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NAVAL NUCLEAR PROPULSION PROGRAM (NNPP) RADIOLOGICAL FINAL REPORT FOR  
DECOMMISSIONING VOLUME II SECTION J SUBSECTION 2.1 THRU SUBSECTION 3.22  
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 J

SUBSECTION 2.1  
THRU  
SUBSECTION 3.22

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

April 1, 1996

**NAVAL NUCLEAR PROPULSION PROGRAM (NNPP)**

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**SUBSECTION 2.1  
THRU  
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## 2.1 Bldg. 11, Southwest End

### a. Introduction:

Building 11 is located in grid D-7 of the Charleston Naval Shipyard map (Figure 10). The southwest end of Building 11 was used for staging and storage of test pumps, tubing, filters, and miscellaneous support equipment used for systems testing during overhaul of nuclear submarines.

#### (1) Description:

Building 11 is approximately 230' long by 75' wide and 18' high. The southwest end of the building, which was used for staging and storage, is approximately 35' wide and 40' long with a painted concrete floor. Within this area is a clean room which has a synthetic tile floor.

#### (2) Brief History:

(a) **Use:** The southwest end of this building was used as a work and storage area for clean or previously released test pumps, tubing, piping, and filters.

(b) **Radiological History:** Although this area has never established as a radioactive material storage or work area, on one occasion equipment with loose surface contamination levels of up to 10,000  $\mu\text{Ci}/100\text{cm}^2$  was inadvertently worked on in this area. On other occasions material with loose surface contamination of several thousand  $\mu\text{Ci}/100\text{cm}^2$  was found in this area. Radioactivity greater than 450  $\mu\text{Ci}/100\text{cm}^2$  has never been found on the surfaces of the building. Contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

#### (3) Survey Requirements:

(a) Group 2 survey in the southwest end.

### b. Discussion:

Building 11, southwest end, was divided into 18 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.

One subsection per grid received a survey with the IM247/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 18 grids which were equal to or greater than twice background, as indicated by the IM-253/PD(HV-1 PHA), or IM-253/PD (HV-2 GROSS).

**2.1 Bldg. 11, Southwest End**

The following typical naturally occurring radionuclides were identified during isotopic analysis of the solid material samples: lead 212, lead 214, potassium 40, thallium 208.

The construction material present in Building 11 southwest end was concrete. For the floor, IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 150, and 6500 counts per minute were based on radiation levels obtained from Building 135.

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) detected 18 areas greater than or equal to twice background.

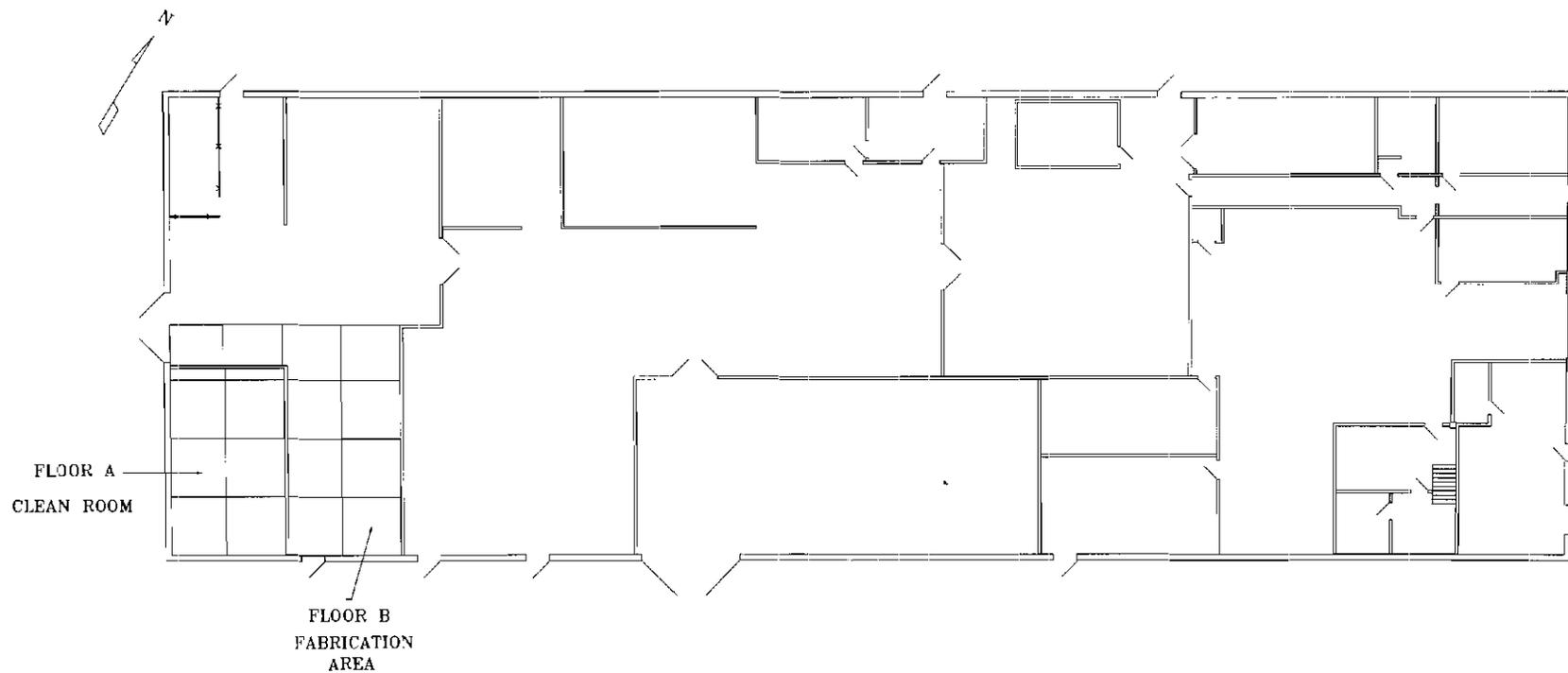
Surveys performed with the IM-253/PD (HV-2 GROSS) detected five areas greater than or equal to twice background.

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 0.35 pCi/g to a high of 1.23 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.

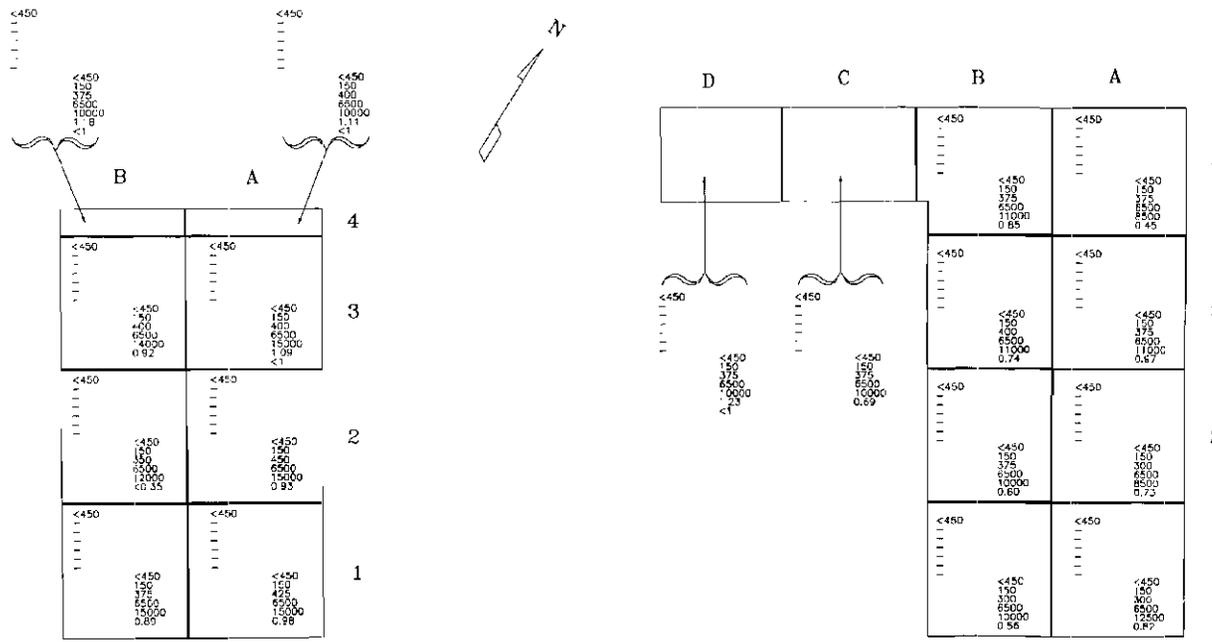
2.1 Bldg. 11, Southwest End

d. Overall Grid Map



2.1 Bldg. 11, Southwest End

e. Localized Grid Maps



FLOOR A

FLOOR B

Sample Data  
 <450 - IA-247/PD Results [ $\mu\text{Ci}/100\text{cm}^2$ ]  
 200 - IA-253/PD (HV-1 PHA) [bkg]  
 300 - IA-253/PD (HV-1 PHA) [cpm]  
 7000 - IA-253/PD (HV-2 GROSS) [bkg]  
 7300 - IA-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Episcic Co-60 Results [ $\mu\text{Ci/g}$ ]

2.1 Bldg. 11, Southwest End

f. Prior To Photographs

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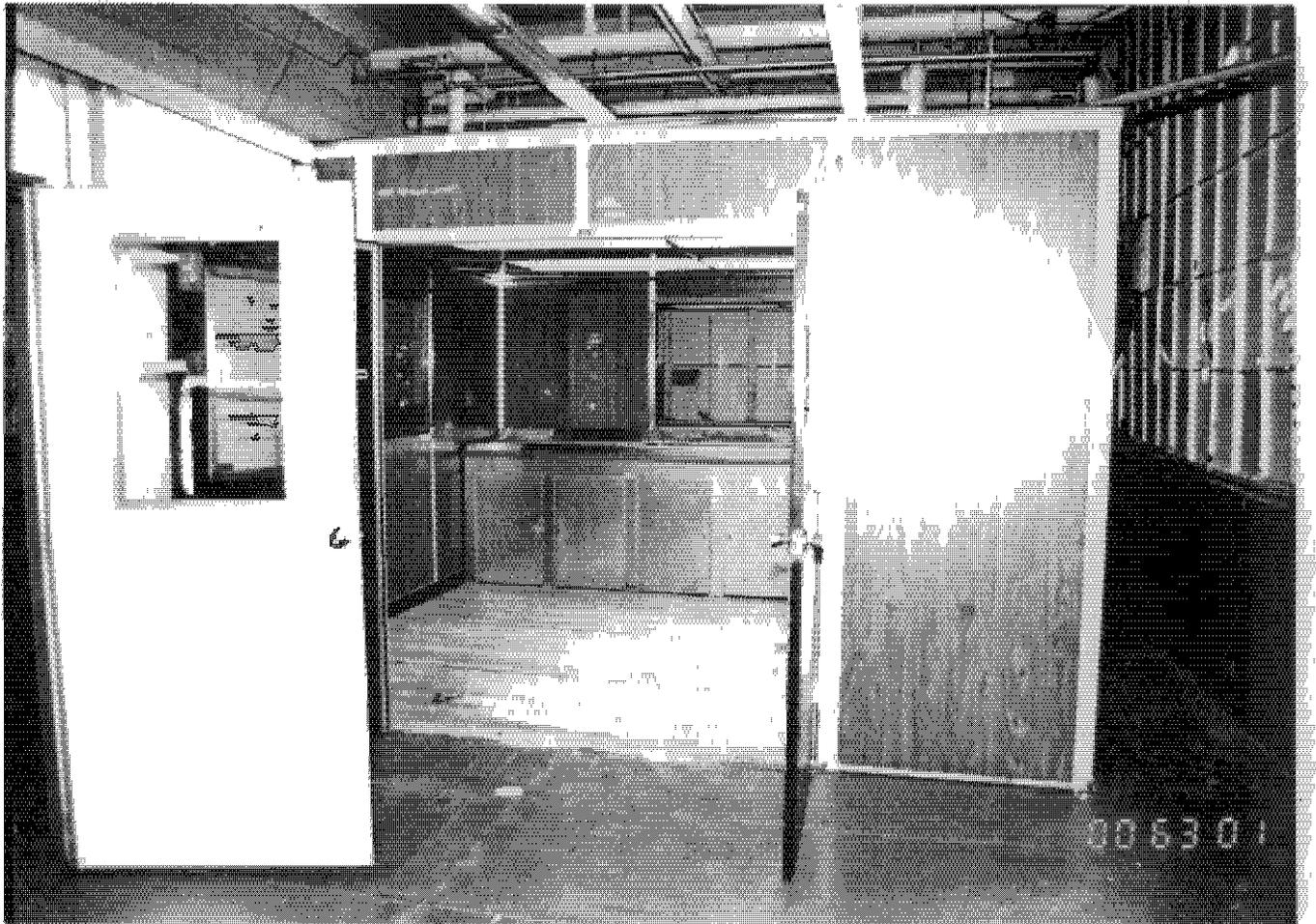


Fabrication Area, looking North.

2.1 Bldg. 11, Southwest End

g. During Photograph

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Clean Room

2.1 Bldg. 11, Southwest End

h. After Photographs

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Fabrication Area, looking South.

2.1 Bldg. 11, Southwest End

h. After Photographs

---

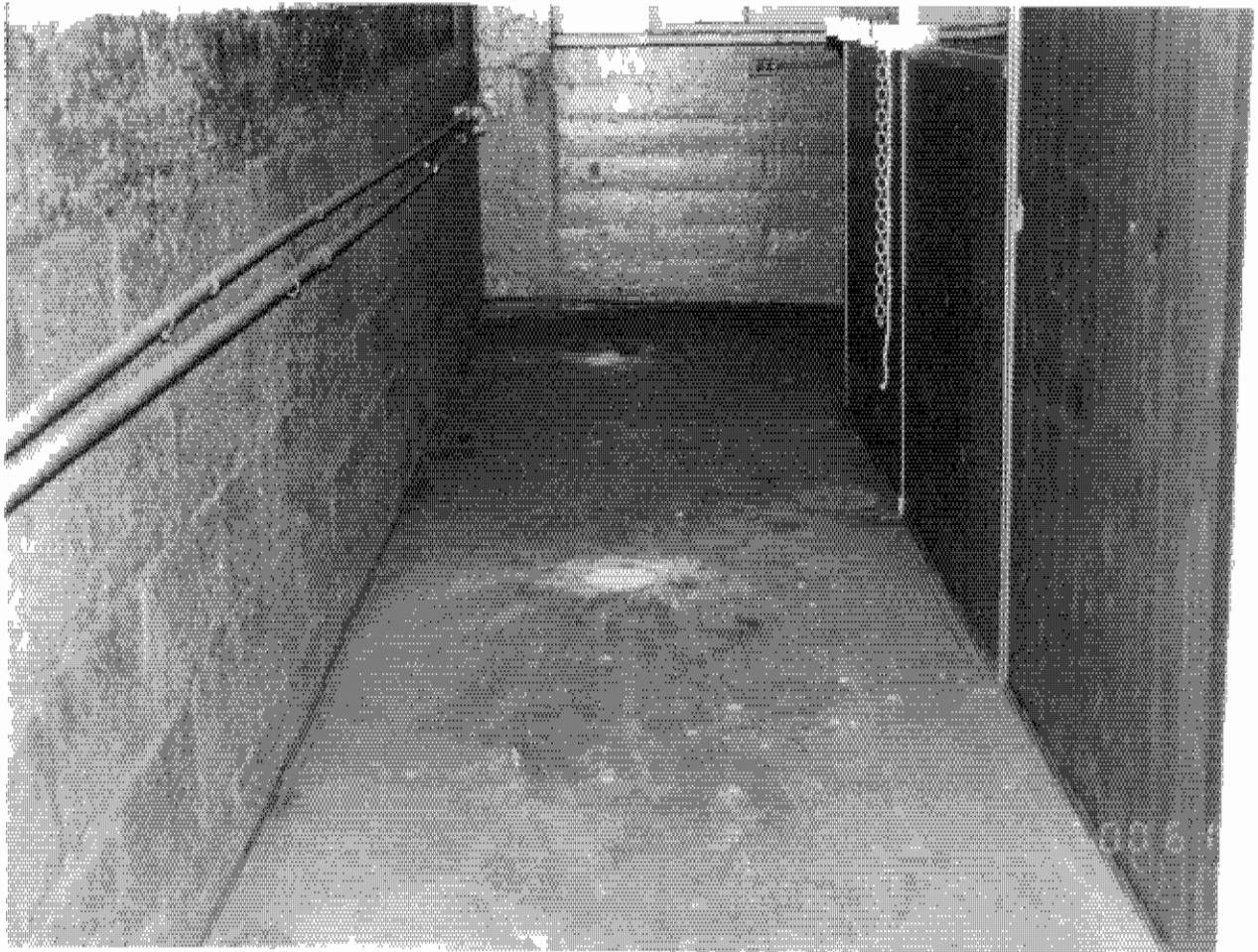


Clean Room.

2.1 Bldg. 11, Southwest End

h. After Photographs

---



Alley adjacent to clean room, looking South.

## 2.2 Bldg. 80, Southeast End

### a. Introduction:

Building 80 is located in grid C-7 of Charleston Naval Shipyard map (Figure 10). Marine Machinists used a portion of the second floor, southeast end, as a training area, material storage area, and office complex.

#### (1) Description:

Building 80 has a three story central section flanked by a two story side section and a one story side section. The building is rectangular in shape, approximately 150' wide by 250' long by 50' high. The walls are corrugated metal supported by the building's metal frame construction. The foundation is a concrete slab.

#### (2) Brief History:

(a) **Use:** Building 80, southeast end, was used by Shop 38, Marine Machinist (Nuclear), as an office complex and occasionally a staging area.

(b) **Radiological History:** Although this area has never been established as a radioactive material storage area or radiological work area, on several occasions radioactive material was found in offices, or in storage areas inside the building. This material had loose surface contamination of several thousand  $\mu\text{Ci}/100\text{cm}^2$  on it. No contamination was detected on the building surfaces as a result of these occurrences. Loose surface contamination levels on the building surfaces were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$ .

#### (3) Survey Requirements:

(a) Group 2 survey.

### b. Discussion:

Building 80 first floor, southeast end, was divided into 35 10' by 10' grids, and the second floor, southeast end, was divided into 39 10' by 10' grids where physically possible. 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).

One solid material sample was taken from Building 80 first floor. This sample was removed from Area 1, grid F1-B, in the location indicating the area of

**2.2 Bldg. 80, Southeast End**

highest potential. The following typical naturally occurring radionuclide was identified during isotopic analysis of the solid material sample: lead 212.

The construction material present in Building 80, southeast end, was concrete. For the first floor, an IM-247/PD background of 40 counts per minute, and an IM-253/PD (HV-1 PHA) background of 250 counts per minute were based on radiation levels obtained from Bldg. 1879. An IM-253/PD (HV-2 GROSS) background of 10000 counts per minute was based on radiation levels obtained from an adjacent area of Building 80. For the second floor an IM-247/PD background of 40 counts per minute, and an IM-253/PD (HV-1 PHA) background of 150 counts per minute were based on radiation levels obtained from Bldg. 21.

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

**c. Summary:**

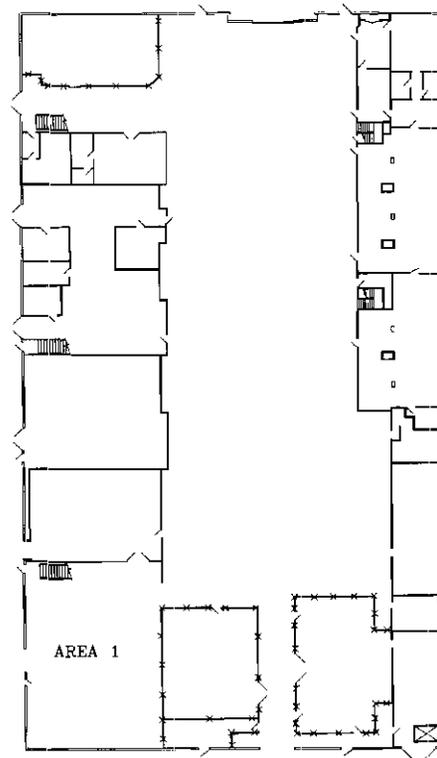
Surveys performed with the IM-247/PD did not detect areas greater than  $450 \mu\text{Ci}/20\text{cm}^2$ .

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

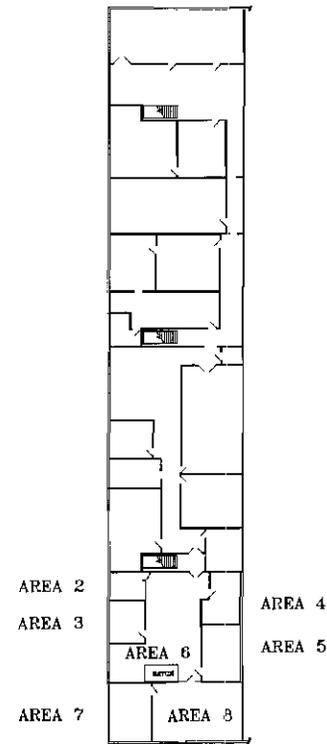
Analysis performed on the solid material sample with the multi-channel analyzer (MCA) detected a gross gamma equivalent cobalt 60 level of 0.84 pCi/g.

2.2 Bldg. 80, Southeast End

d. Site Map



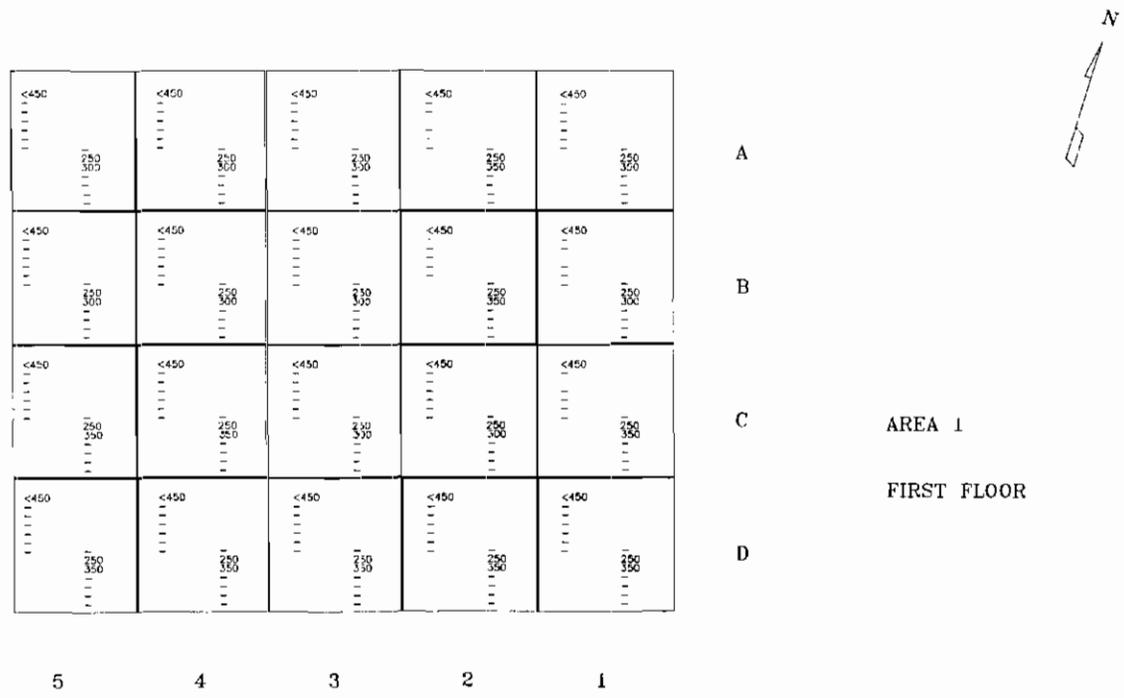
FIRST FLOOR PLAN



SECOND FLOOR PLAN

2.2 Bldg. 30, Southeast End

e. Localized Grid Map



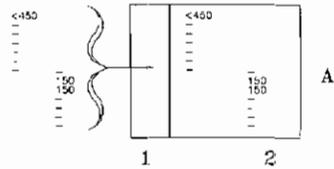
**Sample Data**  
 <450 - IM-217/PD Results [µCi/20cm<sup>2</sup>]  
 200 - IM-253/PD (HV-1 PHA) [Bq]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.52 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]



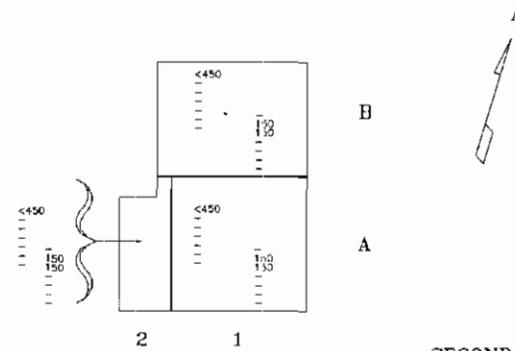
2.2 Bldg. 80, Southeast End

e. Localized Grid Maps

AREA 2

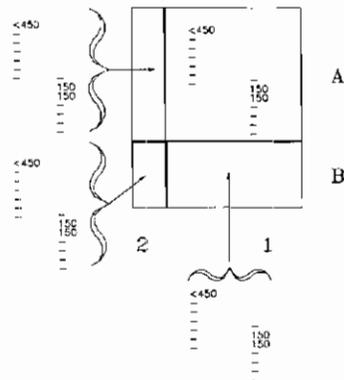


AREA 4

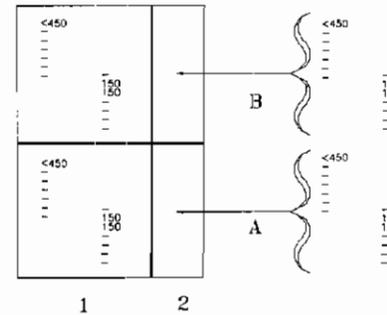


SECOND FLOOR

AREA 3



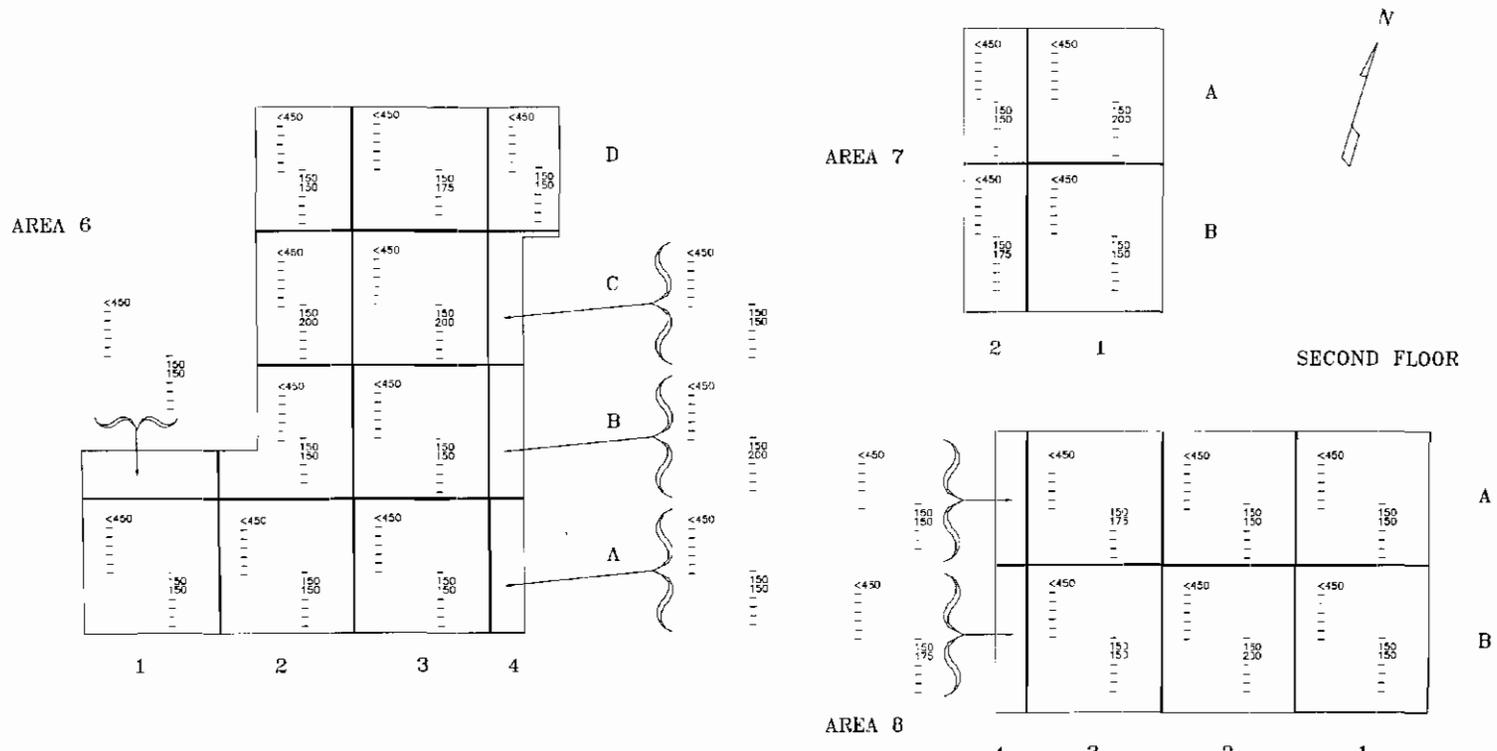
AREA 5



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]  
 1.82 - MCA Great Gamma Eq. Co-60 [ $\mu\text{Ci}/\text{g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci}/\text{g}$ ]

2.2 Bldg. 80, Southeast End

e. Localized Grid Maps



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) [µpm]  
 7000 - IM-253/PD (HV-2 GROSS) [µg/l]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1 Q2 - MCA Gross Gamma Ea, Co-60 [µCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

2.2 Bldg. 80, Southeast End

f. Prior to Survey Photographs

---



Second Floor, Area 6

2.2 Bldg. 80, Southeast End

f. Prior to Survey Photographs

---



Second Floor, Area 5

2.2 Bldg. 80, Southeast End

f. Prior to Survey Photographs

---



Second Floor, Area 8

2.2 Bldg. 80, Southeast End

g. After Survey Photographs

---



Second Floor, Area 2

2.2 Bldg. 80, Southeast End

g. After Survey Photographs

---



First Floor, Area 1

2.2 Bldg. 80, Southeast End

g. After Survey Photographs

---



Second Floor, Area 4

2.2 Bldg. 80, Southeast End

g. After Survey Photographs

---



Second Floor, Area 7

### 2.3 Bldg. 1024, Southeast Corner

#### a. Introduction:

Building 1024 is located in grid D-7 of Charleston Naval Shipyard map (Figure 10). Building 1024 faces southeast on Dry Dock Avenue. This is a single story building with a wooden frame and concrete slab foundation.

#### (1) Description:

Building 1024 is a rectangular building approximately 135' long by 50' wide and 18' tall. The walls are concrete covered with stucco and the floor is a painted concrete slab.

#### (2) Brief History:

(a) **Use:** A portion of this building was used for issue of non-contaminated tools and test equipment. An area of approximately 14' by 16' in the southeast corner of this building was used for surveying laundered anti-contamination clothing during the 1970s and 1980s.

(b) **Radiological History:** Anti-contamination clothing with fixed radioactivity of hundreds of thousands of  $\mu\text{Ci}/20\text{cm}^2$  have been identified in this area. Loose surface contamination levels of several thousand  $\mu\text{Ci}/100\text{cm}^2$  have also been found on anti-contamination clothing surveyed in this area. Loose surface contamination levels on the building's surfaces were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$ .

#### (3) Survey Requirements:

(a) Group 2 survey in the southeast corner.

#### b. Discussion:

The floor of Building 1024 was divided into four grids approximately 10' by 10', where possible, with each of those grids subdivided into two 3' by 3' subsections where possible. These subsections are located in the area of highest potential for contamination. Each grid and subsection 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 1024 storage area floor was concrete. For this area, IM-247/PD and IM-253/PD (HV-1 PHA) backgrounds of 40 and 200 counts per minute were based on radiation levels in unaffected areas of the building.

**2.3 Bldg. 1024, Southeast Corner**

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  $450 \mu\text{Ci}/20\text{cm}^2$ .

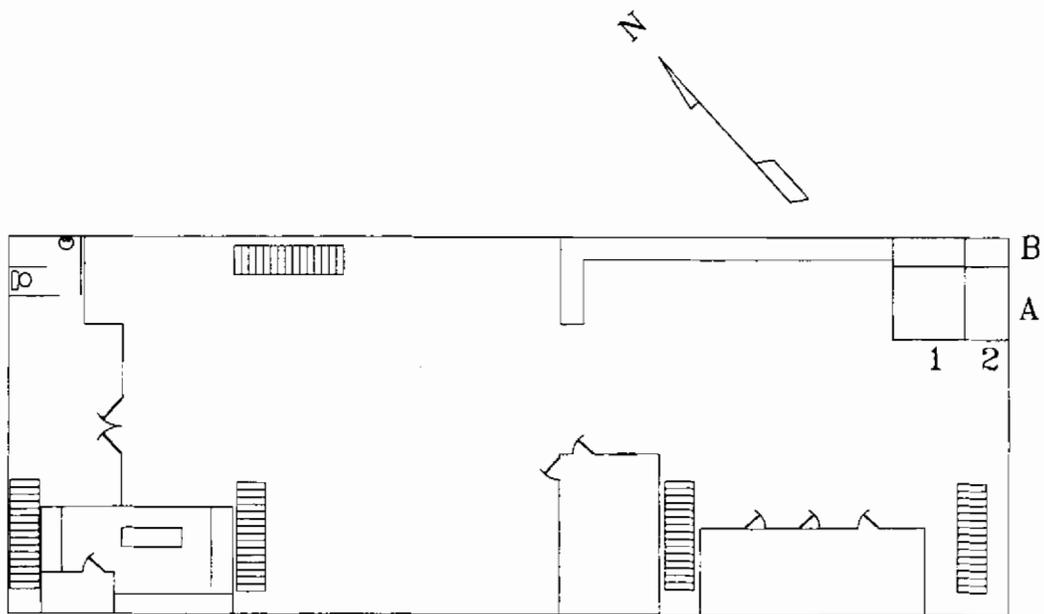
Surveys performed with the IM-253/PD (HV-1 PHA) did not detect areas greater than or equal to twice background.

Solid material samples were not required in this area.

2.3 Bldg. 1024, Southeast Corner

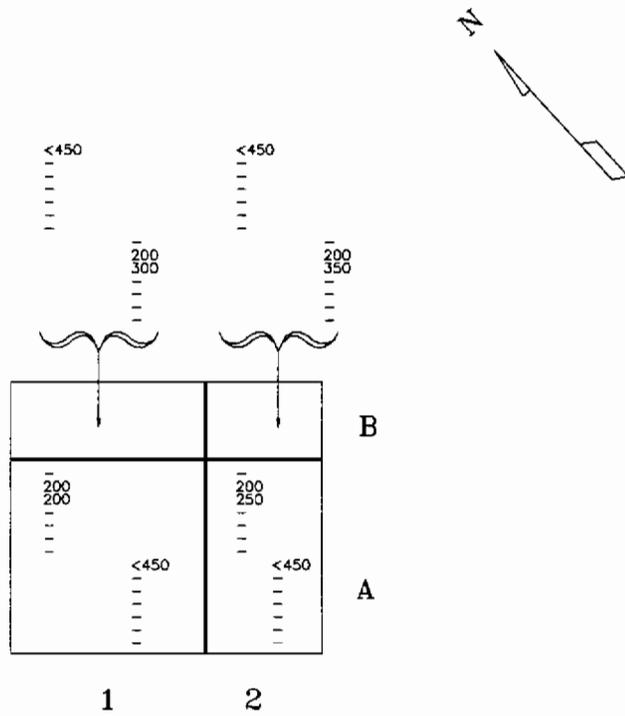
d. Site Map

---



2.3 Bldg. 1024, Southeast Corner

e. Localized Grid Map



**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]

2.3 Bldg. 1024, Southeast Corner

f. Prior Photographs

---



Building 1024 Southeast Corner

2.3 Bldg. 1024, Southeast Corner

g. After Photographs

---



Building 1024 Southeast Corner

## 2.4 Bldg. 1171, East End

### a. Introduction:

Building 1171, originally constructed in 1942 as a pipe shop, is located at the corner of Hobson Avenue and Ninth Street in grid D-8 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:** This building is 300' long by 100' wide and 35' high. The floor is concrete with some areas covered in tile. The walls and roof are corrugated metal supported by an internal wooden frame. The area of concern in Building 1171 was the east end.

(2) **Brief History:**

(a) **Use:** This building was used to store uncontaminated refueling equipment and new fuel.

(b) **Radiological History:** Although the building was never established as a radioactive material storage area, equipment with fixed contamination levels of several thousand  $\mu\text{Ci}/100\text{ cm}^2$  has been found in the east end of the building. There is no history of loose surface contamination levels greater than 450  $\mu\text{Ci}/100\text{ cm}^2$  in this building.

(3) **Survey Requirements:**

(a) Group 2 survey in the east end.

### b. Discussion:

Building 1171, east end, was divided into 100 10' by 10' grids. Each grid 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).

Solid material samples were taken from 27 grids which were equal to or greater than twice background as indicated by the IM-253/PD (HV-1 PHA). The following typical naturally occurring radionuclides were identified during isotopic analysis of the solid material samples: lead 212, lead 214, potassium 40, thallium 208.

The construction material present in Building 1171, east end, was concrete. For 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 background radiation

**2.4 Bldg. 1171, East End**

levels obtained from Building 21.

Removal of light fixtures, electrical cabling and services, fixed cabinets, and other 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) detected 27 areas greater than or equal to twice background.

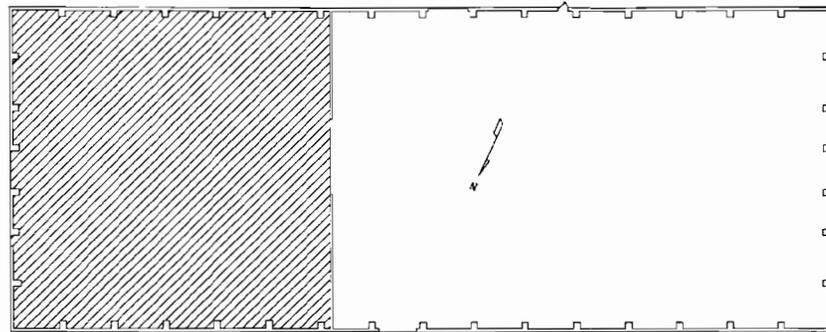
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 2.66 pCi/g to a high of 6.87 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.

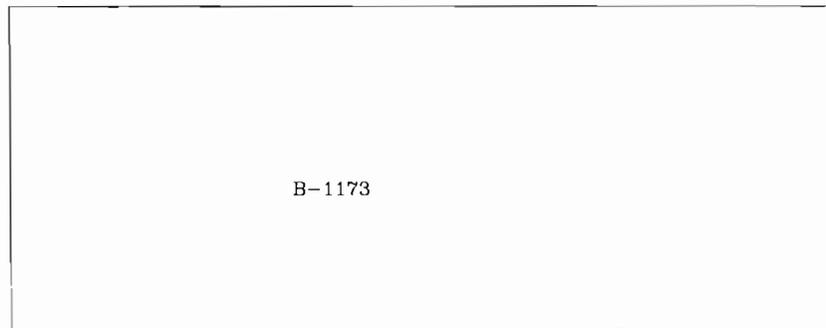
2.4 Bldg. 1171, East End

d. Site Map



EAST END

HOBSON AV.



B-1173

2.4 Bldg. 1171, East End

e. Localized Grid Maps

E	<450 --- 200 350 ---	<450 --- 200 350 ---	<450 --- 200 400 450 550 8500 4.20 <1	<450 --- 200 400 450 550 8500 3.81 <1	<450 --- 200 425 450 550 8500 4.61 <1	<450 --- 200 425 450 550 8500 4.04 <1	<450 --- 200 400 450 550 8000 3.66 <1	<450 --- 200 400 450 550 8000 6.87 <1	<450 --- 200 400 450 550 9000 2.99 <1	<450 --- 200 400 450 550 8500 3.04 <1
D	<450 --- 200 350 ---	<450 --- 200 350 ---	<450 --- 200 250 ---	<450 --- 200 350 ---	<450 --- 200 250 ---	<450 --- 200 350 ---	<450 --- 200 300 ---	<450 --- 200 275 ---	<450 --- 200 350 ---	<450 --- 200 350 ---
C	<450 --- 200 150 ---	<450 --- 200 350 ---	<450 --- 200 200 ---	<450 --- 200 250 ---	<450 --- 200 250 ---	<450 --- 200 300 ---	<450 --- 200 200 ---	<450 --- 200 200 ---	<450 --- 200 350 ---	<450 --- 200 350 ---
B	<450 --- 200 150 ---	<450 --- 200 175 ---	<450 --- 200 200 ---	<450 --- 200 150 ---	<450 --- 200 100 ---	<450 --- 200 150 ---	<450 --- 200 90 ---	<450 --- 200 150 ---	<450 --- 200 150 ---	<450 --- 200 150 ---
A	<450 --- 200 150 ---	<450 --- 200 150 ---	<450 --- 200 150 ---	<450 --- 200 150 ---	<450 --- 200 150 ---	<450 --- 200 100 ---	<450 --- 200 125 ---	<450 --- 200 125 ---	<450 --- 200 125 ---	<450 --- 200 250 ---
	1	2	3	4	5	6	7	8	9	10



**Sample Data**  
 <450 - IM-247/PD Results (µCi/20cm<sup>2</sup>)  
 200 - IM-253/PD (HV-1 PHA) (µg.)  
 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 (pCi/g)  
 <1 - MCA Specific Co-60 Results (pCi/g)



2.4 Bldg. 1171, East End

f. Prior to Photograph

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Looking Eastward toward Center Wall of Building

2.4 Bldg. 1171, East End

g. After Photograph

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Looking toward East Wall

**2.5 Bldg. 1173, Southeast End****a. Introduction:**

Building 1173 is located in grid D-8 of the Charleston Naval Shipyard map (Figure 10). Building 1173, southeast end, was used as a Receipt Inspection Area for reactor plant material. The center section and north side were used by the Supply Dept. for storage of material prior to issue.

