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NAVAL NUCLEAR PROPULSION PROGRAM (NNPP) RADIOLOGICAL FINAL REPORT FOR DECOMMISSIONING VOLUME II SECTION J SUBSECTION 3.23 THRU SUBSECTION 4.4

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 3.23
THRU
SUBSECTION 4.4

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

April 1, 1996

NAVAL NUCLEAR PROPULSION PROGRAM (NNPP)

RADIOLOGICAL FINAL REPORT

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3.23 Bldg. 590A Instrument Storage Room

a. Introduction:

Building 590A , facing northeast on River Road, is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10). Originally constructed in 1935 as Bachelor Officer's Quarters, the building was converted in the 1970's to a Radiological Controls office.

(1) Description:

Building 590A is an "H" shaped two story brick building sitting on a concrete foundation. It is approximately 115' long by 65' wide and 25' high. The instrument storage room was the area of interest.

(2) Brief History:

(a) **Use:** During the late 1970s an instrument storage room on the first floor was used as a source storage area.

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

(3) Survey Requirements:

(a) Group 3 survey.

b. Discussion:

Building 590A instrument storage room was divided into 20 grids, 8 floor grids and 12 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 20 solid material samples were taken from Building 590A instrument storage room. 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, potassium 40, actinium 228.

Individual backgrounds were used for Building 590A Instrument Storage Room floor and walls. Due to variations in natural radioactivity among construction materials, different backgrounds exist. The IM-247/PD, IM-253/PD (HV-1 PHA

3.23 Bldg. 590A Instrument Storage Room

and HV-2 GROSS) background of 60, 600, and 15000 counts per minute used for the floor were based on background radiation levels obtained from Building 1079. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 60, 600, and 15000 counts per minute used for the walls were based on background radiation levels obtained from Building M1123 red brick walls.

c. Summary:

Surveys performed with the IM-247/PD did not detect areas greater than 450μμCi/20cm^2.

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

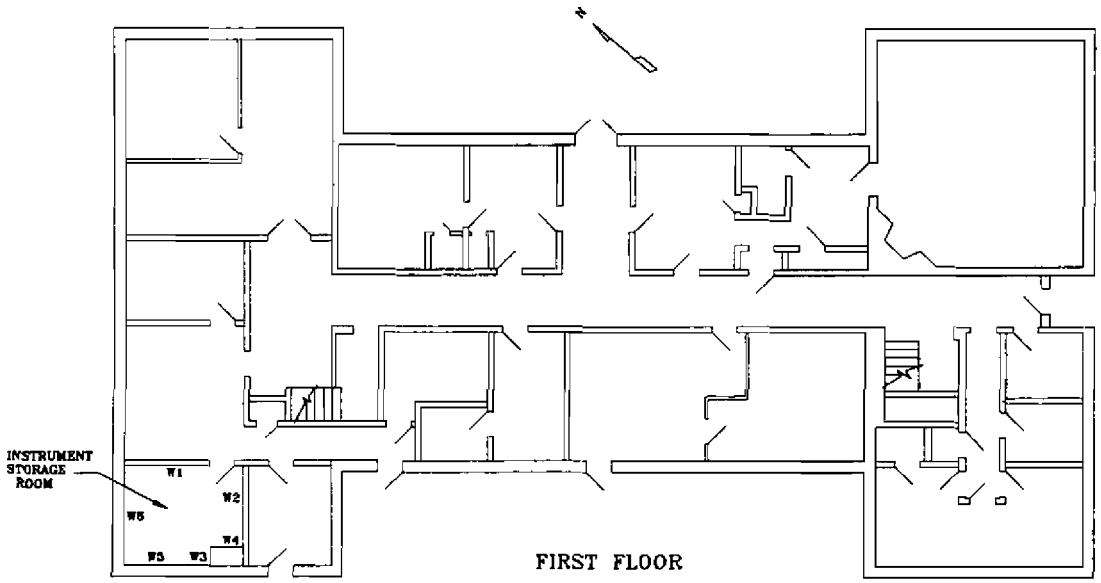
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

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 0.54 pCi/g to a high of 10.17 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.

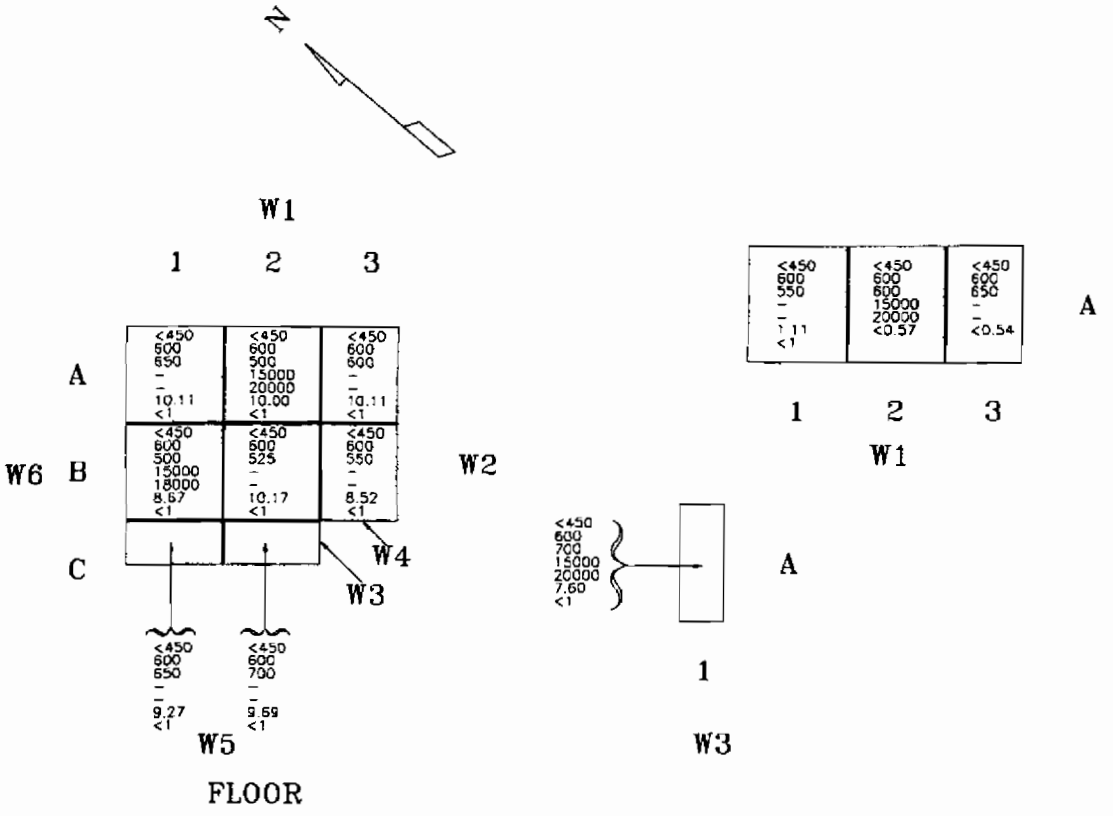
3.23 Bldg. 590A Instrument Storage Room

d. Site Map



3.23 Bldg. 590A Instrument Storage Room

e. Localized Grid Maps

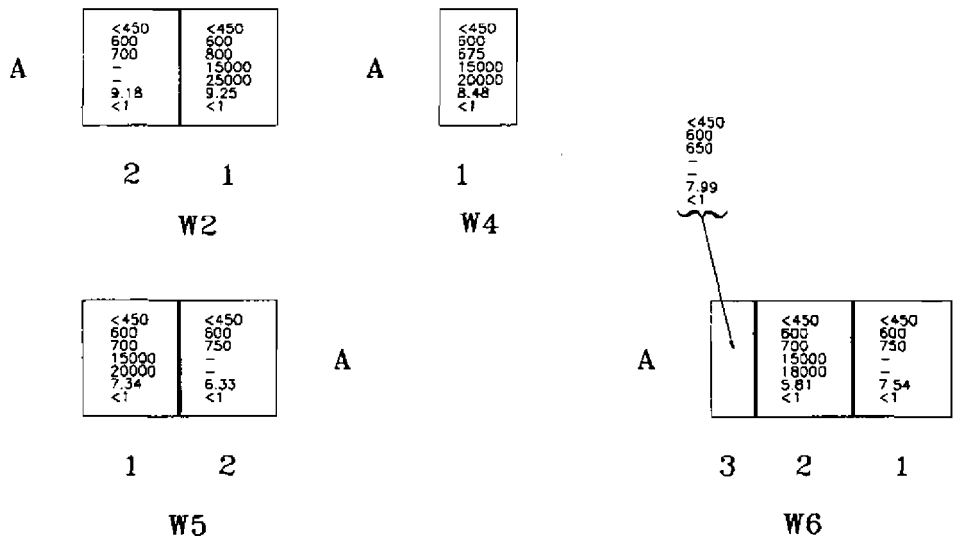


Sample Data

<450 – IM-247/PD Results [µµCi/20cm²]
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]

3.23 Bldg. 590A Instrument Storage Room

e. Localized Grid Maps



Sample Data

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

3.23 Bldg. 590A Instrument Storage Room

h. After Survey Photographs

Building 590A Storage Room

3.24 Bldg. 1267

a. Introduction:

Building 1267 is located in grid D-10 of Charleston Naval Shipyard map (Figure 10). Building 1267 was used as a temporary storage area for radioactive material coming to, and transferring from Charleston Naval Shipyard.

(1) **Description:**

This building is 12' long by 10' wide by 10' high. The walls and roof are corrugated steel over a wood frame. The floor is a concrete slab.

(2) **Brief History:**

(a) **Use:** This building was originally used as a temporary storage area for radioactive material prior to transfer from the shipyard. It was most recently used to store radioactive sources delivered to the shipyard.

(b) **Radiological History:** There is no history of loose surface contamination levels greater than 450 μμCi/100cm^2 in this building.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

Building 1267 was divided into 18 grids, eight floor grids and 10 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 grid 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).

A total of 11 solid material samples were taken from Building 1267, eight floor grids and three wall grids. Each solid material sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material samples: lead 212, lead 214, bismuth 214.

Individual backgrounds were used for Building 1267. For the floor, 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 the background radiation levels obtained from Building 1605. For the metal walls, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 150 counts per

3.24 Bldg. 1267

minute, and an IM-253/PD (HV-2 GROSS) background of 6,500 counts per minute were based on background radiation levels obtained from the metal walls of Building 1893.

c. **Summary:**

Surveys performed with the IM-247/PD did not detect areas greater than 450μμCi/20cm^2.

Surveys performed with the IM-253/PD (HV-1 PHA) detected six 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.

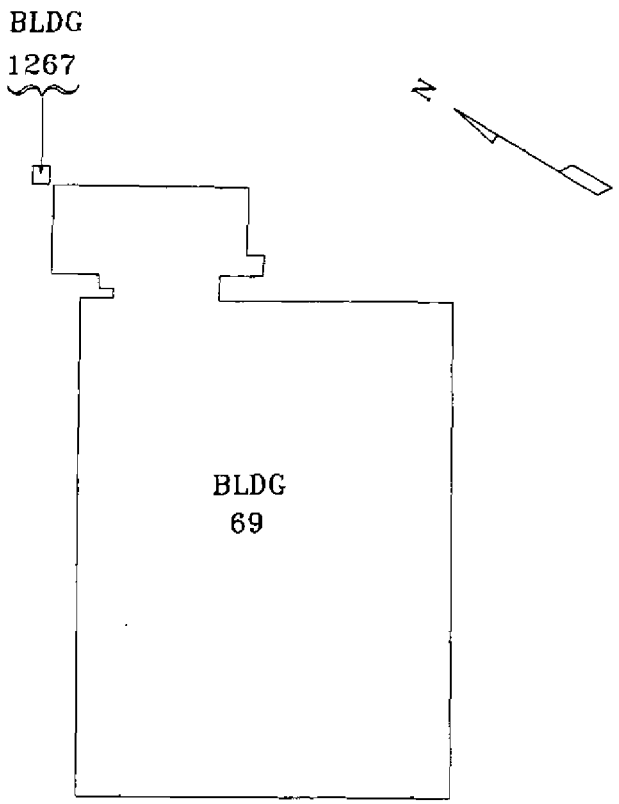
The walls of Building 1267 were unpainted metal and are not normally sampled. However, one metal sample was removed from each wall for analysis where surveys performed with the IM-253/PD (HV-1 PHA) detected areas greater than or equal to twice background.

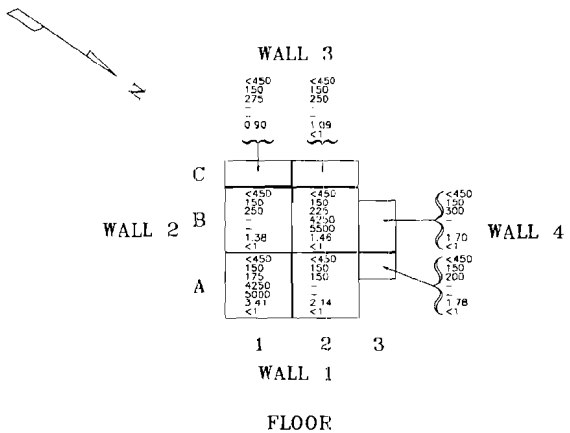
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than a minimum detectable activity of 0.15 pCi/g to a high of 3.41 pCi/g.

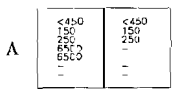
Analysis performed on solid material samples with the MCA for specific cobalt 60, indicated that all solid material samples were less than 1 pCi/g.

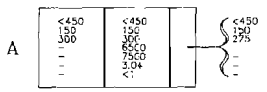
3.24 Bldg. 1267

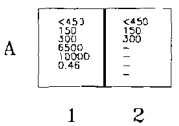
e. Site Grid Map

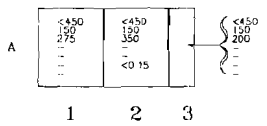












Sample Data
- <450 – IM-247/PD Results [µpCi/20cm²]
- 200 – IM-253/PD (HV-1 PHA) [bkg.]
- 300 – IM-253/PD (HV-1 PHA) [cpm]
- 7000 – IM-253/PD (HV-2 GROSS) [bkg.]
- 7300 – IM 253/PD (HV-2 GROSS) [cpm]
- 1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
- <1 – MCA Specific Co-60 Results [pCi/g]

3.24 Bldg. 1267

f. Prior To Photographs

Bldg 1267

3.24 Bldg. 1267

g. After Photographs

Looking In Bldg 1267

3.25 Bldg. 1317

a. Introduction:

Building 1317, which originally formed part of the residential complex housing the shipyard commander, was built in the 1930's as a residential support structure. Building 1317 most likely originally served as the shipyard commander's staff's quarters.

(1) Description:

Building 1317 is a two-story building that faces southeast near Dry Dock 5. The building is "T" shaped with overall dimensions of 35' by 35' by 23' high. It is of wood frame construction and sits on a concrete foundation with three asymmetrical bays along the front and three bays along the side. Building 1317 is located in grid D-6 of the Charleston Naval Shipyard map (Figure 10).

(2) Brief History:

(a) **Use:** Areas in the first floor of this building were used in 1965 for CRUD weighing and gas analysis procedures involved with reactor plant decontamination.

(b) **Radiological History:** The first floor of the building was controlled as a CSCA while used for radioactive sample analysis. During this time a spill contaminated the walls and the floor of the building to levels in excess of 1×10^6 μμCi/100cm^2. In 1965 the building was decontaminated, surveyed and the CSCA was disestablished. The building was released from radiological controls in 1970 in accordance with the NAVSEA requirements of that time. Because the release requirements have changed since 1970, the building was resurveyed to meet the current requirements.

(3) Survey Requirements:

a. Group 3 survey in the first floor.

b. Group 1 survey in the other areas.

b. Discussion:

The first floor of Building 1317 was, at one time, used for radioactive sample analysis and therefore received a Group 3 survey because of the potential for low levels of contamination (less than 1,000 μμCi/100cm^2).

The Group 3 portion of Building 1317 was divided into eighty-four grids, thirty-

seven floor and forty-seven wall grids. The floor grids were approximately 5' by 5', and the wall grids were approximately 5' wide by 6' high. 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 (HV2-GROSS). Additionally, solid material samples were taken from each grid.

A total of eighty-four solid material samples were taken. Each solid 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 corresponding areas of Building 1317. For areas one, two, and four 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 4500 counts per minute were based on background radiation levels obtained from Building 1605. For area three, an IM-247/PD background of 60 counts per minute, an IM-253/PD (HV-1 PHA) background of 450 counts per minute and an IM-253/PD (HV-2 GROSS) background of 15000 counts per minute were based on background radiation levels obtained from Building 1079.

c. Summary:

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

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

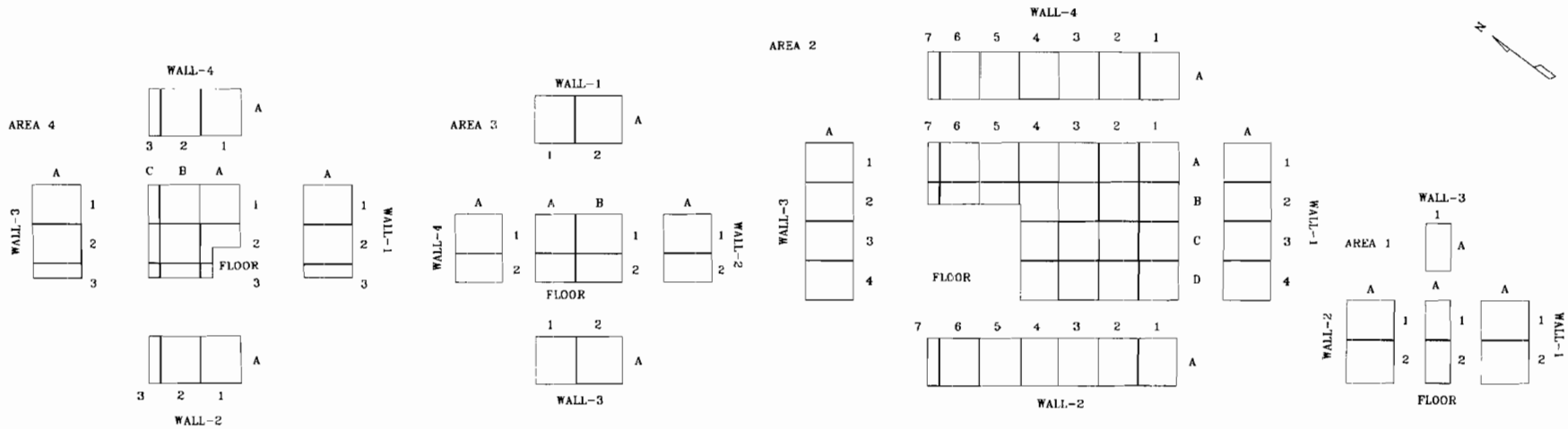
Surveys performed with the IM-253/PD (HV-2 GROSS) detected two areas greater than or equal to twice background.

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 0.17 pCi/g to a high of 5.15 pCi/g.

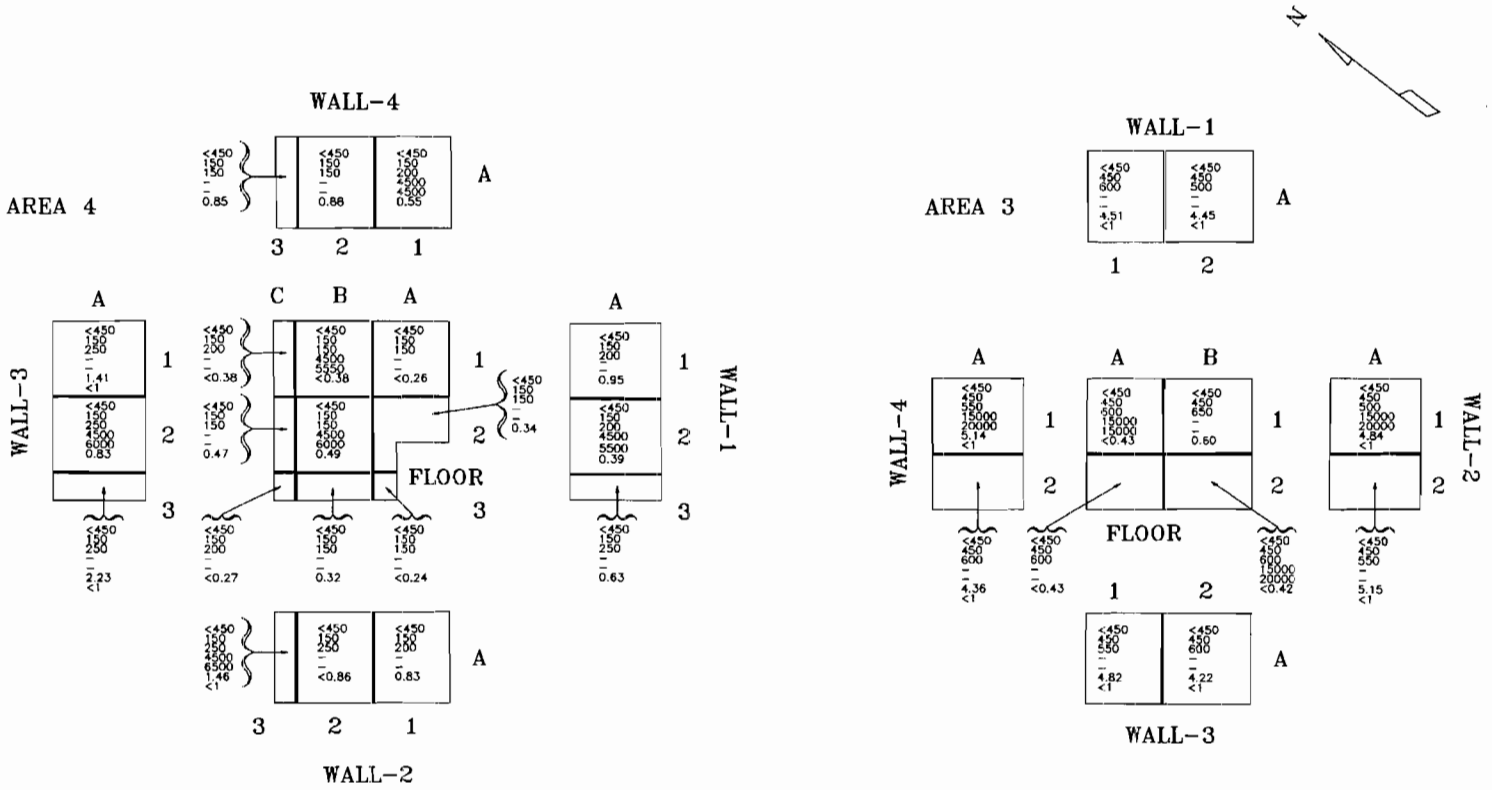
Analysis performed on solid material samples with the MCA for specific cobalt 60 indicated that all solid material samples were less than 1 pCi/g.

3.25 Bldg. 1317

d. Overall Grid Map



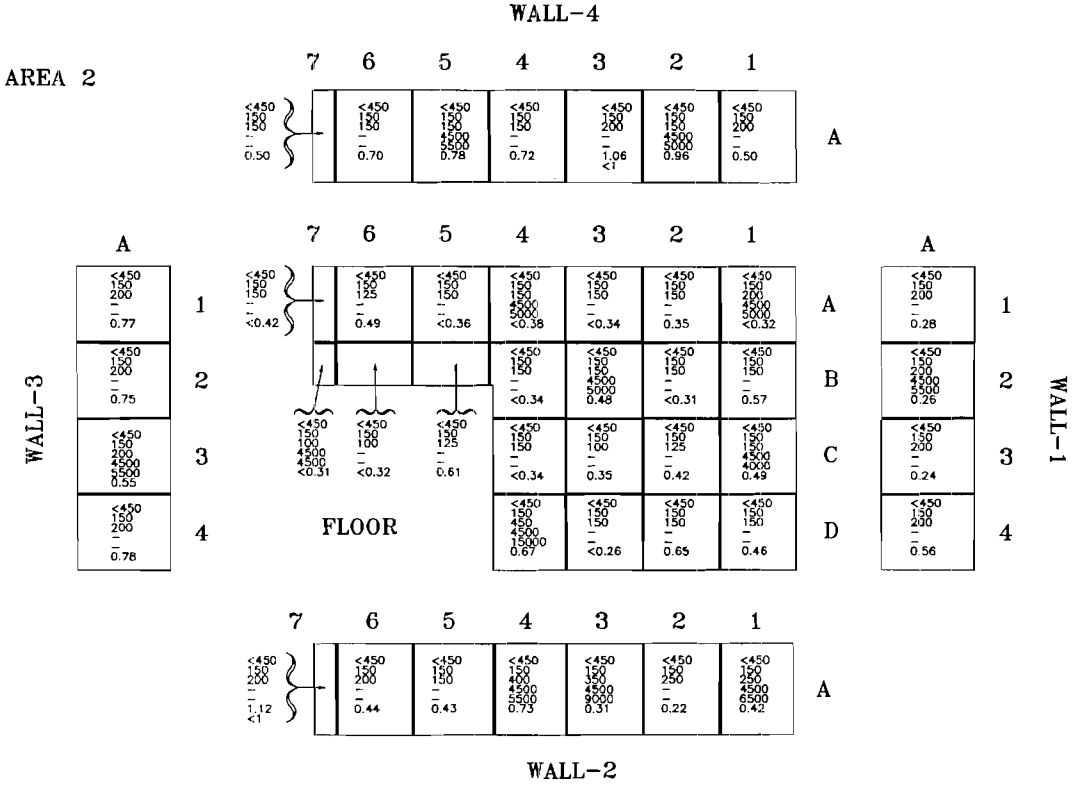
e. Localized Grid Maps

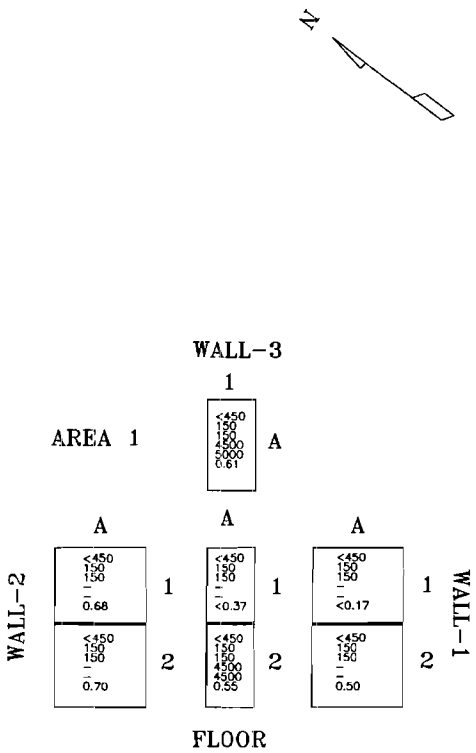


Sample Data
<450 – IM-247/PD Results [μCi/20cm²]
200 – IM-253/PD (HV-1 PHA) [bkg.]
300 – IM-253/PD (HV-1 PHA) [cpm]
7000 – IM-253/PD (HV-2 GROSS) [bkg.]
7300 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.25 Bldg. 1317

e. Localized Grid Maps

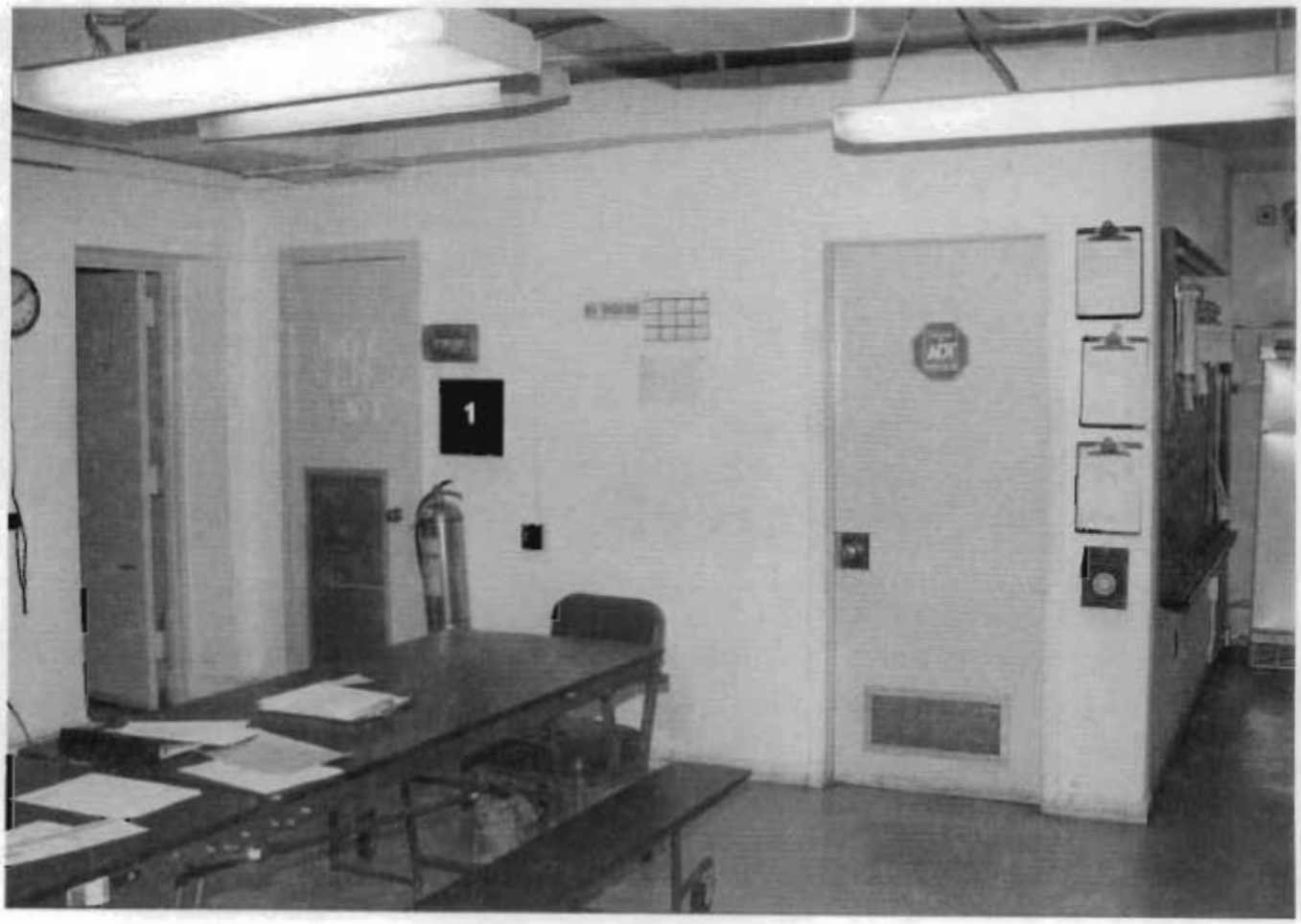




Sample Data
<450 – IM-247/PD Results [µµCi/20cm²]
200 – IM-253/PD (HIV-1 PHA) [bkg.]
300 – IM-253/PD (HIV-1 PHA) [cpm]
7000 – IM-253/PD (HIV-2 GROSS) [bkg.]
7300 – IM-253/PD (HIV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.25 Bldg. 1317

f. Prior to Survey Photographs



Building 1317, first floor, facing northwest.

3.25 Bldg. 1317

g. During Survey Photographs

Building 1317, first floor, facing southeast.

3.25 Bldg. 1317

h. After Survey Photographs

Building 1317, first floor, facing northwest.

3.26 Bldg 1746

a. Introduction:

Building 1746 was a radioactive material storage area located on Dry Dock Avenue between Building 13 and Building 236. Building 1746 is located in grid D-7 of the Charleston Naval Shipyard map (figure 10).

(1) **Description:**

This building is approximately 18' wide by 38' long by 12' high. The exterior walls are made of concrete block, the interior walls are made of sheetrock and expanded metal grating, the floors are made of concrete, and the ceiling is corrugated steel.

(2) **Brief History:**

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

(b) **Radiological History:** This area has been controlled as a radiation area and radioactive material storage area. Contamination levels were always less than 450μμCi/100cm^2

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

Building 1746 was divided into 72 grids, 34 floor grids and 38 wall grids. The floor grids were approximately 5' by 5', and the wall grids were approximately 5' wide by 6' high. Each 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 65 grids.

A total of 66 solid material samples were taken. Each solid material sample was removed from the grid location indicating the area of highest potential, with two samples being removed from grid R1-F-B3. Solid material samples were not taken from seven wall grids because the walls were constructed of expanded metal and therefore required no solid samples. The wall grids not sampled were: R1-W4-A4, R2-W2-A1, R2-W2-A2, R3-W1-A1, R3-W1-A2, R3-W4-A1, and R3-W4-A2. The following typical radionuclides were identified during isotopic analysis of solid material samples: lead 212, lead 214, potassium 40, and bismuth 214.

3.26 Bldg 1746

Individual backgrounds were used for the building walls and floor. For the floor of Building 1746, an IM-247/PD background of 100 counts per minute, an IM-253/PD (HV-1 PHA) background of 650 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 15000 counts per minute were based on background levels obtained from the road west of Building 236. For the walls, an IM-247/PD background of 60 counts per minute, an IM-253/PD (HV-1 PHA) background of 500 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 12500 counts per minute were based on background levels obtained from the concrete block of Building 81

c. **Summary:**

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

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

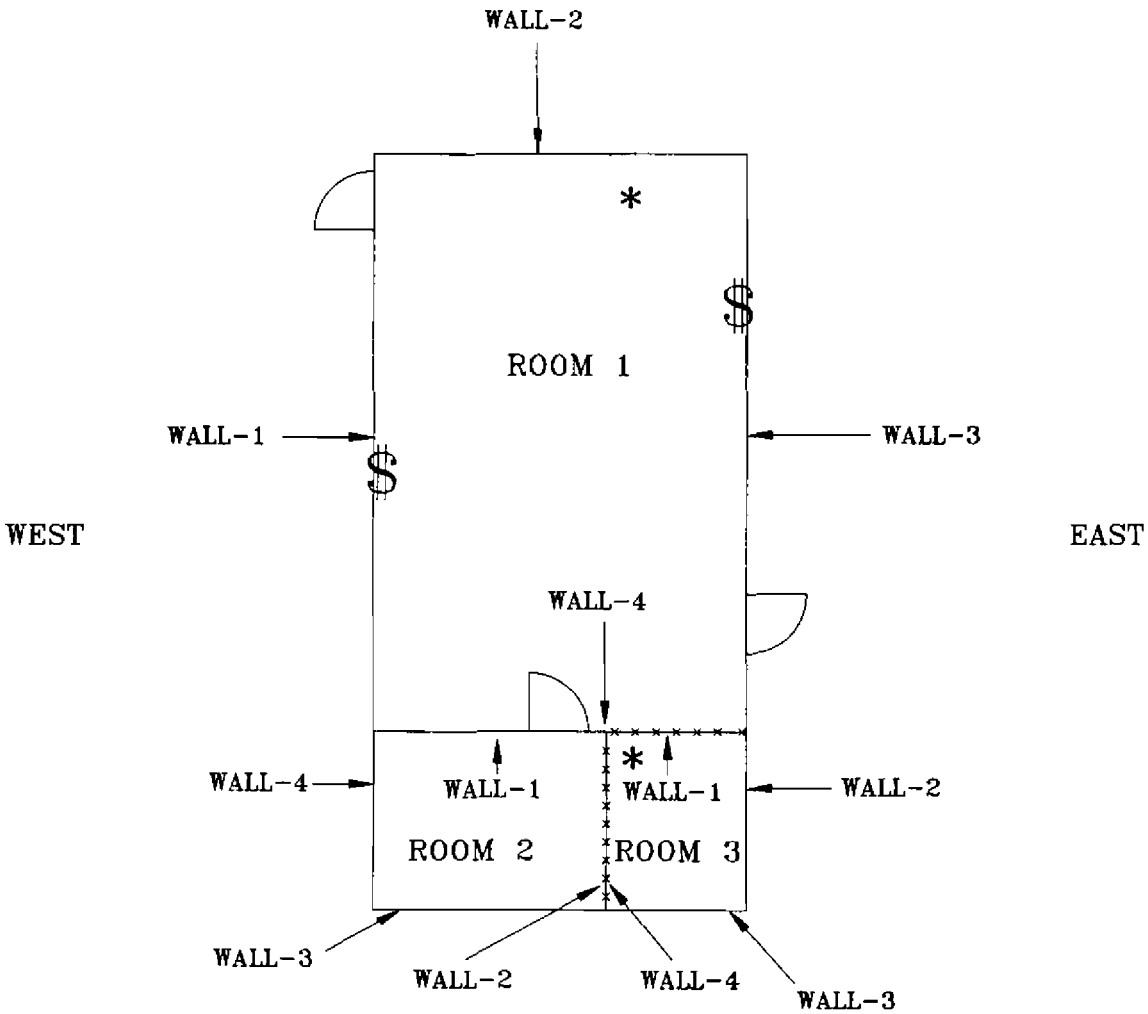
Surveys performed with the IM-253/PD (HV-2 GROSS) detected one area greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.20 pCi/g to a high of 5.79 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.

