~~ <450 650 525 15000 17500 -	↑ ~~~~~ <450 650 650 - - -	↑ ~~~~~ <450 650 800 15000 10000 -	↑ ~~~~~ <450 650 300 - - -	↑ ~~~~~ <450 650 300 - - -	C

**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [pCi]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7300 - IM-253/PD (HV-2 GROSS) [pCi]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3. BUILDING 101, COVERED STORAGE AREA

e. Localized Grid Maps

CEILING

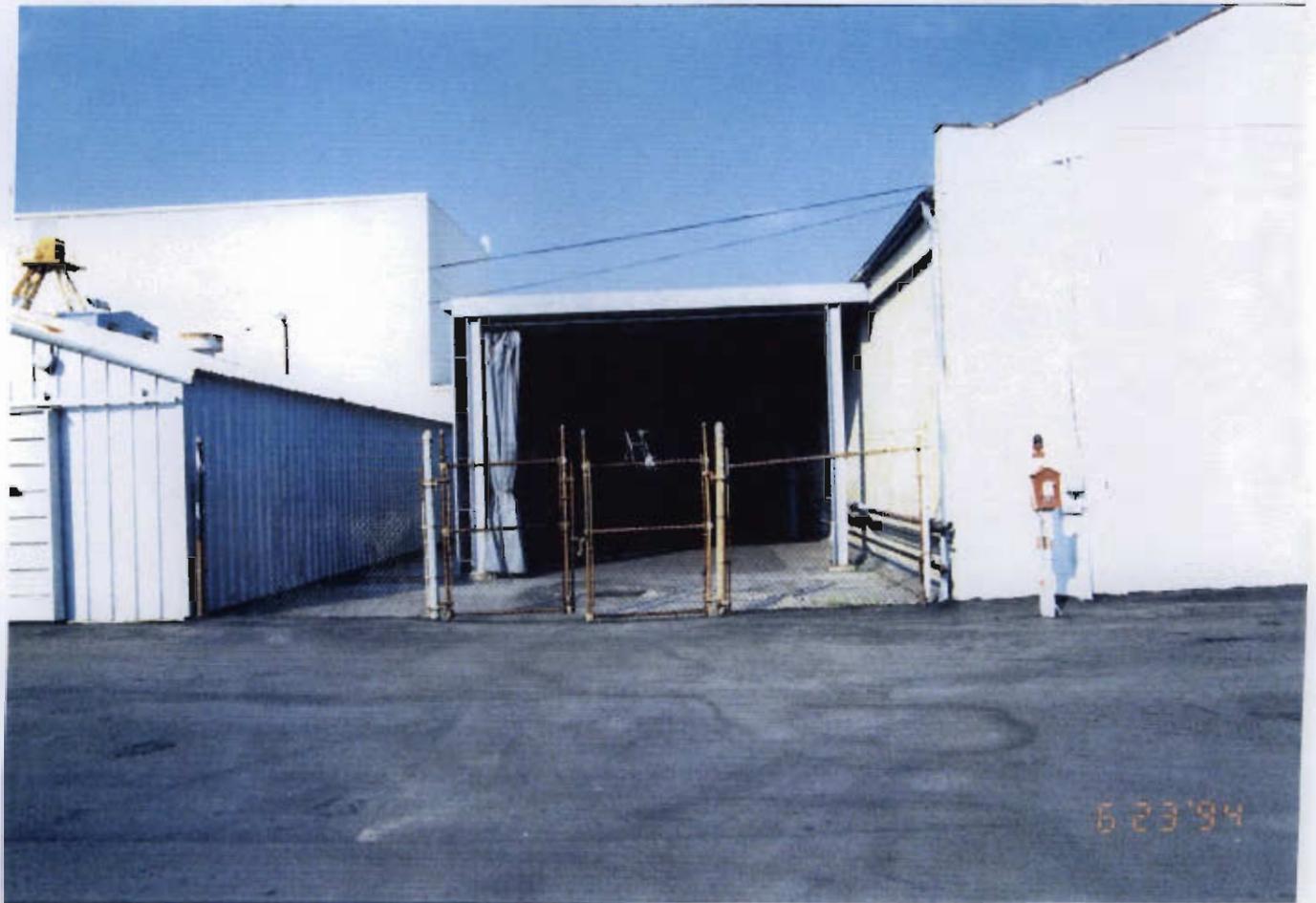
	5	4	3	2	1	
	<450 650 300 - - -	<450 650 300 - - -	<450 650 300 - - -	<450 650 300 - - -	<450 650 350 15000 8000 - -	A
	<450 650 300 - - -	<450 650 300 - - -	<450 650 350 15000 10000 - -	<450 650 300 - - -	<450 650 250 - - -	B
	<450 650 300 15000 10000 - -	<450 650 300 - - -	<450 650 250 - - -	<450 650 250 15000 7500 - -	<450 650 250 - - -	C

**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq/g]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq/g]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 .82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3. BUILDING 101, COVERED STORAGE AREA

f. Prior to Photographs

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Viewing toward entrance of covered area.

3. BUILDING 101, COVERED STORAGE AREA

f. Prior to Photographs

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Viewing into covered area.

3. BUILDING 101, COVERED STORAGE AREA

f. Prior to Photographs

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Looking at ceiling of covered area.

3. BUILDING 101, COVERED STORAGE AREA

g. After Photographs

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Viewing toward Wall 1.

3. BUILDING 101, COVERED STORAGE AREA

g. After Photographs

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Viewing toward Wall 2.

**4. BUILDING 101, EAST END****a. Introduction:**

The Building 101 East End is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

The room is approximately 104' wide by 50' long. The walls are masonry and the floor is painted concrete.

**(2) Brief History:**

- (a) Use:** A wide variety of equipment and material including radioactive resin catch tanks and drums of radioactive waste have been stored on the floor and on shelves in this area. Radioactive liquid transfer hoses were also stored on the raised metal platform in the center of this room.
- (b) Radiological History:** This area has been controlled as a radiation area and radioactive material storage area. Temporary localized CSCAs were established for minor contaminated work. On occasion, material and equipment have been found with uncontrolled loose surface contamination on them. Additionally, radioactive liquids have also been found leaking from resin catch tanks and hoses stored in this area. Following these incidents, all affected areas were decontaminated to less than 450  $\mu\text{Ci}/100\text{cm}^2$ . Loose surface contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .
- (c) Items removed:** The raised metal platform, 25% of the painted concrete floor, the personal access doors on Wall 1 and Wall 2 and the roll-up doors on Wall 1 and Wall 3 were removed and disposed of as radioactive waste. Surveys and solid samples were not required from the items listed above.

**(3) Survey Requirements:**

Group 4 surveys were required for this room.

**b. Discussion:**

The Building 101 East End was divided into a total of 1003 grids. The floor was divided into 3' by 3' grids. The wall grids were divided into 3' by 3' grids below 12' and 9' by 9' grids above 12'. Each grid was identified with its unique designation. As stated in the CNSY Radiological Survey Plan, the overhead of this room was not surveyed in accordance with the typical Group 4 ceiling surveys. These surveys were not performed due to this area's structural

**4. BUILDING 101, EAST END**

arrangement and its low potential for contamination. In lieu of the typical Group 4 surveys, a representative selection of paint samples from the ceiling trusses, trolley tracks and trolley were removed and analyzed.

One hundred percent of all 3' by 3' grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all 3' by 3' grids were surveyed using the IM-253/PD (HV-2 GROSS). Twenty-five percent of all 9' by 9' grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all 9' by 9' grids were surveyed using the IM-253/PD (HV-2 GROSS). Solid material samples were taken from 100 percent of the 3' by 3' grids and 25 percent of the 9' by 9' grids. Additionally, solid material samples were taken from selected structural joints and crevices. Results from these samples were incorporated into the report by utilizing the higher of the normal grid sample or the joint/crevice sample results.

Individual backgrounds were used for this radioactive material storage area. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete floor were 40, 225, 6500 counts per minute respectively. These radiation levels were based upon background levels obtained from the deck of Building 233. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the block walls were 50, 400, 10000 counts per minute respectively. These radiation levels were based upon background levels obtained from Building M1116.

A total of 976 solid material samples were taken. Each solid sample was removed from the grid location indicating the area of highest potential. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212, lead 214, and thallium 208.

**c. Summary:**

Surveys performed with the IM-247/PD detected one area equal to 450  $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected two areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) detected 20 areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than 0.34 pCi/g to a high of 9.17 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that solid material samples were less than 1 pCi/g for all non-paint samples and less than 3 pCi/g for all paint samples.



4. BUILDING 101, EAST END

e. Localized Grid Maps

FLOOR

H	<450 225 300 10000 <1	<450 225 300 10000 1.69 <1	<450 225 300 10000 1.53 <1	<450 225 300 10000 1.80 <1	<450 225 300 10000 1.77 <1	<450 225 300 10000 2.19 2.1	<450 225 300 10000 1.42 <1	<450 225 300 10000 1.20 0.99	<450 225 300 10000 1.22 <1
G	<450 225 300 10000 1.15 <1	<450 225 300 10000 1.46 <1	<450 225 300 10000 2.09 <1	<450 225 300 10000 1.39 <1	<450 225 300 10000 1.26 <1	<450 225 300 10000 2.19 1.75	<450 225 300 10000 1.09 <1	<450 225 300 10000 1.41 <1	<450 225 300 10000 1.16 1.25
F	<450 225 300 10000 1.34 <1	<450 225 300 10000 1.28 <1	<450 225 300 10000 1.27 <1	<450 225 300 10000 1.85 <1	<450 225 300 10000 1.27 <1	<450 225 300 10000 1.75 0.66	<450 225 300 10000 0.86 <1	<450 225 300 10000 0.97 <1	<450 225 300 10000 1.28 1.19
E	<450 225 300 10000 1.27 <1	<450 225 300 10000 1.28 <1	<450 225 300 10000 1.41 <1	<450 225 300 10000 1.10 <1	<450 225 300 10000 1.40 <1	<450 225 300 10000 0.51 0.70	<450 225 300 10000 0.70 0.46	<450 225 300 10000 0.70 0.46	<450 225 300 10000 1.28 1.06
D	<450 225 300 10000 1.33 <1	<450 225 300 10000 0.92 <1	<450 225 300 10000 1.00 <1	<450 225 300 10000 1.17 <1	<450 225 300 10000 1.43 <1	<450 225 300 10000 1.17 1.57	<450 225 300 10000 1.27 0.81	<450 225 300 10000 0.81 1.28	<450 225 300 10000 1.28 1.81
C	<450 225 300 10000 0.91 <1	<450 225 300 10000 1.33 <1	<450 225 300 10000 1.60 <1	<450 225 300 10000 1.24 <1	<450 225 300 10000 1.36 <1	<450 225 300 10000 1.67 1.67	<450 225 300 10000 1.38 1.43	<450 225 300 10000 1.23 1.43	<450 225 300 10000 1.19 1.19
B	<450 225 300 10000 1.26 <1	<450 225 300 10000 1.50 <1	<450 225 300 10000 1.25 <1	<450 225 300 10000 0.99 <1	<450 225 300 10000 1.27 <1	<450 225 300 10000 1.11 1.11	<450 225 300 10000 1.08 1.08	<450 225 300 10000 0.99 0.96	<450 225 300 10000 1.26 1.26
A	<450 225 300 10000 1.43 <1	<450 225 300 10000 1.68 <1	<450 225 300 10000 1.65 <1	<450 225 300 10000 1.28 <1	<450 225 300 10000 1.41 <1	<450 225 300 10000 0.88 0.88	<450 225 300 10000 1.21 <1	<450 225 300 10000 1.16 1.48	<450 225 300 10000 1.87 1.87

W1

W4

Sample Data  
 <450 - IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 - IM-253/PD (HV-1 PHA) [Bq.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq.]  
 13000 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]



4. BUILDING 101, EAST END

e. Localized Grid Maps

FLOOR

W2

Q	<450 350 — 1.35 <1	<450 225 400 19000 0.77 <1	<150 225 400 — 0.97	<450 225 375 — 0.68	<450 225 400 — <1	<450 225 400 8500 15000 2.81 <1	<450 225 350 — 1.02	<450 225 400 — 1.30 <1	<450 225 350 — 1.46 <1	<450 225 375 — 1.72 <1
P	<450 275 275 — 0.86	<450 225 250 — 1.37	<150 225 250 — 0.66	<450 225 250 — <1	<450 225 250 — 1.63	<450 225 250 — 1.38	<450 225 250 — 1.23	<450 225 250 — 1.50	<450 225 250 — 1.45	<150 225 400 — 2.82 <1
O	<450 225 225 — 1.38	<450 225 225 — 1.43	<150 225 250 — 1.30	<450 225 250 — 1.10	<450 225 250 — 1.33	<450 225 250 — 1.24	<450 225 250 — 1.32	<450 225 250 — 1.20	<450 225 250 — 1.12	<150 225 250 — 1.08 <1
N	<450 300 — 1.40 <1	<450 300 — 1.32 <1	<150 300 — 1.46 <1	<450 225 350 — 0.60	<450 225 350 — 1.42 <1	<450 225 350 — 1.96 <1	<450 225 350 — 1.46 <1	<450 225 350 — 1.39 <1	<450 225 350 — 1.27 <1	<450 225 350 — 1.54 <1
M	<450 175 — 1.74 <1	<450 300 — 1.65 <1	<150 300 — 1.74 <1	<450 225 350 — 1.47 <1	<450 225 350 — 1.68 <1	<450 225 350 — 1.35 <1	<450 225 350 — 1.42 <1	<450 225 350 — 1.14 <1	<450 225 350 — 1.77 <1	<450 225 350 — 1.00 <1
L	<450 625 8500 1.00 <1	<450 225 — 0.71 <1	<150 225 8500 — 1.43 <1	<450 225 8500 — 1.25 <1	<450 225 8500 — 1.26 <1	<450 225 8500 — 1.44 <1	<450 225 8500 — 1.42 <1	<450 225 8500 — 1.33 <1	<450 225 8500 — 0.79 <1	<150 225 8500 — 2.28 <1
K	<450 225 — 1.42 <1	<450 300 — 1.06 <1	<150 300 — 1.30 <1	<450 225 350 — 1.21 <1	<450 225 350 — 1.13 <1	<450 225 350 — 1.88 <1	<450 225 350 — 1.61 <1	<450 225 350 — 1.64 <1	<450 225 350 — 1.39 <1	<150 225 350 — 1.13 <1
J	<450 225 8500 1.00 <1	<450 225 300 — 1.26 <1	<150 225 300 — 1.39 <1	<450 225 300 — 1.05 <1	<450 225 300 — 1.05 <1	<450 225 300 — 1.27 <1	<450 225 300 — 1.23 <1	<450 225 300 — 1.44 <1	<450 225 300 — 1.22 <1	<150 225 300 — 1.54 <1
I	<450 225 — 3.02 <1	<450 225 — 1.45 <1	<150 225 — 1.60 <1	<450 225 — 1.62 <1	<450 225 — 1.74 <1	<450 225 — 1.52 <1	<450 225 — 2.07 <1	<450 225 — 1.52 <1	<450 225 — 1.87 <1	<150 225 — 1.75 <1

W1

Sample Data  
 <450 - IM-247:PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253:PD (HV-1 PHA) [pCi]  
 300 - IM-253:PD (HV-1 PHA) [cpm]  
 7000 - IM-253:PD (HV-2 GROSS) [pCi]  
 7300 - IM-253:PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

4. BUILDING 101, EAST END

e. Localized Grid Maps

W1

E	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
D	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450
	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
	2.17	2.50	2.50	2.96	2.34	2.79	2.34	2.96	2.34	2.79	2.34	2.79	2.34	2.79	2.34	2.79	2.34
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
C	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450
	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
	8.70	7.81	8.43	8.11	8.11	8.11	8.11	8.11	8.11	8.11	8.11	8.11	8.11	8.11	8.11	8.11	8.11
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
B	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450
	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
	1.44	2.76	2.95	3.29	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17	3.17
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
A	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450
	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
	2.46	2.52	2.15	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Sample Data  
 <450 - IM-247PD Results [µCi/200cm]  
 200 - IM-2S3PD IHV-1 PHA) [Bq]  
 300 - IM-2S3PD IHV-1 PHA) [cpm]  
 7000 - IM-2S3PD IHV-2 GROSS) [Bq]  
 7300 - IM-2S3PD IHV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Spec'ic Co-60 Results [pCi/g]

4. BUILDING 101, EAST END

e. Localized Grid Maps

W2

E																		
D																		
C																		
B			ACCESS															
A			OPENING															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Sample Data  
 <45C - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 20C - IM-253/PD (HV-1 PHA) [bkg.]  
 30C - IM-253/PD (HV-1 PHA) [cpm]  
 700C - IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci}/\text{g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci}/\text{g}$ ]



4. BUILDING 101, EAST END

e. Localized Grid Maps

W3

E																	
D																	
C																	
B																	
A																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

4. BUILDING 101, EAST END

e. Localized Grid Maps

W4

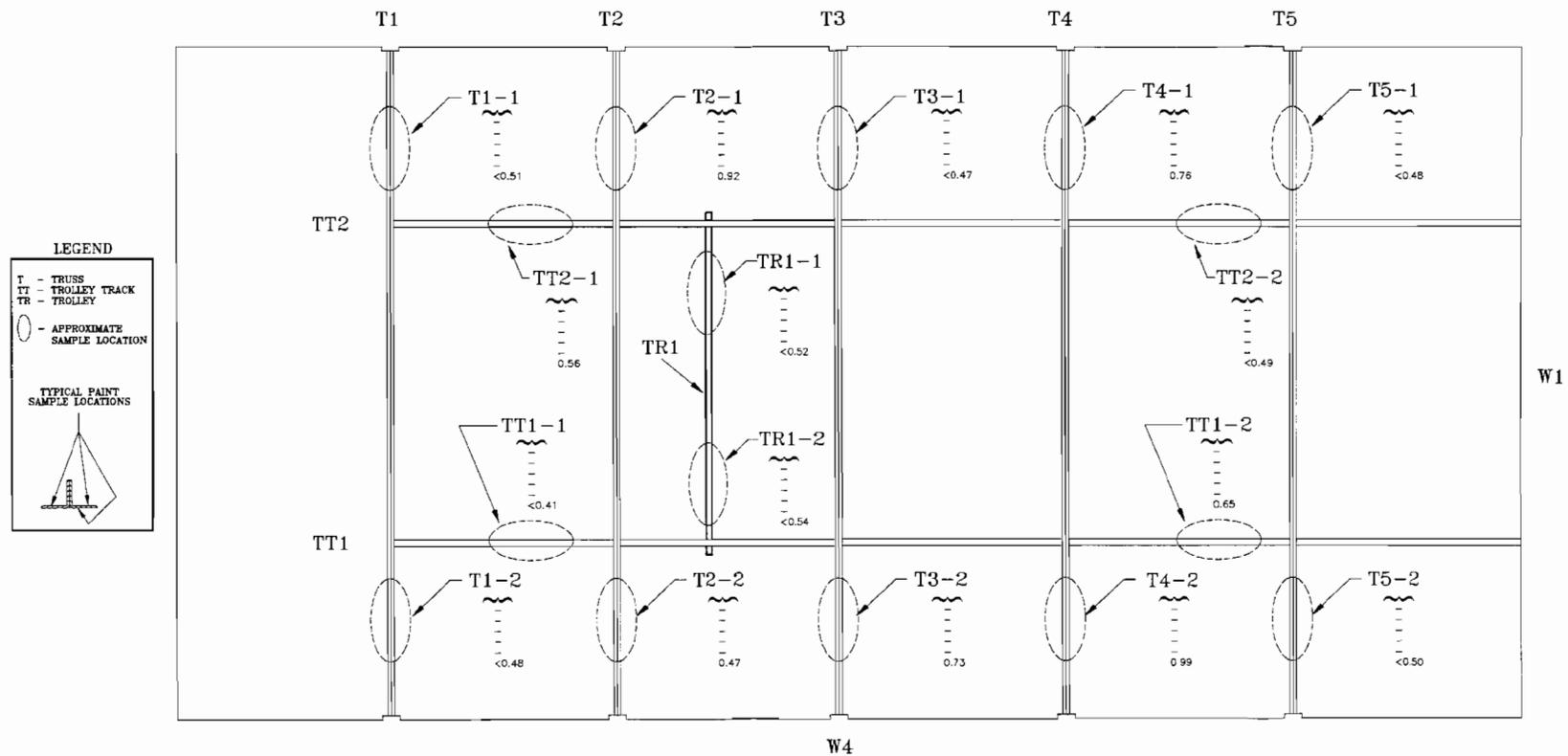
E																		
D																		
C																		
B																		
A																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

Sample Data  
 <450 - IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 230 - IM-253/PD (HV-1 PHA) [bq.]  
 330 - IM-253/PD (HV-1 PHA) [cpm]  
 7200 - IM-253/PD (HV-2 GROSS) [bq.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]



4. BUILDING 101, EAST END

e. Localized Grid Maps



**Note:**  
All solid samples taken consist of paint and have a limit of 3 pCi/g.

**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{g}/20\text{cm}^2$ ]  
 200 - IM-253PD (HV-1 PHA) [bkg.]  
 300 - IM-253PD (HV-1 PHA) [cpm]  
 7000 - IM-253PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253PD (HV-2 GROSS) [cpm]  
 1.52 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

4. BUILDING 101, EAST END

f. Prior to Photographs

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Facing toward center area doorway.

4. BUILDING 101, EAST END

g. During Photographs

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Viewing toward center area doorway.

4. BUILDING 101, EAST END

g. After Photographs

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Facing Wall 1.

**5. BUILDING 101, FENCED AREA & 20' PERIMETER****a. Introduction:**

The Building 101 Fenced Area and 20' perimeter is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

The Fenced Area consists of an area approximately 50' wide by 100' long. Ground covering is asphalt, dirt, and concrete surrounded by a 12' high chain link fence. In addition, the 20' Perimeter Area surrounds other portions of Building 101 and the fenced area.

**(2) Brief History:**

(a) **Use:** Temporary radioactive material storage areas were established to control radioactive material before and after transfer.

(b) **Radiological History:** Portions of this area were controlled as a radiation and radioactive material storage areas. Building 101 Fenced Area was the shipyard's primary site for the shipment and receipt of radioactive material. On occasion the shipyard has received radioactive material from other organizations with uncontrolled loose surface contamination levels. Loose surface contamination levels in the fenced area were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$ .

**(3) Survey Requirements:**

Group 2 and Group 3 surveys were required for these areas.