**(1) Description:**

The building is approximately 260' long by 100' wide and 30' high. The east end consists of a 20' wide walkway with offices and work areas on each side. The south side work areas consist of a series of rooms occupying an area approximately 30' by 80'.

**(2) Brief History:**

- (a) Use:** This building was used as a receiving area for material sent to the shipyard from other organizations. The building was also used as a receipt inspection area for reactor plant material.
- (b) Radiological History:** On occasion, areas in the southeast end of this building were established as radioactive work areas for opening and inspecting equipment. Loose surface contamination levels from several thousand  $\mu\text{Ci}/100\text{cm}^2$  to over 10,000  $\mu\text{Ci}/100\text{cm}^2$  have been found on equipment during inspection of packages. All radioactive components identified in this area were packaged and moved to a radiological repair facility. Loose surface contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$  on the building surfaces.

**(3) Survey Requirements:**

- (a)** Group 2 survey in the southeast end.

**b. Discussion:**

Building 1173, southeast end, was divided into 70 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). Solid material samples were not required to be taken.

The construction material present in Building 1173, southeast end, was concrete. For IM-247/PD and IM-253/PD (HV-1 PHA) backgrounds of 60 and

**2.5 Bldg. 1173, Southeast End**

300 counts per minute were based on background radiation levels obtained from Bldg. 1B84.

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.

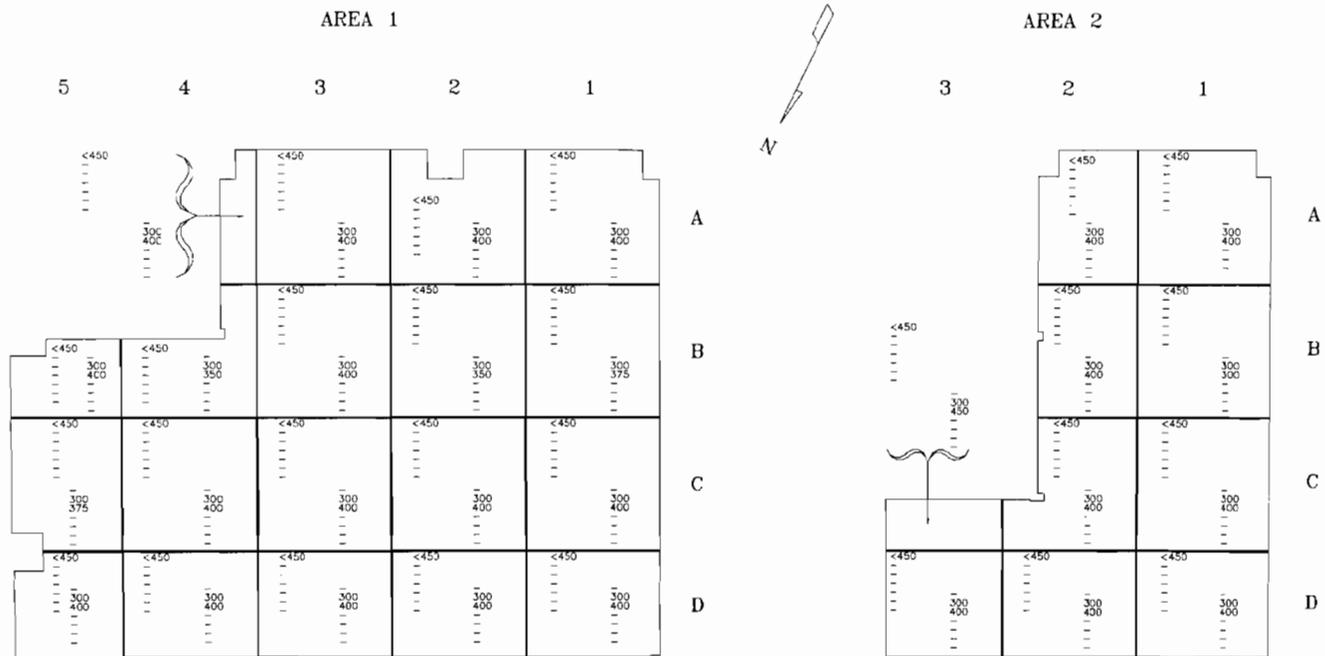
2.5 Bldg. 1173, Southeast End

d. Overall Grid Map



2.5 Bldg. 1173, Southeast End

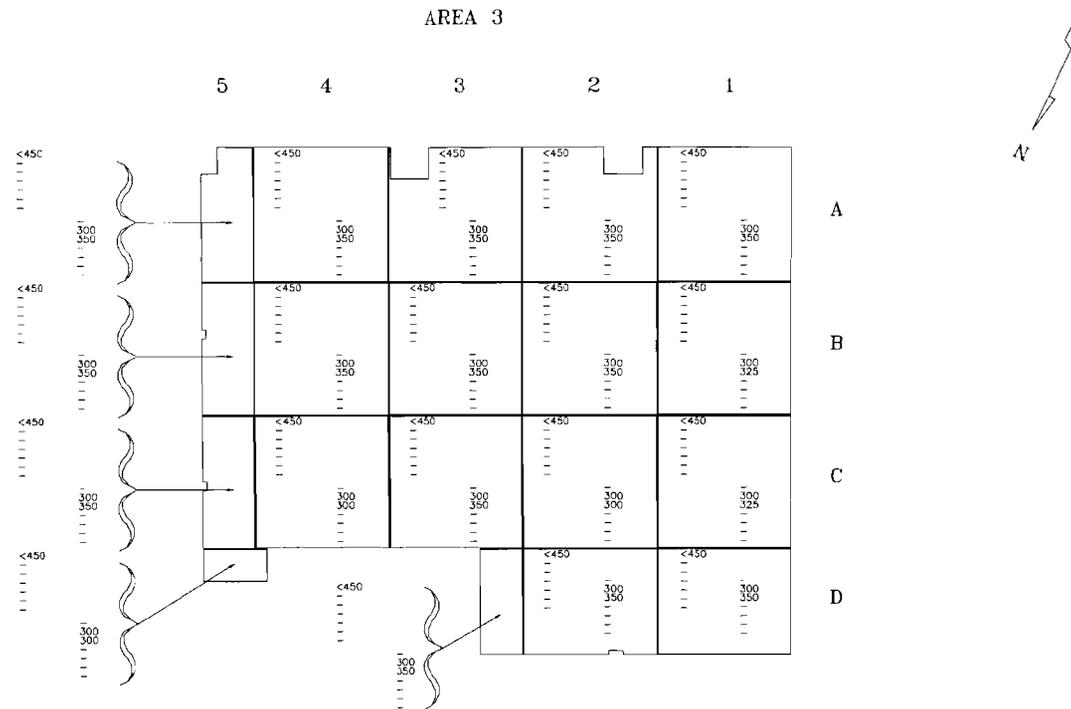
e. Localized Grid Maps



**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq.l]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq.l]  
 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 [ $\mu\text{Ci/g}$ ]

2.5 Bldg. 1173, Southeast End

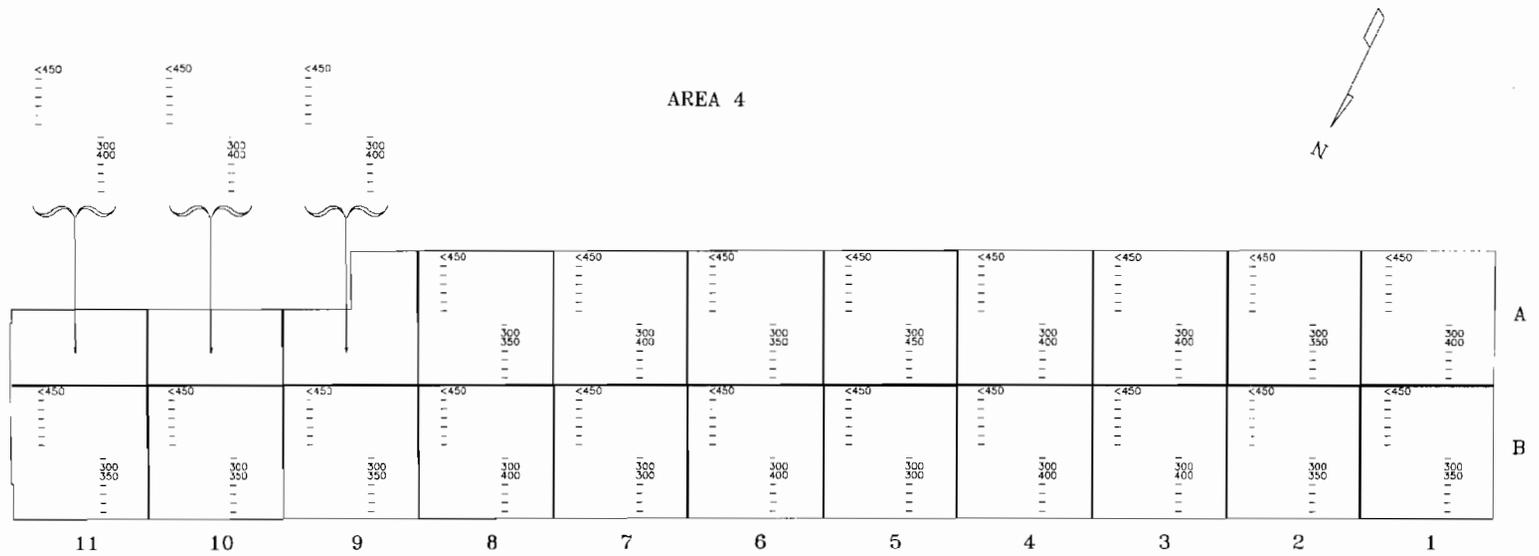
e. Localized Grid Maps



**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [d/g]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GRCSS) [d/g]  
 7100 - 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]

2.5 Bldg. 1173, Southeast End

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.g]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq.g]  
 /300 - 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 [ $\mu\text{Ci}/\text{g}$ ]

2.5 Bldg. 1173, Southeast End

f. After Photographs

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Area 1

2.5 Bldg. 1173, Southeast End

f. After Photographs

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Area 2

2.5 Bldg. 1173, Southeast End

f. After Photographs

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Area 3

2.5 Bldg. 1173, Southeast End

f. After Photographs

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Area 4

## 2.6 Bldg. 1174, Storage Area

### a. Introduction:

Building 1174 is located northwest of Dry Dock 3, in grid D-9 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:** Building 1174 is 500' long by 100' wide, and 35' high. The floor is asphalt. The walls and roof are corrugated metal supported by an internal wooden frame. There was a 30' by 35' storage area with a metal plate in the floor covering a portion of the survey area on the southwestern side .

### (2) Brief History:

(a) **Use:** This building was used in the early 1970s to store uncontaminated refueling equipment.

(b) **Radiological History:** Although this area was never established as a radioactive material storage area, equipment with loose contamination levels of several thousand  $\mu\text{Ci}/100\text{cm}^2$  has been found in the storage area located in the center of the building. No activity above  $450 \mu\text{Ci}/100\text{cm}^2$  was ever detected on the surfaces of the building.

### (3) Survey Requirements:

(a) Group 2 survey in storage area.

### b. Discussion:

Bldg 1174 storage area was divided into 12 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 the Building 1174 storage area floor was asphalt. For the floor, IM-247/PD and IM-253/PD (HV-1 PHA) backgrounds of 50 and 250 counts per minute were based on radiation levels obtained from the road on front of Building 1601.

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

2.6 Bldg. 1174, Storage Area

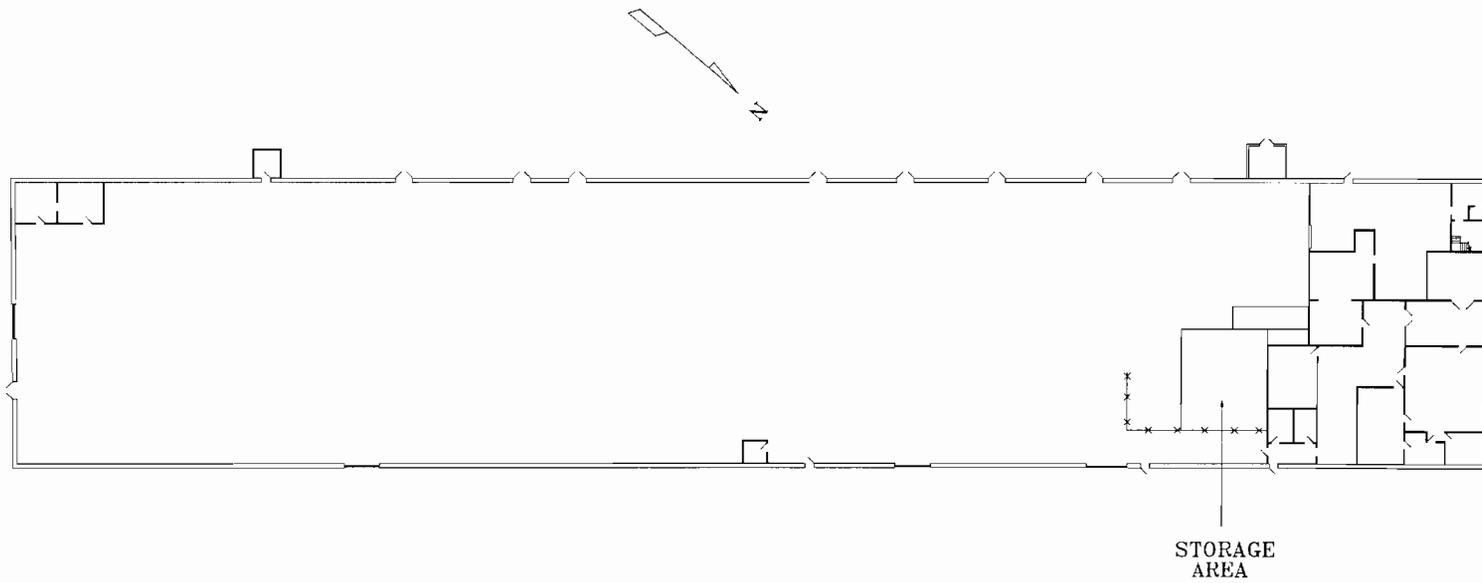
c. **Summary:**

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.

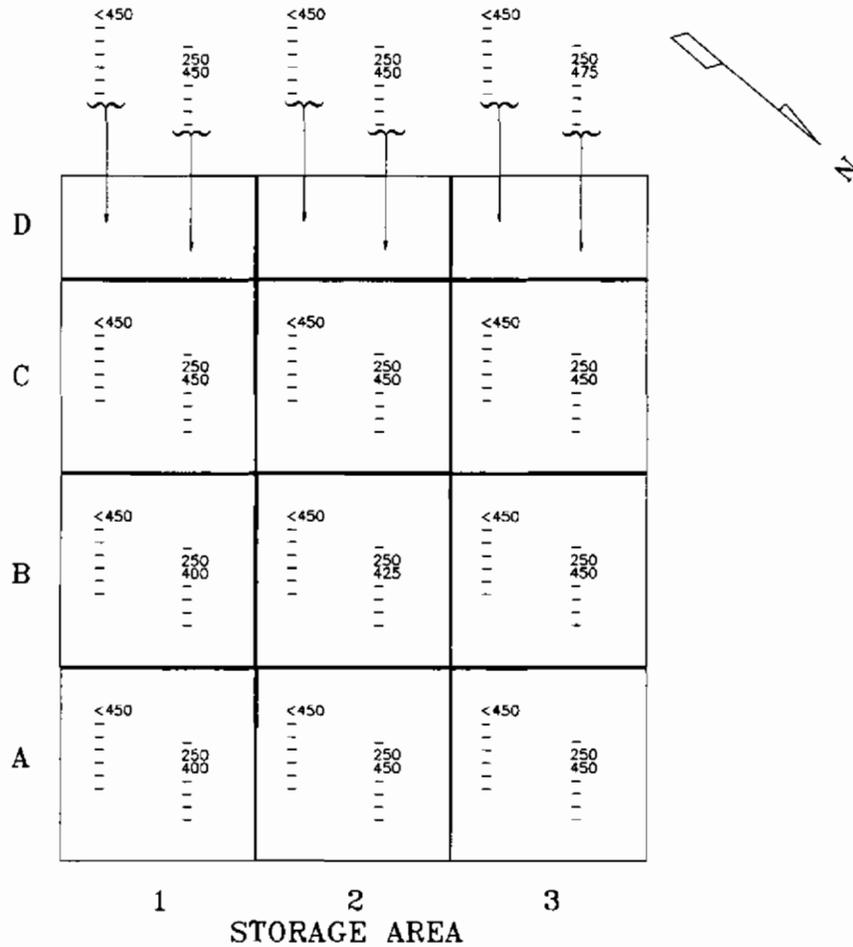
2.6 Bldg. 1174, Storage Area

d. Site Map



2.6 Bldg. 1174, Storage Area

e. Localized Grid Maps



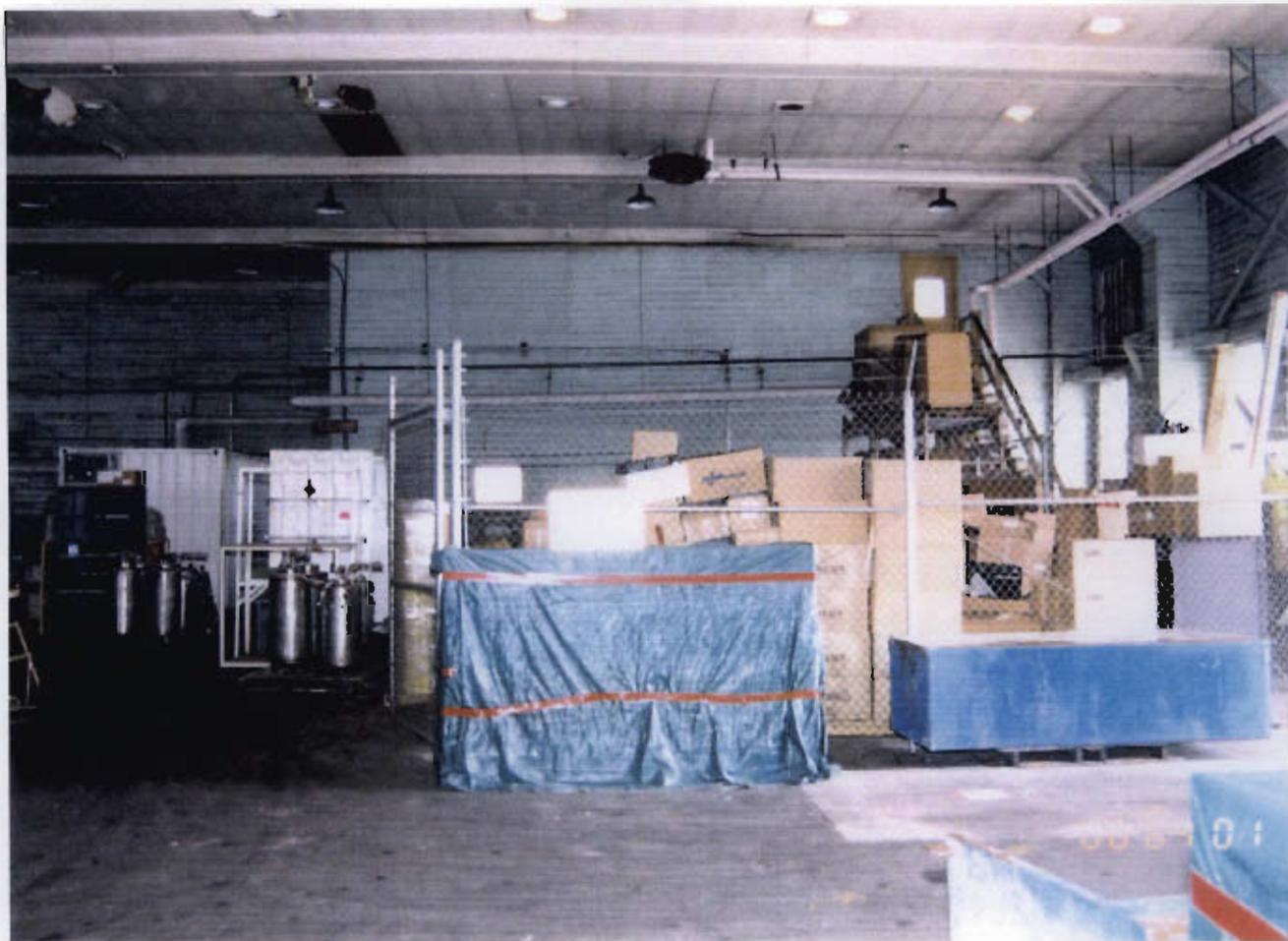
**Sample Data**

- <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 [ $\mu\text{Ci/g}$ ]
- <1 -- MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

2.6 Bldg. 1174, Storage Area

f. Prior to Photograph

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Storage Area

2.6 Bldg. 1174, Storage Area

g. After Photograph

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After survey caption.

### 3.1 Bldg. 3, Gage Calibration Area

#### a. Introduction:

Building 3 is located in grid D-5 of Charleston Naval Shipyard map (Figure 10). The Building 3 Gage Calibration Facility was housed in a series of rooms in the northeast mezzanine.

##### (1) Description:

The mezzanine area is approximately 25' wide by 100' long. The wall is concrete block covered with gypsum board and the floor is concrete covered with clay tiles. The majority of the contaminated work was performed in a 40' by 25' area on the northwest end of the calibration lab.

##### (2) Brief History:

(a) **Use:** The gage calibration facility was used to calibrate contaminated gages prior to building a gage calibration area in a permanent radiological repair facility. Use of this area for radiological work declined in the 1960s when calibration facilities were put in a repair barge. After this time, radiological work was done only occasionally when special equipment was required.

(b) **Radiological History:** Localized areas were set up as controlled surface contamination areas to work on contaminated gages and other reactor plant instrumentation requiring calibration services. Levels of tens of thousands of  $\mu\text{Ci}/100\text{cm}^2$  were involved in this work. Loose surface contamination levels were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$  in this area.

##### (3) Survey Requirements:

(a) Group 3 survey.

#### b. Discussion:

Building 3 Gage Calibration Area was divided into 75 grids, 40 floor grids and 35 wall grids. The floor grids were approximately 5' by 5' where possible and the wall grids were approximately 5' wide by 6' high. Each grid had its own unique designator.

100 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 each grid.

**3.1 Bldg. 3, Gage Calibration Area**

A total of 75 solid material samples were taken from the grid locations 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, potassium 40, bismuth 214.

The construction materials present in Building 3 Gage Calibration Area are concrete covered with clay tiles for the floor and concrete block covered with gypsum board for the walls. For the floor, an IM-247/PD background of 60 counts per minute, an IM-253/PD (HV-1 PHA) background of 250 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 9000 counts per minute were based on radiation levels obtained from the floor of Building 1897. For the walls, an IM-247/PD background of 60 counts per minute, an IM-253/PD (HV-1 PHA) background of 200 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 7000 counts per minute were based on radiation levels obtained from the walls of Building M1264.

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) detected 38 areas greater than or equal to twice background.

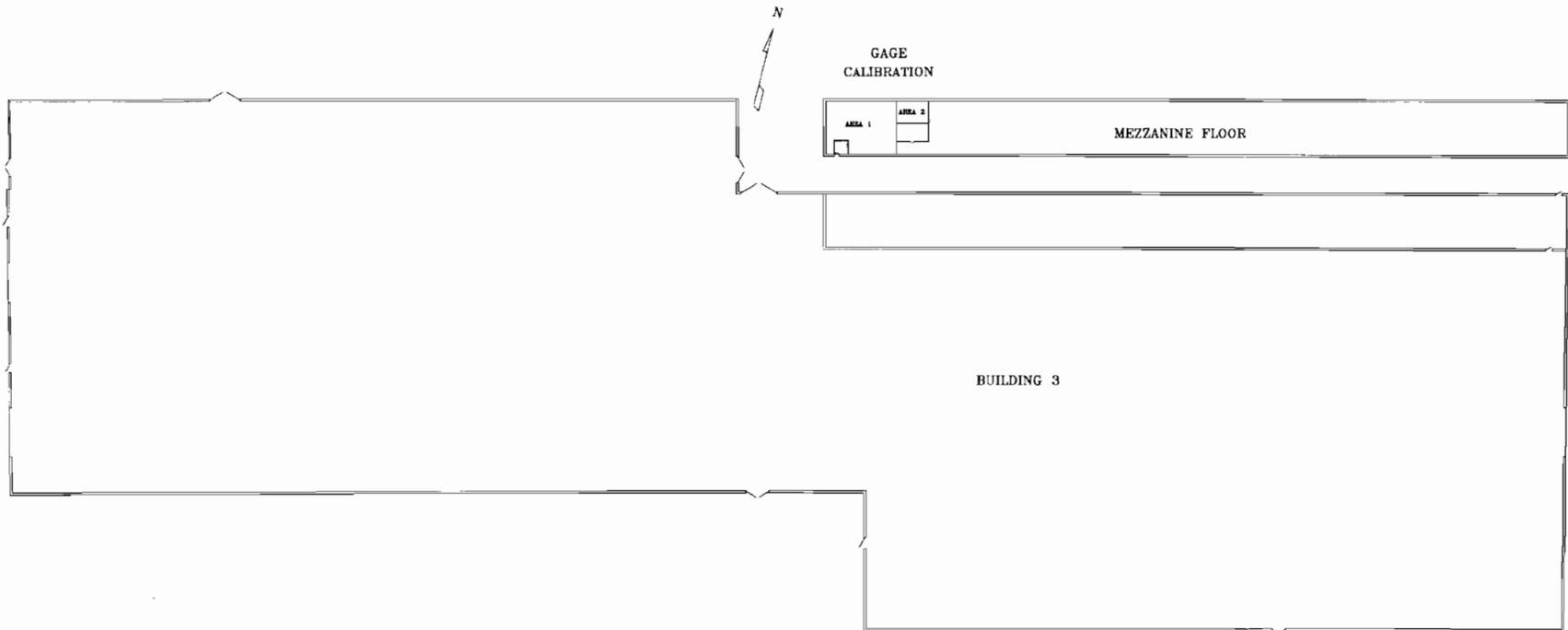
Surveys performed with the IM-253/PD (HV-2 GROSS) detected five areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.11 pCi/g to a high of 8.20 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.

3.1 Bldg. 3, Gage Calibration Area

d. Overall Grid Map





3.1 Bldg. 3, Gage Calibration Area

f. Prior to Survey Photographs

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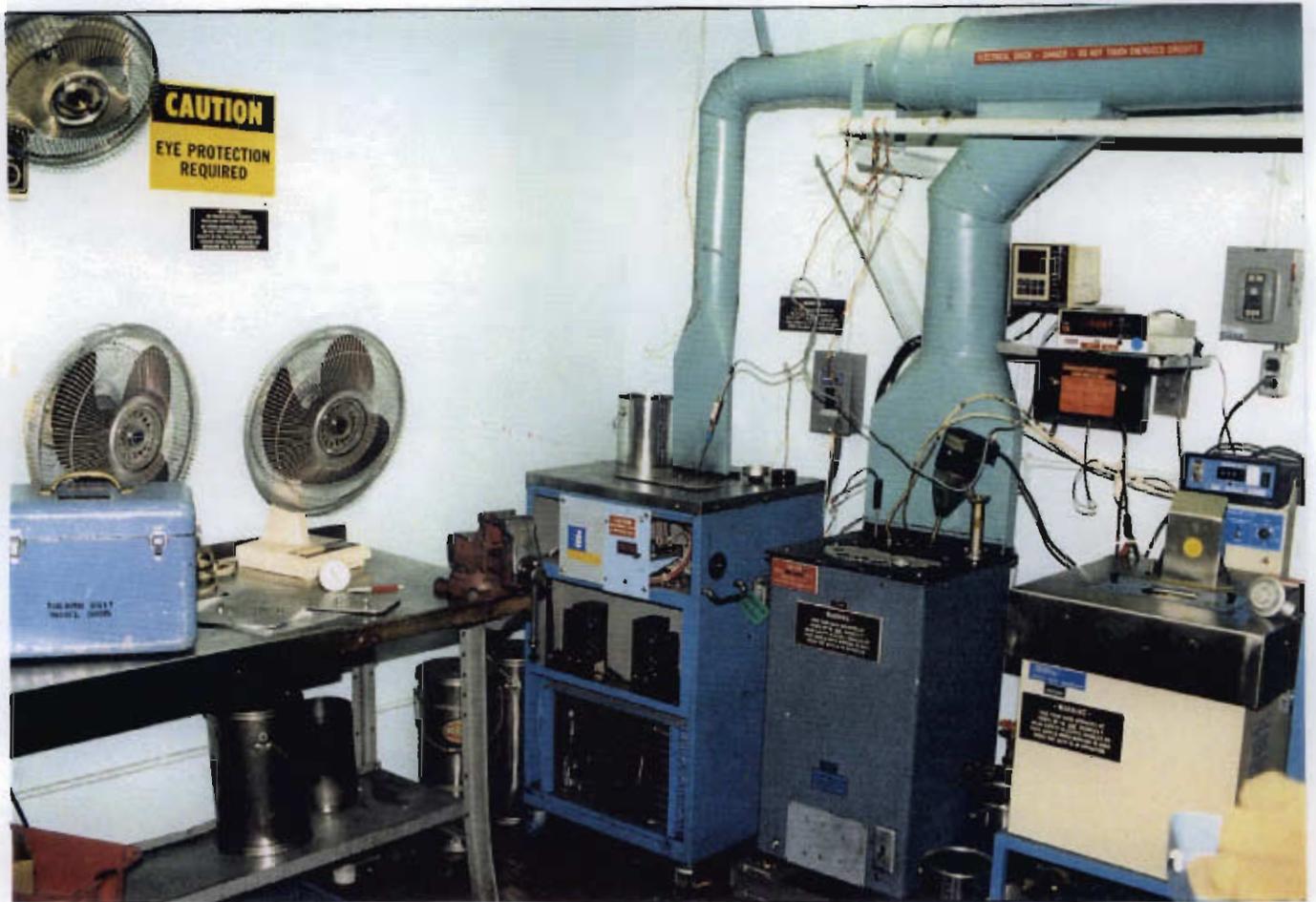


Building 3 Gage Calibration Area.

3.1 Bldg. 3, Gage Calibration Area

f. Prior to Survey Photographs

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Building 3 Gage Calibration Area.

3.1 Bldg. 3, Gage Calibration Area

g. After Survey Photographs

---



Building 3 Gage Calibration Area.

3.1 Bldg. 3, Gage Calibration Area

g. After Survey Photographs

---



Building 3 Gage Calibration Area.

### 3.2 Bldg. 3, Lathe Area

#### a. Introduction:

Building 3 Lathe Area is located in grid D-5 of the Charleston Naval Shipyard map (Figure 10). This area was used occasionally for the machining of radioactive components.

##### (1) Description:

Building 3 Lathe Area is located on the south side of Building 3 about mid-way through the building. The area is approximately 24' wide by 37' long. The floor in this area is made of concrete, the wall is of concrete block construction.

##### (2) Brief History:

(a) **Use:** Lathes in this area were used for general machine work, however, occasionally radioactive components would be machined here.

(b) **Radiological History:** When these machines were being used for machining radioactive components, the immediate vicinity was set up and controlled as a controlled surface contamination area. The surfaces being machined were not contaminated. Loose surface contamination levels were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$ .

##### (3) Survey Requirements:

(a) Group 3 survey.

#### b. Discussion:

The Building 3 Lathe Area, although not normally used for machining of radioactive components, was used occasionally for this purpose. The surfaces being machined were not contaminated and loose surface contamination levels in the area were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$  during the machining operation.

The Building 3 Lathe Area floor was divided into 40 grids approximately 5' by 5' per grid. The wall was divided into five grids 6' high by 5' wide. The three lathes in the area were also surveyed; machine 1 with six grids, machine 2 with four grids, machine 3 with eight grids. Each grid had its own unique designator.

100 percent of all grids were surveyed with the IM-247/PD and an 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 40 floor grids, five wall grids, and seven paint samples were taken from the

**3.2 Bldg. 3, Lathe Area**

machine grids.

A total of 45 solid material samples were taken from the floor and wall. Seven paint samples were taken from the following machine grids: M1-A2, M2-A1, M3-A4, M3-B1, M3-B2, M3-B3, and M3-B4. The paint samples had a limit of 3 pCi/g. The remaining 11 grids were not sampled because the areas were unpainted metal. Each solid material sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclide was identified during isotopic analysis of solid material samples: lead 212.

Individual backgrounds were used for the building wall and floor. For the floor, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 175 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 4000 counts per minute were based on radiation levels obtained from the concrete floor in Building 1891. For the wall, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 350 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 10000 counts per minute were based on radiation levels obtained from the concrete block wall of Building 89. The backgrounds for surveying the lathes were the same as those used for the floor.

**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 five areas greater than or equal to twice background.

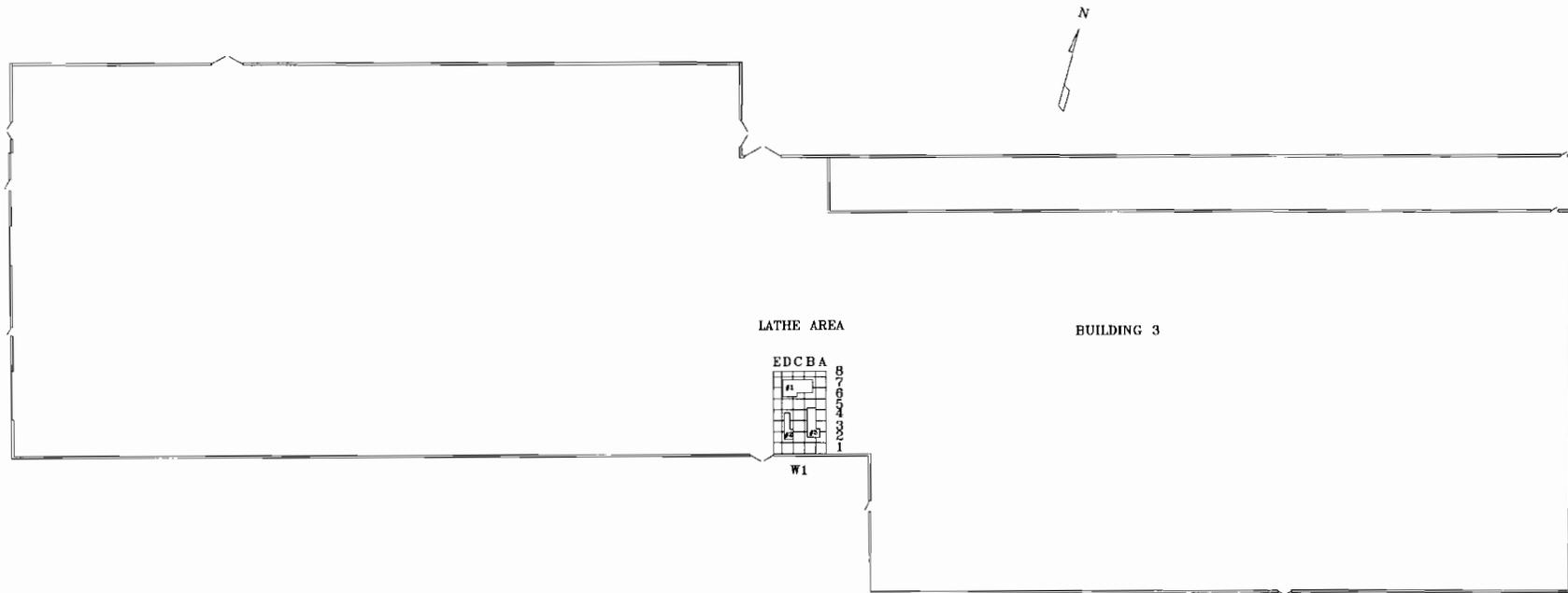
Surveys performed with the IM-253/PD (HV-2 GROSS) detected four areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.06 pCi/g to a high of 2.09 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.

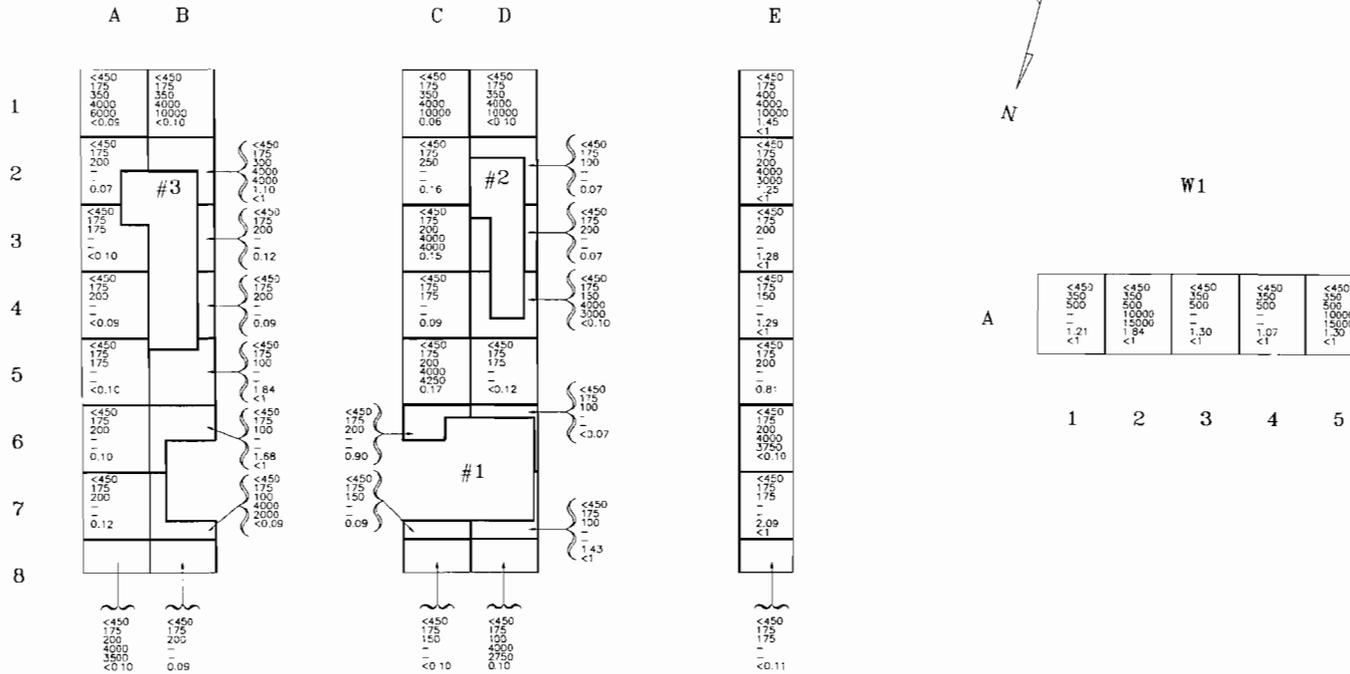
3.2 Bldg. 3, Lathe Area

d. Site Map



3.2 Bldg. 3, Lathe Area

e. Localized Grid Maps

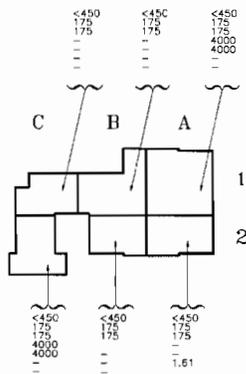


**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bqg]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bqg]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results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

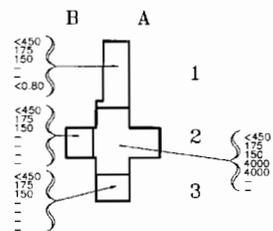
3.2 Bldg. 3, Lathe Area

e. Localized Grid Maps

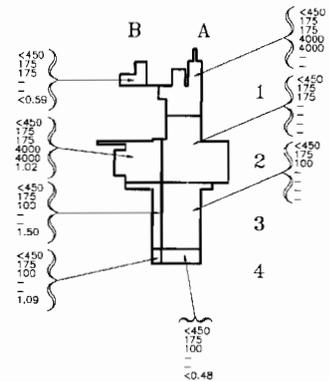
MACHINE #1



MACHINE #2



MACHINE #3



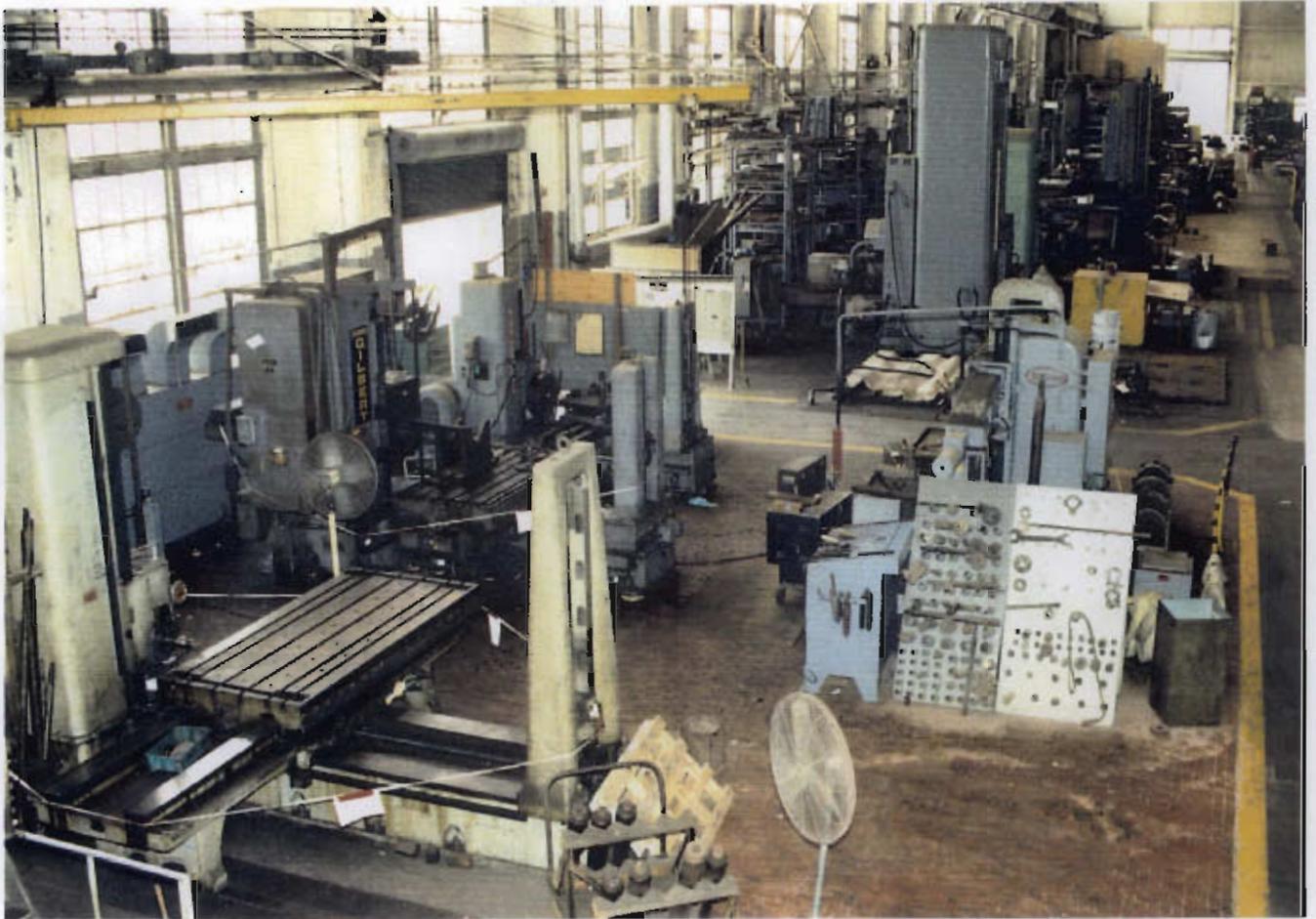
**Note:**  
Samples taken from the lathes consist of  
paint and have a limit of 3 pCi/g.