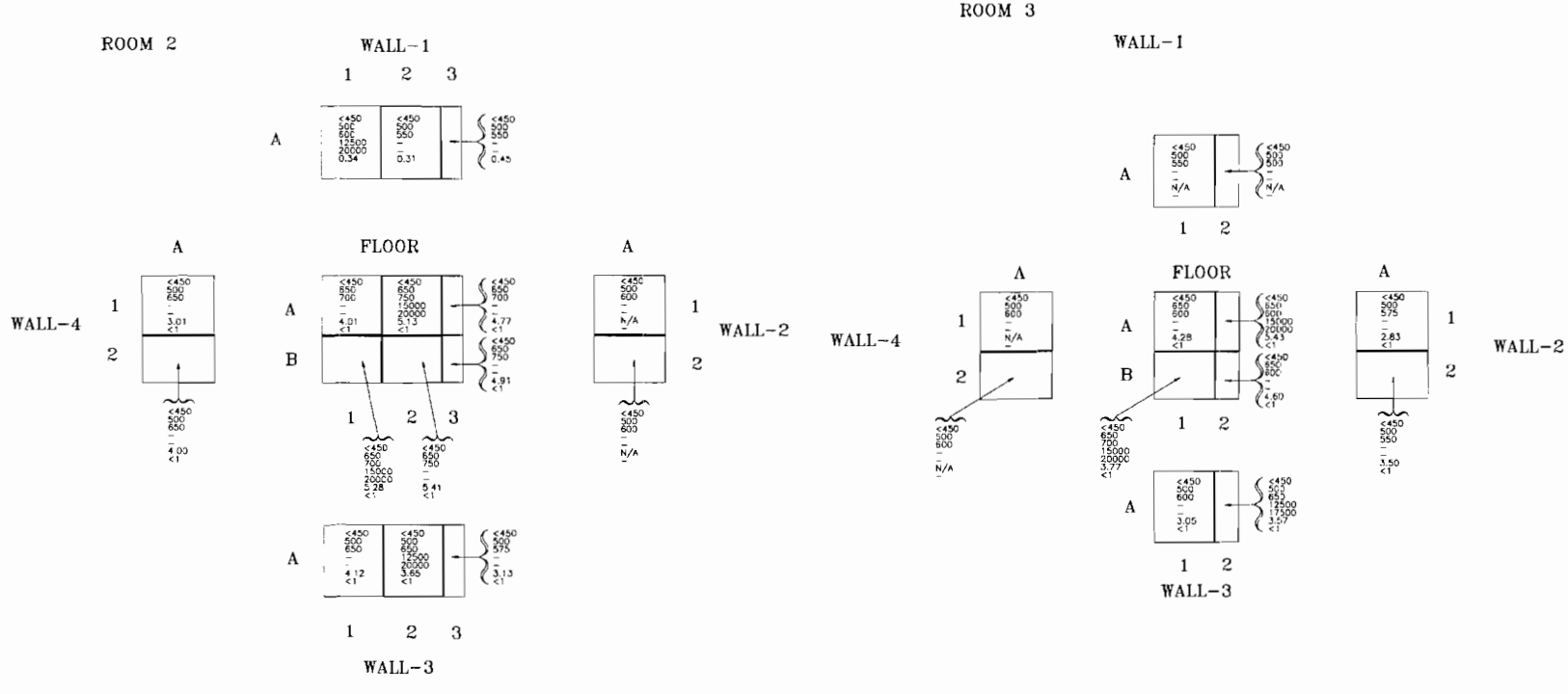
3.26 Bldg 1746

d. Site Map



3.26 Bldg 1746

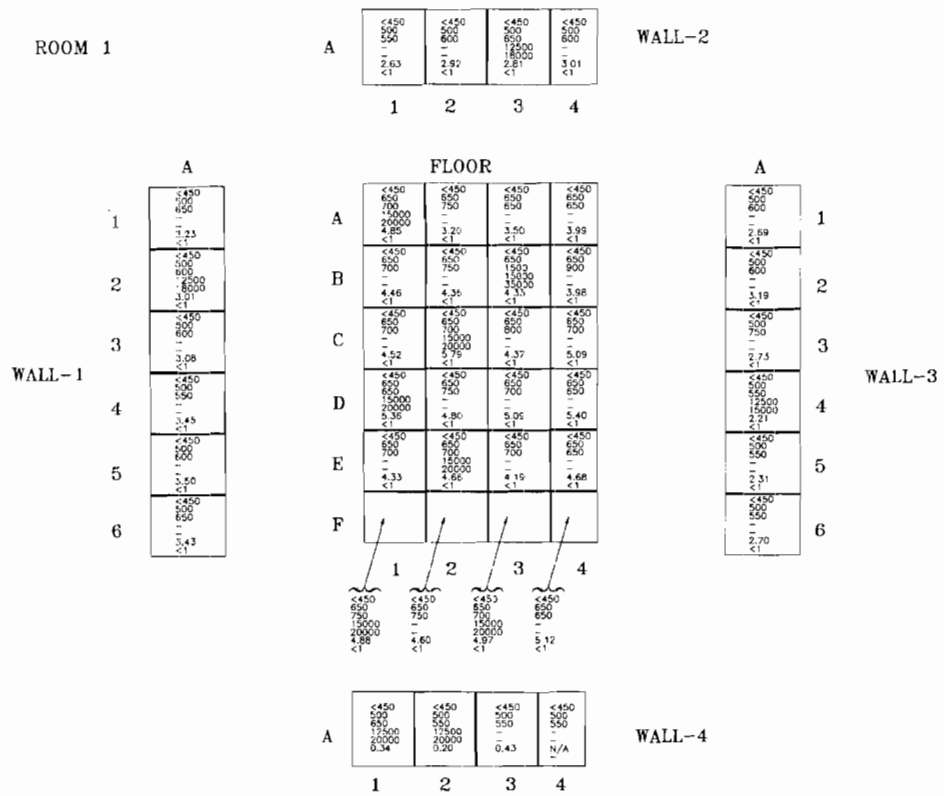
e. Localized Grid Maps



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

3.26 Bldg 1746

e. Localized Grid Maps



Sample Data

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

3.26 Bldg 1746

f. Prior Photograph

Room1, facing southeast into Rooms 2 & 3

3.26 Bldg 1746

f. Prior Photograph

Room 2, facing west to walls 1 & 4

3.26 Bldg 1746

f. Prior Photograph

Room 3, facing southeast into room

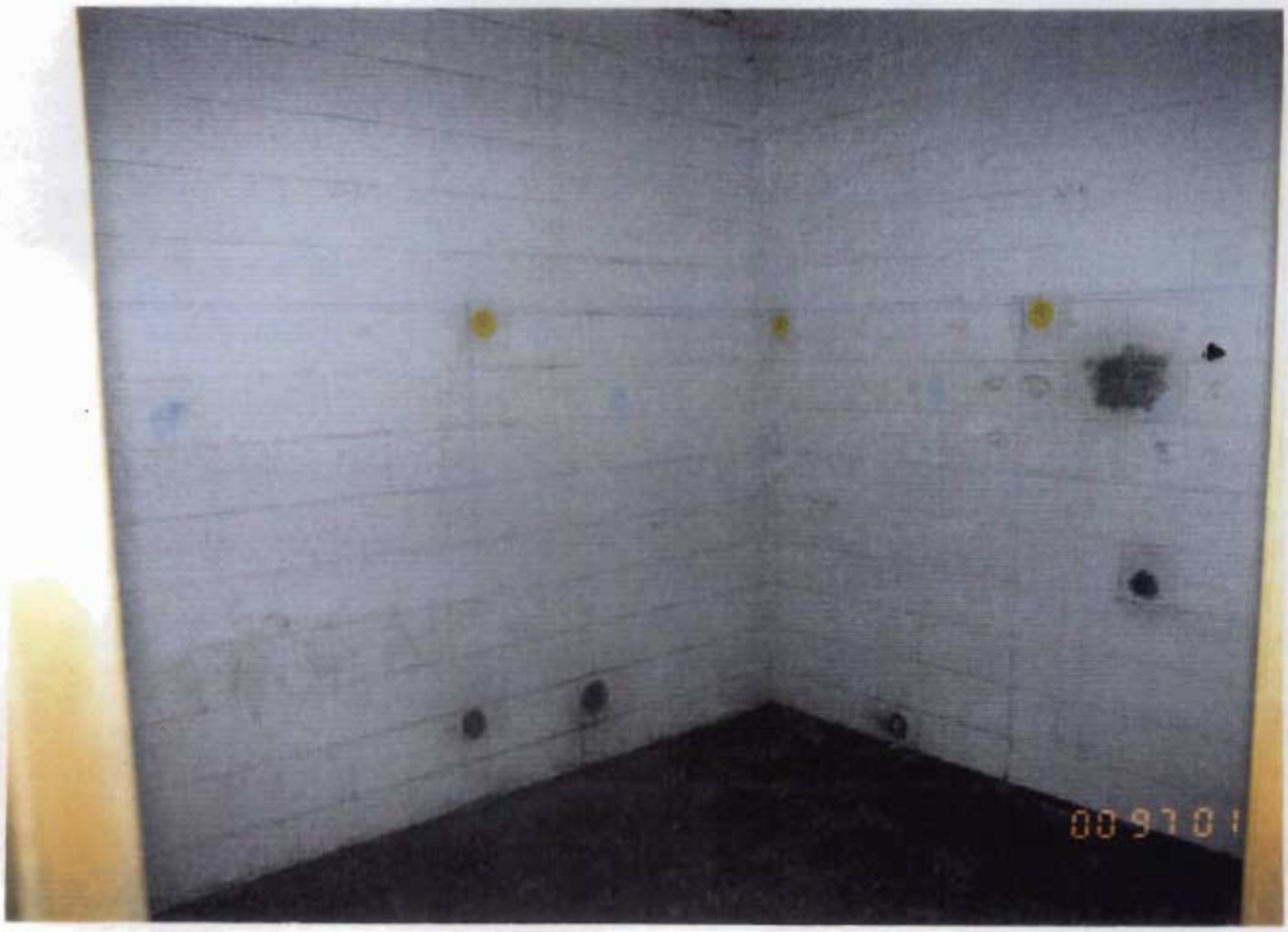
3.26 Bldg 1746

g. After Photograph

Room 1

3.26 Bldg 1746

g. After Photograph



Room 2, facing south to walls 3 & 4

3.26 Bldg 1746

g. After Photograph

Room 3, facing southeast into room

3.27 Bldg. 380-207

a. Introduction:

Building 380-207 was located west of Building 1174 in grid D-9 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:**

Building 380-207 is a Butler Building approximately 10' wide by 40' long by 8' high. The building has sheet metal and sheetrock/drywall walls and a tiled plywood floor.

(2) **Brief History:**

(a) **Use:** A source storage area was located in 380-207 and was used to store radioactive calibration sources.

(b) **Radiological History:** The sources stored here contained isotopes including Co-60, Cs-137, Na-22, Mn-54, Co-57, Cd-109, and Ba-133. There is no history of loose surface contamination in this area.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

The floor in the storage room, located in the southwest end of Building 380-207, was divided into eight grids, two floor grids and six 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 eight solid material samples were taken from the northeast end of Building 380-207 floor and walls. 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 214, thallium 208, bismuth 214, and potassium 40.

The construction material present in Building 380-207 was synthetic tile covering plywood floors, metal for walls 1 and 2, and sheetrock/drywall for walls 3 and 4. For the floor, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2

3.27 Bldg. 380-207

GROSS) background of 40, 200, and 5000 counts per minute were based on radiation levels obtained from conex box number 730951. For the walls, an IM-247/PD and an IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 40, 150, and 4500 counts per minute were based on background radiation levels obtained from the same conex box listed above.

Removal or 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 $\mu\mu Ci/20cm^2$.

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

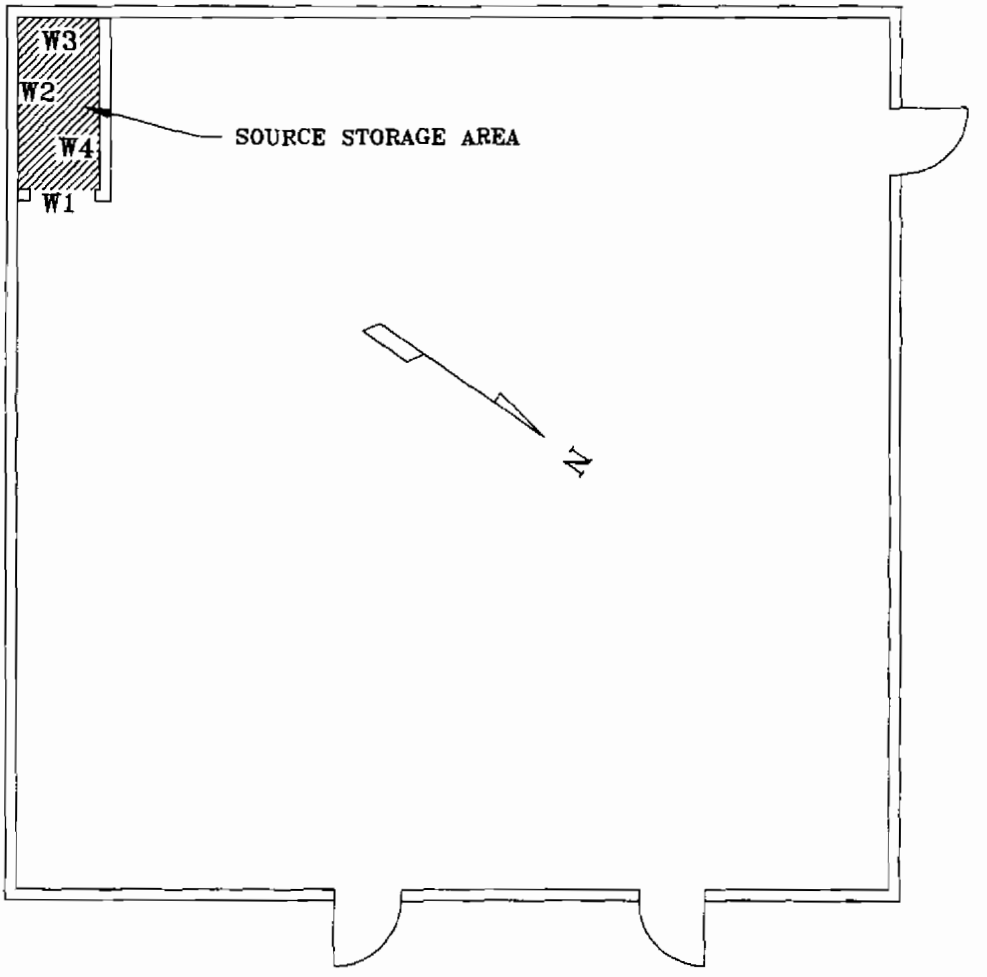
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than minimum detectable activity of 0.23 pCi/g to a high of 3.39 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.

3.27 Bldg. 380-207

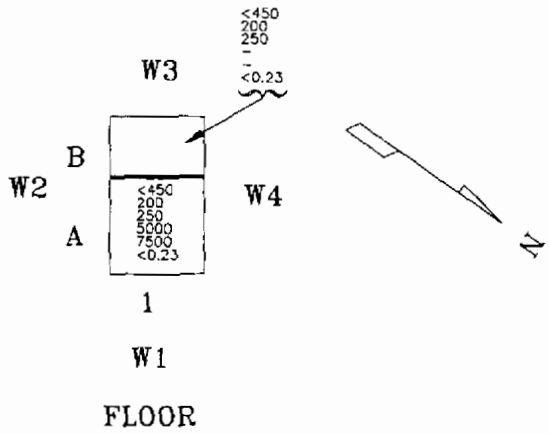
d. Site Map

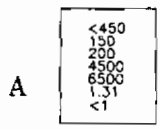


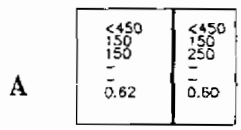
BLDG #1174

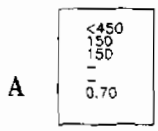
3.27 Bldg. 380-207

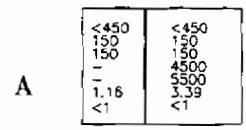
e. Localized Grid Maps











Sample Data

<450 – IM-247/PD Results [μμCi/20cm²]
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]

3.27 Bldg. 380-207

g. After Photograph

Source Storage Area.

3.28 Cofferdam Laydown Area

a. Introduction:

The Cofferdam Laydown Area was located north of Building 79, in grid D-8 of the Charleston Naval Shipyard map (Figure 10). Temporary radioactive material (RAM) storage areas, controlled by roping off the areas, were established within the Cofferdam Laydown Area.

(1) **Description:** The size of the storage area was 110' by 90'. The ground cover is asphalt and concrete in this area.

(2) **Brief History:**

(a) **Use:** This temporary RAM storage area was established in 1994. The area was used as the storage and survey area for portable facilities, such as Refueling Cofferdams, prior to shipping them to another Naval facility.

(b) **Radiological History:** This area has been controlled as a radiation area and a radioactive material storage area. Loose surface contamination levels were maintained less than 450μμCi/100cm^2.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

The Cofferdam Laydown Area was divided into 396 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.

A total of 396 solid material samples were taken from the Cofferdam Laydown Area. Each solid material sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material samples: lead-212, lead-214, thallium-208, bismuth-214, and potassium-40.

Individual backgrounds were used for asphalt and concrete in the Cofferdam Laydown Area. Due to variations in natural radioactivity among construction materials, different background levels exist. The IM-247/PD, IM-253/PD (HV-1

3.28 Cofferdam Laydown Area

PHA and HV-2 GROSS) background of 80, 650, and 15000 counts per minute used for asphalt were based on the radiation levels obtained from the road west of Building 236. The IM-247/PD, IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 45, 375, and 8000 counts per minute used for the concrete were based on the radiation levels obtained form Building 1635.

c. Summary:

Surveys performed with the IM-247/PD did not detect areas greater than 450μμCi/20cm^2.

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

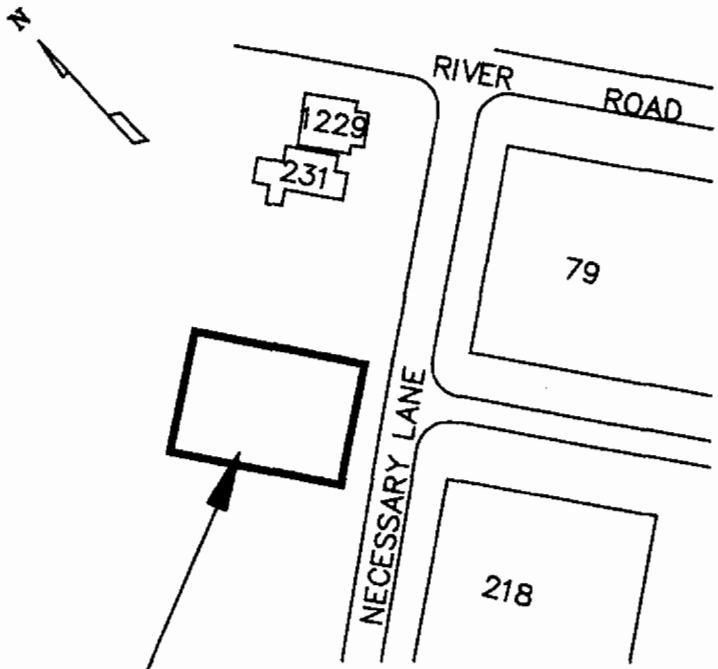
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than minimum detectable activity of 0.32pCi/g to a high of 9.67pCi/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.

3.28 Cofferdam Laydown Area

d. Site Map



3.28 Cofferdam Laydown Area

e. Localized Grid Maps

18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
<450 650 150 – – 0.44	<450 650 150 15000 9500 1.06	<450 650 150 – – 0.51	<450 650 150 15000 5000 0.54	<450 650 200 – – 0.81	<450 650 200 15000 6000 1.39	<450 650 650 – – 2.91	<450 650 750 15000 20000 9.04	<450 650 600 – – 7.55	<450 650 500 15000 17500 7.69	<450 650 650 – – 7.07	<450 650 600 15000 20000 7.22	<450 650 650 – – 8.05	<450 650 750 15000 20000 7.42	<450 650 700 – – 7.58	<450 650 700 15000 15000 8.08	<450 650 650 – – 7.04	<450 650 650 15000 15000 7.59	A
<450 650 150 – – 1.62	<450 650 150 – – 1.77	<450 650 150 – – 1.55	<450 650 150 – – 1.49	<450 650 200 – – 1.91	<450 650 200 – – 1.43	<450 650 400 – – 0.87	<450 650 750 – – 7.01	<450 650 650 – – 7.81	<450 375 400 – – 1.07	<450 650 750 – – 6.26	<450 650 700 – – 6.05	<450 650 700 – – 7.24	<450 650 750 – – 6.54	<450 650 700 – – 7.14	<450 650 700 – – 7.04	<450 650 650 – – 7.74	<450 650 700 – – 7.31	B
<450 650 150 15000 5500 1.07	<450 650 150 – – 0.90	<450 650 150 15000 5000 0.76	<450 650 150 – – 0.39	<450 650 150 15000 5500 0.54	<450 650 150 – – 0.56	<450 650 400 19000 15000 0.92	<450 650 750 – – 7.14	<450 650 650 15000 20000 6.09	<450 650 650 – – 7.03	<450 375 400 8000 8000 1.62	<450 375 400 – – 1.16	<450 375 400 8000 8000 1.33	<450 375 200 – – 1.27	<450 650 750 15000 20000 5.67	<450 650 600 – – 7.42	<450 650 650 15000 20000 7.87	<450 650 750 – – 7.84	C
<450 650 150 – – 7.75	<450 650 150 – – 7.58	<450 650 150 – – 0.92	<450 650 150 – – 0.88	<450 650 175 – – 0.96	<450 650 150 – – 0.62	<450 650 450 – – 1.29	<450 650 750 – – 7.61	<450 650 600 – – 8.00	<450 650 650 – – 2.05	<450 650 650 – – 0.90	<450 650 650 – – 1.10	<450 650 700 – – 8.18	<450 375 250 – – 1.30	<450 375 375 – – 1.48	<450 375 600 – – 1.71	<450 650 700 – – 6.12	<450 650 650 – – 6.72	D
<450 650 250 – – 0.84	<450 650 150 15000 8500 0.76	<450 650 250 – – 0.57	<450 650 200 15000 5000 0.64	<450 650 150 – – 0.86	<450 650 175 15000 5500 1.74	<450 650 650 – – 1.57	<450 650 700 15000 20000 6.50	<450 650 650 – – 7.29	<450 650 800 15000 20000 6.06	<450 650 625 – – 7.38	<450 650 650 15000 20000 6.85	<450 650 650 – – 7.67	<450 650 700 15000 20000 6.81	<450 650 750 – – 6.86	<450 650 750 15000 20000 6.16	<450 650 650 – – 5.59	<450 375 200 8000 7250 9.04	E
<450 650 300 – – 0.54	<450 650 250 – – 0.53	<450 650 250 – – 0.49	<450 650 150 – – 0.46	<450 650 150 – – 0.49	<450 650 650 – – 0.71	<450 650 650 – – 0.73	<450 650 700 – – 7.03	<450 650 650 – – 7.33	<450 650 800 – – 7.36	<450 650 600 – – 7.25	<450 650 600 – – 4.78	<450 650 700 – – 8.28	<450 650 700 – – 7.01	<450 650 650 – – 7.31	<450 650 600 – – 7.04	<450 650 800 – – 7.99	<450 650 550 – – 6.86	F
<450 650 350 15000 9000 0.37	<450 650 250 – – <0.38	<450 650 350 15000 8500 0.79	<450 650 300 – – 7.64	<450 650 100 15000 5000 7.96	<450 650 150 – – 7.39	<450 650 500 15000 15000 1.13	<450 650 700 – – 6.93	<450 650 650 15000 20000 4.71	<450 650 800 – – 6.77	<450 650 600 15000 20000 6.97	<450 650 625 – – 7.93	<450 650 650 15000 17500 7.82	<450 650 500 – – 7.33	<450 650 750 15000 20000 7.53	<450 650 850 – – 7.96	<450 650 850 15000 17500 7.42	<450 650 600 – – 6.71	G
<450 650 350 – – 0.63	<450 650 200 – – <0.34	<450 650 275 – – 0.93	<450 650 200 – – 1.46	<450 650 100 – – 0.79	<450 650 150 – – 0.79	<450 650 400 – – 0.67	<450 650 700 – – 7.24	<450 650 600 – – 7.01	<450 650 700 – – 6.55	<450 650 675 – – 7.13	<450 650 600 – – 0.60	<450 650 700 – – 0.47	<450 650 500 – – <0.41	<450 650 700 – – 7.34	<450 650 650 – – 6.36	<450 650 600 – – 6.41	<450 650 400 – – 7.34	H
<450 650 350 – – <0.36	<450 650 300 15000 9000 <0.32	<450 650 250 – – 0.71	<450 650 150 15000 15000 0.77	<450 650 150 – – 0.78	<450 650 150 15000 5500 1.45	<450 650 650 – – 1.06	<450 650 550 15000 17500 5.73	<450 650 600 – – 7.34	<450 650 800 15000 18000 7.86	<450 650 650 – – 6.36	<450 650 650 15000 15000 7.85	<450 650 650 – – 7.36	<450 650 450 15000 17500 6.70	<450 650 700 – – 6.78	<450 650 650 15000 17500 6.86	<450 650 700 – – 7.29	<450 650 425 15000 12500 7.41	I
<450 650 350 – – 0.96	<450 650 450 – – 2.61	<450 650 250 – – 0.64	<450 650 175 – – 0.91	<450 650 200 – – 1.20	<450 650 150 – – 1.35	<450 650 500 – – 1.05	<450 650 450 – – 7.11	<450 650 700 – – 5.62	<450 650 800 – – 6.79	<450 650 675 – – 6.87	<450 650 700 – – 6.89	<450 650 600 – – 7.85	<450 650 650 – – 7.60	<450 650 700 – – 7.67	<450 650 700 – – 7.46	<450 650 600 – – 7.26	<450 650 550 – – 6.80	J
<450 650 250 15000 8000 0.63	<450 650 250 – – 1.07	<450 650 250 15000 9000 0.59	<450 650 200 – – 0.48	<450 650 200 15000 5500 0.95	<450 650 150 – – 0.89	<450 650 550 15000 15000 1.14	<450 650 500 – – 7.30	<450 650 700 15000 20000 5.37	<450 650 750 – – 7.92	<450 650 650 15000 20000 6.69	<450 650 500 – – 6.53	<450 650 650 15000 17500 7.18	<450 650 700 – – 7.77	<450 650 650 15000 17500 8.55	<450 650 400 – – 2.33	<450 650 600 15000 12500 2.88	<450 650 450 – – 2.25	K

Sample Data

- <450 – IM-247/PD Results (μCi/20cm²)
- 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)

3.28 Cofferdam Laydown Area

e. Localized Grid Maps

18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
<450 650 200 – – 0.62	<450 650 300 – – 1.43 <1	<450 650 200 – – 0.72	<450 650 225 – – 1.51 <1	<450 650 175 – – 1.24 <1	<450 650 250 – – 1.37 <1	<450 650 325 – – 1.06 <1	<450 650 550 – – 8.35 <1	<450 650 800 – – 7.20 <1	<450 650 750 – – 7.80 <1	<450 650 650 – – 7.41 <1	<450 650 600 – – 7.07 <1	<450 650 650 – – 7.91 <1	<450 650 650 – – 7.29 <1	<450 650 600 – – 1.87 <1	<450 650 350 – – 2.18 <1	<450 650 300 – – 1.62 <1	<450 650 450 – – 4.47 <1	L
<450 650 200 – – 0.41	<450 650 220 15000 8000 0.98	<450 650 350 – – 0.77	<450 650 225 15000 5750 0.79	<450 650 275 – – 0.40	<450 650 197 15000 6000 1.15 <1	<450 650 200 – – 0.84	<450 650 500 15000 15000 6.40 <1	<450 650 750 – – 7.89 <1	<450 650 750 15000 17500 7.66 <1	<450 650 650 – – 7.17 <1	<450 650 600 15000 17500 6.60 <1	<450 650 650 – – 7.11 <1	<450 650 650 15000 15000 1.68 <1	<450 650 425 – – 2.68 <1	<450 650 450 15000 17500 1.84 <1	<450 650 425 – – 2.15 <1	<450 650 520 15000 17500 7.71 <1	M
<450 650 150 – – 1.38 <1	<450 650 175 – – 1.29 <1	<450 650 225 – – 0.86	<450 650 250 – – 1.00 <1	<450 650 250 – – 0.59	<450 650 125 – – 1.06 <1	<450 650 200 – – 1.32 <1	<450 650 500 – – 8.02 <1	<450 650 800 – – 7.74 <1	<450 650 700 – – 8.83 <1	<450 650 650 – – 7.22 <1	<450 650 600 – – 7.54 <1	<450 650 450 – – 1.47 <1	<450 650 650 – – 1.14 <1	<450 650 425 – – 1.82 <1	<450 650 650 – – 4.79 <1	<450 650 750 – – 7.48 <1	<450 650 550 – – 6.81 <1	N
<450 650 200 15300 8000 1.10 <1	<450 650 200 – – 2.05 <1	<450 650 250 15000 6500 1.31 <1	<450 650 150 – – 0.77	<450 650 150 15000 6000 0.55	<450 650 250 – – <0.36	<450 650 350 15000 12500 6.08 <1	<450 650 500 – – 7.31 <1	<450 650 600 15000 15000 6.89 <1	<450 650 700 – – 8.87 <1	<450 650 650 15000 20000 7.81 <1	<450 650 550 – – 1.32 <1	<450 650 400 15000 10000 1.60 <1	<450 650 650 – – 1.80 <1	<450 650 700 15000 17500 6.49 <1	<450 650 650 – – 6.97 <1	<450 650 750 15000 17500 7.76 <1	<450 650 850 – – 8.56 <1	O
<450 650 250 – – 0.87	<450 650 300 – – 0.49	<450 650 250 – – 0.98	<450 650 150 – – 0.44	<450 650 200 – – 0.35	<450 650 200 – – 0.65	<450 650 450 – – 4.49 <1	<450 650 650 – – 8.60 <1	<450 650 700 – – 8.13 <1	<450 650 550 – – 7.27 <1	<450 650 450 – – 3.27 <1	<450 650 350 – – 1.57 <1	<450 650 550 – – 1.94 <1	<450 650 650 – – 7.61 <1	<450 650 650 – – 8.08 <1	<450 650 700 – – 7.87 <1	<450 650 675 – – 8.14 <1	<450 655 950 – – 7.68 <1	P
<450 650 250 – – 1.11 <1	<450 650 250 15000 7500 0.42	<450 650 225 – – 0.34	<450 650 200 15000 6500 1.10 <1	<450 650 150 – – 0.81	<450 650 150 15000 6000 1.21 <1	<450 650 400 – – 4.14 <1	<450 650 600 15000 15000 4.43 <1	<450 650 600 – – 3.84 <1	<450 650 400 15000 12500 1.42 <1	<450 650 300 – – 1.76 <1	<450 650 400 15000 15000 2.02 <1	<450 650 700 – – 7.51 <1	<450 650 750 15000 17500 7.98 <1	<450 650 750 – – 7.49 <1	<450 650 750 15000 17500 7.98 <1	<450 650 700 – – 7.24 <1	<450 655 500 15000 15000 7.98 <1	Q
<450 650 275 – – 1.05 <1	<450 650 300 – – 0.56	<450 650 250 – – 0.87	<450 650 200 – – 0.89	<450 650 200 – – 0.79	<450 650 150 – – 0.60	<450 650 450 – – 4.40 <1	<450 650 400 – – 3.77 <1	<450 650 450 – – 1.90 <1	<450 650 550 – – 1.86 <1	<450 650 600 – – 1.60 <1	<450 650 700 – – 7.36 <1	<450 650 700 – – 7.68 <1	<450 650 700 – – 7.62 <1	<450 650 650 – – 6.90 <1	<450 650 600 – – 7.29 <1	<450 650 700 – – 7.09 <1	<450 650 530 – – 8.45 <1	R
<450 650 275 15300 5500 2.30 <1	<450 650 250 – – 1.22 <1	<450 650 200 15000 7000 0.90	<450 650 200 – – 0.83	<450 650 175 15000 5750 0.78	<450 650 150 – – 0.95	<450 650 550 15000 15000 1.75 <1	<450 650 500 – – 1.80 <1	<450 650 400 15000 10000 2.23 <1	<450 650 600 – – 2.08 <1	<450 650 650 – – 7.56 <1	<450 650 700 – – 7.45 <1	<450 650 700 15000 15000 6.80 <1	<450 650 750 – – 8.10 <1	<450 650 700 15000 15000 7.32 <1	<450 650 700 – – 6.97 <1	<450 650 800 15000 17500 7.71 <1	<450 650 600 – – 8.17 <1	S
<450 650 225 – – 1.82 <1	<450 650 250 – – 1.34 <1	<450 650 300 – – 0.94	<450 650 200 – – 1.40 <1	<450 650 175 – – 0.72	<450 650 400 – – 2.07 <1	<450 650 450 – – 2.10 <1	<450 650 500 – – 3.10 <1	<450 650 700 – – 2.54 <1	<450 650 700 – – 1.86 <1	<450 650 700 – – 8.22 <1	<450 650 750 – – 7.72 <1	<450 650 750 – – 7.44 <1	<450 650 800 – – 7.81 <1	<450 650 800 – – 7.73 <1	<450 650 750 – – 8.23 <1	<450 650 800 – – 7.32 <1	<450 650 800 – – 6.80 <1	T
<450 650 275 – – 0.96	<450 650 250 15000 10000 1.09 <1	<450 650 250 – – 0.73	<450 650 250 15000 7000 0.79	<450 650 300 – – 1.54 <1	<450 650 400 15000 9000 2.12 <1	<450 650 400 – – 1.55 <1	<450 650 600 15000 15000 4.50 <1	<450 650 700 – – 6.90 <1	<450 650 750 15000 17500 7.62 <1	<450 650 750 – – 7.52 <1	<450 650 750 15000 17500 7.06 <1	<450 650 750 – – 6.08 <1	<450 650 750 15000 15000 6.90 <1	<450 650 800 – – 7.31 <1	<450 650 700 15000 17500 7.25 <1	<450 650 800 – – 7.17 <1	<450 650 825 15000 15000 6.52 <1	U
<450 650 650 15000 20000 5.78 <1	<450 650 800 – – 5.91 <1	<450 650 650 15000 17500 0.88	<450 650 650 – – 2.02 <1	<450 650 650 15000 8000 1.44 <1	<450 650 650 – – 2.11 <1	<450 650 650 15000 17500 1.83 <1	<450 650 650 – – 8.18 <1	<450 650 750 15000 17500 6.35 <1	<450 650 750 – – 6.48 <1	<450 650 750 15000 20000 5.84 <1	<450 650 700 – – 9.62 <1	<450 650 700 15000 15000 7.29 <1	<450 650 750 – – 6.90 <1	<450 650 750 15000 15000 7.61 <1	<450 650 750 – – 7.68 <1	<450 650 750 15000 17500 7.57 <1	<450 650 600 – – 7.61 <1	V

N

Sample Data

- <450 – IM-247/PD Results [μμC/20cm²]
- 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]

3.28 Cofferdam Laydown Area

f. Prior Photographs

Cofferdam Laydown Area

3.28 Cofferdam Laydown Area

g. After Photographs

Cofferdam Laydown Area

3.29 Dry Dock 4 Spent Fuel Storage Area

a. Introduction:

The Spent Fuel Storage Area is located in grid D-10 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:**

This area consists of a fenced area approximately 30' by 300'. The ground covering is asphalt and concrete.

(2) **Brief History:**

(a) **Use:** This area was used for storage of spent fuel cask rail cars prior to shipment.

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

(3) **Survey Requirements:**

Group 3 and Group 2 surveys were performed in this storage area.

b. Discussion:

Group 3 survey areas were divided into approximately 5' by 5' sections where physically possible. One hundred percent of all 5' by 5' grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25% of all 5' by 5' grids was surveyed using the IM-253/PD (HV-2 GROSS).

Group 2 survey areas were divided into approximately 10' by 10' grids. Where physically possible, each grid contained two 3' by 3' subsections which were located in areas of highest potential for contamination. One of these subsections was surveyed using the IM-247/PD and the other using the IM-253/PD (HV-1 PHA).

Solid material samples were taken from each 5' by 5' grid. Additionally, solid material samples were also taken from each 3' by 3' subsection that resulted in levels greater than or equal to twice background with the IM-253/PD.

The Dry Dock #4 Spent Fuel Storage Area was divided into four hundred and twenty 5' by 5' grids and twenty-nine 10' by 10' grids.

Individual backgrounds were used for this radioactive material storage area. This area is constructed primarily of concrete and asphalt. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the

concrete pours were 40, 200, and 4000 counts per minute respectively. These radiation levels were based upon background levels obtained from the Pier K Quay Wall. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the asphalt pours were 60, 350, and 7500 counts per minute respectively. These radiation levels were also based upon background levels obtained from the Pier K Quay Wall.

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

c. Summary:

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

Surveys performed with the IM-253/PD (HV-1 PHA) detected eight 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.

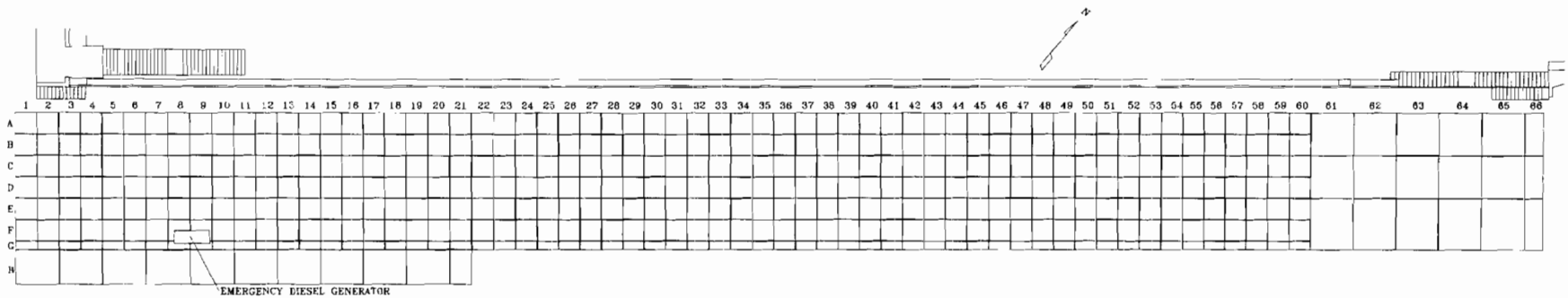
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.49 pCi/g to a high of 7.12 pCi/g.

Analysis performed on initial solid material samples with the MCA for specific cobalt 60 indicated two solid material samples exceeding 1 pCi/g at grid locations D-49 and D-51.

The extent of the contamination was identified by taking additional solid material samples in the surrounding vicinity. Remediation consisted of the excavation of an area approximately 13' by 39'. The concrete areas were removed to a minimum depth of 1/2" whereas the asphalt areas were completely removed. Following remediation, additional solid material samples were taken in the area and all were less than 1 pCi/g specific Co-60.