**b. Discussion:**

The 20' Perimeter Area was divided into 65 10' by 10' grids. Where physically possible, each grid was subdivided into two, 3' by 3' subsections that were located in areas of highest potential for contamination. One of these subsections was surveyed using the IM-247/PD and the other using the IM-253/PD (HV-1 PHA). Solid material samples were not required except from each grid that resulted in greater than  $450 \mu\text{Ci}/20\text{cm}^2$  with an IM-247/PD or greater than twice background with an IM-253/PD.

The Building 101 Fenced Area was divided into 574, 5' by 5' grid sections where physically possible. One hundred percent of all 5' by 5' grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all 5' by 5' grids was surveyed using the IM-253/PD (HV-2 GROSS).

**5. BUILDING 101, FENCED AREA & 20' PERIMETER**

Solid material samples were taken from each 5' by 5' grid.

Individual backgrounds were used for this area. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the asphalt pours were 80, 600, 22500 counts per minute respectively. These radiation levels were based upon background levels obtained from the Building 220 east road. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the cement pours were 40, 300, 12500 counts per minute respectively. These radiation levels were also based upon background levels obtained from the building M1123 deck. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the dirt were 40, 200, 8500 counts per minute respectively. These radiation levels were based upon background levels obtained from the Building 681 field.

A total of 533 solid material samples was taken. Each solid sample was removed from the grid location indicating the area of highest potential. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212, lead 214, and potassium 40.

**c. Summary:**

Surveys performed with the IM-247/PD detected 78 areas greater than 450  $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected 198 areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) detected 111 areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 1.16 pCi/g to a high of 14.84 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that solid material samples were less than 1pCi/g from non-paint samples and less than 3Pci/g for paint samples. However, two samples with traces of cobalt 60 greater than the minimum detectable activity were identified. For each sample, the extent of the trace cobalt 60 radioactivity was identified by taking additional solid material samples in the surrounding vicinity and core samples from the contaminated locations. The results of the core samples indicated no specific cobalt 60. Remediation consisted of the excavation of two areas approximately 2' by 2'. Asphalt was removed to a minimum depth of 1/2". Following remediation, additional solid material samples taken indicated less than 1 pCi/g specific cobalt 60. No traces of cobalt 60 were identified.

5. BUILDING 101, FENCED AREA & 20' PERIMETER

e. Localized Grid Maps

J	<450 200 150 8500 15000 3.20 <1	<450 600 500 — — 4.03 <1	<450 600 500 — — 3.95 <1	<450 600 500 — — 3.13 <1	<450 600 500 — — 3.57 <1	<450 600 500 — — 2.96 <1	<450 600 500 — — 2.96 <1	<450 600 500 — — 3.28 <1	<450 600 500 — — 3.81 <1	<450 600 500 — — 2.89 <1	<450 600 500 — — 3.05 <1	<450 600 500 — — 2.68 <1	<450 600 500 — — 4.15 <1	<450 600 500 — — 3.27 <1	<450 600 500 — — 2.94 <1		
I	<450 600 550 3 3.19 <1	<450 600 600 — — 3.86 <1	<450 600 600 — — 5.22 <1	<450 600 600 — — 4.99 <1	<450 600 600 — — 4.12 <1	<450 600 550 — — 3.79 <1	<450 600 550 — — 3.28 <1	<450 600 550 — — 3.97 <1	<450 600 600 — — 3.83 <1	<450 600 550 — — 2.42 <1	<450 600 500 — — 3.30 <1	<450 600 500 — — 2.88 <1	<450 600 500 — — 3.10 <1	<450 600 400 — — 2.73 <1	<450 600 425 — — 2.72 <1		
H	720 600 600 22500 22500 5.85 <1	630 600 600 22500 22500 5.80 <1	630 600 600 22500 22500 5.87 <1	630 600 600 22500 22500 4.99 <1	<450 600 500 — — 3.32 <1	<450 600 600 — — 2.84 <1	<450 600 600 — — 2.19 <1	<450 600 600 — — 3.23 <1	<450 600 600 — — 3.36 <1	<450 600 1000 — — 3.47 <1	<450 600 1000 — — 3.70 <1	<450 600 850 — — 3.11 <1	<450 600 800 — — 2.99 <1	<450 600 400 — — 3.17 <1	<450 600 400 — — 3.06 <1		
G	540 600 600 22500 86000 5.27 <1	630 600 600 22500 22500 5.74 <1	630 600 600 22500 22500 5.84 <1	630 600 600 22500 22500 4.97 <1	<450 600 500 — — 5.11 <1	<450 600 600 — — 2.06 <1	<450 600 600 — — 4.38 <1	<450 600 600 — — 2.83 <1	<450 600 600 — — 3.55 <1	<450 600 1000 — — 3.03 <1	<450 600 1000 — — 4.20 <1	<450 600 600 — — 3.96 <1	<450 600 600 — — 3.35 <1	<450 600 600 — — 3.46 <1	<450 600 600 — — 3.29 <1		
F	720 600 600 22500 86000 5.27 <1	630 600 600 22500 22500 5.74 <1	630 600 600 22500 22500 5.84 <1	630 600 600 22500 22500 4.97 <1	<450 600 500 — — 5.11 <1	<450 600 600 — — 2.38 <1	<450 600 600 — — 1.96 <1	<450 600 600 — — 3.00 <1	<450 600 600 — — 2.90 <1	<450 600 1000 — — 3.96 <1	<450 600 1000 — — 3.83 <1	<450 600 600 — — 3.78 <1	<450 600 600 — — 3.32 <1	<450 600 400 — — 5.28 <1	<450 600 400 — — 3.85 <1		
E													585 600 22500 40000 5.49 <1	<450 600 1500 40000 3.77 <1	<450 600 1500 40000 4.43 <1		
D													<450 600 22500 40000 5.00 <1	<450 600 22500 40000 4.75 <1	<450 600 22500 40000 4.05 <1		
C													<450 600 1250 22500 40000 4.99 <1	<450 600 1250 22500 45000 5.12 <1	<450 600 1000 22500 37500 2.85 <1		
B														<450 600 22500 40000 6.27 <1	<450 600 1000 22500 3.79 <1		
A															<450 600 1250 22500 40000 5.83 <1		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Notes:

- (1) Area surveyed with an IM-247/PD, indicating detectable activity greater than or equal to 450 µCi/20cm<sup>2</sup> were sampled and analyzed by spectral analysis. In these cases, analysis of the spectrum indicated only photpeaks of naturally occurring isotopes not associated with the Naval Nuclear Propulsion Program. These natural isotopes include K-40, Ra-226, Pb-212, Bi-214, Be-7, Tl-208 and Ac-228.
- (2) High activity readings with the IM-247/PD and the IM-253/PD in gnds with low gross gamma solid surface sample results were investigated. Core samples were taken in areas where high readings were noted. Core sample results indicated high natural radioactivity levels in the aggregates of the asphalt and the soil beneath the asphalt.

**Sample Data**  
 <450 – IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 – IM-253/PD (HV-1 PHA) [bq.]  
 300 – IM-253/PD (HV-1 PHA) [cpm]  
 7000 – IM-253/PD (HV-2 GROSS) [bqg]  
 7300 – IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 – MCA Specific Co-60 Results [pCi/g]

5. BUILDING 101, FENCED AREA & 20' PERIMETER

e. Localized Grid Maps

J	<450 600 1500 22500 40000 3.35 <1	<450 600 1500 22500 40000 3.50 <1	<450 600 1000 — — 3.31 <1	<450 600 500 — 22500 30000 3.27 <1	<450 600 800 — 22500 30000 3.27 <1
I	<450 600 1500 22500 40000 3.14 <1	<450 600 1500 22500 40000 3.33 <1	<450 600 1000 — — 2.87 <1	<450 600 800 — 22500 8500 17500 3.20 <1	<450 600 800 — 22500 8500 17500 2.72 <1
H	<450 600 1000 — — 3.96 <1	<450 600 1000 — — 3.11 <1	<450 600 1000 — — 3.32 <1	<450 600 800 — 22500 8500 17500 3.54 <1	<450 600 800 — 22500 8500 17500 2.42 <1
G	<450 600 1500 22500 35000 4.06 <1	<450 600 1500 22500 35000 3.74 <1	<450 600 1500 22500 35000 3.29 <1	<450 600 1000 — — — 2.72 <1	<450 600 1000 — — — 2.72 <1
F	<450 600 350 — — 3.57 <1	<450 600 350 — — 3.92 <1	<450 600 1000 — — 3.50 <1	<450 600 1000 — — 2.81 <1	<450 600 1000 — — 2.81 <1
E	<450 600 — — — 3.49 <1	<450 600 1500 22500 35000 3.85 <1	<450 600 1500 22500 35000 3.41 <1	<450 600 1500 22500 35000 3.85 <1	<450 600 1500 22500 35000 3.85 <1
D	<450 600 — — — 3.39 <1	<450 600 400 — — 2.92 <1	<450 600 1500 22500 35000 4.75 <1	<450 600 1500 22500 35000 4.75 <1	<450 600 1500 22500 35000 4.75 <1
C	<450 600 300 — — 3.20 <1	<450 600 250 10000 3.47 <1	<450 600 1500 22500 35000 3.47 <1	<450 600 1500 22500 35000 3.47 <1	<450 600 1500 22500 35000 3.47 <1
B	<450 600 200 — — 2.74 <1	<450 600 250 — — 2.94 <1	<450 600 1500 22500 35000 3.47 <1	<450 600 1500 22500 35000 3.47 <1	<450 600 1500 22500 35000 3.47 <1
A	<450 600 1250 22500 35000 4.79 <1	<450 600 1250 22500 35000 4.79 <1	<450 600 1500 22500 35000 4.79 <1	<450 600 1500 22500 35000 4.79 <1	<450 600 1500 22500 35000 4.79 <1

T	500 600 3000 25000 49.1 <1	540 600 2500 25000 6.12 <1	800 600 2500 25000 6.36 <1	640 600 2500 25000 4.66 <1	675 600 2000 25000 7.40 <1
S	540 600 2500 25000 2.74 <1	585 600 2500 25000 4.72 <1	985 600 2500 25000 5.47 <1	495 600 2500 25000 6.84 <1	585 600 2500 25000 6.11 <1
R	630 600 2000 22500 4.80 <1	600 600 2000 22500 5.00 <1	800 600 2000 22500 5.00 <1	900 600 2000 22500 6.92 <1	<450 600 2000 22500 6.92 <1
Q	<450 600 2000 22500 40000 2.23 <1	<450 600 2000 22500 40000 2.49 <1	<450 600 2000 22500 40000 3.35 <1	<450 600 2000 22500 40000 2.43 <1	<450 600 2000 22500 40000 2.43 <1
P	<450 600 1500 22500 40000 3.06 <1	<450 600 1500 22500 40000 2.58 <1	<450 600 2000 22500 50000 2.89 <1	<450 600 2000 22500 50000 2.85 <1	<450 600 1250 22500 40000 3.16 <1
O	<450 600 — — — 3.40 <1	<450 600 1500 22500 35000 3.85 <1	<450 600 1500 22500 35000 3.79 <1	<450 600 1500 22500 35000 4.58 <1	<450 600 1500 22500 35000 3.02 <1
N	<450 600 — — — 2.46 <1	<450 600 400 — — 1.84 <1	<450 600 1500 22500 35000 4.79 <1	<450 600 1500 22500 35000 4.68 <1	<450 600 1500 22500 35000 2.84 <1
M	<450 600 1500 22500 45000 2.87 <1	<450 600 1500 22500 45000 3.75 <1	<450 600 1500 22500 45000 2.87 <1	<450 600 1500 22500 45000 2.81 <1	<450 600 1500 22500 45000 2.81 <1
L	<450 600 1500 22500 45000 3.70 <1	<450 600 1500 22500 45000 4.49 <1	<450 600 1500 22500 45000 3.96 <1	<450 600 1500 22500 45000 3.96 <1	<450 600 1500 22500 45000 3.96 <1
K	540 600 1500 22500 45000 3.82 <1	<450 600 1500 22500 45000 4.73 <1	<450 600 1500 22500 45000 3.99 <1	<450 600 1500 22500 45000 3.23 <1	<450 600 1500 22500 45000 3.52 <1

- Notes:**
- Areas surveyed with an IM-247/PD, indicating detectable activity greater than or equal to 450  $\mu\text{Ci}/20\text{cm}^2$  were sampled and analyzed by spectral analysis. In these cases, analysis of the spectrum indicated only photopeaks of naturally occurring isotopes not associated with the Naval Nuclear Production Program. These natural isotopes include K-40, Ra-226, Pb-212, Bi-214, Be-7, Tl-208 and Ac-228.
  - High activity readings with the IM-247/PD and the IM-253/PD in grids with low gross gamma solid surface sample results were investigated. Core samples were taken in areas where high readings were noted. Core sample results indicated high natural radioactivity levels in the aggregates of the asphalt and the soil beneath the asphalt.

**Sample Data**

<450 – IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 – IM-253/PD (HV-1 PHA) [Bq/g]  
 300 – IM-253/PD (HV-1 PHA) [cpm]  
 7000 – IM-253/PD (HV-2 GROSS) [Bq/g]  
 7500 – IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 – MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 – MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]



5. BUILDING 101, FENCED AREA & 20' PERIMETER

e. Localized Grid Maps

<450	<450	540	630	540
600	600	500	500	500
1000	200	200	200	200
-	4.89	4.89	4.89	4.89
<1	<1	<1	<1	<1
<450	630	585	540	540
1000	600	600	600	600
-	27500	12500	22500	22500
5.32	8500	5000	6300	5000
<1	<1	5.08	4.78	<1
585	<1	<1	<1	<1
600	600	285	540	540
7500	200	200	200	200
4.90	3500	2500	1500	1500
<1	8500	60000	8000	25000
<1	4.89	4.28	4.38	4.70
675	800	585	540	540
600	600	600	600	600
3000	3500	2500	2300	200
75000	8500	8500	8000	10000
5.36	4.92	5.18	4.98	5.04
<1	<1	<1	<1	<1
675	675	675	675	540
600	600	600	600	600
3000	3000	2500	2900	2000
75000	75000	85000	75000	8500
4.78	5.61	4.73	4.98	4.83
<1	<1	<1	<1	<1
900	540	540	900	540
600	600	600	600	600
2000	2000	2000	2000	2000
42500	22500	22500	22500	22500
65000	65000	65000	65000	65000
5.21	5.16	4.14	4.99	4.71
<1	<1	<1	<1	<1
585	585	900	540	540
600	600	600	600	600
22500	22500	22500	22500	22500
65000	65000	65000	65000	65000
4.41	4.86	4.87	5.75	4.72
<1	<1	<1	<1	<1
640	540	630	540	540
600	600	600	600	600
22500	27500	22500	22500	22500
75000	75000	75000	75000	75000
5.00	5.10	4.89	4.99	4.99
<1	<1	<1	<1	<1
900	900	900	900	900
2900	2900	3000	3000	2900
75000	75000	75000	75000	75000
4.89	4.82	4.94	4.94	4.94
<1	<1	<1	<1	<1
900	540	900	900	675
600	600	3000	3000	200
3000	2000	2000	2000	2000
22500	60000	65000	65000	25000
5.54	3.99	5.08	6.39	4.45
<1	<1	<1	<1	<1

AD  
AC  
AB  
AA  
Z  
Y  
X  
W  
V  
U

21 22 23 24 25

<450	<450	<450	<450	<450
200	200	200	200	200
350	350	350	350	350
-	4.11	-	-	-
<1	3.26	2.79	2.32	2.87
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
1000	200	200	200	200
-	8500	8500	8500	8500
3.32	15000	15000	15000	15000
<1	7.52	3.84	2.33	4.85
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
175	400	475	425	450
-	8500	8500	8500	8500
3.08	15000	15000	15000	15000
<1	3.38	1.49	2.14	2.33
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
1000	400	500	500	600
-	8500	8500	8500	8500
3.24	15000	15000	15000	15000
<1	3.27	1.06	3.47	4.39
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
550	200	200	200	200
-	8500	8500	8500	8500
2.72	11500	17500	17500	10000
<1	2.91	2.67	2.24	3.08
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
8500	8500	8500	8500	8500
15000	15000	15000	15000	15000
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
8500	8500	8500	8500	8500
15000	15000	15000	15000	15000
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
8500	8500	8500	8500	8500
15000	15000	15000	15000	15000
<1	<1	<1	<1	<1
<450	585	<450	<450	<450
200	200	200	200	200
8500	8500	8500	8500	8500
15000	15000	15000	15000	15000
<1	3.08	<1	<1	<1
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
8500	8500	8500	8500	8500
15000	15000	15000	15000	15000
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
8500	8500	8500	8500	8500
15000	15000	15000	15000	15000
<1	<1	<1	<1	<1

AN  
AM  
AL  
AK  
AJ  
AI  
AH  
AG  
AF  
AE

21 22 23 24 25

<450	<450	<450	<450	<450
400	300	300	300	300
1000	500	500	500	400
-	17500	-	-	-
2.58	1.61	1.97	1.26	2.12
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
425	300	300	300	<450
-	425	425	425	8500
1.70	1.38	1.66	1.53	15000
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
15000	8500	8500	8500	300
-	8500	8500	8500	8500
2.51	17500	15000	15000	15000
<1	2.83	2.01	3.01	4.42
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	250	300	300	300
1000	250	300	300	300
-	8500	8500	8500	8500
3.09	15000	15000	15000	5000
<1	4.11	2.92	3.06	2.6
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
300	300	300	300	300
1000	300	300	300	300
-	8500	8500	8500	8500
1.59	10000	10000	10000	10000
<1	2.58	1.98	2.90	2.88
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
2500	200	200	200	200
-	8500	8500	8500	8500
2.69	1.98	3.10	2.28	2.63
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
300	800	600	600	600
1000	400	400	400	350
-	22500	-	-	22500
4.78	12500	12500	12500	12500
<1	4.99	5.80	4.39	4.94
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
400	600	600	600	600
3500	450	350	350	450
-	22500	-	-	22500
15000	15000	15000	15000	15000
1.0	5.09	4.82	4.63	5.81
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
300	600	600	600	600
1500	350	350	350	350
-	8500	8500	8500	8500
2.94	15000	15000	15000	15000
<1	<1	<1	<1	<1
<450	<450	<450	<450	<450
200	200	200	200	200
1000	300	300	300	300
-	10000	-	-	-
1.16	2.71	3.17	4.91	4.55
<1	<1	<1	<1	<1

AX  
AW  
AV  
AU  
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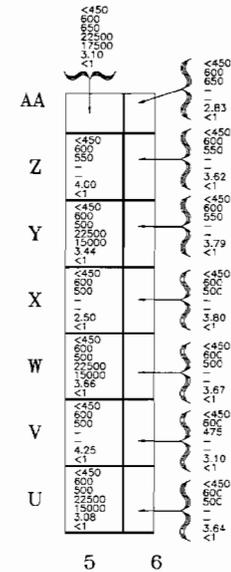
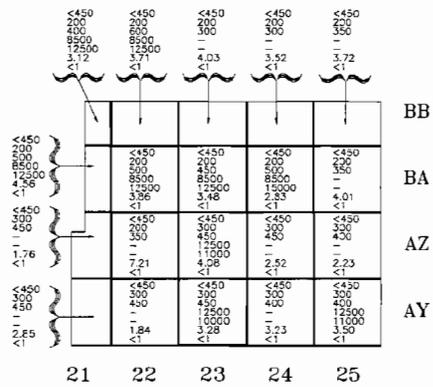
21 22 23 24 25

**Notes:**  
 (1) Areas surveyed with an IM-247/PD, indicating detectable activity greater than or equal to 450  $\mu\text{Ci}/20\text{cm}^2$  were sampled and analyzed by spectral analysis. In these cases, analysis of the spectrum indicated only photopeaks of naturally occurring isotopes not associated with the Naval Nuclear Propulsion Program. These natural isotopes include K-40, Ra-226, Po-212, Bi-214, Be-7, Th-232 and Ac-228.  
 (2) High activity readings with the IM-247/PD and the IM-253/PD in grids with low gross gamma solid surface sample results were investigated. Core samples were taken in areas where high readings were noted. Core sample results indicated high natural radioactivity levels in the aggregates of the asphalt and the soil beneath the asphalt.