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

3.2 Bldg. 3, Lathe Area

f. Prior To Survey Photographs

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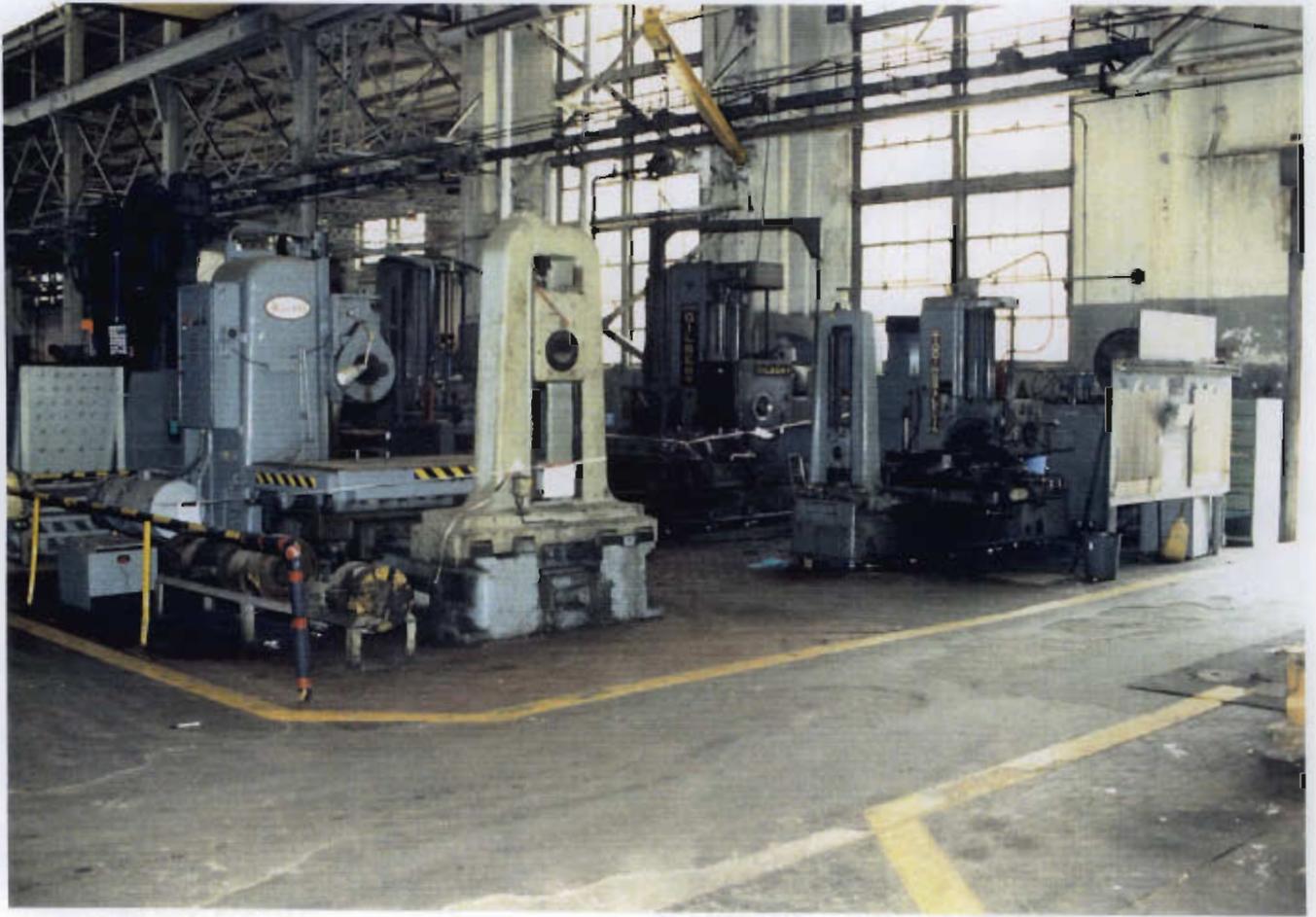


Building 3 Lathe Area, facing west.

3.2 Bldg. 3, Lathe Area

f. Prior to Survey Photographs

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Building 3 Lathe Area, facing southeast.

3.2 Bldg. 3, Lathe Area

g. After Survey Photographs

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Building 3 Lathe Area, facing south.

3.2 Bldg. 3, Lathe Area

g. After Survey Photographs

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Building 3 Lathe Area, facing south.

### 3.3 Bldg. 3 Supermill Area

#### a. Introduction:

Building 3 is located in grid D-5 of the Charleston Naval Shipyard map (figure 10). The Supermill Area is located on the south side of Building 3 about mid-way through the building.

#### (1) Description:

The Supermill Area is approximately 30' wide by 27' long and encompassed a small section along the south wall. The floor in this area is concrete and also concrete covered with 4" by 4" wooden blocks.

#### (2) Brief History:

(a) **Use:** The Supermill is a milling machine used for machining large components. Occasionally radioactive components too large to be machined in the radiological repair facilities were machined here.

(b) **Radiological History:** When this machine was in use, the immediate vicinity was set up as a Controlled Surface Contamination Area. The surfaces machined were not contaminated. Loose surface contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$  during this work.

#### (3) Survey Requirements:

(a) Group 3 survey.

#### b. Discussion:

The Building 3 Supermill Area was divided into 33 floor grids and 11 machine grids. The floor and machine grids were 5' by 5' where configurations allowed. Each grid had its own unique designator.

100 percent of all grids were surveyed with the IM-247/PD and an 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 floor grid.

A total of 33 solid material samples were taken from the Supermill Area floor. The Supermill itself is unpainted metal, therefore it did not require solid material samples be taken. Each solid material sample was taken 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 lead 214.

**3.3 Bldg. 3 Supermill Area**

For the floor of Building 3 Supermill Area, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 200 counts per minute, and an IM-253/PD (HV-1 GROSS) background of 5500 counts per minute were based on radiation levels obtained from the concrete floor of Building 21.

For the machine of Building 3 Supermill Area, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 150 counts per minute, and an IM-253/PD (HV-1 GROSS) background of 5000 counts per minute were based on radiation levels obtained from the metal cable spools in Building 21

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.

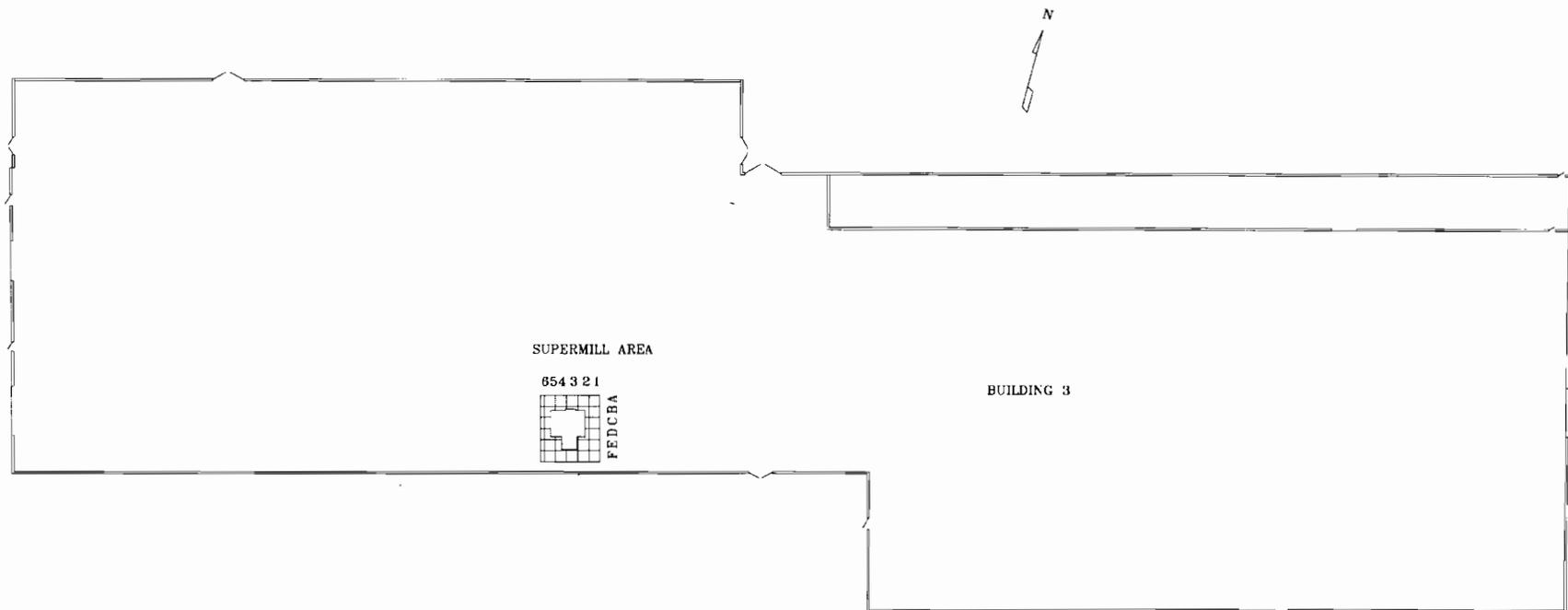
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than a minimum detectable activity of 0.07 pCi/g to a high of 4.15 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.

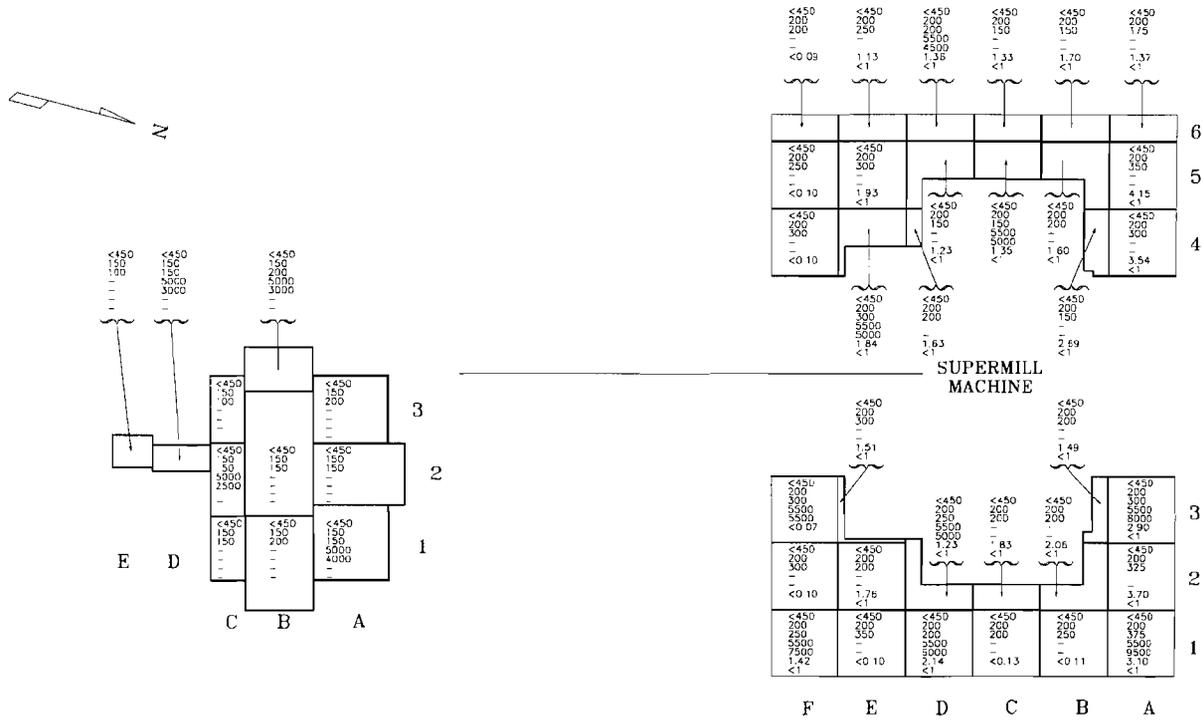
3.3 Bldg. 3 Supermill Area

d. Site Map



3.3 Bldg. 3 Supermill Area

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/g]  
 300 – IM-253/PD (HV-1 PHA) [dpm]  
 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]

3.3 Bldg. 3 Supermill Area

f. Prior to Survey Photograph

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Building 3 Supermill, facing south

3.3 Bldg. 3 Supermill Area

g. During Survey Photograph

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Building 3 Supermill, facing south

3.3 Bldg. 3 Supermill Area

h. After Survey Photograph

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Building 3 Supermill, facing south

### 3.4 Bldg. 9, Foundry

#### a. Introduction:

Building 9, built in 1909, is located between Fourth and Fifth Street in grid C-7 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:** This building is constructed of brick with a concrete floor and wooden roof. The foundry is located in the 174' long and 141' wide south wing of the building. Within the foundry is an oven constructed of a concrete base with metal walls and ceiling.

#### (2) Brief History:

(a) **Use:** In the mid to late 1960s the oven in the foundry was used to bake new surface coatings on reactor plant components. This location also served as a radioactive material storage area for the components being worked. There are three areas of interest in Building 9 Foundry, one in the main bay area, one to the east of the main bay area, and the oven.

(b) **Radiological History:** Areas of the foundry were used as radioactive material storage areas and the ovens were controlled as radiation areas while in use. Activated components of several mr/hr were baked in the oven. Loose surface contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$  on the components and in the area.

#### (3) Survey Requirements:

(a) Group 3 survey.

#### b. Discussion:

Building 9 Foundry Areas were divided into 141 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 grids in the oven that covered unpainted metal surfaces.

A total of 136 solid material samples were taken from Building 9 Foundry Area. Each 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, lead 214, thallium 208, bismuth 214, and potassium 40.

**3.4 Bldg. 9, Foundry**

Individual backgrounds were used for Building 9 Foundry Area concrete, brick, and metal. 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) backgrounds 40, 400, and 15000 counts per minute used for the concrete floor were based on the radiation levels obtained from Building 417. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds level of 60, 600, and 15000 counts per minute used for the brick walls were based on background levels obtained from M1123. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds 40, 250, and 6500 counts per minute used for the metal of the oven were based on background levels obtained from Building 1884.

**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.

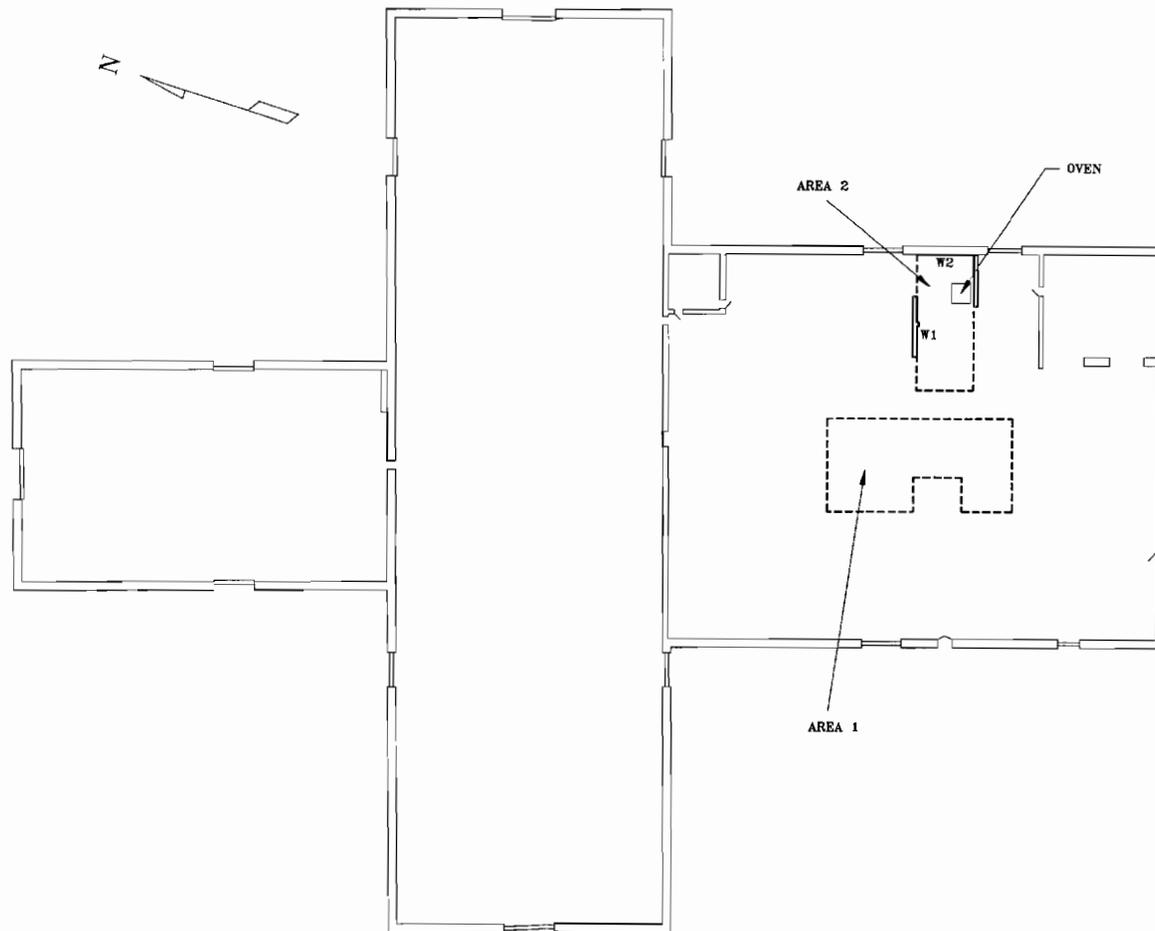
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a minimum detectable activity of less than 0.34 pCi/g to a high of 6.77 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.

3.4 Bldg. 9, Foundry

d. Site Map



3.4 Bldg. 9, Foundry

e. Localized Grid Maps

	<450 400 450 15000 15000 <0.36	<450 400 400 15000 15000 <1	<450 400 400 15000 15000 <0.34	<450 400 400 15000 15000 3.78	<450 400 400 15000 15000 3.30	<450 400 400 15000 15000 3.89	<450 400 400 15000 15000 5.02	<450 400 400 15000 15000 5.77	<450 400 400 15000 15000 5.27	<450 400 400 15000 15000 5.04	<450 400 400 15000 15000 4.53	<450 400 400 15000 15000 2.29	<450 400 400 15000 15000 5.02	
G														
F	<450 400 350 0.52	<450 400 300 3.03	<450 400 300 <0.40	<450 400 600 4.26	<450 400 650 <1	<450 400 600 4.62	<450 400 600 2.18	<450 400 600 15000 15000 5.25	<450 400 700 600 15000 15000 3.89	<450 400 600 600 15000 15000 4.53	<450 400 600 600 15000 15000 3.98	<450 400 600 500 600 15000 15000 3.74	<450 400 600 500 600 15000 15000 3.08	<450 400 600 600 15000 15000 2.58
E	<450 400 300 15000 7500 1.04	<450 400 300 15000 7500 1.48	<450 400 200 15000 7500 1.22	<450 400 250 15000 7500 5.76	<450 400 550 15000 7500 5.58	<450 400 550 15000 7500 5.94	<450 400 600 15000 7500 4.45	<450 400 600 15000 7500 4.78	<450 400 600 15000 7500 4.78	<450 400 500 600 15000 15000 4.34	<450 400 550 600 15000 15000 5.20	<450 400 475 600 15000 15000 5.00	<450 400 475 600 15000 15000 4.13	
D	<450 400 350 15000 8000 1.14	<450 400 300 15000 8000 1.12	<450 400 300 15000 8000 1.43	<450 400 700 15000 8000 6.56	<450 400 700 15000 8000 5.22	<450 400 700 15000 8000 4.69	<450 400 700 15000 8000 4.21	<450 400 700 15000 8000 3.72	<450 400 700 15000 8000 4.25	<450 400 650 650 15000 15000 6.77	<450 400 650 600 15000 15000 3.30	<450 400 600 600 15000 15000 4.16	<450 400 600 600 15000 15000 3.81	
C	<450 400 300 15000 10000 1.13	<450 400 300 15000 10000 1.25	<450 400 350 15000 10000 1.53	<450 400 650 15000 10000 5.03	<450 400 700 15000 10000 5.01	<450 400 650 15000 10000 4.83	<450 400 650 15000 10000 3.58	<450 400 700 15000 10000 3.23	<450 400 600 600 15000 15000 3.35	<450 400 650 650 15000 15000 4.72	<450 400 650 600 15000 15000 3.94	<450 400 600 600 15000 15000 4.75	<450 400 600 600 15000 15000 5.60	
B	<450 400 300 15000 10000 1.25	<450 400 350 15000 10000 1.55	<450 400 250 15000 10000 1.01	<450 400 650 15000 10000 5.88	<450 400 650 15000 10000 5.03	<450 400 600 15000 10000 1.32	<450 400 600 15000 10000 1.57	<450 400 600 15000 10000 1.57	<450 400 500 600 15000 15000 2.05	<450 400 600 600 15000 15000 3.54	<450 400 600 600 15000 15000 5.26	<450 400 600 600 15000 15000 5.26	<450 400 600 600 15000 15000 5.25	
A	<450 400 5000 10000 4	<450 400 400 15000 10000 1.24	<450 400 400 15000 10000 3.88	<450 400 400 15000 10000 5.35	<450 400 400 15000 10000 4.71	<450 400 400 15000 10000 1.28	<450 400 400 15000 10000 1.88	<450 400 400 15000 10000 1.88	<450 400 400 15000 10000 1.88	<450 400 400 15000 10000 3.41	<450 400 400 15000 10000 4.44	<450 400 400 15000 10000 4.44	<450 400 400 15000 10000 4.18	

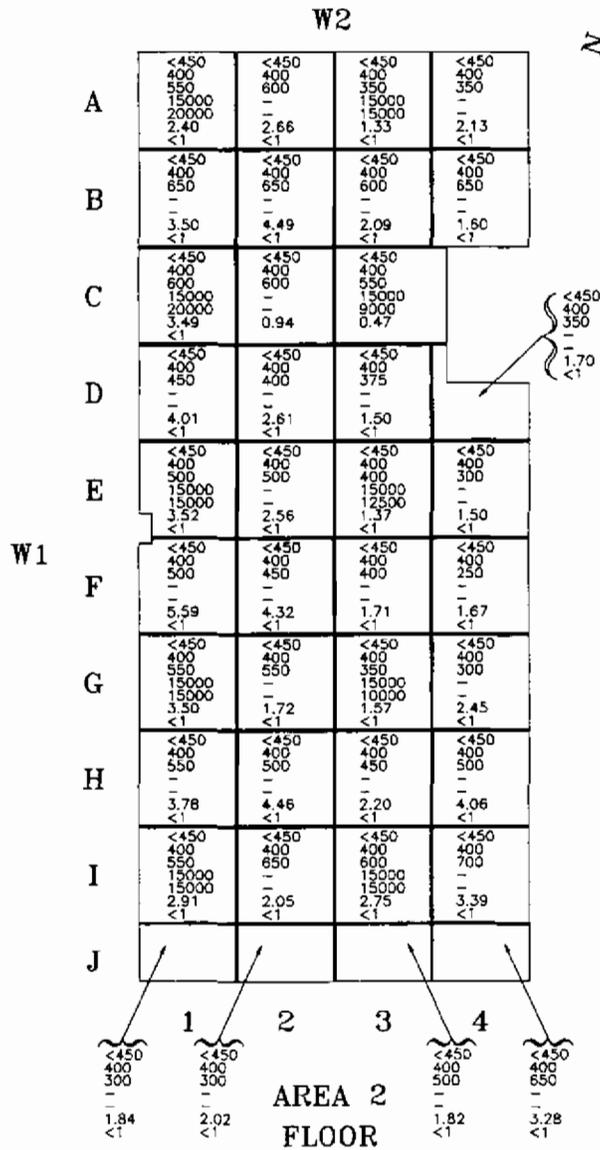


AREA 1 FLOOR

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]  
 1.02 - MCA Gross Gamma Est. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3.4 Bldg. 9, Foundry

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 [ $\mu\text{Ci/g}$ ]  
 <1 – MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3.4 Bldg. 9, Foundry

e. Localized Grid Maps

A

<450 800 700 15000 20000 3.15 <1	<450 600 800 — — 3.09 <1	<450 600 700 — — 3.25 <1	<450 600 500 — — 3.10 <1
1	2	3	4

W2

A

<450 600 500 15000 15000 1.70 <1	<450 600 550 — — 2.58 <1	<450 600 550 — — 1.85 <1	<450 600 600 15000 15000 2.32 <1	<450 600 500 — — 3.64 <1
1	2	3	4	5

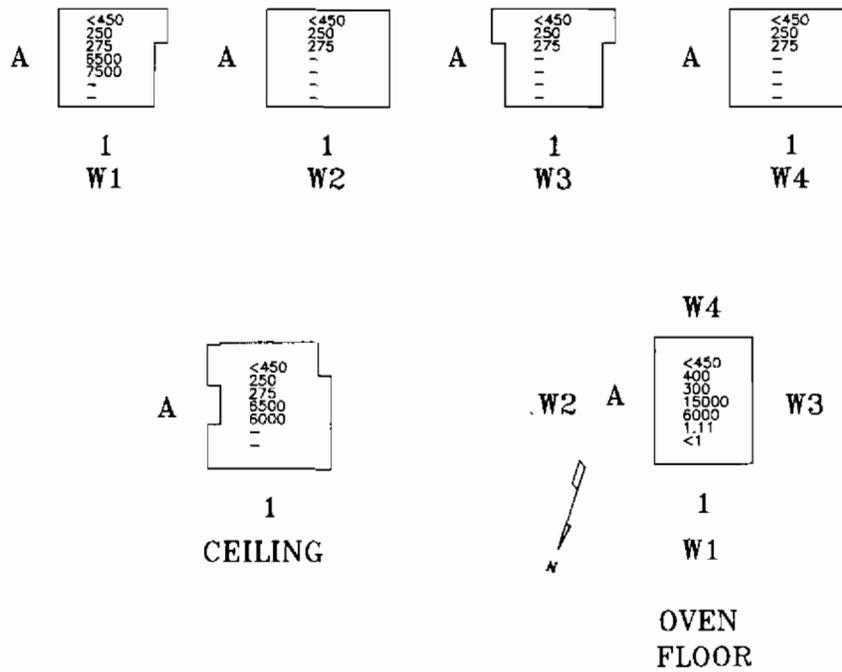
W1

AREA 2 WALLS

**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 [ $\mu\text{Ci}/\text{g}$ ]

3.4 Bldg. 9, Foundry

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 [ $\mu\text{Ci/g}$ ]  
 <1 -- MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3.4 Bldg. 9, Foundry

f. Prior Photograph

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Area 1, looking west.

3.4 Bldg. 9, Foundry

g. After Photographs

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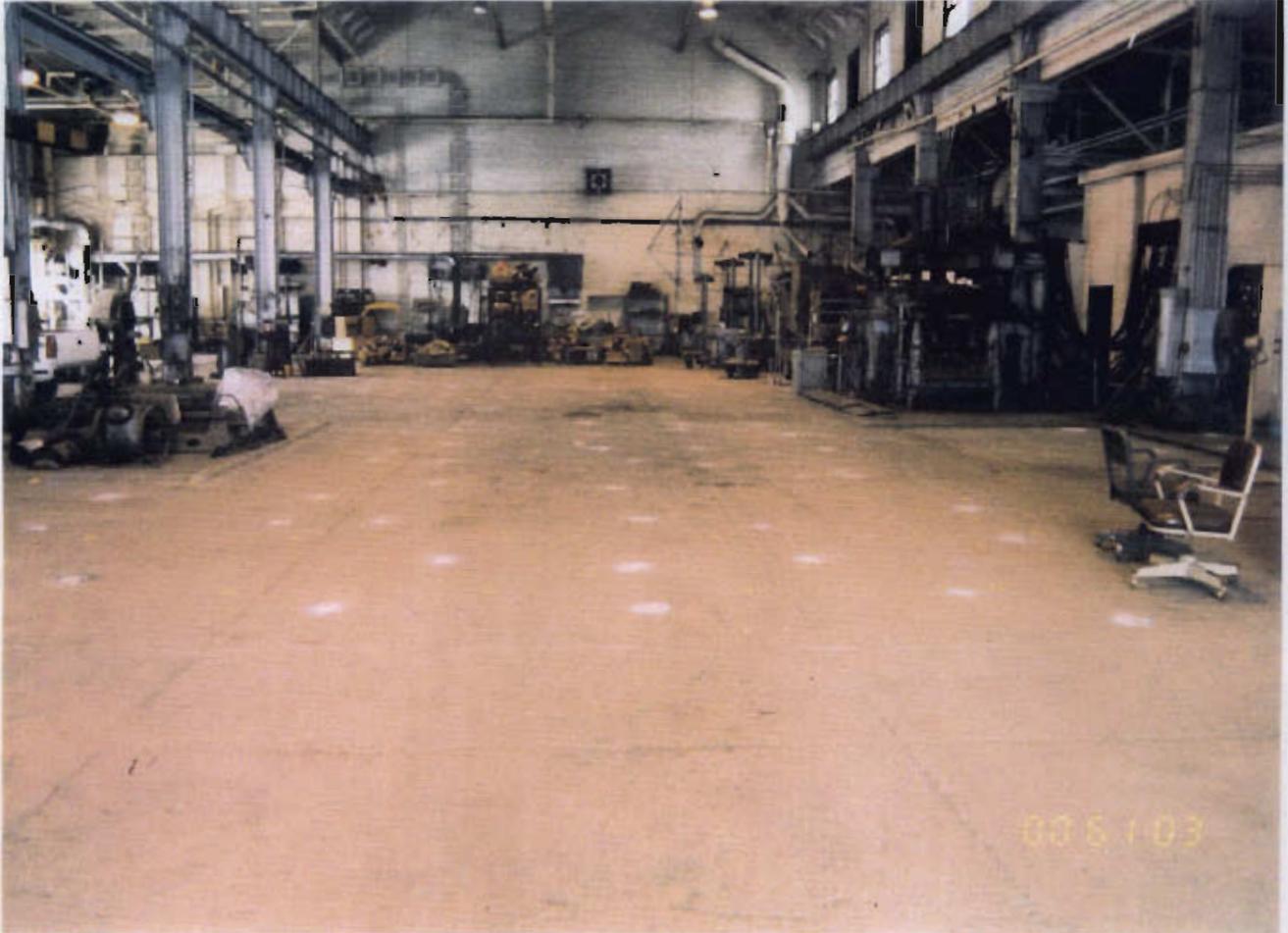


Building 9, Area 2

3.4 Bldg. 9, Foundry

h. After Photographs

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Building 9, Area 1, looking north

3.4 Bldg. 9, Foundry

i. After Photographs

---



Building 9, Area 1, looking south

**3.5 Bldg. 35****a. Introduction:**

This building is located in grid D-5 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

Building 35 is an "L" shaped building having structural terra cotta walls, covered with a concrete stucco on the exterior. The building sits on a concrete slab foundation.

**(2) Brief History:**

(a) **Use:** Building 35 was once a shipyard supply and receiving facility. This building now serves as the welding shop and the Welding Engineering facility. Areas in this building were used to store radioactive material that was sent to the shipyard. The building was used for this purpose until 1969.

(b) **Radiological History:** The area 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.

**(3) Survey Requirements:**

(a) Group 3 survey.

**b. Discussion:**

Building 35 Storage Areas and slab were divided into 166 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 the IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-247/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid.

A total of 166 solid material samples were taken from Building 35 Storage Area. Each 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 and lead 214.

Individual backgrounds were used for Building 35 Storage Area concrete and block. Due to variations in natural radioactivity among the construction

**3.5 Bldg. 35**

materials, different background levels exist. The IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 300, and 10000 counts per minute used for the concrete floor; and, 40, 250, and 6000 counts per minute used for the block walls were based on background radiation levels obtained from Building 89.

**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 62 areas greater than or equal to twice background.

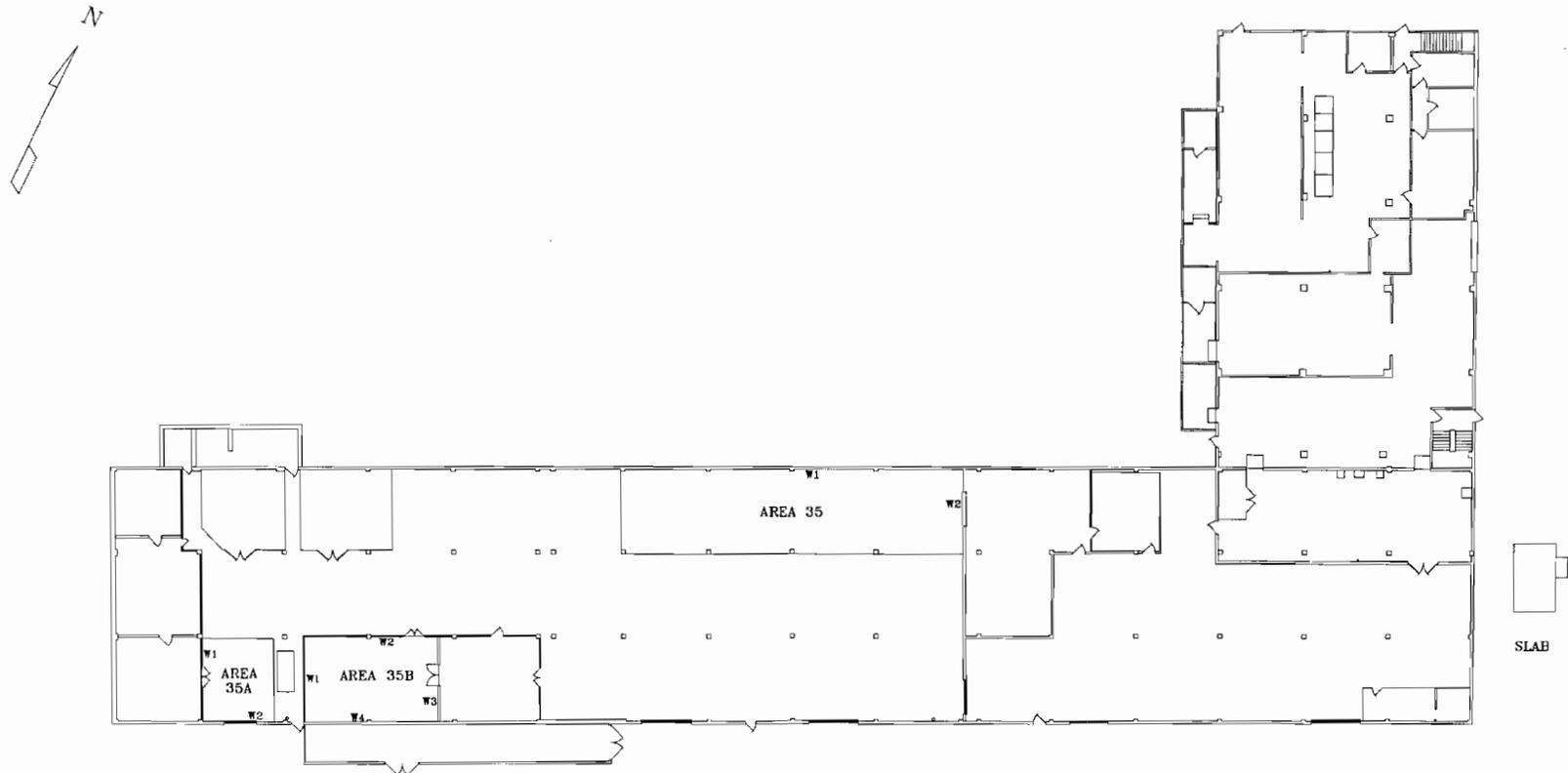
Surveys performed with the IM-253/PD (HV-2 GROSS) detected 14 areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.38 pCi/g to a high of 5.63 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 grids had paint samples: Section 35A grid W1-A3 and Section 35B grids W2-A2 and W4-A2.