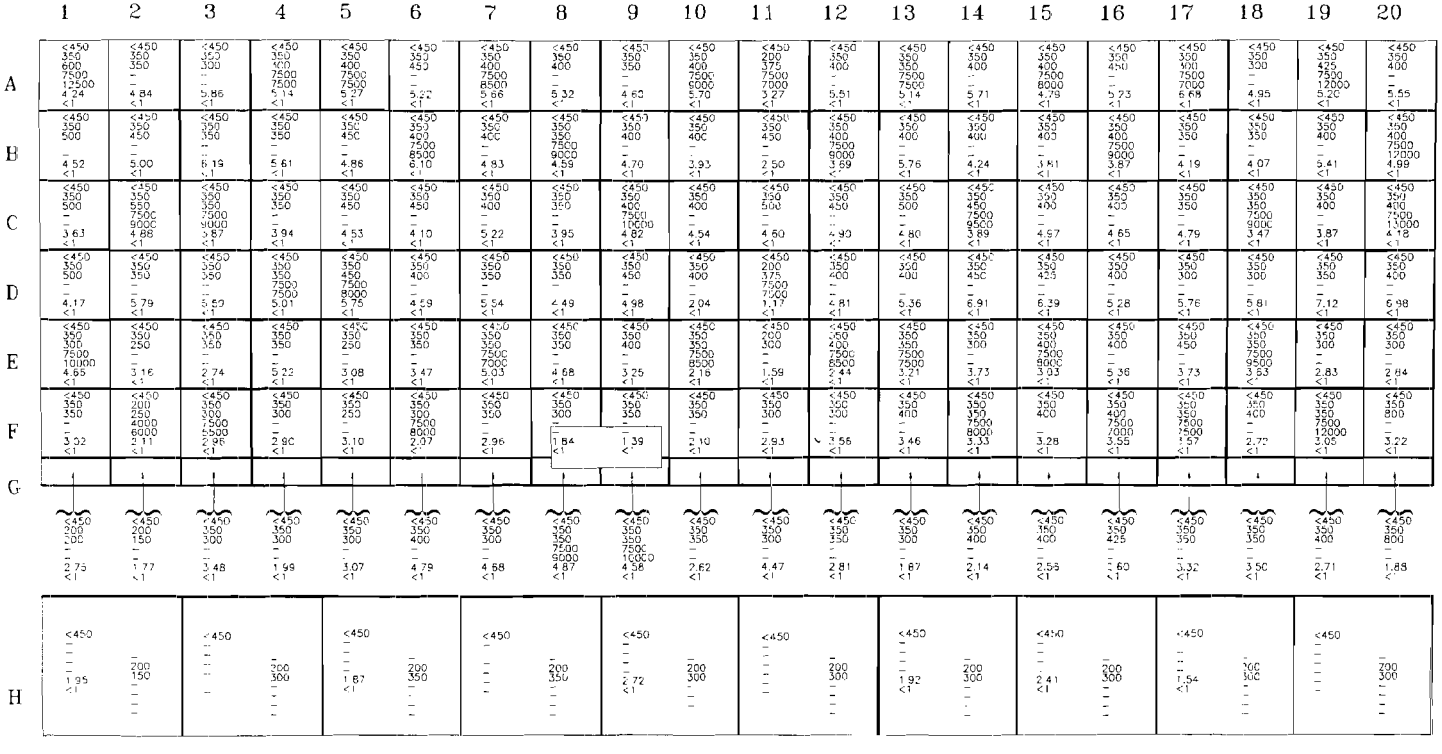
3.29 Dry Dock 4 Spent Fuel Storage Area

d. Overall Grid Map



3.29 Dry Dock 4 Spent Fuel Storage Area

e. Localized Grid Maps

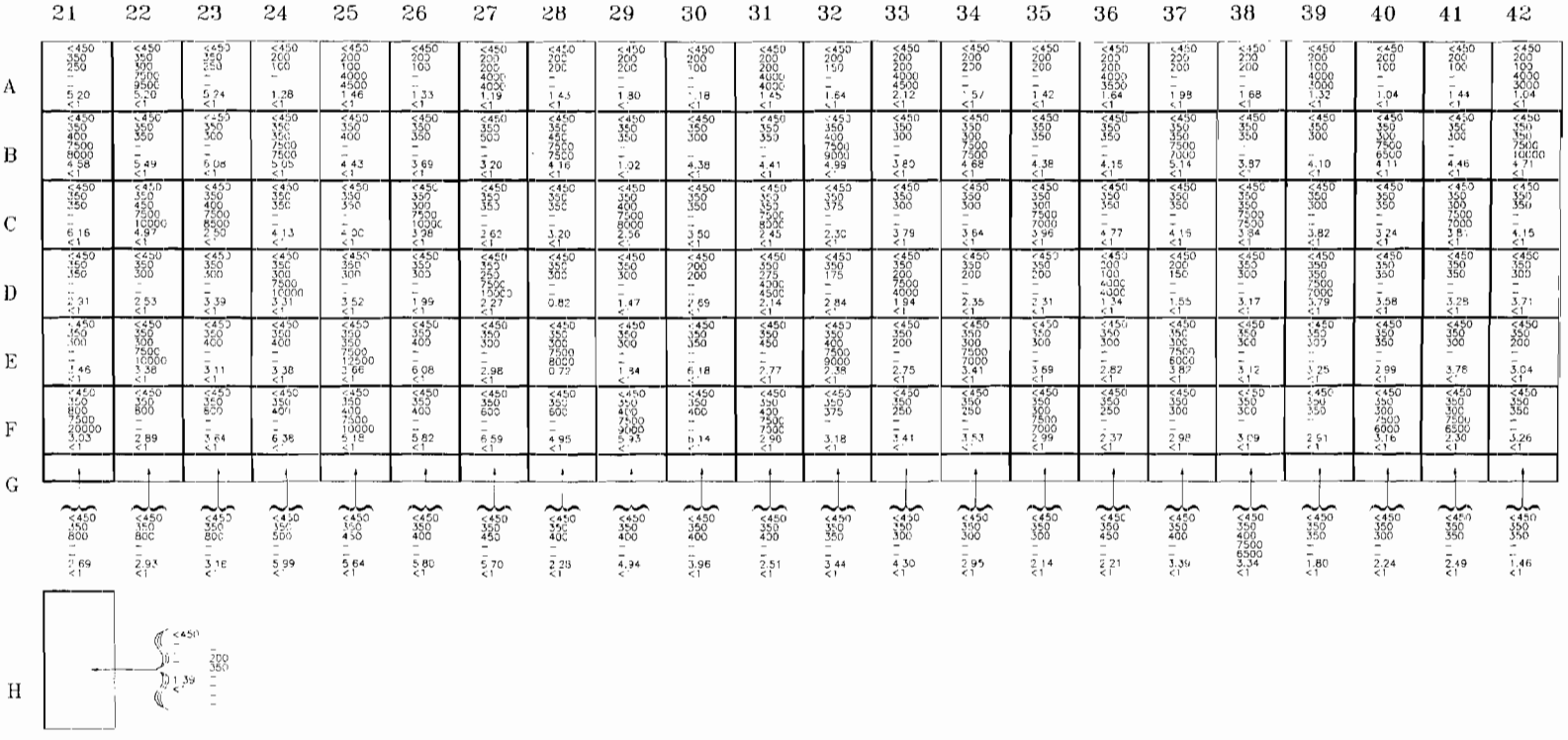


Sample Data

<450 – IM-247/PD Results [μμCi/20cm²]
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]

3.29 Dry Dock 4 Spent Fuel Storage Area

e. Localized Grid Maps

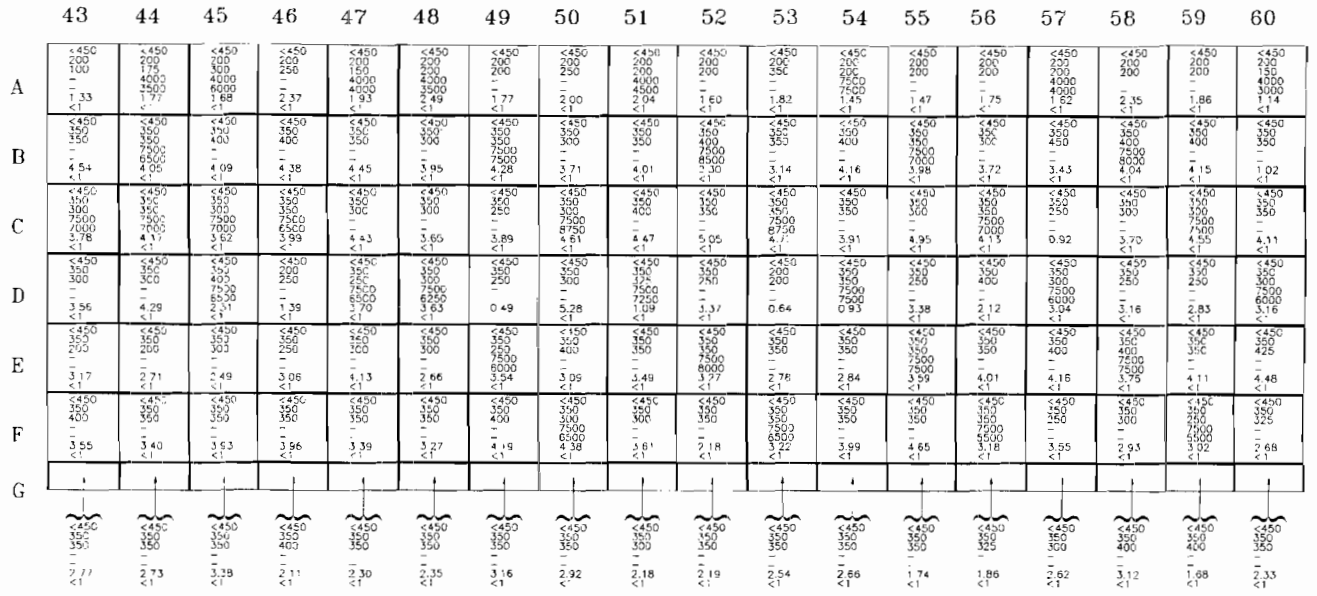


Sample Data

< 450 – IM-247/PD Results: [μC/20cm²]
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]

3.29 Dry Dock 4 Spent Fuel Storage Area

e. Localized Grid Maps

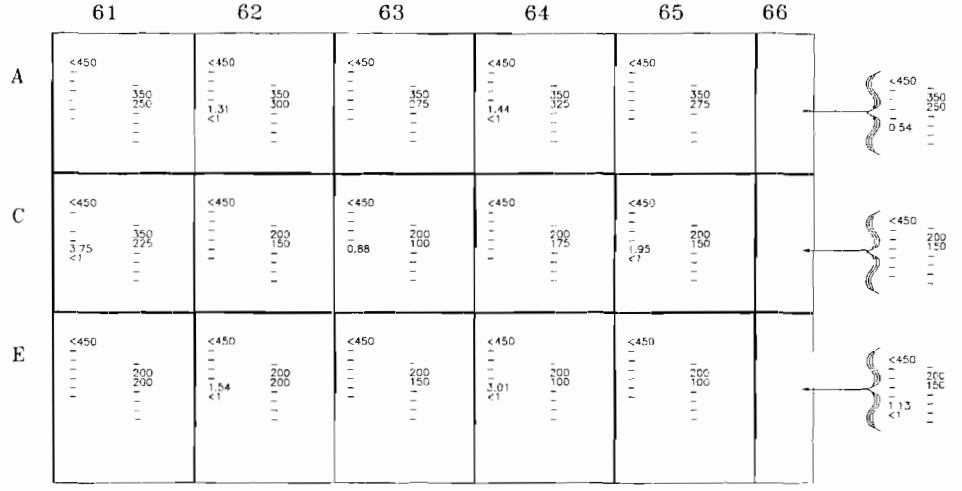


Sample Data

- <450 – IM-247/PD Results [μg/Cu/20cm²]
- 200 – IM-253/PD (HV-1 PHA) [bkg]
- 300 – IM-253/PD (HV-1 PHA) [cpm]
- 7300 – 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]

3.29 Dry Dock 4 Spent Fuel Storage Area

e. Localized Grid Maps



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

3.29 Dry Dock 4 Spent Fuel Storage Area

f. Prior to Photographs

Head of storage area.

3.29 Dry Dock 4 Spent Fuel Storage Area

g. During Photographs

Before Remediation, viewing west.

3.29 Dry Dock 4 Spent Fuel Storage Area

h. During Photographs

During remediation, viewing grid E53.

3.29 Dry Dock 4 Spent Fuel Storage Area

h. After Photographs

Gate entrance.

3.29 Dry Dock 4 Spent Fuel Storage Area

h. After Photographs

Viewing remediation grids.

3.30 Dry Dock 5, S5G Refueling Foundations

a. Introduction:

The S5G Refueling Foundations are located between Dry dock 5 and Building 247, in grid D-7 of the Charleston Naval Shipyard map (figure 10).

(1) **Description:** There are three concrete foundations in this area, ranging from approximately 20' wide by 20' long to 20' wide by 40' long.

(2) **Brief History:**

(a) **Use:** Portable facilities including a change area, dockside refueling enclosure, and a controlled storage area were mounted on these foundations to support refueling and overhaul of the USS NARWHAL in the late 1980s.

(b) **Radiological History:** These areas were controlled as radiologically controlled areas while in use. The facilities had metal floors. Loose surface contamination levels were maintained less than $450\mu\mu Ci/100cm^2$.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

The Dry Dock 5 S5G Refueling Facility Foundations, "A", "B", and "C" were divided into a total of 100 grids measuring approximately 5' by 5'. 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% 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 100 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.

The construction material present in the S5G Foundations was cement. For these areas, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 75 counts per minute, and an IM-253/PD (HV-2 GROSS) background of 4000 counts per minute were based on background radiation levels obtained from Building 1489.

c. Summary:

3.30 Dry Dock 5, S5G Refueling Foundations

Surveys performed with the IM-247/PD did not detect areas greater than 450μμCi/20cm^2.

Surveys performed with the IM-253/PD (HV-1 PHA) detected 62 areas greater than or equal to twice background.

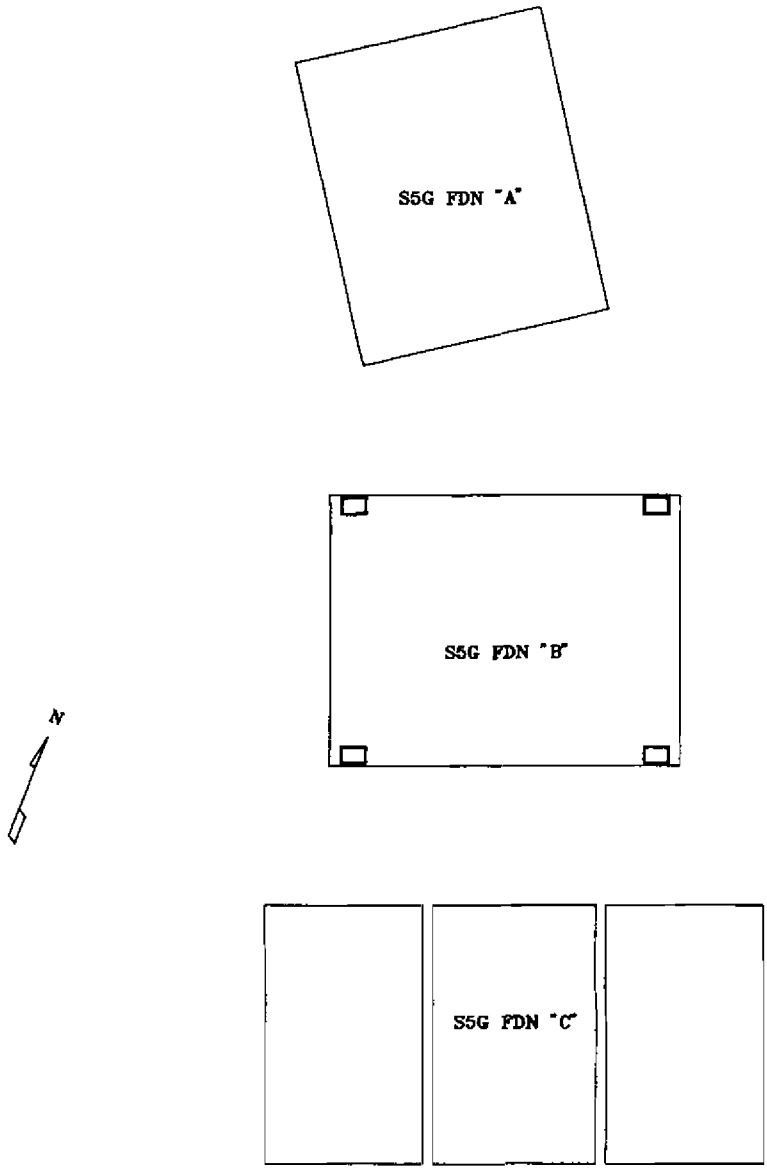
Surveys performed with the IM-253/PD (HV-2 GROSS) detected two areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.59 pCi/g to a high of 2.10 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.

3.30 Dry Dock 5, S5G Refueling Foundations

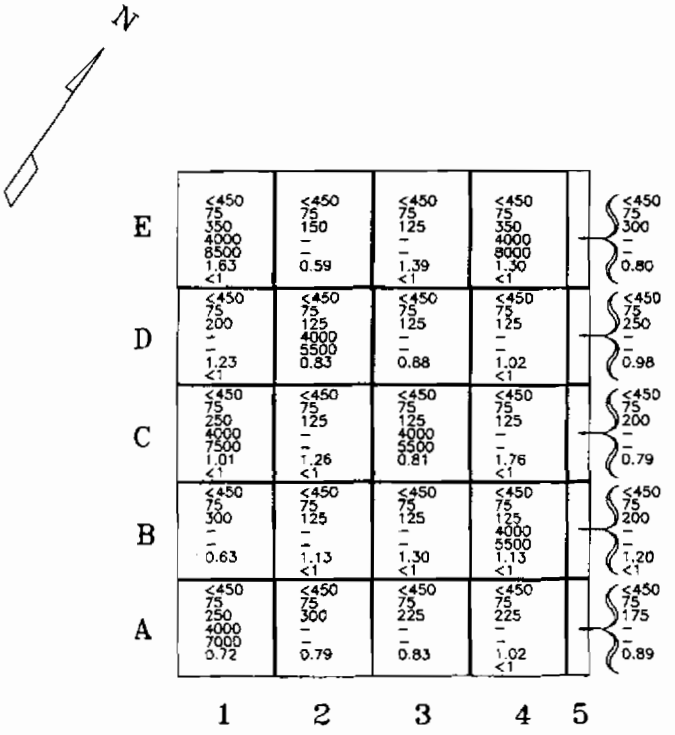
d. Site Map



DRYDOCK 5

3.30 Dry Dock 5, S5G Refueling Foundations

e. Localized Grid Maps

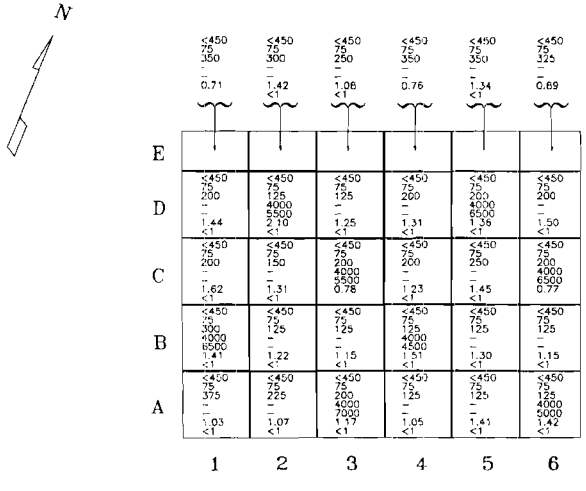


S5G FDN "A"

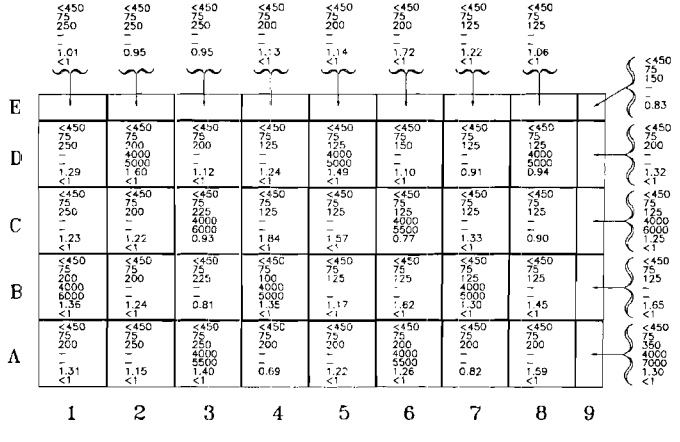
Sample Data
<450 – IM-247/PD Results [μμCi/20cm²]
200 – IM-253/PD (HV-1 PHA) [bkg.]
300 – IM-253/PD (HV-1 PHA) [cpm]
7000 – IM-253/PD (HV-2 GROSS) [bkg.]
7300 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.30 Dry Dock 5, S5G Refueling Foundations

e. Localized Grid Maps



S5G FDN "B"



S5G FDN "C"

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

3.30 Dry Dock 5, S5G Refueling Foundations

f. Prior to Survey Photograph

Foundation "A" Facing South

3.30 Dry Dock 5, S5G Refueling Foundations

f. Prior Photograph

Foundation "B" Facing East

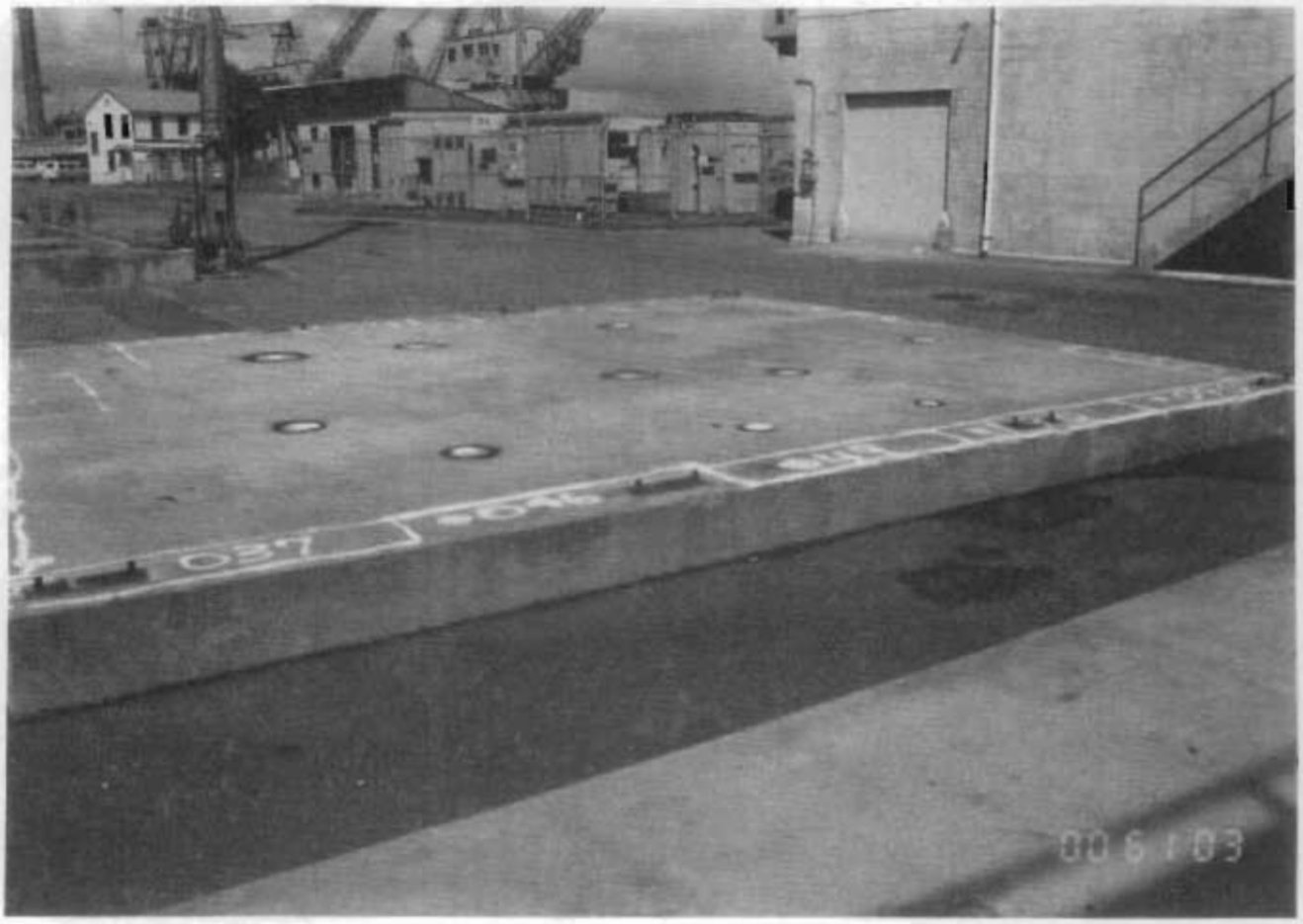
3.30 Dry Dock 5, S5G Refueling Foundations

f. Prior Photograph

Foundation "C" Facing North

3.30 Dry Dock 5, S5G Refueling Foundations

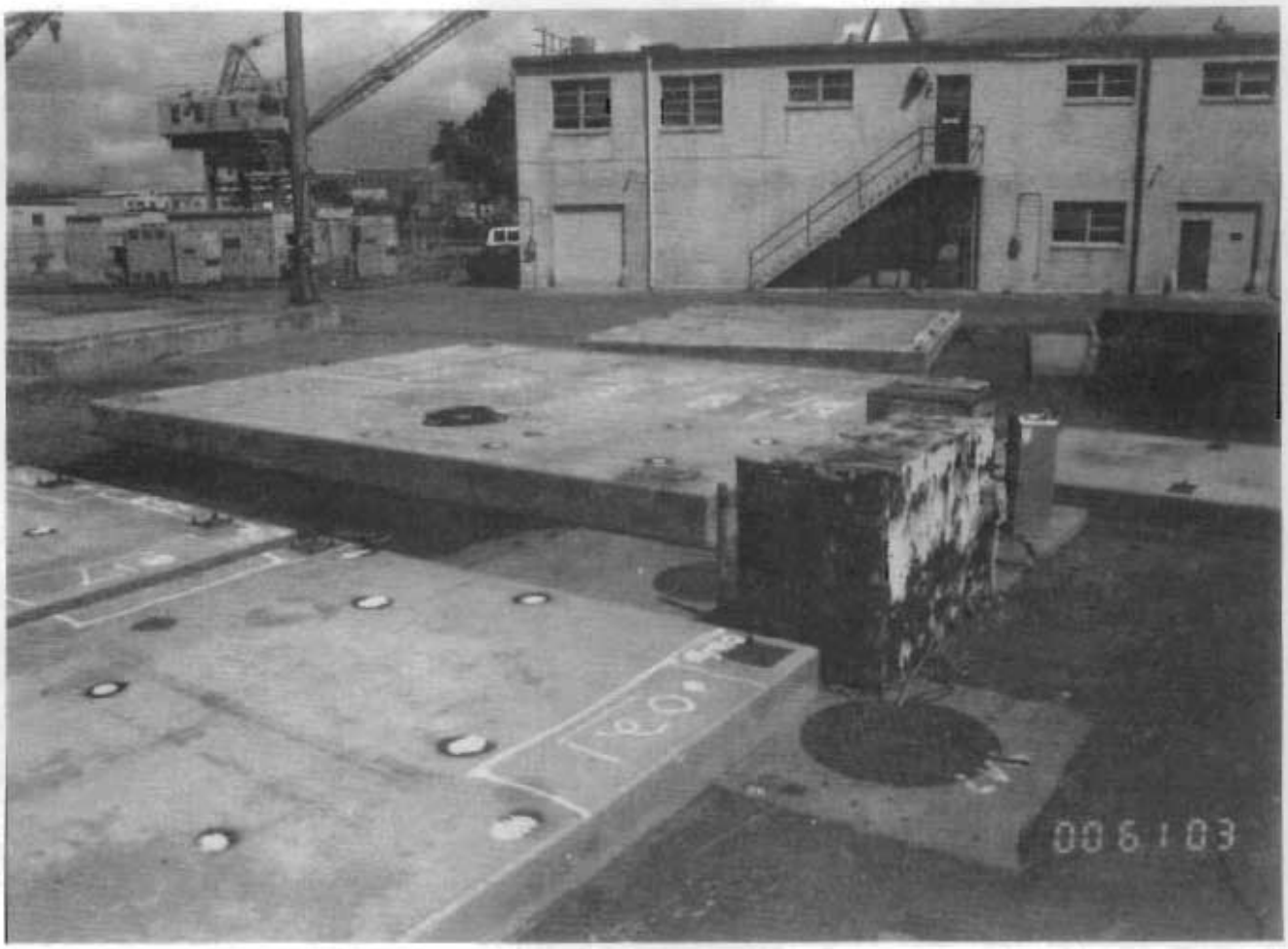
g. After Photograph



Foundation "A" Facing West

3.30 Dry Dock 5, S5G Refueling Foundations

g. After Photograph



Foundation "B" Facing North

3.30 Dry Dock 5, S5G Refueling Foundations

g. After Survey Photograph

Foundation "C" Facing West

3.31 Dry Dock 5 Miscellaneous RAM Storage Areas

a. Introduction:

Dry Dock 5 Miscellaneous Radioactive Material (RAM) Storage Areas were located north of Dry Dock 5 between Building 247 and the Cooper River, in grid D-7 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:** Dry Dock 5 High Rad Fort T-Block Area, Store House Number 2 and Nucleonics Laboratory, and Hull House Laydown Area were RAM storage areas which typically consisted of radiation areas roped off as necessary to control access. The ground cover is asphalt and concrete in these areas.

(2) **Brief History:**

(a) **Use:** Temporary radioactive material storage areas have been established in areas adjacent to Dry Dock 5 to support work on the nuclear powered vessels during availability in the dry dock. They were used for temporary storage of radioactive material which included ship's components.

(b) **Radiological History:** These areas were controlled as radiation areas and RAM storage areas. Loose surface contamination levels were maintained less than 450 $\mu\mu Ci/100cm^2$.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

Dry Dock 5 Miscellaneous RAM Storage Areas were divided into a total of 114 grids, approximately 5' by 5' in size: the T-Block Area had 48 grids, the Nucleonics Laboratory Area had 36 grids, and the Laydown Area had 30 grids. Each grid had its own unique designator.

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

A total of 114 solid material samples were taken from these 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, potassium 40, beryllium 7.

3.31 Dry Dock 5 Miscellaneous RAM Storage Areas

Individual backgrounds were used for the Dry Dock 5 Miscellaneous RAM Storage Areas. For the asphalt portion, an IM-247/PD background of 100 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 12000 counts per minute were based on background radiation levels obtained from Building 1648 Road. For the cement portion an IM-247/PD background of 40 count 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 the background radiation levels obtained from Building 1605.

c. Summary:

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

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

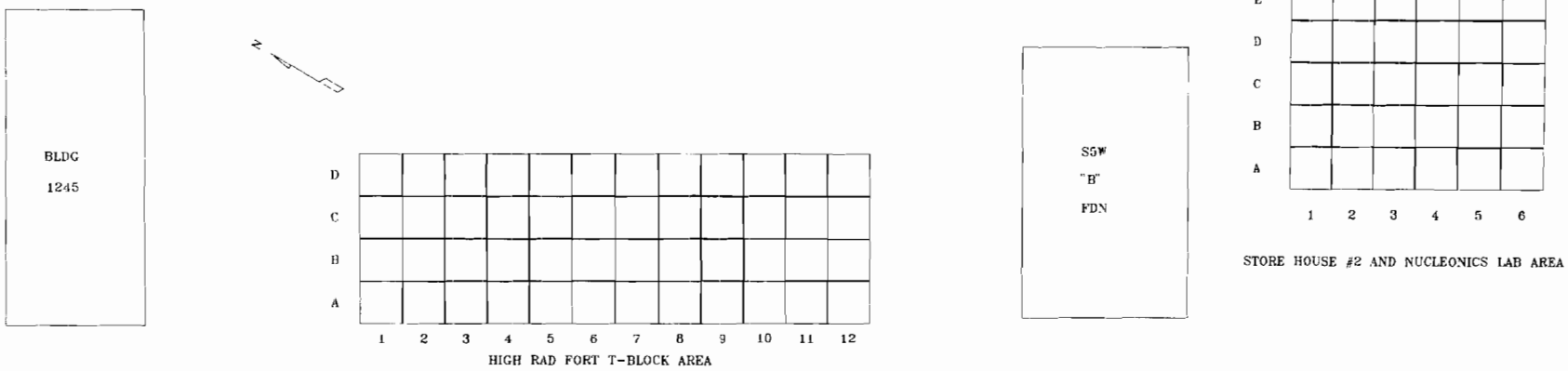
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.59 pCi/g to a high of 8.39 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.

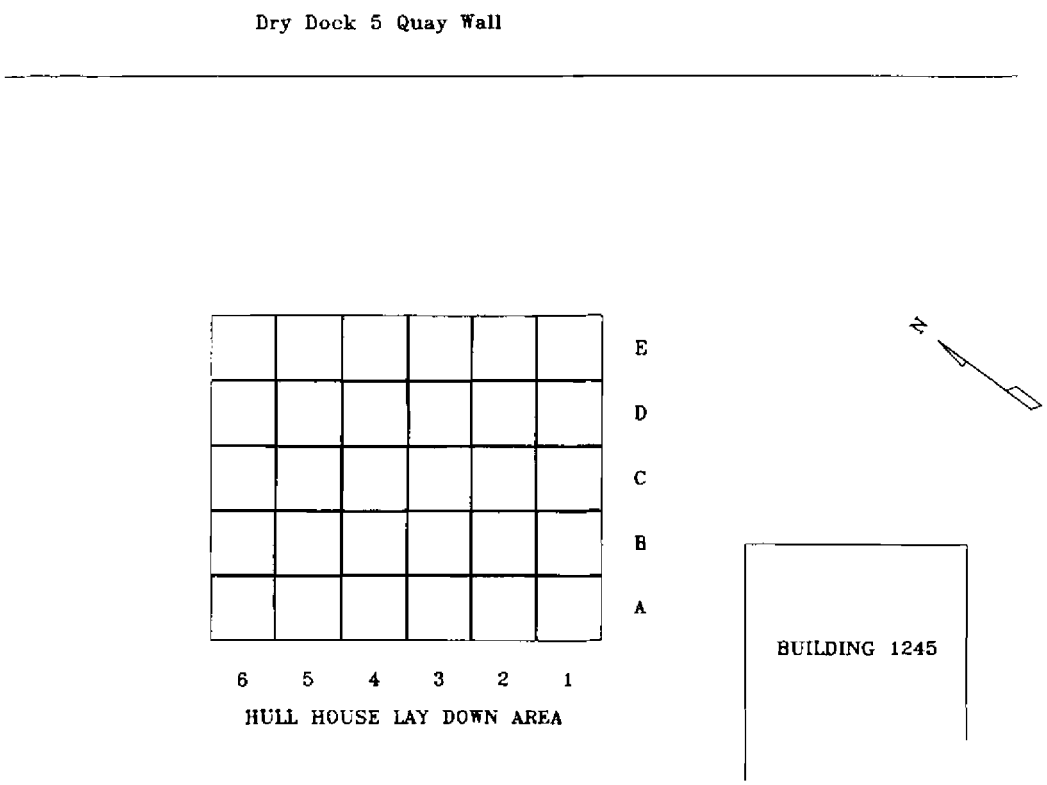
3.31 Dry Dock 5 Miscellaneous RAM Storage Areas

d. Overall Site Maps



3.31 Dry Dock 5 Miscellaneous RAM Storage Areas

e. Overall Site Map



3.31 Dry Dock 5 Miscellaneous RAM Storage Areas

e. Localized Grid Maps

	1	2	3	4	5	6	7	8	9	10	11	12
D	<450 400 600 – – 6.27 <1	<450 400 600 – – 6.20 <1	<450 400 650 – – 1.34 <1	<450 400 600 – – 1.74 <1	<450 400 600 – – 3.94 <1	<450 400 600 – – 4.36 <1	<450 400 750 – – 8.28 <1	<450 400 700 – – 7.30 <1	<450 400 650 – – 7.42 <1	<450 400 700 – – 4.04 <1	<450 400 600 – – 4.41 <1	<450 400 600 – – 3.80 <1
C	<450 400 600 12000 15000 7.36 <1	<450 400 600 – – 7.01 <1	<450 400 650 12000 15000 7.46 <1	<450 400 650 – – 4.20 <1	<450 400 600 12000 15000 3.97 <1	<450 400 600 – – 3.81 <1	<450 400 750 12000 15000 7.08 <1	<450 400 750 – – 6.85 <1	<450 400 750 12000 15000 6.38 <1	<450 400 750 – – 7.06 <1	<450 400 750 12000 15000 4.59 <1	<450 400 550 – – 4.01 <1
B	<450 400 700 – – 7.36 <1	<450 400 750 – – 7.58 <1	<450 400 700 – – 7.10 <1	<450 400 750 – – 6.73 <1	<450 400 700 – – 7.83 <1	<450 400 700 – – 7.06 <1	<450 400 650 – – 7.69 <1	<450 400 600 – – 7.54 <1	<450 400 600 – – 7.52 <1	<450 400 550 – – 6.75 <1	<450 400 500 – – 7.41 <1	<450 400 550 – – 7.11 <1
A	<450 400 750 12000 15000 7.27 <1	<450 400 700 – – 6.08 <1	<450 400 650 12000 15000 7.20 <1	<450 400 700 – – 7.13 <1	<450 400 700 12000 15000 6.39 <1	<450 400 700 – – 6.21 <1	<450 400 650 12000 15000 6.53 <1	<450 400 650 – – 7.40 <1	<450 400 550 12000 15000 6.51 <1	<450 400 600 – – 6.01 <1	<450 400 550 12000 15000 7.06 <1	<450 400 550 – – 6.89 <1

HIGH RAD FORT T–BLOCK AREA

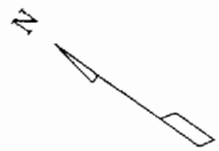
	1	2	3	4	5	6
F	<450 400 600 – – 7.02 <1	<450 400 550 – – 6.29 <1	<450 400 550 – – 6.77 <1	<450 400 650 12000 17500 6.39 <1	<450 400 650 – – 5.74 <1	<450 400 650 – – 5.64 <1
E	<450 400 700 12000 17500 6.58 <1	<450 400 600 – – 6.12 <1	<450 400 600 – – 5.66 <1	<450 400 600 – – 7.23 <1	<450 400 600 – – 7.17 <1	<450 400 700 – – 6.86 <1
D	<450 400 700 – – 6.29 <1	<450 400 700 – – 6.54 <1	<450 400 700 – – 6.61 <1	<450 400 600 12000 15000 7.42 <1	<450 400 600 – – 6.47 <1	<450 400 600 – – 6.42 <1
C	<450 400 750 12000 20000 6.73 <1	<450 400 600 – – 6.44 <1	<450 400 600 12000 20000 5.83 <1	<450 400 600 – – 6.43 <1	<450 400 600 – – 6.90 <1	<450 400 600 12000 17500 6.38 <1
B	<450 400 600 – – 6.01 <1	<450 400 650 – – 6.58 <1	<450 400 650 – – 6.25 <1	<450 400 600 12000 15000 6.63 <1	<450 400 575 – – 5.66 <1	<450 400 600 – – 6.51 <1
A	<450 400 550 12000 20000 6.39 <1	<450 400 500 – – 5.15 <1	<450 400 550 12000 20000 6.82 <1	<450 400 600 – – 5.41 <1	<450 400 600 – – 6.90 <1	<450 400 600 12000 15000 6.54 <1

STORE HOUSE #2 AND NUCLEONICS LAB AREA

Sample Data
<450 – IM-247/PD Results [$\mu\mu$Cv/20cm^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.]
7500 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.31 Dry Dock 5 Miscellaneous RAM Storage Areas

e. Localized Grid Map



<450 150 150 – – 0.99	<450 150 150 – – 1.15 <1	<450 150 125 4000 3750 0.59	<450 150 200 – – 0.89	<450 150 200 – – 0.96	<450 150 200 4000 4000 0.68
<450 150 75 – – 0.71	<450 150 150 – – 0.80	<450 150 125 – – 0.85	<450 150 100 – – 0.91	<450 150 75 – – 1.82 <1	<450 150 150 – – 1.64 <1
<450 150 100 – – 1.92 <1	<450 150 150 – – 1.63 <1	<450 150 100 4000 4000 1.49 <1	<450 150 100 – – 1.97 <1	<450 150 150 – – 2.27 <1	<450 150 100 4000 4000 1.80 <1
<450 150 100 4000 4000 1.59 <1	<450 150 200 – – 1.78 <1	<450 150 150 – – 1.55 <1	<450 150 150 4000 4000 0.83	<450 150 200 – – 4.00 <1	<450 150 175 – – 1.69 <1
<450 150 150 – – 1.24 <1	<450 150 200 – – 2.23 <1	<450 150 150 4000 4000 1.94 <1	<450 150 150 – – 1.21 <1	<450 150 150 – – 1.19 <1	<450 150 200 4000 4500 1.90 <1

E D C B A

6 5 4 3 2 1

HULL HOUSE LAYDOWN AREA

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

3.31 Dry Dock 5 Miscellaneous RAM Storage Areas

f. After Photographs

Store House #2 and Nucleonics Lab Area.