**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PPHA) [pCi/g]  
 300 - IM-253/PD (HV-1 PPHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [pCi/g]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

5. BUILDING 101, FENCED AREA & 20' PERIMETER

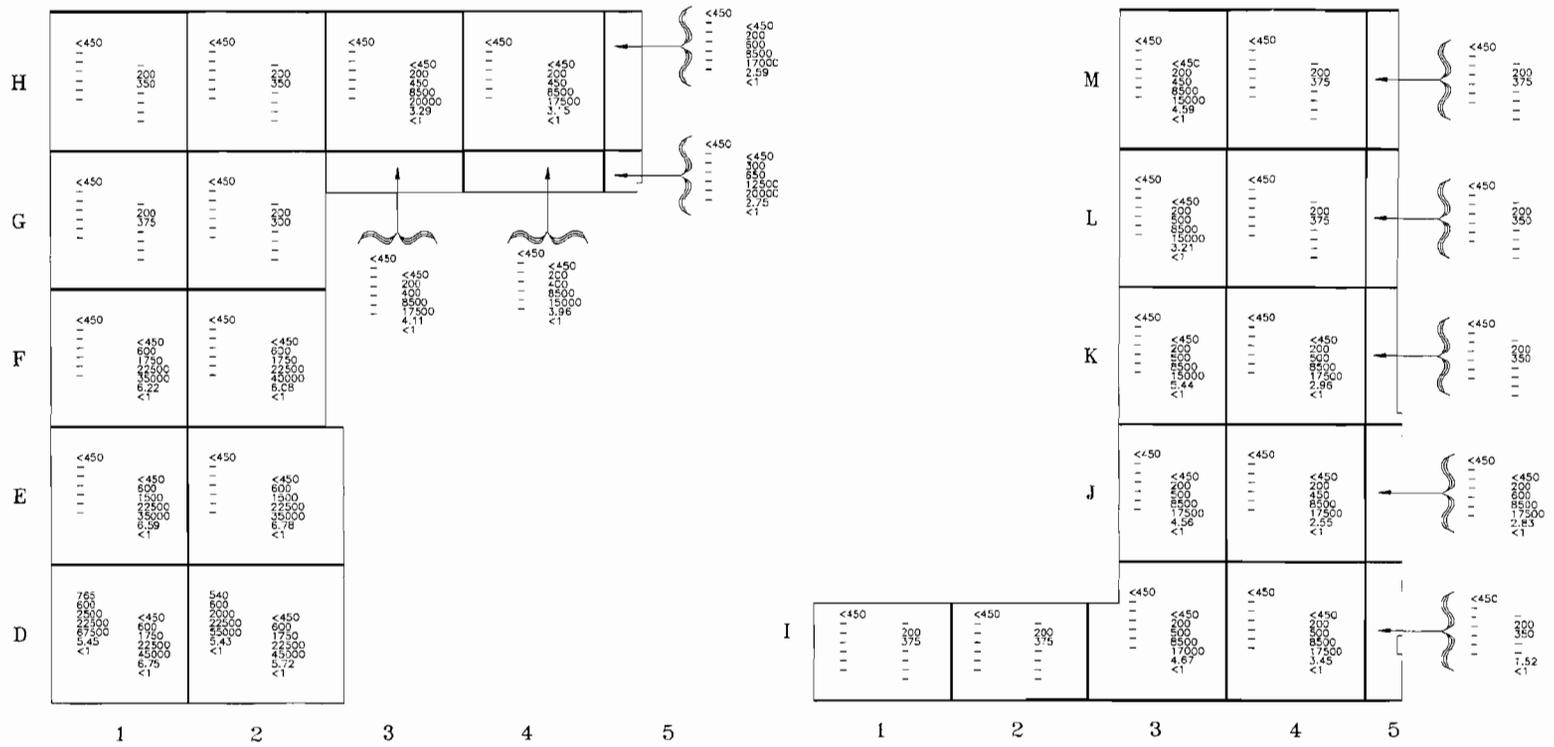
e. Localized Grid Maps



**Sample Data**  
 <450 – IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 – IM-253/PD (HV-1 PHA) [Bq]  
 300 – IM-253/PD (HV-1 PHA) [cpm]  
 7000 – IM-253/PD (HV-2 GROSS) [Bq]  
 7300 – IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 – MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 – MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

5. BUILDING 101, FENCED AREA & 20' PERIMETER

e. Localized Grid Maps



**Note:**  
 Areas surveyed with an IM-247/PD, indicating detectable activity greater than or equal to 450µCi/20cm<sup>2</sup>, were sampled and analyzed by spectral analysis. In these cases, analysis of the spectrum indicated only photopeaks of naturally occurring isotopes not associated with the Naval Nuclear Propulsion Program. These natural isotopes include K-40, Ra-226, Pb-212, Bi-214, Be-7, Th-208 and Ac-228.

**Sample Data**  
 <450 – IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 – IM-253/PD (HV-1 PHAI) [bkg.]  
 300 – IM-253/PD (HV-1 PHAI) [cpm]  
 7000 – IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 – IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 – MCA Specific Co-60 Results [pCi/g]

5. BUILDING 101, FENCED AREA & 20' PERIMETER

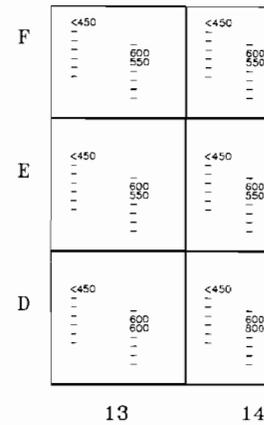
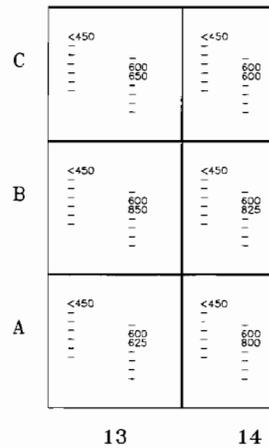
e. Localized Grid Maps

	O	<450 390 375	<450 390 375	<450 390 360	<450 390 360	<450 500 550	<450 600 700	<450 390 360	<450 390 375	<450 590 575	<450 390 360
	N	<450 390 375	<450 390 375	<450 390 360							
		3	4	5	6	7	8	9	10	11	12

**Sample Data**  
 <450 – IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 – IM-253/PD (HV-1 PHA) [bkg.]  
 300 – IM-253/PD (HV-1 PHA) [cpm]  
 700 – IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 – IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 – MCA Specific Co-60 Results [pCi/g]

5. BUILDING 101, FENCED AREA & 20' PERIMETER

e. Localized Grid Maps



Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [bkg.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 700 - IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

5. BUILDING 101, FENCED AREA & 20' PERIMETER

f. Prior to Photographs

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Viewing main entrance to fenced area.

5. BUILDING 101, FENCED AREA & 20' PERIMETER

f. Prior to Photographs

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Viewing north side of building.

5. BUILDING 101, FENCED AREA & 20' PERIMETER

f. Prior to Photographs

---



Viewing west end of building.

5. BUILDING 101, FENCED AREA & 20' PERIMETER

g. After Photographs

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Viewing north side of building.

5. BUILDING 101, FENCED AREA & 20' PERIMETER

g. After Photographs

---



Viewing toward building 79A.

**6. BUILDING 101, NORTH STORAGE ROOM****a. Introduction:**

The North Storage Room is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

The room is approximately 17' wide by 17' long by 9' high. The walls and ceiling are masonry and the floor is concrete.

**(2) Brief History:**

(a) **Use:** This room was used as a general radioactive material storage area but was later converted, in the 1980s, to a storage area for plutonium beryllium sources.

(b) **Radiological History:** This area has been controlled as a radiation area and radioactive material storage area. During use, all radioactive material and radioactive sources were tightly sealed and contained. Loose surface contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**(3) Survey Requirements:**

Group 3 and Group 6 surveys were required for this room.

**b. Discussion:**

The Building 101 North Storage Room was divided into 12, 5' by 5' floor grids and 16, 5' by 6' wall grids. Each grid was identified with its unique designation.

One hundred percent of all grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all grids were surveyed using the IM-253/PD (HV-2 GROSS). A minimum of 25 percent of the floor grids were surveyed using the AN/PDR-56. Additionally solid material samples were taken from each wall and floor grid.

Individual backgrounds were used for this radioactive material storage area. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete floor were 50, 500, 15000 counts per minute respectively. These radiation levels were based upon background levels obtained from the walkway north of Building 220. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the block walls were 50, 500, 15000 counts per minute respectively. These radiation levels were based upon background levels obtained from Building 672.

A total of 28 solid material samples were taken. Each solid sample was

**6. BUILDING 101, NORTH STORAGE ROOM**

removed from the grid location indicating the area of highest potential. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212, lead 214, and thallium 208.

**c. Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than 450  $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the AN/PDR-56 found no detectable alpha radioactivity.

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

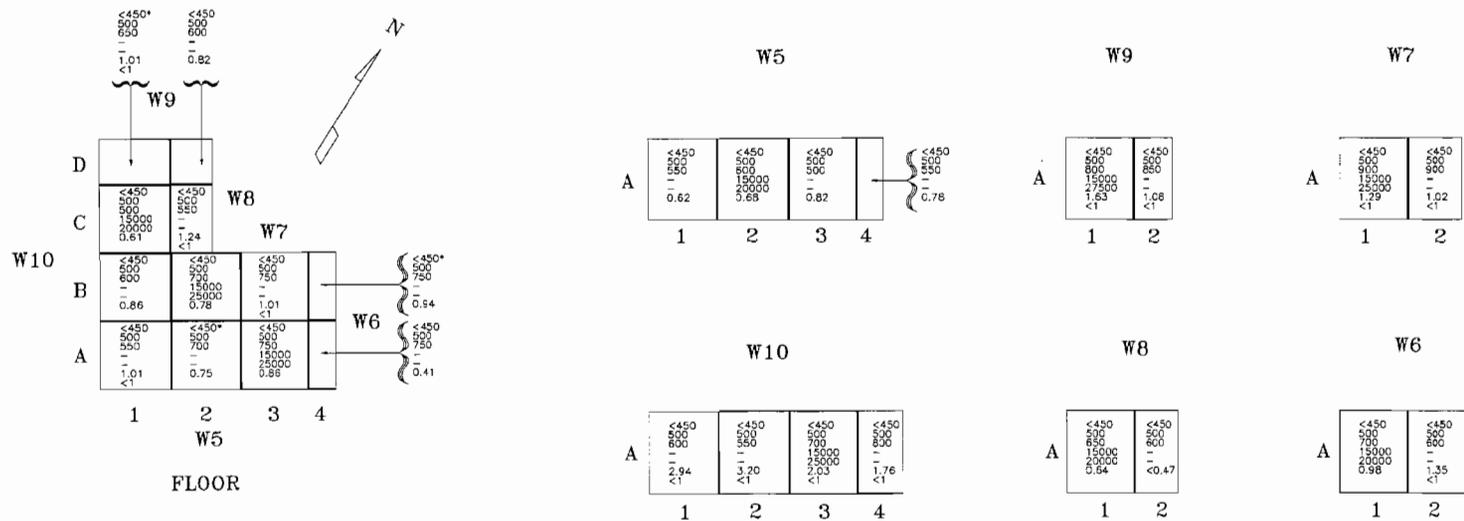
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.41 pCi/g to a high of 3.20 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that all solid material samples were less than 1 pCi/g.

6. BUILDING 101, NORTH STORAGE ROOM

e. Localized Grid Maps



Note:  
\* Denotes grids which were surveyed with an AN/PDR-56 for Alpha radioactivity and no detectable activity was found.

**Sample Data**  
 <450 - IM-247/PO Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7300 - IM-253/PD (HV-2 GROSS) [Bq.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci}/\text{g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci}/\text{g}$ ]

6. BUILDING 101, NORTH STORAGE ROOM

f. Prior to Photographs

---



Facing toward Wall 9.

6. BUILDING 101, NORTH STORAGE ROOM

f. Prior to Photographs

---



Viewing ceiling.

6. BUILDING 101, NORTH STORAGE ROOM

g. After Photographs

---



Viewing toward doorway.

6. BUILDING 101, NORTH STORAGE ROOM

g. After Photographs

---



Facing Wall 6.

6. BUILDING 101, NORTH STORAGE ROOM

g. After Photographs

---



Facing Wall 9.

## 7. BUILDING 101, SOUTH STORAGE ROOM

### a. Introduction:

The South Storage Room is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10).

#### (1) Description:

The room is approximately 17' wide by 22' long by 9' high. The walls are masonry and the floor is painted concrete.

#### (2) Brief History:

(a) **Use:** This room was used as a general radioactive material storage area since the 1960s.

(b) **Radiological History:** This area has been controlled as a radiation area and radioactive material storage area. On occasion, material and equipment have been found with loose surface contamination on them, causing the spread of contamination to the shelves. Following discovery, all affected areas were decontaminated to less than  $450 \mu\text{Ci}/100\text{cm}^2$ . Loose surface contamination levels were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$ .

#### (3) Survey Requirements:

Group 3 surveys were required for this room.

### b. Discussion:

The Building 101 South Storage Room was divided into 15, 5' by 5' floor grids and 16, 5' by 6' wall grids. Each grid was identified with its unique designation.

One hundred percent of all grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all grids were surveyed using the IM-253/PD (HV-2 GROSS). Additionally solid material samples were taken from each wall and floor grid.

Individual backgrounds were used for this radioactive material storage area. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete floor and walls were 40, 150, 6500 counts per minute respectively. These radiation levels were based upon background levels obtained from Building 135.

A total of 31 solid material samples were taken. Each solid sample was removed from the grid location indicating the area of highest potential. The following naturally occurring radionuclides were typical isotopes identified during

7. BUILDING 101, SOUTH STORAGE ROOM

analysis of solid material samples: lead 212 and thallium 208.

c. **Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than 450  $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected nine areas greater than or equal to twice background.

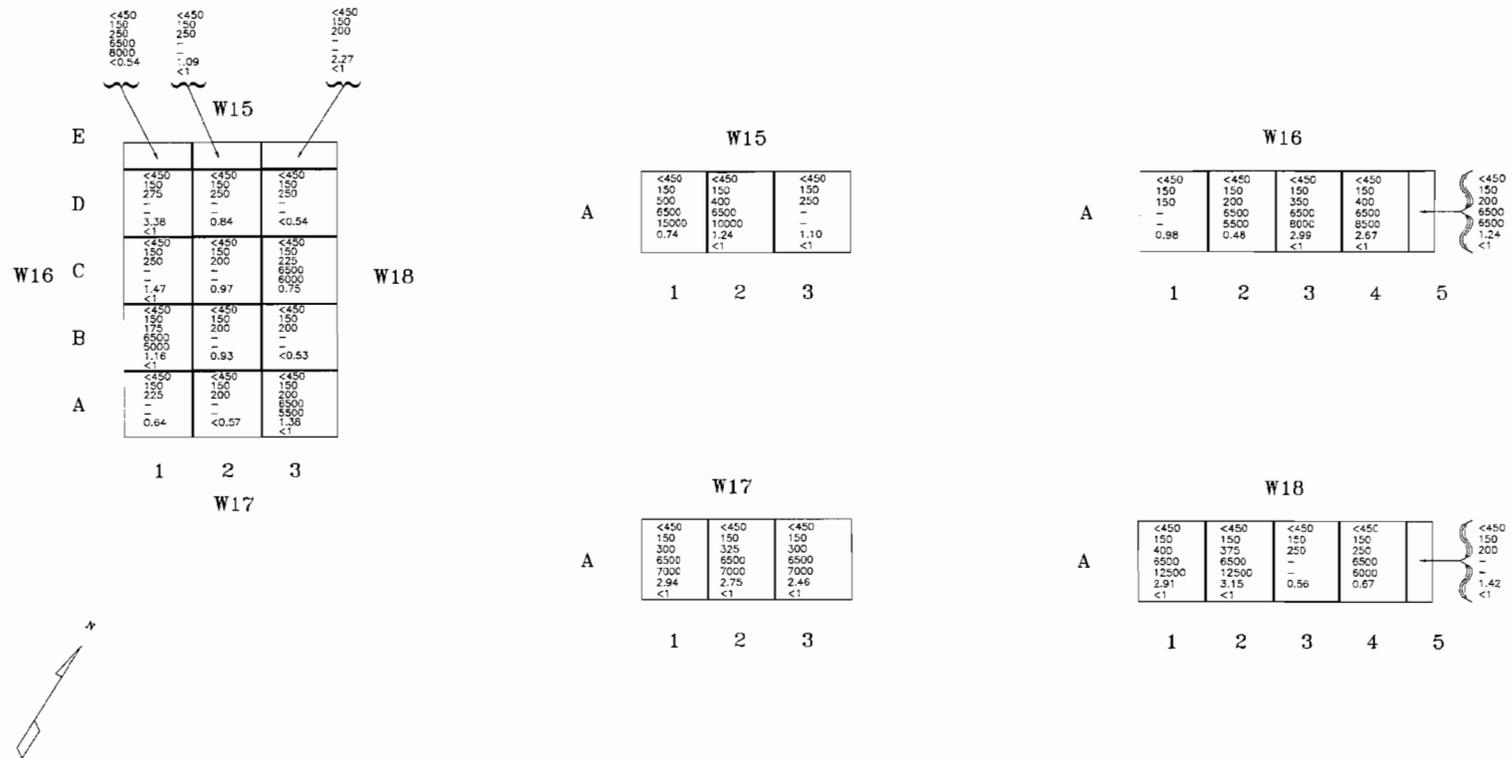
Surveys performed with the IM-253/PD (HV-2 GROSS) detected one area greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.48 pCi/g to a high of 3.38 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that all solid material samples were less than 1 pCi/g.

7. BUILDING 101, SOUTH STORAGE ROOM

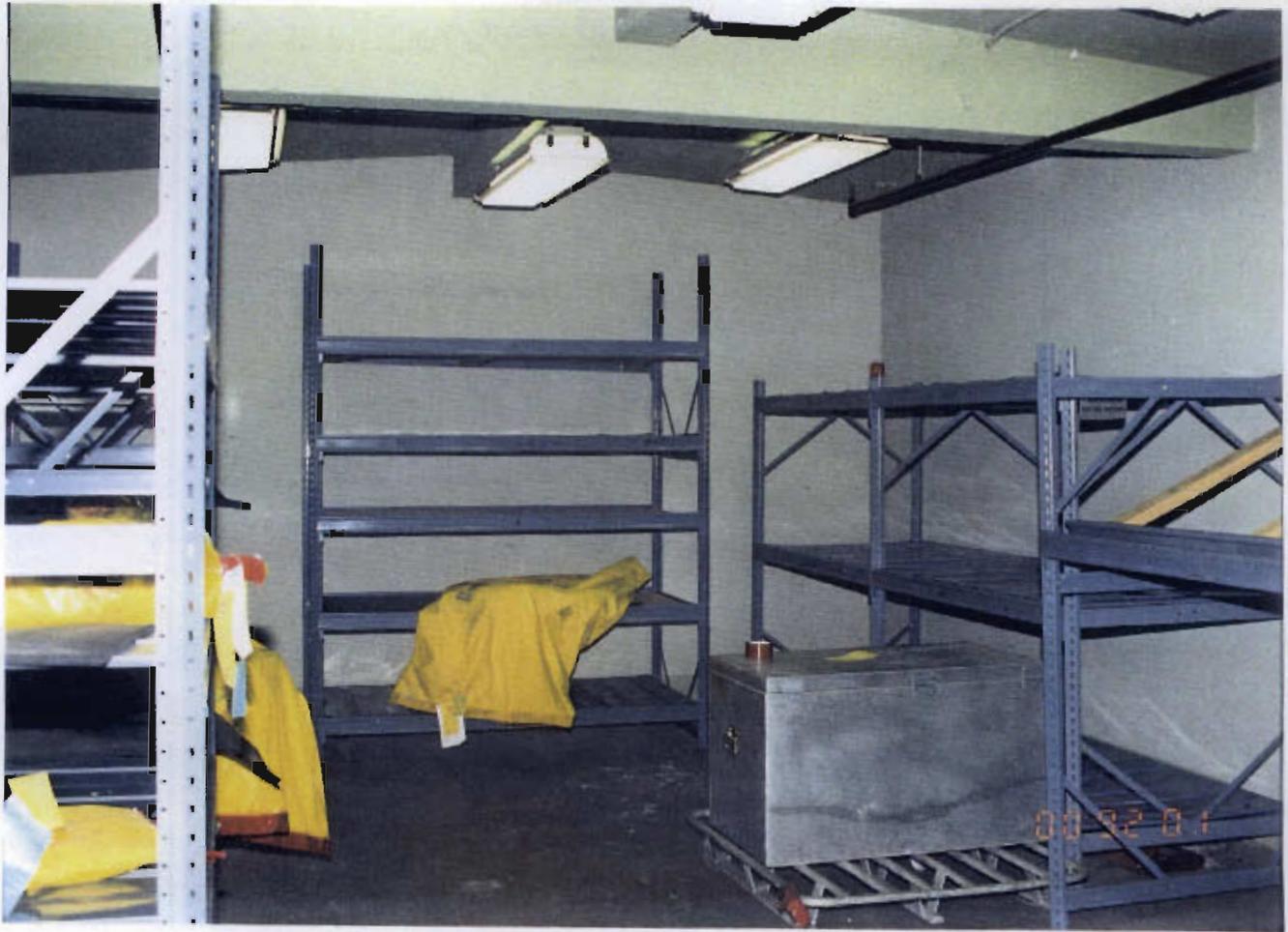
e. Localized Grid Maps



7. BUILDING 101, SOUTH STORAGE ROOM

f. Prior to Photographs

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Facing toward Wall 17.

7. BUILDING 101, SOUTH STORAGE ROOM

g. After Photographs

---



Facing toward Wall 17.

**8. BUILDING 101, WEST END****a. Introduction:**

The Building 101 West End is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

The room is approximately 26' wide by 50' long. The walls are masonry and block. The floor is painted concrete.

**(2) Brief History:**

(a) **Use:** This room was used primarily to store radioactive refueling equipment.

(b) **Radiological History:** This area has been controlled as a radiation area and radioactive material storage area. Localized CSCAs have occasionally been established to perform minor work. Loose surface contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**(3) Survey Requirements:**

Group 3 surveys were required for this room.

**b. Discussion:**

The Building 101 West End was divided into 60, 5' by 5' floor grids and 33, 5' by 6' wall grids. Each grid was identified with its unique designation.

One hundred percent of all grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all grids were surveyed using the IM-253/PD (HV-2 GROSS). Additionally solid material samples were taken from each wall and floor grid.

Individual backgrounds were used for this radioactive material storage area. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the walls and floor were 40, 200, 6500 counts per minute respectively. These radiation levels were based upon background levels obtained from the deck of Building 233.

A total of 93 solid material samples were taken. Each solid sample was removed from the grid location indicating the area of highest potential. Solid samples taken from wall grids W19-A5, W19-A6, W20-A1, W20-A3, W20-A4, and W20-A5 consisted of paint and had a limit of 3 pCi/g. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212, lead 214, and thallium 208.

**8. BUILDING 101, WEST END**

**c. Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than 450  $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected one area greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than 0.39 pCi/g to a high of 2.55 pCi/g.