3.5 Bldg. 35

d. Site Map



3.5 Bldg. 35

e. Localized Grid Maps

A	<450 300 600 — 1.81 <1	<450 300 650 10000 20000 1.59 <1	<450 300 700 — 1.73 <1	<450 300 650 10000 17500 1.80 <1	W1
B	<450 300 750 — 1.82 <1	<450 300 600 — 1.93 <1	<450 300 650 — 1.95 <1	<450 300 650 — 2.34 <1	
C	<450 300 750 — 1.75 <1	<450 300 700 — 1.88 <1	<450 300 700 — 2.71 <1	<450 300 650 10000 17500 2.76 <1	
D	<450 300 650 10000 20000 1.71 <1	<450 300 650 — 2.03 <1	<450 300 600 10000 20000 1.97 <1	<450 300 650 — 1.69 <1	
E	<450 300 650 — 2.14 <1	<450 300 650 — 1.79 <1	<450 300 10000 17500 2.47 <1	<450 300 650 — 2.34 <1	
F	<450 300 600 — 1.86 <1	<450 300 625 — 1.68 <1	<450 300 625 — 2.49 <1	<450 300 500 — 2.52 <1	
G	<450 300 750 — 1.83 <1	<450 300 700 10000 20000 1.70 <1	<450 300 700 10000 22500 1.59 <1	<450 300 700 — 1.87 <1	
H	<450 300 700 10000 20000 1.48 <1	<450 300 700 — 1.68 <1	<450 300 700 — 2.96 <1	<450 300 700 — 2.25 <1	
	1	2	3	4	

I	<450 300 600 — 2.56 <1	<450 300 575 — 2.56 <1	<450 300 600 — 2.94 <1	<450 300 500 10000 20000 2.26 <1	
J	<450 300 650 — 2.87 <1	<450 300 600 — 2.79 <1	<450 300 575 10000 20000 2.81 <1	<450 300 600 — 2.29 <1	
K	<450 300 650 — 5.63 <1	<450 300 650 10000 20000 2.89 <1	<450 300 600 — 2.22 <1	<450 300 600 625 10000 17500 2.11 <1	W1
L	<450 300 625 — 1.84 <1	<450 300 600 — 2.46 <1	<450 300 700 — 1.93 <1	<450 300 600 10000 17500 2.11 <1	
M	<450 300 650 — 2.06 <1	<450 300 650 — 2.11 <1	<450 300 600 10000 20000 2.76 <1	<450 300 600 — 2.52 <1	
N	<450 300 550 10000 15000 2.54 <1	<450 300 550 — 2.95 <1	<450 300 500 — 3.10 <1	<450 300 500 — 2.31 <1	
O	<450 300 625 — 2.19 <1	<450 300 575 — 2.58 <1	<450 300 550 — 2.32 <1	<450 300 500 — 2.22 <1	
P	<450 300 600 10000 15000 2.15 <1	<450 300 550 10000 15000 2.54 <1	<450 300 425 — 2.09 <1	<450 300 425 — 1.78 <1	
	1	2	3	4	W2

AREA 35 FLOOR

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 [ $\mu\text{Ci/g}$ ]

3.5 Bldg. 35

e. Localized Grid Maps

A

<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450	<450
300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
600	600	600	600	750	400	400	700	700	500	500	800	700	450	450	550
-	10000	-	-	-	-	10000	-	-	-	-	-	10000	20000	-	-
2.41	1.04	0.83	1.39	1.30	1.15	1.00	1.51	1.54	1.23	1.60	2.72	2.67	0.96	1.10	1.34
<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

W1

<450	<450	<450	<450
300	300	300	300
700	450	400	450
10000	-	10000	-
1.41	0.92	0.91	2.20
<1			<1
4	3	2	1

A

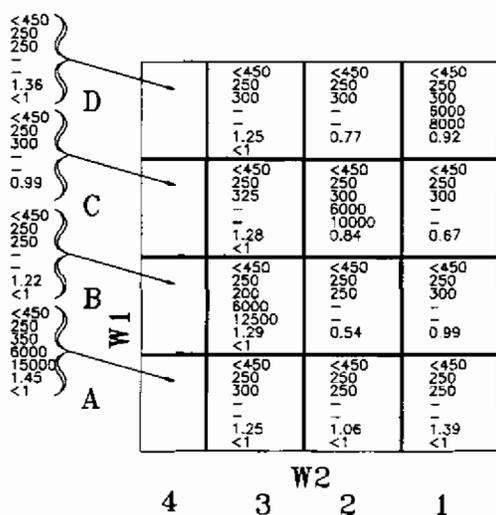
W2

AREA 35 WALLS

Sample Data  
 <450 - IM-247/PD Results [µCi/20cm²]  
 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]

3.5 Bldg. 35

e. Localized Grid Maps



AREA 35A FLOOR

A

<450 250 550 -	<450 250 450 -	<450 250 400 6000 9000 -<0.74	<450 250 450 -
0.38	0.43		0.76
1	2	3	4

W1

<450 250 450 -	<450 250 400 6000 9000 1.56 <1	<450 250 350 -	<450 250 350 -
1.78 <1	1.56 <1	1.59 <1	1.37 <1
4	3	2	1

A

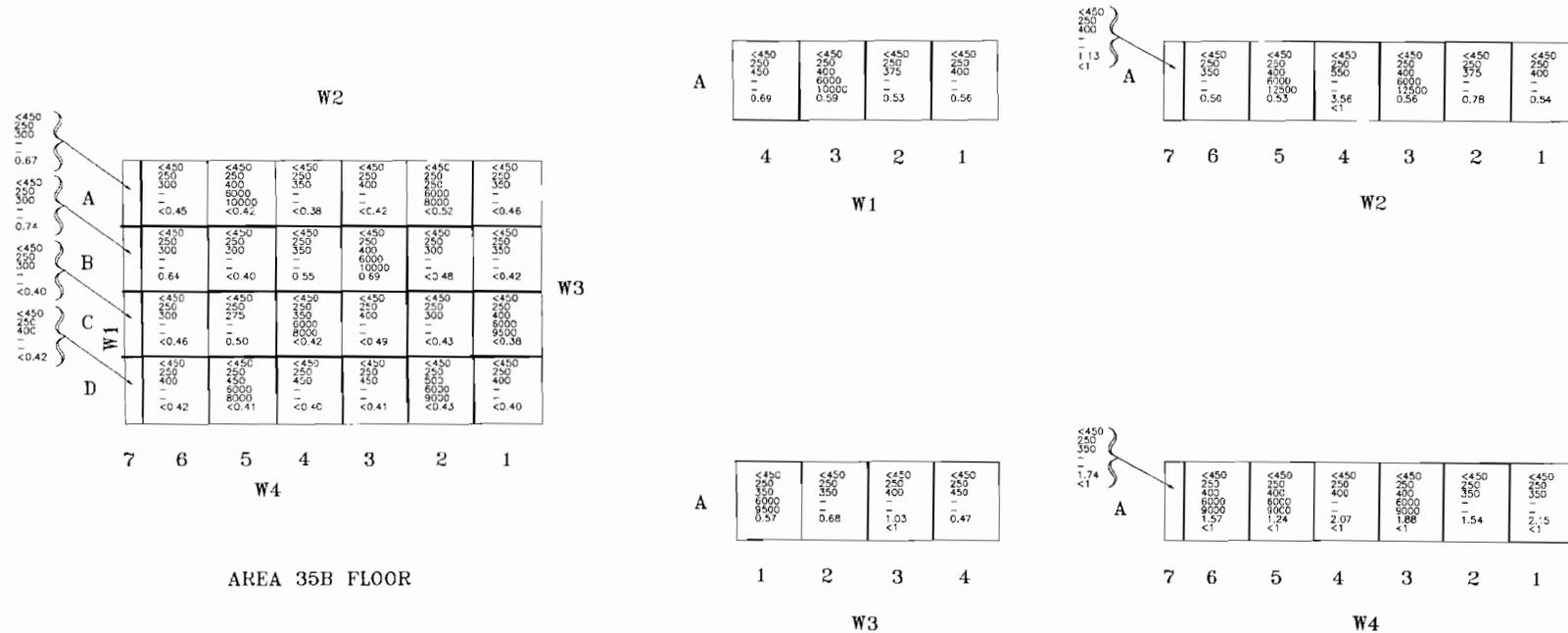
W2

**Note**  
Samples taken from 35A-W1-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) [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]

3.5 Bldg. 35

e. Localized Grid Maps



**Note**  
 Samples taken from grids 35B-W2-A2 and 35B-W4-A2 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/L]  
 300 – IM-253/PD (HV-1 PHA) [cpm]  
 7000 – IM-253/PD (HV-2 GROSS) [Bq/L]  
 7300 – IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 – MCA Gross Gamma Ec. Co-60 [pCi/g]  
 <1 – MCA Specific Co-60 Results [pCi/g]

3.5 Bldg. 35

e. Localized Grid Maps

A	<450	<450	<450
	250	250	250
	250	200	250
	-	-	-
	1.26	1.13	1.16
	<1	<1	<1
B	<450	<450	<450
	250	250	250
	200	250	200
	-	6500	-
	1.72	1.29	1.46
	<1	<1	<1
C	<450	<450	
	250	250	
	250	250	
	6500	-	
	9000		
	1.21	0.95	
	<1		
	1	2	3

SLAB

**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 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 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3.5 Bldg. 35

f. Prior Photograph

---



Slab

3.5 Bldg. 35

f. Prior Photograph

---



Area 35, viewing west.

3.5 Bldg. 35

f. Prior Photograph

---



Area 35B, viewing west.

3.5 Bldg. 35

g. After Photograph

---



Slab

3.5 Bldg. 35

g. After Photograph

---



Area 35, viewing northwest.

3.5 Bldg. 35

g. After Photograph

---



Area 35A, viewing southeast.

3.5 Bldg. 35

g. After Photograph

---



Area 35B, viewing southwest.

**3.6 Bldg. 44, Plating Facility****a. Introduction:**

Building 44 is located in grid C-5 of the Charleston Naval Shipyard map (Figure 10). The area of interest in this building is the Plating Facility which was located on the northwest side of the building.

**(1) Description:**

Building 44 is a rectangular two story building approximately 300' long by 125' wide and 35' high. The building is constructed of concrete. The plating facility is located in a 25' wide by 105' long addition to the north side of the building. This facility is concrete block construction with a concrete slab foundation and metal corrugated roof supported by internal metal trusses.

**(2) Brief History:**

- (a) Use:** Building 44 was a supply and shop stores building. In the mid to late 1960s the plating facility was used to chemically strip activated metal coatings from reactor plant components. The components were then replated in this facility or coated with a different material and sent to the foundry for finishing.
- (b) Radiological History:** Areas in the plating facility were controlled as radiological work areas during stripping and replating and as radiation areas for storage of components being worked. Activated components had surface radioactivity levels of several mr/hr and loose surface contamination levels in the thousands of  $\mu\mu\text{Ci}/100\text{cm}^2$ . On one occasion components with loose surface contamination of several thousand  $\mu\mu\text{Ci}/100\text{cm}^2$  were chemically stripped using no radiological controls. No loose surface contamination was found on the surfaces of the facility as a result of this occurrence. No known loose surface contamination levels in excess of  $450 \mu\mu\text{Ci}/100\text{cm}^2$  have been reported.

**(3) Survey Requirements:**

- (a) Group 3 survey.

**b. Discussion:**

Building 44 Plating Facility was divided into 182 grids: 105 floor grids, 72 wall grids, and 5 column grids. The floor grids were approximately 5' by 5' and the wall and column grids were approximately 5' by 6' high. Each grid had its own unique designator.

**3.6 Bldg. 44, Plating Facility**

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.

A total of 182 solid material samples were taken from Building 44 Plating Area. Each 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: bismuth 214, lead 212, lead 214, potassium 40, and radium 226.

Individual backgrounds were used for Building 44 Plating Facility concrete block walls, concrete deck, concrete walls, and metal walls. Due to variations in natural radioactivity among the construction materials, different background levels exist. For the block walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 325, and 8000 counts per minute were based on radiation levels from Building 233. For the concrete deck, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 225, and 6500 counts per minute were based on radiation levels from Building 233 deck. For the concrete walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 325, and 6250 counts per minute were based on radiation levels from Building 132. For the metal walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 55, 275, and 6750 counts per minute were based on radiation levels from Building 1884.

**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.

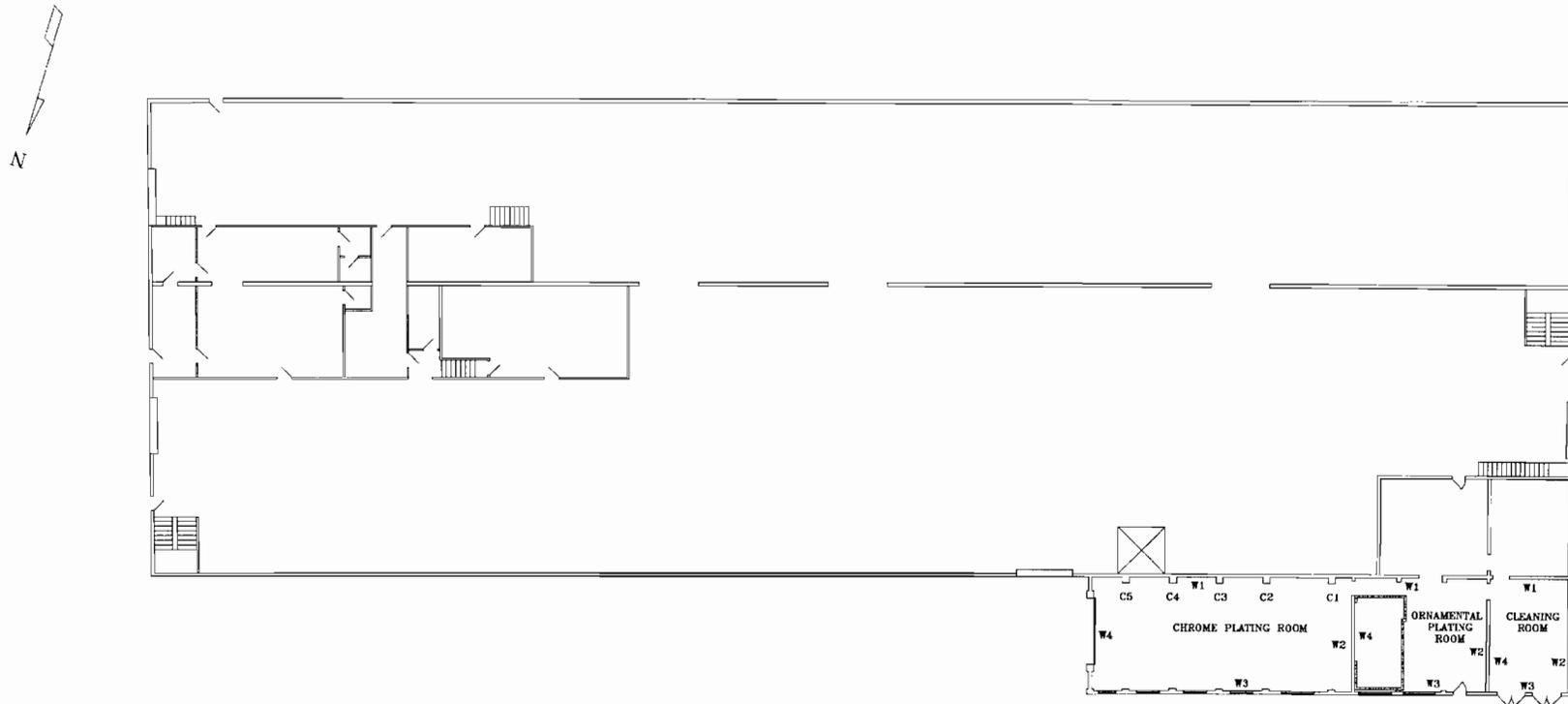
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.24 pCi/g to a high of 5.60 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 indicated less than 3 pCi/g. The following grids had paint samples: Chrome Plating Room grids W4-A2 and W4-A3.

3.6 Bldg. 44, Plating Facility

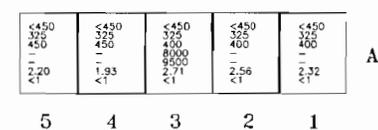
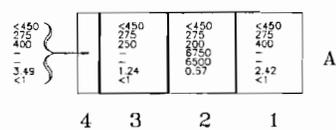
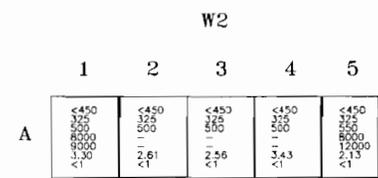
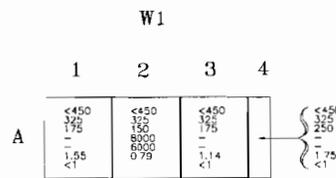
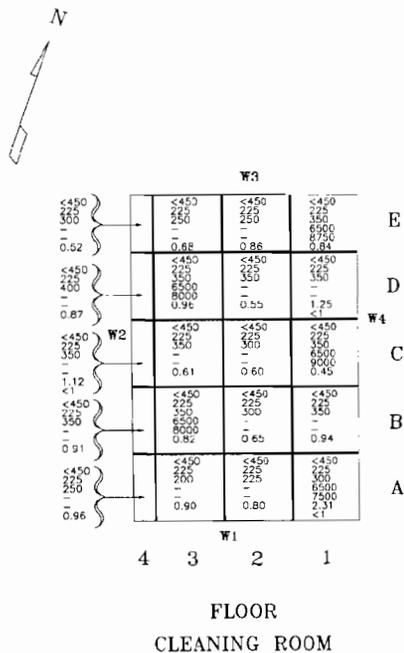
d. Site Map



FIRST FLOOR

3.6 Bldg. 44, Plating Facility

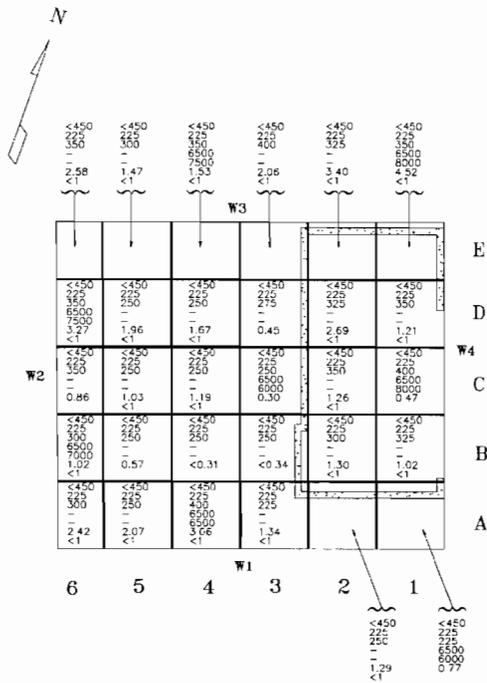
e. Localized Grid Maps



Sample Data  
 <450 - IM-241/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [dpm]  
 500 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [dpm]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.87 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

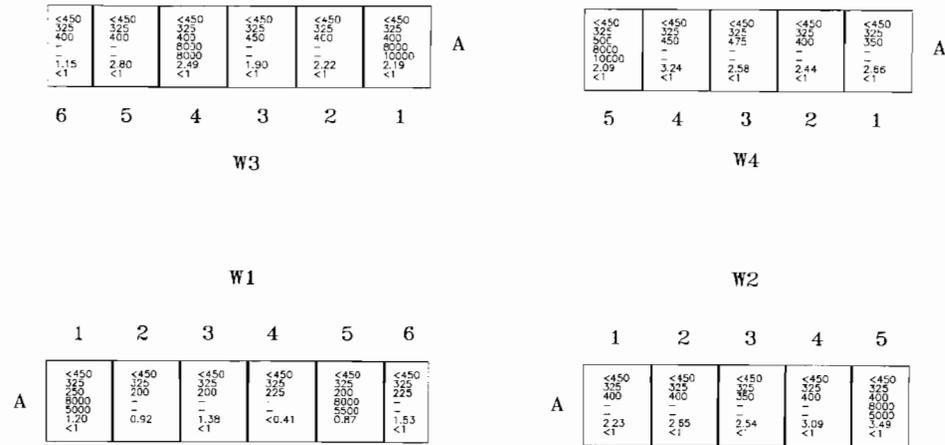
3.6 Bldg. 44, Plating Facility

e. Localized Grid Maps



FLOOR  
ORNAMENTAL PLATING ROOM

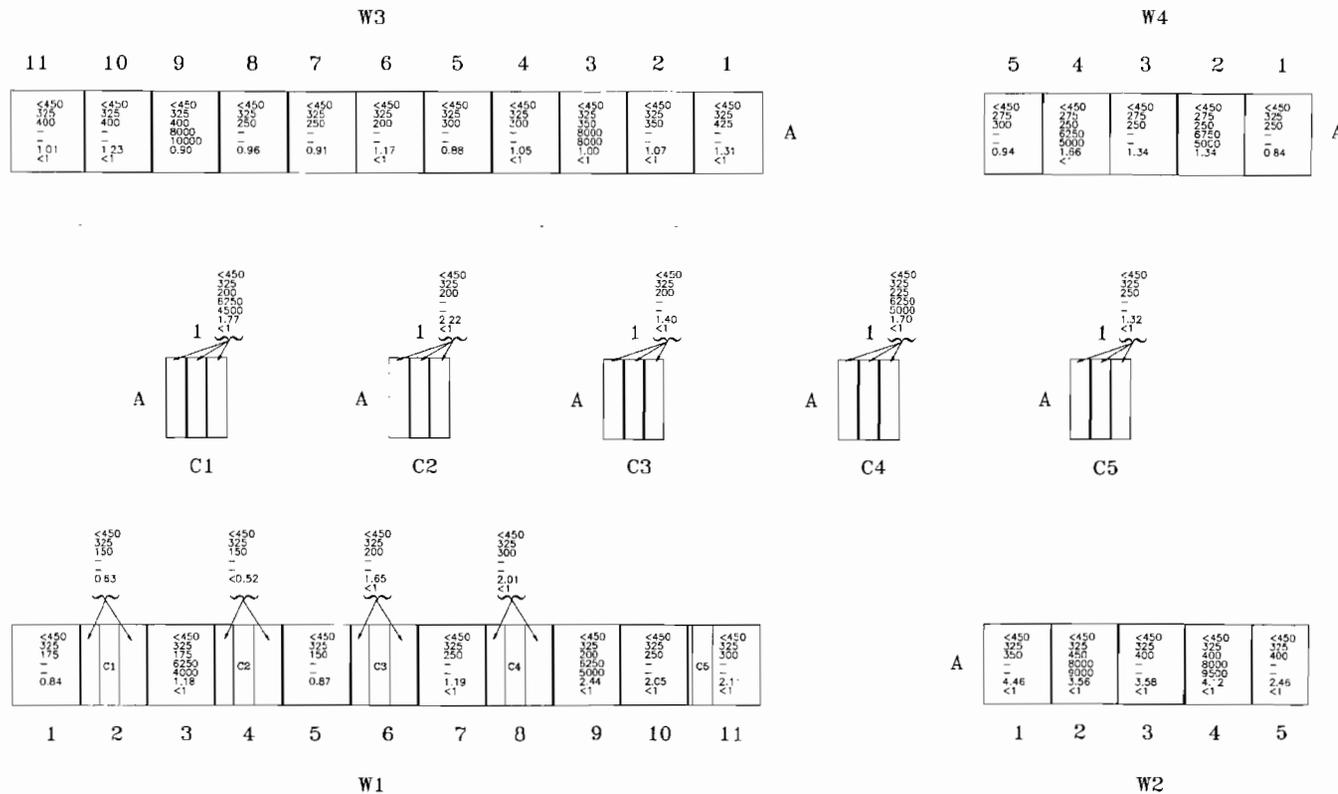
**Sample Data**  
 <450 – IM-247/PD Results [µpCi/20cm<sup>2</sup>]  
 200 – IM-253/PD (HV-1 PHA) [Bq/L]  
 330 – IM-253/PD (HV-1 PHA) [cpm]  
 7000 – IM-253/PD (HV-2 GROSS) [Bq/L]  
 7300 – IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 – MCA Specific Co-60 Results [pCi/g]





3.6 Bldg. 44, Plating Facility

e. Localized Grid Maps



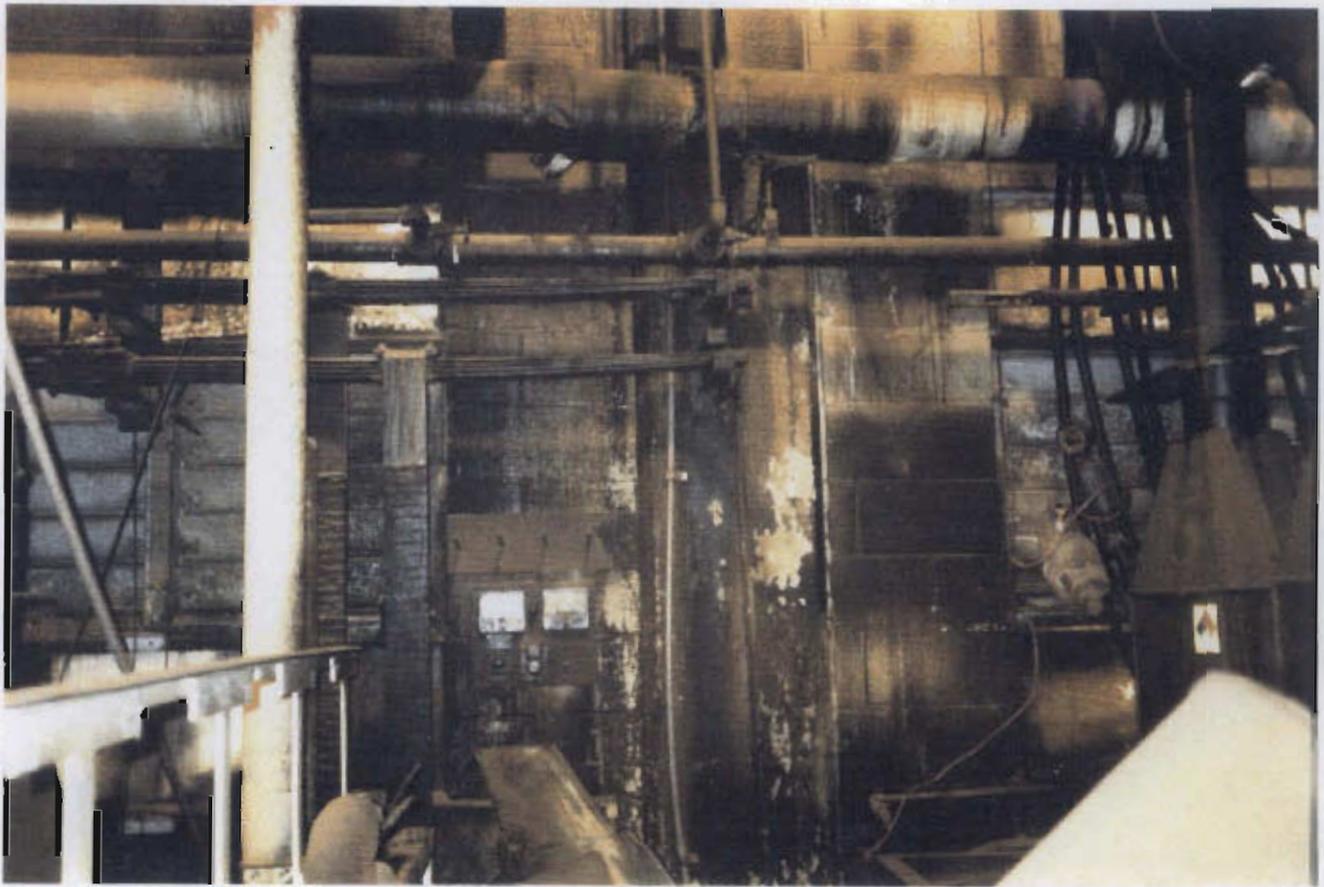
**Note**  
Samples taken from gncs W4-A2 and W4-A3 consist of paint and have a limit of 3 pCi/g.

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

3.6 Bldg. 44, Plating Facility

f. Prior Photograph, Chrome Plating Room

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Viewing northeast into room

3.6 Bldg. 44, Plating Facility

g. Prior Photograph, Cleaning Room

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Viewing northwest into room

3.6 Bldg. 44, Plating Facility

f. Prior Photograph, Ornamental Plating Room

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Viewing northeast into room

3.6 Bldg. 44, Plating Facility

g. After Photograph, Chrome Plating Room

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Viewing east to Wall 4

3.6 Bldg. 44, Plating Facility

f. After Photograph, Cleaning room

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Viewing north to Wall 3

3.6 Bldg. 44, Plating Facility

g. After Photograph, Ornamental Plating Room

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Viewing south to Wall 1

**3.7 Bldg. 58****a. Introduction:**

Building 58 is located in grid C-5 of the Charleston Naval Shipyard map (Figure 10). Originally constructed in 1942 as a Labor Board & Post Office, Building 58 currently serves as the Shipyard Branch Clinic.

**(1) Description:**

Building 58 is a two story "L" shaped building approximately 215' long by 60' wide and 25' tall. Typical offices are 12' wide by 14' long with painted concrete block and sheetrock walls, tiled floor, and a drop ceiling.

**(2) Brief History:**

(a) **Use:** Building 58 contains the shipyard clinic and radiation health facilities. Through the early 1970's, room 241 was used as an environmental counting laboratory. In 1972 this facility was disestablished and the laboratory was moved to room 205. Again in 1975, the counting laboratory was disestablished and moved to room 109. Finally, in 1982, the counting laboratory was moved to trailer 105-103 where it remained until closure. Between 1975 and 1982, room 101 was used as a sample preparation area to support the counting laboratory in room 109. From 1975 room 102A was used to store sources used for calibrating the instruments used by the Radiation Health Division. Rooms 101, 102A, and 109 are located in the south end of the building. Rooms 241 and 205 are located in the northeast corner of the building.

(b) **Radiological History:** These areas were controlled as radiation areas and radioactive material storage areas when in use. Room 201 was released from radiological controls in 1975 in accordance with the NAVSEA requirements of that time. Because the release requirements have changed since 1975, the room was resurveyed to meet the current requirements. Sources stored in room 102A have contained isotopes such as Co-60, Cs-137, Ba-133, Na-22, Cd-109, Co-57, Hg-203, Sn-113, Sr-85, Y-88. Contamination levels were always maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$  equivalent cobalt 60.

**(3) Survey Requirements:**

- (a) Group 3 surveys in rooms 101, 102A, 109, 241, and 205.
- (b) Group 6 survey in Room 102A.

**3.7 Bldg. 58****b. Discussion:**

Group 3 survey areas were divided into 87 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 87 solid material samples were taken from the Group 3 and 6 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, and potassium 40.

The construction materials present in the Group 3 Areas are a concrete floor and concrete block walls. For the floors, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 150, and 4750 counts per minute were based on radiation levels obtained from Pier K Quaywall. For the concrete block and sheetrock walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 30, 200, and 3500 counts per minute were based on background radiation levels obtained from Building 185.

Group 6 surveys were performed in these areas in accordance with localized survey instructions. A minimum of 25% of the group six floor grids in room 102A closet were surveyed with the AN/PDR-56.

**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) detected 24 areas greater than or equal to twice background.

Surveys performed with the IM-253/PD (HV-2 GROSS) detected 10 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 a minimum detectable activity of 0.25 pCi/g to a high of 7.13 pCi/g.

**3.7 Bldg. 58**

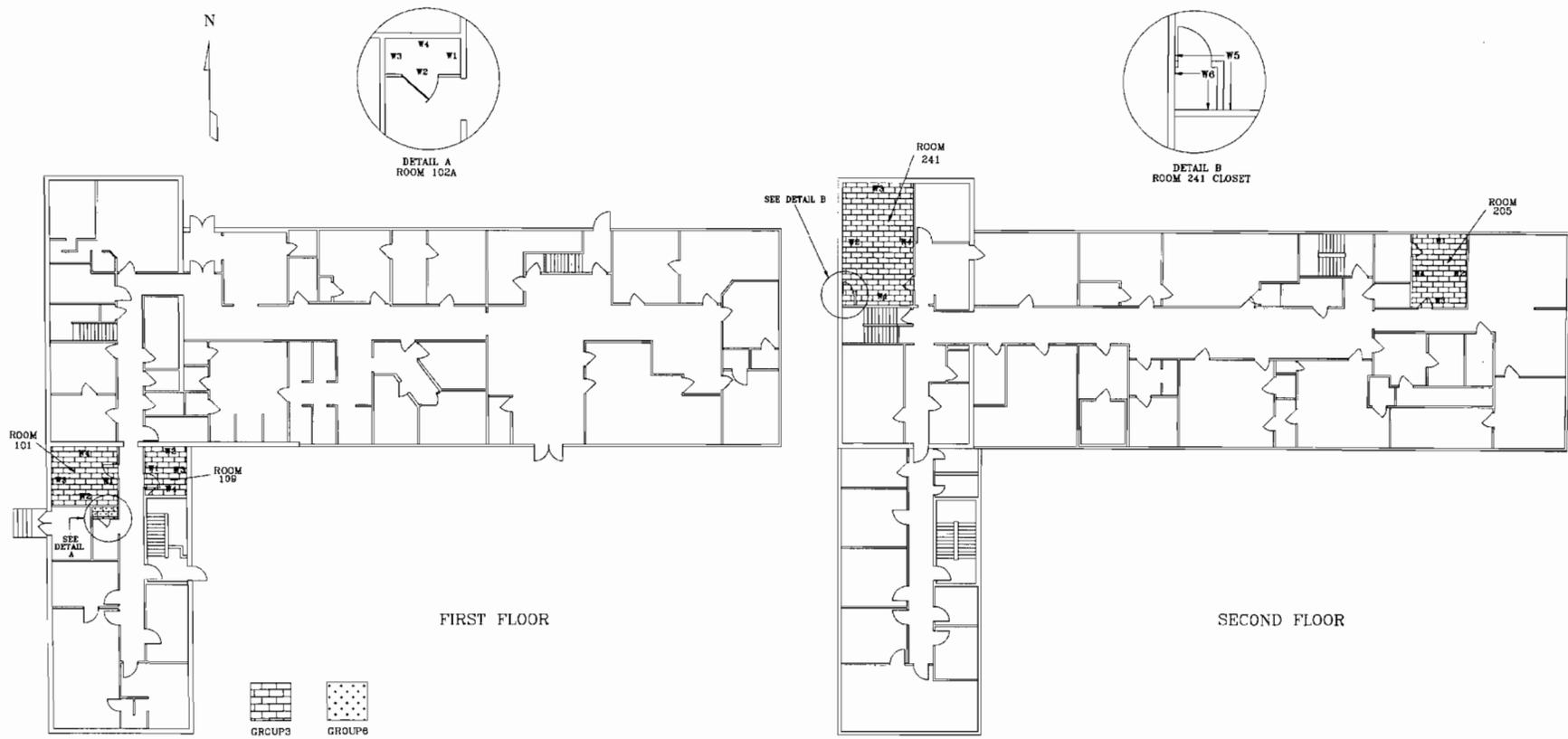
Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples were less than 1 pCi/g.

**Group 6 Summary**

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

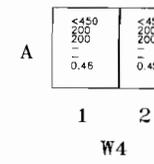
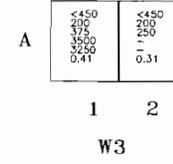
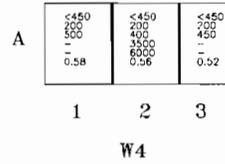
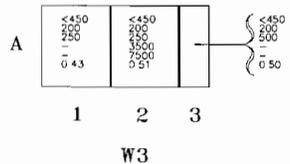
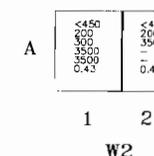
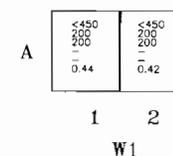
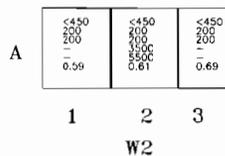
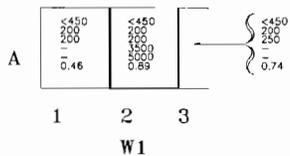
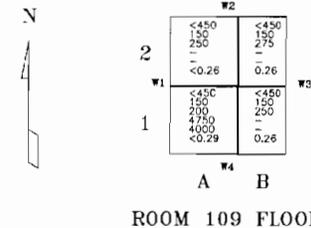
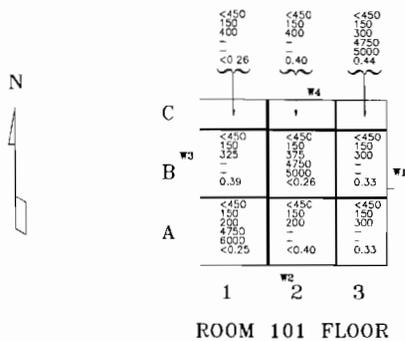
3.7 Bldg. 58

d. Site Map



3.7 Bldg. 58

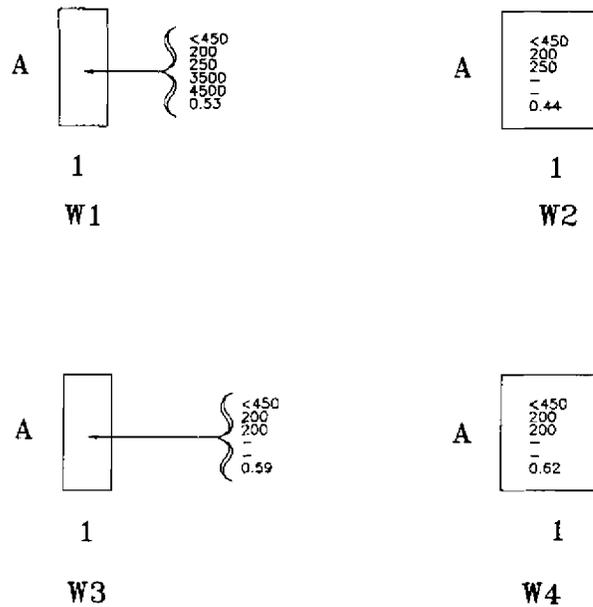
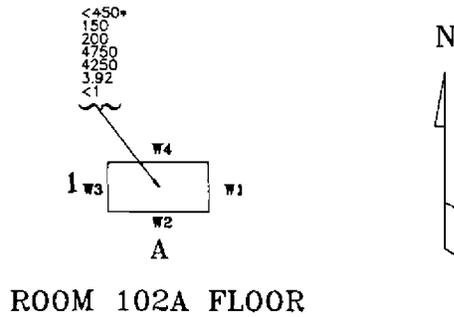
e. Localized Grid Maps



Sample Data  
 <450 - IM-241/PD Results [ $\mu\text{C}/20\text{cm}^2$ ]  
 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]

3.7 Bldg. 58

e. Localized Grid Maps



Notes:

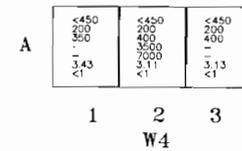
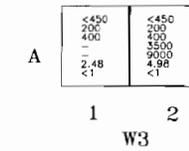
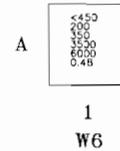
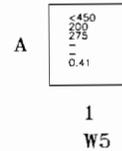
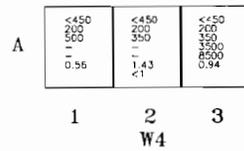
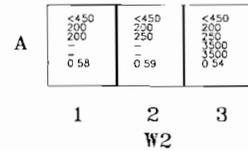
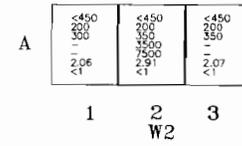
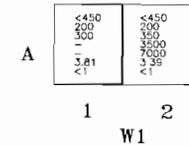
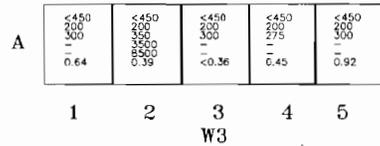
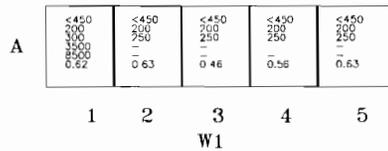
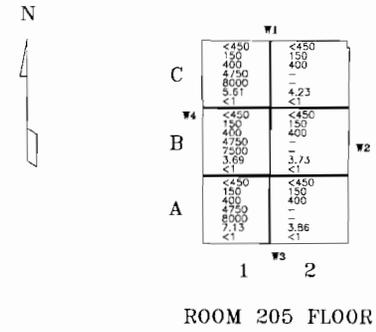
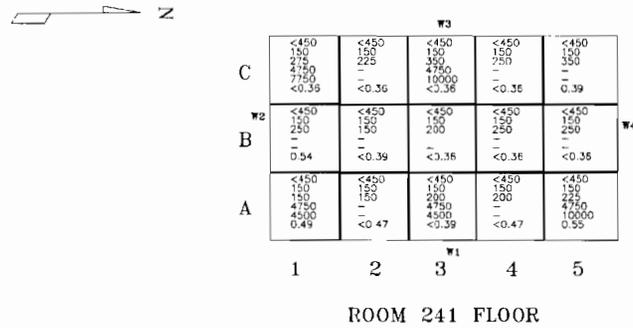
\*Denotes grids which were surveyed with an AN/PDR-56 for Alpha radioactivity and no detectable activity was found.

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]
- 1.82 – MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci}/\text{g}$ ]
- <1 – MCA Specific Co-60 Results [ $\mu\text{Ci}/\text{g}$ ]

3.7 Bldg. 58

e. Localized Grid Maps



**Sample Data**  
 <450 - IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 - IM-253/PD (HV-1 PHA) [bq.l]  
 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]

3.7 Bldg. 58

f. Prior Photograph

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Room 101, viewing southwest.

3.7 Bldg. 58

f. Prior Photograph

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Room 205, viewing east.

3.7 Bldg. 58

f. Prior Photograph

---



Room 205, viewing south.

3.7 Bldg. 58

g. After Photograph

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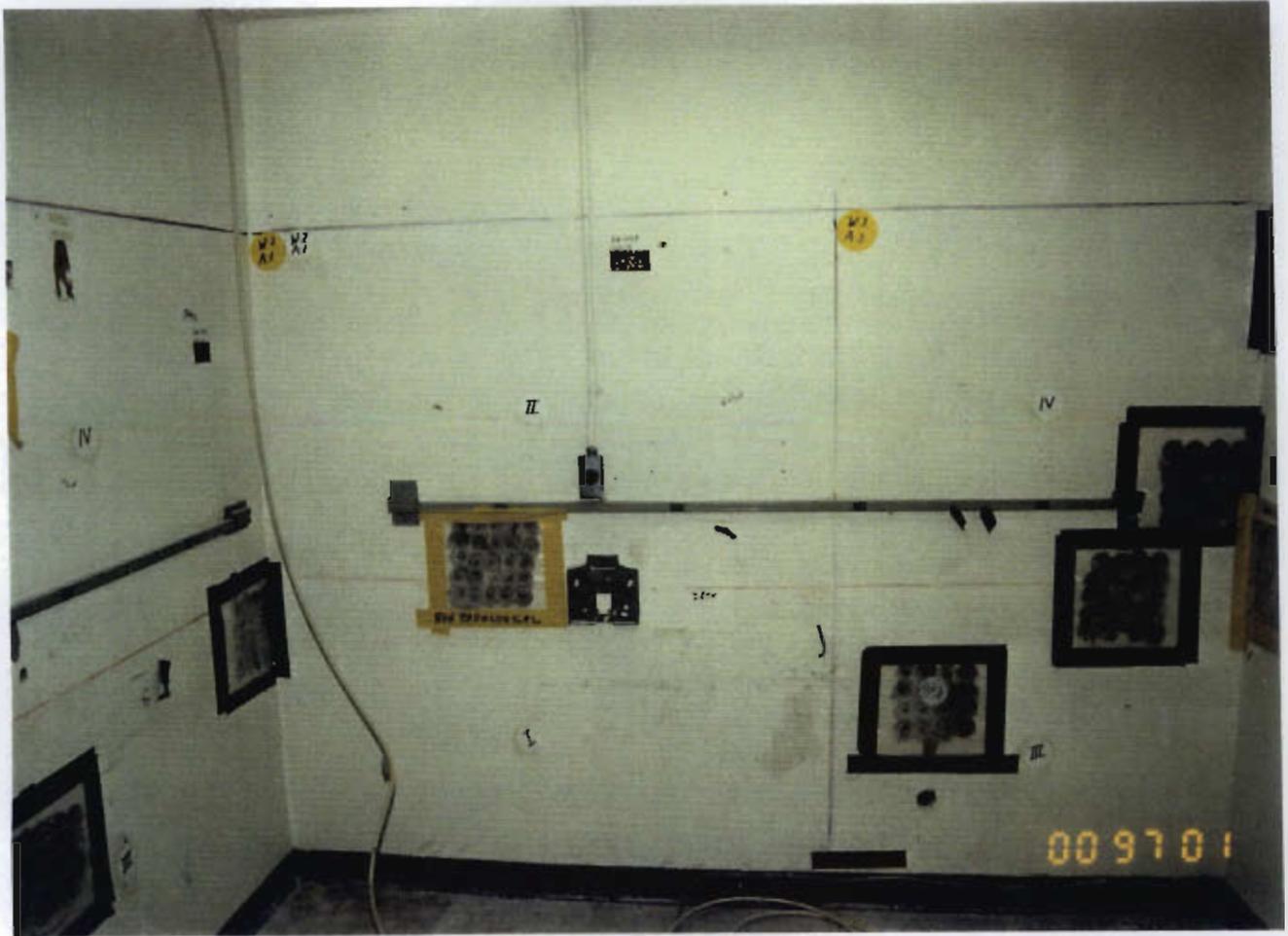
Room 101, viewing west.