3.31 Dry Dock 5 Miscellaneous RAM Storage Areas

f. After Photographs

Hull House Laydown Area.

3.31 Dry Dock 5 Miscellaneous RAM Storage Areas

f. After Photographs

High Rad Fort T-Block Area.

3.32 S6G Refueling Facility Foundations

a. Introduction

The S6G Refueling Facility Foundations are located in grid C-6 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:**

These concrete foundations are typically 20' wide by 20' long. Asphalt areas adjacent to the foundations enclosed an area of 150' x 104'.

(2) **Brief History:**

(a) **Use:** Portable facilities including a change area, dockside refueling enclosure, and a controlled storage area were mounted on these foundations to support refueling and overhaul of 688 class submarines.

(b) **Radiological History:** These areas were controlled as Radiological Control Areas while in use. The facilities had metal floors. Loose surface contamination levels were maintained less than 450 μμCi/100cm^2.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

S6G Refueling Facility Foundation slabs were divided into 246 grids. The adjacent areas were divided into 470 grids for a total of 716 grids measuring approximately 5' x 5'. Each grid had its own unique designator.

One hundred percent of all grids were surveyed with the IM-247/PD and IM-253/PD (HV-1 PHA). A minimum of 25% of all grids were surveyed with the IM-253/PD (HV-2 GROSS). Solid material samples were taken from each grid with the exception of grid number A-1 of the adjacent asphalt areas which was unpainted metal.

A total of 715 solid material samples were taken from these 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, potassium 40, thallium 208, and bismuth 214.

The construction material present in the S6G Refueling Facility Foundations is concrete and the adjacent areas is asphalt. Due to variations in natural radioactivity among the construction materials, different background levels exist.

3.32 S6G Refueling Facility Foundations

For the S6G Training Base Slab, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 50, 140, and 5250 counts per minute were based on pre-construction surveys. For the OHRE Slab, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 50, 350, and 10000 counts per minute were based on pre-construction surveys. For the Change House/ Frisk Area Slabs, Alternate Exhaust Slab, RAE/Training Base Ventilation Slab, Vertical Stairwell #2 Base, DRE #1 Slab, DRE #1 Ventilation Slab, Storage Enclosure #1 exterior walls, A/C Slab, and Storage Enclosure #2 Slab, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 400, and 15000 counts per minute were based on background radiation levels obtained from Building 417 deck. For the adjacent asphalt areas, the IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 80, 400, 12000 counts per minute were based on background radiation levels obtained from Building 1648.

c. Summary:

Surveys performed with the IM-247/PD did not detect areas greater than 450μμCi/20cm^2.

Surveys performed with the IM-253/PD (HV-1 PHA) detected 19 areas greater than or equal to twice background.

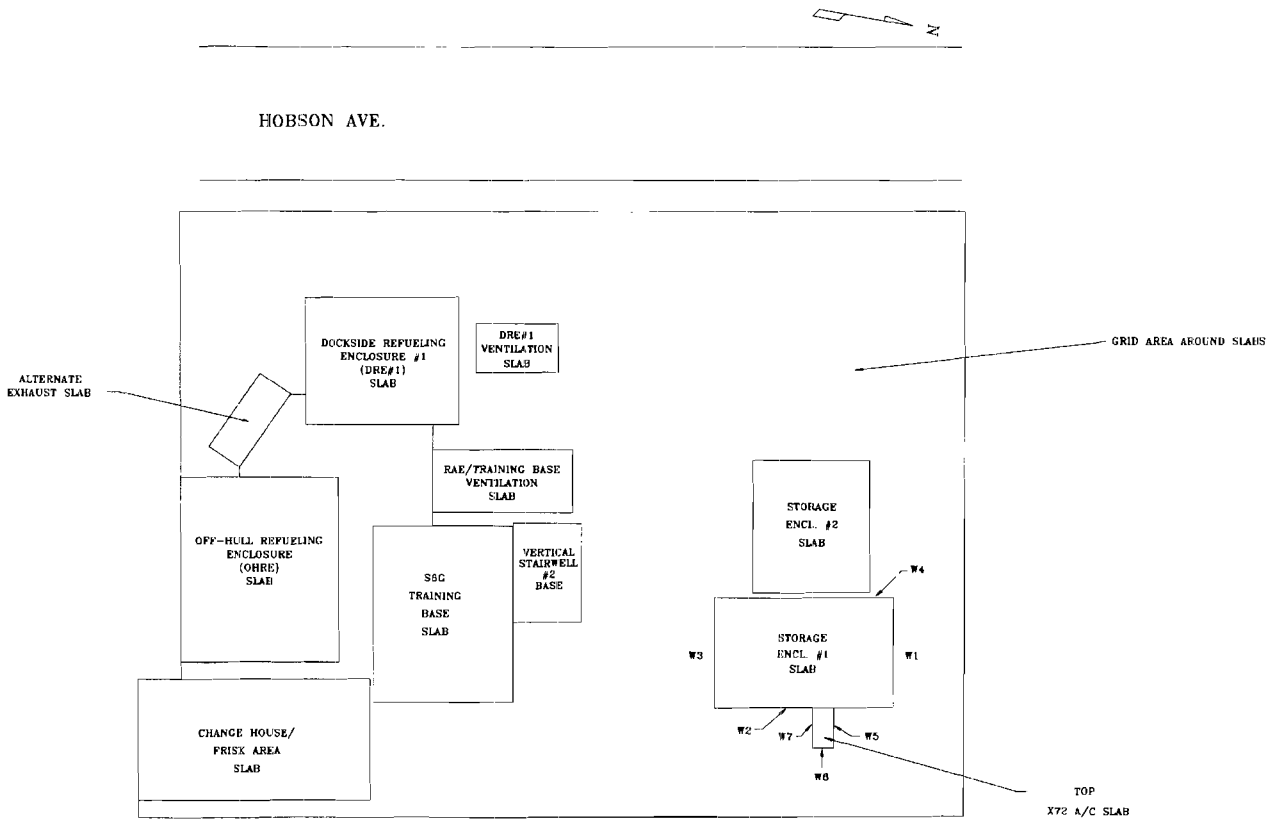
Surveys performed with the IM-253/PD (HV-2 GROSS) detected two areas greater than or equal to twice background.

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 0.28 pCi/g to a high of 15.25 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.

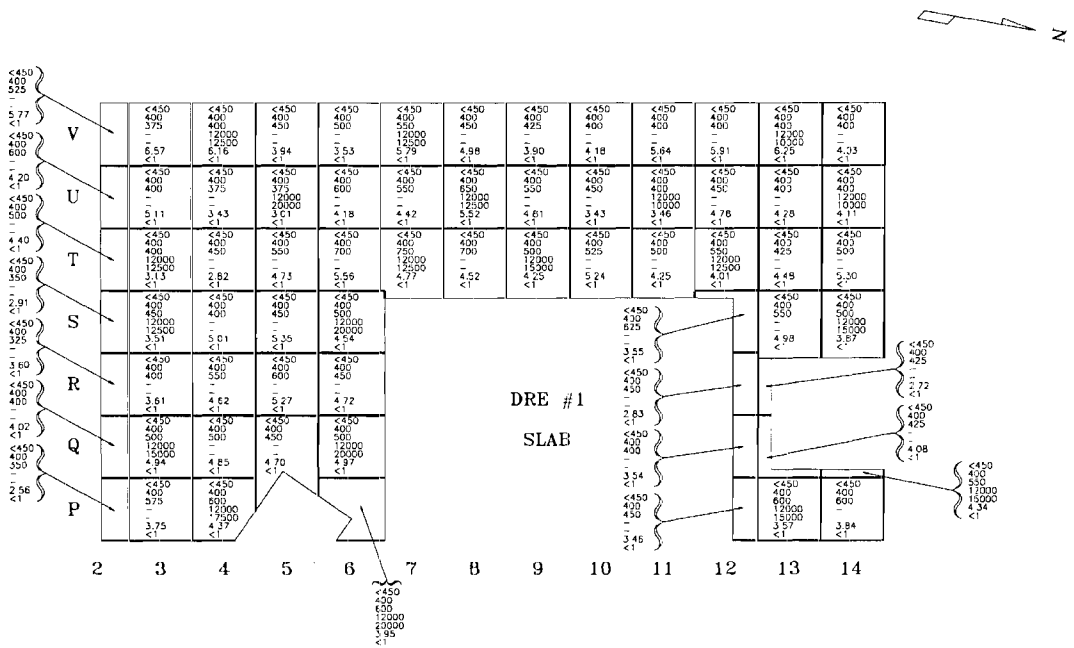
3.32 S6G Refueling Facility Foundations

d. Site Map



3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, S6G Refueling Slabs Adjacent Asphalt Areas

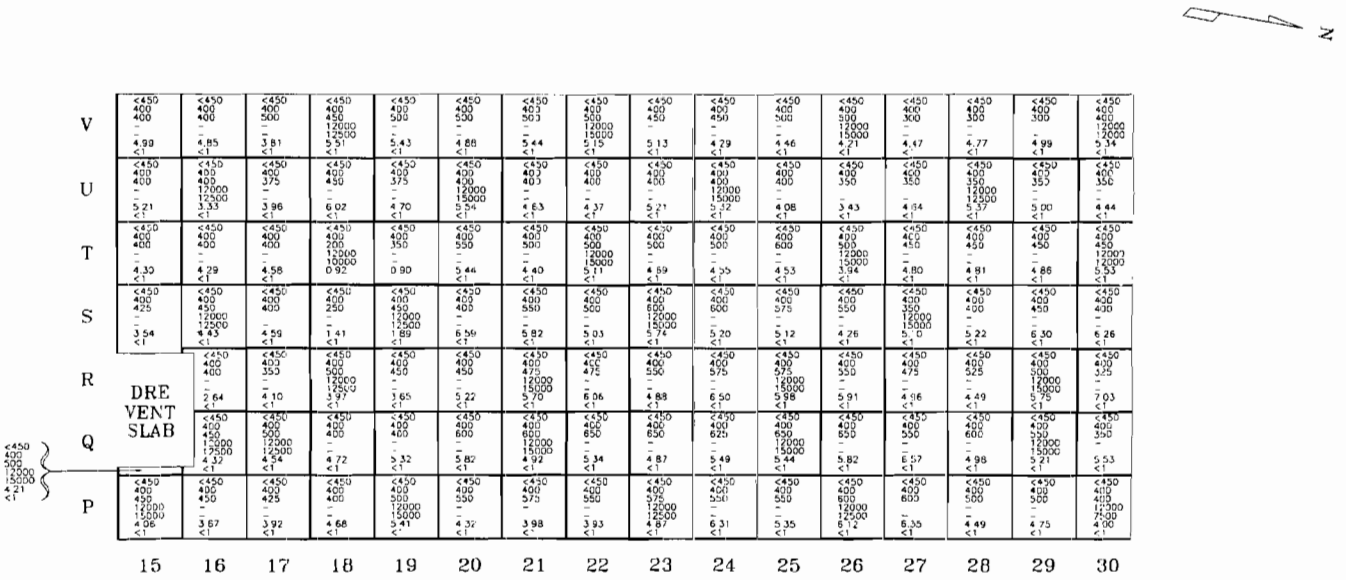


Sample Data

- <450 – IM-247/PD Results [µµCi/20cm²]
- 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]

3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, S6G Refueling Slabs Adjacent Asphalt Areas

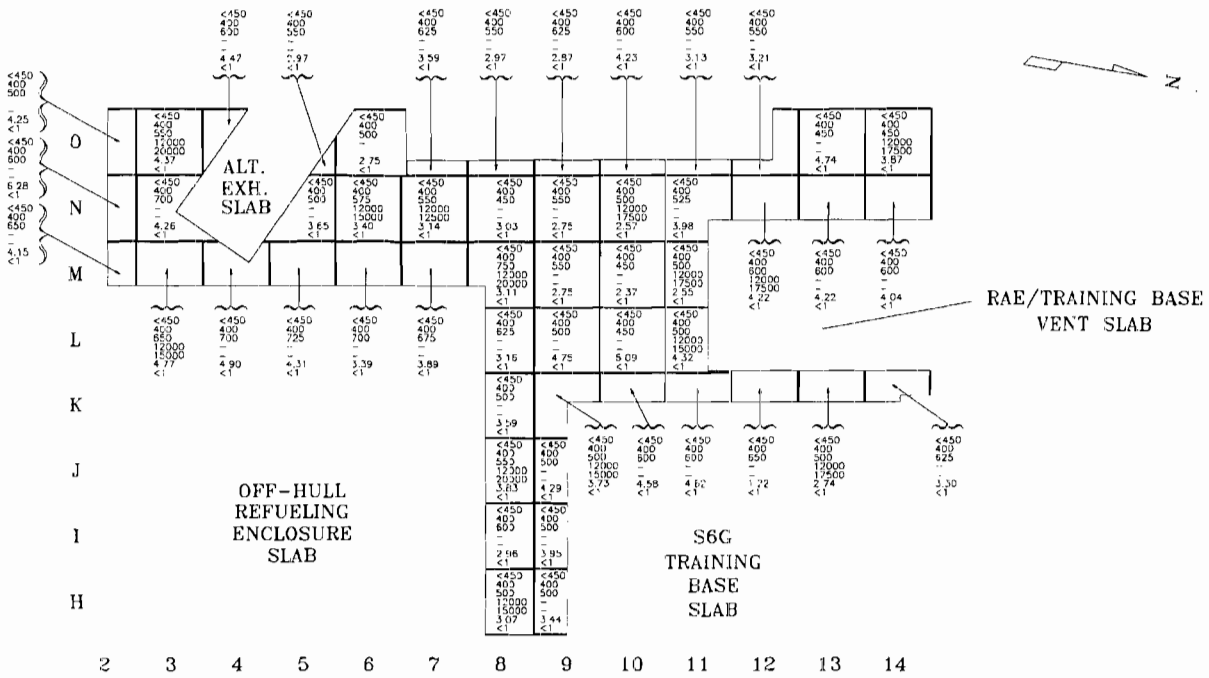


Sample Data

<450 – IM-247/PD Results [µµCi/20cm²]
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]

3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, S6G Refueling Slabs Adjacent Asphalt Areas

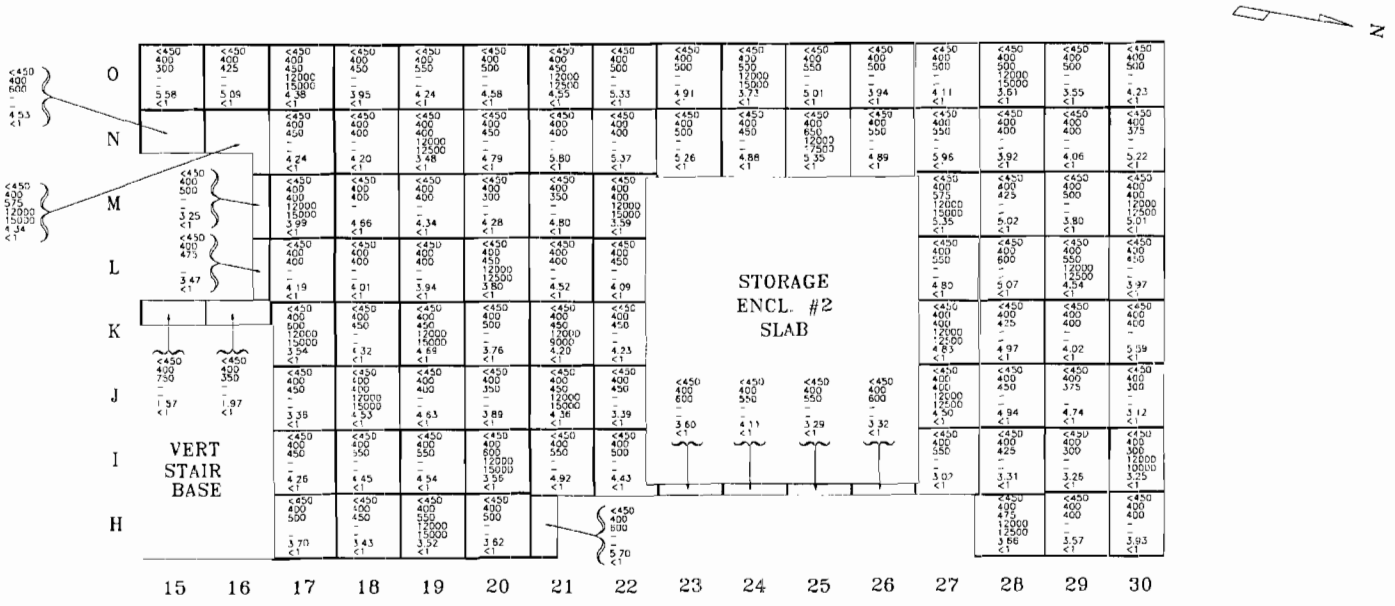


Sample Data

<450 – IM-247/PD Results [μμCi/20cm²]
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]

3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, S6G Refueling Slabs Adjacent Asphalt Areas

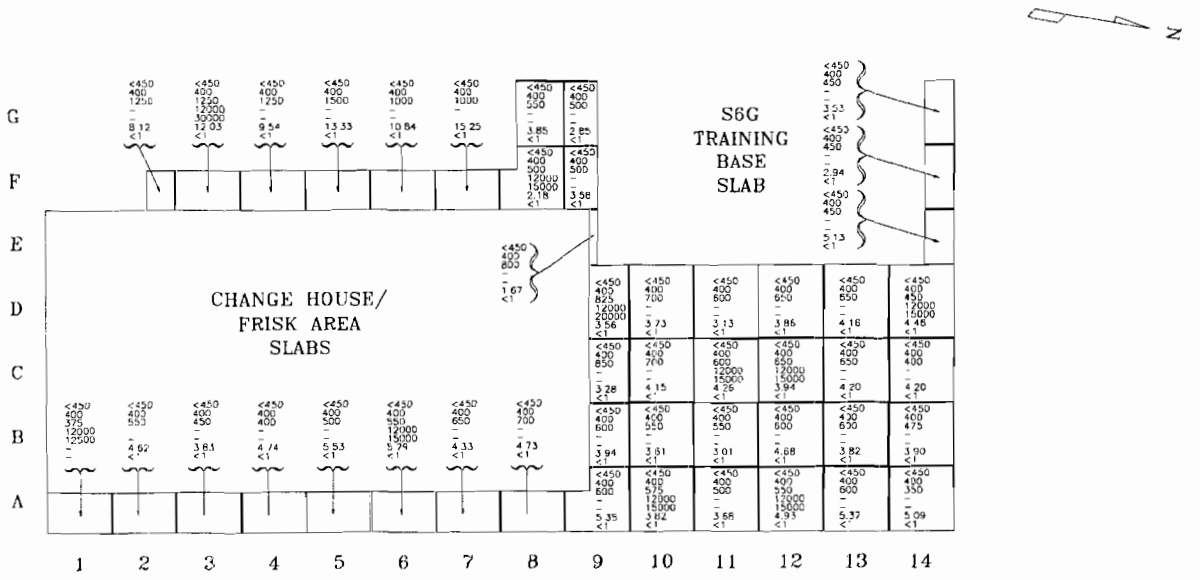


Sample Data

- <450 -- IM-247/PD Results [μμCi/20cm²]
- 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]

3.32 S6G Refueling Facility Foundations

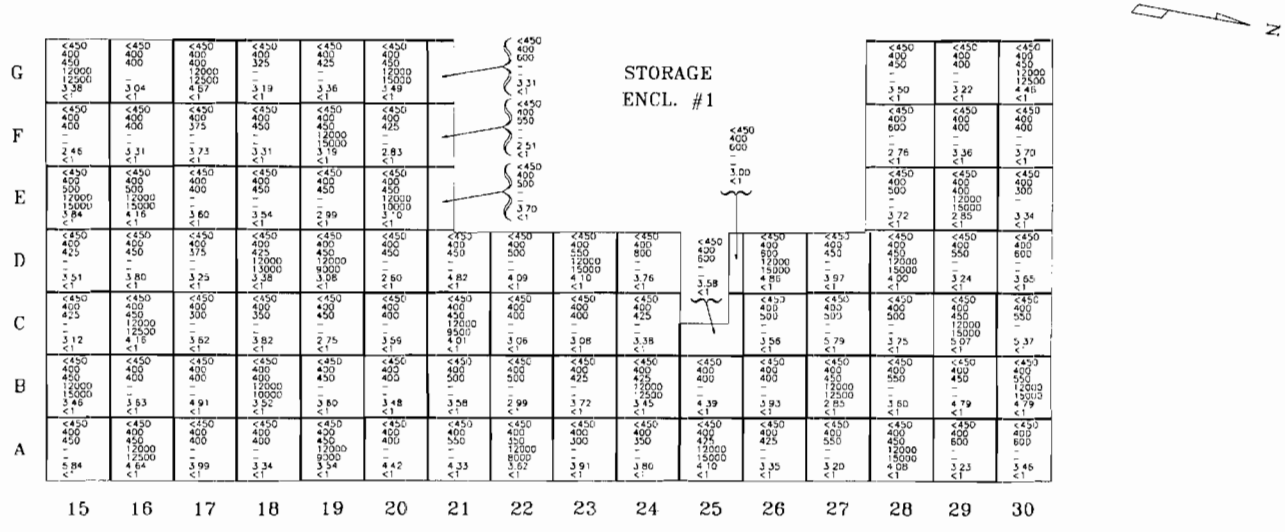
e. Localized Grid Maps, S6G Refueling Slabs Adjacent Asphalt Areas



Sample Data
<450 – IM-24//PD Results [μμCi/20cm²]
230 – IM-253/PD (HV-1 PHA) [bkg.]
330 – 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]

3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, S6G Refueling Slabs Adjacent Asphalt Areas

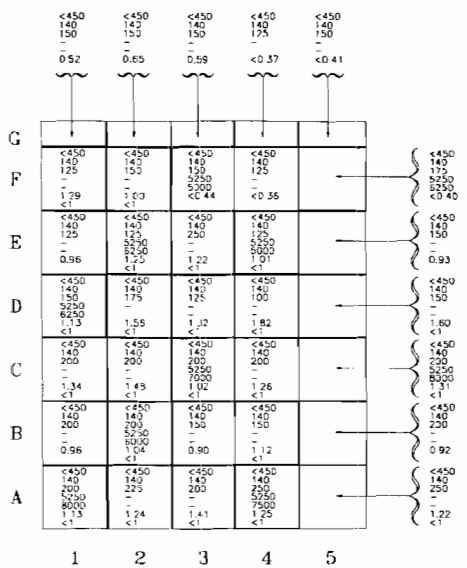


Sample Data

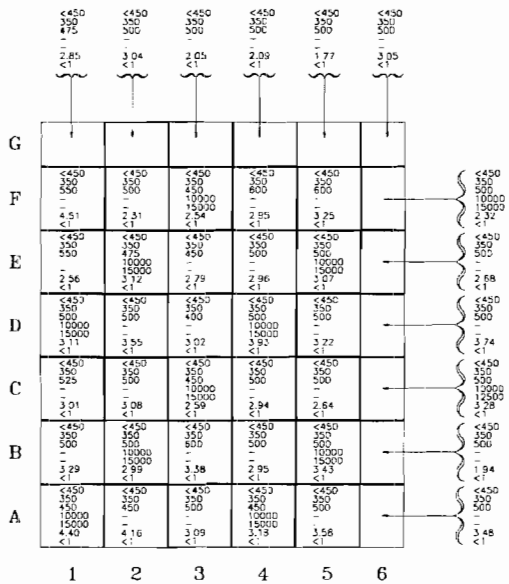
<450 – IM-247/PD Results [μμCi/20cm²]
200 – IM-253/PD (HV-1 PHA) [bkg.]
300 – IM-253/PD (HV-1 PHA) [cpm]
7000 – IM-253/PD (HV-2 GROSS) [bkg.]
7300 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, S6G Training & OHRE Slabs



S6G TRAINING BASE SLAB



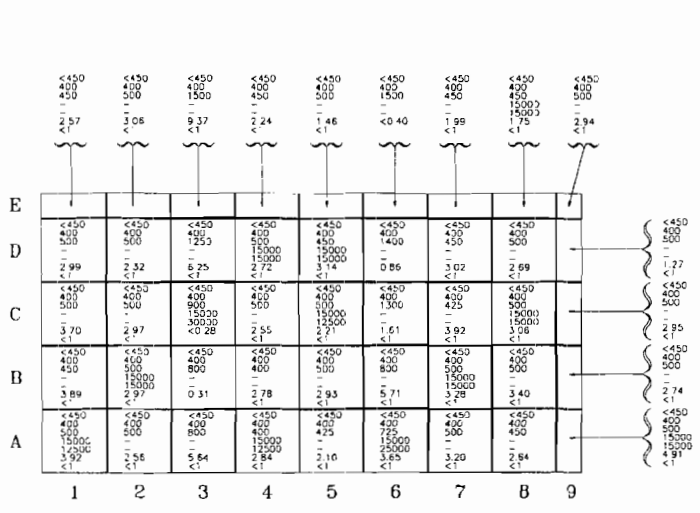
OHRE SLAB

Sample Data

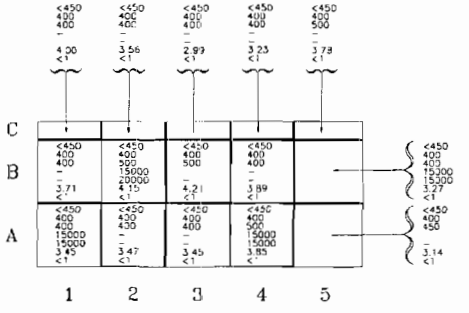
< 450 – IM-247/PD Results [μμCi/20cm²]
200 – IM-253/PD (HV-1 PHA) [bkg.]
300 – IM-253/PD (HV-1 PHA) [cpm]
7000 – IM-253/PD (HV-2 GROSS) [bkg.]
7300 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, Change House/Frisk & RAE/TB Vent Slabs



CHANGE HOUSE/FRISK AREA SLAB

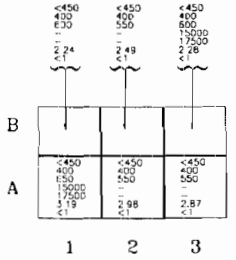


RAE/TRAINING BASE VENT SLAB

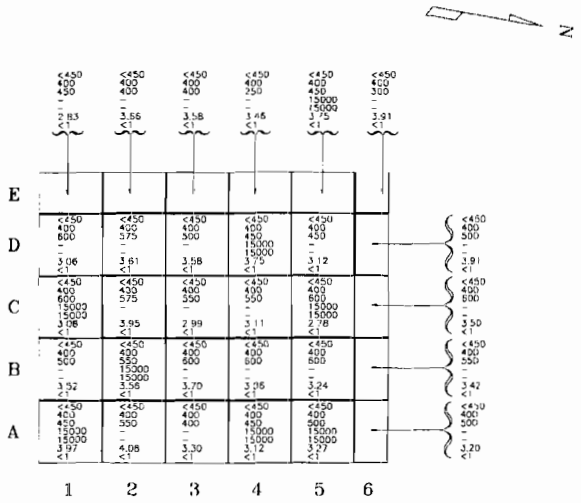
Sample Data
<450 – IM-247/PD Results [µCi/20cm²]
200 – IM-253/PD (HV-1 PHA) [bkg.]
300 – IM-253/PD (HV-1 PHA) [cpm]
7000 – IM-253/PD (HV-2 GROSS) [bkg.]
7300 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, DRE #1 Vent Slab & DRE #1 Slab



DRE#1 VENT SLAB

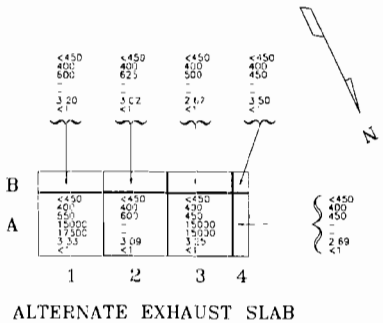


DRE#1 SLAB

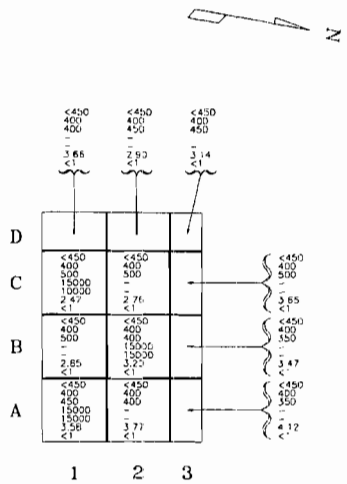
Sample Data
<450 – IM-247/PD Results [μμCi/20cm²]
200 – IM-253/PD (HV-1 PHA) [bkg.]
300 – IM-253/PD (HV-1 PHA) [cpm]
7000 – IM-253/PD (HV-2 GROSS) [bkg.]
7300 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.32 S6G Refueling Facility Foundations

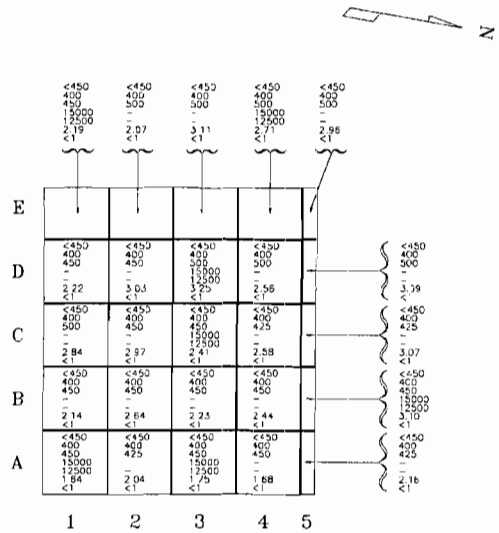
e. Localized Grid Maps, Alternate Exhaust, Vertical Stairwell, Storage Encl #2 Slabs



ALTERNATE EXHAUST SLAB



VERTICAL STAIRWELL #2 BASE



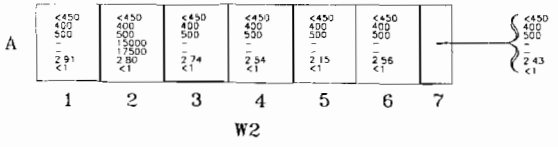
STORAGE ENCLOSURE #2 SLAB

Sample Data

< 450 – IM-247/PD Results [μμC/20cm²]
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]

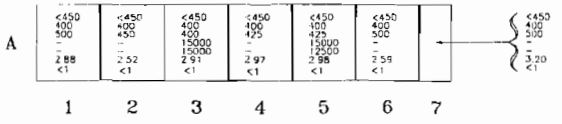
3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, Storage Encl #1 Walls