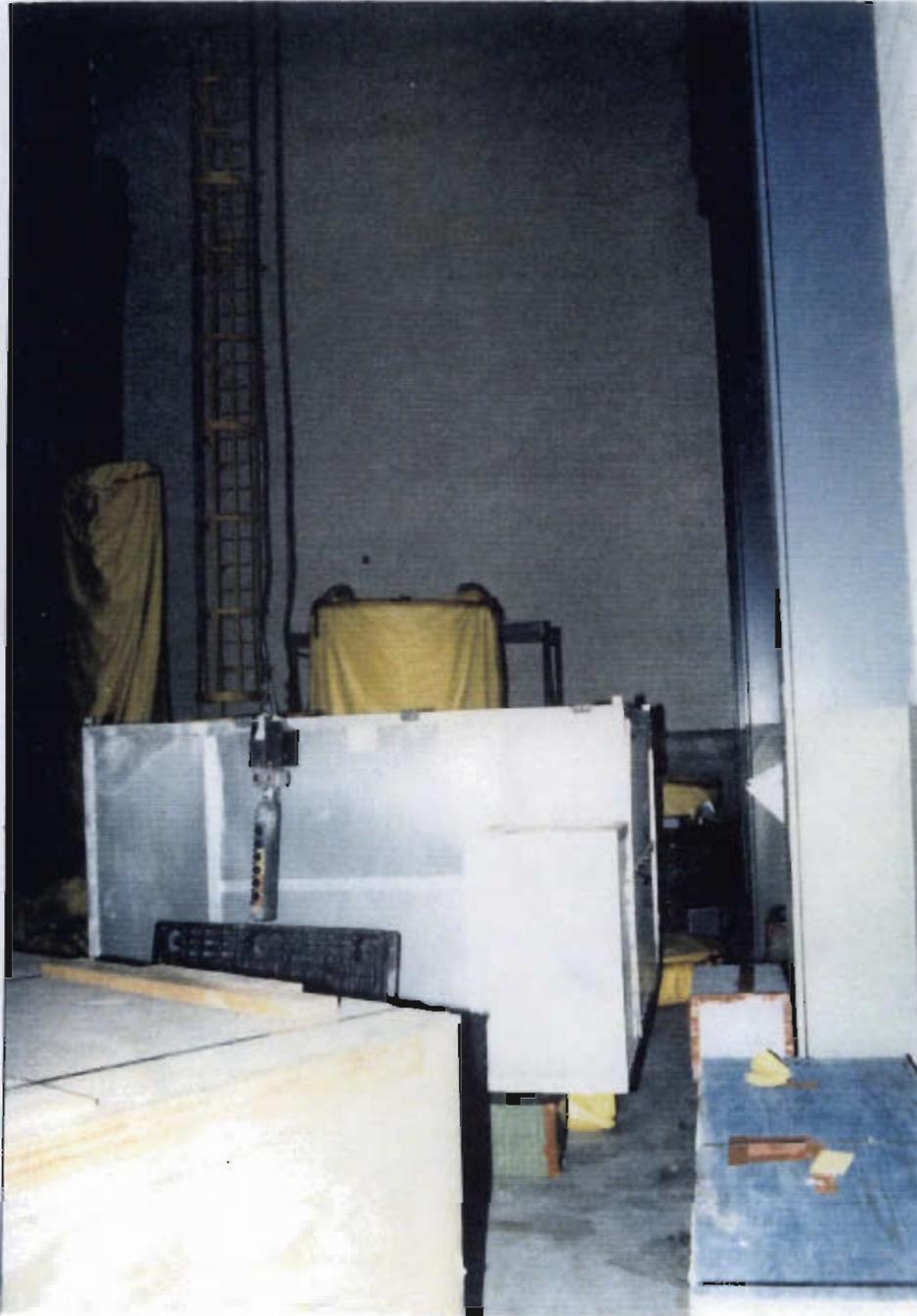
Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that solid material samples were less than 1 pCi/g for all non-paint samples and less than 3 pCi/g for all paint samples.



8. BUILDING 101, WEST END

f. Prior to Photographs

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Facing Wall 22.

8. BUILDING 101, WEST END

g. After Photographs

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Facing Wall 20.

**9. BUILDING 1426****a. Introduction:**

Building 1426 is a corrugated metal building located south of Building 101, in grid D-8 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

This building is approximately 20' wide by 45' long by 15' high. The walls and roof are corrugated metal construction. The floor is an unpainted concrete slab.

**(2) Brief History:**

(a) **Use:** This building served as a radioactive material storage area since the late 1960s. A wide variety of equipment and material was stored in this area over the years.

(b) **Radiological History:** This area was controlled as a radiation area and a radioactive material storage area. At least one spill of radioactive liquid occurred here causing a spread of contamination to the floor of up to 10000  $\mu\mu\text{Ci}/100\text{cm}^2$ . The area was decontaminated to less than 450  $\mu\mu\text{Ci}/100\text{cm}^2$ . Loose surface contamination levels were maintained less than 450  $\mu\mu\text{Ci}/100\text{cm}^2$ .

(c) **Items removed:** Removal of light fixtures, electrical cabling and services, fixed cabinets, and other fixed equipment was not required.

**(3) Survey Requirements:**

Group 3 surveys were required for this area.

**b. Discussion:**

The building was divided into 40 floor grids and 28 wall grids. The floor grids were approximately 5' by 5', and the wall grids were approximately 5' wide by 6' high. Each grid had its own unique designator.

One hundred percent of all grids were surveyed with the IM-247/PD and IM-253/PD (HV-1 PHA). A minimum of 25 percent of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from 41 grids.

A total of 41 solid material samples were taken, each solid material sample was removed from the grid location indicating the area of highest potential. A solid sample taken from wall grid W4-A9 consisted of paint and had a limit of 3

**9. BUILDING 1426**

pCi/g. The remaining wall grids were unpainted metal, therefore no samples were required.

Individual backgrounds were used for the floor and walls. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete floor were 40, 200, 6000 counts per minute respectively. These radiation levels were based upon backgrounds obtained from Building 233. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the block walls were 40, 200, 6,000 counts per minute respectively. These radiation levels were based upon backgrounds obtained from Building 1893.

The following typical naturally occurring radionuclides were identified during isotopic analysis of solid samples: lead 212 and lead 214.

**c. Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than 450  $\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

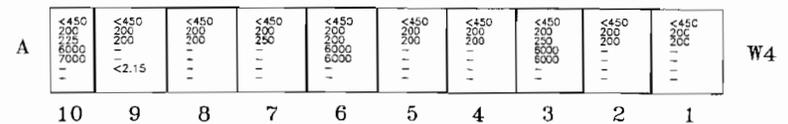
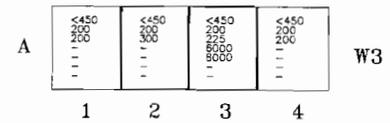
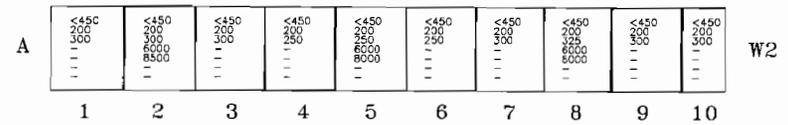
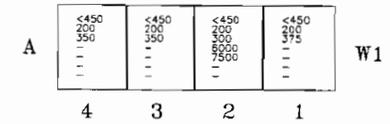
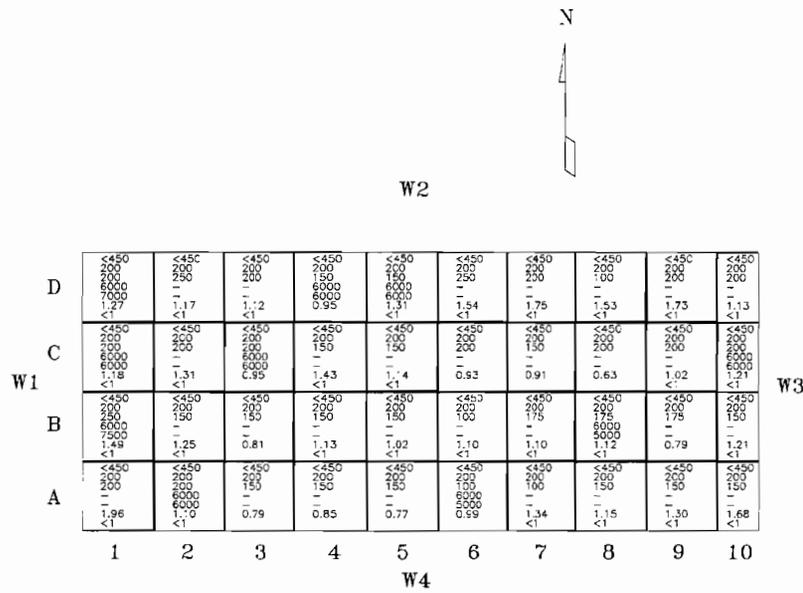
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.63 pCi/g to a high of 1.96 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples were less than 1 pCi/g, except for the paint sample. Analysis performed on the paint sample indicated less than 3 pCi/g.

9. BUILDING 1426

e. Localized Grid Maps



Note: Samples taken from grid W4-A9 consist of paint and have a limit of 3 pCi/g.

Sample Data  
 <450 – IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 – IM-253/PD (HV-1 PHA) [Bq.g.]  
 300 – IM-253/PD (HV-1 PHA) [cpm]  
 7000 – IM-253/PD (HV-2 GROSS) [Bq.g.]  
 7300 – IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 – MCA Specific Co-60 Results [pCi/g]

9. BUILDING 1426

f. Prior to Photographs

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Viewing front of building.

9. BUILDING 1426

f. Prior to Photographs

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Viewing toward back of building.

9. BUILDING 1426

g. After Photographs

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Viewing toward main entrance.

## 1.1 Controlled Storage Enclosure #1

### a. Introduction:

Controlled Storage Enclosure #1 (CSE) is situated in the Building 222 refueling complex, which is located in grid C-6 of the Charleston Naval Shipyard map (Figure 10). Controlled Storage Enclosure #1 was abandoned in place.

(1) **Description:** This enclosure is 18' 6" by 31' 2" by 25' high. Construction is carbon steel framing with monopanel walls. The building has a steel floor and a 12' by 20' roof opening with a lift-off roof.

### (2) Brief History:

(a) **Use:** CSE #1 was used as a storage and work enclosure in the late 1960s and early 1970s for the original S5W refueling complex. This enclosure was released from radiological controls in 1974 in accordance with the NAVSEA requirements of that time. Since 1974 the enclosure has been used as an uncontrolled clean storage area in the Building 222 refueling complex.

(b) **Radiological History:** The facility was maintained as a controlled surface contamination area while it was a part of the refueling complex. During use, the floor and walls were exposed to loose surface contamination levels up to 10000  $\mu\text{Ci}/100\text{cm}^2$ . In 1974 the enclosure was decontaminated to less than 450  $\mu\text{Ci}/100\text{cm}^2$  and surveyed for unrestricted release in accordance with the NAVSEA requirements of that time. Because the release requirements have changed since 1974, the enclosure was resurveyed to meet the current requirements.

### (3) Survey Requirements:

(a) Group 3 survey.

### b. Discussion:

CSE #1 was divided into 44 grids, 24 floor grids and 20 wall grids. The floor grids were approximately 5' by 5' and the wall grids were approximately 5' wide by 6' high. Each grid had its own unique designator.

One hundred percent of all grids were surveyed with the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-247/PD (HV-2 GROSS).

A total of 42 paint samples were taken from CSE #1. There were 24 samples taken from the floor grids and 18 samples taken from the wall grids. Wall grid W1-A4 was an unpainted metal door and W4-A1 was an unpainted portion of a

### 1.1 Controlled Storage Enclosure #1

W1-A4 was an unpainted metal door and W4-A1 was an unpainted portion of a monopanel. Each paint sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of the paint samples: lead 212, thallium 208.

Individual backgrounds were used for the CSE #1 metal floor and metal walls. Due to variations in natural radioactivity among construction materials, different background levels exist. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 400, and 10000 counts per minute used for the metal floor were based on the radiation levels obtained from Building M 1116. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 325, and 6500 counts per minute used for the metal walls were based on background radiation levels obtained from Building 665.

Removal of light fixtures, electrical cabling and services, fixed cabinets, and other fixed equipment was not required.

#### c. Summary:

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

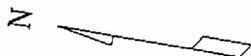
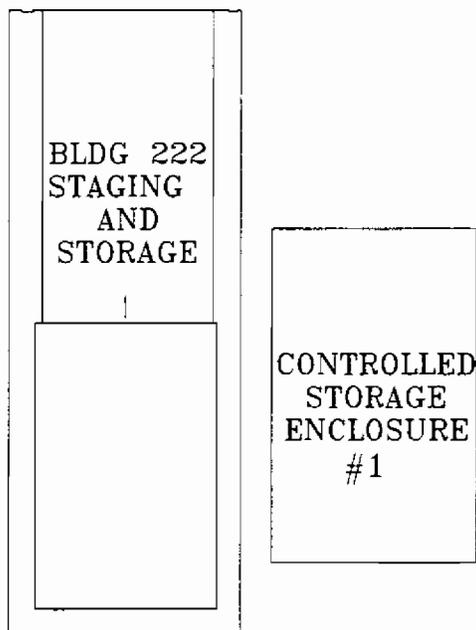
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than a minimum detectable activity of 0.41 pCi/g to a high of 2.01 pCi/g.

Analysis performed on the solid material paint samples with the MCA for specific cobalt 60, indicated that all paint samples were less than 3 pCi/g. However, one paint sample from grid W2-A3 with traces of Co-60 greater than the minimum detectable activity was identified. For that sample, the trace of Co-60 radioactivity was investigated by taking additional solid material samples in the surrounding vicinity. Due to the small effort involved, the shipyard remediated the area. Remediation consisted of removing paint from the sheet metal of wall grid W2-A3. Following remediation, additional solid material samples were taken in the area and all were less than 1 pCi/g specific Co-60. No traces of Co-60 were identified.

1.1 Controlled Storage Enclosure #1

d. Site Map

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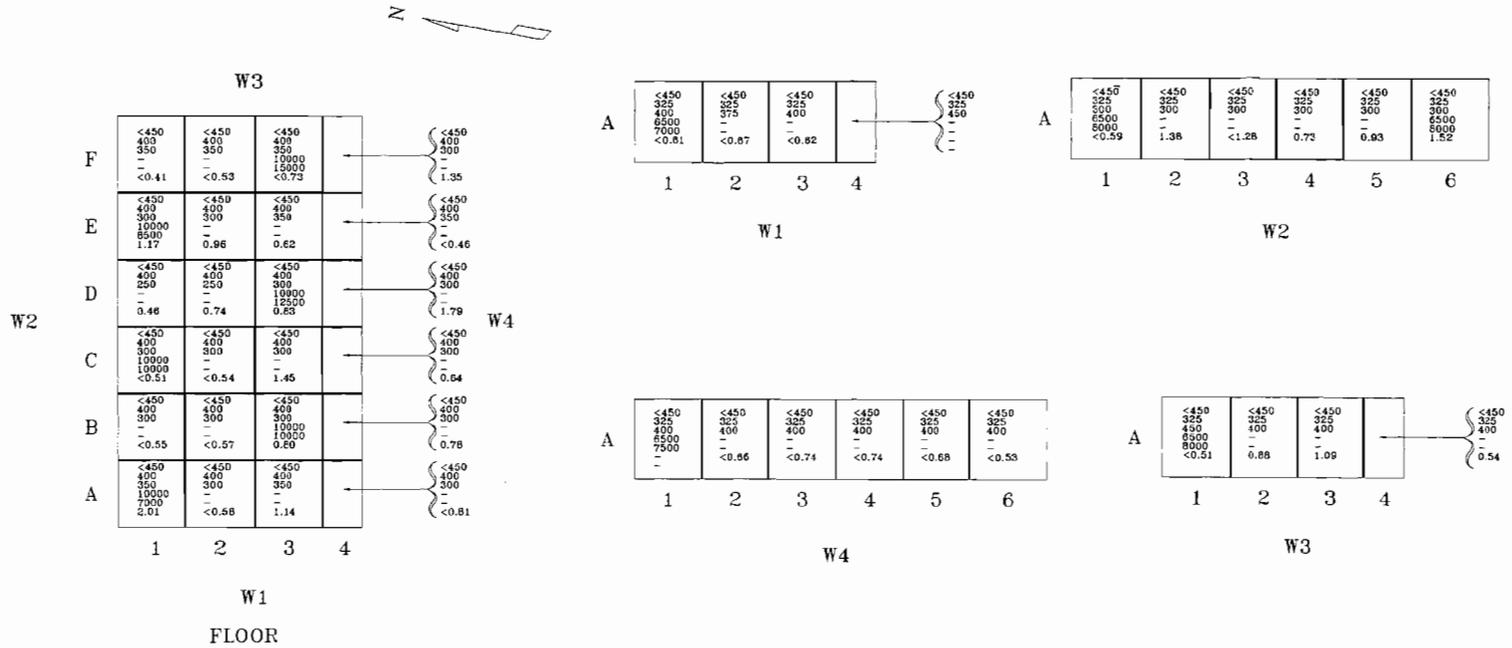
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HOBSON AVE.

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1.1 Controlled Storage Enclosure #1

e. Localized Grid Maps



**Note**  
Samples taken from all grids consist of paint and have a limit of 3 µCi/g.

**Sample Data**  
 <450 - IM-247/PC Results [µCi/20cm<sup>2</sup>]  
 200 - IM-253/PC (HV-1 PHA) [Bq/g]  
 300 - IM-253/PC (HV-1 PHA) [cpm]  
 7000 - IM-253/PC (HV-2 GROSS) [cpm]  
 7300 - IM-253/PC (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

1.1 Controlled Storage Enclosure #1

f. After Photograph

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Looking west to Wall #1

1.1 Controlled Storage Enclosure #1

g. After Photograph

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Looking east to Wall #3

## 1.2 Controlled Storage Enclosure #2

### a. Introduction:

Controlled Storage Enclosure #2 (CSE) is situated in Building 222 refueling complex, which is located in grid C-6 of the Charleston Naval Shipyard map (Figure 10). Controlled Storage Enclosure #2 was abandoned in place.

#### (1) Description:

This enclosure is 18' 6" wide by 31' 2" long by 25' high. Construction is carbon steel framing with monopanel walls. The building has a concrete floor and a 12' by 20' roof opening with a lift-off roof.

#### (2) Brief History:

(a) **Use:** This facility was used as a storage and work enclosure in the late 1960s and early 1970s for the original S5W refueling complex. This enclosure was released from radiological controls in 1974 in accordance with the NAVSEA requirements of that time. Since 1974 the enclosure has been used as an uncontrolled clean storage area in the Building 222 refueling complex.

(b) **Radiological History:** The CSE #2 was maintained as a controlled surface contaminated area while it was a part of the refueling complex. While the enclosure was part of the S5W refueling complex, the floor and walls were exposed to loose surface contamination levels up to 10000  $\mu\text{Ci}/100\text{cm}^2$ . In 1974 the enclosure was decontaminated to less than 450  $\mu\text{Ci}/100\text{cm}^2$  and surveyed for unrestricted release in accordance with the NAVSEA requirements of that time. Because the release requirements have changed since 1974, the enclosure was resurveyed to meet the current requirements.

#### (3) Survey Requirements:

(a) Group 3 survey.

### b. Discussion:

CSE #2 was divided into 44 grids, 24 floor grids and 20 wall grids. The floor grids were approximately 5' by 5' and the wall grids were approximately 5' wide by 6' high. Each grid had its own unique designator.

One hundred percent of all grids were surveyed with the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid.

## 1.2 Controlled Storage Enclosure #2

A total of 44 solid material samples were taken from the CSE #2. There were 24 concrete samples taken from the floor grids and 20 paint samples taken from the wall grids. Each solid material sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material samples: lead 212, lead 214, thallium 208, bismuth 214.

Individual backgrounds were used for CSE #2 concrete floor and metal walls. Due to variations in natural radioactivity among the construction materials, different background levels exist. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 40, 400, 10000 counts per minute used for the concrete floor were based on the radiation levels obtained from Building M1116. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 325, 6500 counts per minute used for the metal walls were based on background radiation levels obtained from Building 665.

Removal of light fixtures, electrical cabling and services, fixed cabinets, and other fixed equipment was not required.

### c. Summary:

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

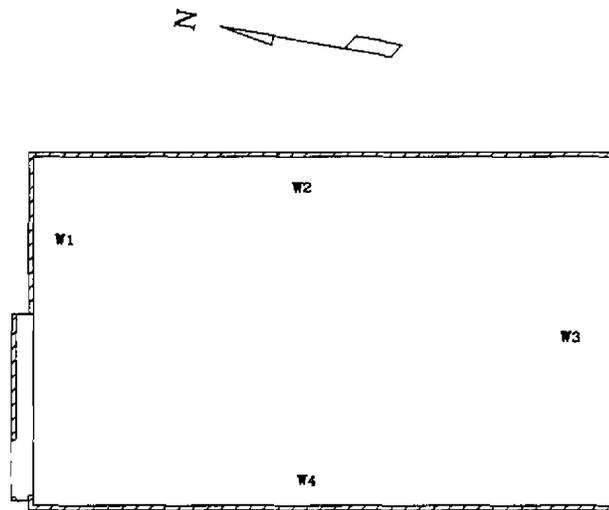
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than minimum detectable activity of 0.54 pCi/g to a high of 2.54 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that all solid material samples were less than 1 pCi/g, except for paint samples. Analysis performed on paint samples indicated less than 3 pCi/g.

1.2 Controlled Storage Enclosure #2

d. Site Map

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HOBSON AVE.

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1.2 Controlled Storage Enclosure #2

f. After Photograph

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Looking north to Wall #1

1.2 Controlled Storage Enclosure #2

g. After Photograph

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Looking south to Wall #3

### 1.3 Building 58 Internal Monitoring Trailers

#### a. Introduction:

The Internal Monitoring Trailers consist of two trailers located west of Building 58 in grid C-5 of the Charleston Naval Shipyard map (Figure 10).

##### (1) Description:

Trailer number one is a Butler Building approximately 9' wide by 29' long by 8' high. Trailer number two is a Butler Building approximately 20' wide by 20' long by 8' high. The Buildings have sheet metal and sheetrock/drywall walls and tiled plywood floors.

##### (2) Brief History:

(a) **Use:** Trailers number one and two were used to perform internal monitoring of personnel, environmental sample counting, and base closure sample preparation and analysis. The Counting Laboratory was moved to trailer number one in 1982.

(b) **Radiological History:** Low level sealed sources used for lab instrument calibration were stored in these areas. These trailers were established as radioactive material storage areas and radiation areas periodically while in use. There is no known history of contamination in these areas.

##### (3) Survey Requirements:

(a) Group 3 survey.

(b) Group 6 survey.

#### b. Discussion:

Trailer number one was divided into 32 grids: 12 floor grids and 20 wall grids. Trailer number two was divided into 46 grids: 20 floor grids and 26 wall grids. The floor grids were approximately 5' by 5' and the wall grids were approximately 5' wide by 6' high. Each grid had its own unique designator.

One hundred percent of all grids were surveyed with the IM-247/PD and IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid.

A total of 78 solid material samples were taken from Trailers Number One and Two floors and walls. Each solid material sample was removed from the grid location indicating the area of highest potential. The following typical naturally

### 1.3 Building 58 Internal Monitoring Trailers

occurring radionuclides were identified during isotopic analysis of solid material samples: lead 212, lead 214, bismuth 214, and potassium 40.

The construction material present in the trailers were synthetic tile covering plywood floors, metal and sheetrock/drywall for walls. For the floor, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 200, and 5000 counts per minute were based on radiation levels obtained from connex box number 730951. For the walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 150, and 4500 counts per minute were based on background radiation levels obtained from the same connex box listed above.

Group 6 surveys were performed in accordance with localized survey instructions. A minimum of 25% of the floor grids were surveyed with the AN/PDR-56.

Removal of light fixtures, electrical cabling and services, fixed cabinets, and other fixed equipment was not required.