3.7 Bldg. 58

g. After Photograph

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Room 109, viewing east.

3.7 Bldg. 58

g. After Photograph

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Room 109, viewing south.

3.7 Bldg. 58

g. After Photograph

---



Room 205, viewing northeast.

3.7 Bldg. 58

g. After Photograph

---



Room 205, viewing southeast.

3.7 Bldg. 58

g. After Photograph

---



Room 241, viewing south.

### 3.8 Bldg. 59/59A, Shield Block Storage Areas

#### a. Introduction:

Buildings 59/59A are corrugated metal buildings sitting on a concrete slab and are located in grid D-5 of the Charleston Naval Shipyard map (Figure 10). Radioactive material storage areas were set up in Building 59 along the south wall and Building 59A east end.

#### (1) Description:

Together the buildings are approximately 100' wide by 400' long by 30' high. The walls are block/corrugated metal and the floor is a concrete slab. The buildings contained three radioactive material storage areas. One storage area was 22' by 34' along the south wall of Building 59. There were two storage areas on the east end of Building 59A, one 40' by 45' along the south wall and one 20' by 25' along the north wall.

#### (2) Brief History:

(a) **Use:** Buildings 59/59A were the shipfitter layout area and sheet metal shop. The shield block storage areas were used to provide temporary storage for potentially contaminated reactor plant components which were removed during an overhaul.

(b) **Radiological History:** Reactor plant components with fixed contamination of up to several thousand  $\mu\text{Ci}/20\text{cm}^2$  were stored in these areas. The areas were controlled as radiation areas and radioactive material storage areas. Loose surface contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

#### (3) Survey Requirements:

(a) Group 3 survey in the storage areas.

#### b. Discussion:

Building 59/59A Shield Block Storage Areas were used for temporary storage of shield blocks during a submarine overhaul. The areas were controlled by either a wire cage or by being roped off for short term storage. Thus, no survey was required for these temporary barriers.

The storage area of Building 59 was divided into 35 floor grids approximately 5' by 5' and five wall grids approximately 6' high by 5' wide. Each grid had its own unique designator.

The two storage areas of Building 59A were divided into 86 floor grids approximately 5' by 5' and 28 wall grids approximately 6' high by 5' wide. Each

**3.8 Bldg. 59/59A, Shield Block Storage Areas**

grid had its own unique designator.

100 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 154 grids.

A total of 154 solid material samples were taken from the floor and walls of Building 59/59A. Each sample was removed from the grid location indicating the area of highest potential. Samples taken from grids 59A-1-W2-A1 and 59A-1-W2-A3 consisted of paint and had a limit of 3 pCi/g. The following typical naturally occurring radionuclide was identified during isotopic analysis of solid material samples: lead 212.

Individual backgrounds were used for the building wall and floor of the shield block storage area of Building 59. For the floor, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 250 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 7000 counts per minute were based on background levels obtained from the Pier X Quay Wall. For the cement wall of Building 59, an IM-247/PD background of 50 counts per minute, an IM-253/PD (HV-1 PHA) background of 400 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 10000 counts per minute were based on background levels obtained from the cement wall of Building 89.

Individual backgrounds were used for the building walls and floor of the shield block storage areas of Building 59A. For the floor of Building 59A, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 150 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 3000 counts per minute were based on background levels obtained from the Building 185 floor. For the cement wall of Building 59A, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 350 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 15000 counts per minute were obtained from the cement wall of Building 417. For the block walls of Building 59A, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 300 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 6000 counts per minute were based on background levels obtained from the block wall of Building 89.

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  $\mu\text{Ci}/20\text{cm}^2$ .

**3.8 Bldg. 59/59A, Shield Block Storage Areas**

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

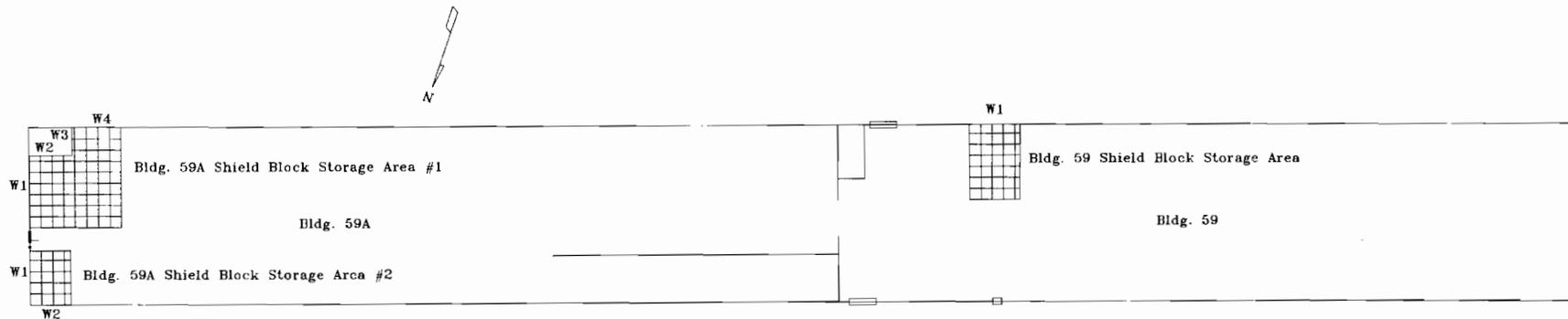
Surveys performed with the IM-253/PD (HV-2 GROSS) detected three areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than a minimum detectable activity of 0.42 pCi/g to a high of 3.72 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. Analysis performed on the paint samples indicated less than 3 pCi/g.

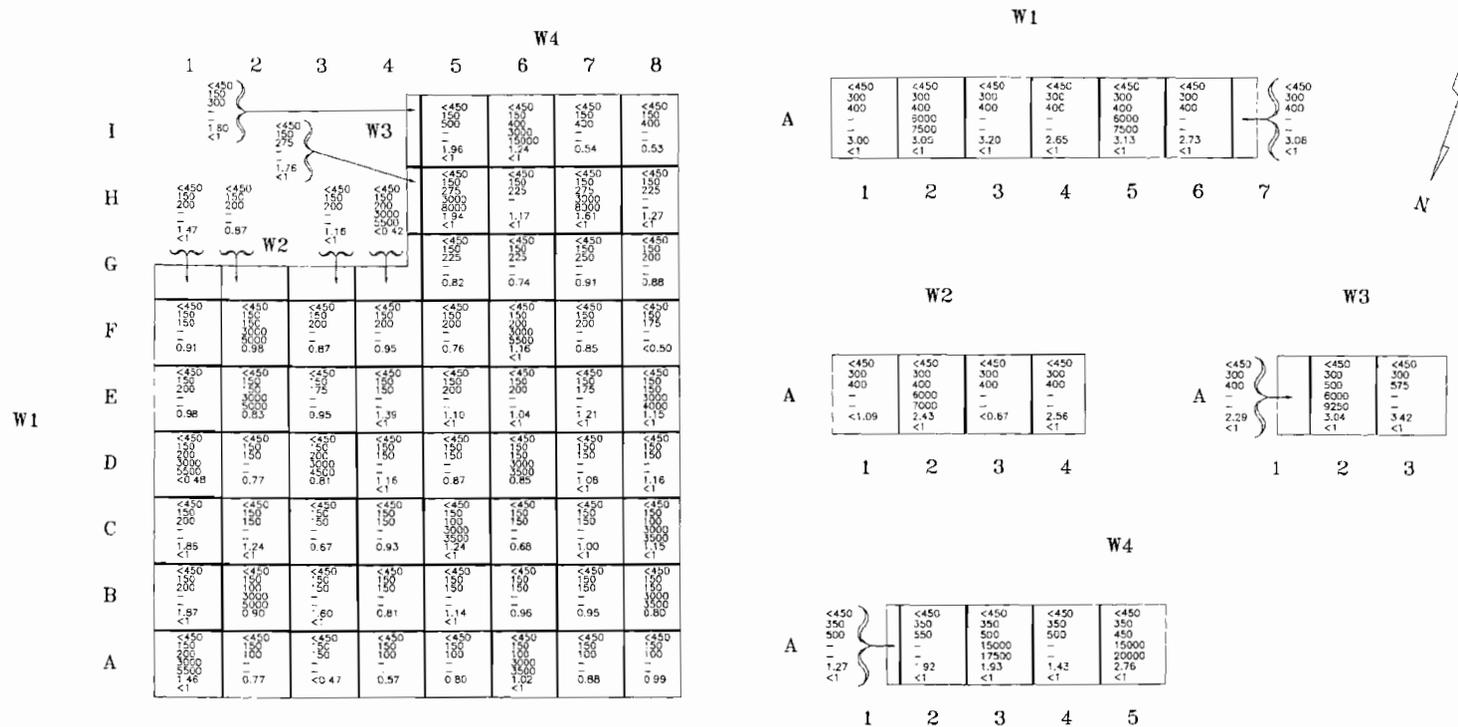
3.8 Bldg. 59/59A, Shield Block Storage Areas

d. Site Map



3.8 Bldg. 59/59A, Shield Block Storage Areas

e. Localized Grid Maps



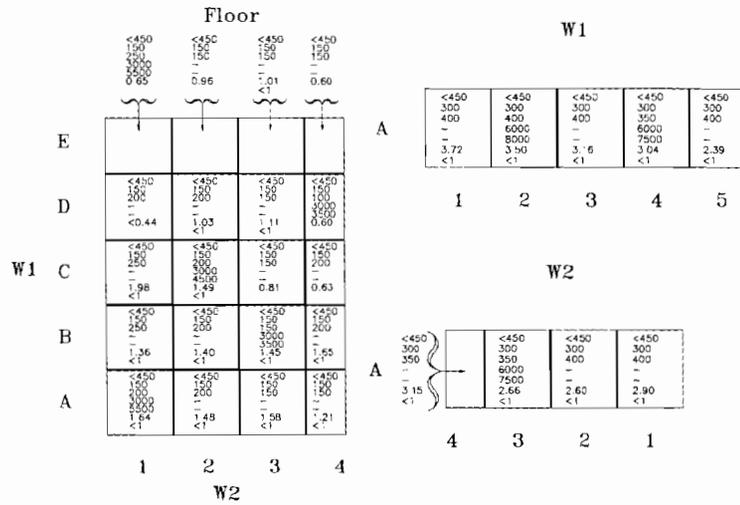
Bldg. 59A Shield Block Storage Area #1

**Note**  
Samples taken from grids 59A-1-W2-A1 and 59A-1-W2-A3 consist of paint and have a limit of 3 pCi/g.

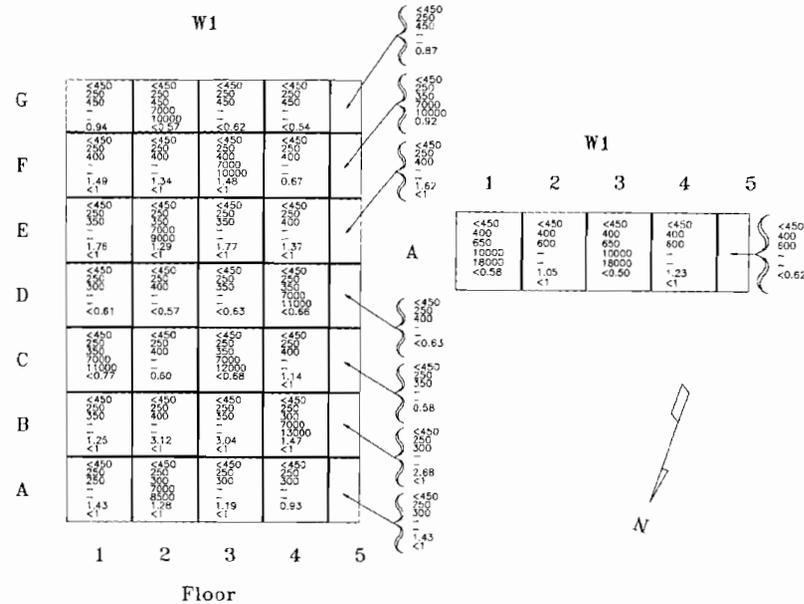
**Sample Data**  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq/g]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7500 - IM-253/PD (HV-2 GROSS) [Bq/g]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3.8 Bldg. 59/59A, Shield Block Storage Areas

e. Localized Grid Maps



Bldg. 59A Shield Block Storage Area #2



Bldg. 59 Shield Block Storage Area

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

3.8 Bldg. 59/59A, Shield Block Storage Areas

f. Prior To Survey Photographs

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Shield Block Storage Area Number 1

3.8 Bldg. 59/59A, Shield Block Storage Areas

f. Prior To Survey Photographs

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Building 59 Shield Block Storage Area

3.8 Bldg. 59/59A, Shield Block Storage Areas

g. After Survey Photographs

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Shield Block Storage Area Number 1

3.8 Bldg. 59/59A, Shield Block Storage Areas

g. After Survey Photographs

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Building 59 Shield Block Storage Area

### 3.9 Bldg. 59, Fenced Area and Connex Boxes

#### a. Introduction:

The Building 59 fenced area was a satellite radioactive material storage area located east of Building 2. The fenced area is located in grid E-5 of the Charleston Naval Shipyard map (Figure 10). Within this fenced area were four connex boxes in which radioactive material was stored prior to final disposition.

#### (1) Description:

The concrete slab at the east end of this fenced area accommodated four standard connex boxes which were used as radioactive material storage areas for reactor plant components. The connex boxes had wooden floors with metal sides and roofs.

#### (2) Brief History:

- (a) **Use:** The Building 59 fenced area was used as a loading area for the connex boxes. These connex boxes acted as temporary storage for radioactive reactor plant components.
- (b) **Radiological History:** Reactor plant components with fixed contamination up to several thousand  $\mu\text{Ci}/20\text{cm}^2$  were stored in these containers. The connex boxes were controlled as radiation areas and radioactive material storage areas while being used as such. Loose surface contamination levels were maintained less than  $450 \mu\text{Ci}/100\text{cm}^2$ .

#### (3) Survey Requirements:

- (a) Group 3 survey.

#### b. Discussion:

The connex boxes were used to temporarily store radioactive reactor plant components during an overhaul. These connex boxes, which were located in the Building 59 fenced area, were maintained as radiation areas when contaminated components were present.

The concrete slab in front of the connex boxes was divided into seven 5' by 5' grids. Each connex box floor was divided into eight approximately 5' by 5' grids for a total of 32 floor grids. The walls of each connex box were divided into 12 grids approximately 5' wide by 6' high for a total of 48 wall grids. Each grid had its own unique designator.

100 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

**3.9 Bldg. 59, Fenced Area and Connex Boxes**

87 grids.

A total of 87 solid material samples were taken. Seven samples were taken from the concrete slab and 80 from the connex boxes. Samples taken from the connex box walls consisted of paint and had a limit of 3 pCi/g. Each sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclide was identified during isotopic analysis of solid material samples: lead 212.

The backgrounds used for the concrete slab in the Building 59 fenced area were as follows: for the IM-247/PD a background of 40 counts per minute, for the IM-253/PD (HV-1 PHA) a background of 150 counts per minute, for the IM-253/PD (HV-2 GROSS) a background of 4000 counts per minute. These levels were obtained from Pier K Quay Wall.

The backgrounds used for the connex boxes in the Building 59 fenced area were as follows: for the IM-247/PD a background of 40 counts per minute, for the IM-253/PD (HV-1 PHA) a background of 150 counts per minute, for the IM-253/PD (HV-2 GROSS) a background of 4000 counts per minute. These levels were obtained from Connex Box 466718.

**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.

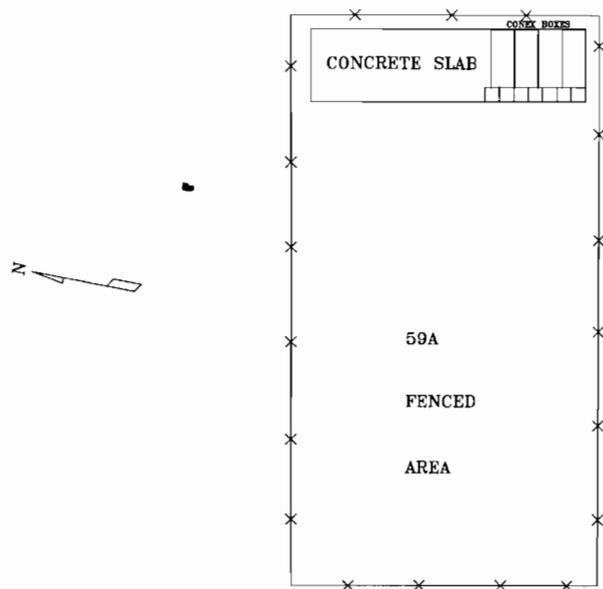
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than a minimum detectable activity of 0.13 pCi/g to a high of 2.69 pCi/g.

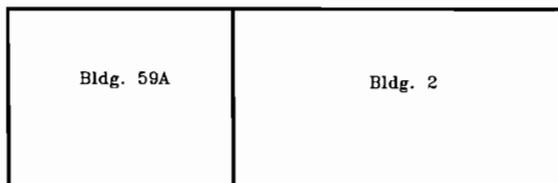
Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that solid material samples were less than 1 pCi/g, except for paint samples. Analysis performed on paint samples indicated less than 3 pCi/g.

3.9 Bldg. 59, Fenced Area and Connex Boxes

d. Site Map

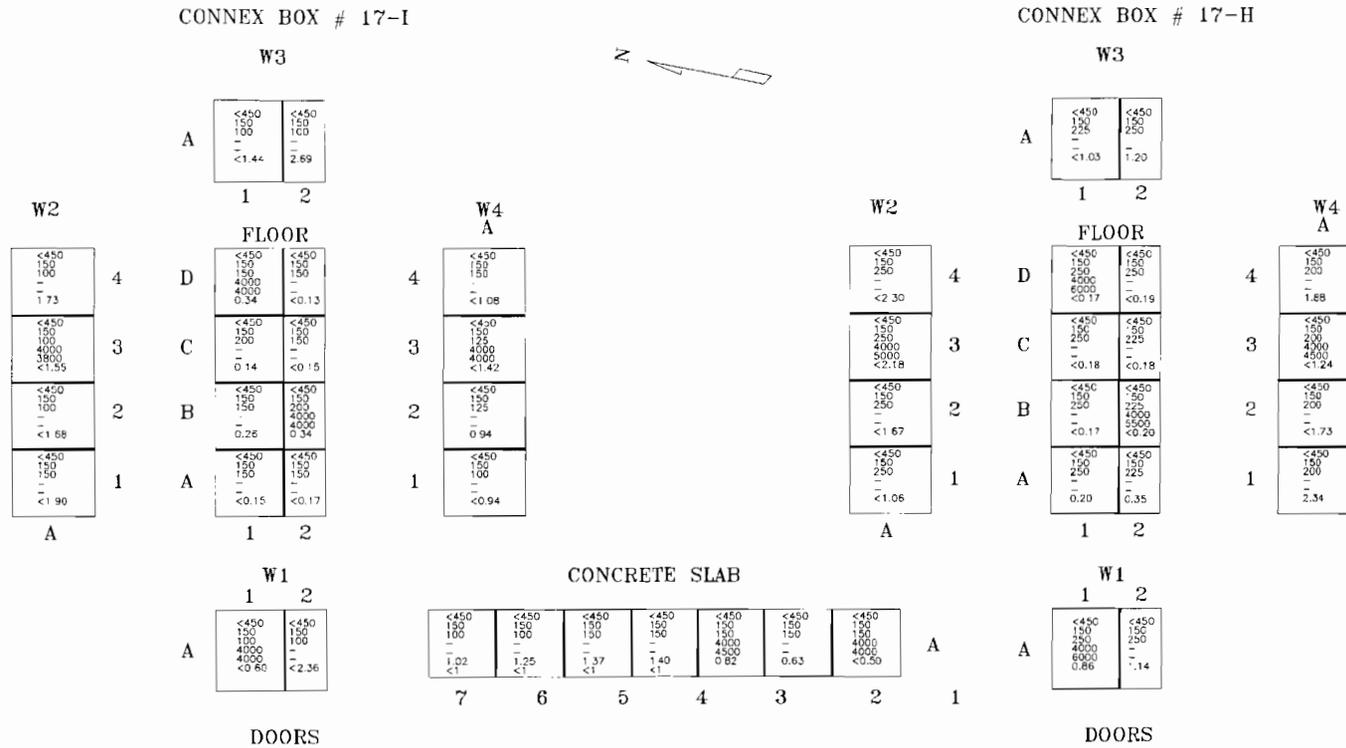


ROE AVENUE



3.9 Bldg. 59, Fenced Area and Connex Boxes

e. Localized Grid Maps



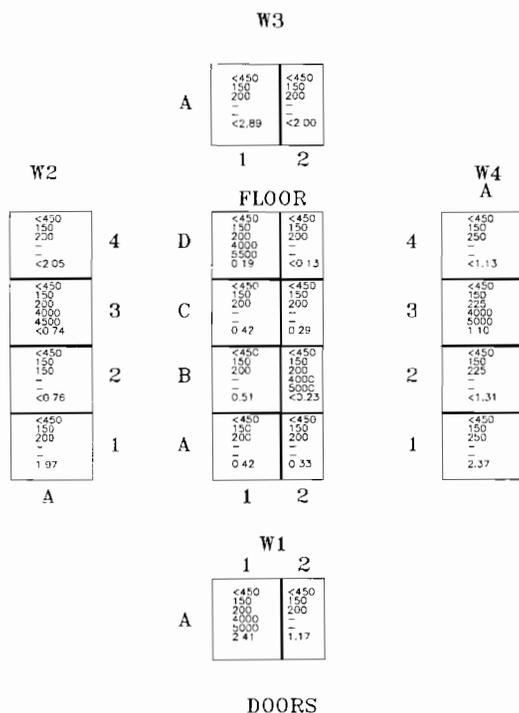
**Note**  
Samples taken from the connex box walls and doors consist of paint and have a limit of 3 pCi/g.

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

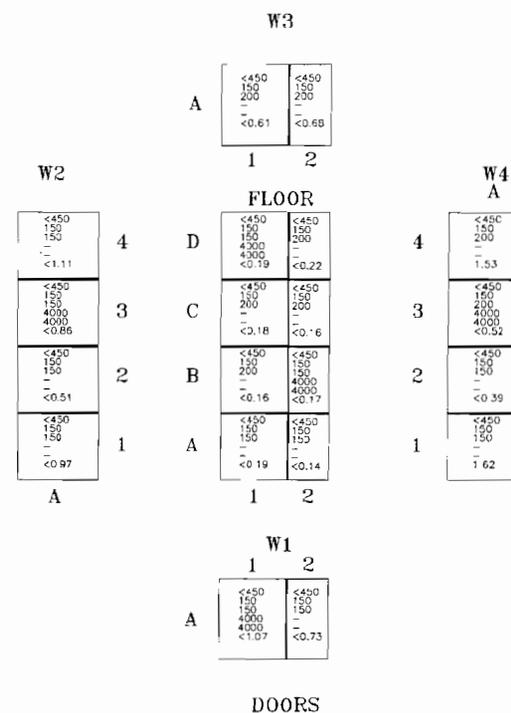
3.9 Bldg. 59, Fenced Area and Connex Boxes

e. Localized Grid Maps

CONNEX BOX # 17-J



CONNEX BOX # 17-K



Note  
Samples taken from the connex box walls and doors  
consist of paint and have a limit of 3 pCi/g

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

3.9 Bldg. 59, Fenced Area and Connex Boxes

f. Prior To Survey Photographs

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Fenced area concrete slab, facing southeast.

3.9 Bldg. 59, Fenced Area and Connex Boxes

g. After Survey Photographs

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Fenced area concrete slab, facing southeast.

3.9 Bldg. 59, Fenced Area and Connex Boxes

g. After Survey Photographs

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Inside connex box.

**3.10 Bldg. 62****a. Introduction:**

Building 62 is located in grid D-5 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

This building is a two story rectangular structure approximately 380' long by 50' wide and 25' high. The concrete block building sits on a concrete slab foundation.

**(2) Brief History:**

(a) **Use:** A small area on the first floor of this building was used as a radioactive material storage area.

(b) **Radiological History:** The area was controlled as a radiation area and a radioactive material storage area. Contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**(3) Survey Requirements:**

(a) Group 3 survey.

**b. Discussion:**

Building 62 Storage Area was divided into 32 grids. The floor grids were approximately 5' by 5'. 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). Additionally, solid material samples were taken from each grid.

A total of 31 solid material samples were taken from Building 62 Storage Area. Grid W3-A1 is an expanded metal door, therefore, a solid material sample was not taken from this grid. Each 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, lead-214, thallium-208, and bismuth-214.

Individual backgrounds were used for Building 62 Storage Area, concrete and block. 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) backgrounds of 40, 225, and 6500 counts per minute used for the concrete floor and 45, 400, and 8000 counts per minute used for

3.10 Bldg. 62

the block walls were all based on radiation levels obtained from Building 233.

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.

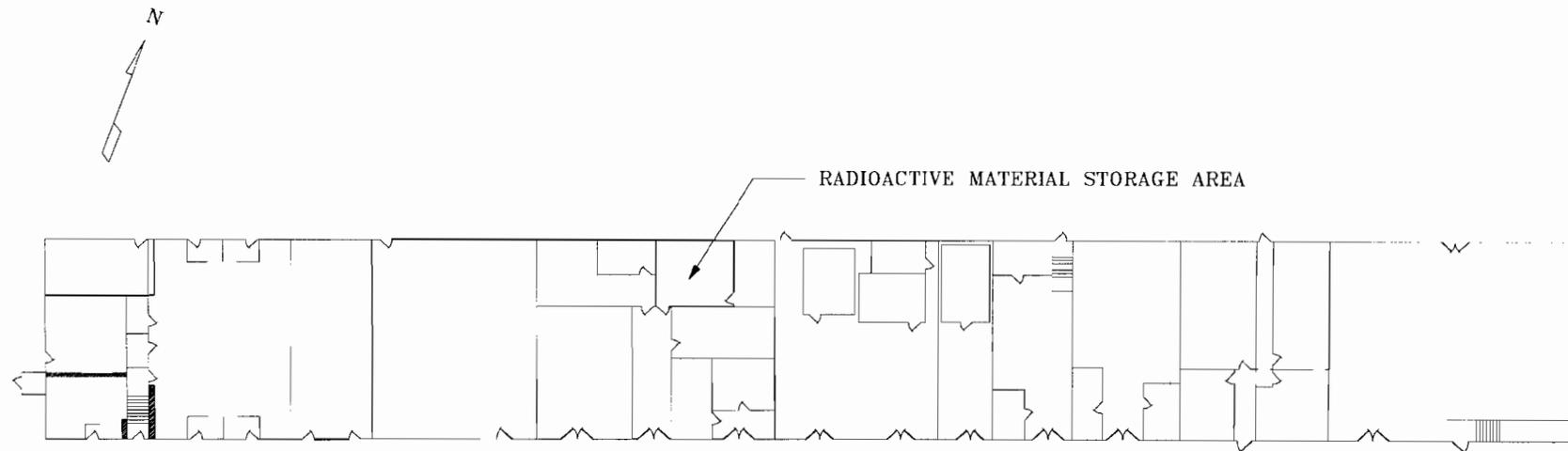
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than a minimum detectable activity of 0.18 pCi/g to a high of 1.62 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.

3.10 Bldg. 62

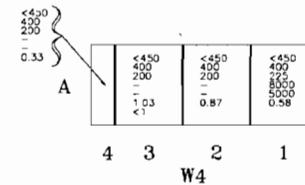
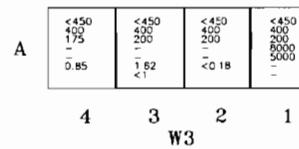
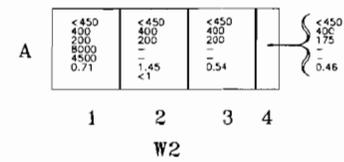
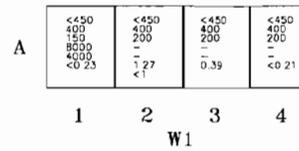
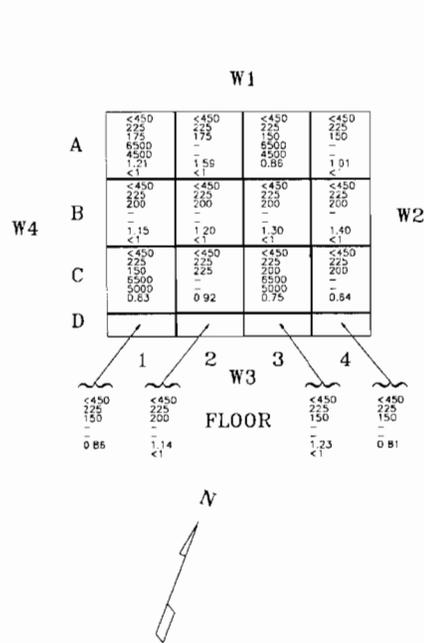
d. Site Map



1ST FLOOR

3.10 Bldg. 62

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 [ $\mu\text{Ci/g}$ ]

3.10 Bldg. 62

f. Prior Photograph, Radioactive Material Storage Area

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Looking west to wall 4

3.10 Bldg. 62

f. Prior Photograph, Radioactive Material Storage Area

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Looking northwest to walls 1 & 4

3.10 Bldg. 62

h. After, Radioactive Material Storage Area

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Looking north to wall 1.

3.10 Bldg. 62

h. After, Radioactive Material Storage Area

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Looking east to wall 2.

3.10 Bldg. 62

h. After, Radioactive Material Storage Area

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Looking south to wall 3.

**3.11 Bldg. 69****a. Introduction:**

Building 69 is located in grid D-10 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

The building is a single story structure approximately 320' long by 240' wide and 45' high. It has a metal frame construction resting on a poured concrete slab. The exterior walls are corrugated metal.

**(2) Brief History:**

(a) **Use:** The building is a shipyard receiving and supply building. In the 1960s the building was used to receive and store overhauled nuclear valves, differential pressure cells, and other nuclear components.

(b) **Radiological History:** On several occasions loose and fixed radioactivity was found on nuclear material stored in this building. No radioactivity was found on the surfaces of the building. The area was released from radiological controls in 1970 per the NAVSEA requirements of that time. Because the release requirements have changed since 1970, the storage area and receiving bay were resurveyed to meet the current requirements.

**(3) Survey Requirements:**

(a) Group 3 survey.

**b. Discussion:**

Building 69 Storage Area was divided into a total of 74 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 the IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-247/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid.

A total of 74 solid material samples were taken from Building 69 Storage Area. Each 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, lead 214, thallium 208, bismuth 214.

The construction materials present in Building 69 Storage Area are concrete,

**3.11 Bldg. 69**

block, and metal. Due to variations in natural radioactivity among the construction materials, different background levels exist. For the concrete floor, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 45, 500, and 12500 counts per minute were based on radiation levels obtained from Building 1800. For the block walls, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 50, 525, and 16750 counts per minute were based on radiation levels obtained from Building 1640. For metal walls, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 40, 400, and 12500 counts per minute were based on radiation levels obtained from Building 27 supply trailer wall. For the concrete walls, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 45, 500, and 13250 counts per minute were based on radiation levels obtained from Building 1079.

**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.

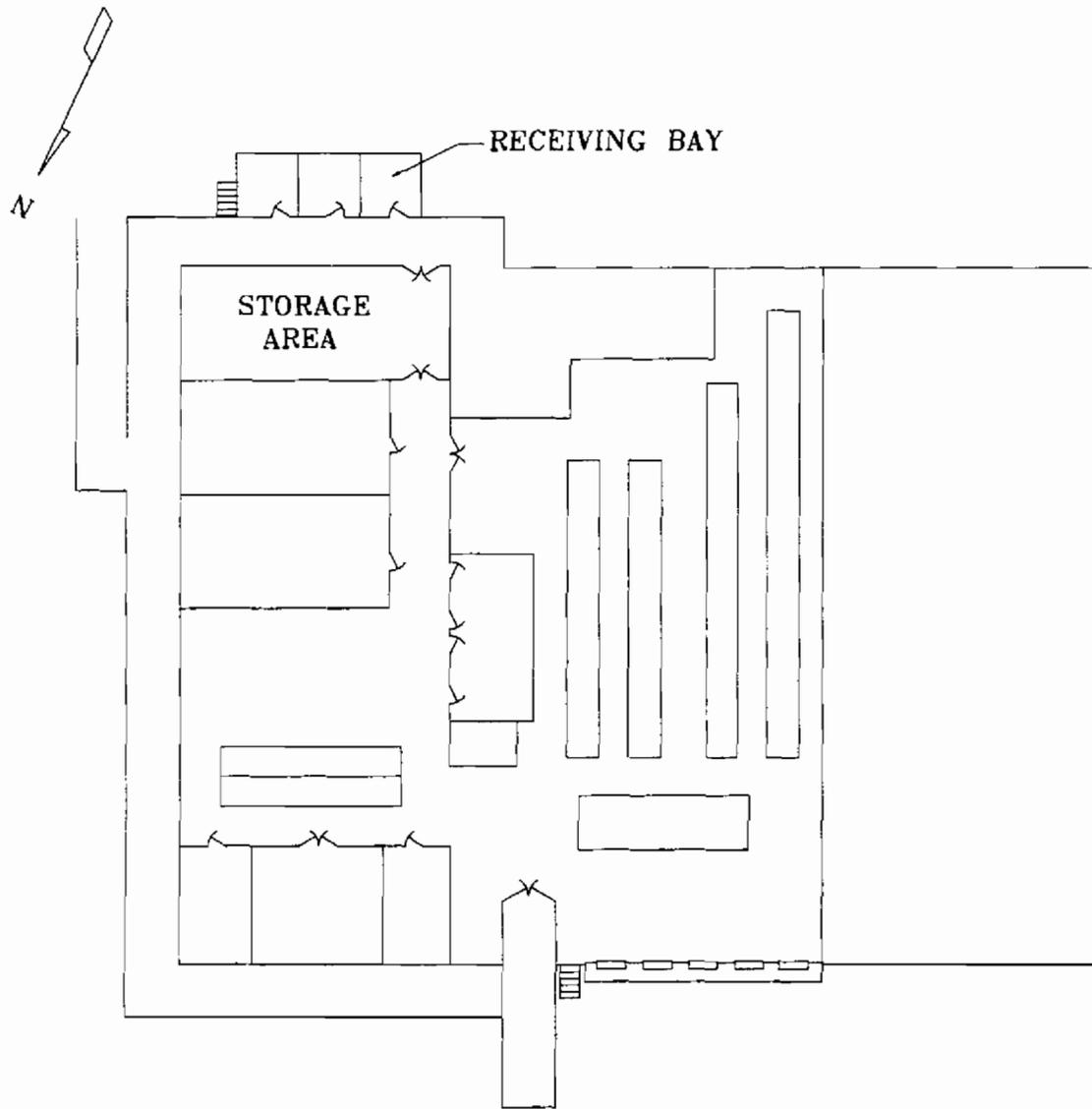
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.39 pCi/g to a high of 3.86 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 from Room 1 grids W2-A1 and W4-A1 indicated less than 3 pCi/g.

3.11 Bldg. 69

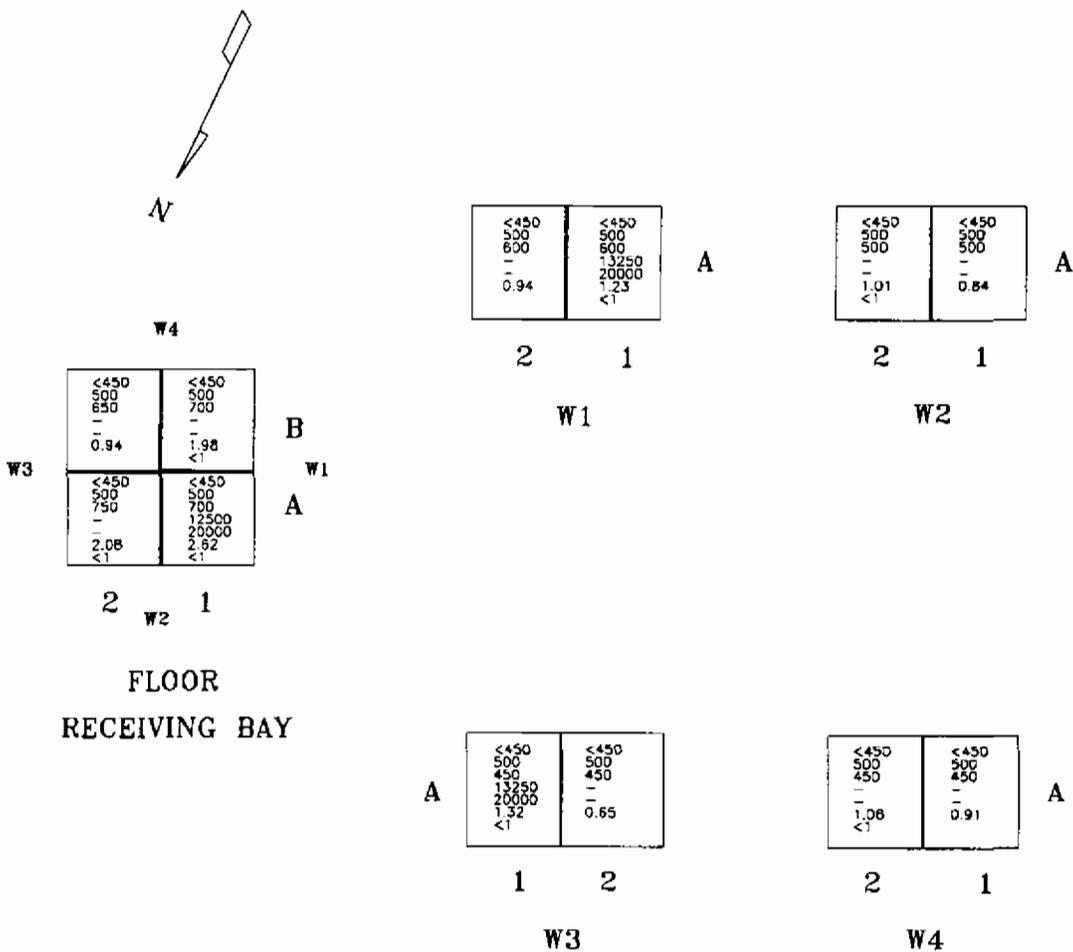
d. Site Map





3.11 Bldg. 69

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 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3.11 Bldg. 69

f. Prior Photograph, Receiving Bay

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Looking southwest to wall 1.

3.11 Bldg. 69

f. Prior Photograph, Storage Area

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Looking east to wall 4.

3.11 Bldg. 69

g. After Photograph, Receiving Bay

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Looking southwest to wall 1.

3.11 Bldg. 69

g. After Photograph, Storage Area



Center of area looking southwest.

**3.12 Bldg. 95****a. Introduction:**

Building 95 is located on Eleventh Street of the Charleston Naval Base. This building is located in grid D-10 of the Charleston Naval Shipyard map (Figure 9 of Vol. II A.). It was constructed in 1943 during World War II expansion of the Charleston Naval Shipyard. It was constructed as a support building to facilitate operations involving the Destroyer Escort Program in the South Yard.

**(1) Description:**

Building 95 is a one-story utility building that faces northwest off River Road. It has a rectangular plan and is 46 feet long by 27 feet wide. It has one structural bay along the end and four structural bays along each side. The building is constructed of concrete block piers with a concrete slab floor. There is a sump area below the floor slab which is accessible through metal covered holes in the floor. The exterior walls are composed of stuccoed concrete blocks. The entry consists of large paired metal doors. Windows are located along the side elevations.

**(2) Brief History:**

(a) **Use:** This building was initially used as a support facility for the construction of Destroyer Escorts in Dry Docks 3 and 4. However building 95 was later used for storage of radioactive material while radioactive work was performed in Dry Docks 3 and 4.

(b) **Radiological History:** There is no history of loose surface contamination levels greater than  $450 \mu\text{Ci}/100\text{cm}^2$  in this structure.

**(3) Survey Requirements:**

Group 3 Survey.

**b. Discussion:**

Building 95 is categorized as a Group 3 building. Group 3 refers to radioactive material storage areas with potential for low levels of contamination less than  $1000 \mu\text{Ci}/100\text{cm}^2$ .

The floors were divided into approximately fifty-four, 5' by 5' grids. The walls were divided into approximately thirty, 5' by 6' grids. Each grid was identified with its unique designation.

One hundred percent of all grids were surveyed with the IM-247/PD and the IM-253/PD (HV-1 PHA). Then minimum of twenty-five percent of all grids were

**3.12 Bldg. 95**

surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each wall and floor grid.