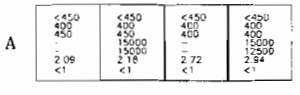
W2

EAST WALL



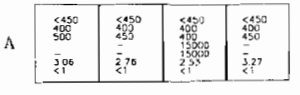
W4

WEST WALL



W1

NORTH WALL



W3

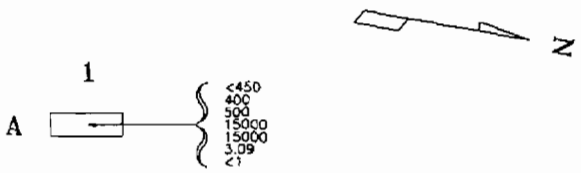
SOUTH WALL

Sample Data

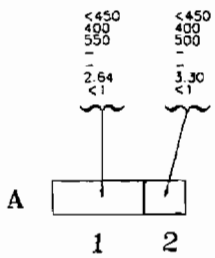
<450 – IM-247/PD Results [μμCi/20cm²]
200 – IM-253/PD (HV-1 PHA) [bkg.]
300 – IM-253/PD (HV-1 PHA) [cpm]
7000 – IM-253/PD (HV-2 GROSS) [bkg.]
7300 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.32 S6G Refueling Facility Foundations

e. Localized Grid Maps, Storage Encl #1 Walls

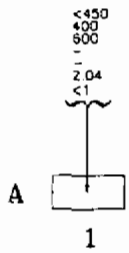


TOP
A/C SLAB



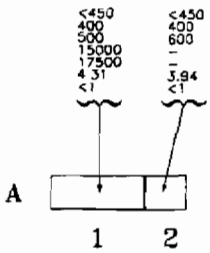
W7

SOUTH SIDE
A/C SLAB



W6

EAST SIDE
A/C SLAB



W5

NORTH SIDE
A/C SLAB

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

3.32 S6G Refueling Facility Foundations

f. After Photograph

Training Base Slab

3.32 S6G Refueling Facility Foundations

f. After Photograph

OHRE Slab

3.32 S6G Refueling Facility Foundations

f. After Photograph

RAE Training Base Vent Slab

3.32 S6G Refueling Facility Foundations

f. After Photograph

DRE #1 Slab

3.32 S6G Refueling Facility Foundations

f. After Photograph

Alternate Exhaust Slab

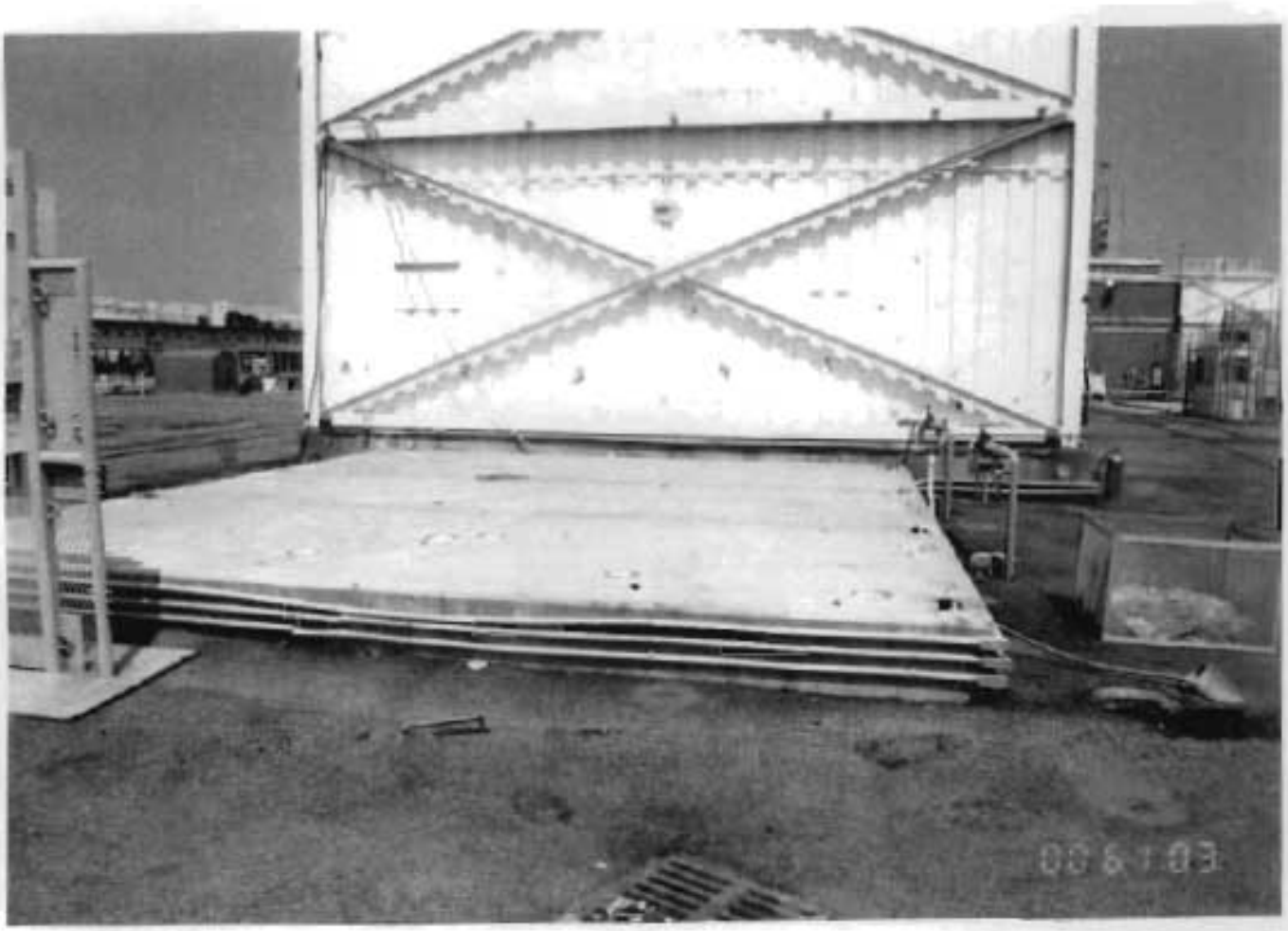
3.32 S6G Refueling Facility Foundations

f. After Photograph

Vertical Stairwell #2 Base

3.32 S6G Refueling Facility Foundations

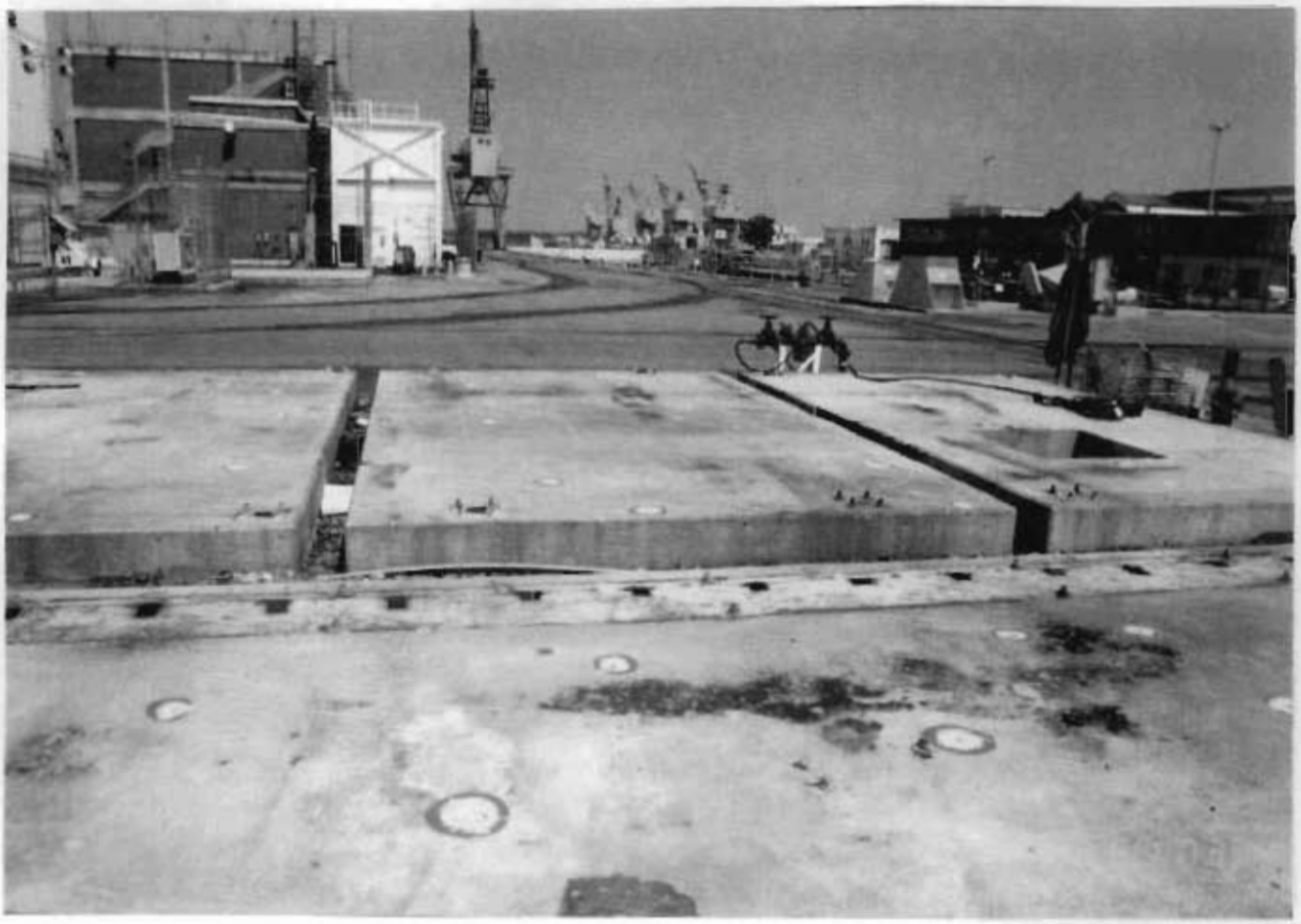
f. After Photograph



Storage Enclosure #1 Slab

3.32 S6G Refueling Facility Foundations

f. After Photograph



Change House/Frisk Area Slab

3.33 Parking Lot E-5

a. Introduction:

Parking lot E-5 is located in grid D-9 of the Charleston Naval Shipyard map (Figure 10). The parking lot is located outside the Tenth Street Gate paralleling Hobson Ave.

(1) **Description:**

The ground cover in the parking lot is asphalt.

(2) **Brief History:**

(a) **Use:** An area in this parking lot was established as a radioactive material work area to refurbish a reactor access enclosure.

(b) **Radiological History:** The area was controlled as a radioactive material storage area during this work. No loose surface contamination was found during the course of this work. Loose surface contamination levels were less than 450 $\mu\mu Ci/100cm^2$.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

Parking Lot E-5 was divided into 360 grids approximately 5' by 5'. Each grid had its own unique designator.

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

A total of 360 solid material samples were taken from Parking Lot E-5. 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, bismuth 214, thallium 208, potassium 40.

The construction material present in Parking Lot E-5 was asphalt. The IM-247/PD and the IM-253/PD (HV-1 and HV-2 GROSS) background of 60, 425, and 10000 counts per minute were based on the radiation levels obtained from the road near Building M1257.

3.33 Parking Lot E-5

c. Summary:

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

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

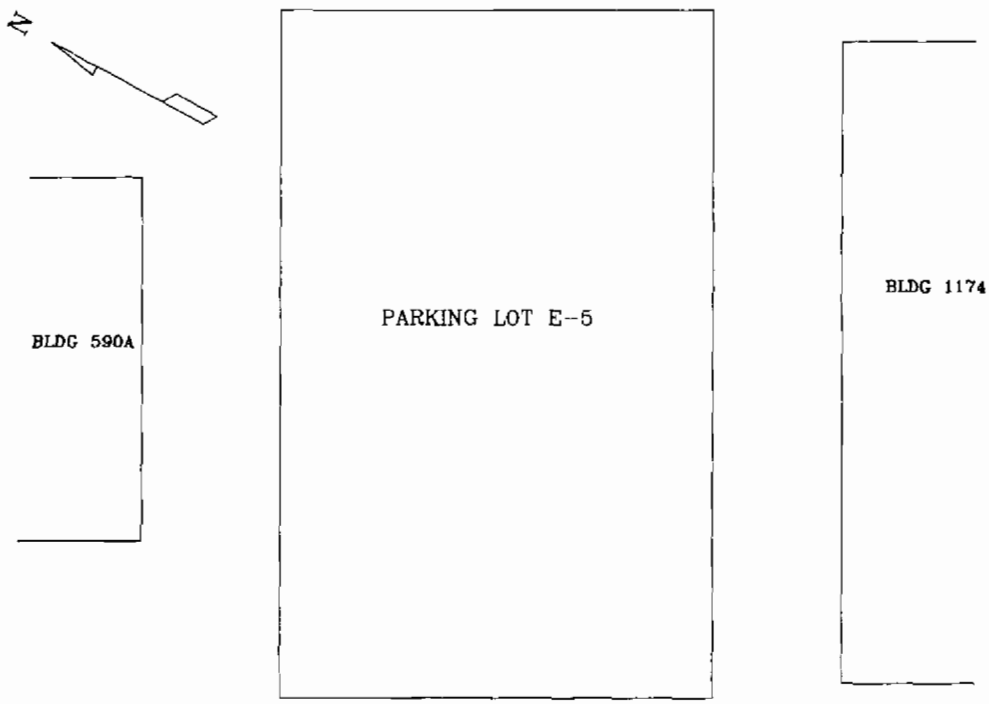
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 3.61 pCi/g to a high of 9.14 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.

3.33 Parking Lot E-5

d. Site Map



3.33 Parking Lot E-5

e. Localized Grid Maps

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
H	<450 425 400 – – 8.62 <1	<450 425 350 10000 9000 – 5.79 <1	<450 425 450 – – 4.82 <1	<450 425 425 – – 5.81 <1	<450 425 400 – – 6.02 <1	<450 425 350 – – 5.11 <1	<450 425 450 – – 4.17 <1	<450 425 450 10000 12500 – 5.76 <1	<450 425 450 – – 5.28 <1	<450 425 425 – – 4.43 <1	<450 425 450 – – 4.99 <1	<450 425 450 – – 5.71 <1	<450 425 425 10000 12500 – 3.84 <1	<450 425 450 – – 4.41 <1	<450 425 425 – – 4.76 <1
G	<450 425 400 – – 5.60 <1	<450 425 450 – – 5.09 <1	<450 425 500 – – 5.39 <1	<450 425 425 10000 9000 – 5.37 <1	<450 425 425 – – 4.65 <1	<450 425 350 – – 4.64 <1	<450 425 425 – – 5.61 <1	<450 425 425 – – 5.01 <1	<450 425 425 10000 12500 – 4.64 <1	<450 425 425 – – 5.40 <1	<450 425 425 – – 5.03 <1	<450 425 425 – – 5.27 <1	<450 425 425 – – 4.33 <1	<450 425 425 10000 12500 – 4.88 <1	<450 425 425 – – 5.02 <1
F	<450 425 450 – – 4.53 <1	<450 425 450 – – 5.45 <1	<450 425 550 10000 9000 – 5.49 <1	<450 425 550 – – 5.76 <1	<450 425 425 – – 5.73 <1	<450 425 400 10000 10000 – 5.32 <1	<450 425 425 – – 5.76 <1	<450 425 425 – – 4.95 <1	<450 425 500 – – 5.52 <1	<450 425 500 – – 5.27 <1	<450 425 500 19000 12500 – 5.48 <1	<450 425 500 – – 4.52 <1	<450 425 500 – – 5.58 <1	<450 425 500 – – 4.32 <1	<450 425 500 – – 4.72 <1
E	<450 425 500 10000 15000 – 6.45 <1	<450 425 550 – – 5.95 <1	<450 425 500 – – 5.32 <1	<450 425 550 – – 5.70 <1	<450 425 500 10000 15000 – 5.70 <1	<450 425 550 – – 4.61 <1	<450 425 600 10000 15000 – 6.08 <1	<450 425 600 – – 4.53 <1	<450 425 550 – – 5.33 <1	<450 425 550 10000 15000 – 5.64 <1	<450 425 600 – – 5.86 <1	<450 425 600 10000 12500 – 5.91 <1	<450 425 550 – – 5.50 <1	<450 425 550 – – 5.54 <1	<450 425 600 10000 12500 – 5.98 <1
D	<450 425 450 – – 4.94 <1	<450 425 450 10000 10000 – 4.67 <1	<450 425 450 – – 4.98 <1	<450 425 500 – – 5.19 <1	<450 425 450 – – 5.18 <1	<450 425 450 – – 4.74 <1	<450 425 450 – – 4.36 <1	<450 425 450 10000 15000 – 4.55 <1	<450 425 450 – – 5.57 <1	<450 425 450 – – 5.86 <1	<450 425 500 – – 5.77 <1	<450 425 500 10000 10000 – 5.90 <1	<450 425 500 – – 4.85 <1	<450 425 550 – – 5.39 <1	<450 425 500 – – 4.98 <1
C	<450 425 450 – – 4.91 <1	<450 425 500 – – 4.20 <1	<450 425 450 – – 5.40 <1	<450 425 450 10000 12500 – 4.91 <1	<450 425 450 – – 5.71 <1	<450 425 425 – – 4.44 <1	<450 425 450 – – 5.54 <1	<450 425 450 – – 5.43 <1	<450 425 455 10000 12500 – 6.40 <1	<450 425 450 – – 5.72 <1	<450 425 500 – – 6.74 <1	<450 425 500 – – 6.27 <1	<450 425 500 – – 4.95 <1	<450 425 500 10000 8500 – 5.06 <1	<450 425 500 – – 5.29 <1
B	<450 425 450 – – 5.54 <1	<450 425 425 – – 5.72 <1	<450 425 450 10000 12500 – 6.03 <1	<450 425 550 – – 5.12 <1	<450 425 450 – – 6.05 <1	<450 425 550 10000 10000 – 5.65 <1	<450 425 500 – – 5.74 <1	<450 425 550 – – 5.46 <1	<450 425 450 – – 4.23 <1	<450 425 500 – – 5.20 <1	<450 425 500 10000 10000 – 4.75 <1	<450 425 500 – – 5.78 <1	<450 425 500 – – 4.82 <1	<450 425 500 – – 5.21 <1	<450 425 500 – – 5.12 <1
A	<450 425 425 10000 8500 – 4.61 <1	<450 425 400 – – 4.45 <1	<450 425 450 – – 5.05 <1	<450 425 450 – – 6.43 <1	<450 425 500 10000 12500 – 5.59 <1	<450 425 550 – – 5.11 <1	<450 425 550 10000 12500 – 5.46 <1	<450 425 500 – – 4.90 <1	<450 425 500 – – 5.14 <1	<450 425 500 10000 12500 – 4.67 <1	<450 425 500 – – 6.72 <1	<450 425 500 10000 8000 – 5.38 <1	<450 425 550 – – 8.45 <1	<450 425 500 – – 6.30 <1	<450 425 500 10000 10000 – 5.52 <1

Sample Data
< 450 – IM-247/PD Results (μμCi/20cm²)
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)

3.33 Parking Lot E-5

e. Localized Grid Maps

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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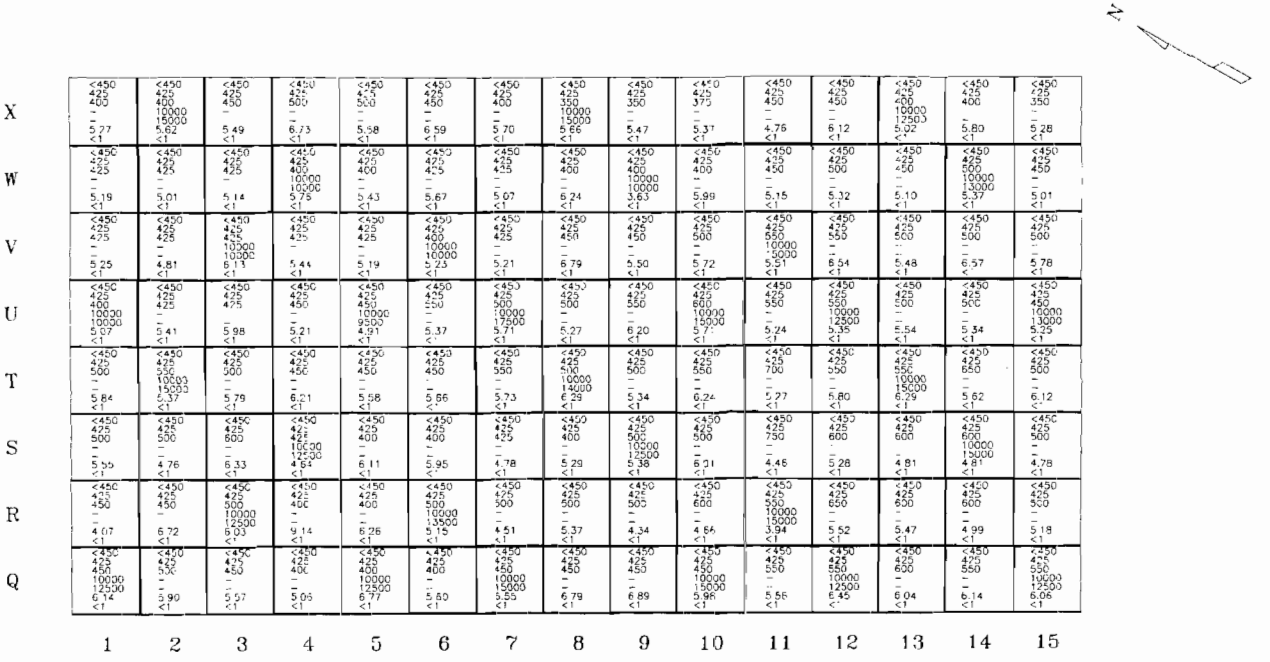
Sample Data
- < 450 – IM-247/PD Results [μμCv/20cm²]
- 200 – IM-253/PD (HV-1 PHA) [bkg.]
- 300 – IM-253/PD (HV-1 PHA) [cpm]
- 7000 – IM-253/PD (HV-2 GROSS) [bkg.]
- 7300 – IM-253/PD (HV-2 GROSS) [cpm]
- 1.82 – MCA Gross Gamma Eq. Co-60 [μCi/g]
- <1 – MCA Specific Co-60 Results [pCi/g]

3.33 Parking Lot E-5

e. Localized Grid Maps



Sample Data

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

3.33 Parking Lot E-5

f. Prior To Survey Photograph

Parking Lot E-5, facing East .

3.33 Parking Lot E-5

h. After Survey Photograph

Parking Lot E-5, facing East.

3.34 Pier F-G RAM Storage Area

a. Introduction:

The Pier F-G Radioactive Material Storage Area is located in grid D-7 of the Charleston Naval Shipyard map (Figure 10), between Dry Dock 5 and Pier G, adjacent to the Cooper River.

(1) **Description:** Temporary radioactive material storage areas, controlled by roping off or by erecting a fence as necessary, were established in this area. A typical size of a storage area was 15' by 15'. The ground cover is concrete in this area.

(2) **Brief History:**

(a) **Use:** These temporary radioactive material storage areas were used for storage of various pieces of equipment such as portable refueling facilities and portable radioactive liquid collection tanks.

(b) **Radiological History:** The areas were controlled as radiation areas and radioactive material storage areas. Loose surface contamination levels were maintained less than 450 $\mu\mu Ci/100cm^2$.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

The Pier F-G Radioactive Material Storage Area was divided into 176 grids approximately 5' by 5'. 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.

A total of 176 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 and lead 214.

The construction material present in the area surveyed for the Pier F-G Radioactive Material Storage Area was concrete. For this 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-2 GROSS) background of 4,750 counts per minute were based on background radiation levels obtained from the Pier T Quaywall.

3.34 Pier F-G RAM Storage Area

c. Summary:

Surveys performed with the IM-247/PD did not detect areas greater than 450μμCi/20cm^2.

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

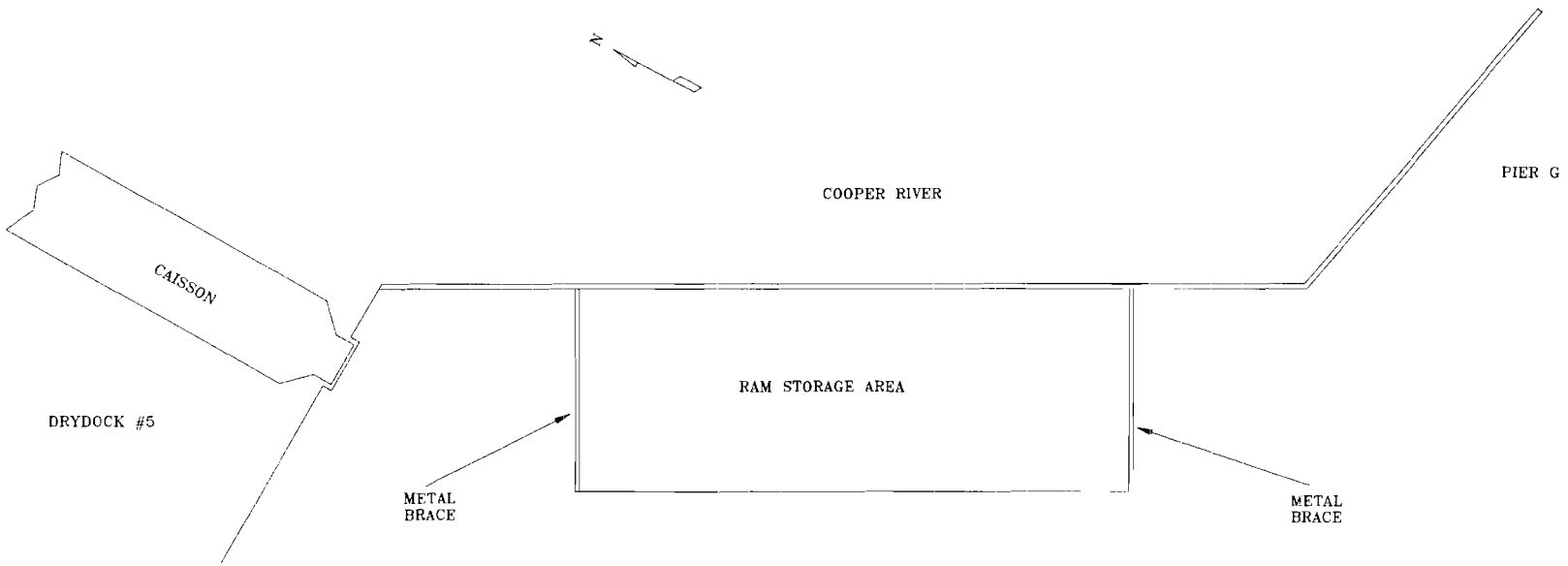
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

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 0.57 pCi/g to a high of 4.30 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.

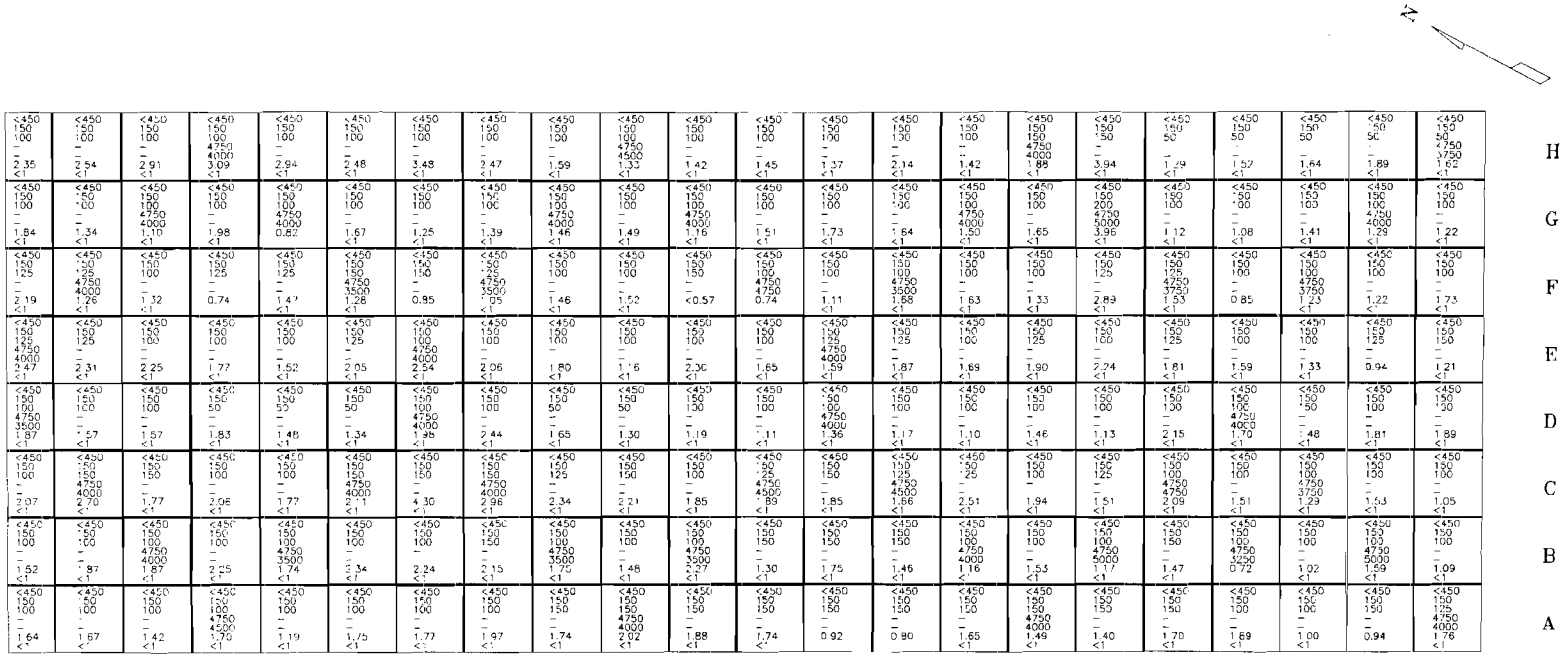
3.34 Pier F-G RAM Storage Area

d. Site Map



3.34 Pier F-G RAM Storage Area

e. Localized Grid Map



Sample Data

<450 – IM-247/PD Results [μμCu/20cm²]
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]

3.34 Pier F-G RAM Storage Area

f. Prior To Survey Photographs

Pier F-G RAM Storage Area, facing north.

3.34 Pier F-G RAM Storage Area

g. After Survey Photographs

Pier F-G RAM Storage Area, facing south.

3.35 Pier G-H RAM Storage Area

a. Introduction:

The Pier G-H Radioactive Material Storage Area is located in grid D-8 of the Charleston Naval Shipyard map (Figure 10), between Pier G and Pier H, adjacent to the Cooper River.

(1) **Description:**

Temporary radioactive material storage areas, controlled by roping off or by erecting a fence as necessary, were established in this area. The fenced area is approximately 175' long and 60' wide. A typical size storage area was 15' by 15'. The ground cover is asphalt, concrete, and rock in these areas.

(2) **Brief History:**

(a) **Use:** The fenced area was used as a long term radioactive material storage area for radioactive liquid collection facilities, refueling access enclosures, and other large weather resistant items. The temporary radioactive material storage areas were used for storage of portable radioactive liquid collection tanks and spent fuel handling containers.

(b) **Radiological History:** These areas were controlled as radiation areas and radioactive material storage areas. Loose surface contamination levels were maintained less than 450 $\mu\mu Ci/100cm^2$.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

Pier G-H Radioactive Material Storage Area was divided into 812 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 the IM-253/PD (HV-2 GROSS). Additionally, solid material samples were taken from each grid.

A total of 812 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.

3.35 Pier G-H RAM Storage Area

The construction materials present in the G-H Ram Storage areas were asphalt, cement, and rock. For all materials, 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 7000 counts per minute were based on background radiation levels obtained from Bldg. 1884 Deck.

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 any areas greater than 450 $\mu\mu Ci/20cm^2$. However, surveys performed in grid N 10 with the IM-247/PD detected 450 $\mu\mu Ci/20cm^2$. Analysis of the solid sample taken in grid N 10 indicated the activity was due to naturally occuring radionuclides.

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

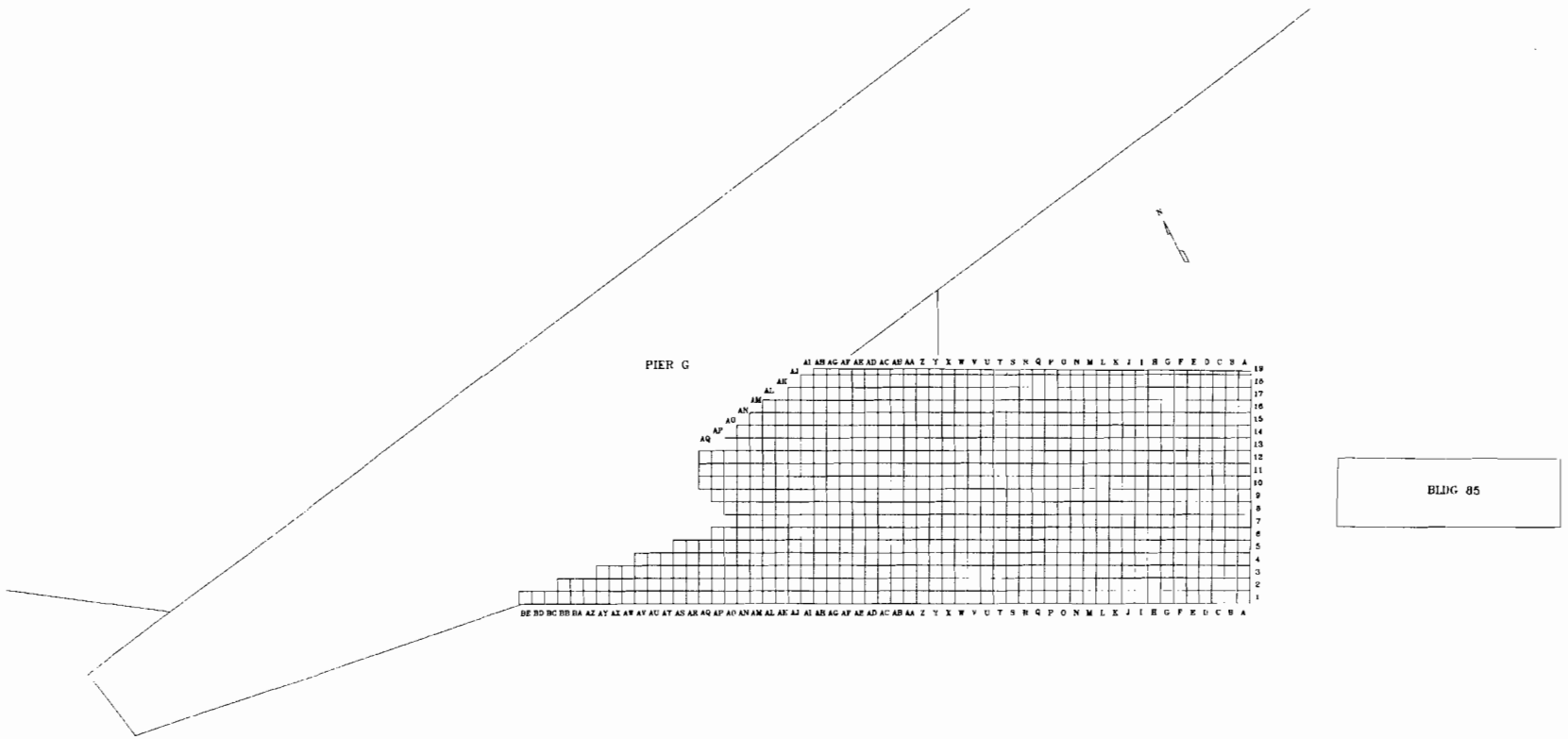
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.20 pCi/g to a high of 7.96 pCi/g.

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

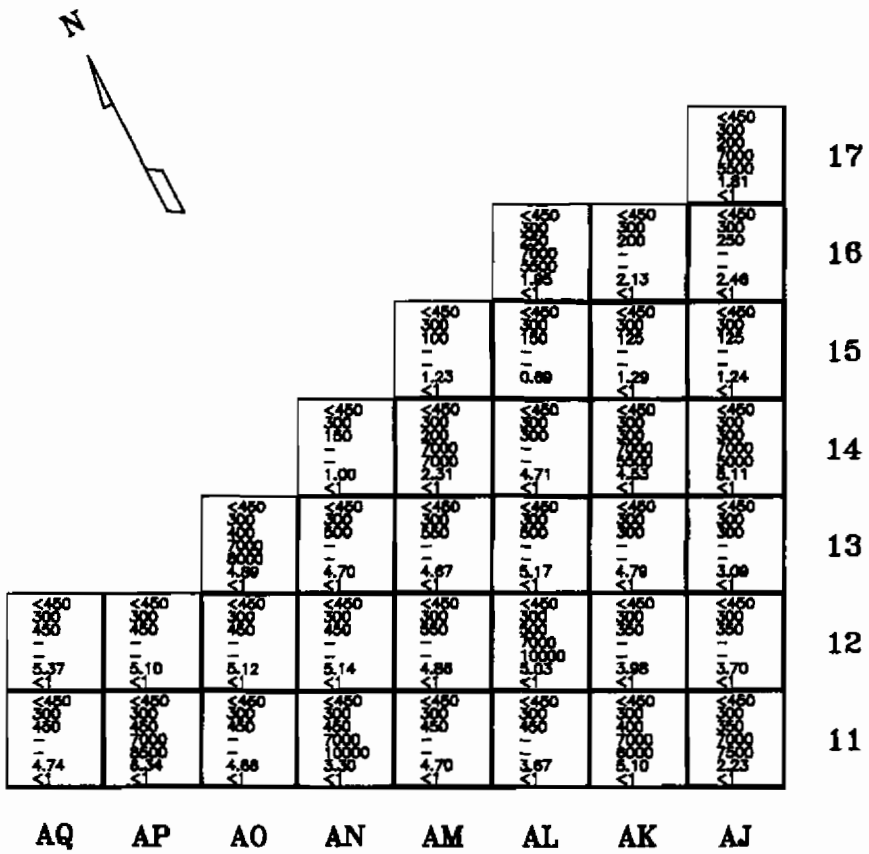
3.35 Pier G-H RAM Storage Area

d. Site Grid Map



3.35 Pier G-H RAM Storage Area

e. Localized Grid Maps

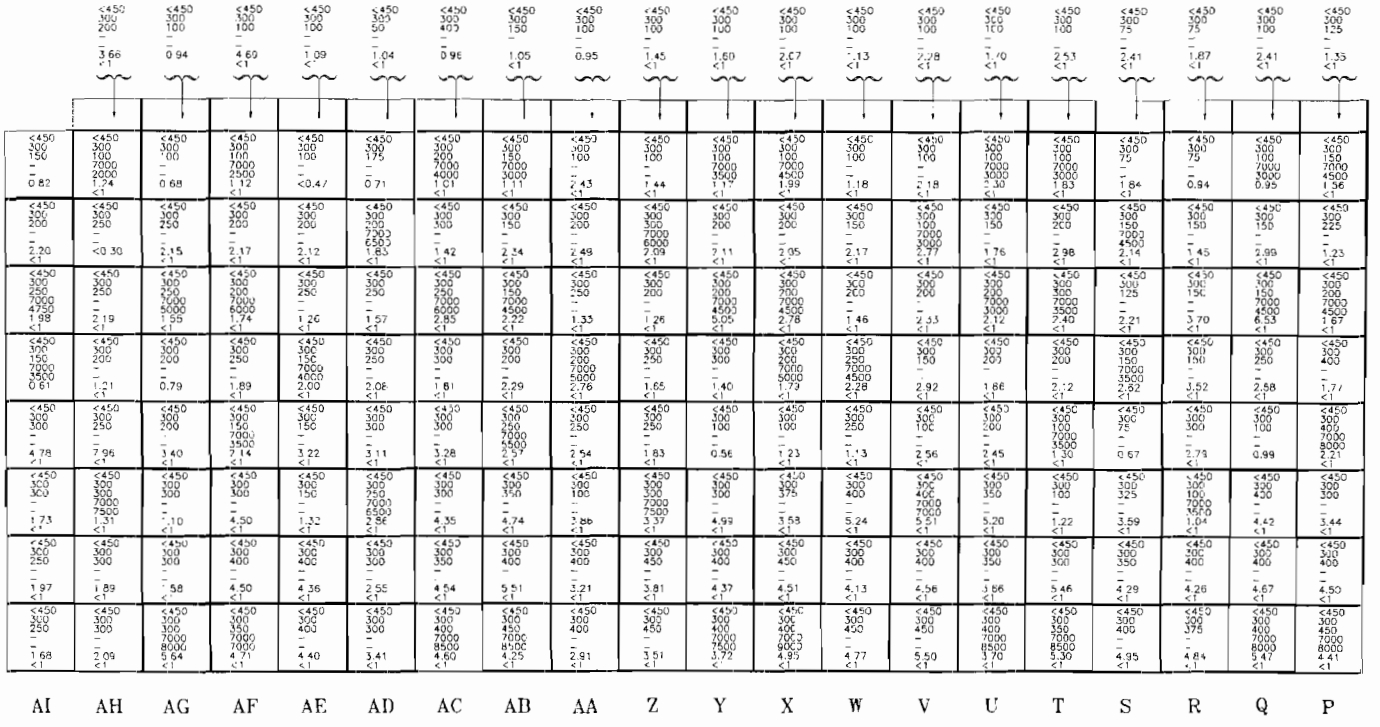


Sample Data

- <450 – IM-247/PD Results [μμCi/20cm²]
- 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]