#### c. Summary:

##### Group 3 Summary

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than minimum detectable activity of 0.26 pCi/g to a high of 2.99 pCi/g.

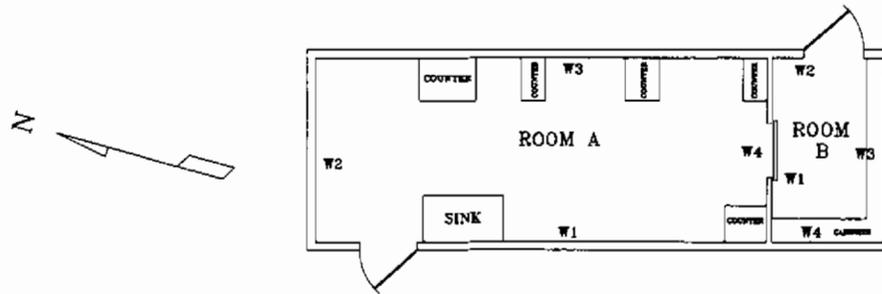
Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples were less than 1 pCi/g.

##### Group 6 Summary

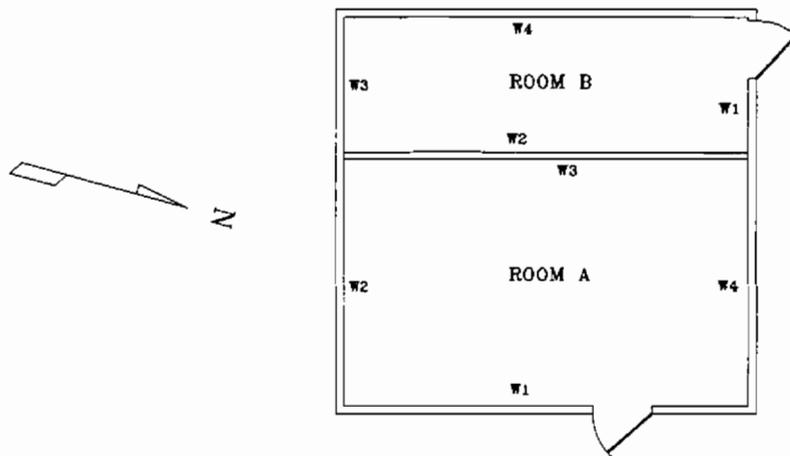
Surveys performed with the AN/PDR-56 found no detectable alpha radioactivity.

1.3 Building 58 Internal Monitoring Trailers

d. Site Map



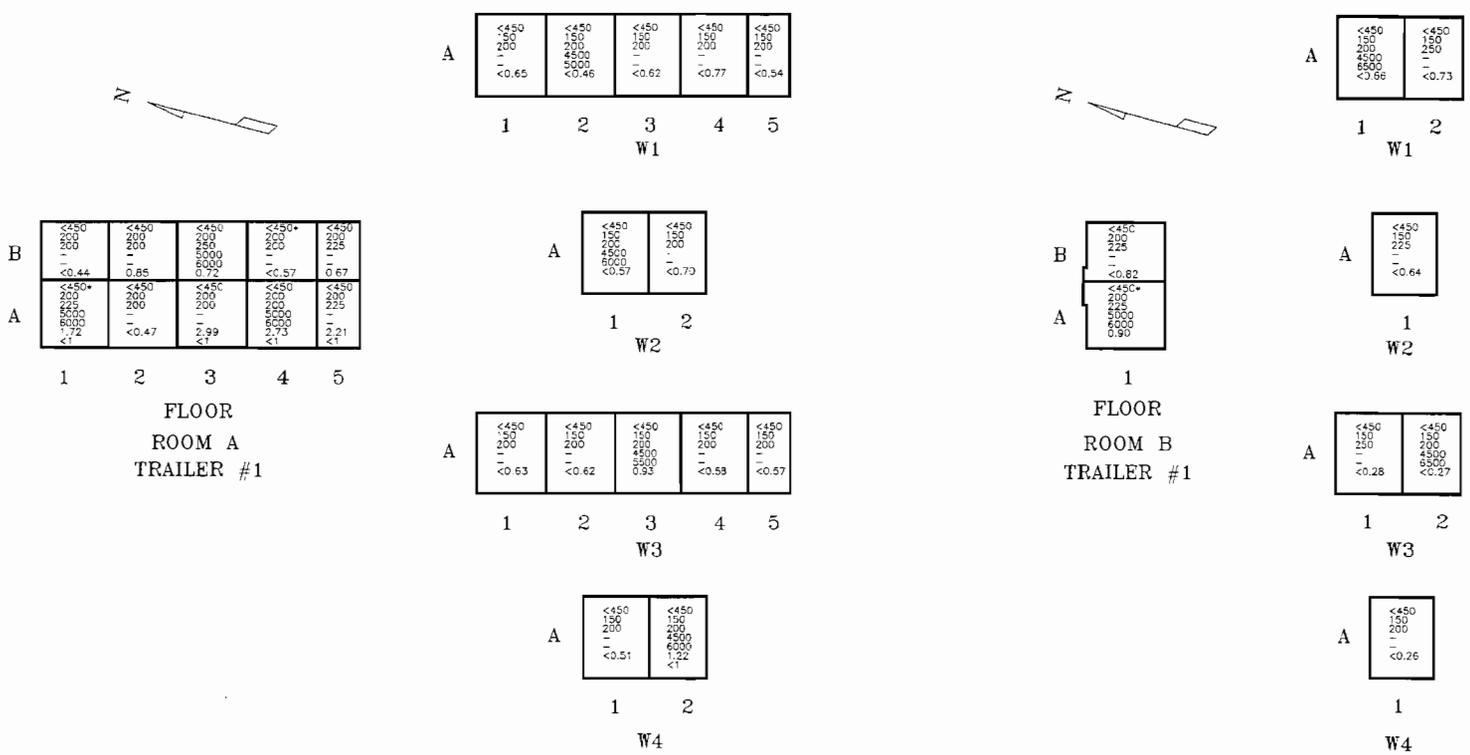
TRAILER #1  
(LOC WEST END OF BLDG 58)



TRAILER #2  
(LOC WEST END OF BLDG 58)

1.3 Building 58 Internal Monitoring Trailers

e. Localized Grid Maps

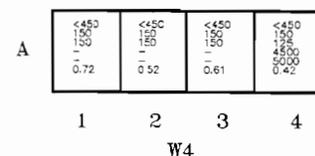
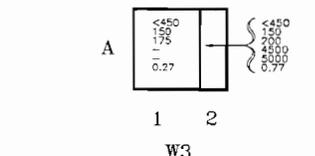
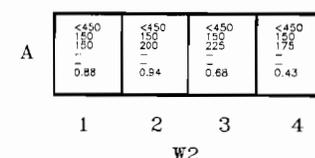
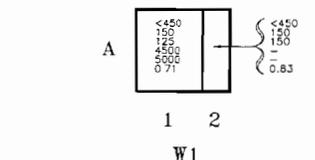
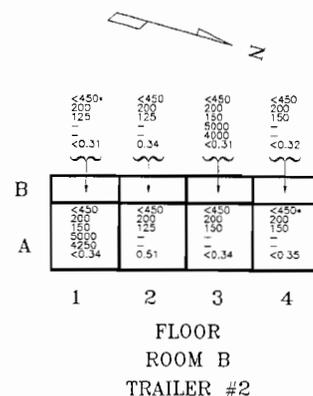
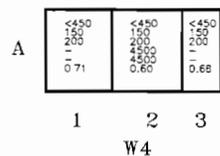
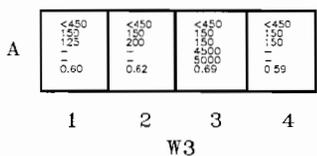
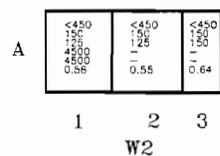
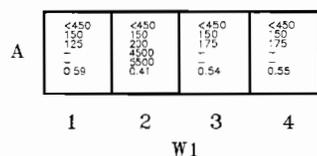
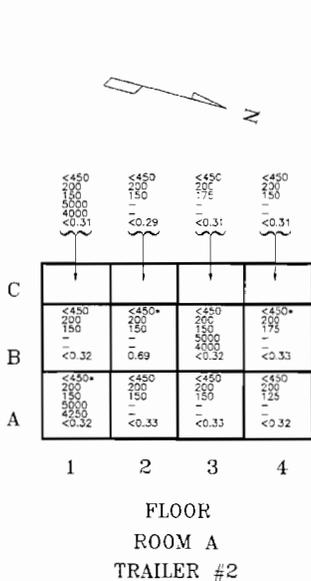


Note:  
\* Denotes grids which were surveyed with an AN/PDR-56 for Alpha radioactivity and no detectable activity was found.

Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [bq]  
 300 - IM-283/PD (HV-1 PHA) [cpm]  
 7500 - IM-253/PD (HV-2 GROSS) [bq]  
 7500 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

1.3 Building 58 Internal Monitoring Trailers

e. Localized Grid Maps



Note:  
 \* Denotes grids which were surveyed with an AN/PDR-56 for Alpha radioactivity and no detectable activity was found.

Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [bkg.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.32 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 < - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

1.3 Building 58 Internal Monitoring Trailers

f. After Photograph

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Trailer #1, Room A, looking south.

1.3 Building 58 Internal Monitoring Trailers

g. After Photograph

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Trailer #1, Room B, looking west.

1.3 Building 58 Internal Monitoring Trailers

f. After Photograph

---



Trailer #2, Room A, looking north.

1.3 Building 58 Internal Monitoring Trailers

g. After Photograph

---



Trailer #2, Room B, looking northwest.

## 1.4 Change House/Frisk Enclosure

### a. Introduction

The Change House/Frisk Enclosure was originally located in grid G-41 of the Charleston Naval Shipyard map (Figure 10), between Hobson Avenue and Building 222. The building has since been moved to grid J-34 as part of the base closure efforts.

#### (1) Description:

This is a 20' by 40' by 10' high butler building. The building has sheet metal walls and synthetic tiled plywood floors. A portion of the deck is reinforced with carbon steel for supporting a whole body frisker.

#### (2) Brief History:

- (a) **Use:** This enclosure was first used as dress out areas and access control points for the USS NARWHAL (SSN 671) training/Pier-J fuel exchanges and shipboard refueling complexes. The enclosure was then modified for use as the change house for the SSN 688 class refueling training complex. Final use was as a dress out area and access control point for Building 79A closure work.
- (c) **Radiological History:** A small section of the enclosure has been established as an RCA. The facility has no history of spills. Contamination levels were maintained less than 450  $\mu\text{Ci}/100^2$ .

#### (3) Survey Requirements:

- (a) Group 2 survey.
- (b) Group 3 survey.

### b. Discussion:

The Change House/Frisk Enclosure has a total of 32 grids. Each grid had its own unique designator. Areas of the Change House/Frisk Enclosure with a low potential for contamination were divided into four approximately 10' by 10' grid sections in accordance with Group 2 survey requirements. Each of these grids contained two 3' by 3' subsections which were placed in the areas of highest potential contamination. One 3' by 3' subsection was surveyed using the IM-247/PD and the other 3' by 3' subsection was surveyed using the IM-253/PD (HV-1 PHA).

Areas of the Change House/Frisk Enclosure with a higher potential for contamination were divided into 16 approximately 5' by 5' floor grids and 12 approximately 6' high by 5' wide wall grids in accordance with Group 3 survey

#### 1.4 Change House/Frisk Enclosure

requirements. One hundred percent of the remaining grids were surveyed with the IM-247/PD and IM-253/PD (HV-1 PHA). A minimum of 25% of these grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each of the grids with the exception of W3-A3 which was an unpainted metal surface.

A total of 27 solid material samples were taken from the Change House/Frisk Enclosure. Each solid sample was removed from the grid location indicating the highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material samples: lead 212, and thallium 208.

The IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 150, and 4750 counts per minute were based on background radiation levels obtained from the Engineering Trailer.

##### c. **Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected two areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

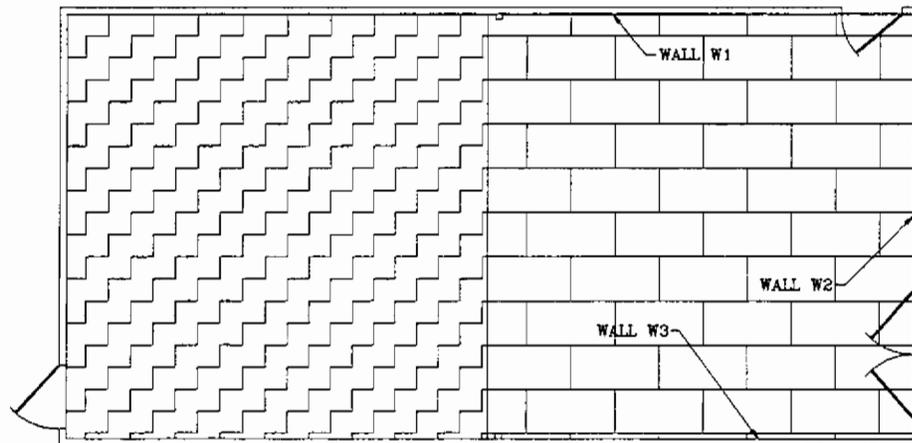
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a minimum detectable activity of less than 0.30 pCi/g to a high of 0.85 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples were less than 1 pCi/g.

1.4 Change House/Frisk Enclosure

d. Site Map

688 CHANGE HOUSE  
KEY PLAN

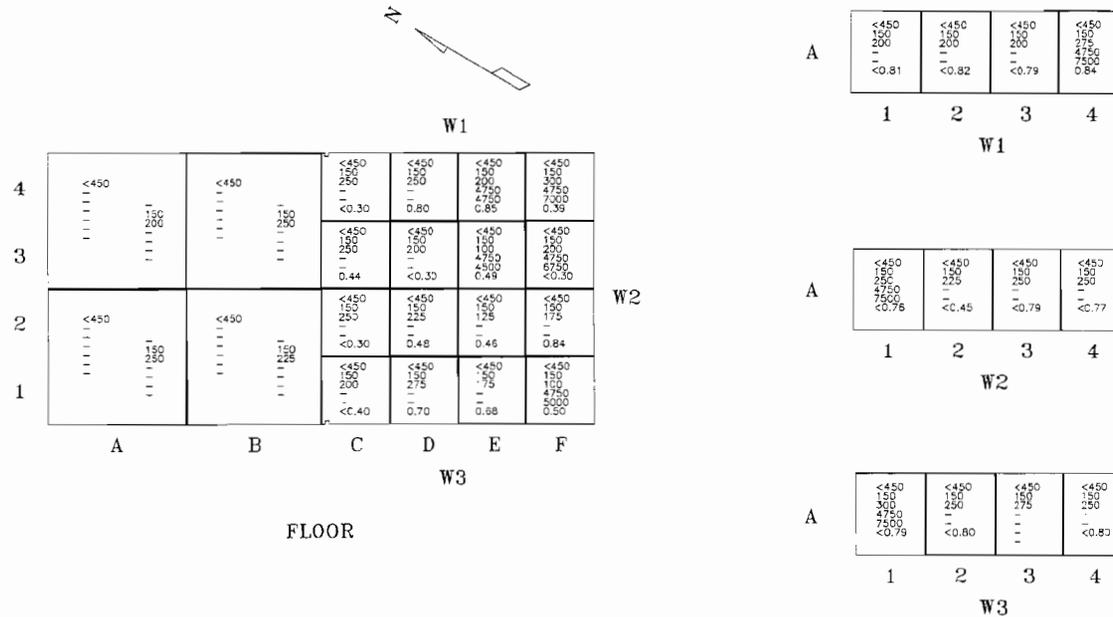


 GROUP 2 SURVEY

 GROUP 3 SURVEY

1.4 Change House/Frisk Enclosure

e. Localized Grid Maps



**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [pkgs.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [pkgs.]  
 7500 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

1.4 Change House/Frisk Enclosure

f. Prior Photograph

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Change House/Frisk Enclosure

1.4 Change House/Frisk Enclosure

f. After Photograph

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Looking northwest to Group 2 survey area.

1.4 Change House/Frisk Enclosure

g. After Photograph

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Looking southeast to Group 3 survey area.

## 1.5 Dry Dock Platforms

### a. Introduction:

A total of 24 Dry Dock Platforms were surveyed in accordance with CNSY NNPP Survey Plan.

#### (1) Description:

Radioactive servicing equipment, primarily portable effluent collection tanks and radiological ventilation systems were located on platforms during repair/overhaul of nuclear powered ships in dry docks. The platforms stand approximately 40' high. The structures are constructed of painted carbon steel.

#### (2) Brief History:

(a) Use: These platforms were used to support either portable effluent collection tanks and/or alternate exhaust ventilation units. They were used when the dry dock was either partially or fully flooded. The topside of the dry dock staging platform was the only place that radioactive material was stored. Therefore, the underside of the platform and the platform supports were not required to be surveyed.

(b) **Radiological History:** These platforms were established as radiation and radioactive material storage areas. Some radiological work was performed on the platforms. Low level spills have occurred on the topsides of these platforms. Loose surface contamination levels were maintained less than  $450\mu\text{Ci}/20\text{cm}^2$ .

#### (3) Survey Requirements:

(a) Group 3 survey.

### b. Discussion:

The platform decks of the Dry Dock Platforms were divided into 602 grids. The grids were approximately 5' by 5'. Each grid had its own unique designator.

One hundred percent of all grids were surveyed with the IM-247/PD and IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid which had a sufficient amount of paint available for sampling.

A total of 438 solid material samples were taken from the Dry Dock Platforms. Each solid material sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclides

## 1.5 Dry Dock Platforms

were identified during isotopic analysis of solid material samples: lead 212, lead 214, thallium 208, beryllium 7.

The construction material for the Dry Dock Platforms was steel. Due to surveys being performed in two different locations, analogous backgrounds varied. For the surveys performed on the platforms in Dry Dock 2 the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 30, 250, and 5500 counts per minute were based on radiation levels obtained from the Building 1639 wall. For the surveys performed on the platforms on Pier H the IM-247/PD and the IM-253/PD (HV-1 and HV-2 GROSS) backgrounds of 40, 150, and 3500 were based on radiation levels obtained from Trailer J106.

### c. Summary:

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than minimum detectable activity of 0.25 pCi/g to a high of 2.95 pCi/g.

Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples taken were less than 3 pCi/g. All solid material samples were paint.

1.5 Dry Dock Platforms

f. After Photograph

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Staging platforms

**2.1 NFE/IAF****a. Introduction:**

The New fuel Enclosure (NFE)/Installation Assembly Fixture (IAF) is located in grid D-5 of the Charleston Naval Shipyard map (figure 10).

**(1) Description:**

The NFE/IAF is 32' by 43' by 43' high with painted carbon steel walls/roof and a stainless steel deck. Within this structure are three roof openings, two mechanical and one lift off. Positioned within the southwest corner of the NFE is the IAF. The IAF is 16' by 16' by 30' high with painted carbon steel walls and a stainless steel deck. Within the IAF is a 13' deep stainless steel lined pit. The south wall of the IAF at ground level supports the IAF Fluids Alcove. The west wall of the IAF contains a mechanical platform and Air Manifold Alcove. The roof of the IAF has a mechanical roof section.

**(2) Brief History:**

- (a) **Use:** This NFE was used as an inspection area for new reactor fuel and the IAF as an inspection area for reuse control rods/filler plugs.
- (b) **Radiological History:** The NFE was controlled as a CSCA for a few refuelings for convenience only. A CSCA reduction program later moved the CSCA boundary to within the IAF. Due to the nature of the work in the IAF, the radiological potential is much greater than in the NFE. There have been reported spills and indications of airborne radioactivity in the IAF, and reported spills in the NFE as well. Loose surface radioactivity levels greater than 10000  $\mu\text{Ci}/100\text{cm}^2$  could be encountered when exposing previously unexposed areas. Both areas above are and have been controlled as an RCA.
- (c) **Items removed:** Government Furnished Equipment, fluid system and IAF/Support Assembly Storage Stand (SASS) components.

**(3) Survey Requirements:**

- (a) NFE - Group 3 survey
- (b) IAF - Group 5 survey

**b. Discussion:****(1) Group 3 survey:**

**2.1 NFE/IAF**

The NFE was divided into 168 grids; 101 wall grids, 42 floor grids, 13 platform grids, and 12 roof grids. These grids were approximately 5' by 5'. Each grid had its own unique designator.

One hundred percent of all grids were surveyed with the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid with the exception of unpainted stainless steel structures.

A total of 106 paint samples were taken from the NFE. Each paint sample was removed from the grid location indicating the highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of paint samples: lead 212.

Individual backgrounds were used for the NFE steel walls and floors. Due to variations in natural radioactivity among the construction materials, different background levels exist. For the carbon steel walls, the IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 150, and 4500 counts per minute were based on radiation levels from Connex box 730951. For the steel floors, the IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 200, and 5500 counts per minute were based on radiation levels from Building 21 deck.

**(2) Group 5 survey:**

The IAF was divided into 276 grids: 210 wall grids, 30 ceiling grids, 29 floor grids, and 7 roof grids. The stainless steel pit within the IAF was divided into 115 grids: 81 wall grids, 16 floor grids, 16 ceiling grids, and 2 hatch grids. The floor grids were divided into 3' by 3' grids. The walls were divided into 3' by 3' grids up to 12' high, then 6' by 6' grids above 12'. Each grid had its own unique designator. The 3' by 3' grids around the top of IAF were used because of the proximity to ventilation access.

One hundred percent of all 3' by 3' grids were surveyed with the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25 percent of all 3' by 3' grids were surveyed with the IM-253/PD (HV-2 GROSS). A minimum of 25 percent of the ceiling 6' by 6' grids and 50 percent of the wall 6' by 6' grids were surveyed using the IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS). One solid material sample was taken from each 3' by 3' grid, a minimum of 50 percent of 6' by 6' wall grids, and a minimum of 25 percent of 6' by 6' ceiling grids with the exception that solid material samples were not taken from grids that are unpainted metal.

A total of 199 solid material samples were taken from the IAF. Each

**2.1 NFE/IAF**

solid material sample was removed from the grid location indicating the highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material samples: lead 212.

For the ceiling and walls of the IAF, the IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 150, and 4500 counts per minute were based on radiation levels from Connex box 730951. For the floors of the IAF, the IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 200, and 5500 counts per minute were based on radiation levels from Building 21 deck.

**c. Summary:****(1) Group 3 survey:**

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.44 pCi/g to a high of 9.92 pCi/g.