A total of eighty-two solid material samples were taken. Solid material samples at W1-A3 and W4-A3 were not required because surfaces at these locations consisted of unpainted metal. Each solid sample taken was removed from the grid location indicating 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

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

Two different construction materials, providing different background radiation levels, were present in the areas surveyed in Building 95. The results are that several different background levels exist in Building 95, because of the variation in the natural radioactivity among the concrete slab floor and concrete block walls. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete slab floor were 60, 200 and 7000 counts per minute respectively, based upon background radiation levels obtained from Building 81. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete block walls were 80, 450 and 11000 counts per minute respectively, based upon background radiation levels obtained from Building 81.

The sump area under Building 95 was not used for the storage of radioactive material. Furthermore there is no history of radioactive liquids or loose surface contamination spills in this structure and thus no contamination would be present below the floor level. Therefore surveys in the sump area were 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.

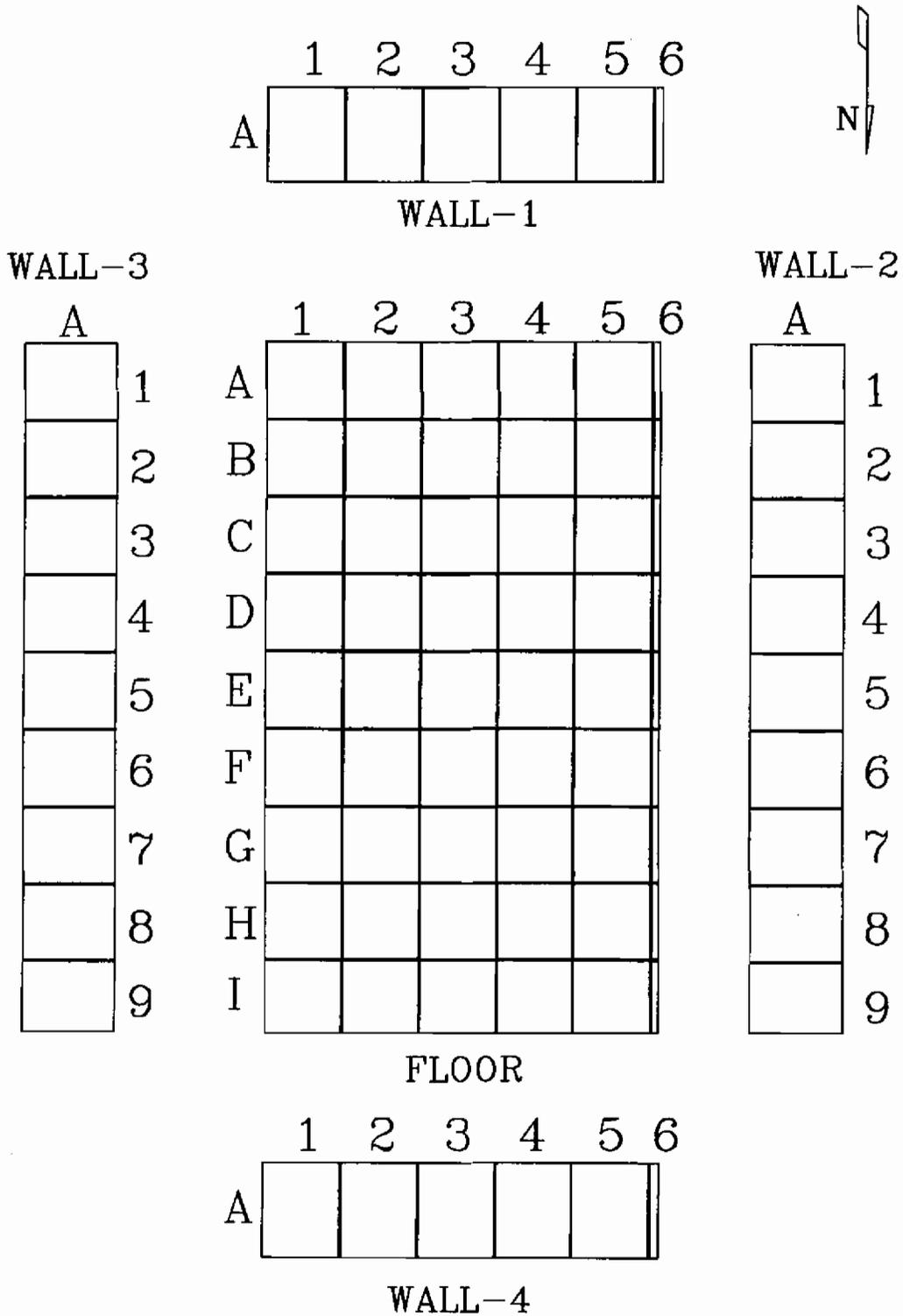
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.87 pCi/g to a high of 6.20 pCi/g with an average of 2.45 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.

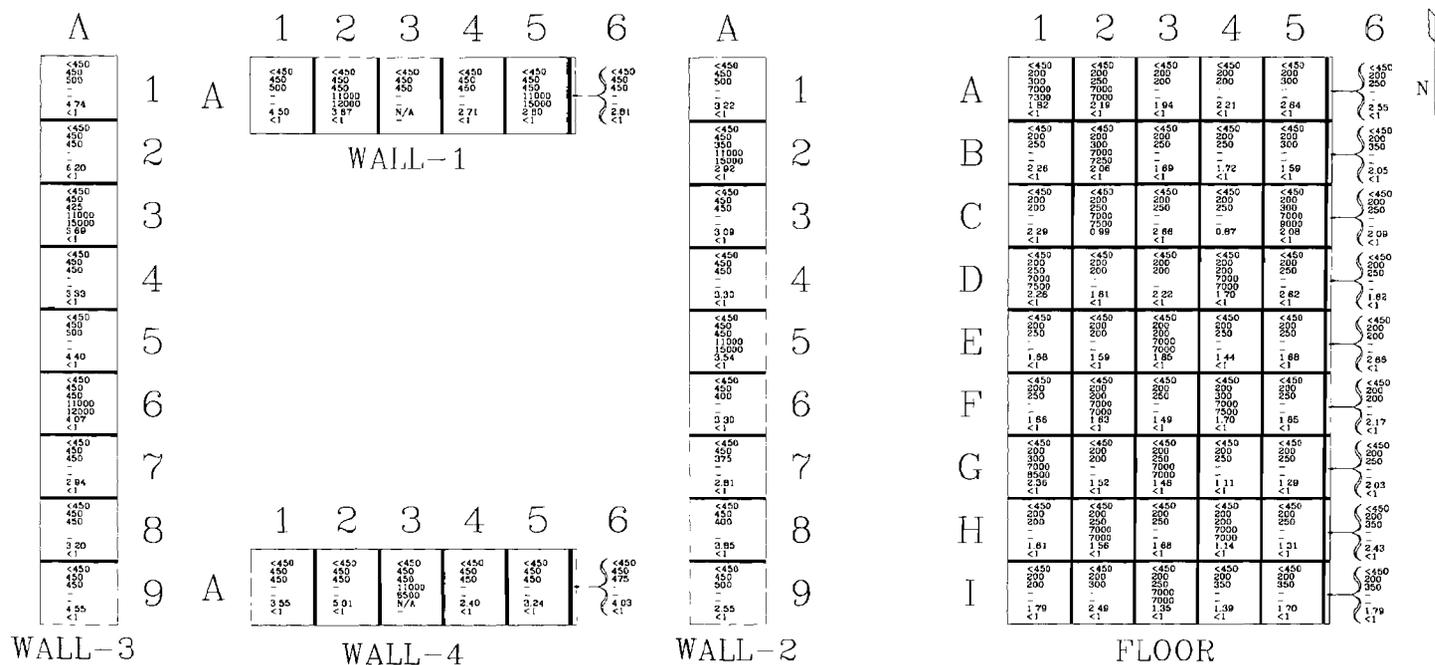
3.12 Bldg. 95

d. Overall Grid Map



3.12 Bldg. 95

e. Localized Grid Maps



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

3.12 Bldg. 95

f. Prior To Survey Photographs

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North entrance facing southwest, 1994

3.12 Bldg. 95

f. Prior To Survey Photographs

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Interior facing south wall, 1994  
(Miscellaneous non-nuclear equipment)

3.12 Bldg. 95

g. During Survey Photographs

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Interior, viewing south wall, 1994.

3.12 Bldg. 95

h. After Survey Photographs

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Interior, facing south entrance, 1994.

**3.13 Bldg. 96****a. Introduction:**

Building 96 is located on Eleventh Street of the Charleston Naval Base. This building is located in grid D-10 of the Charleston Naval Shipyard map (Figure 9 of Vol. II A.). It was constructed in 1943 during World War II expansion of the Charleston Naval Shipyard. It was constructed as a support building to facilitate operations involving the Destroyer Escort Program in the South Yard.

**(1) Description:**

Building 96 is a single-story utility building that faces northwest off River Road. It has a rectangular plan and is 46 feet long by 27 feet wide. It has one structural bay on the northwest elevation and four structural bays along each side. The building is constructed of concrete block tiers with a concrete slab floor. There is a sump area below the floor slab which is accessible through metal covered holes in the floor. The exterior walls are clad with painted concrete blocks. The roof is a flat concrete slab with a metal ventilator. The main entry consists of large paired metal hinged doors.

**(2) Brief History:**

(a) **Use:** This building was initially used as a support facility for the construction of Destroyer Escorts in Dry Docks 3 and 4. However building 96 was later used for storage of radioactive material while radiological work was performed in Dry Docks 3 and 4.

(b) **Radiological History:** There is no history of loose surface contamination levels greater than  $450 \mu\text{Ci}/100\text{cm}^2$  in this structure.

**(3) Survey Requirements:**

Group 3 Survey.

**b. Discussion:**

Building 96 is categorized as a Group 3 building. Group 3 refers to radioactive material storage areas with potential for low levels of contamination less than  $1000 \mu\text{Ci}/100\text{cm}^2$ .

The floors were divided into approximately fifty-four, 5' by 5' grids. The walls were divided into approximately thirty, 5' by 6' grids. Each grid was identified with its unique designation.

One hundred percent of all grids were surveyed with the IM-247/PD and the IM-

**3.13 Bldg. 96**

253/PD (HV-1 PHA). Then minimum of twenty-five percent of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each floor and wall grid.

A total of eighty-four solid material samples were taken. Each solid material sample taken was removed from the grid location indicating 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.

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

Two different construction materials, providing different background radiation levels, were present in the areas surveyed in Building 96. The results are that several different background levels exist in Building 96, because of the variation in the natural radioactivity among the concrete slab floor and concrete block walls. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete slab floor were 60, 200 and 7000 counts per minute respectively, based upon background radiation levels obtained from Building 81. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete block walls were 80, 450 and 11000 counts per minute respectively, based upon background radiation levels obtained from Building 81.

The sump area under Building 96 was not used for the storage of radioactive material. Furthermore there is no history of radioactive liquids or loose surface contamination spills in this structure and thus no contamination would be present below the floor level. Therefore surveys in the sump area were 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) detected one area greater than or equal to twice background.

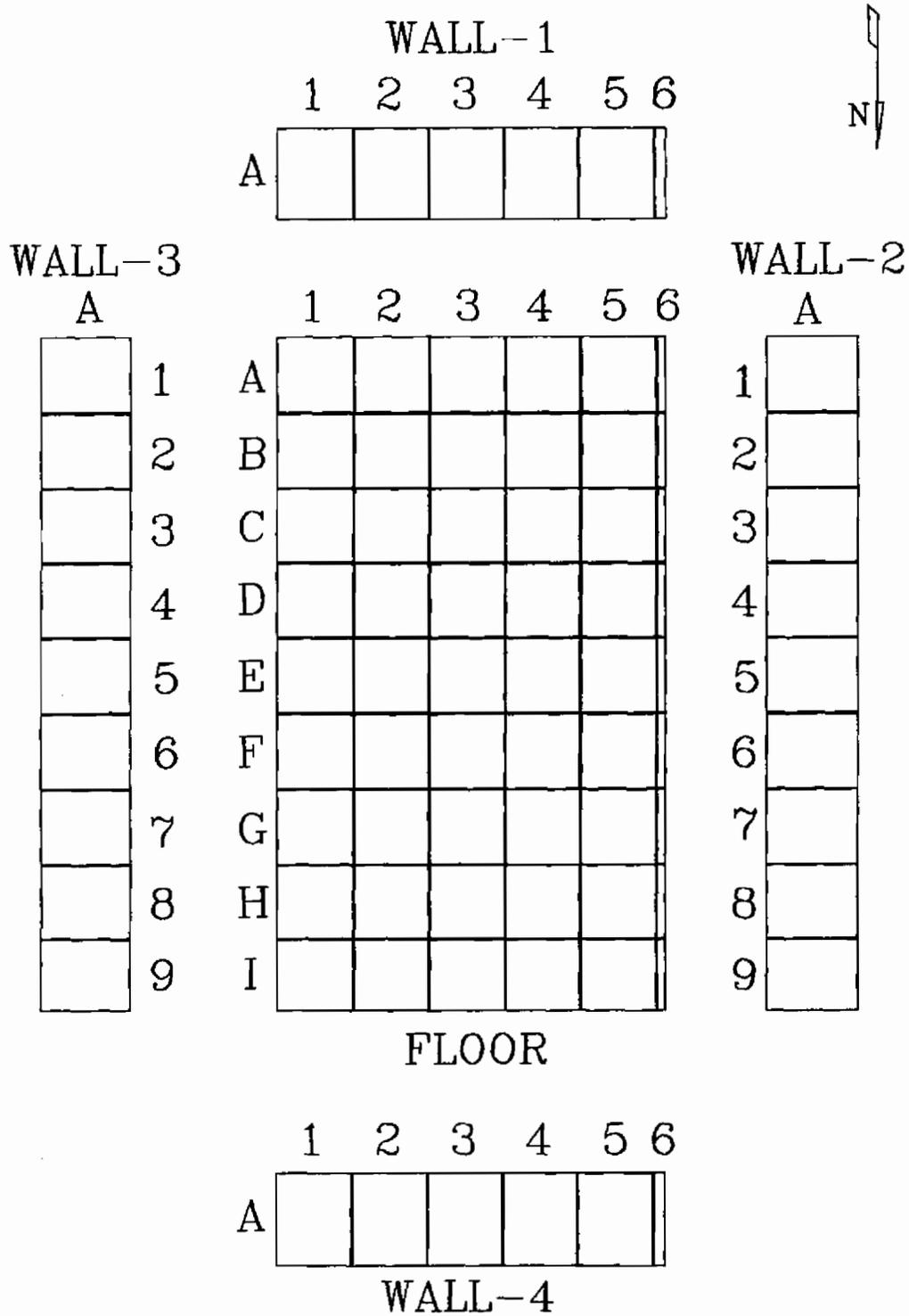
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.69 pCi/g to a high of 6.64 pCi/g with an average of 2.36 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.

3.13 Bldg. 96

d. Overall Grid Map





3.13 Bldg. 96

f. Prior To Survey Photographs

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Exterior, viewing south entrance.

3.13 Bldg. 96

h. After Survey Photographs

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Interior, facing North wall.

3.13 Bldg. 96

h. After Survey Photographs

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Interior, viewing south and east walls.

**3.14 Bldg. 177, Contaminated Work Room****a. Introduction:**

Building 177 is located in grid C-6 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

The contaminated work room is located on the fourth floor of the building. This room is approximately 10' wide by 20' long and 12' high. The walls are concrete block and the floor is painted concrete. The ceiling is concrete.

**(2) Brief History:**

(a) **Use:** This room was used to perform contaminated work such as decontamination of instruments.

(b) **Radiological History:** A number of radioactive sources have been stored in this area. The isotopes contained in these sources follow: Cs-137, Tc-99, and Co-60. Contamination levels were maintained less than 450  $\mu\text{Ci}/100 \text{ cm}^2$ .

**(3) Survey Requirements:**

(a) Group 3 survey.

**b. Discussion:**

The contaminated work room was divided into 24 grids; there were 10 floor grids and 14 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 24 solid material samples were taken. 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 the contaminated work room. Due to variations in natural radioactivity among construction materials, different background levels exist. For the concrete floor, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 40, 200, and 5000

**3.14 Bldg. 177, Contaminated Work Room**

counts per minute were based on radiation levels obtained from Building 21. For the concrete block walls, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 40, 150, and 4000 counts per minute were based on background radiation levels obtained from Building 185.

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) detected four areas greater than or equal to twice background.

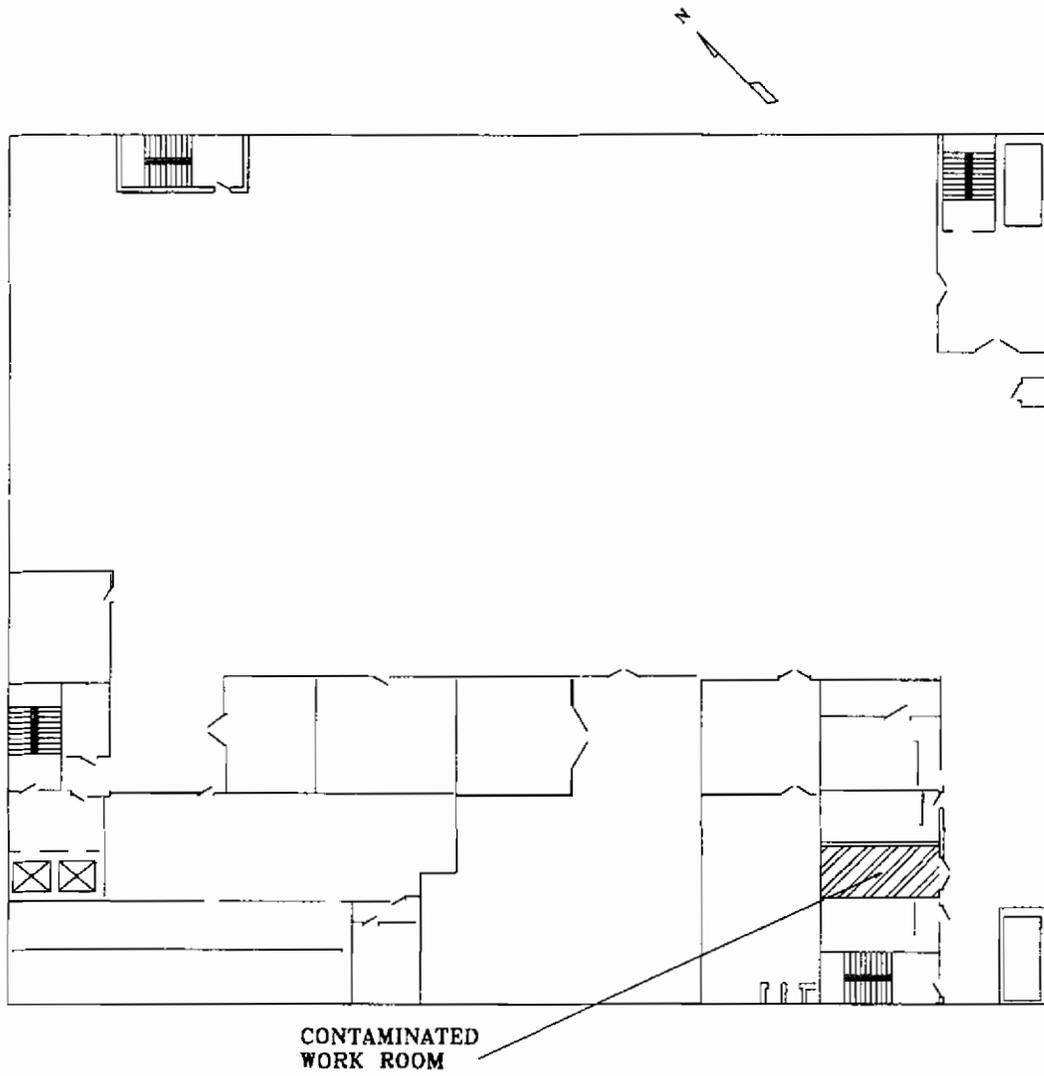
Surveys performed with the IM-253/PD (HV-2 GROSS) detected one area greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.63 pCi/g to a high of 3.84 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.

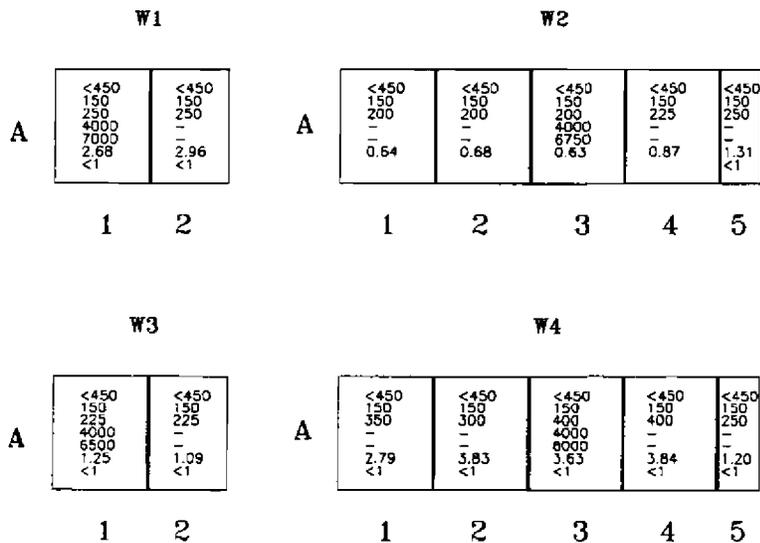
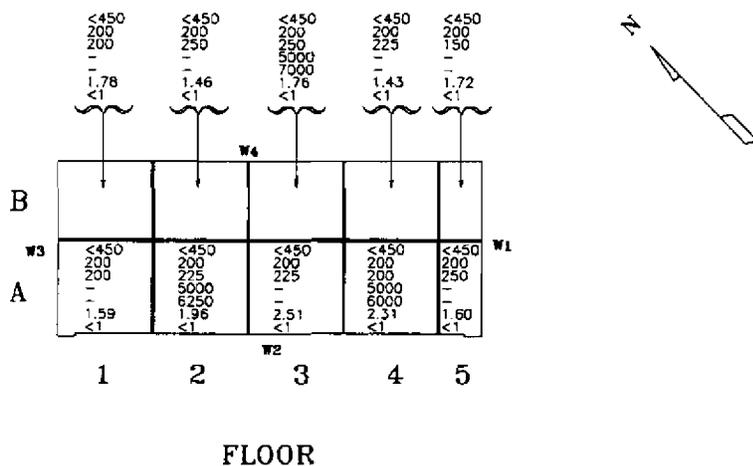
3.14 Bldg. 177, Contaminated Work Room

d. Site Map



3.14 Bldg. 177, Contaminated Work Room

e. Localized Grid Maps



**Sample Data**  
 <450 – IM-247/PD Results [µCi/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 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]

3.14 Bldg. 177, Contaminated Work Room

f. Prior Photograph, Contaminated Work Room

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Looking northwest into room

3.14 Bldg. 177, Contaminated Work Room

f. Prior Photograph, Contaminated Work Room

---



Looking northwest into room

3.14 Bldg. 177, Contaminated Work Room

g. After Photograph, Contaminated Work Room

---



Looking northwest into room

**3.15 Building 177, Electronics Shop and Storage Cage**

The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 175, and 4500 counts per minute for the concrete floors and walls were based on radiation levels obtained from building 1724.

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) 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 low of 0.56 pCi/g to a high of 3.64 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. The one paint sample taken from the Electronics Shop grid W2-A30 indicated less than 3 pCi/g.

### 3.15 Building 177, Electronics Shop and Storage Cage

#### a. Introduction:

Building 177 is located in grid C-6 of the Charleston Naval Shipyard map (Figure 10).

#### (1) Description:

The Electronics Shop and Storage Cage Area is located on the second floor of Building 177.

#### (2) Brief History:

(a) **Use:** The shipyard's electronics work was performed in this area. The storage cage has regularly been used to store radioactive material.

(b) **Radiological History:** The Storage Cage was established as a radioactive material storage area. Although the electronics shop had never been established as a radiological work area, in 1968 a spread of contamination of several thousand  $\mu\text{Ci}/100\text{cm}^2$  was traced to this area. The spread of radioactivity originated from a contaminated boroscope stored in this area. The area was decontaminated to less than  $450 \mu\text{Ci}/100 \text{cm}^2$ .

#### (3) Survey Requirements:

(a) Group 3 survey.

#### b. Discussion:

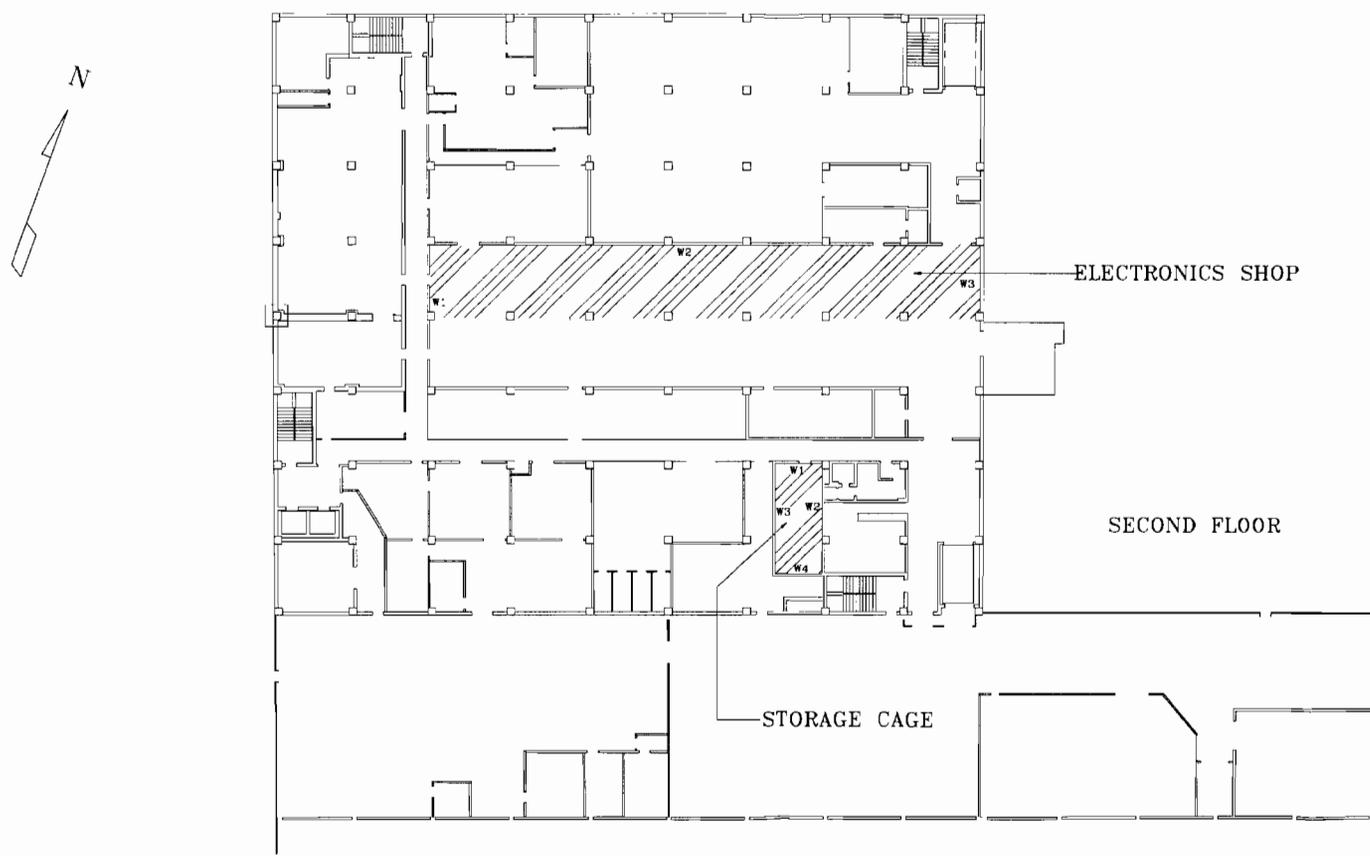
The floors of the Electronics Shop and Storage Cage, were divided into 199 grids, 142 floor grids and 57 wall grids. The floor grids were approximately 5' by 5' and the wall grids were approximately 5' wide by 6' high. Each grid had its own unique designator.

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 199 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.

3.15 Building 177, Electronics Shop and Storage Cage

d. Site Map



3.15 Building 177, Electronics Shop and Storage Cage

e. Localized Grid Maps

D	<450 175 200 -- -- 1.80 <.1	<450 175 200 -- -- 1.34 <.1	<450 175 200 -- -- 1.88 <.1	<450 175 200 -- -- 1.76 <.1	<450 175 200 -- -- 1.46 <.1	<450 175 200 -- -- 1.70 <.1	<450 175 200 -- -- 1.73 <.1	<450 175 200 -- -- 1.88 <.1	<450 175 200 -- -- 1.83 <.1	<450 175 200 -- -- 1.60 <.1	<450 175 200 -- -- 1.70 <.1	<450 175 200 -- -- 1.66 <.1	<450 175 200 -- -- 1.41 <.1	<450 175 200 -- -- 1.27 <.1	<450 175 200 -- -- 1.57 <.1
C	<450 175 150 4500 4500 1.37 <.1	<450 175 150 4500 4500 1.95 <.1	<450 175 125 4500 4500 1.78 <.1	<450 175 150 125 -- 1.36 <.1	<450 175 125 150 -- 1.56 <.1	<450 175 125 150 -- 2.32 <.1	<450 175 125 150 -- 2.02 <.1	<450 175 125 150 -- 1.73 <.1	<450 175 200 4500 4500 <.1	<450 175 200 4500 4500 1.57 <.1	<450 175 200 4500 4500 1.94 <.1	<450 175 200 4500 4500 2.03 <.1	<450 175 200 4500 4500 1.65 <.1	<450 175 200 4500 4500 1.19 <.1	<450 175 200 4500 4500 1.27 <.1
B	<450 175 200 -- -- 1.22 <.1	<450 175 250 200 -- 1.38 <.1	<450 175 200 200 -- 1.34 <.1	<450 175 200 200 -- 1.65 <.1	<450 175 150 225 -- 1.70 <.1	<450 175 150 225 -- 1.68 <.1	<450 175 150 225 -- 1.65 <.1	<450 175 150 225 -- 1.58 <.1	<450 175 200 200 -- 1.54 <.1	<450 175 200 200 -- 2.14 <.1	<450 175 200 200 -- 1.91 <.1	<450 175 200 200 -- 1.41 <.1	<450 175 200 200 -- 2.13 <.1	<450 175 200 200 -- 1.25 <.1	<450 175 200 200 -- 1.60 <.1
A	<450 175 200 4500 4500 1.46 <.1	<450 175 200 4500 4500 0.96 <.1	<450 175 200 4500 4500 1.2 <.1	<450 175 200 4500 4500 1.93 <.1	<450 175 200 4500 4500 2.15 <.1	<450 175 200 4500 4500 1.47 <.1	<450 175 200 4500 4500 1.75 <.1	<450 175 200 4500 4500 1.79 <.1	<450 175 200 4500 4500 1.50 <.1	<450 175 200 4500 4500 1.89 <.1	<450 175 200 4500 4500 2.01 <.1	<450 175 200 4500 4500 1.26 <.1	<450 175 200 4500 4500 1.36 <.1	<450 175 200 4500 4500 0.99 <.1	<450 175 200 4500 4500 1.25 <.1
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

FLOOR  
ELECTRONICS SHOP

Sample Data  
 <450 - IM-247/PD Results [ $\mu$ C/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 Eq. Co-60 [pCi/g]  
 <.1 - MCA Specific Co-60 Results [pCi/g]

3.15 Building 177, Electronics Shop and Storage Cage

e. Localized Grid Maps

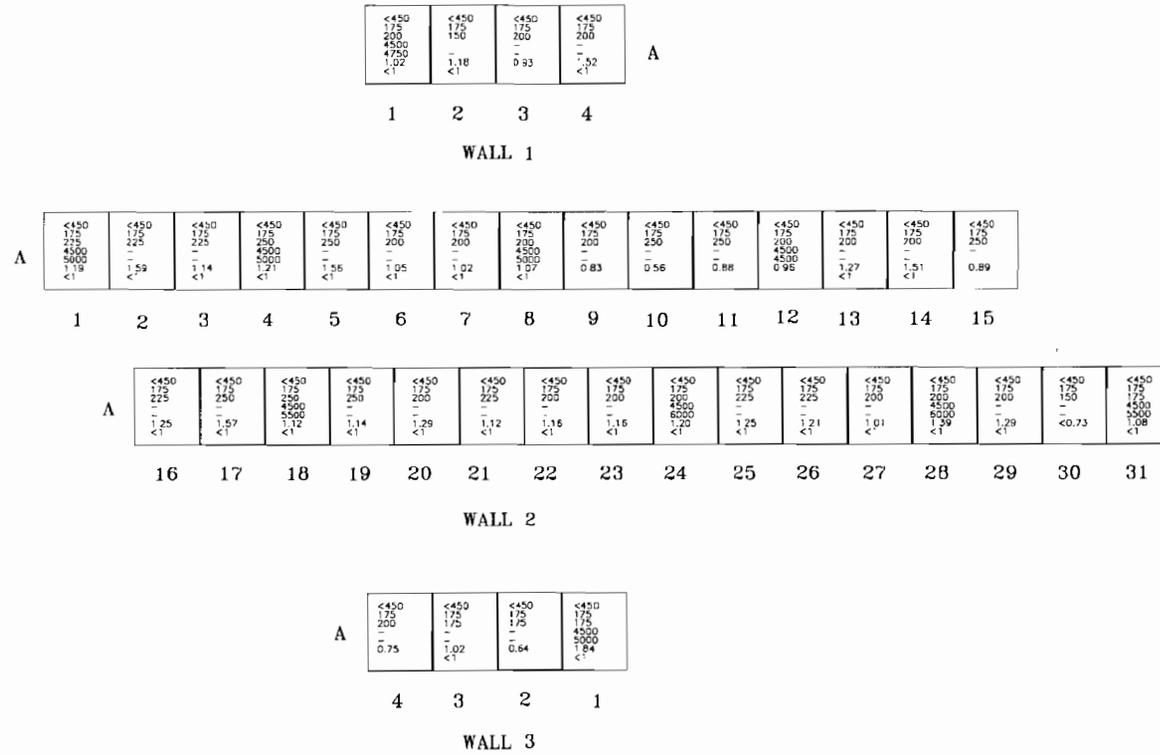
D	<450 175 150 — — 1.24 <1	<450 175 200 — 4500 1.19 <1	<450 175 200 — 4500 1.19 <1	<450 175 150 — — 1.35 <1	<450 175 150 — — 1.32 <1	<450 175 200 — — 1.01 <1	<450 175 200 — — 1.07 <1	<450 175 200 — — 1.15 <1	<450 175 150 — — 1.21 <1	<450 175 200 — — 1.03 <1	<450 175 200 — — 1.50 <1	<450 175 200 — — 0.91 <1	<450 175 175 — 4500 1.43 <1	<450 175 200 — — 1.94 <1	<450 175 200 — — 1.30 <1	<450 175 200 — — 1.25 <1
C	<450 175 200 — 4500 1.18 <1	<450 175 200 — — 1.46 <1	<450 175 200 — — 1.37 <1	<450 175 200 — — 1.12 <1	<450 175 150 — 4500 1.49 <1	<450 175 150 — — 1.77 <1	<450 175 175 — 4500 1.93 <1	<450 175 400 — — 1.48 <1	<450 175 200 — 4500 1.93 <1	<450 175 200 — 4500 2.07 <1	<450 175 200 — — 1.29 <1	<450 175 200 — — 1.09 <1	<450 175 200 — — 1.81 <1	<450 175 225 — — 2.02 <1	<450 175 200 — — 1.94 <1	<450 175 200 — — 1.70 <1
B	<450 175 200 — — 1.19 <1	<450 175 200 — — 1.16 <1	<450 175 200 — — 1.21 <1	<450 175 200 — — 1.08 <1	<450 175 175 — — 1.35 <1	<450 175 200 — — 1.81 <1	<450 175 200 — — 1.82 <1	<450 175 200 — — 2.33 <1	<450 175 175 — — 1.55 <1	<450 175 175 — — 1.72 <1	<450 175 175 — — 1.09 <1	<450 175 200 — — 1.23 <1	<450 175 200 — — 1.51 <1	<450 175 200 — — 1.68 <1	<450 175 200 — — 2.04 <1	<450 175 200 — — 1.09 <1
A	<450 175 125 — — 0.83 <1	<450 175 200 — 4500 1.82 <1	<450 175 150 — — 1.40 <1	<450 175 150 — 3500 1.20 <1	<450 175 175 — — 1.18 <1	<450 175 150 — 4000 1.33 <1	<450 175 150 — — 1.11 <1	<450 175 175 — — 1.60 <1	<450 175 200 — 4250 1.09 <1	<450 175 200 — — 1.09 <1	<450 175 175 — 4500 1.36 <1	<450 175 175 — — 1.12 <1	<450 175 175 — 4500 1.48 <1	<450 175 175 — — 1.39 <1	<450 175 200 — — 1.39 <1	<450 175 200 — — 1.92 <1
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

FLOOR  
ELECTRONICS SHOP

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 Eq. Co-60 [pCi/g]  
 <1 – MCA Specific Co-60 Results [pCi/g]

3.15 Building 177, Electronics Shop and Storage Cage

e. Localized Grid Maps



**Note**  
Sample taken from grid W2-A30 consisted 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) [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]

3.15 Building 177, Electronics Shop and Storage Cage

e. Localized Grid Maps

1	<450 175 200 4500 1.15 5.1	<450 175 200 — — 0.94	<450 175 200 — — 1.06
2	<450 175 200 — 1.00 5.1	<450 175 225 — 1.46 5.1	<450 175 200 4500 4500 1.23
3	<450 175 200 — 1.87 5.1	<450 175 200 4500 1.90 5.1	<450 175 200 — 1.27 5.1
4	<450 175 200 4500 1.12 5.1	<450 175 200 — — 0.98	<450 175 200 — 2.30 5.1
5	<450 175 200 — 1.09 5.1	<450 175 200 4500 1.76 5.1	<450 175 200 — 1.82 5.1
6	<450 175 225 — 1.26 5.1	<450 175 200 — 1.80 5.1	<450 175 200 — 3.04 5.1
	A	B	C

FLOOR  
STORAGE CAGE

A	<450 175 200 — 0.62	<450 175 200 4500 0.90	<450 175 200 — 2.21 5.1
	1	2	3

WALL 1

A	<450 175 200 — 1.97 5.1	<450 175 200 — 0.80	<450 175 225 — 6000 1.08 5.1	<450 175 200 — 1.59 5.1	<450 175 200 — 1.38 5.1	<450 175 200 — 0.80
	1	2	3	4	5	6

WALL 2

A	<450 175 200 — 1.19 5.1	<450 175 200 — 1.25 5.1	<450 175 200 4500 1.16 5.1
	3	2	1

WALL 3

A	<450 175 200 — 1.12 5.1	<450 175 200 4500 0.66	<450 175 175 — 0.85	<450 175 150 — 0.99	<450 175 200 4500 1.51 5.1	<450 175 200 — 0.74
	6	5	4	3	2	1

WALL 4

Sample Data  
 <450 - IM-247/PD Results [ $\mu\text{Ci}/20\text{cm}^2$ ]  
 200 - IM-253/PD (HV-1 PHA) [Bq/l]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq/l]  
 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 [ $\mu\text{Ci/g}$ ]

3.15 Building 177, Electronics Shop and Storage Cage

f. Prior Photograph



Shop Area, viewing northeast.

3.15 Building 177, Electronics Shop and Storage Cage

g. After Photograph

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Shop area, viewing east.

**3.16 Bldg. 177, Vent Fan Work Areas****a. Introduction:**

Building 177 is located in grid C-6 of the Charleston Naval Shipyard map (figure 10). There were two vent fan work areas located on the first floor of Building 177, in the South Bay area.

**(1) Description:**

Each of the Building 177 Vent Fan Work Areas encompassed an area approximately 20' by 20'. Vent Fan Work Area Number One was located along the south wall of the South Bay area. This area has a concrete floor. Vent Fan Work Area Number Two was located in the east corner of the work room directly across work area number one. This area has a tile covered concrete floor.

**(2) Brief History:**

- (a) Use:** These areas were regularly used to repair and balance contaminated vent fans.
- (b) Radiological History:** When a potentially contaminated fan was present in the work area, a CSCA was established in the room. Loose surface contamination levels were maintained less than  $450\mu\text{Ci}/100\text{cm}^2$ .

**(3) Survey Requirements:**

- (a)** Group 3 survey in the work area.

**b. Discussion:**

Building 177 Vent Fan Work Areas were used as maintenance areas for potentially contaminated components. Vent Fan Work Areas One and Two were divided into 16 floor grids per area. Each floor grid was approximately 5' by 5' where physically possible. Each grid has its own unique designator.

100 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 each floor grid.

A total of 32 solid material samples were taken from the two work areas. Each solid material sample was taken from the grid location indicating the highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material sampled: lead 212 and lead 214.

For the floor of the Building 177 Vent Fan Work Area Number One, an IM-

**3.16 Bldg. 177, Vent Fan Work Areas**

247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 200 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 4500 counts per minute were based on radiation levels obtained from the concrete floor of Building 21.

For the floor of the Building 177 Vent Fan Work Area Number Two, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 150 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 4000 counts per minute were based on radiation levels obtained from the concrete floor of Building 1605.

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.