3.35 Pier G-H RAM Storage Area

e. Localized Grid Maps

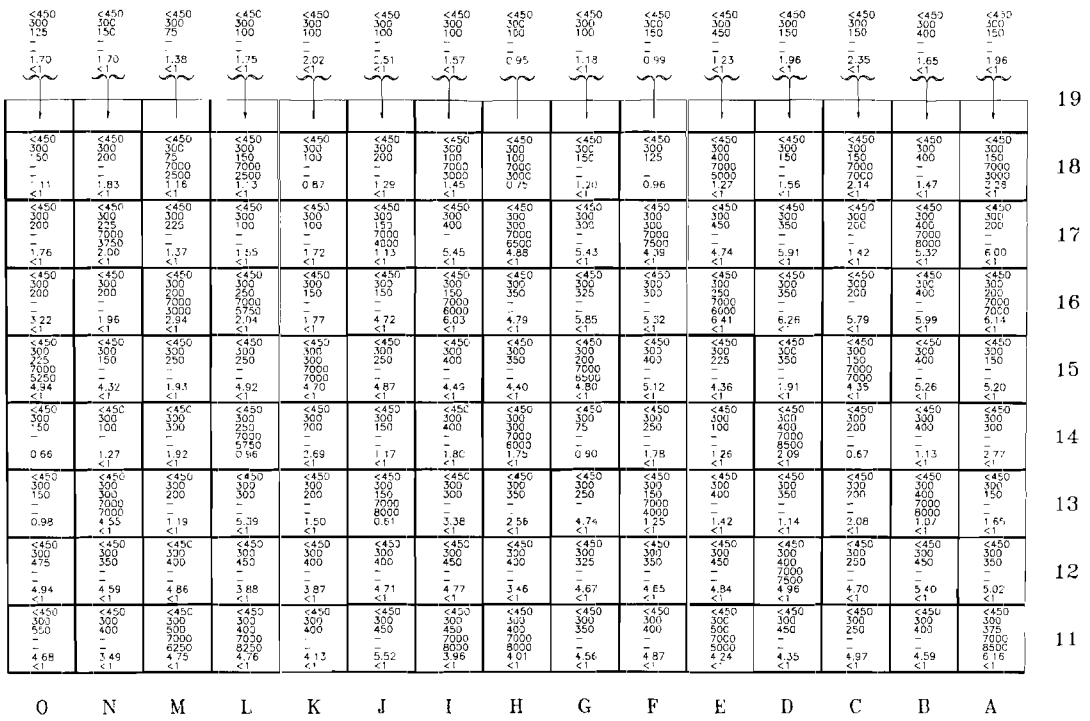


Sample Data

- <450 – IM-247/PD Results [μμCi/20cm²]
- 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]
- .82 – MCA Gross Gamma Ec Co-60 [pCi/g]
- <1 – MCA Specific Co-60 Results [pCi/g]

3.35 Pier G-H RAM Storage Area

e. Localized Grid Maps

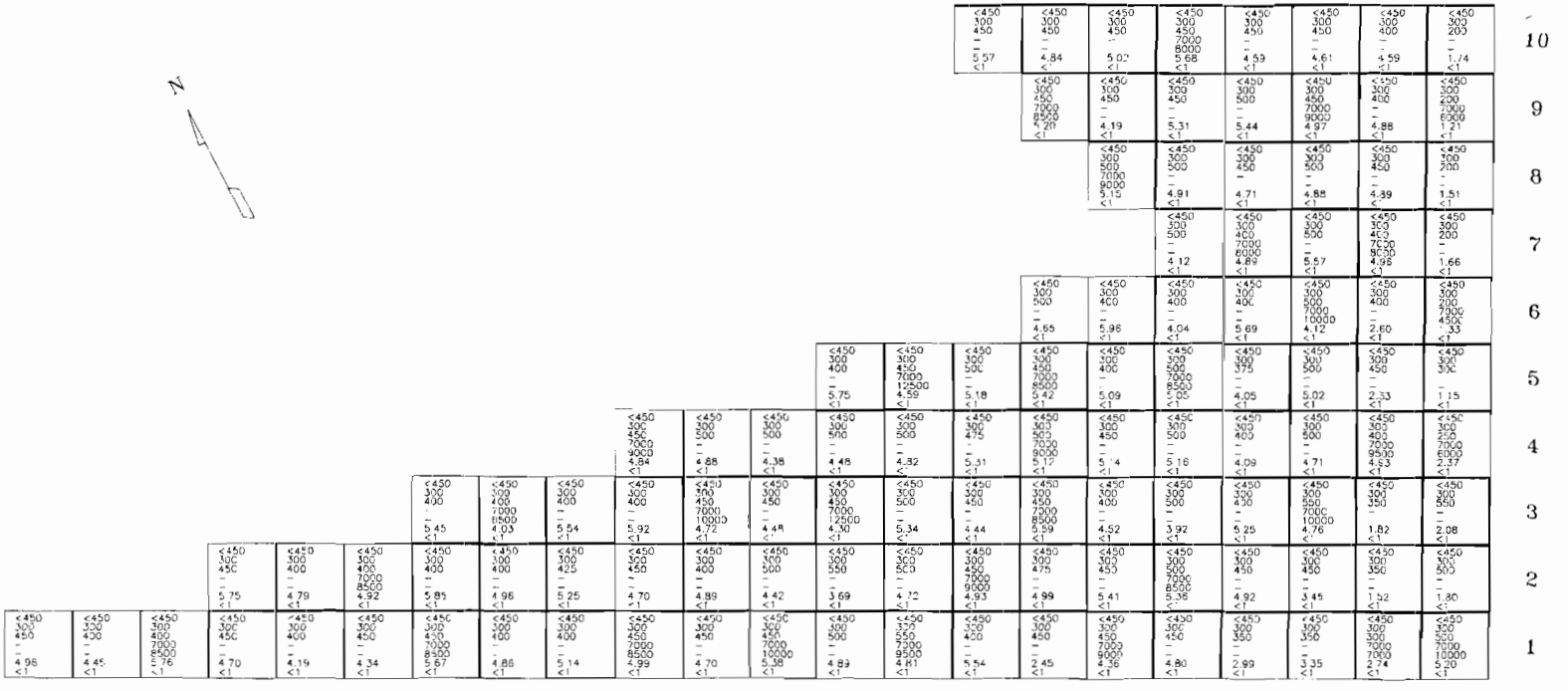


Sample Data

- < 450 – IM-247/PD Results [μμCu/20cm²]
- 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]

3.35 Pier G-H RAM Storage Area

e. Localized Grid Maps



Sample Data

<450 – IM-247/PD Results [µµCi/20cm²]
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]

3.35 Pier G-H RAM Storage Area

e. Localized Grid Maps

<450 300 200 7000 5000 2.12 <1	<450 300 200 – – 1.76 <1	<450 300 400 – – 4.28 <1	<450 300 – – – 4.43 <1	<450 300 400 7000 7500 4.57 <1	<450 300 300 – – 3.54 <1	<450 300 500 – – 5.47 <1	<450 300 450 – – 5.14 <1	<450 300 450 7000 8500 4.59 <1	<450 300 450 – – 5.17 <1	<450 300 500 – – 4.44 <1	<450 300 400 – – 5.32 <1	<450 300 400 7000 10000 4.60 <1	<450 300 350 – – 5.88 <1	<450 300 350 – – 3.75 <1	<450 300 500 – – 5.17 <1	<450 300 500 7000 10000 4.71 <1	<450 300 500 – – 4.34 <1	<450 300 500 – – 4.04 <1	<450 300 500 – – 4.33 <1	10
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<450 300 200 7000 8000 4.06 <1	<450 300 200 – – 1.88 <1	<450 300 400 – – 1.94 <1	<450 300 500 7000 8500 4.82 <1	<450 300 375 7000 8500 4.49 <1	<450 300 350 – – 4.28 <1	<450 300 400 – – 4.28 <1	<450 300 300 – – 3.90 <1	<450 300 400 7000 8000 <0.20 <1	<450 300 400 – – 3.48 <1	<450 300 425 – – 3.89 <1	<450 300 400 – – 4.59 <1	<450 300 400 7000 13000 4.71 <1	<450 300 400 – – 4.28 <1	<450 300 300 – – 4.79 <1	<450 300 400 – – 4.32 <1	<450 300 500 7000 10000 3.77 <1	<450 300 450 – – 4.37 <1	<450 300 300 – – 4.66 <1	<450 300 450 – – 4.57 <1	5
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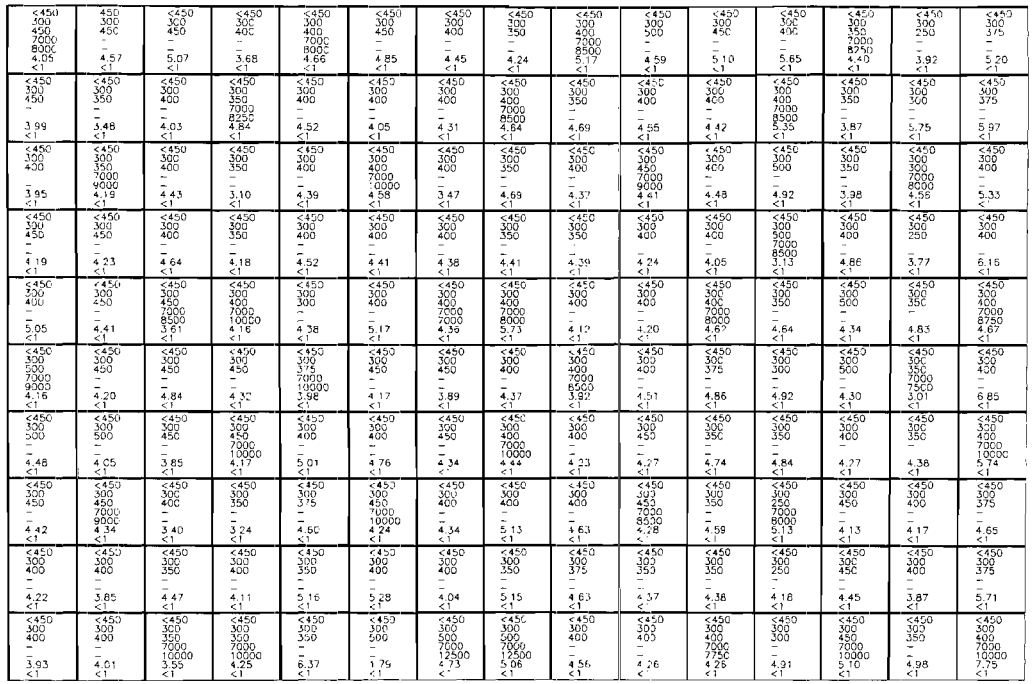
<450 300 200 – – 1.50 <1	<450 300 200 7000 7000 2.01 <1	<450 300 500 – – 1.21 <1	<450 300 400 – – 4.38 <1	<450 300 400 – – 4.62 <1	<450 300 400 7000 8500 5.24 <1	<450 300 400 – – 5.00 <1	<450 300 400 – – 6.04 <1	<450 300 500 – – 3.57 <1	<450 300 400 7000 7500 4.63 <1	<450 300 400 – – 4.90 <1	<450 300 350 – – 4.47 <1	<450 300 400 – – 4.13 <1	<450 300 350 7000 10000 3.63 <1	<450 300 400 – – 4.68 <1	<450 300 400 – – 4.18 <1	<450 300 500 – – 3.51 <1	<450 300 450 7000 9000 3.99 <1	<450 300 450 – – 4.44 <1	<450 300 500 – – 4.43 <1	3
<450 300 400 – – 0.81 <1	<450 300 400 – – 4.84 <1	<450 300 400 – – 5.33 <1	<450 300 300 – – 5.10 <1	<450 300 450 – – 5.21 <1	<450 300 350 – – 4.30 <1	<450 300 400 – – 4.57 <1	<450 300 400 – – 5.26 <1	<450 300 450 – – 4.04 <1	<450 300 350 – – 4.23 <1	<450 300 400 – – 4.92 <1	<450 300 400 – – 4.27 <1	<450 300 400 – – 4.43 <1	<450 300 350 – – 4.58 <1	<450 300 350 – – 4.74 <1	<450 300 450 – – 4.82 <1	<450 300 400 – – 4.28 <1	<450 300 450 – – 3.81 <1	<450 300 400 – – 4.39 <1	<450 300 400 – – 4.28 <1	2
<450 300 550 – – 5.26 <1	<450 300 350 – – 4.31 <1	<450 300 400 7000 8000 5.61 <1	<450 300 300 7000 7000 0.73 <1	<450 300 350 – – 4.99 <1	<450 300 300 – – 4.18 <1	<450 300 350 7000 8000 4.90 <1	<450 300 450 7000 9000 0.93 <1	<450 300 450 – – 5.07 <1	<450 300 350 – – 3.24 <1	<450 300 450 7000 8000 3.72 <1	<450 300 350 7000 9000 3.95 <1	<450 300 400 – – 5.07 <1	<450 300 350 – – 4.50 <1	<450 300 300 7000 8500 4.89 <1	<450 300 400 7000 8000 4.72 <1	<450 300 450 – – 3.91 <1	<450 300 400 – – 4.13 <1	<450 300 400 7000 7500 1.21 <1	<450 300 500 7000 9000 4.04 <1	1
AI	AH	AG	AF	AE	AD	AC	AB	AA	Z	Y	X	W	V	U	T	S	R	Q	P	

Sample Data

< 450 – IM-247/PD Results (μμCi/20cm²)
200 – IM-253/PD (HV-1 PHA) (bkg.)
300 – IM-253/PD (HV-1 PHA) (cpm)
7000 – IM-253/PD (HV-2 GROSS) (bkg.)
7300 – IM-253/PD (HV-2 GROSS) (cpm)
1.62 – MCA Gross Gamma Eq. Co-60 (pCi/g)
<1 – MCA Specific Co-60 Results (pCi/g)

3.35 Pier G-H RAM Storage Area

e. Localized Grid Map



Sample Data

- <450 – IM-247/PD Results [μμC/20cm²]
- 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]

3.35 Pier G-H RAM Storage Area

f. Prior to Survey Photographs

Pier G-H Ram Storage Area.

3.35 Pier G-H RAM Storage Area

f. During Survey Photographs

Pier G-H Ram Storage Area.

3.35 Pier G-H RAM Storage Area

g. After Survey Photographs

Pier G-H Ram Storage

3.36 Pier J-K RAM Storage Area

a. Introduction:

The Pier J-K Radioactive Material (RAM) Storage Area was located on River Road, south of Pier J, in grid D-9 of the Charleston Naval Shipyard map (Figure 10). Temporary radioactive material storage areas, controlled by roping off or by erecting a fence, were established within the J-K RAM Storage Area.

(1) **Description:** The typical size of a storage area was 25' by 25'. The ground cover is asphalt and concrete in this area.

(2) **Brief History:**

(a) **Use:** These temporary RAM storage areas were used for storage of various pieces of equipment such as portable refueling facilities and portable radioactive liquid collection tanks.

(b) **Radiological History:** These areas have been controlled as radiation areas and radioactive material storage areas. Loose surface contamination levels were maintained less than 450 $\mu\mu Ci/100cm^2$.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

Pier J-K RAM Storage Area was divided into 179 grids approximately 5' by 5'. Each grid had its own unique designator.

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

A total of 179 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, potassium 40.

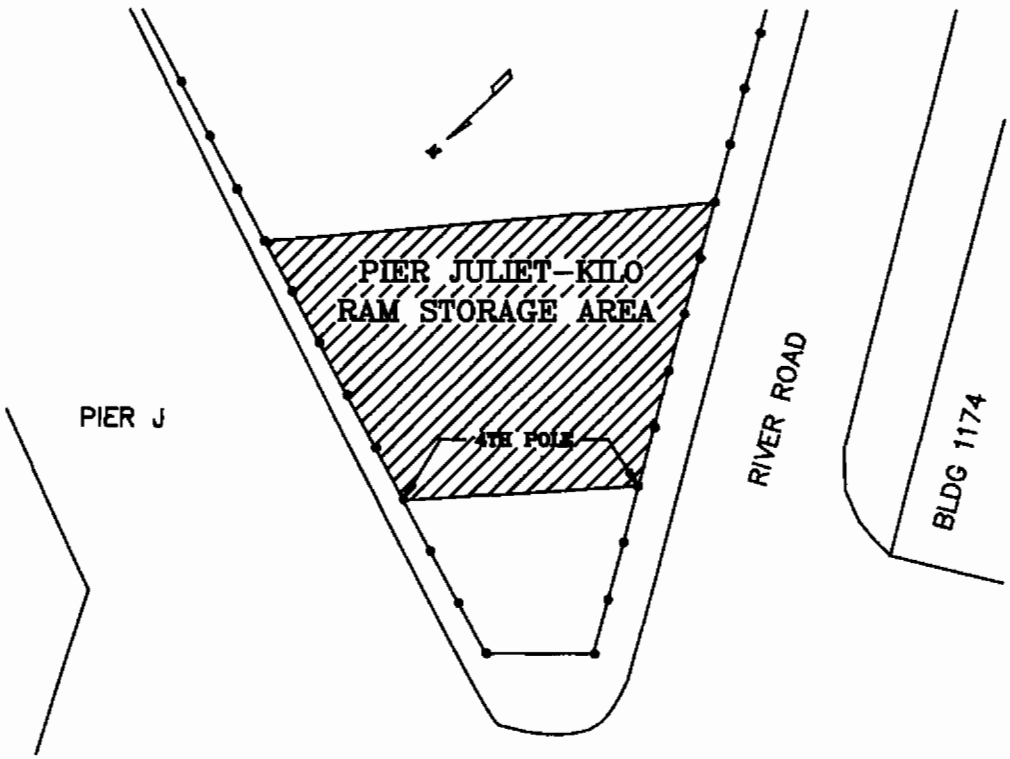
The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 80, 500, and 15000 counts per minute were based on the radiation levels obtained from B-220 North Walkway.

c. Summary:

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

3.36 Pier J-K RAM Storage Area

d. Site Map



3.36 Pier J-K RAM Storage Area

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

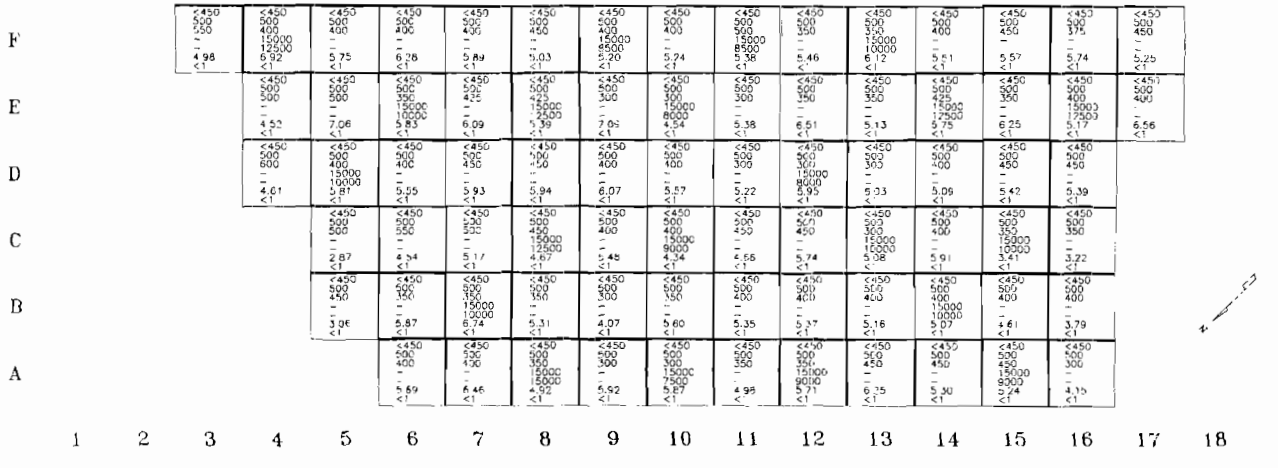
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 2.87 pCi/g to a high of 8.51 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.

3.36 Pier J-K RAM Storage Area

e. Localized Grid Maps

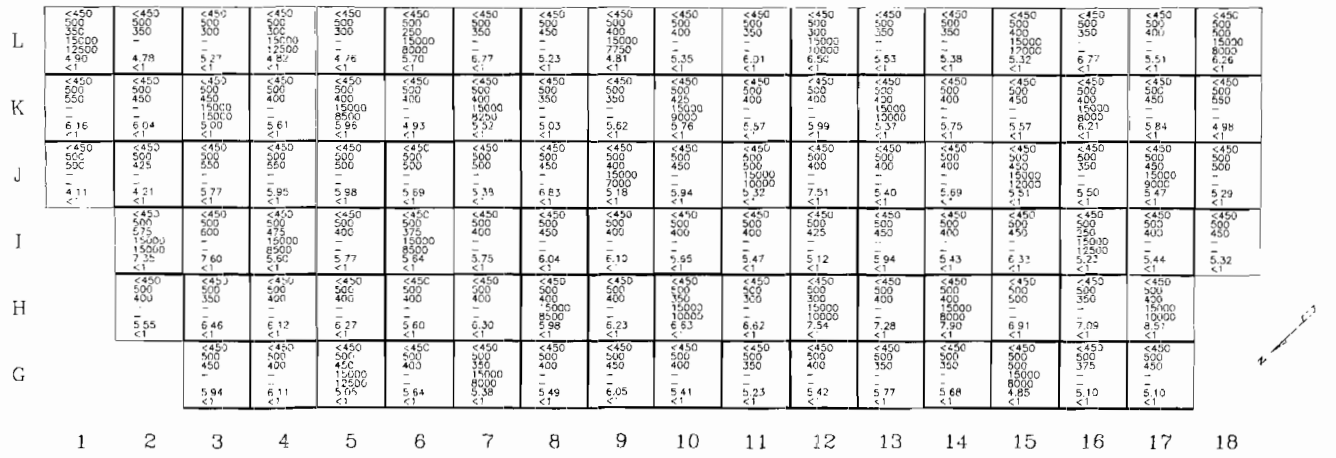


Sample Data

< 450 – IM-247/PD Results [μαCi/20cm²]
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]

3.36 Pier J-K RAM Storage Area

e. Localized Grid Maps



Sample Data

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

3.36 Pier J-K RAM Storage Area

f. During Survey Photograph

J-K RAM Storage Area, facing East.

3.36 Pier J-K RAM Storage Area

g. After Survey Photographs

J-K RAM Storage Area, facing West.

3.37 Rail Line Radioactive Material Storage Areas

a. Introduction:

There were six rail spurs normally used for storage of radioactive material (RAM). They were located as follows: east of Building 1174; east of Building 590A; south of 13th Street; east of River Road and south of Pier G; north of Building 32; and adjacent to Building 1024. These are Number One through Six respectively.

(1) **Description:**

The ground cover in these areas is either asphalt, cement, gravel, rock, dirt and/or wood.

(2) **Brief History:**

(a) **Use:** These areas were established as RAM storage areas for temporary storage of spent fuel shipping casks, fuel transfer casks, or radioactive liquid collection tanks.

(b) **Radiological History:** While in use, each area was controlled as a RAM storage area and a radiation area. No loose surface contamination was found in these areas. Contamination levels were less than 450 $\mu\mu Ci/100cm^2$.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

(1) Rail Line RAM Storage Area Number 1 was divided into 102 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.

A total of 102 solid material samples were taken from the Rail Line RAM Storage Area Number 1. 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, potassium 40, bismuth 214, and thallium 208.

The IM-247/PD, IM-253/PD (HV-1 PHA), and IM-253/PD (HV-2

3.37 Rail Line Radioactive Material Storage Areas

GROSS) background of 60, 400, and 9250 counts per minute used for the asphalt were based on background levels obtained from Building 89 parking area.

(2) Rail Line RAM Storage Area Number 2 was divided into 45 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.

A total of 45 solid material samples were taken from the Rail Line RAM Storage Area Number 2. 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 potassium-40.

The IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 500, and 12500 counts per minute were based on background radiation levels for rock obtained from Building 1628 Rail line.

(3) Rail Line RAM Storage Area Number 3 was divided into 45 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.

A total of 45 solid material samples were taken from the Rail Line RAM Storage Area Number 3. 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, potassium 40, thallium 208, and actinium 228.

The IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds of 40, 500, and 12500 counts per minute were based on background radiation levels for rock obtained from Building 1628 Rail line.

(4) Rail Line RAM Storage Area Number 4 was divided into 174 grids.

3.37 Rail Line Radioactive Material Storage Areas

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.

A total of 174 solid material samples were taken from the Rail Line RAM Storage Area Number 4. 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, potassium 40, bismuth 214, and thallium 208.

Individual backgrounds were used for Rail Line RAM Storage Area Number 4 asphalt and cement. 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 IM-253/PD (HV-2 GROSS) background of 60, 200, and 6000 counts per minute used for the asphalt were based on background levels obtained from Building NS-53/B. The IM-247/PD, IM-253/PD (HV-1 PHA), IM-253/PD (HV-2 GROSS) backgrounds of 40, 150, and 3500 counts per minute used for the cement were based on background levels obtained from Building 32.

(5) Rail Line RAM Storage Area Number 5 was divided into 102 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.

A total of 102 solid material samples were taken from the Rail Line RAM Storage Area Number 5. 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.

Individual backgrounds were used for the Rail Line RAM Storage Area Number 5 rock and dirt. Due to variations in natural radioactivity among the construction materials, different background levels exist. The IM-247/PD, IM-253/PD (HV-1 PHA), IM-253/PD (HV-2 GROSS) backgrounds of 120, 1000, and 20000 counts per minute used for the rock were based on background levels obtained from an area adjacent

to the Power House. The IM-247/PD, IM-253/PD (HV-1 PHA), IM-253/PD (HV-2 GROSS) backgrounds of 60, 900, and 20000 counts per minute used for the dirt were based on background levels obtained from an area adjacent to the Power House.

(6) Rail Line RAM Storage Area Number 6 was divided into 105 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.

A total of 105 solid material samples were taken from the Rail Line RAM Storage Area Number 6. 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.

Individual backgrounds were used for the Rail Line RAM Storage Area Number 6 asphalt and rail road over rock areas. 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 IM-253/PD (HV-2 GROSS) background of 60, 400, and 9250 counts per minute used for the asphalt were based on background levels obtained from Building 89 Parking Lot. The IM-247/PD, IM-253/PD (HV-1 PHA), IM-253/PD (HV-2 GROSS) backgrounds of 120, 600, and 17500 counts per minute used for the rail road over rock were based on background levels obtained from Building 1171 Rail Road line.

c. Summary:

(1) Surveys performed in Rail Line Ram Storage Area Number 1 with the IM-247/PD did not detect areas greater than 450$\mu\mu$Ci/20cm^2.

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

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect any 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 3.45 pCi/g to a high of 7.24 pCi/g.

3.37 Rail Line Radioactive Material Storage Areas

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) Surveys performed in Rail Line Ram Storage Area Number 2 with the IM-247/PD did not detect any areas greater than 450μμCi/20cm^2.

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

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect any 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 0.35 pCi/g to a high of 8.24 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) Surveys performed in Rail Line Ram Storage Area Number 3 with the IM-247/PD did not detect areas greater than 450μμCi/20cm^2.

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

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect any 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 0.51 pCi/g to a high of 16.72 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.

(4) Surveys performed in Rail Line Ram Storage Area Number 4 with the IM-247/PD did not detect areas greater than 450μμCi/20cm^2.

Surveys performed with the IM-253/PD (HV-1 PHA) detected 50 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.

3.37 Rail Line Radioactive Material Storage Areas

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 0.37 pCi/g to a high of 10.37 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.

(5) Surveys performed in Rail Line Ram Storage Area Number 5 with the IM-247/PD detected one area greater than 450μμCi/20cm^2.

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

Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect any 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 0.99 pCi/g to a high of 12.38 pCi/g.

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

(6) Surveys performed in Rail Line Ram Storage Area Number 6 with the IM-247/PD did not detect areas greater than 450μμCi/20cm^2.

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

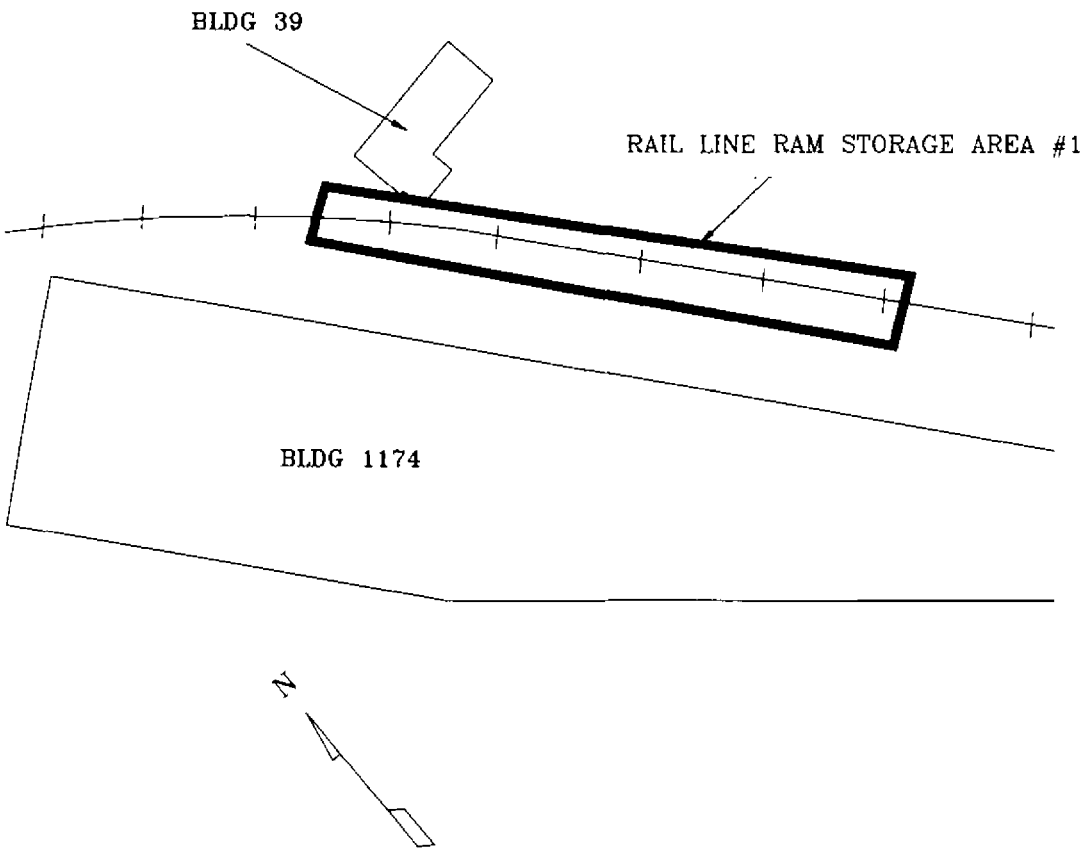
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect any areas greater than or equal to twice background.

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 0.26 pCi/g to a high of 12.80 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.

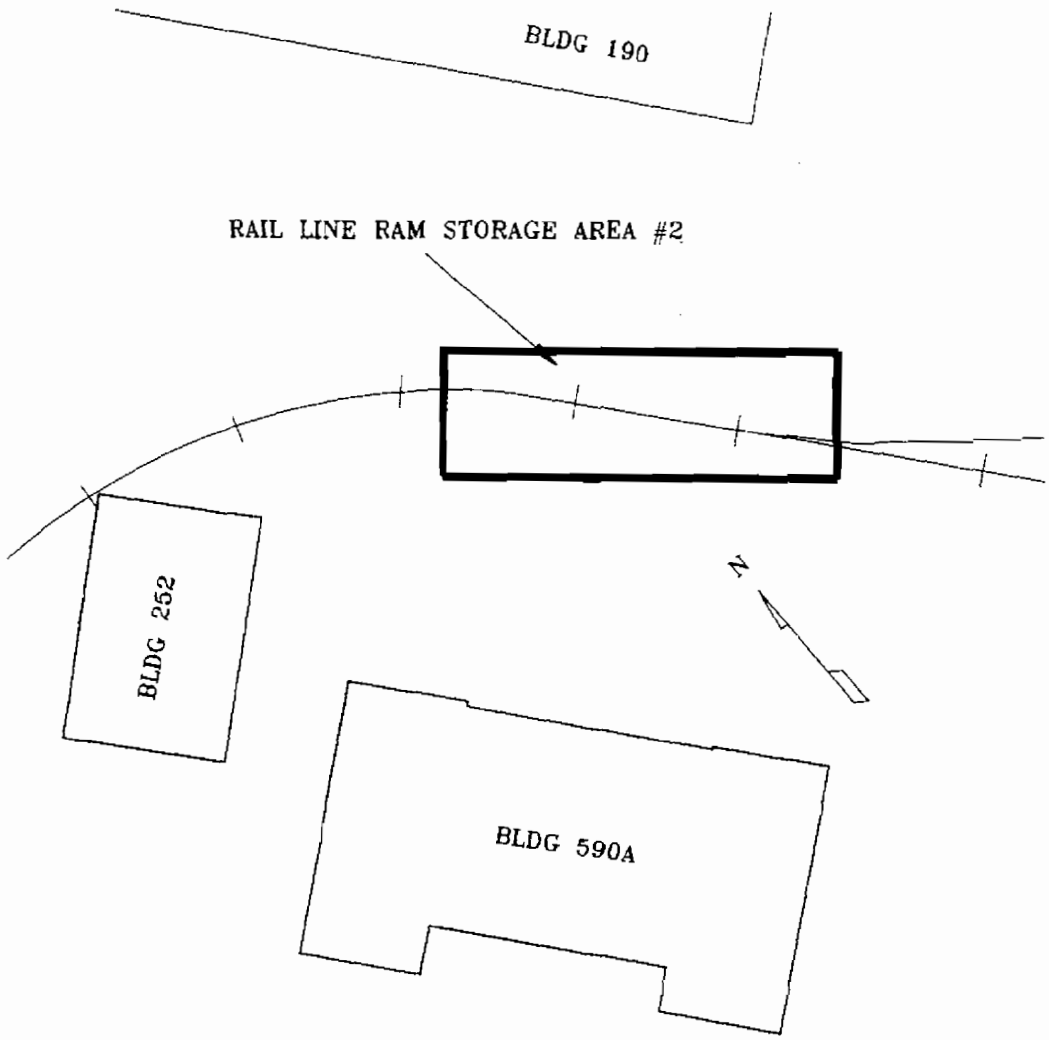
3.37 Rail Line Radioactive Material Storage Areas

d. Site Map



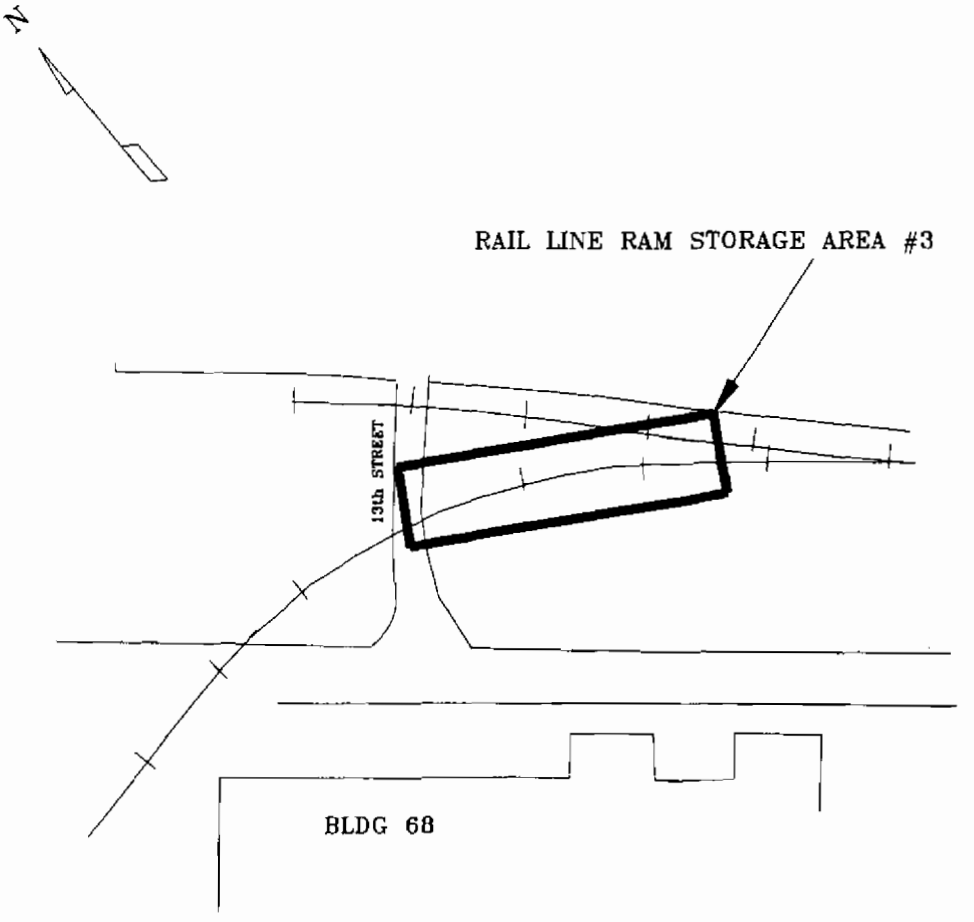
3.37 Rail Line Radioactive Material Storage Areas

d. Site Map



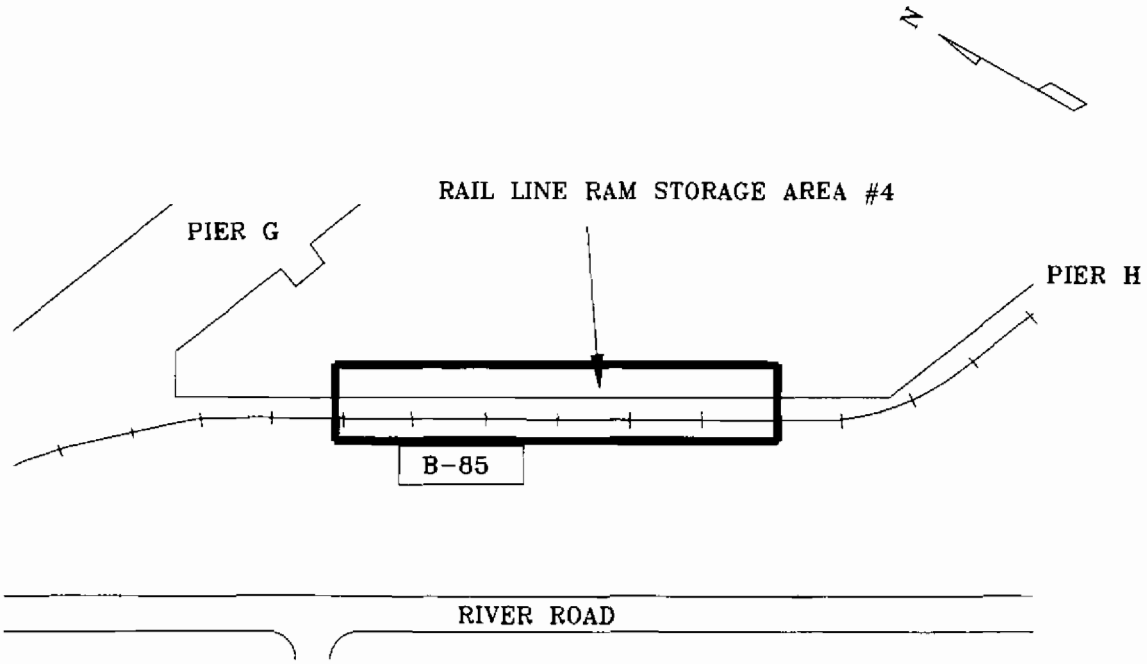
3.37 Rail Line Radioactive Material Storage Areas