Analysis performed on solid material paint samples with the MCA for specific cobalt 60 indicated that all paint samples were less than 3 pCi/g and showed no trace of cobalt 60 with the exception of trace activity in four paint samples taken from the walls of the NFE. The extent of the contamination was identified by taking additional solid material samples from the surrounding vicinity. These areas were remediated by removing the paint from the affected areas. Post remediation solid material samples were not taken because all paint was removed from affected areas and the remaining surface is non-painted metal. Paint samples were taken from all grids in walls W1 through W17, W23, W25 through W31, and the IAF Roof.

**(2) Group 5 survey:**

Surveys performed with the IM-247/PD did not detect areas greater than  $450\mu\text{Ci}/20\text{cm}^2$ .

**2.1 NFE/IAF**

Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

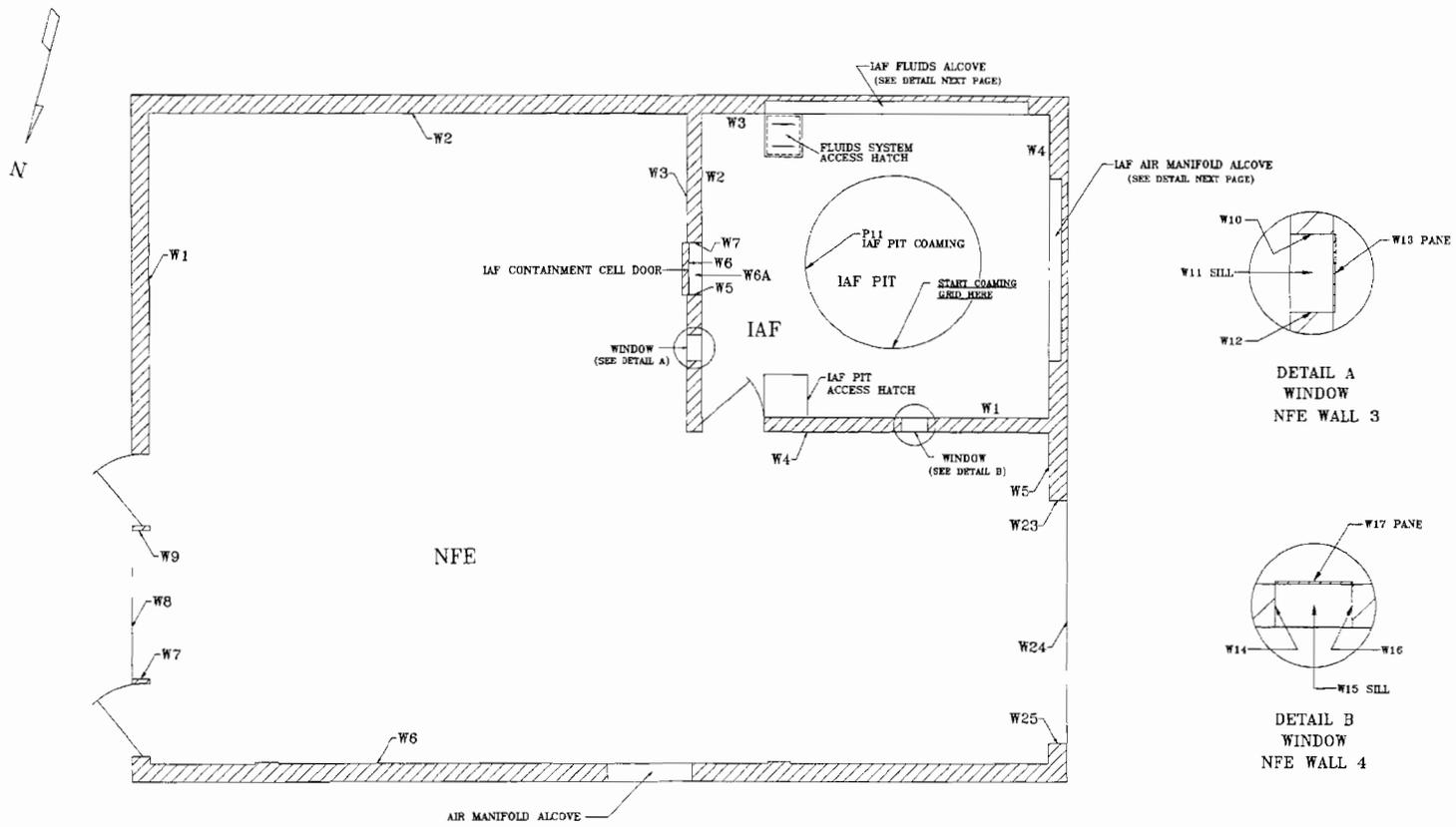
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.44 pCi/g to a high of 6.16 pCi/g.

Analysis performed on solid material paint samples with the MCA for specific cobalt 60 indicated that all paint samples were less than 3 pCi/g and showed no trace of cobalt 60 with the exception of trace activity in three paint samples taken from the IAF walls. The extent of the contamination was identified by taking additional solid material samples from the surrounding vicinity. These areas were remediated by removing the paint from the affected areas. Post remediation solid material samples were not taken because all paint was removed from affected areas and the remaining surface is non-painted metal. All samples taken were paint samples.

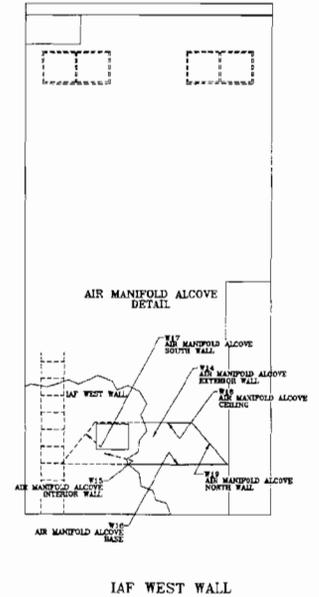
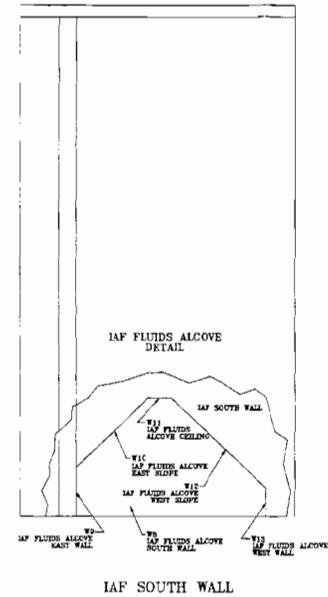
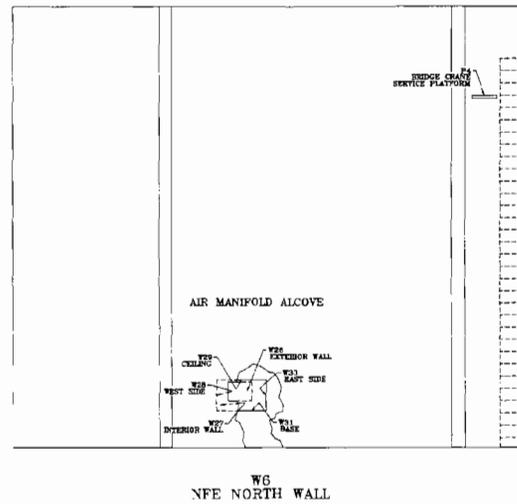
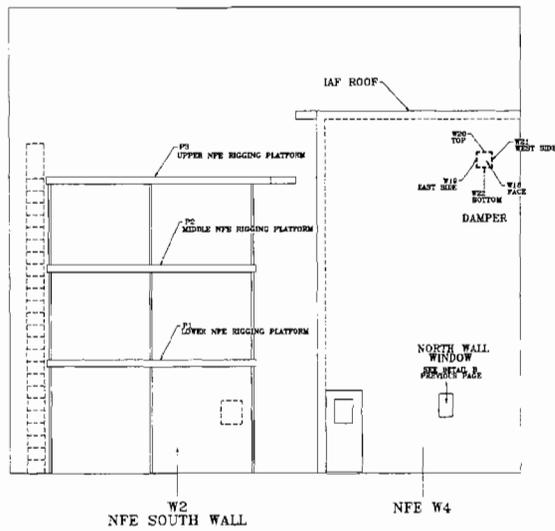
2.1 NFE/IAF

d. Site Map



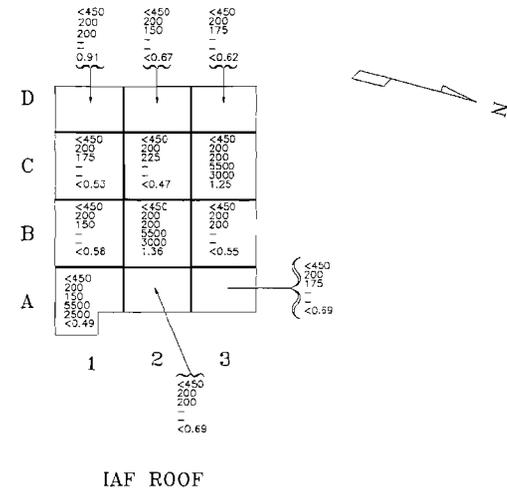
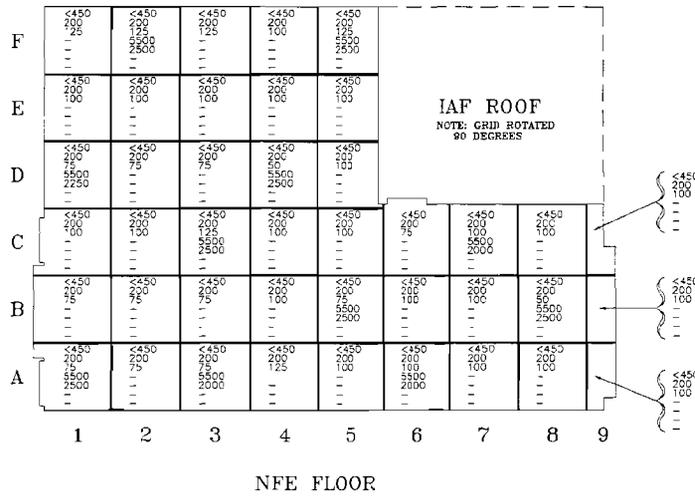
2.1 NFE/IAF

d. Site Map



2.1 NFE/IAF

e. Localized Grid Maps



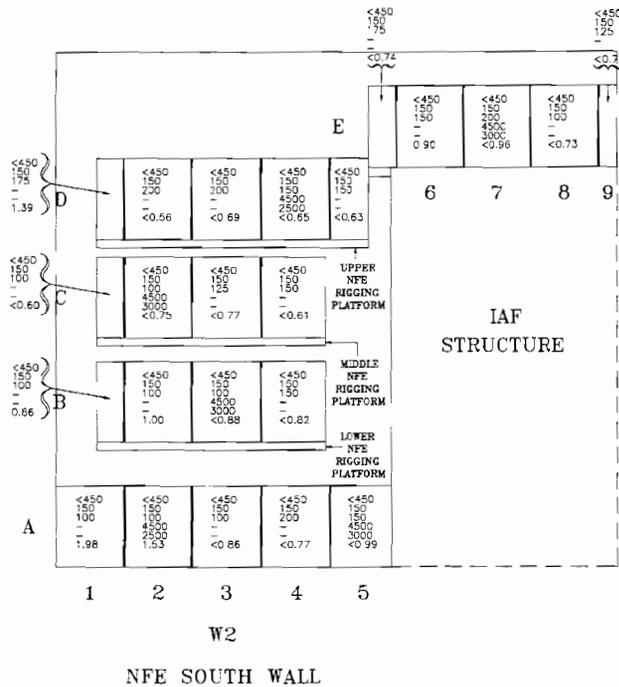
**Note**  
Samples taken from all grids in the IAF roof consist of paint and have a limit of 3 pCi/g.

**Sample Data**  
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 20C - IM-253/PD (HV-1 PHA) [pCi/g]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [b-g]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]



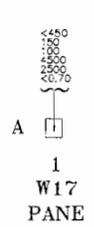
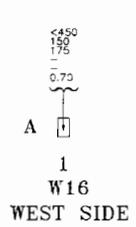
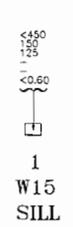
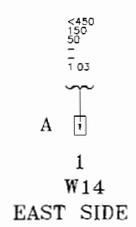
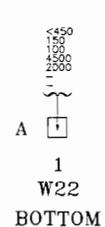
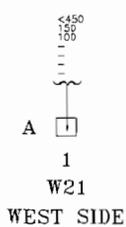
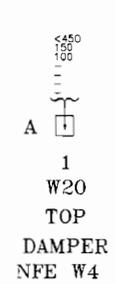
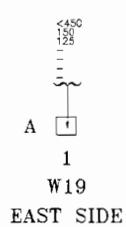
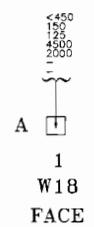
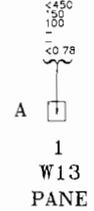
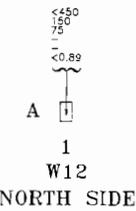
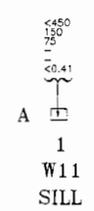
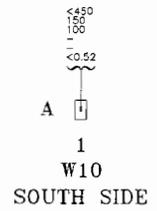
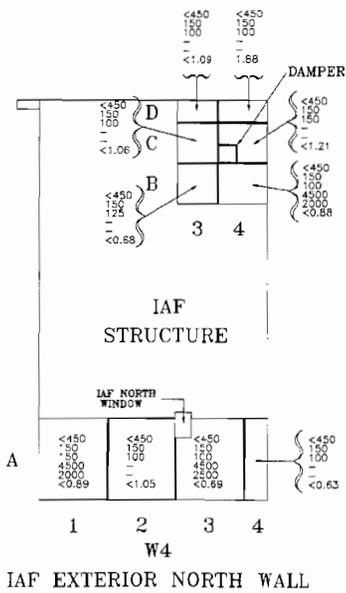
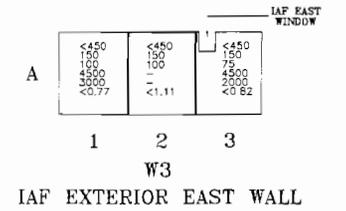
2.1 NFE/IAF

e. Localized Grid Maps



2.1 NFE/IAF

e. Localized Grid Maps

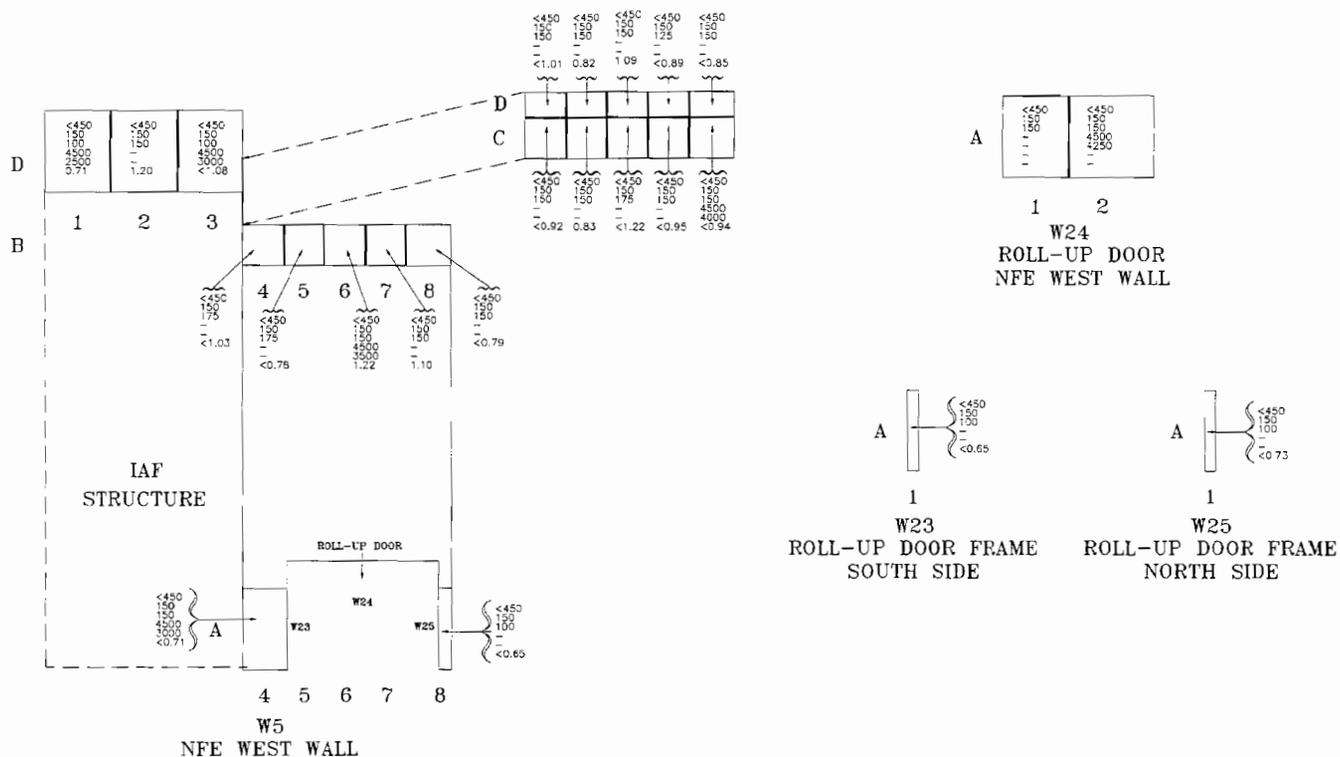


Note  
Samples taken from all grids in W3, W4, and W10 through  
W17 consist of paint and have a limit of 3 pCi/g.

Sample Data  
<450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
200 - IM-253/PD (HV-1 PHA) [bkg.]  
300 - IM-253/PD (HV-1 PHA) [cpm]  
7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
7300 - IM-253/PD (HV-2 GROSS) [cpm]  
1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
<1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

e. Localized Grid Maps

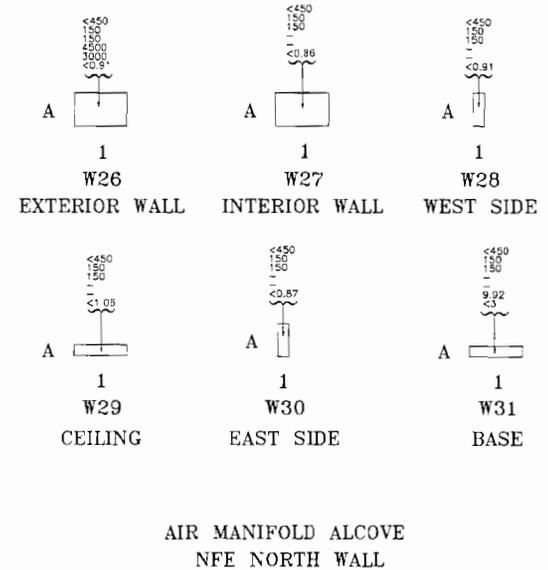
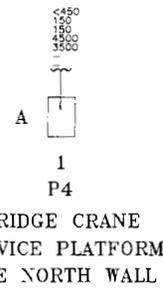
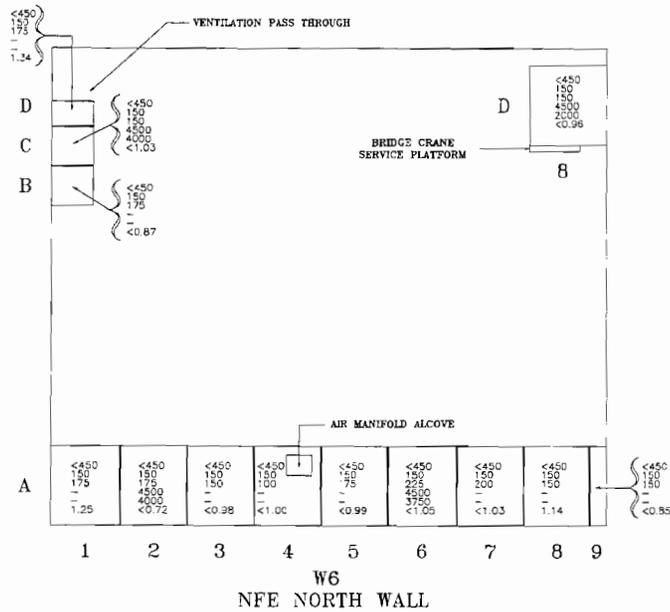


**Note**  
Samples taken from all grids in W5, W23 and W25 consist of paint and have a limit of 3 pCi/g

**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/2\text{Cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [bkg]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [bkg]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

e. Localized Grid Maps

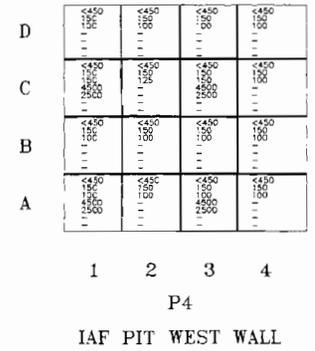
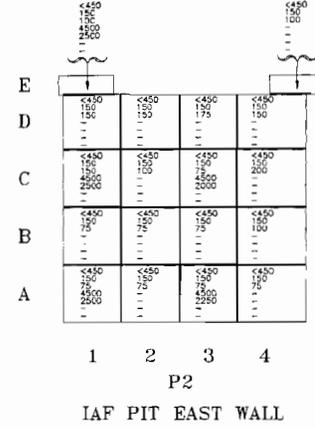
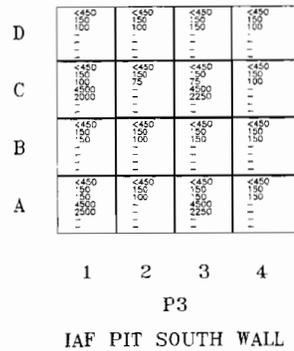
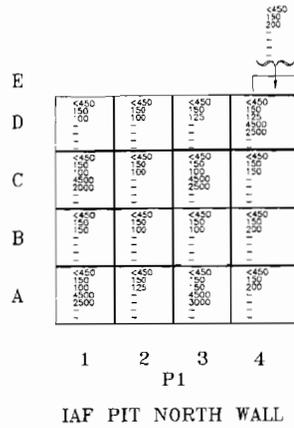
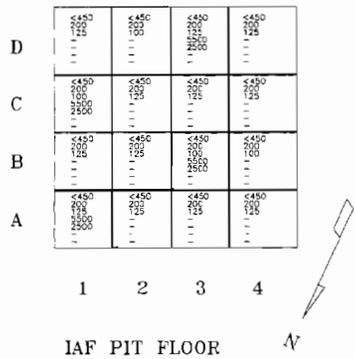
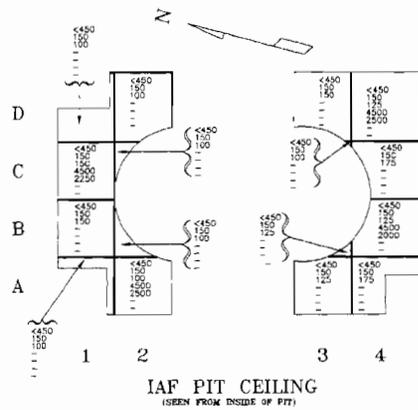


Note  
 Samples taken from all grids in W6 and W26 through 31  
 consist of paint and have a limit of 3 pCi/g.

Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq/g]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq/g]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

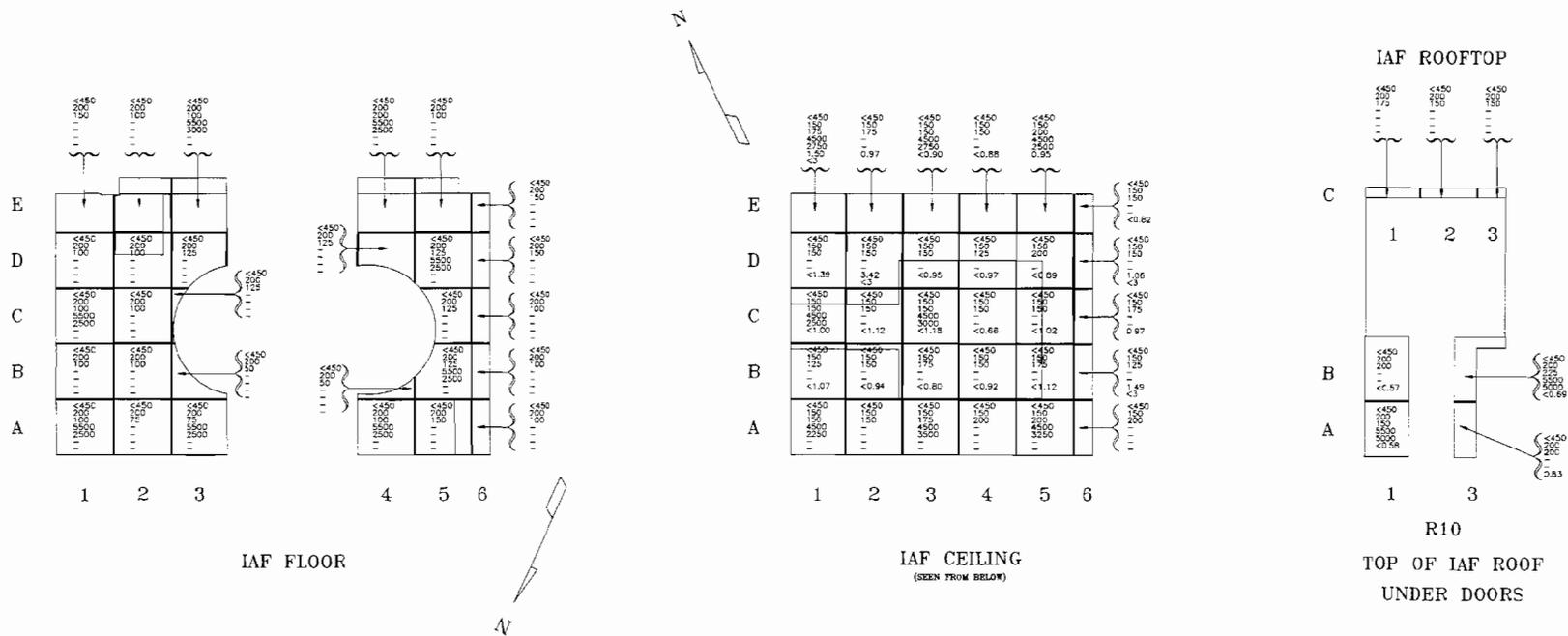
e. Localized Grid Maps



**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [bkg.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

e. Localized Grid Maps

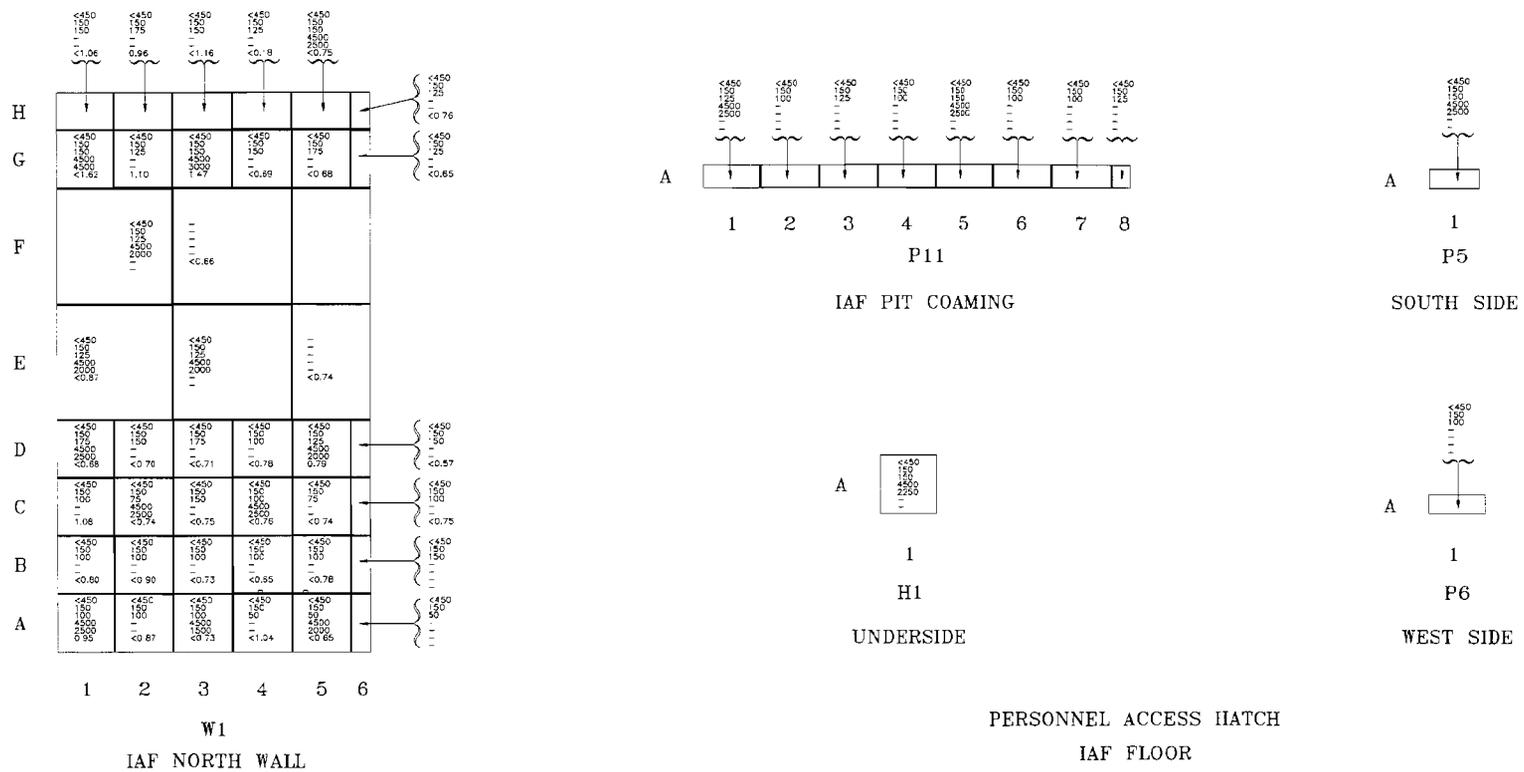


**Note**  
Samples taken from all grids in the IAF Ceiling except Row A and all grids in the IAF Roof except Row C consist of paint and have a limit of 3 pCi/g.

**Sample Data**  
 <450 - IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 20C - IM-253/PD (HV-1 PHA) [bkg.]  
 30C - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PC (HV-2 GROSS) [bkg.]  
 7300 - IM-253/PC (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

e. Localized Grid Maps

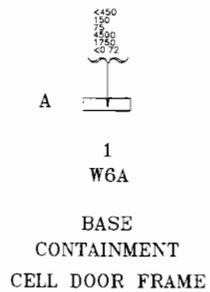
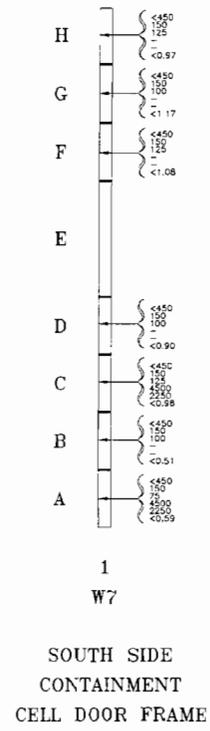
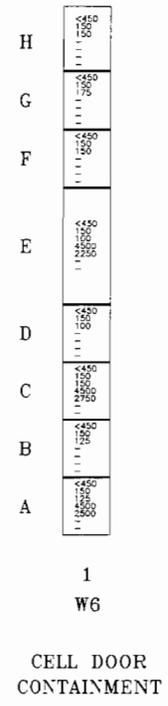
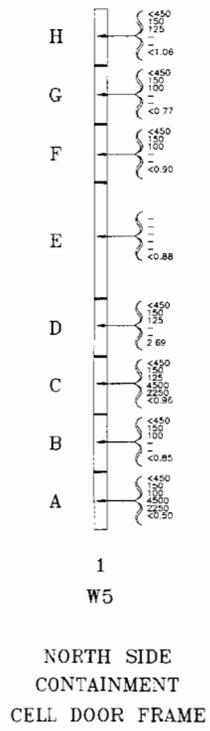
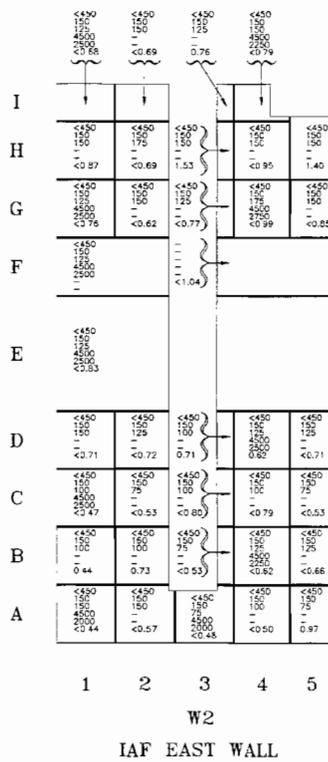


**Note**  
Samples taken from all grids in W1 consist of paint and have a limit of 3 pCi/g.

**Sample Data**  
<450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
200 - IM-253/PD (HV-1 PHA) [bkg.]  
300 - IM-253/PD (HV-1 PHA) [cpm]  
7000 - IM-253/PD (HV-2 GROSS) [bkg.]  
7300 - IM-253/PD (HV-2 GROSS) [cpm]  
1.62 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
<1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

e. Localized Grid Maps

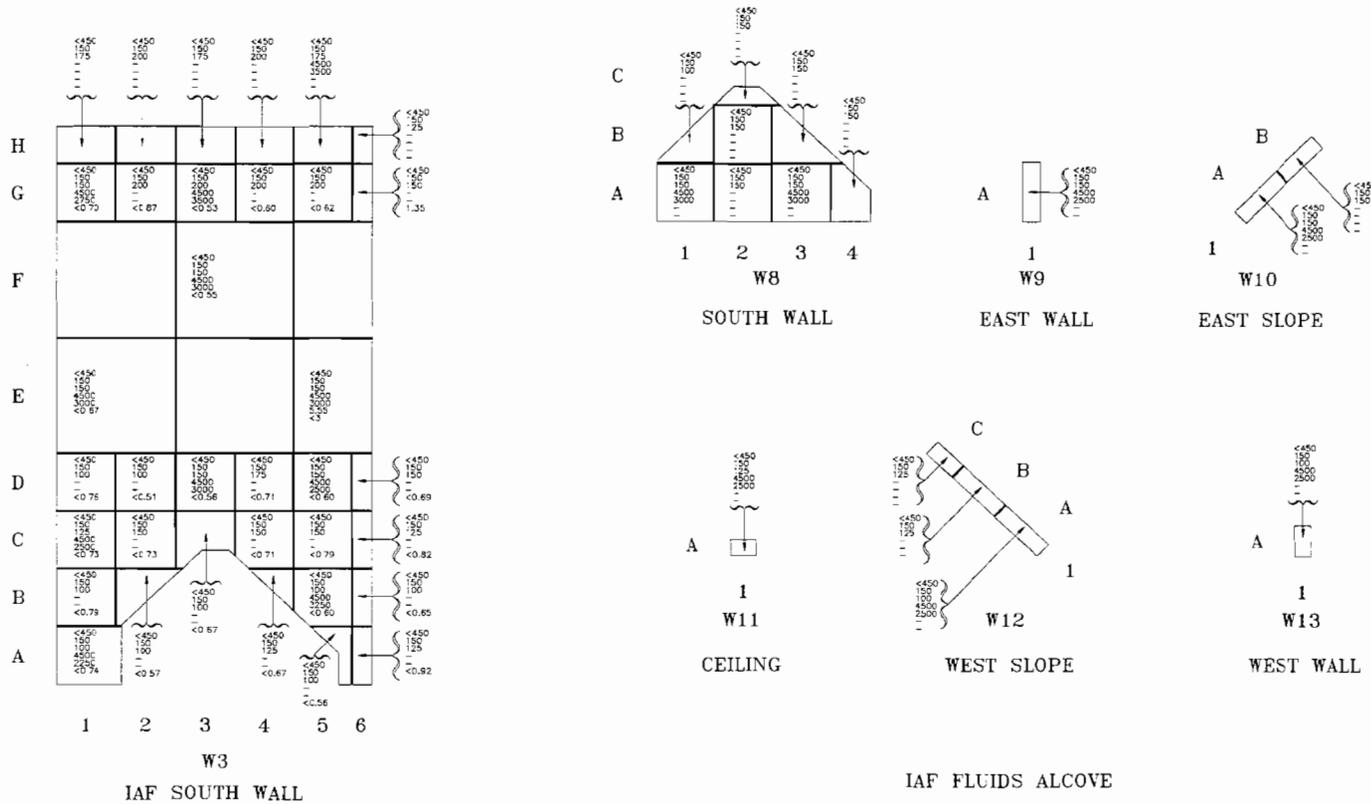


**Note**  
Samples taken from all grids in W2, W5, grid W6A-A1, and all grids in W7 except E1 consist of paint and have a limit of 3 pCi/g

**Sample Data**  
 <450 - IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 - IM-253/PD (HV-1 PHA) [Bq]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7300 - IM-253/PD (HV-2 GROSS) [Bq]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

e. Localized Grid Maps

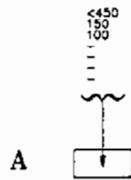


**Note**  
Samples taken from all grids in W3 except Row H consist of paint and have a limit of 3 pCi/g.

**Sample Data**  
<450 - IM-247/PD Results [µCi/20cm<sup>2</sup>]  
200 - IM-253/PD (HV-1 PHA) [Bq.]  
300 - IM-253/PD (HV-1 PHA) [cpm]  
7000 - IM-253/PD (HV-2 GROSS) [Bq.]  
7300 - IM-253/PD (HV-2 GROSS) [cpm]  
1.82 - MCA Gross Gamma Es. Co-60 [pCi/g]  
<1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

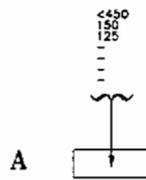
e. Localized Grid Maps



1

P7

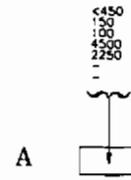
SOUTH SIDE



1

P8

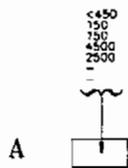
WEST SIDE



1

P9

NORTH SIDE



1

P10

LEDGE



1

H2

ACCESS HATCH  
UNDERSIDE

FLUID SYSTEM  
ACCESS HATCH  
IAF FLOOR

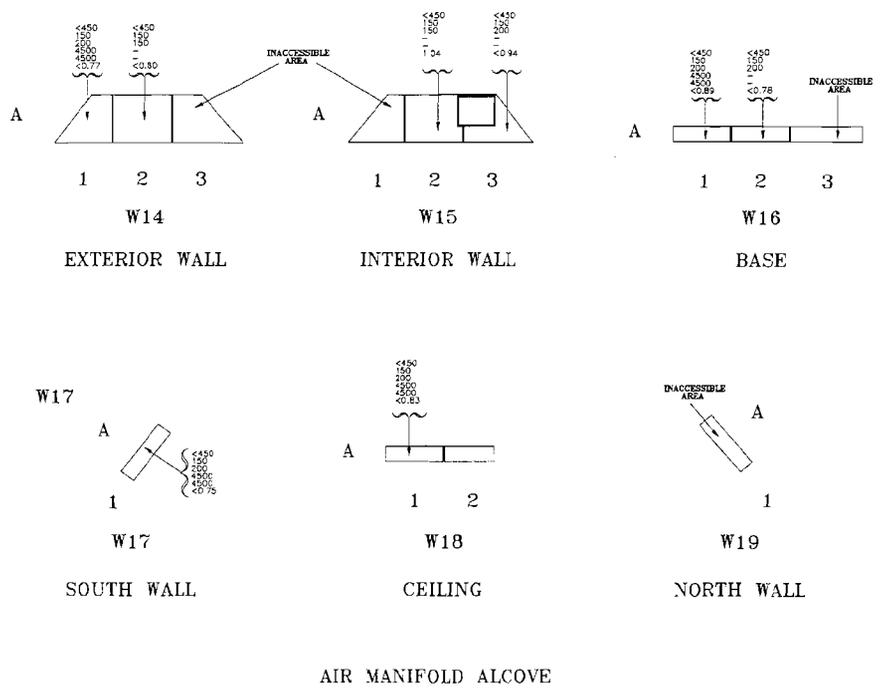
Sample Data

- <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]
- 200 - IM-253/PD (HV-1 PHA) [bkg.]
- 300 - IM-253/PD (HV-1 PHA) [cpm]
- 7000 - IM-253/PD (HV-2 GROSS) [bkg.]
- 7300 - IM-253/PD (HV-2 GROSS) [cpm]
- 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]
- <1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

e. Localized Grid Maps

		<450 150 200 4500 3000 <1.00	<450 150 150 4500 3000 <1.01	<450 150 150 4500 3000 <1.17	<450 150 150 4500 3000 <0.84	
J						
I		<450 150 200 4500 3000 <1.00	<450 150 175 4500 3000 <1.37	<450 150 150 4500 3000 <1.21	<450 150 150 4500 3000 8.16 <1.01	
H		<450 150 200 4500 3000 <0.78	<450 150 200 4500 3000 <0.90	<450 150 150 4500 3000 <0.58	<450 150 150 4500 3000 <0.93 4500 <0.97	
G		<450 150 200 4500 3000 <0.80	<450 150 200 4500 3000 <1.18	<450 150 175 4500 3000 <1.09	<450 150 150 4500 3000 215 175 <0.89 0.85	
F		<450 150 150 4500 3000 <0.75	<450 150 150 4500 3000 <1.05	<450 150 150 4500 3000 <0.72	<450 150 150 4500 3000 <0.79 <0.95	
E		<450 150 175 4500 3000 <0.86	<450 150 175 4500 3000 <0.81	<450 150 150 4500 3000 <0.88	<450 150 200 4500 3000 1.19 <0.71	
D		<450 150 150 4500 3000 <1.88	<450 150 175 4500 3000 <0.82	<450 150 200 4500 3000 <0.66	<450 150 200 4500 3000 <0.74	
C		<450 150 175 4500 3000 <0.67	<450 150 150 4500 3000 <0.67	<450 150 200 4500 3000 <0.72	<450 150 150 4500 3000 <0.67	
B		<450 150 150 4500 3000 <0.81	<450 150 150 4500 3000 <0.77	<450 150 100 4500 3000 <0.75	<450 150 150 4500 3000 <0.85	
A		<450 150 150 4500 3000 <0.74	<450 150 150 4500 3000 <0.71	<450 150 150 4500 3000 <0.69	<450 150 150 4500 3000 <0.66	
		1	2	3	4	
		W4				
		IAF WEST WALL				



**Note**  
 Samples taken from all grids in W14, W15, W17, and grids W14-A1, W14-A2, W16-A1, W16-A2 and W18-A1 consist of paint and have a limit of 3 pCi/g.