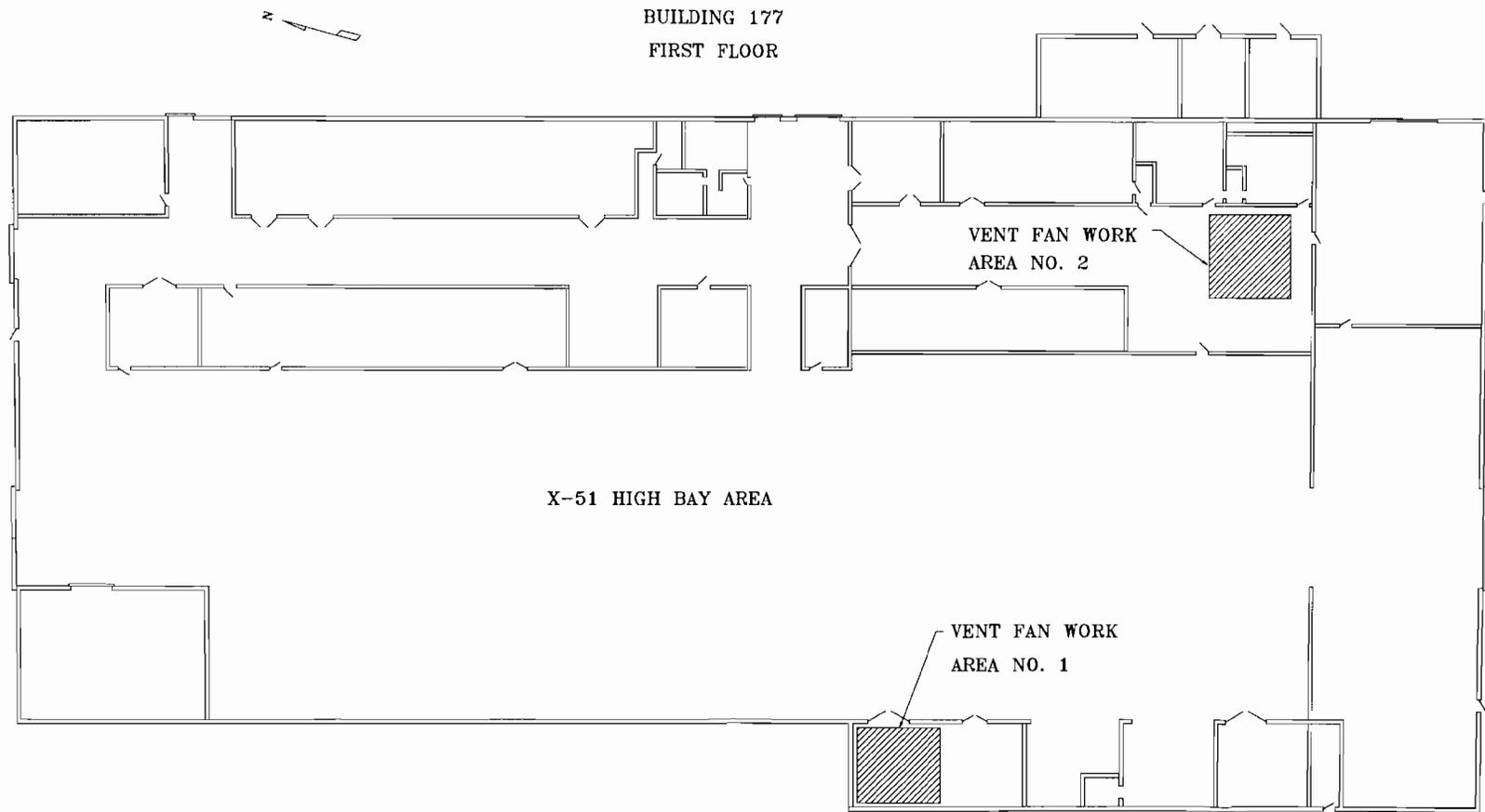
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than a minimum detectable activity of 0.23 pCi/g to a high of 3.19 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.

3.16 Bldg. 177, Vent Fan Work Areas

d. Site Map



3.16 Bldg. 177, Vent Fan Work Areas

e. Localized Grid Maps

GRID MAP  
VENT FAN WORK  
AREA NO. 1

	<450 700 350 — 2.08 <1	<450 200 200 — 0.90	<450 200 200 — 1.31 <1	<450 200 200 4500 4500 2.46 <1
4				
3	<450 200 350 — 2.16 <1	<450 200 150 4500 — 1.19 <1	<450 200 200 4500 — 1.05 <1	<450 200 200 — 2.24 <1
2	<450 700 350 — 1.74 <1	<450 200 100 — 1.08 <1	<450 200 200 4500 4500 1.15 <1	<450 200 200 — 2.81 <1
1	<450 200 350 4500 8500 1.92 <1	<450 350 375 — 3.19 <1	<450 200 200 — 1.16 <1	<450 200 150 — 1.10 <1
	A	B	C	D



GRID MAP  
VENT FAN WORK  
AREA NO. 2

	<450 150 200 — <0.36	<450 150 150 — <0.25	<450 150 150 — <0.23	<450 150 150 4000 4500 <0.35
4				
3	<450 150 150 — <0.34	<450 150 250 4500 — <0.24	<450 150 250 — <0.28	<450 150 175 — 0.31
2	<450 150 150 — <0.41	<450 150 50 — 0.25	<450 150 175 4000 3250 <0.28	<450 150 150 — <0.25
1	<450 150 200 4000 5000 <0.26	<450 150 200 — <0.24	<450 150 150 — <0.24	<450 150 150 — <0.24
	A	B	C	D

**Sample Data**  
 <450 – IM-24/FPD 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 Et. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 – MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3.16 Bldg. 177, Vent Fan Work Areas

f. Prior Photograph

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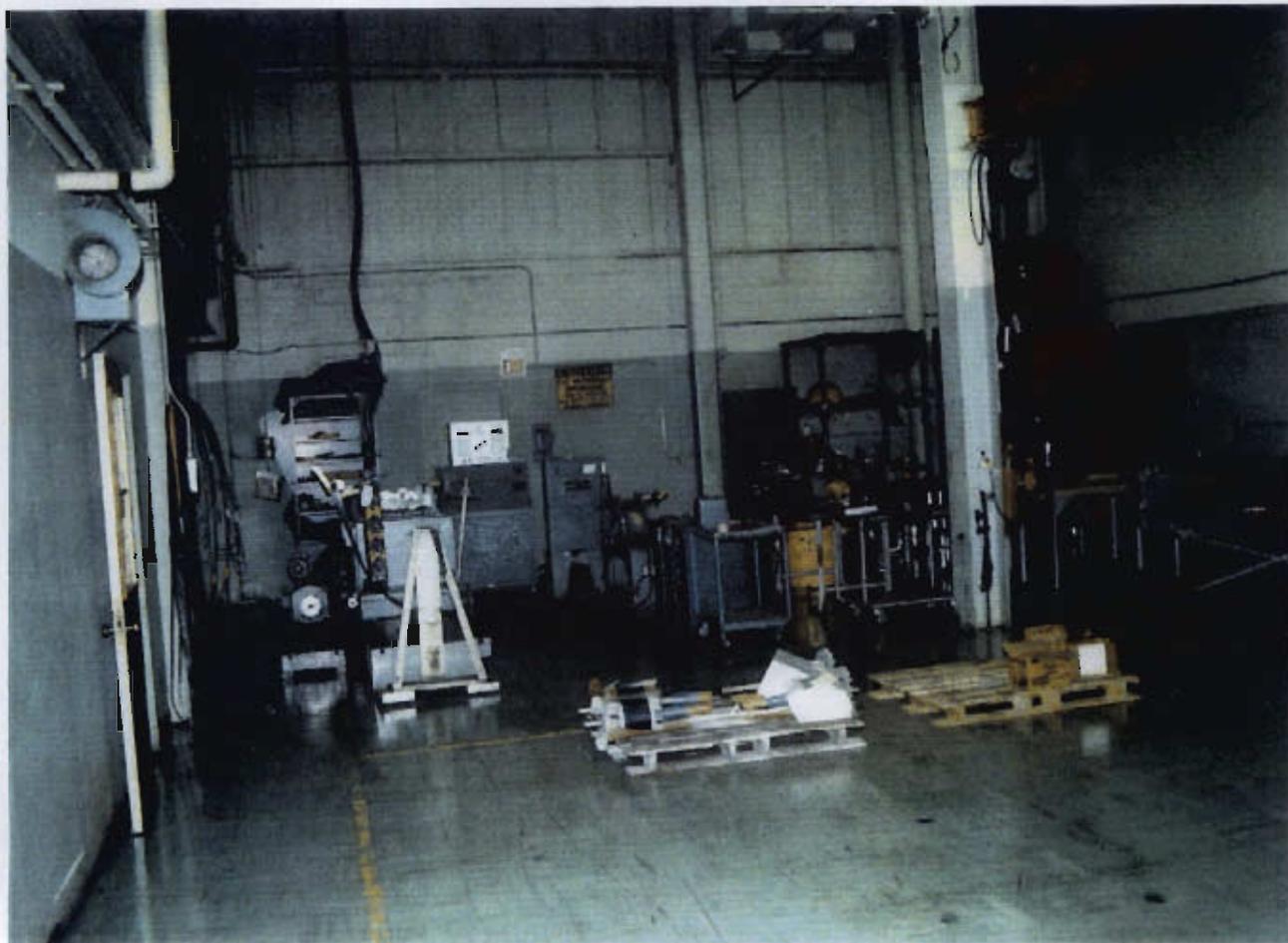


Building 177 Vent Fan Work Area Number One

3.16 Bldg. 177, Vent Fan Work Areas

f. Prior Photograph

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Building 177 Vent Fan Work Area Number Two

3.16 Bldg. 177, Vent Fan Work Areas

g. After Photograph

---



Building 177 Vent Fan Work Area Number One

3.16 Bldg. 177, Vent Fan Work Areas

g. After Photograph

---



Building 177 Vent Fan Work Area Number Two

**3.17 Bldg. 190****a. Introduction:**

Building 190 is located in grid D-8 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

Building 190 is a two story rectangular structure approximately 240' long by 50' wide by 30' high. The building is brick resting on a concrete slab foundation. The Group 2 survey areas consisted of Room 107 on the first floor and Rooms 203 and 223 on the second floor. The Group 3 and 6 survey areas consisted of Rooms 102 and 106. Both rooms are similarly constructed. The west walls are painted concrete block. The other walls are sheet rock. The floors are tile covered concrete. Both rooms have a false ceiling.

**(2) Brief History:**

(a) **Use:** Building 190 housed shipyard and fleet radiological training facilities. Rooms 102 and 106 were used to store and issue instruments used by the Radiation Monitoring Division.

(b) **Radiological History:** Instruments with sources containing quantities of Th 232 and Tc 99 were stored in this area. There was no history of radiological contamination in this area.

**(3) Survey Requirements:**

(a) Group 2 survey: Rooms 107, 203, and 223.

(b) Group 3 and 6 survey: Rooms 102 and 106

**b. Discussion:****Group 2 Areas**

The floors of rooms 107, 203, and 223 were divided into 19 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. 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 for the floors was tile covered concrete. The IM-247/PD and the IM-253/PD(HV-1 PHA and HV-2 GROSS) backgrounds of 40, 200 and 5500 counts per minutes were used based on background radiation levels obtained from Building B-21.

**3.17 Bldg. 190****Group 3 and 6 Areas**

Group 3 survey areas were divided into 47 grids, 21 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 with the exception of room 106 grids W7-A2 and W7-A3 which were unpainted metal.

A total of 45 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: bismuth 40, lead 212, lead 214, and potassium 40.

Individual backgrounds were used for Building 190. Due to variations in natural radioactivity among construction material, different background levels exist. For the tile covered concrete floor in Room 102, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 200, and 5500 counts per minute used were based on radiation levels obtained from Building 664. For the tile covered concrete floor in Room 106, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 50, 250, and 7500 counts per minute used were based on radiation levels obtained from Building 1893. For the block walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 50, 300, and 9000 counts per minute used were based on background radiation levels obtained from Building 21. For the sheetrock walls, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 250, and 7500 counts per minute used were based on background radiation levels obtained from Building M1116.

Group 6 surveys were performed in Room 102 and 106 in accordance with localized survey instructions. A minimum of 25% of the group six 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 2:**

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

**3.17 Bldg. 190**

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

Solid material samples were not required.

**Group 3:**

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 seven 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 0.24 pCi/g to a high of 5.25 pCi/g.

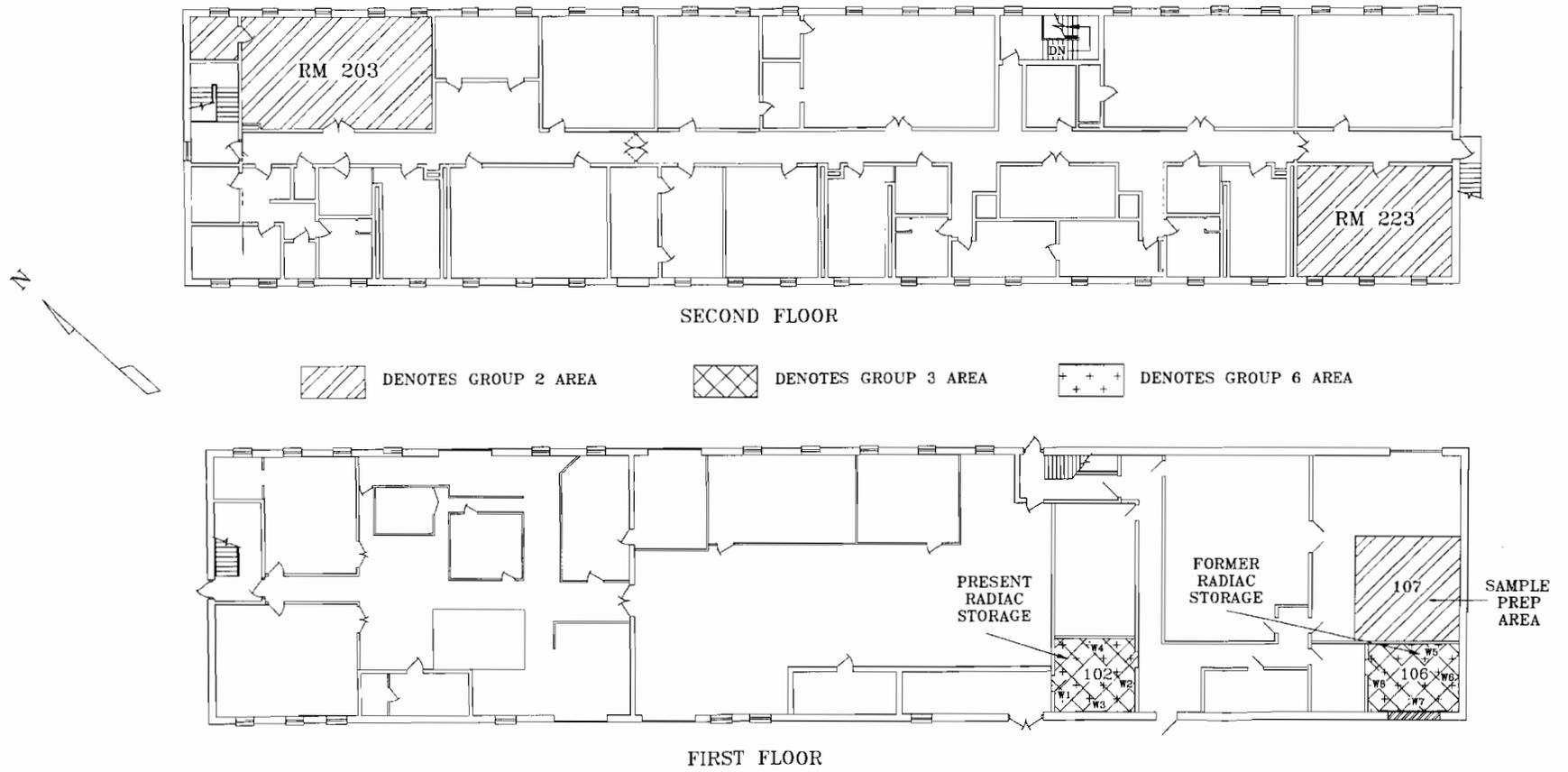
Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples were less than 1 pCi/g. The one paint sample taken from Room 102 grid W4-A2 indicated less than 3 pCi/g.

**Group 6:**

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

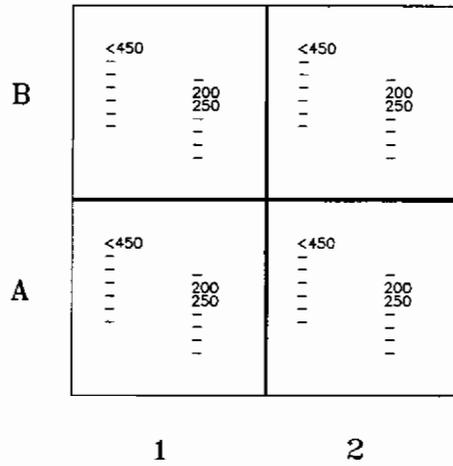
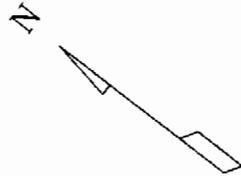
3.17 Bldg. 190

d. Site Map



3.17 Bldg. 190

e. Localized Grid Maps

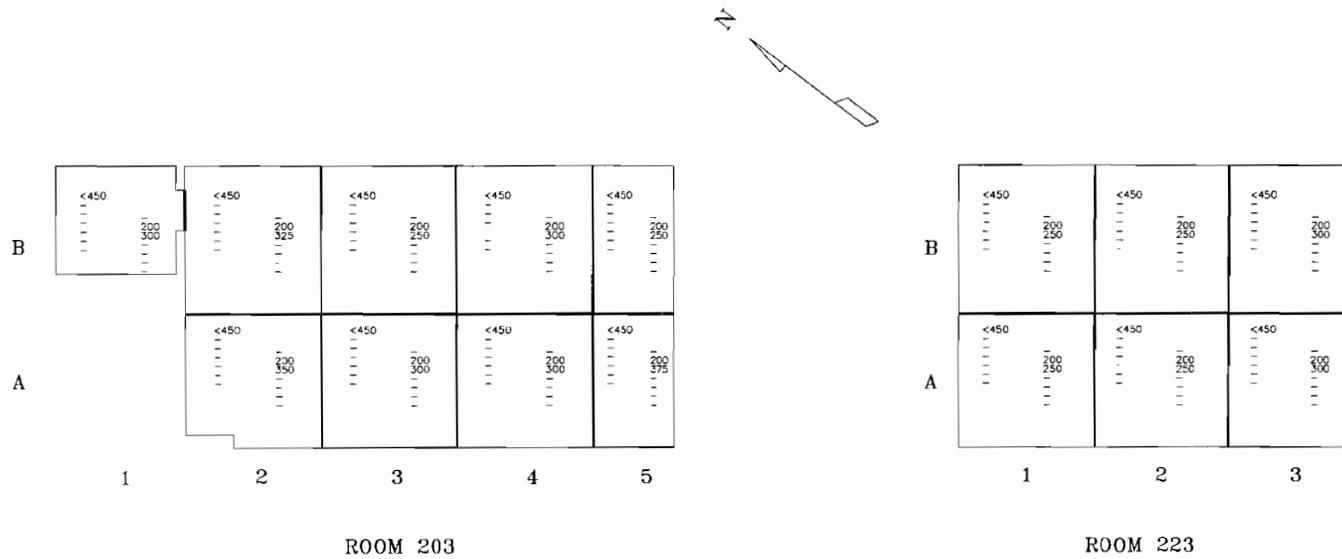


ROOM 107

**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]

3.17 Bldg. 190

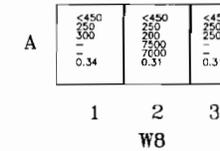
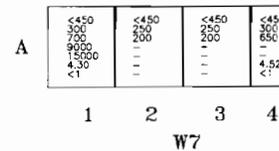
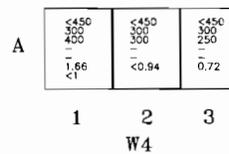
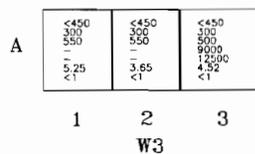
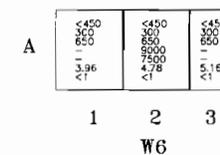
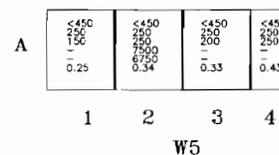
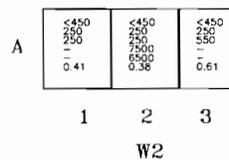
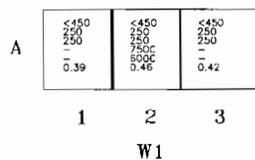
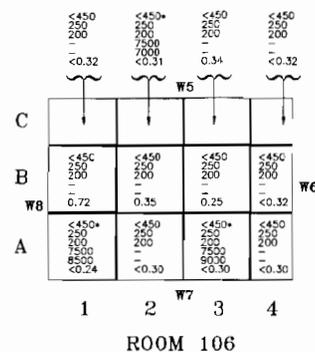
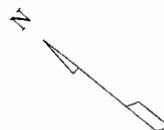
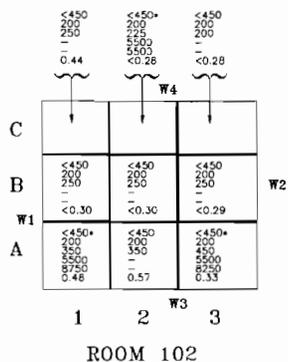
e. Localized Grid Maps



**Sample Data**  
 <450 - IM-241/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]  
 1.82 - MCA Gross Gamma Eq. Co-60 [ $\mu\text{Ci/g}$ ]  
 <1 - MCA Specific Co-60 Results [ $\mu\text{Ci/g}$ ]

3.17 Bldg. 190

e. Localized Grid Maps



**Notes**  
 1 - Sample taken from Room 102 grid W4-A2 consisted of paint and has a limit of 3 pCi/g.  
 2 - \*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-253PD (HV-1 PMA) [Bq.]  
 300 - IM-253PD (HV-1 PMA) [cpm]  
 7000 - IM-253PD (HV-2 GROSS) [Bq.]  
 7300 - IM-253PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3.17 Bldg. 190

f. Prior Photograph

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Room 106, viewing south.

3.17 Bldg. 190

f. Prior Photograph

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Room 107, viewing southwest.

3.17 Bldg. 190

f. Prior Photograph

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Room 223, viewing east.

3.17 Bldg. 190

g. After Photograph

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Room 102, viewing west.

3.17 Bldg. 190

g. After Photograph

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Room 106, viewing south.

3.17 Bldg. 190

g. After Photograph

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Room 107, viewing south.

3.17 Bldg. 190

g. After Photograph

---



Room 203, viewing east.

3.17 Bldg. 190

g. After Photograph

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Room 223, viewing west.

**3.18 Bldg. 217****a. Introduction:**

Building 217 is a concrete building located between Building 13 and Building 187, west of Dry Dock St. in grid D-7 of the Charleston Naval Shipyard map (Figure 10).

**(1) Description:**

Building 217 is approximately 11' wide by 23' long by 12' high. The walls, floor, and ceiling are made of concrete.

**(2) Brief History:**

(a) **Use:** This building was used as a radioactive material storage area in the late 1970s and early 1980s.

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

**(3) Survey Requirements:**

(a) Group 3 survey.

**b. Discussion:**

Building 217 is a Group 3 building. Group 3 is a category of radioactive material storage areas where there was a potential for contamination levels of less than  $1000\mu\text{Ci}/100\text{cm}^2$ .

The floor area was divided into ten grids, 5' by 5' where physically possible. There are ten internal walls in this structure, the walls were divided into twenty grids 6' high by 5' wide where configuration allowed. Each grid has 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 twenty-five percent of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each wall and floor grid.

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

**3.18 Bldg. 217**

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

Individual backgrounds were used for the building walls and floor . For the concrete slab floor of Building 217, an IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 80, 650, and 15000 counts per minute were based on background radiation levels obtained from the concrete slab floor of Building 1079. For the concrete walls of Building 217, an IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 80, 650, and 15000 counts per minute were based on background levels obtained from the concrete block walls of Building 1640.

**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.

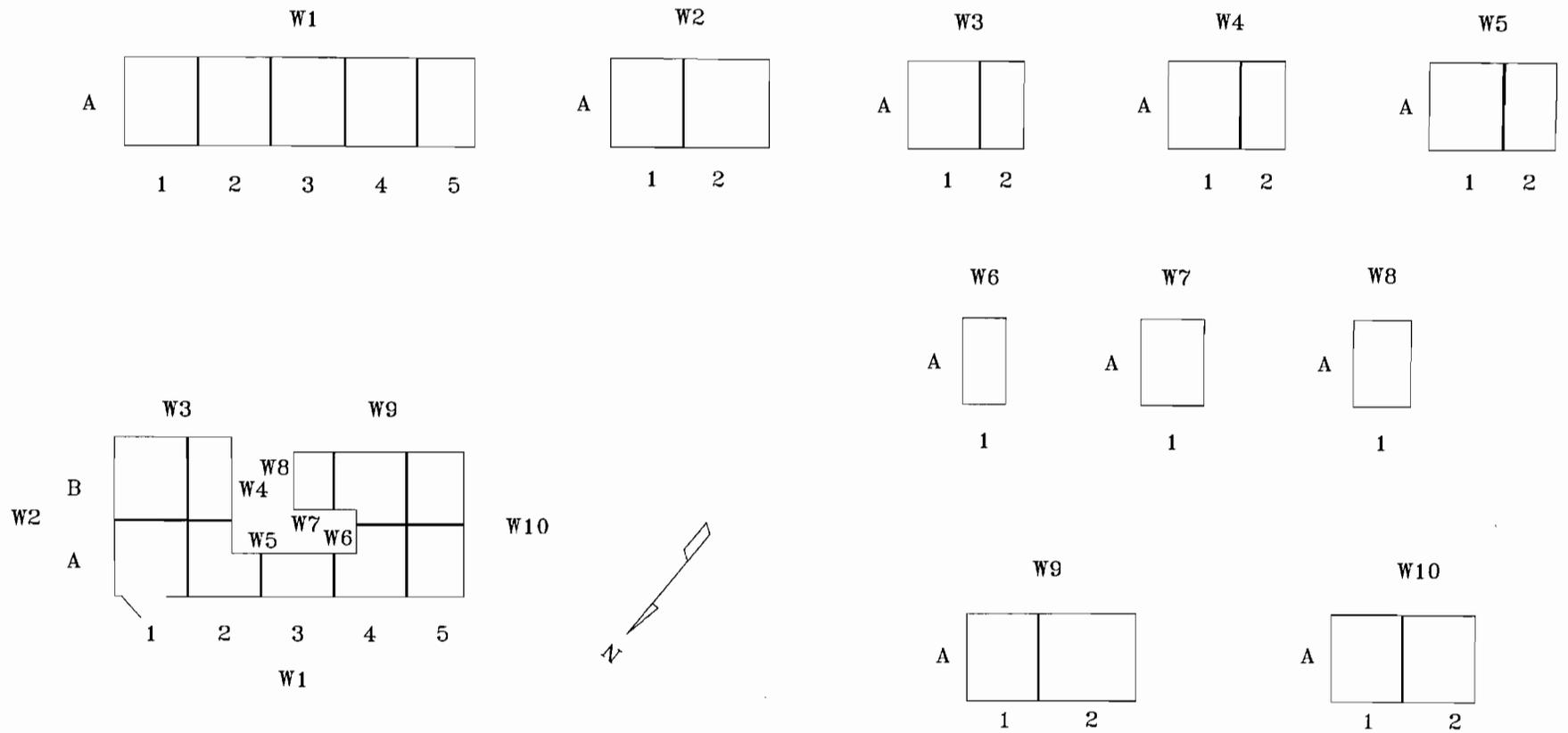
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 1.15 pCi/g to a high of 3.22 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.

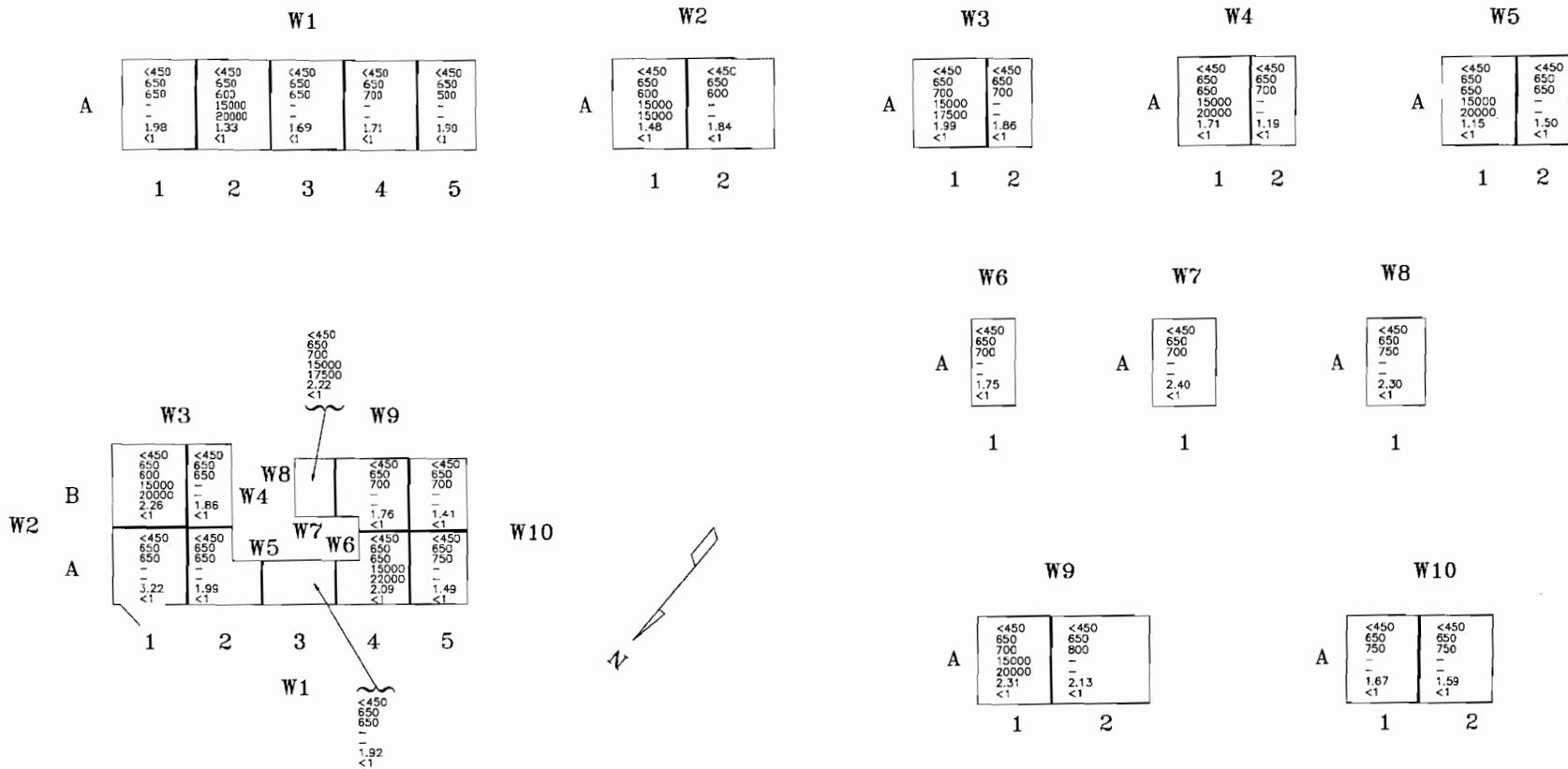
3.18 Bldg. 217

d. Overall Grid Map



3.18 Bldg. 217

e. Localized Grid Maps



**Sample Data**  
 <450 - IM-247/PD Results (µCi/20cm²)  
 200 - IM-253/PD (HV-1 FHA) [Bq/L]  
 300 - IM-253/PD (HV-1 FHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [cpm]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma E<sub>γ</sub> Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]

3.18 Bldg. 217

f. Prior to Photographs

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Building 217 external.

3.18 Bldg. 217

f. Prior to Photographs

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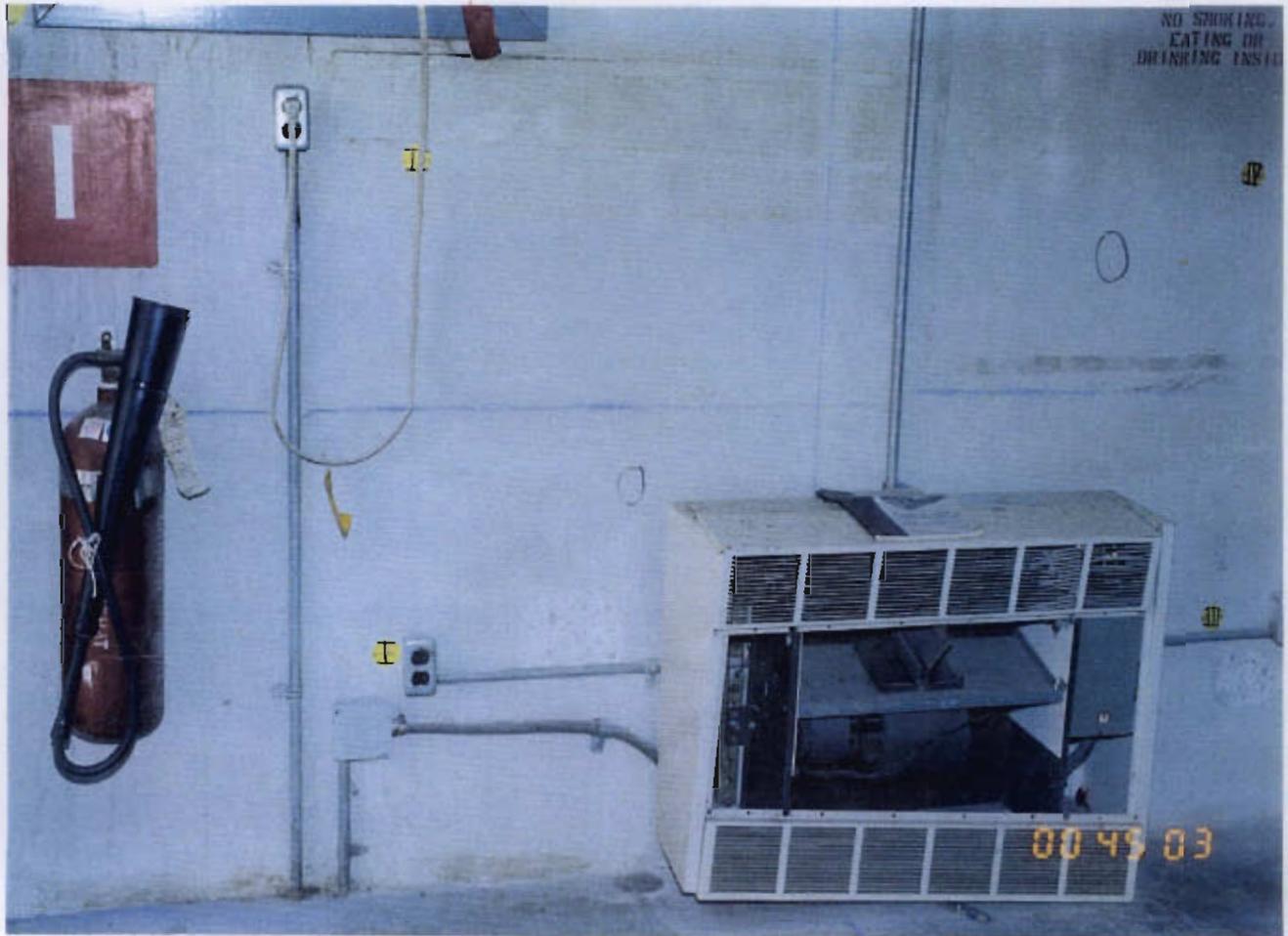


Building 217 internal.

3.18 Bldg. 217

g. After Photographs

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Building 217 internal.

3.18 Bldg. 217

g. After Photographs

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Building 217 Inside View.

**3.19 Bldg. 218****a. Introduction:**

Building 218 is located in grid D-8 of the Charleston Naval Shipyard map (Figure 10). Radioactive material storage areas have been established in the center section of the western half, and in the northeast corner of the building.

**(1) Description:**

This building is 300' long by 130' wide. The ceiling is 60' high in the center and 20' high on the sides. Temporary radiation areas were typically 15' wide by 20' long.

**(2) Brief History:**

(a) **Use:** The west end and the northeast corner of this building were used as radioactive material storage areas for S5W and S6G contaminated refueling equipment.

(b) **Radiological History:** Areas in this building have been established as radiation areas and radioactive material storage areas. Radioactive waste awaiting shipment for disposal was also stored in Building 218. On one occasion material with loose surface contamination levels of several thousand  $\mu\text{Ci}/100\text{cm}^2$  was found. Contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**(3) Survey Requirements:**

(a) Group 3 survey.

**b. Discussion:**

Building 218 floor was divided into 358 grids. The floor grids were approximately 5' by 5'. Each grid had its own unique designator. The turret foundation and metal platform shown on the site map were not included in the survey since radioactive material was never stored on either of these areas.

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 358 solid material samples were taken from Building 218. 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.

**3.19 Bldg. 218**

The construction material present in Building 218 radioactive material storage areas was concrete. For the concrete floor, an IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 150, and 4250 counts per minute were based on background radiation levels obtained from Building 1605.

**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.

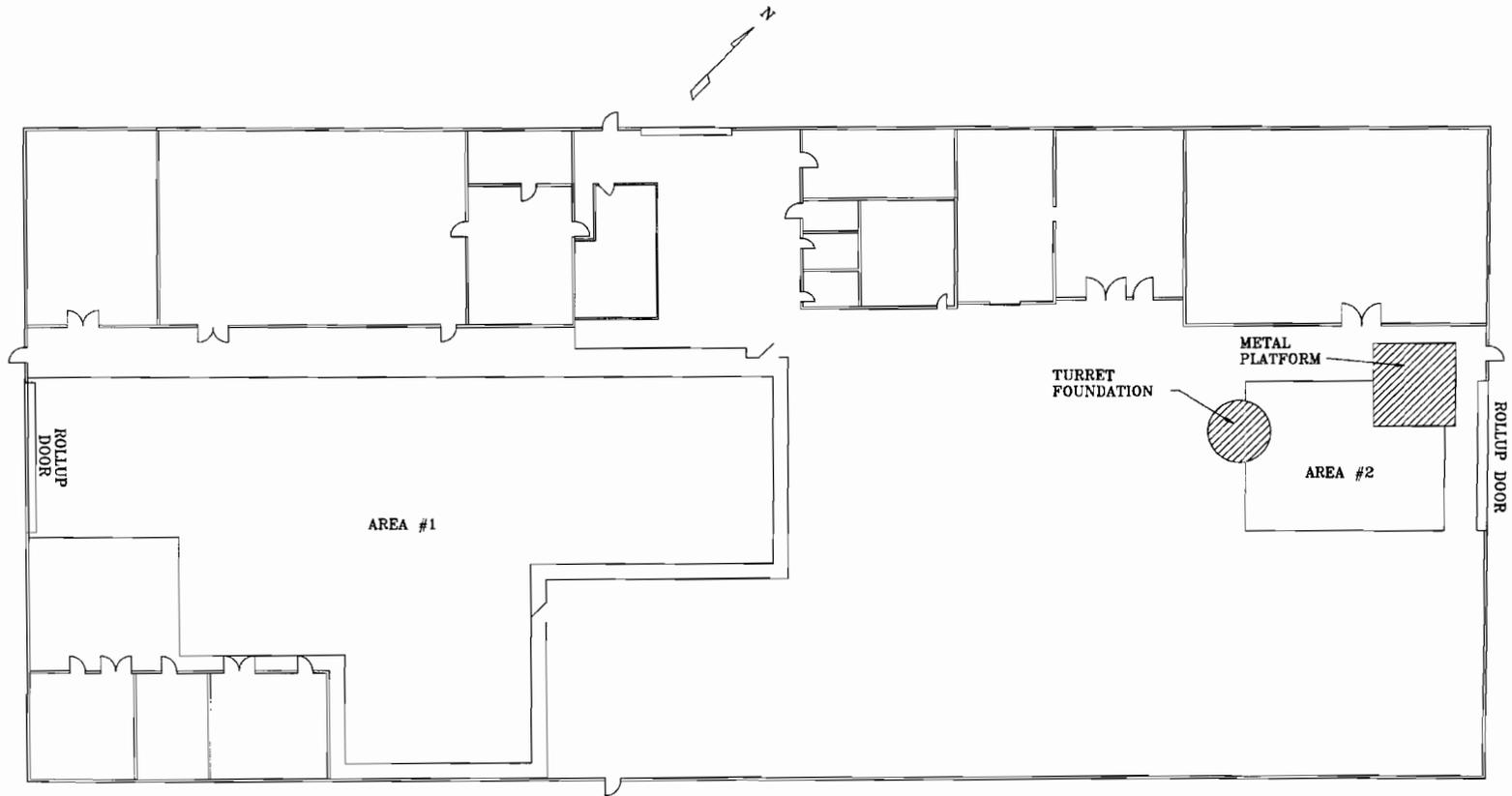
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.43 pCi/g to a high of 2.07 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.