d. Site Map



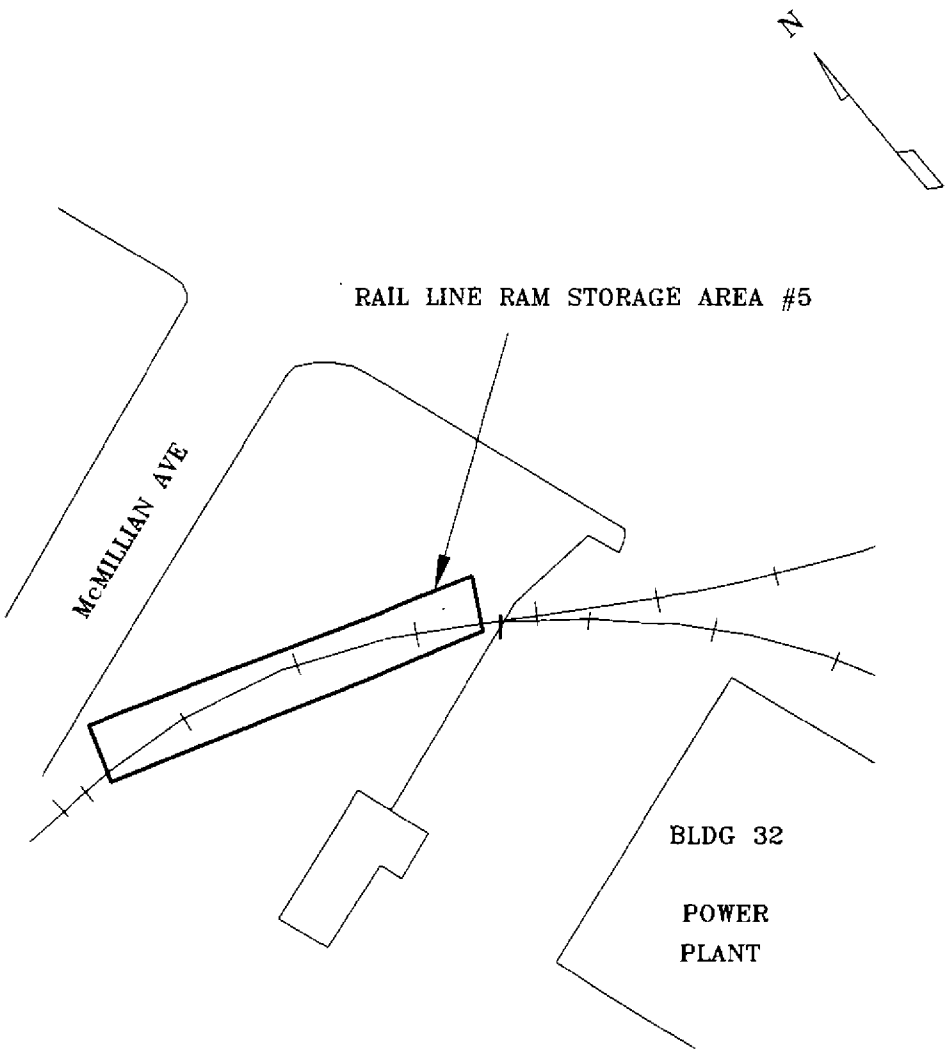
3.37 Rail Line Radioactive Material Storage Areas

d. Site Map



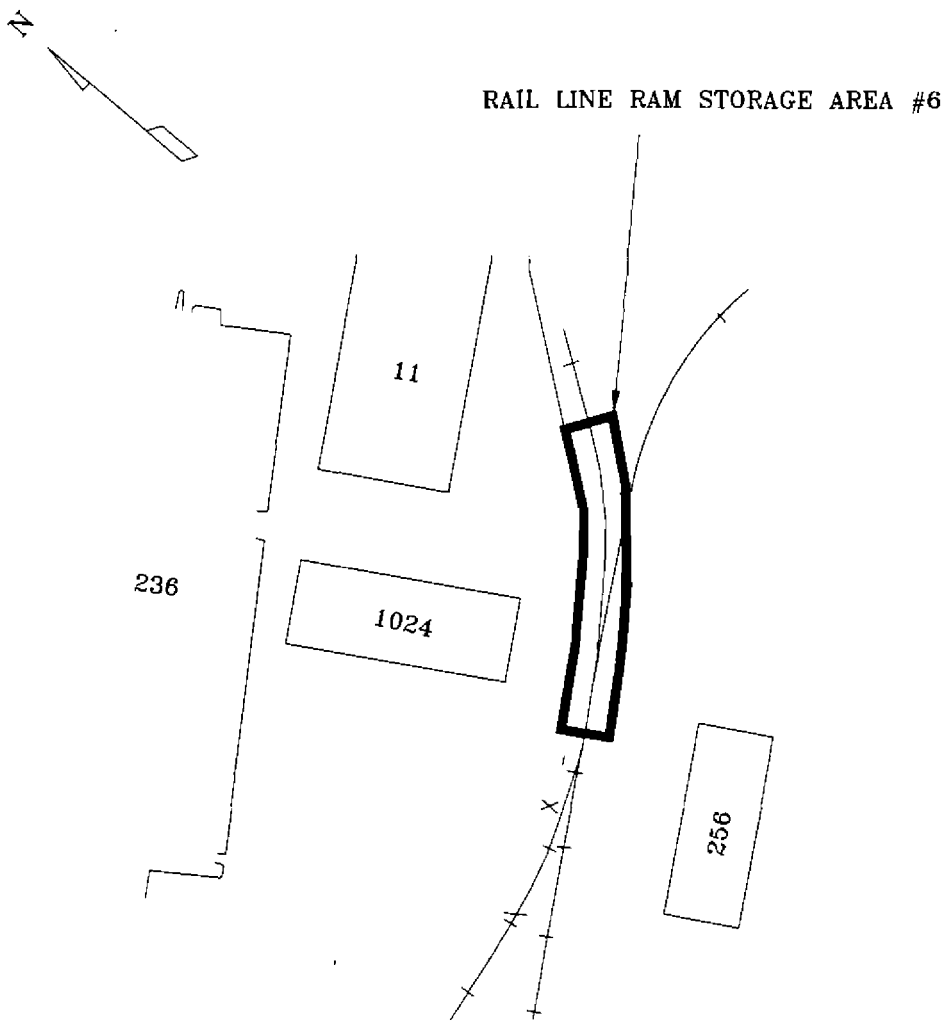
3.37 Rail Line Radioactive Material Storage Areas

d. Site Map



3.37 Rail Line Radioactive Material Storage Areas

d. Site Map



3.37 Rail Line Radioactive Material Storage Areas

e. Localized Grid Maps

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C	<450 400 600 9250 15000 6.35 <1	<450 400 550 – – 6.38 <1	<450 400 600 – – 6.67 <1	<450 400 500 9250 12000 6.46 <1	<450 400 450 – – 6.35 <1	<450 430 450 – – 7.10 <1	<450 400 700 – – 6.64 <1	<450 400 700 9250 15000 5.79 <1	<450 400 500 – – 5.99 <1	<450 400 600 – – 6.85 <1	<450 400 550 – – 5.56 <1	<450 400 600 9250 12500 6.67 <1	<450 450 500 – – 6.01 <1	<450 400 600 9250 12500 5.55 <1	<450 400 450 – – 5.99 <1	<450 400 550 – – 5.83 <1	<450 400 600 – – 5.49 <1
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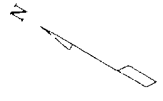
RAIL LINE RAM STORAGE AREA #1

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

3.37 Rail Line Radioactive Material Storage Areas

e. Localized Grid Maps



	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
C	<450 400 500 9250 12500 5.70 <1	<450 400 500 – – 6.03 <1	<450 400 500 9250 15000 5.25 <1	<450 400 550 – – 5.57 <1	<450 400 550 – – 5.84 <1	<450 400 550 – – 5.90 <1	<450 400 550 9250 12500 5.83 <1	<450 400 450 – – 5.37 <1	<450 400 550 9250 10000 5.63 <1	<450 400 400 – – 5.75 <1	<450 400 450 – – 5.93 <1	<450 400 400 – – 5.82 <1	<450 400 350 9250 9500 3.45 <1	<450 400 400 – – 4.98 <1	<450 400 400 9250 10000 5.32 <1	<450 400 425 – – 5.69 <1	<450 400 375 – – 6.25 <1
B	<450 400 650 – – 6.40 <1	<450 400 650 – – 6.33 <1	<450 400 650 – – 5.90 <1	<450 400 500 – – 6.88 <1	<450 400 550 9250 13500 6.40 <1	<450 400 450 – – 5.80 <1	<450 400 450 – – 7.06 <1	<450 400 500 – – 5.60 <1	<450 400 600 – – 5.97 <1	<450 400 450 – – 6.25 <1	<450 400 450 9250 12500 6.39 <1	<450 400 650 – – 7.24 <1	<450 400 400 – – 6.59 <1	<450 400 350 – – 5.02 <1	<450 400 500 – – 5.50 <1	<450 400 500 9350 10000 4.29 <1	<450 400 500 – – 6.07 <1
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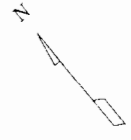
RAIL LINE RAM STORAGE AREA #1

Sample Data

<450 – IM-247/PD Results [μCi/20cm²]
200 – IM-253/PD (HV-1 PHA) [bkg.]
500 – IM-253/PD (HV-1 PHA) [cpm]
7000 – IM-253/PD (HV-2 GROSS) [bkg.]
7500 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.37 Rail Line Radioactive Material Storage Areas

e. Localized Grid Maps



	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
C	<450 500 700 12500 15000 6.24 <1	<450 500 650 - - 6.02 <1	<450 500 650 - - 7.84 <1	<450 500 650 12500 10000 1.99 <1	<450 500 600 - - 3.89 <1	<450 500 600 - - 4.92 <1	<450 500 650 - - 4.95 <1	<450 500 500 12500 15000 4.43 <1	<450 500 500 - - 5.34 <1	<450 500 700 - - 5.05 <1	<450 500 750 - - 5.40 <1	<450 500 700 12500 15000 5.54 <1	<450 500 650 - - 5.30 <1	<450 500 650 - - <0.35	<450 500 650 12500 10000 1.32 <1
B	<450 500 600 - - 8.07 <1	<450 500 500 11500 15300 5.59 <1	<450 500 600 - - 4.92 <1	<450 500 500 - - 4.53 <1	<450 500 500 - - 4.52 <1	<450 500 625 12500 15000 4.87 <1	<450 500 500 - - 1.87 <1	<450 500 550 - - 6.64 <1	<450 500 500 - - 7.32 <1	<450 500 650 - - 4.89 <1	<450 500 600 - - 2.24 <1	<450 500 500 - - 5.00 <1	<450 500 500 12500 12500 4.39 <1	<450 500 500 - - 4.10 <1	<450 500 500 - - 3.94 <1
A	<450 500 850 - - 6.01 <1	<450 500 700 - - 5.83 <1	<450 500 600 12500 17500 4.17 <1	<450 500 500 - - 3.88 <1	<450 500 500 12500 15000 4.40 <1	<450 500 500 - - 5.30 <1	<450 500 650 - - 3.68 <1	<450 500 700 - - 3.42 <1	<450 500 500 12500 15000 4.26 <1	<450 500 650 - - 7.57 <1	<450 500 650 12500 15000 7.01 <1	<450 500 650 - - 1.80 <1	<450 500 600 - - 5.53 <1	<450 500 600 12500 15000 7.56 <1	<450 500 600 - - 6.77 <1

RAIL LINE RAM STORAGE AREA #2

Sample Data

< 450 – IM-247/PD Results [μμCi/20cm²]
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.E2 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.37 Rail Line Radioactive Material Storage Areas

e. Localized Grid Maps

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
C	<450 500 600 12500 15000 7.11 <1	<450 500 650 - - 9.28 <1	<450 500 650 - - 7.75 <1	<450 500 650 12500 15000 7.59 <1	<450 500 550 - - 8.32 <1	<450 500 550 - - 5.74 <1	<450 500 550 - - 2.84 <1	<450 500 550 12500 15000 5.01 <1	<450 500 550 - - 6.03 <1	<450 500 550 - - 5.41 <1	<450 500 600 - - 4.25 <1	<450 500 600 12500 15000 8.13 <1	<450 500 700 - - 3.00 <1	<450 500 800 - - 9.24 <1	<450 500 900 12500 15000 8.53 <1
B	<450 500 450 - - 8.06 <1	<450 500 450 - - 10.74 <1	<450 500 500 12500 15000 6.62 <1	<450 500 600 - - 7.91 <1	<450 500 650 - - 7.06 <1	<450 500 700 - - 8.60 <1	<450 500 600 - - 7.62 <1	<450 500 600 - - 5.96 <1	<450 500 550 - - 5.60 <1	<450 500 600 12500 15000 7.29 <1	<450 500 600 - - 6.91 <1	<450 500 600 - - 5.48 <1	<450 500 600 - - 8.95 <1	<450 500 750 12500 15000 8.77 <1	<450 500 700 - - 8.12 <1
A	<450 500 700 - - 8.92 <1	<450 500 800 12500 20000 9.51 <1	<450 500 800 - - 16.72 <1	<450 500 800 - - 8.05 <1	<450 500 850 12500 20000 7.73 <1	<450 500 750 - - 7.29 <1	<450 500 750 12500 17500 9.51 <1	<450 500 500 - - 7.89 <1	<450 500 600 - - 7.01 <1	<450 500 600 - - 8.16 <1	<450 500 600 12500 15000 9.27 <1	<450 500 700 - - 8.92 <1	<450 500 600 12500 15000 4.89 <1	<450 500 650 - - 7.97 <1	<450 500 850 - - 7.42 <1

RAIL LINE RAM STORAGE AREA #3

Sample Data
<450 – IM-247/PD Results [μCi/20cm²]
200 – IM-253/PD (HV-1 PHA) [bkg.]
300 – IM-253/PD (HV-1 PHA) [cpm]
7000 – IM-253/PD (HV-2 GROSS) [bkg.]
7500 – IM-253/PD (HV-2 GROSS) [cpm]
1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.37 Rail Line Radioactive Material Storage Areas

e. Localized Grid Maps

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
C	<450 200 350 6000 7500 7.08 <1	<450 200 350 – – 6.86 <1	<450 200 350 – – 5.28 <1	<450 200 300 – – 5.72 <1	<450 200 300 – – 6.45 <1	<450 200 300 – – 6.38 <1	<450 200 350 6000 8500 6.43 <1	<450 200 300 – – 7.45 <1	<450 200 300 – – 7.06 <1	<450 200 400 – – 6.05 <1	<450 200 300 6000 10000 5.73 <1	<450 200 300 – – 5.71 <1	<450 200 375 6000 10000 6.04 <1	<450 200 300 – – 5.56 <1	<450 200 300 – – 0.82 –	<450 200 350 – – 2.83 <1	<450 200 300 6000 8000 2.86 <1	<450 200 300 – – 3.18 <1	<450 200 300 – – 3.14 <1	<450 200 350 6000 8000 3.11 <1
B	<450 200 300 – – 6.56 <1	<450 200 300 – – 6.18 <1	<450 200 350 6000 10000 7.31 <1	<450 200 350 – – 6.53 <1	<450 200 400 – – 6.34 <1	<450 200 450 6000 7500 4.87 <1	<450 200 350 – – 5.24 <1	<450 200 300 – – 6.85 <1	<450 200 300 6000 7000 5.86 <1	<450 200 350 – – 5.98 <1	<450 200 300 – – 6.35 <1	<450 200 300 6000 10000 6.85 <1	<450 200 300 – – 10.37 <1	<450 200 300 – – 6.11 <1	<450 200 425 – – 5.29 <1	<450 200 400 6000 9000 5.50 <1	<450 200 425 – – 6.34 <1	<450 200 300 – – 4.46 <1	<450 200 350 6000 9000 5.95 <1	<450 200 300 – – 5.46 <1
A	<450 200 350 – – 5.44 <1	<450 200 400 6000 7500 6.52 <1	<450 200 300 – – 5.47 <1	<450 200 300 – – 4.63 <1	<450 150 400 6000 7530 2.45 <1	<450 200 400 – – 5.54 <1	<450 150 400 – – 2.85 <1	<450 200 300 6000 7000 5.76 <1	<450 200 350 – – 6.08 <1	<450 200 400 – – 5.08 <1	<450 200 300 6000 7000 5.50 <1	<450 200 400 – – 5.08 <1	<450 200 350 – – 6.07 <1	<450 200 350 – – 5.12 <1	<450 200 350 6000 9000 5.28 <1	<450 200 400 – – 4.83 <1	<450 200 425 – – 5.85 <1	<450 200 450 6000 8750 5.66 <1	<450 200 450 – – 6.04 <1	<450 200 400 – – 5.52 <1

N

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
C	<450 200 350 – – 6.67 <1	<450 200 350 – – 6.05 <1	<450 200 300 – – 6.63 <1	<450 200 300 6000 8500 6.78 <1	<450 200 300 – – 5.79 <1	<450 200 300 – – 5.61 <1	<450 200 350 – – 6.83 <1	<450 200 350 6000 7500 5.42 <1	<450 200 350 – – 5.89 <1	<450 200 350 – – 5.68 <1	<450 200 350 6000 7000 7.32 <1	<450 200 350 – – 6.34 <1	<450 200 250 – – 6.86 <1	<450 200 300 – – 6.51 <1	<450 200 250 6000 7000 7.79 <1	<450 200 300 – – 6.88 <1	<450 200 350 – – 7.19 <1	<450 200 300 6000 7500 6.14 <1	<450 200 300 – – <0.37 –	<450 200 350 – – 6.92 <1
B	<450 200 300 – – 7.23 <1	<450 200 350 – – 6.59 <1	<450 200 400 6000 10000 6.61 <1	<450 200 450 – – 6.88 <1	<450 200 400 – – 6.76 <1	<450 200 350 – – 6.05 <1	<450 200 350 6000 10000 5.80 <1	<450 200 350 – – 6.90 <1	<450 200 400 – – 6.30 <1	<450 200 350 6000 10500 6.29 <1	<450 200 350 – – 6.08 <1	<450 200 300 – – 6.38 <1	<450 200 300 – – 6.46 <1	<450 200 350 6000 6500 5.89 <1	<450 200 300 – – 6.13 <1	<450 200 300 – – 6.14 <1	<450 200 350 6000 7500 5.30 <1	<450 200 400 – – 5.52 <1	<450 200 375 – – 5.42 <1	<450 200 375 – – 5.99 <1
A	<450 250 450 – – 5.51 <1	<450 200 350 6000 10000 5.96 <1	<450 200 400 – – 5.13 <1	<450 200 350 – – 5.65 <1	<450 200 350 6000 10000 4.68 <1	<450 150 350 – – 2.64 <1	<450 200 350 – – 5.30 <1	<450 200 350 – – 5.94 <1	<450 150 400 3500 8000 3.01 <1	<450 200 300 – – 5.20 <1	<450 200 300 – – 5.59 <1	<450 200 275 – – 5.53 <1	<450 150 375 3500 8000 3.68 <1	<450 150 350 – – 2.62 <1	<450 200 300 – – 6.40 <1	<450 150 450 3500 7500 2.91 <1	<450 200 300 – – 5.87 <1	<450 200 350 6000 7000 5.76 <1	<450 200 350 – – 5.18 <1	<450 200 300 – – 5.00 <1

RAIL LINE RAM STORAGE AREA #4

Sample Data

<450 -- IM-267/PD Results [μμCv/20cm²]
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]

3.37 Rail Line Radioactive Material Storage Areas

e. Localized Grid Maps

	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
C	<450 200 400 – – 7.72 <1	<450 200 350 6000 8000 7.48 <1	<450 200 400 – – 6.81 <1	<450 200 300 – – 6.09 <1	<450 200 250 – – 4.60 <1	<450 200 350 – – 6.51 <1	<450 200 350 6000 7500 4.12 <1	<450 200 350 – – 4.65 <1	<450 200 350 6000 8500 5.18 <1	<450 150 300 – – 5.47 <1	<450 200 450 – – 5.62 <1	<450 200 250 6000 9000 5.15 <1	<450 700 400 – – 5.52 <1	<450 200 400 – – 5.56 <1	<450 200 400 – – 5.12 <1	<450 200 250 6000 9250 5.80 <1	<450 200 300 – – 6.72 <1	<450 200 400 6000 7000 4.80 <1
B	<450 200 400 6000 7500 6.04 <1	<450 200 400 – – 5.20 <1	<450 200 300 – 6000 6250 6.07 <1	<450 200 300 6000 6250 5.80 <1	<450 200 300 – – 4.99 <1	<450 200 350 6000 7500 6.45 <1	<450 200 375 – – 5.57 <1	<450 200 375 – – 6.73 <1	<450 200 375 – – 6.36 <1	<450 200 450 – – 4.16 <1	<450 420 550 6000 9000 6.00 <1	<450 800 250 – – 6.15 <1	<450 200 400 – – 6.36 <1	<450 200 300 6000 8750 6.74 <1	<450 200 325 – – 5.57 <1	<450 200 250 – – 6.12 <1	<450 200 250 – – 6.62 <1	<450 200 350 – – 5.45 <1
A	<450 200 300 – – 6.14 <1	<450 200 400 – – 6.04 <1	<450 200 300 6000 6500 6.04 <1	<450 200 350 – – 6.32 <1	<450 150 350 6000 6500 2.22 <1	<450 150 400 – – 1.60 <1	<450 200 350 – – 5.72 <1	<450 200 400 – – 5.62 <1	<450 200 400 – – 6.28 <1	<450 200 350 6000 7500 5.37 <1	<450 200 250 – – 7.36 <1	<450 200 400 – – 5.74 <1	<450 200 400 3500 8500 5.46 <1	<450 200 400 – – 5.83 <1	<450 200 375 – – 4.86 <1	<450 200 350 – – 6.07 <1	<450 200 400 3500 8500 6.08 <1	<450 200 350 – – 5.60 <1

RAIL LINE RAM STORAGE AREA #4

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

3.37 Rail Line Radioactive Material Storage Areas

e. Localized Grid Maps

	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18
C	<450 1000 800 – – 7.28 <1	<450 1000 700 – – 9.86 <1	<450 1000 750 20000 17500 6.99 <1	<450 1000 850 – – 7.51 <1	<450 1000 850 26000 25000 7.58 <1	<450 1000 850 – – 7.28 <1	<450 1000 800 – – 10.36 <1	<450 1000 800 – – 10.97 <1	<450 1000 800 20000 20000 7.53 <1	<450 1000 800 – – 11.62 <1	<450 1000 900 20000 20000 9.29 <1	<450 1000 900 – – 7.22 <1	<450 1000 900 – – 7.80 <1	<450 1000 900 – – 7.57 <1	<450 1000 872 20000 20000 9.20 <1	<450 1000 800 – – 9.42 <1	<450 1000 850 20000 20000 10.49 <1
B	<450 1000 800 – – 6.81 <1	<450 1000 750 20000 15000 10.51 <1	<450 1000 750 – – 5.24 <1	<450 1000 800 – – 6.77 <1	<450 1000 800 – – 8.77 <1	<450 1000 750 – – 9.14 <1	<450 1000 850 20000 20000 8.47 <1	<450 1000 800 – – 7.08 <1	<450 1000 750 – – 10.02 <1	<450 1000 600 – – 10.63 <1	<450 1000 850 – – 7.73 <1	<450 1000 750 – – 8.48 <1	<450 1000 800 20000 20000 8.74 <1	<450 1000 800 – – 9.42 <1	<450 1000 900 – – 8.16 <1	<450 1000 800 – – 9.01 <1	<450 1000 800 – – 8.25 <1
A	<450 1000 700 20000 20000 2.38 <1	<450 1000 750 – – 7.46 <1	<450 1000 700 – – 8.65 <1	<450 1000 700 20000 17500 9.77 <1	<450 1000 850 – – 7.82 <1	<450 1000 1000 20000 20000 2.99 <1	<450 1000 1000 – – 9.93 <1	<450 1000 550 – – 9.18 <1	<450 1000 600 – – 8.90 <1	<450 1000 500 20000 15000 8.52 <1	<450 1000 750 – – 11.31 <1	<450 1000 700 20000 20000 8.21 <1	<450 1000 700 – – 7.85 <1	<450 1000 750 – – 10.41 <1	<450 1000 700 – – 8.10 <1	<450 1000 750 20000 20000 9.91 <1	<450 1000 900 – – 9.20 <1

	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
C	<450 1000 850 – – 9.36 <1	<450 1000 850 – – 9.39 <1	<450 1000 900 – – 9.10 <1	<450 1000 850 20000 20000 9.51 <1	<450 1000 850 – – 8.38 <1	<450 1000 850 20000 20000 7.13 <1	<450 1000 850 – – 8.43 <1	<450 1000 850 – – 8.42 <1	<450 1000 850 – – 9.36 <1	<450 1000 850 20000 20000 5.83 <1	<450 1000 800 – – 9.18 <1	<450 1000 800 – – 9.68 <1	<450 1000 750 – – 8.58 <1	<450 1000 650 23000 20000 4.74 <1	<450 1000 550 – – 9.97 <1	<450 1000 450 – – 5.86 <1	<450 1000 600 20000 15000 4.96 <1
B	<450 1000 800 – – 9.93 <1	<450 1000 800 20000 15000 8.59 <1	<450 1000 850 – – 8.78 <1	<450 1000 800 – – 10.36 <1	<450 1000 900 – – 11.69 <1	<450 1000 700 – – 10.63 <1	<450 1000 800 – – 10.27 <1	<450 1000 700 20000 20000 9.26 <1	<450 1000 800 – – 10.28 <1	<450 1000 700 – – 12.18 <1	<450 1000 750 – – 9.75 <1	<450 1000 700 – – 8.78 <1	<450 1000 800 – – 9.08 <1	<450 1000 800 – – 8.63 <1	<450 1000 800 20000 15000 6.66 <1	<450 1000 700 – – 8.66 <1	2160 1000 550 – – 2.72 <1
A	<450 1000 900 20000 15000 7.85 <1	<450 900 850 – – 8.04 <1	<450 900 850 – – 4.89 <1	<450 900 750 – – 6.03 <1	<450 900 750 20000 15000 8.73 <1	<450 900 450 – – 1.59 <1	<450 900 400 20000 15000 1.95 <1	<450 900 350 – – 0.99 <1	<450 900 425 – – 1.09 <1	<450 900 375 – – 1.95 <1	<450 900 350 20000 15000 2.16 <1	<450 1000 550 – – 7.80 <1	<450 1000 600 20000 15000 7.08 <1	<450 1000 600 – – 7.59 <1	<450 1000 550 – – 7.00 <1	<450 1000 600 20000 15000 7.95 <1	<450 1000 600 – – 4.65 <1

RAIL LINE RAM STORAGE AREA #5

Notes:

(1) Areas surveyed with an IM-247/PD, indicating detectable activity greater than or equal to 450μCi/20cm² were sampled and analyzed by spectral analysis. In these cases, analysis of the spectrum indicated only photopeaks of naturally occurring isotopes not associated with the Naval Nuclear Propulsion Program. These natural isotopes include K-40, Ra-226, Pb-212, Bi-214, Be-7, Tl-208 and Ac-228.

Sample Data

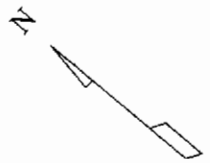
<450 -- IM-247/PD Results [μCi/20cm²]
200 -- IM-253/PD (HV-1 PHA) [bkg.]
300 -- IM-253/PD (HV-1 PHA) [cpm]
7000 -- IM-253/PD (HV-2 GROSS) [bkg.]
7300 -- IM-253/PD (HV-2 GROSS) [cpm]
1.82 -- MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 -- MCA Specific Co-60 Results [pCi/g]

3.37 Rail Line Radioactive Material Storage Areas

e. Localized Grid Maps

	1	2	3
J	<450 600 450 – – 2.16 <1	<450 600 350 – – 4.47 <1	<450 600 300 17500 9000 2.21 <1
I	<450 600 450 17500 15000 1.65 <1	<450 600 250 – – 0.88	<450 600 300 – – 2.59 <1
H	<450 400 350 – – 4.08 <1	<450 400 350 – – 6.25 <1	<450 400 250 – – 4.68 <1
G	<450 400 350 9250 12500 4.73 <1	<450 400 250 – – 3.84 <1	<450 400 300 – – 5.44 <1
F	<450 400 350 – – 4.24 <1	<450 400 300 – – 4.53 <1	<450 600 300 – – 7.00 <1
E	<450 400 400 9250 8500 5.63 <1	<450 400 300 – – 4.29 <1	<450 600 275 – – 1 45 <1
D	<450 400 425 – – 4.12 <1	<450 400 300 – – 4.69 <1	<450 400 350 9250 7500 4.16 <1
C	<450 600 450 17500 18000 8.22 <1	<450 600 450 – – 8.84 <1	<450 600 400 – – 3.73 <1
B	<450 600 700 – – 6.40 <1	<450 600 550 – – 8.33 <1	<450 600 550 17500 15000 7.55 <1
A	<450 600 600 17500 15000 7.53 <1	<450 600 450 – – 6.21 <1	<450 600 650 – – 7.20 <1

	1	2	3
T	<450 600 450 – – 3.20 <1	<450 600 225 – – 5.95 <1	<450 600 500 17500 15000 5.34 <1
S	<450 600 450 17500 15000 4.94 <1	<450 600 300 – – 5.36 <1	<450 600 450 – – 0.65
R	<450 600 400 – – 8.19 <1	<450 500 500 – – 8.55 <1	<450 600 500 17500 15000 6.05 <1
Q	<450 600 500 17500 15000 4.09 <1	<450 600 500 – – 3.40 <1	<450 600 400 – – 0.44
P	<450 600 500 – – 9.32 <1	<450 600 500 – – 7.24 <1	<450 600 450 17500 12500 7.41 <1
O	<450 600 500 17500 15000 4.08 <1	<450 600 400 – – <0.30	<450 600 350 – – 2.31 <1
N	<450 400 650 – – 5.48 <1	<450 600 350 – – 5.46 <1	<450 600 350 9250 9250 <0.32
M	<450 400 750 9250 17500 6.48 <1	<450 600 400 – – 7.21 <1	<450 600 475 – – 11.84 <1
L	<450 400 750 – – 6.87 <1	<450 600 450 – – 9.25 <1	<450 600 350 17500 8000 5.78 <1
K	<450 600 450 17500 12500 2.47 <1	<450 600 400 – – 4.30 <1	<450 600 400 – – 6.69 <1

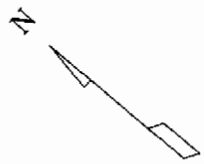


RAIL LINE RAM STORAGE AREA #6

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

3.37 Rail Line Radioactive Material Storage Areas

e. Localized Grid Maps



	1	2	3
AD	<450 600 450 – – 3.29 <1	<450 600 450 – – 3.58 <1	<450 600 450 17500 15000 6.70 <1
AC	<450 600 600 – – 2.84 <1	<450 600 500 – – 4.86 <1	<450 600 500 – – <0.35
AB	<450 600 400 17500 15000 3.36 <1	<450 600 400 – – 4.47 <1	<450 600 700 – – 6.43 <1
AA	<450 600 600 – – 7.78 <1	<450 600 600 – – 6.85 <1	<450 600 700 17500 15000 12.80 <1
Z	<450 600 450 17500 17500 <0.26	<450 600 450 – – 3.12 <1	<450 600 600 – – 6.02 <1
Y	<450 600 500 – – 5.05 <1	<450 600 450 – – 2.84 <1	<450 600 500 17500 9000 6.70 <1
X	<450 600 600 17500 15000 5.21 <1	<450 600 350 – – 4.42 <1	<450 600 400 – – 9.49 <1
W	<450 600 600 – – 6.69 <1	<450 600 350 – – 5.58 <1	<450 600 650 17500 17500 6.01 <1
V	<450 600 400 – – 7.49 <1	<450 600 300 – – <0.31	<450 600 650 – – 6.25 <1
U	<450 600 400 – – 5.22 <1	<450 600 250 – – 5.34 <1	<450 600 400 – – 7.65 <1

	1	2	3
AI	<450 500 350 17500 15000 2.00 <1	<450 600 300 – – 3.19 <1	<450 600 300 – – 8.56 <1
AH	<450 600 350 – – <0.34	<450 600 350 – – 8.74 <1	<450 600 400 17500 15000 6.40 <1
AG	<450 600 450 17500 15000 0.60	<450 600 450 – – 3.84 <1	<450 600 550 – – 6.57 <1
AF	<450 600 450 – – 5.71 <1	<450 600 450 – – 1.62 <1	<450 600 500 17500 15000 7.56 <1
AE	<450 600 450 17500 12500 0.57	<450 600 400 – – 2.87 <1	<450 600 600 – – 4.28 <1

RAIL LINE RAM STORAGE AREA #6

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

3.37 Rail Line Radioactive Material Storage Areas

f. Before Photographs

Rail Line RAM Storage Area #1.

3.37 Rail Line Radioactive Material Storage Areas

f. Before Photographs

Rail Line RAM Storage Area #2

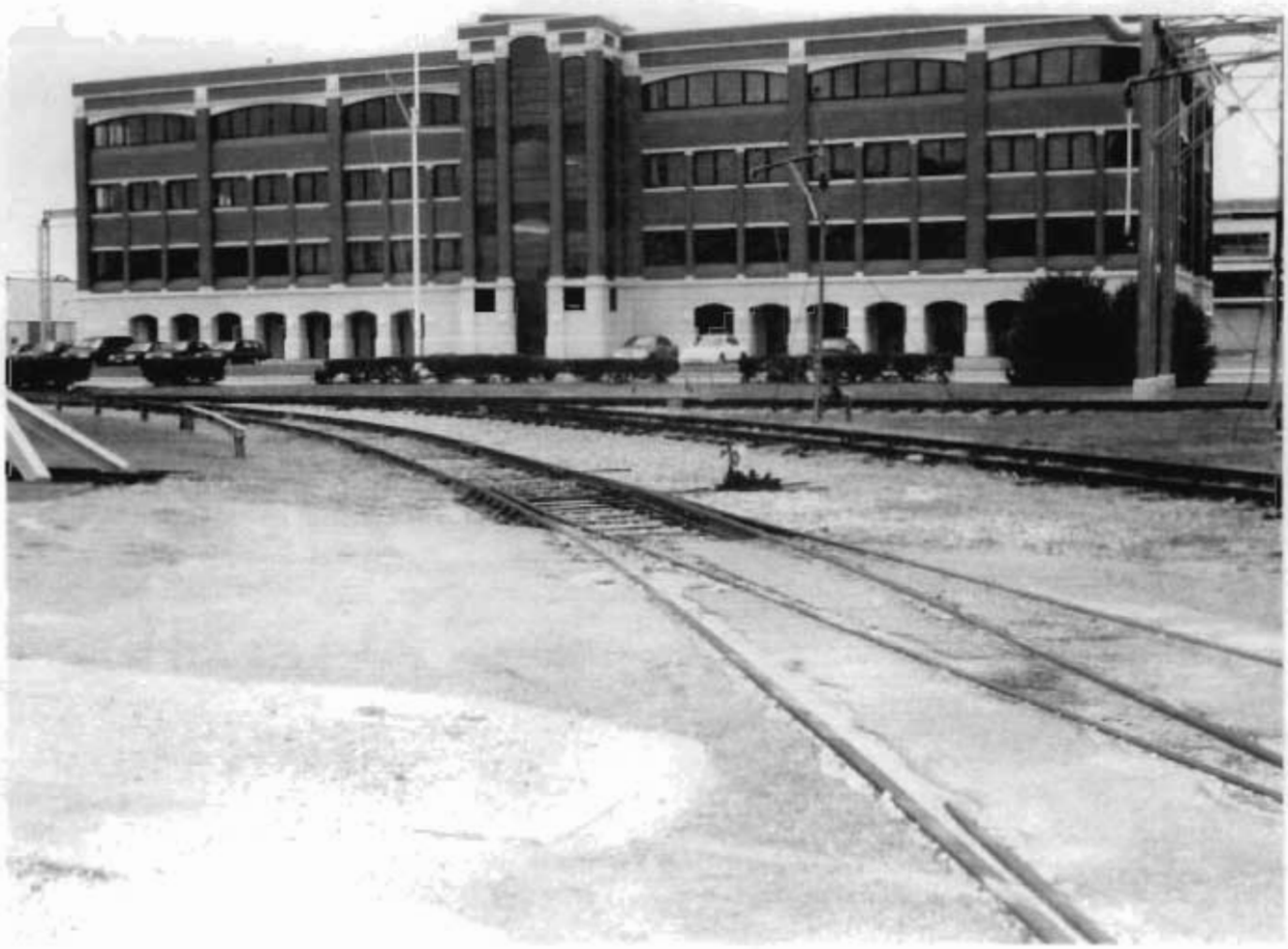
3.37 Rail Line Radioactive Material Storage Areas

f. Before Photographs

Rail Line RAM Storage Area #3.