**Sample Data**  
 <450 - IM-247/PD Results [µpCi/20cm<sup>2</sup>]  
 200 - IM-253/PD (HV-1 PHA) [bkg.]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GRCSS) [bkg.]  
 7300 - IM-253/PD (HV-2 GRCSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

2.1 NFE/IAF

f. Prior Photograph

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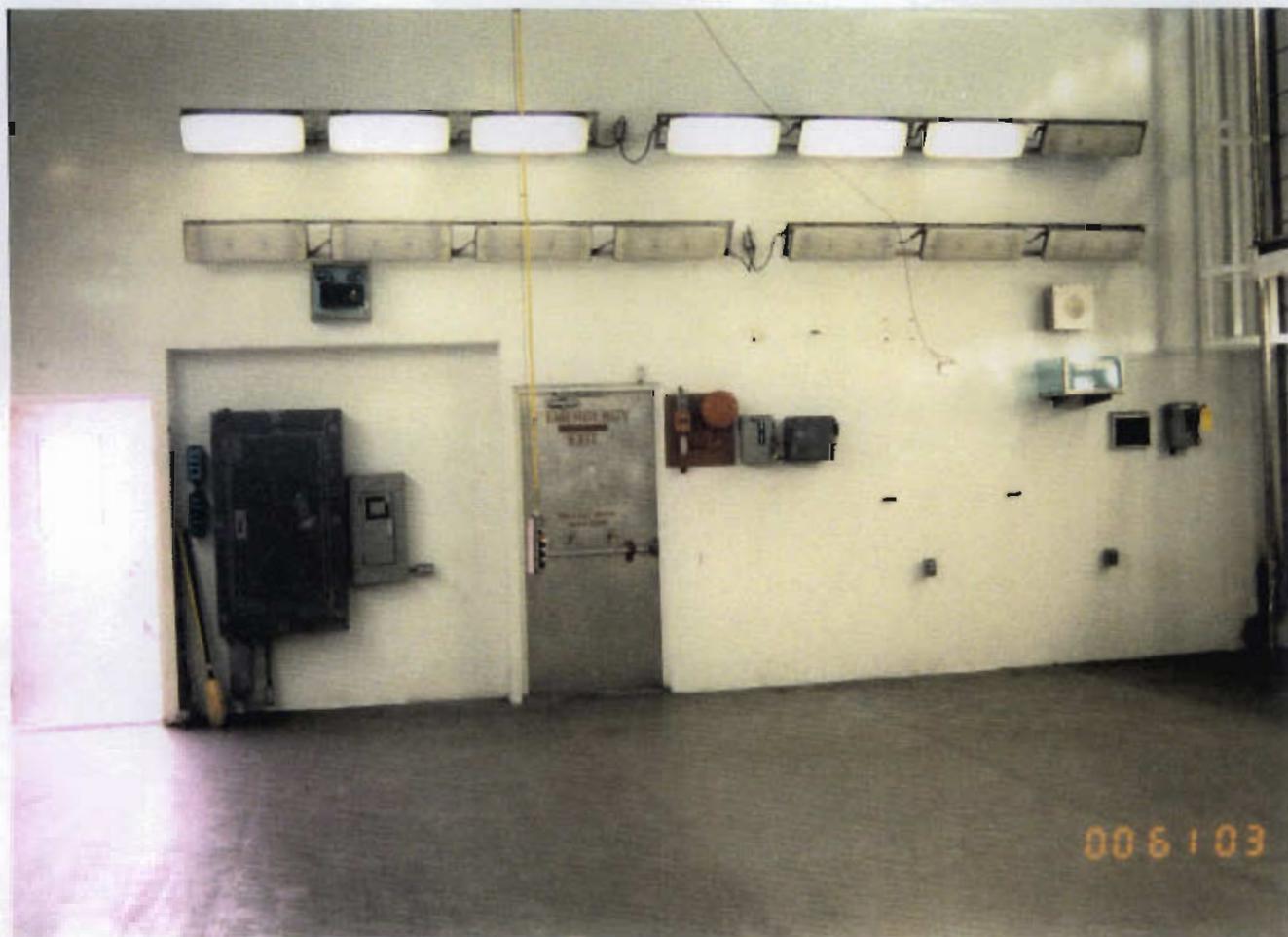


North corner of NFE looking west.

2.1 NFE/IAF

f. Prior Photograph

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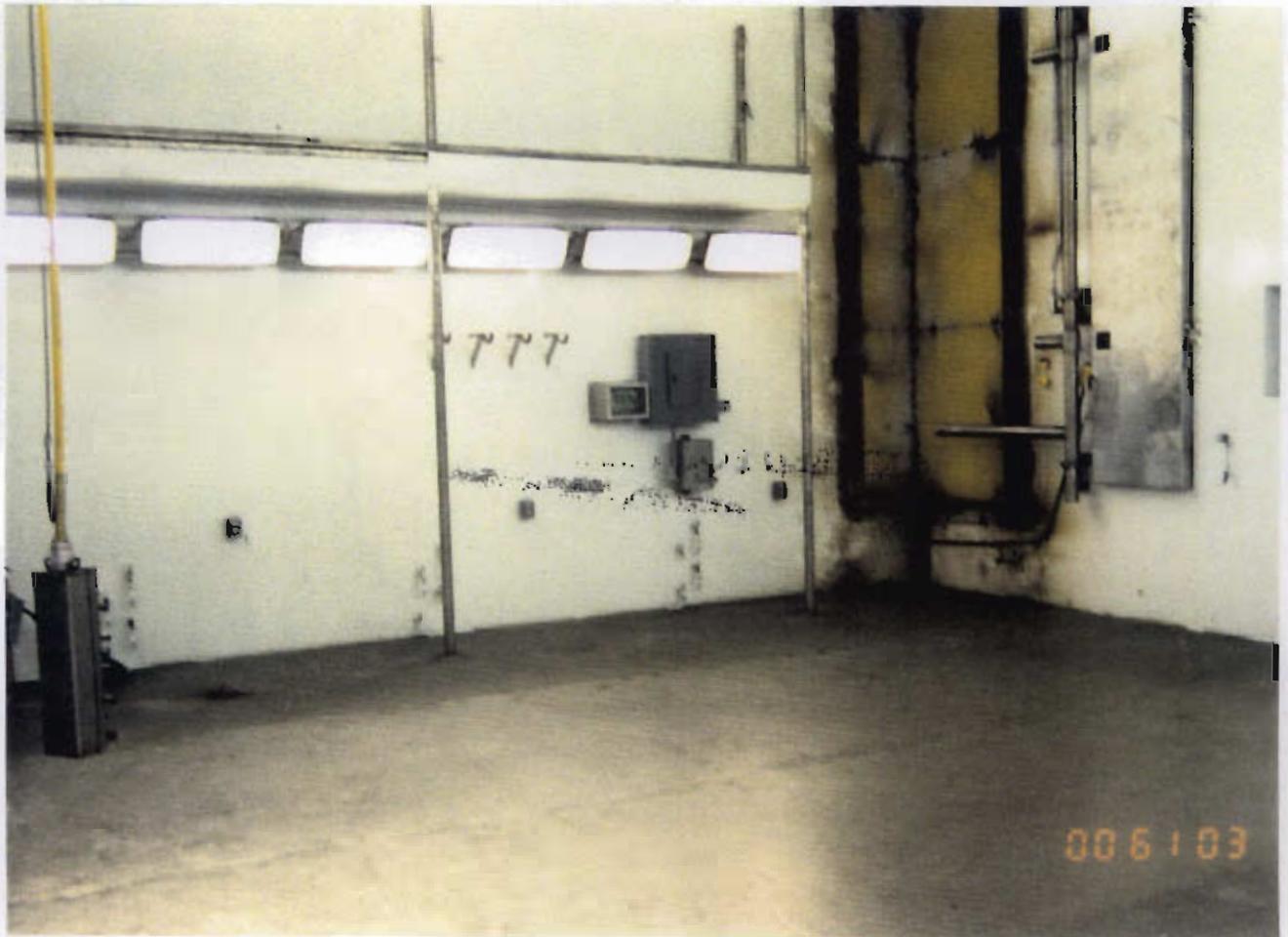


West corner of NFE looking east.

2.1 NFE/IAF

f. During Photograph

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Center of NFE looking to south wall.

2.1 NFE/IAF

f. During Photograph

---



IAF entrance looking to IAF south wall.

2.1 NFE/IAF

f. During Photograph

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Center of IAF looking to IAF east wall.

2.1 NFE/IAF

g. After Photograph

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North corner of NFE looking west.

2.1 NFE/IAF

g. After Photograph

---



North corner of NFE looking west.

2.1 NFE/IAF

g. After Photograph

---

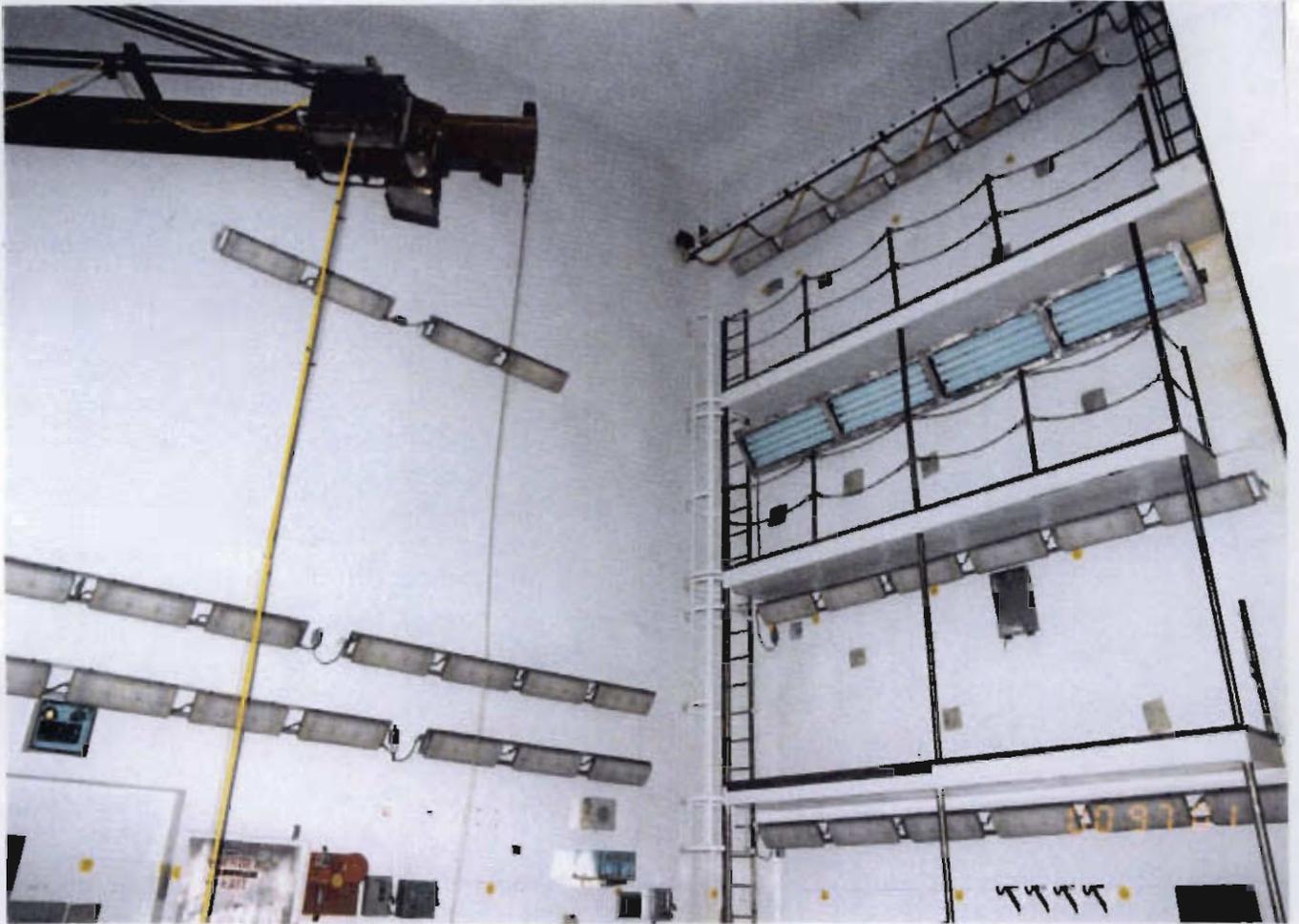


West corner of NFE looking east.

2.1 NFE/IAF

g. After Photograph

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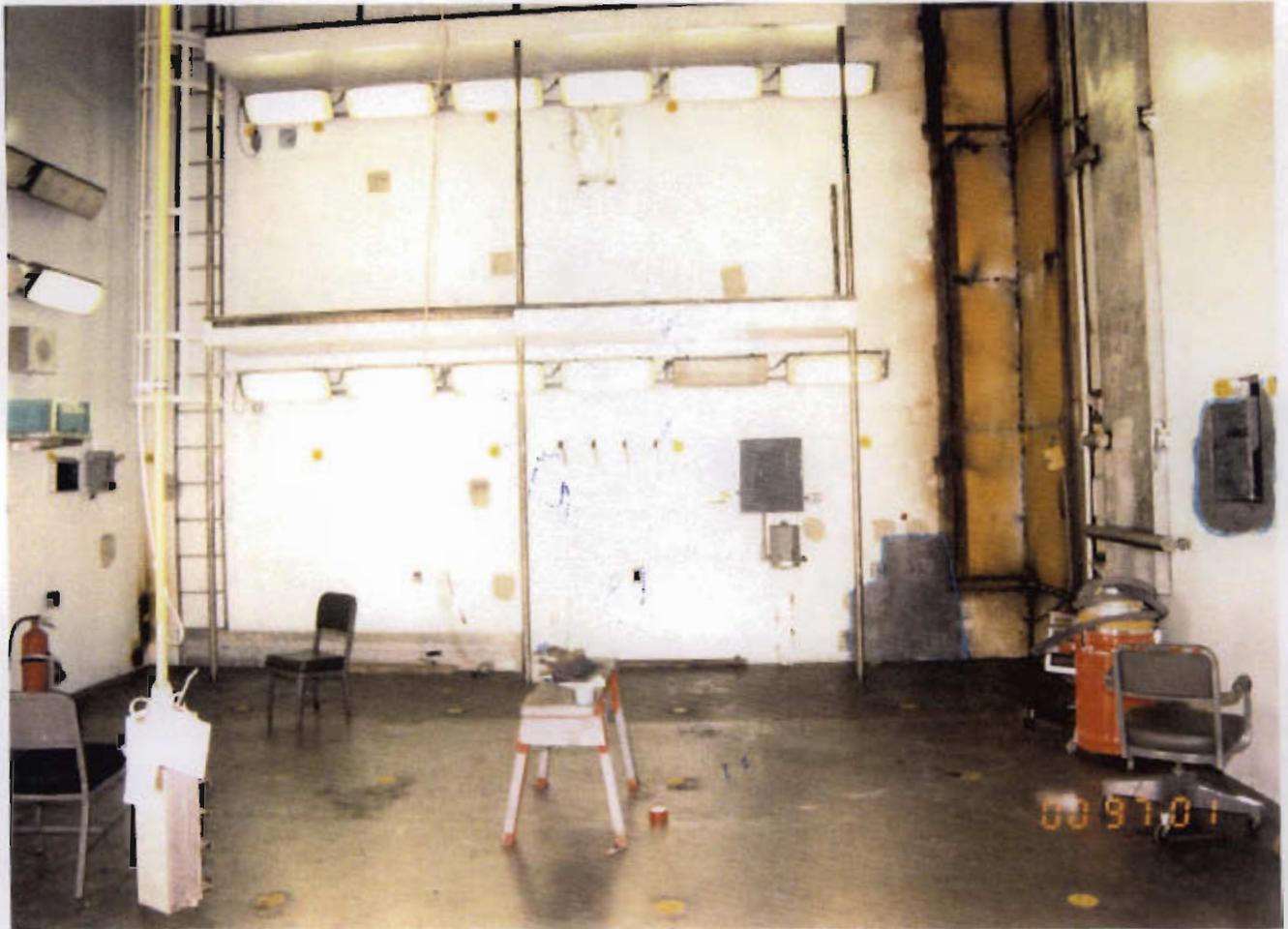


West corner of NFE looking east.

2.1 NFE/IAF

g. After Photograph

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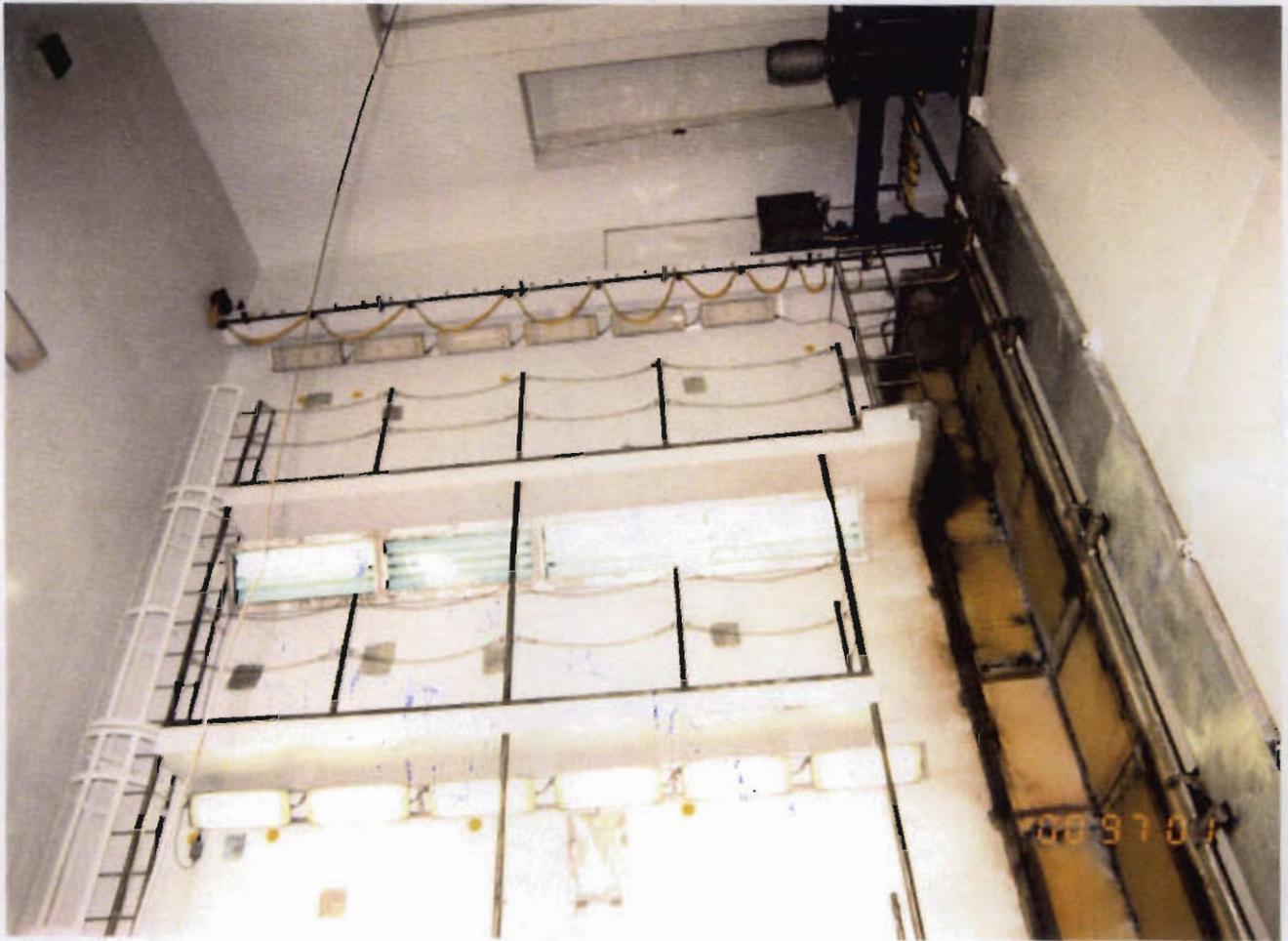


Center of NFE looking to south wall.

2.1 NFE/IAF

g. After Photograph

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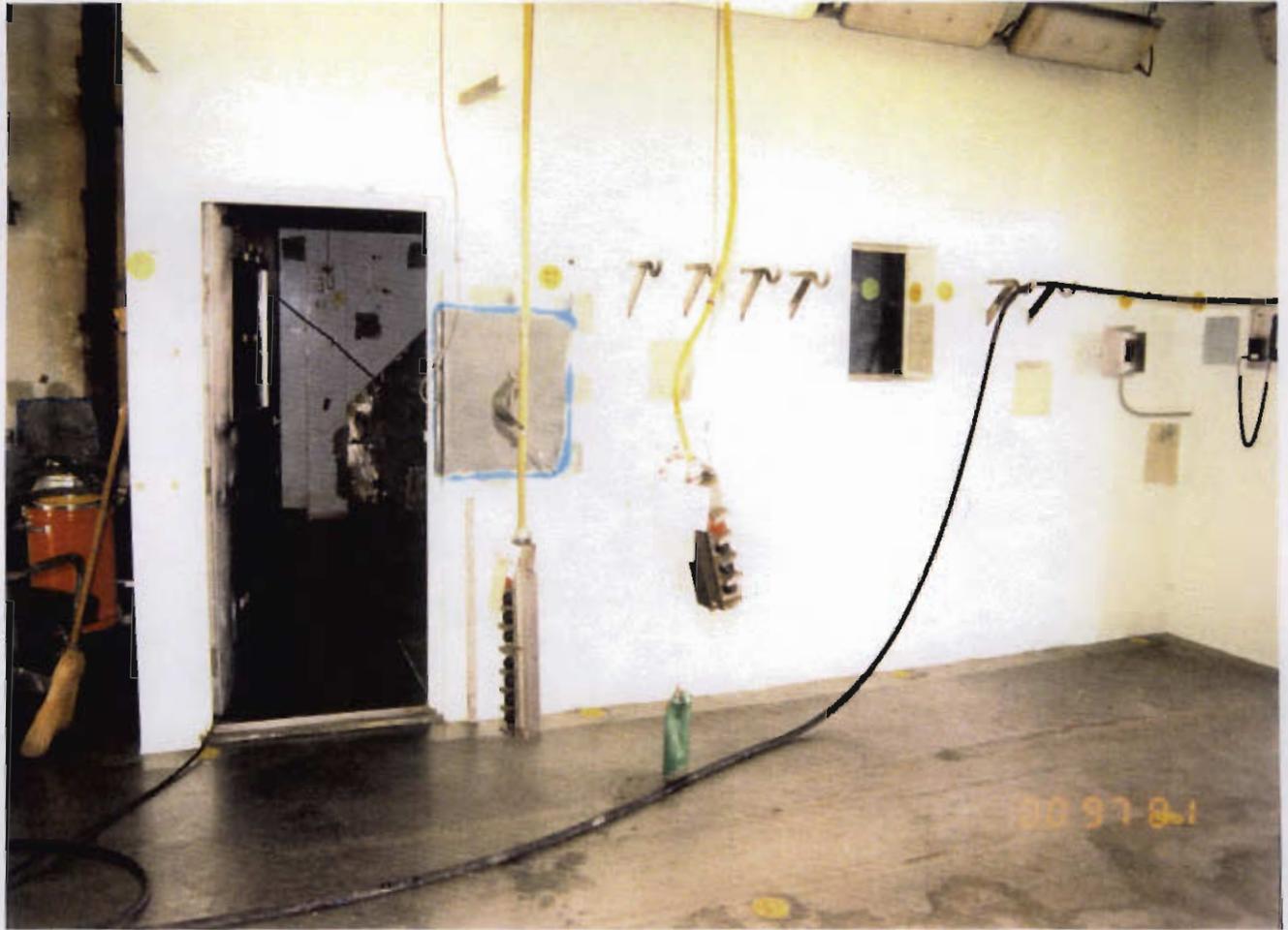


Center of NFE looking to south wall.

2.1 NFE/IAF

g. After Photograph

---



Center of NFE looking to NFE wall 4.

2.1 NFE/IAF

g. After Photograph

---



IAF entrance looking to IAF south wall.

2.1 NFE/IAF

g. After Photograph

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Looking to IAF north and east wall.

2.1 NFE/IAF

g. After Photograph

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Center of IAF looking down into pit.