3.19 Bldg. 218

d. Overall Site Map

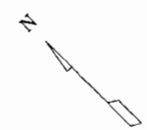


3.19 Bldg. 218

e. Localized Grid Maps

10	<450 150 150 - - 1.10 <1	<450 150 200 - - 1.18 <1	<450 150 150 4250 5500 1.11 <1	<450 150 150 - - 1.27 <1	<450 150 150 100 150 0.92 <1	<450 150 150 - - 0.98 <1	<450 150 150 4250 4000 1.25 <1	<450 150 150 75 - 1.02 <1	<450 150 150 125 - 0.63 <1	<450 150 150 - - 1.47 <1	<450 150 150 4250 4000 1.28 <1	
9	<450 150 150 4250 4500 0.94 <1	<450 150 200 - - 0.94 <1	<450 150 150 - - 0.78 <1	<450 150 150 175 - 0.80 <1	<450 150 150 4250 4000 0.96 <1	<450 150 150 - - <1 <1	<450 150 150 150 - 1.24 <1	<450 150 150 200 - 1.14 <1	<450 150 150 150 4250 4000 0.84 <1	<450 150 150 125 - 1.24 <1	<450 150 150 - - 1.26 <1	<450 150 150 200 - 1.10 <1
8	<450 150 150 - - 1.24 <1	<450 150 200 - - 1.24 <1	<450 150 150 200 4250 5500 1.17 <1	<450 150 150 200 - 1.04 <1	<450 150 150 150 - 1.11 <1	<450 150 150 150 - 0.56 <1	<450 150 150 150 4250 4000 1.12 <1	<450 150 150 175 - 0.98 <1	<450 150 150 250 - 1.04 <1	<450 150 150 125 200 1.27 <1	<450 150 150 200 4250 4500 0.85 <1	
7	<450 150 175 4250 4500 1.15 <1	<450 150 200 - - 0.98 <1	<450 150 150 - - 1.11 <1	<450 150 150 175 - 1.29 <1	<450 150 150 150 4250 4000 1.36 <1	<450 150 150 150 - 0.89 <1	<450 150 150 150 4250 4000 1.12 <1	<450 150 150 200 - 1.15 <1	<450 150 150 200 4250 4500 0.88 <1	<450 150 150 200 - 0.71 <1	<450 150 150 200 - 0.43 <1	<450 150 150 - - 0.76 <1
6	<450 150 150 - - 1.33 <1	<450 150 200 - - 1.02 <1	<450 150 150 4250 5500 0.73 <1	<450 150 150 200 - 0.57 <1	<450 150 150 150 - 1.06 <1	<450 150 150 150 4250 5500 0.68 <1	<450 150 150 150 - 1.01 <1	<450 150 150 200 - 1.01 <1	<450 150 150 200 - 1.01 <1	<450 150 150 200 - 1.01 <1	<450 150 150 200 - 1.01 <1	<450 150 150 200 - 1.01 <1
5	<450 150 200 - - 0.91 <1	<450 150 200 - - 1.11 <1	<450 150 150 - - 2.07 <1	<450 150 150 175 - 1.39 <1	<450 150 150 150 4250 4000 1.01 <1	<450 150 150 150 - 0.65 <1	<450 150 150 150 4250 4000 1.12 <1	<450 150 150 200 - 1.10 <1	<450 150 150 200 - 1.10 <1	<450 150 150 200 - 1.10 <1	<450 150 150 200 - 1.10 <1	<450 150 150 200 - 1.10 <1
4	<450 150 150 4250 4500 0.89 <1	<450 150 200 - - 0.98 <1	<450 150 150 - - 1.30 <1	<450 150 150 175 4250 4500 1.42 <1	<450 150 150 150 - 1.42 <1	<450 150 150 150 4250 4000 0.73 <1	<450 150 150 150 4250 4000 1.35 <1	<450 150 150 200 - 1.42 <1	<450 150 150 200 - 1.42 <1	<450 150 150 200 - 1.42 <1	<450 150 150 200 - 1.42 <1	<450 150 150 200 - 1.42 <1
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2	<450 150 200 - - 1.10 <1	<450 150 200 4250 5000 0.89 <1	<450 150 150 - - 1.84 <1	<450 150 150 200 - 1.52 <1	<450 150 150 150 4250 4000 0.91 <1	<450 150 150 150 - 0.62 <1	<450 150 150 150 4250 4000 1.03 <1	<450 150 150 200 - 1.22 <1	<450 150 150 200 - 1.22 <1	<450 150 150 200 - 1.22 <1	<450 150 150 200 - 1.22 <1	<450 150 150 200 - 1.22 <1
1	<450 150 150 4250 4500 1.28 <1	<450 150 200 - - 1.02 <1	<450 150 150 - - 1.77 <1	<450 150 150 200 4250 4500 0.99 <1	<450 150 150 200 - 1.13 <1	<450 150 150 150 - 0.71 <1	<450 150 150 150 4250 4000 1.13 <1	<450 150 150 200 - 1.13 <1	<450 150 150 200 - 1.13 <1	<450 150 150 200 - 1.13 <1	<450 150 150 200 - 1.13 <1	<450 150 150 200 - 1.13 <1

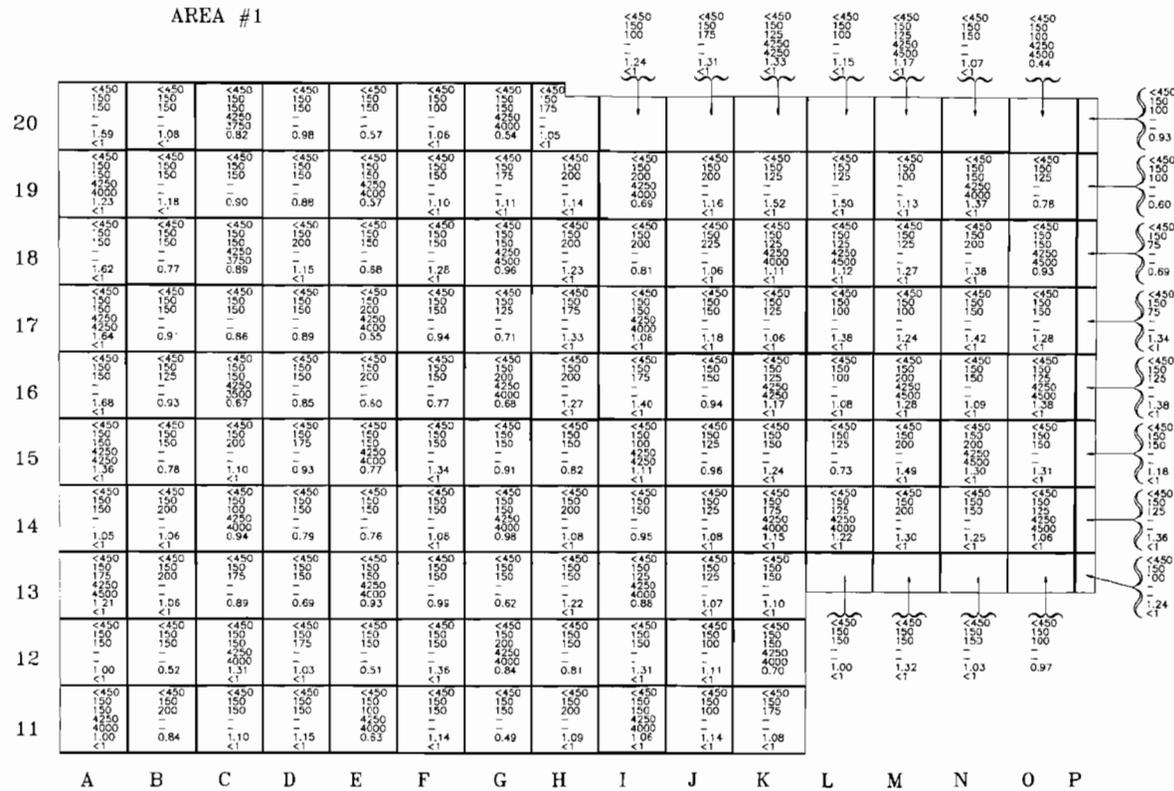
AREA #1



**Sample Data**  
 <450 - IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 - IM-253/PD (HV-1 PHA) [cpm]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [cpm]  
 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]

3.19 Bldg. 218

e. Localized Grid Maps

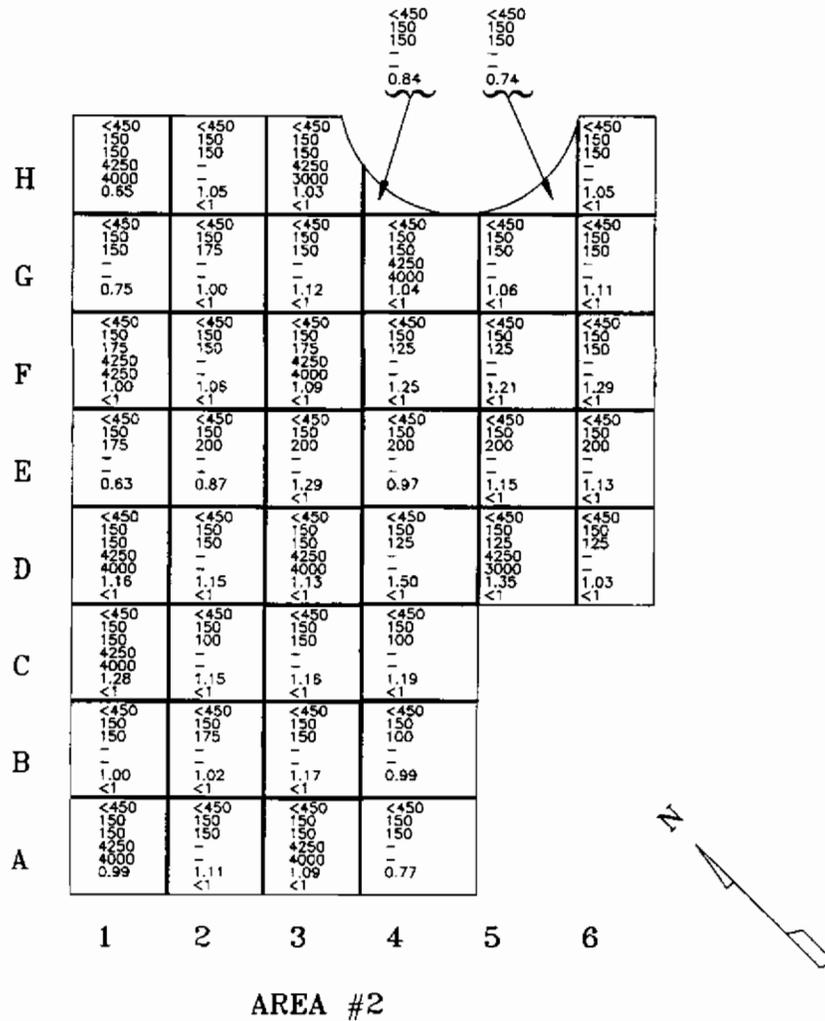


Sample Data  
 <450 - IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 - IM-253/PD (HV-1 PHA) [Bq]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [Bq]  
 7300 - IM-253/PD (HV-2 GROSS) [cpm]  
 1.82 - MCA Gross Gamma Eq. Co-60 [pCi/g]  
 <1 - MCA Specific Co-60 Results [pCi/g]



3.19 Bldg. 218

e. Localized Grid Maps



**Sample Data**  
 <450 – IM-247/PD Results [µCi/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 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]

3.19 Bldg. 218

f. Prior to Photographs

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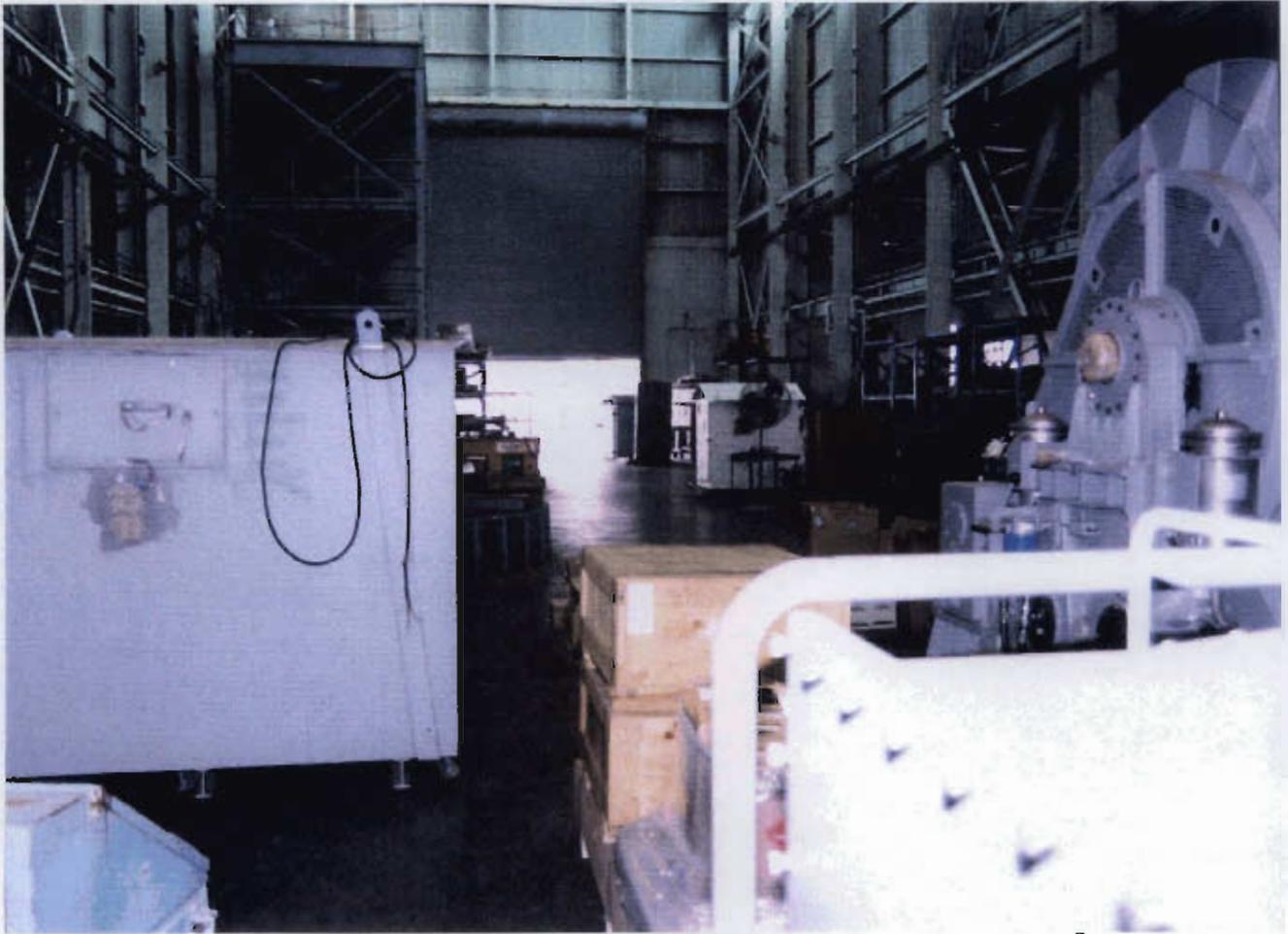


Facing West.

3.19 Bldg. 218

f. Prior to Photographs

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Facing East

3.19 Bldg. 218

g. After Photographs

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Facing West

3.19 Bldg. 218

g. After Photographs

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Facing East

**3.20 Bldg. 239****a. Introduction:**

Building 239 is located in grid E-5 of Charleston Naval Shipyard map (Figure 10). Building 239 was used for storage, maintenance, and issue of respiratory protection equipment. For a brief period of time, radioactive material was stored in Building 239, work room 25.

**(1) Description:**

Building 239, room 25, is approximately 20' wide by 26' long. The ceiling is painted concrete. The walls are painted concrete block. The floor is concrete covered with synthetic tile.

**(2) Brief History:**

(a) **Use:** This building housed the shipyards respiratory care facility. In 1993 radioactive insulation was stored and worked on in room number 25 of this building.

(b) **Radiological History:** Room 25 was controlled as a radiation area and a radioactive material storage area. Loose surface contamination levels were maintained less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

**(3) Survey Requirements:**

(a) Group 3 survey.

**b. Discussion:**

Building 239, room 25, was divided into 70 grids, 40 floor grids and 30 wall grids. The floor grids were approximately 5' by 5' where possible, and the wall grids were approximately 5' wide by 6' high. Each grid had its own unique designator.

100 percent of all grids possible were surveyed with the IM-247/PD and IM-253/PD (HV-1 PHA). Wall grid W2-A2 was a door opening where a rollup door was installed, however the rollup door was immobilized in the retracted position above the required survey height prior to radiologically controlled work being performed, therefore the grid area was not surveyed. 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 each grid.

A total of 69 solid material samples were taken from Building 239, room 25. 40 tile samples from the floor grids and 29 wall grids. One solid material sample consisted of paint and had a limit of 3 pCi/g. Each solid material sample was removed from the grid location indicating the area of highest potential. The

**3.20 Bldg. 239**

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

The construction material present in Building 239, room 25, was synthetic tile covered concrete for floor and block for the wall. For the floor, an IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 350, and 12500 counts per minute were based on radiation levels obtained from Building M1264. For the wall, an IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 300, and 10000 counts per minute were based on radiation levels obtained from Building 672.

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.

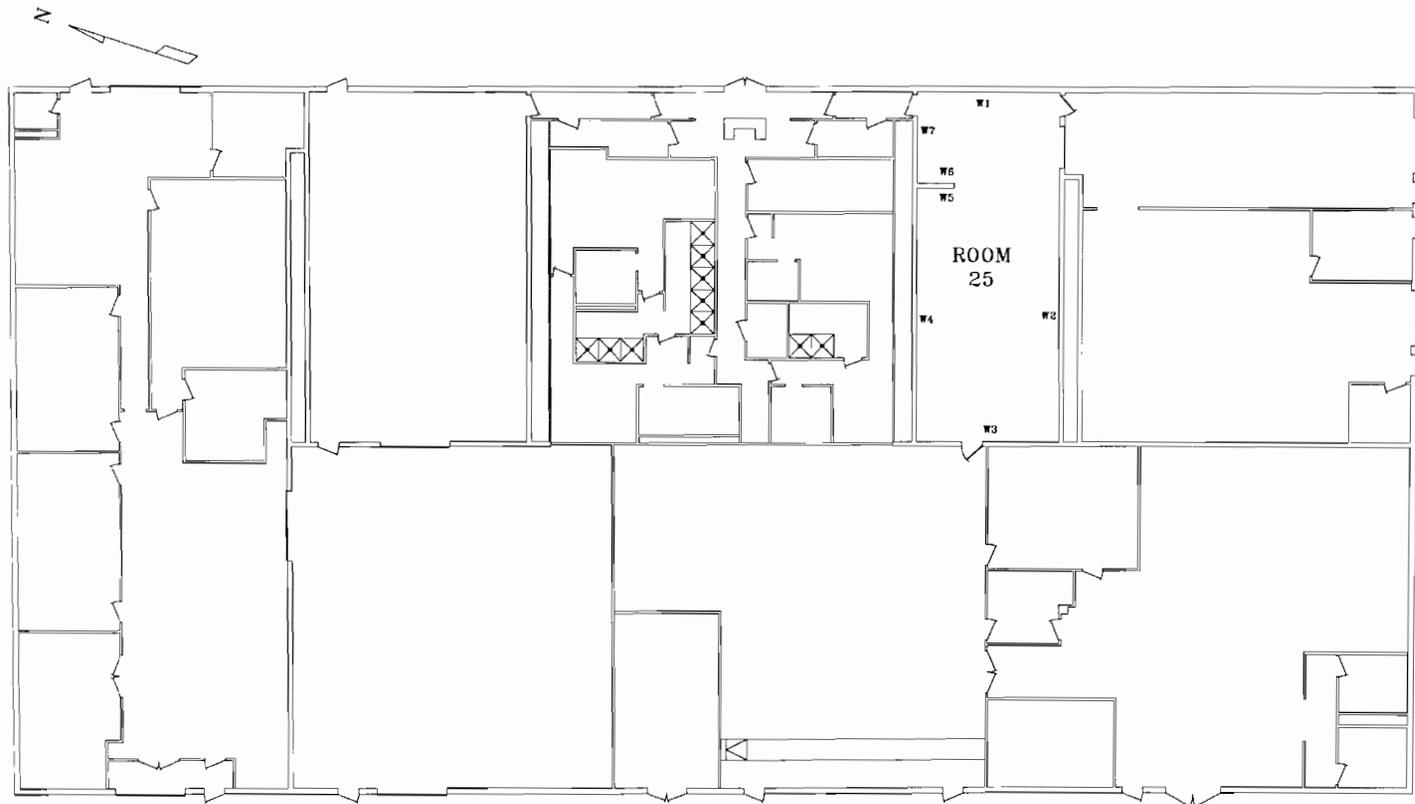
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.34 pCi/g to a high of 2.70 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 a paint sample. Analysis performed on the paint sample indicated less than 3 pCi/g.

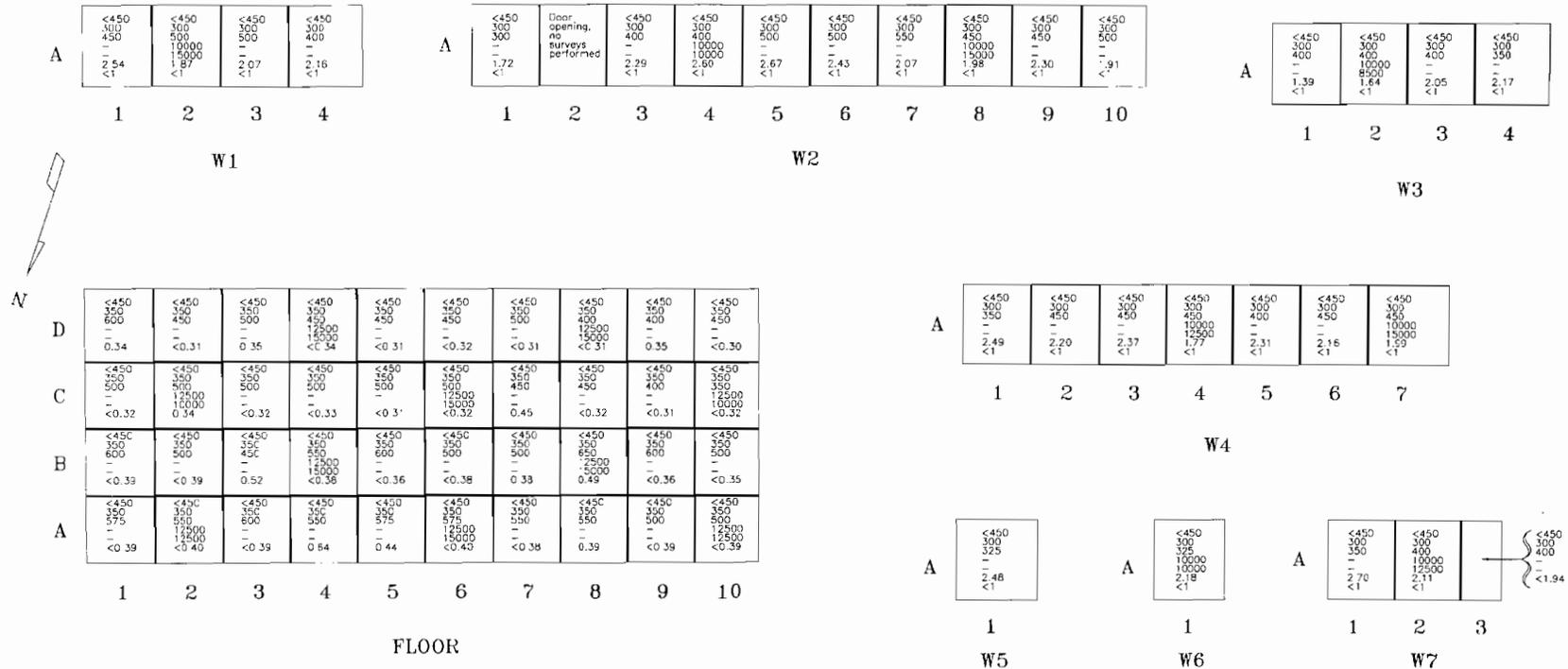
3.20 Bldg. 239

d. Site Map



3.20 Bldg. 239

e. Localized Grid Maps



**Note**  
Sample taken from grid W7-A3  
consists of paint and has 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) [pCi/g]  
300 — IM-253/PD (HV-1 PHA) [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]

3.20 Bldg. 239

f. Prior to Photographs

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Building 239, Room 25.

3.20 Bldg. 239

g. After Photographs

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Building 239, Room 25.

**3.21 Bldg 241****a. Introduction:**

Building 241, Crane Shop, is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:** The building is approximately 300' long by 240' wide and 85' high. It is a corrugated metal building sitting on a concrete slab.

(2) **Brief History:**

(a) **Use:** This building served as a crane repair shop. A 15' by 20' work pit in this building was used as a radioactive material storage area for a spent fuel rail car.

(b) **Radiological History:** This area was controlled as a radiation area and a radioactive material storage area. No loose surface contamination greater than 450  $\mu\text{Ci}/100\text{cm}^2$  was detected during the work performed in this area.

(3) **Survey Requirements:**

(a) Group 3 survey.

**b. Discussion:**

The Building 241 work pit was divided into 41 grids measuring approximately 5' by 5'. Each grid has its own unique designator.

100 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 IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid.

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

The construction material present in the Building 241 storage area was concrete for the floor and walls. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 60, 300, and 7000 counts per minute used for the floor were based on background radiation levels obtained from Bldg. 1884. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 50, 300, and 9000 counts per minute used for the walls were based on background radiation levels obtained from Bldg. 135.

**3.21 Bldg 241**

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  $450\mu\mu\text{Ci}/20\text{cm}^2$ .

Surveys performed with the IM-253/PD (HV-1 PHA) detected 41 areas greater than or equal to twice background.

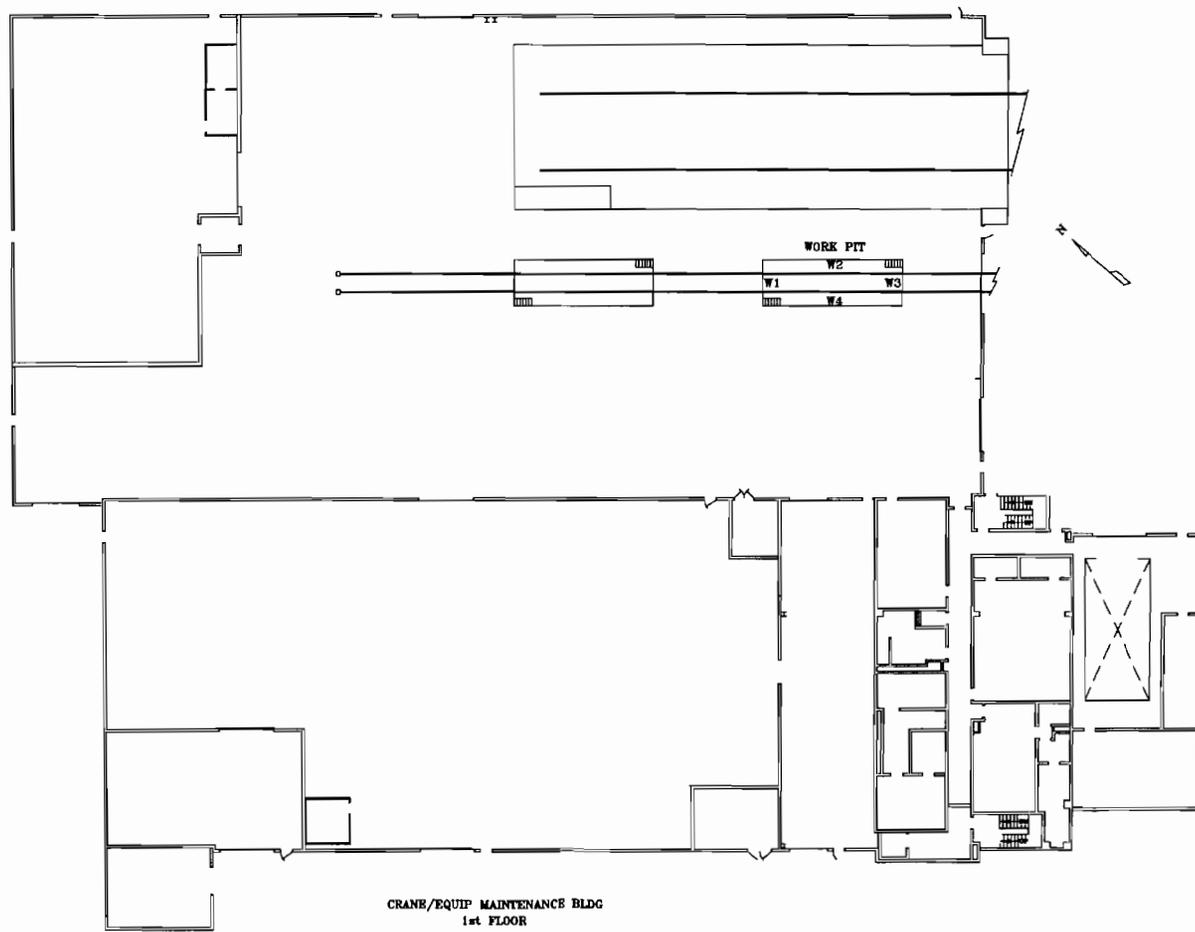
Surveys performed with the IM-253/PD (HV-2 GROSS) detected six areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 1.84 pCi/g to a high of 4.10 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.

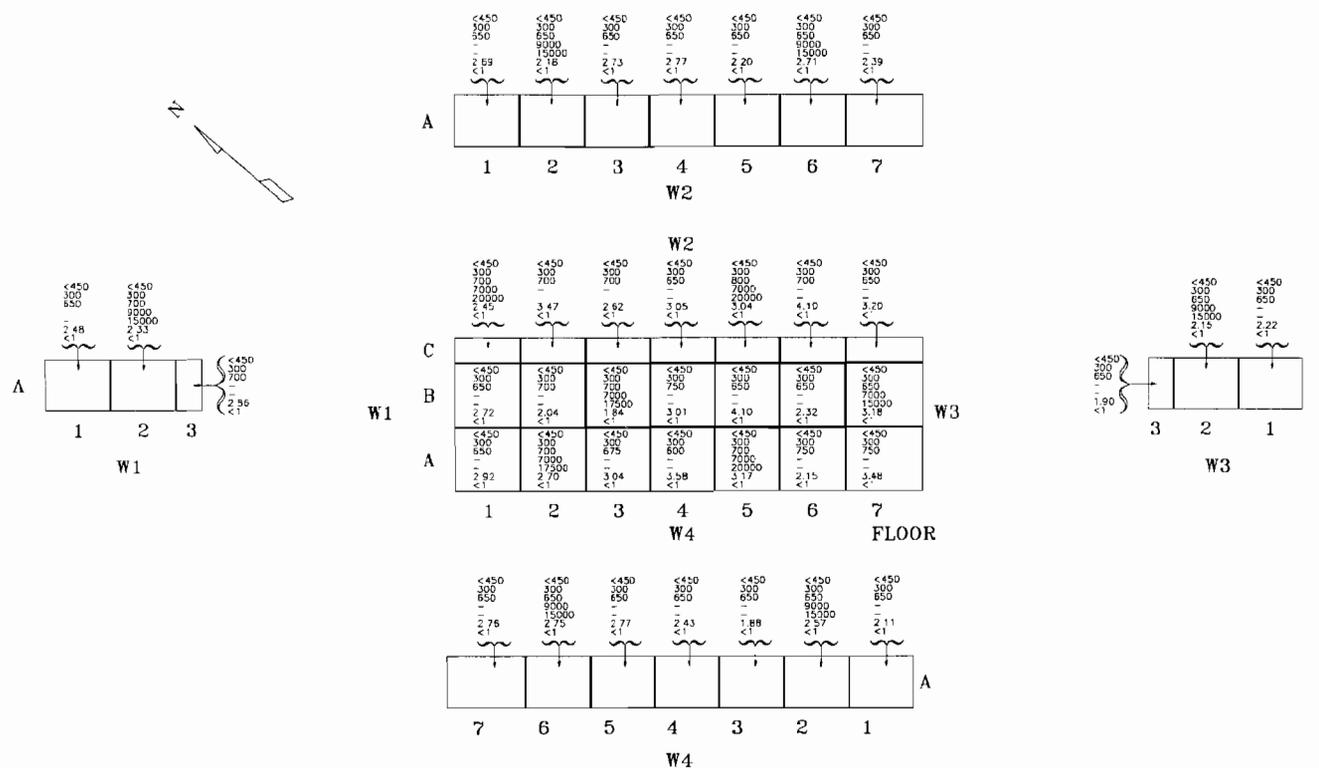
3.21 Bldg 241

d. Overall Grid Map



3.21 Bldg 241

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) [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]

3.21 Bldg 241

g. After Survey Photographs



Bldg 241

### 3.22 Building 246 Mixed Waste Storage Bay

#### a. Introduction:

Building 246 is located in grid C-12 of the Charleston Naval Shipyard map (Figure 10).

#### (1) Description:

Building 246 was designed as a hazardous waste storage area; construction was completed in October of 1986. The building is approximately 50' wide by 110' long. The floor is unpainted concrete. The walls are unpainted concrete block up to the 5' level and sheet metal above this level. The ceiling is also sheet metal.

#### (2) Brief History:

(a) **Use:** Sections of this building were used for storage of mixed hazardous and radioactive material beginning in September of 1993.

(b) **Radiological History:** These sections were controlled as a radiation area and a radioactive material storage area. Loose surface contamination levels were always less than 450  $\mu\text{Ci}/100\text{cm}^2$ .

#### (3) Survey Requirements:

- (a) Group 1 survey.
- (b) Group 2 survey.
- (c) Group 3 survey.

#### b. Discussion:

##### (1) Group 1 Areas

Group 1 surveys were performed in the Building 246 General Area (all interior areas except group 2 and group 3 as shown on the site map). Surveys using the IM-253/PD (HV-1 PHA and HV-2 gross) were performed in selected locations within these areas.

##### (2) Group 2 & 3 Areas

Building 246 Mixed Waste Storage Bay, Group 2 & 3 areas were divided into 86 grids. Each grid had its own unique designator. Areas of the storage bay with a low potential for contamination were divided into 12 approximately 10' by 10' floor grid sections in accordance with Group 2 survey requirements. Each of these grids contained two 3' by 3'

### 3.22 Building 246 Mixed Waste Storage Bay

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 storage bay with a higher potential for contamination were divided into 56 approximately 5' by 5' floor grids and 18 approximately 5' wide by 6' high wall grids in accordance with the Group 3 survey 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 all grids were surveyed with the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid.

A total of 74 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 bismuth 214.

Due to variations in natural radioactivity among construction material, different background levels exist. For the floor, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 55, 600, and 15000 counts per minute were based on radiation levels obtained from Building 1079. For the walls, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 50, 500, and 15000 counts per minute were based on background radiation levels obtained from Building 1800.

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

##### (1) **Group 1 Areas**

Surveys performed in accordance with the Group 1 survey requirements did not detect any areas greater than twice background levels.

##### (2) **Group 2 & 3 Areas**

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

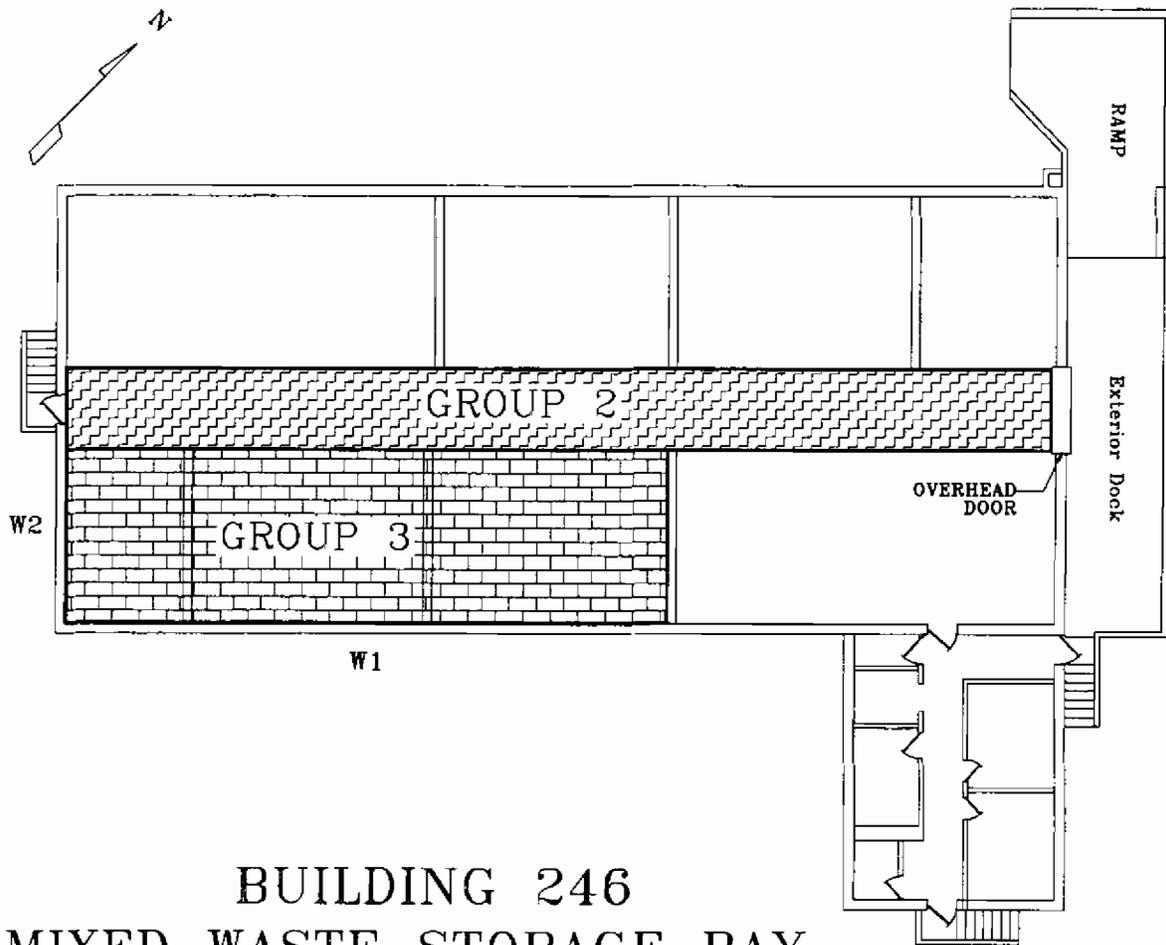
**3.22 Building 246 Mixed Waste Storage Bay**

analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 1.51 pCi/g to a high of 5.10 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.

3.22 Building 246 Mixed Waste Storage Bay

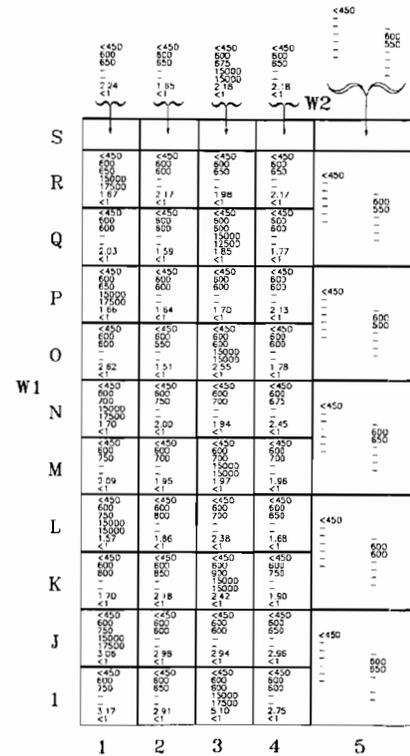
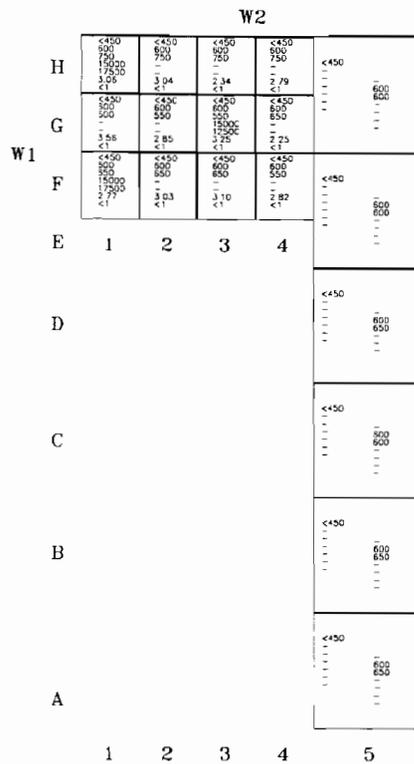
Site Map



BUILDING 246  
MIXED WASTE STORAGE BAY

3.22 Building 246 Mixed Waste Storage Bay

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.l]  
 300 - IM-253/PD (HV-1 PHA) [cpm]  
 7000 - IM-253/PD (HV-2 GROSS) [bq.l]  
 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]

3.22 Building 246 Mixed Waste Storage Bay

e. Localized Grid Maps



W1

A	<450 500 500 15000 2.48 <1	<450 500 700 — — <1	<450 500 750 — — <1	<450 500 750 15000 15000 3.48 <1	<450 500 750 15000 2.45 <1	<450 500 800 — — <1	<450 500 800 — — <1	<450 500 775 — — <1	<450 500 750 — — <1	<450 500 725 — — <1	<450 500 750 — — <1	<450 500 750 15000 3.15 <1	<450 500 800 — — <1	<450 500 700 — — <1
	1	2	3	4	5	6	7	8	9	10	11	12	13	14

W2

A	<450 500 700 — — <1	<450 500 700 15000 3.94 <1	<450 500 700 — — <1	<450 500 850 — — <1
	1	2	3	4

**Sample Data**  
 <450 – IM-247/PD Results [µCi/20cm<sup>2</sup>]  
 200 – IM-253/PD (HV-1 PHA) [dmg.]  
 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 Ec. Co-60 [pCi/g]  
 <1 – MCA Specific Co-60 Results [pCi/g]

3.22 Building 246 Mixed Waste Storage Bay

f. After Photograph

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Viewing northeast

3.22 Building 246 Mixed Waste Storage Bay

f. After Photograph

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Viewing southwest