3.37 Rail Line Radioactive Material Storage Areas

f. Before Photographs



Rail Line RAM Storage Area #5.

3.37 Rail Line Radioactive Material Storage Areas

g. After Photographs

Rail line RAM Storage Area #1.

3.37 Rail Line Radioactive Material Storage Areas

g. After Photographs

Rail Line RAM Storage Area #1.

3.37 Rail Line Radioactive Material Storage Areas

g. After Photographs

Rail Line RAM Storage Area #2.

3.37 Rail Line Radioactive Material Storage Areas

g. After Photographs

Rail Line RAM Storage Area #2.

3.37 Rail Line Radioactive Material Storage Areas

g. After Photographs

Rail Line RAM Storage Area #3.

3.37 Rail Line Radioactive Material Storage Areas

g. After Photographs

Rail Line RAM Storage Area #4.

3.37 Rail Line Radioactive Material Storage Areas

g. After Photographs

Rail Line RAM Storage Area #4.

3.37 Rail Line Radioactive Material Storage Areas

g. After Photographs

Rail Line RAM Storage Area #5.

3.37 Rail Line Radioactive Material Storage Areas

g. After Photographs

Rail Line RAM Storage Area #6.

3.38 YFN-1205 Barge

a. Introduction:

The YFN-1205 barge is a floating support facility which Charleston Naval Shipyard used to support off-yard repair evolutions.

(1) **Description:**

The YFN-1205 is a flat top barge with a shipyard built single story superstructure. The superstructure contains a portable machine shop. Adjacent to the portable machine shop was a vat area that was constructed of a metal floor partially covered with linoleum, and metal and expanded metal walls partially covered with rubber insulation, plywood, and formica.

(2) **Brief History:**

(a) **Use:** This barge has been the responsibility of Shop 38 and was used to support non-nuclear shipyard tiger team operations. One room was used on occasion to phosphate coat reactor vessel studs.

(b) **Radiological History:** An area on this barge was controlled for a period of time in 1970 as a controlled surface contaminated area and radioactive material storage area to support work on coating radioactive reactor plant components. The vats used for this work were decontaminated and surveyed. All surveys show less than 450 $\mu\mu Ci/100cm^2$. The area on the barge was released from radiological controls in 1970 in accordance with the NAVSEA requirements of that time. Because the release requirements have changed since 1970, the barge vat area was resurveyed to meet the current requirements.

(3) **Survey Requirements:**

(a) Group 3 survey in the vat area.

b. Discussion:

The Vat Area on the Barge YFN-1205 was divided into 26 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.

3.38 YFN-1205 Barge

A total of 26 solid material samples were taken from the Vat 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 214 and thallium 208.

The construction material present in the Vat Area of Barge YFN-1205 was metal, rubber insulation linoleum, formica, and plywood. For the IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) a background of 40, 50, and 1250 counts per minute were based on background radiation levels obtained from Barge H - 418.

c. Summary:

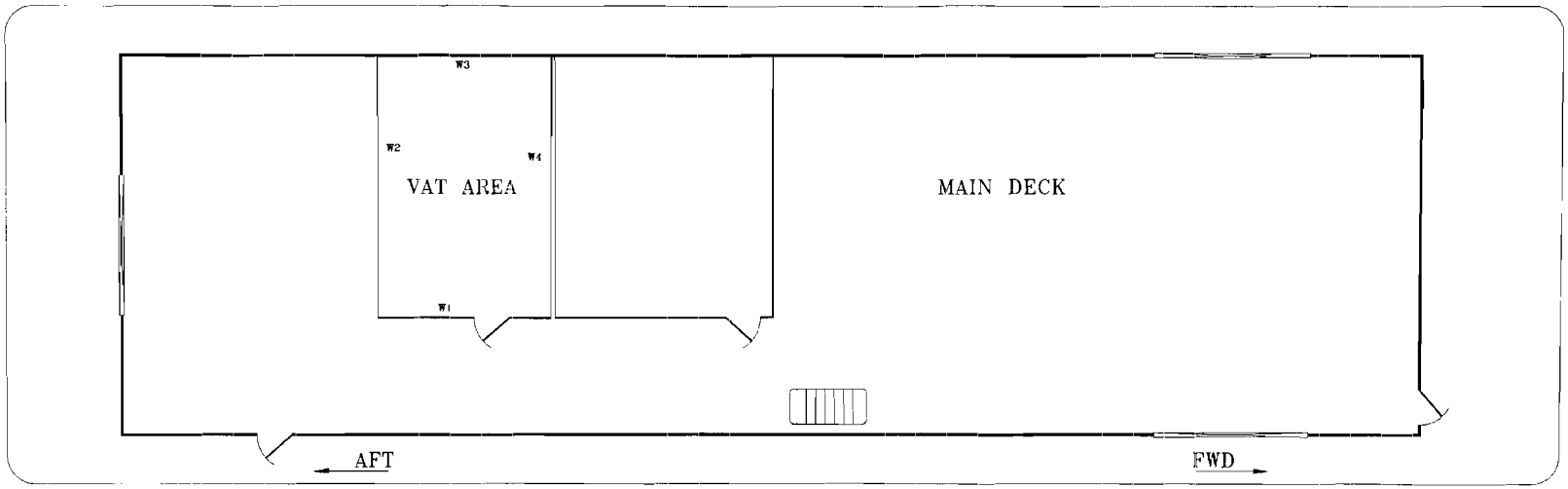
Surveys performed with the IM-247/PD did not detect areas greater than 450 $\mu\mu Ci/20cm^2$.

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.

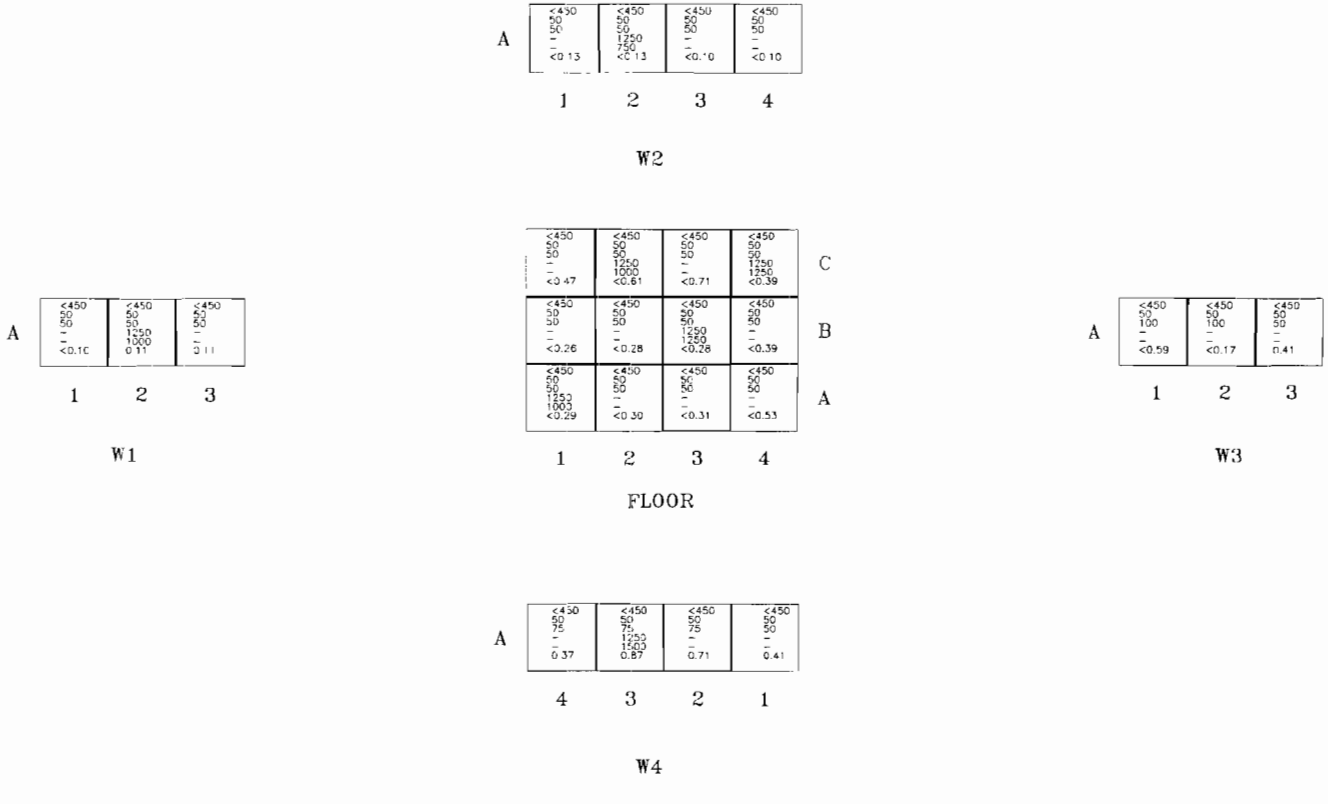
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from less than a minimum detectable activity of 0.10 pCi/g to a high of 0.87 pCi/g.

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, except for paint samples. Analysis performed on paint samples from grids, F-A-4, F-B-4, F-C-1, F-C-2, F-C-3, and F-C-4 indicated less than 3 pCi/g.


W3
W2
W4
VAT AREA
MAIN DECK
W1
AFT
FWD

3.38 YFN-1205 Barge

e. Localized Grid Maps

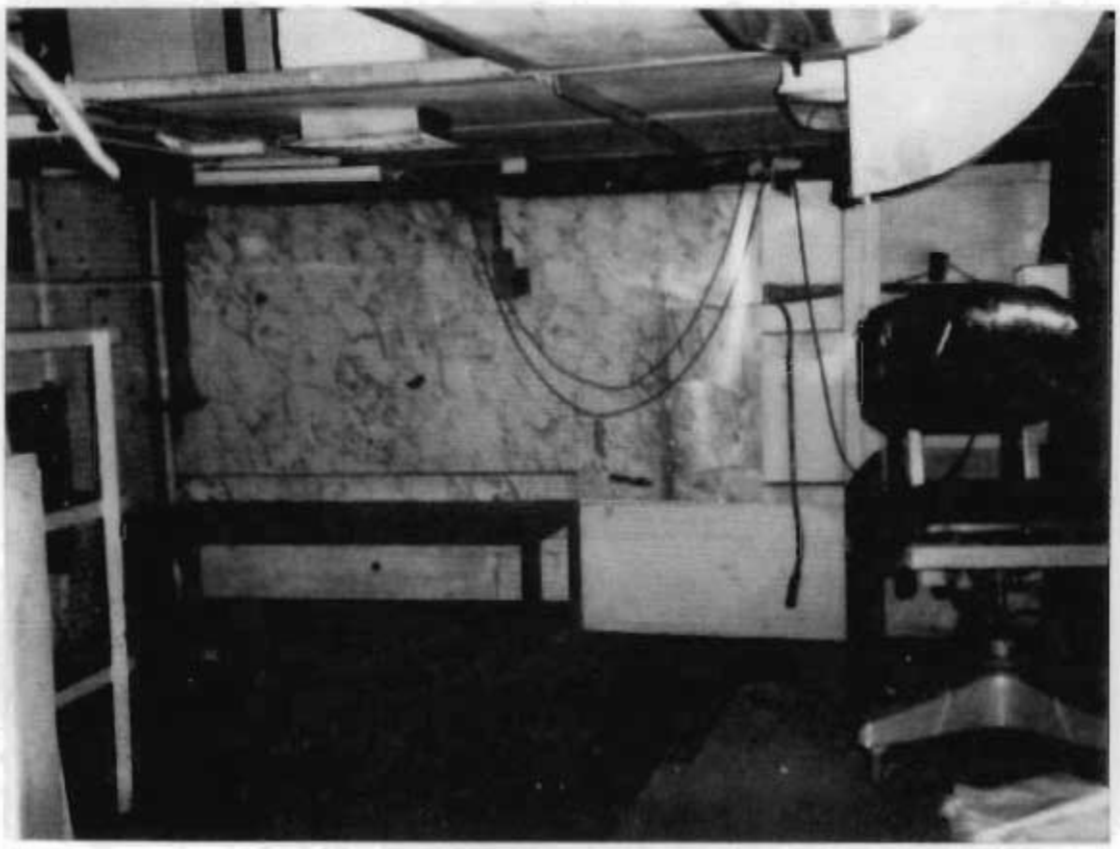


Note:
Paint samples taken from floor grids F-A-4, F-B-4, F-C-1, F-C-2, F-C-3, and F-C-4 have a limit of 3 pCi/g

Sample Data
<450 – IM-247/PD Results [μμCi/20cm²]
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]
1.87 – MCA Gross Gamma Eq. Co-60 [pCi/g]
<1 – MCA Specific Co-60 Results [pCi/g]

3.38 YFN-1205 Barge

f. Prior Photograph



YFN-1205 Vat Area

3.38 YFN-1205 Barge

g. After Photograph

YFN-1205 Vat Area.

3.39 Dry Dock 5 Quay Wall RAM Storage Area

a. Introduction:

Dry Dock 5 Quay Wall Radioactive Material Storage Area is located northeast of Dry Dock 5, adjacent to Building 1245.

(1) **Description:**
This storage area is located in grid D-7 of the Charleston Naval Shipyard map (Figure 10). The radioactive material storage areas located on this quay wall typically consisted of 15' by 30' radiation areas roped or fenced off to control access. The ground cover is asphalt and concrete.

(2) **Brief History:**

(a) **Use:** This radioactive material storage area was used for temporary and long term storage of various pieces of equipment such as portable refueling facilities and large demineralizer casks.

(b) **Radiological History:** Areas have been controlled as radiation areas and radioactive material storage areas. Loose surface contamination levels were less than 450μμCi/100cm^2.

(3) **Survey Requirements:**

(a) Group 3 survey.

b. Discussion:

Dry Dock 5 Quay Wall Radioactive Material Storage Area is a Group 3 category of radioactive material storage areas where there was a potential for contamination levels of less than 1,000μμCi/100cm^2.

The quay wall was divided into one hundred and eighty-nine grids, approximately 5' by 5'. 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 grid.

A total of one hundred and eighty-nine solid material samples were taken. Each solid 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, radium 226, beryllium 7.

3.39 Dry Dock 5 Quay Wall RAM Storage Area

Two types of construction materials were present in the areas surveyed on the quay wall--asphalt and concrete. This resulted in the use of different backgrounds for the quay wall release survey. For the asphalt, an IM-247/PD background of 100 counts per minute, IM-253/PD (HV-1 PHA) background of 400 counts per minute and an IM-253/PD (HV-2 GROSS) background of 12000 counts per minute were based on background radiation levels obtained from the asphalt road in front of Building 1648. For the concrete portion of the quay wall, an IM-247/PD background of 40 counts per minute, IM-253/PD (HV-1 PHA) background of 150 counts per minute and IM-253/PD (HV-2 GROSS) background count of 4000 counts per minute were based on background levels obtained from the concrete portion of Pier K Quay Wall.

c. Summary:

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

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

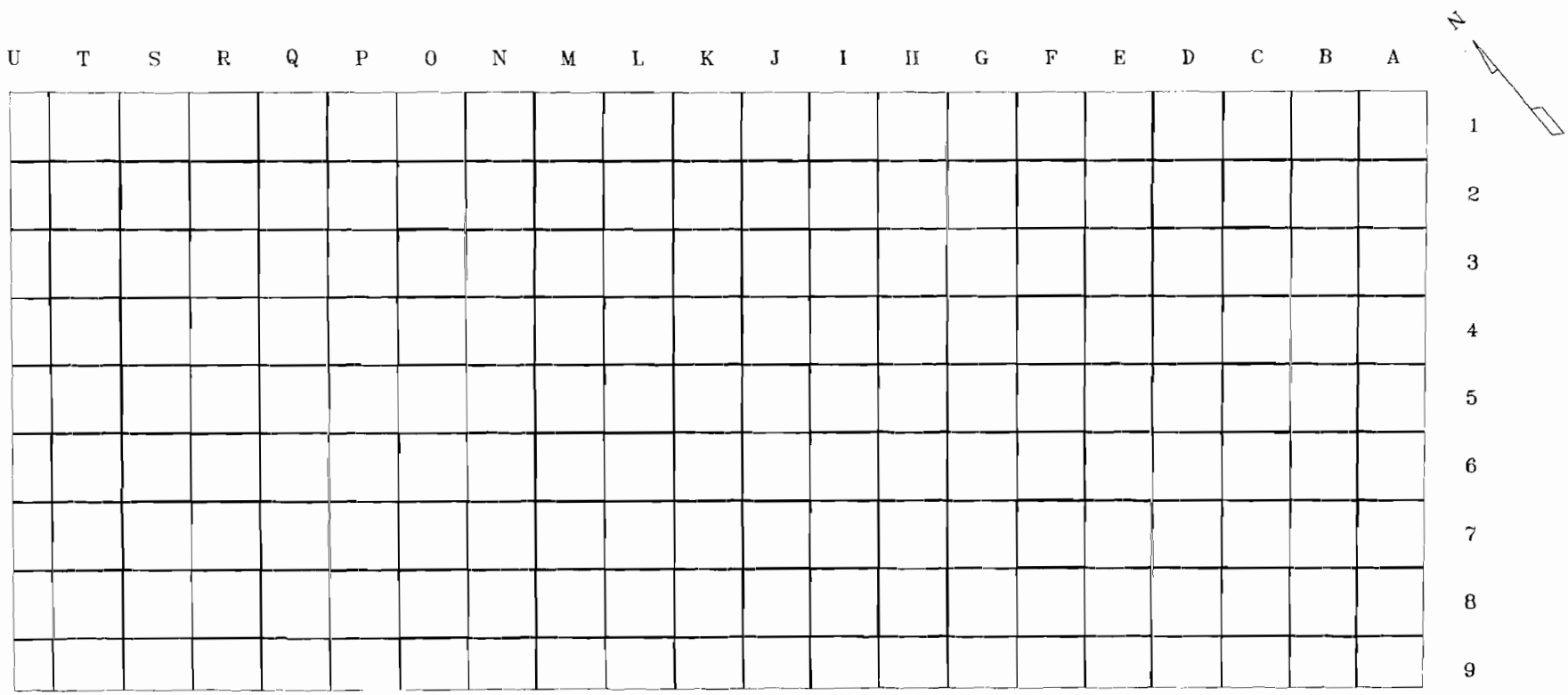
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.99 pCi/g to a high of 8.61 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.

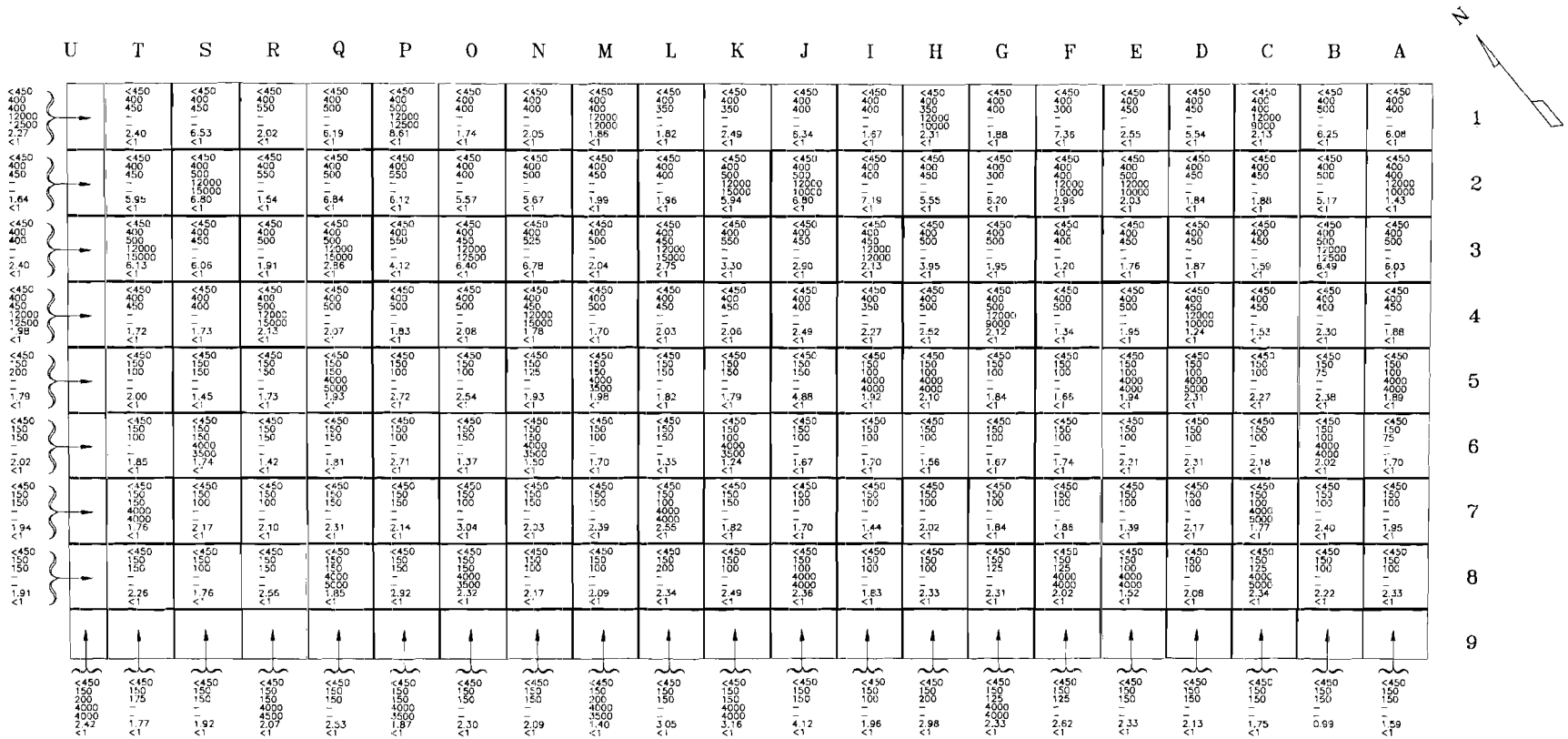
3.39 Dry Dock 5 Quay Wall RAM Storage Area

d. Overall Grid Map



3.39 Dry Dock 5 Quay Wall RAM Storage Area

e. Localized Grid Maps



Sample Data

<450 – IM-247/PD Results [μg Cs/20cm²]
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]

3.39 Dry Dock 5 Quay Wall RAM Storage Area

f. After Survey Photographs

Quay Wall facing south.

3.39 Dry Dock 5 Quay Wall RAM Storage Area

f. After Survey Photographs

Quay Wall facing north.

4.1 Building 3, Radiological Work Area

a. Introduction:

Building 3 is located in grid D-5 of the Charleston Naval Shipyard map (Figure 10). In the early 1960s a tent was constructed in the northeast corner of the building and was used as a radiological work area.

(1) Description:

The survey areas consist of 24' by 24' floor surface and a 24' by 12' wall surface. The floor is made of concrete and the wall is of concrete block construction.

(2) Brief History:

(a) **Use:** Work was performed in a herculite tent to support nuclear submarine component overhauls.

(b) **Radiological History:** Throughout its use this tent was controlled and maintained as a Controlled Surface Contamination Area (CSCA). Component overhauls involved contamination levels greater than 1×10^6 $\mu\mu Ci/100cm^2$. Records of contamination after use show loose surface contamination levels less than 450 $\mu\mu Ci/100cm^2$.

(3) Survey Requirements:

Group 4 surveys were performed in this work area.

b. Discussion:

Building 3 Rad Work Area is categorized as a Group 4 area. Group 4 refers to radiological work areas with radiological history indicating potential for contamination levels of 1000 - 10,000 $\mu\mu Ci/100cm^2$. Building 3 Radiological Work Area floor and wall areas were divided into approximately 3' by 3' sections where physically possible. One hundred percent of all 3' by 3' grids were surveyed using the IM-247/PD and the IM-253/PD (HV-1 PHA). A minimum of 25% of all 3' by 3' grids was surveyed using the IM-253/PD (HV-2 GROSS).

Solid material samples were taken from each grid. Additionally, solid material samples were taken from crevices in floor grids and wall grids below the 6' level. Additionally solid material samples were taken from selected structural joints and crevices. Results from these samples were incorporated into the report by utilizing the higher of the normal grid sample or the joint/crevice sample result.

The Building 3 Rad Work Area was divided into sixty-three 3' by 3' floor grids and thirty-two 3' by 3' wall grids.

4.1 Building 3, Radiological Work Area

Individual backgrounds were used for this radioactive material storage area. This area is constructed primarily of a concrete slab floor and a concrete block wall. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete floor were 40, 200, and 7500 counts per minute respectively. These radiation levels were based upon background levels obtained from Building 664. The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the block wall were 40, 250, and 10000 counts per minute respectively. These radiation levels were based upon background levels obtained from Building 672.

A total of ninety-five solid material samples were taken. Each solid sample was removed from the grid location indicating the area of highest potential. Samples taken from wall 1 (grids A-5 & A-6) consisted of paint and had a limit of 3 pCi/g. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212, lead 214, and bismuth 214.

c. Summary:

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

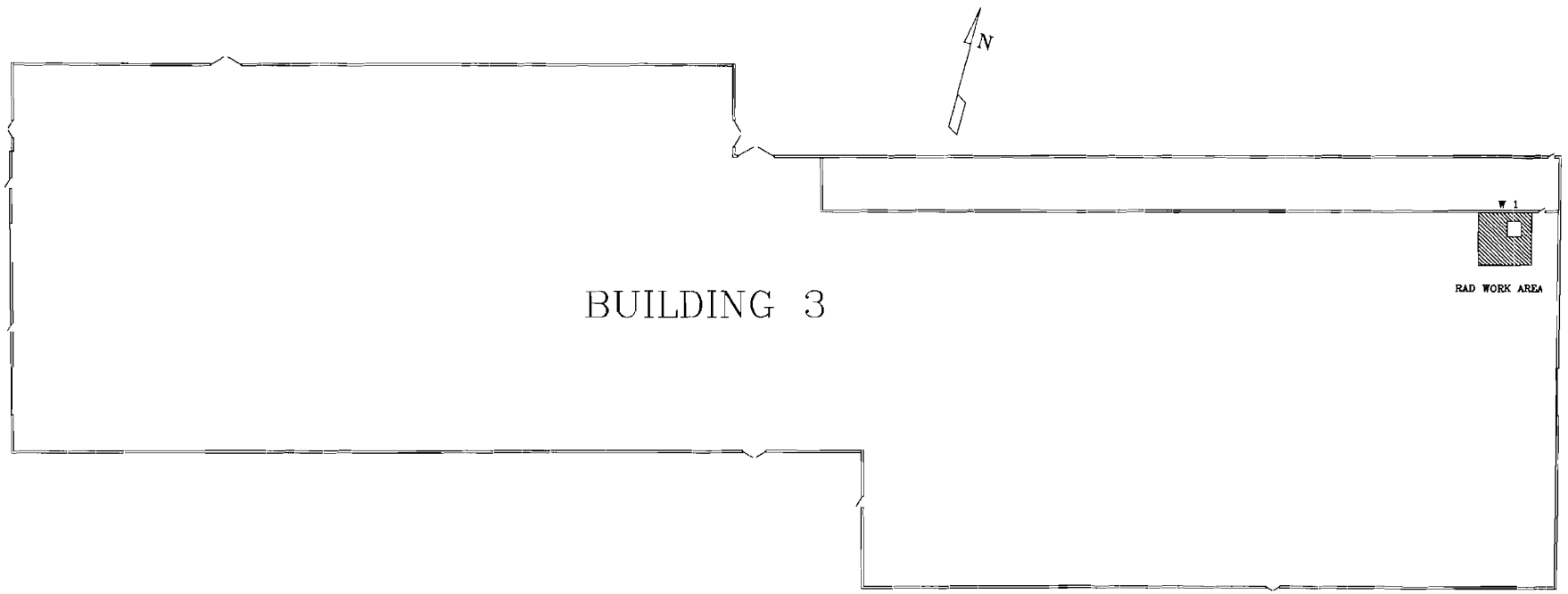
Surveys performed with the IM-253/PD (HV-1 PHA) detected three areas greater than or equal to twice background.

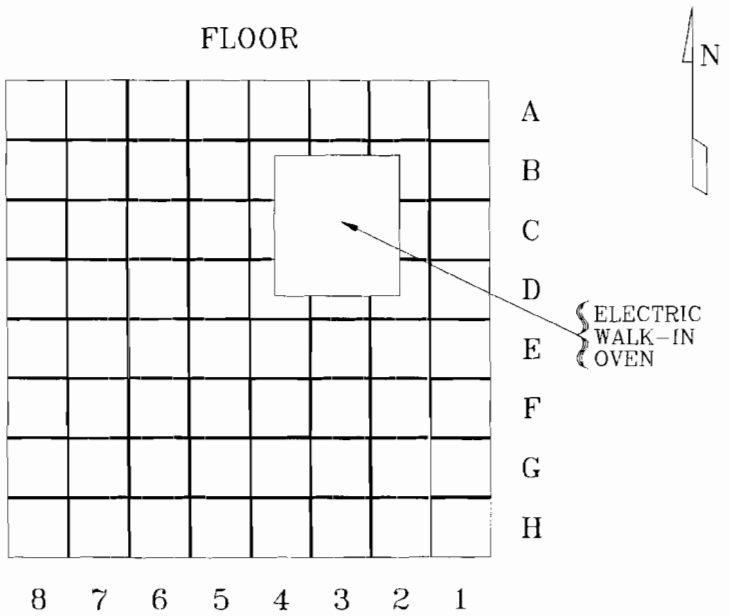
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detected areas greater than or equal to twice background.

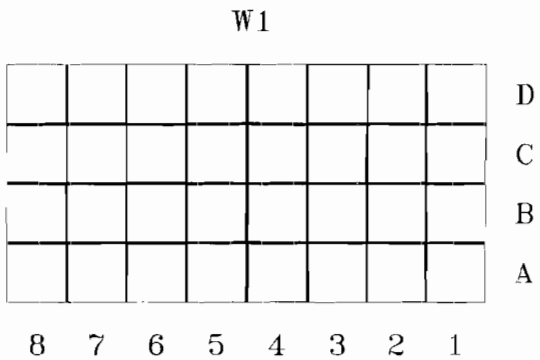
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.51 pCi/g to a high of 5.30 pCi/g.

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, expect for paint samples. Analysis performed on paint samples indicated less than 3 pCi/g.

d. Overall Grid Map



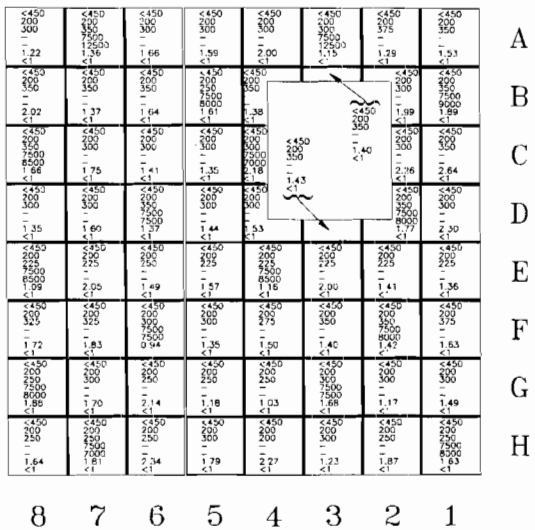

FLOOR
N
A
B
C
D
E
F
G
H
ELECTRIC
WALK–IN
OVEN
8 7 6 5 4 3 2 1


W1
D
C
B
A
8 7 6 5 4 3 2 1

4.1 Building 3, Radiological Work Area

e. Localized Grid Maps

FLOOR



	8	7	6	5	4	3	2	1
A	<450 200 300 – – 1.22 <1	<450 200 350 – 7500 12500 1.36 <1	<450 200 300 – – 1.66 <1	<450 200 300 – – 1.59 <1	<450 200 300 – – 2.00 <1	<450 200 300 7500 12500 1.15 <1	<450 200 375 – – 1.29 <1	<450 200 350 – – 1.53 <1
B	<450 200 350 – – 2.02 <1	<450 200 350 – – 1.37 <1	<450 200 350 – – 1.64 <1	<450 200 350 7500 8000 1.61 <1	<450 200 350 – – 1.38 <1		<450 200 300 – – 1.99 <1	<450 200 350 7500 9000 1.89 <1
C	<450 200 300 7500 8500 1.66 <1	<450 200 300 – – 1.75 <1	<450 200 300 – – 1.41 <1	<450 200 300 – – 1.35 <1	<450 200 300 7500 7000 2.18 <1	<450 200 350 – – 1.43 <1	<450 200 300 – – 2.76 <1	<450 200 300 – – 2.64 <1
D	<450 200 300 – – 1.35 <1	<450 200 300 – – 1.60 <1	<450 200 300 7500 7500 1.37 <1	<450 200 300 – – 1.44 <1	<450 200 300 7500 8500 1.53 <1		<450 200 350 7500 8000 1.77 <1	<450 200 300 – – 2.30 <1
E	<450 200 225 7500 8500 1.09 <1	<450 200 225 – – 2.05 <1	<450 200 200 – – 1.49 <1	<450 200 225 – – 1.57 <1	<450 200 225 7500 8500 1.16 <1	<450 200 275 – – 2.00 <1	<450 200 225 – – 1.41 <1	<450 200 225 – – 1.36 <1
F	<450 200 325 – – 1.72 <1	<450 200 325 – – 1.83 <1	<450 200 300 7500 7500 0.94 <1	<450 200 300 – – 1.35 <1	<450 200 275 – – 1.50 <1	<450 200 350 – – 1.40 <1	<450 200 350 7500 8000 1.42 <1	<450 200 375 – – 1.63 <1
G	<450 200 250 7500 8500 1.86 <1	<450 200 300 – – 1.70 <1	<450 200 250 – – 2.14 <1	<450 200 250 – – 1.18 <1	<450 200 250 – – 1.03 <1	<450 200 300 7500 7500 1.68 <1	<450 200 300 – – 1.17 <1	<450 200 300 – – 1.49 <1
H	<450 200 250 – – 1.64 <1	<450 200 250 7500 7000 1.81 <1	<450 200 250 – – 2.34 <1	<450 200 300 – – 1.79 <1	<450 200 200 – – 2.27 <1	<450 200 300 – – 1.23 <1	<450 200 250 – – 1.87 <1	<450 200 250 7500 8500 1.63 <1

N

W1

	8	7	6	5	4	3	2	1
D	<450 250 450 – – 1.83 <1	<450 250 450 – – 0.51 <1	<450 250 400 – – 0.79 <1	<450 250 450 10000 15000 2.06 <1	<450 250 450 – – 1.17 <1	<450 250 400 – – 0.55 <1	<450 250 450 – – 2.29 <1	<450 250 450 10000 15000 2.58 <1
C	<450 250 450 – – 1.96 <1	<450 250 450 10000 15000 2.65 <1	<450 250 400 – – 2.32 <1	<450 250 400 – – 1.92 <1	<450 250 550 10000 15000 0.86 <1	<450 250 450 – – 0.86 <1	<450 250 450 – – 1.82 <1	<450 250 400 – – 1.99 <1
B	<450 250 350 – – 2.97 <1	<450 250 400 – – 2.49 <1	<450 250 450 – – 3.12 <1	<450 250 400 10000 15000 5.30 <1	<450 250 350 – – 0.86 <1	<450 250 400 – – 1.48 <1	<450 250 400 10000 15000 1.59 <1	<450 250 350 – – 2.03 <1
A	<450 250 450 – – 4.41 <1	<450 250 400 – – 4.00 <1	<450 250 150 10000 15000 <1.48	<450 250 – – – <1.11	<450 250 450 10000 15000 0.98	<450 250 500 – – 1.27 <1	<450 250 450 – – 1.53 <1	<450 250 550 – – 1.35 <1

Note
Samples taken from wall 1 (grids A-5 & A-6), consist of paint and have a limit of 3 pCi/g

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

4.1 Building 3, Radiological Work Area

f. Prior to Photographs

Interior, viewing north.

4.1 Building 3, Radiological Work Area

g. During Photograph

Interior, viewing north.

4.1 Building 3, Radiological Work Area

h. After Photographs

Viewing north wall.

4.2 Bldg. 1760

a. Introduction:

Building 1760 is located in grid D-8 of the Charleston Naval Shipyard map (Figure 10). This facility was utilized as a Radioactive Material (RAM) Storage Area for equipment used in support of submarines during an availability.

(1) **Description:**

The area of interest is the concrete slab, which was the floor of Building 1760. The structure itself was removed from the slab in 1994 and disposed of as radioactive material.

(2) **Brief History:**

(a) **Use:** This building was used as a RAM storage area for material such as ventilation ducts, HEPA filter housings, and radioactive liquid pump down equipment.

(b) **Radiological History:** The building was controlled as a radiation area and a RAM storage area. On several occasions loose surface contamination involving levels of several thousand $\mu\mu Ci/100cm^2$ were found on material stored in this building. On at least one occasion there was a spill of radioactive liquid causing a spread of contamination of several thousand $\mu\mu Ci/100cm^2$ to the floor of this building. The spill was decontaminated to less than 450 $\mu\mu Ci/100cm^2$. Loose surface contamination levels were maintained less than 450 $\mu\mu Ci/100cm^2$ in this building.

(3) **Survey Requirements:**

(a) Group 4 survey.

b. Discussion:

Building 1760 slab was divided into 157 grids. These grids were approximately 3' by 3'. Each grid had its own unique designator.

Building 1760 is no longer in place on the concrete slab, therefore, no wall or ceiling surveys were taken.

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. Additionally, solid material samples were taken from selected crevices. Results from these samples were incorporated into the report by utilizing the higher of the normal grid sample or the crevice sample result.

4.2 Bldg. 1760

A total of 157 solid material samples were taken from the Building 1760 slab. Each solid material sample was removed from the grid location indicating the area of highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material samples: lead 212, lead 214, thallium 208, bismuth 214.

Solid material samples were taken from crevices in the floor grids at the junction of the asphalt to concrete and along the steel plate beneath the walls of the former structure.

The IM-247/PD and IM-253/PD (HV-1 PHA and HV-2 GROSS) background of 40, 150, and 4500 counts per minute were based on background radiation levels obtained from the floor of Building 1605.

c. Summary:

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

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

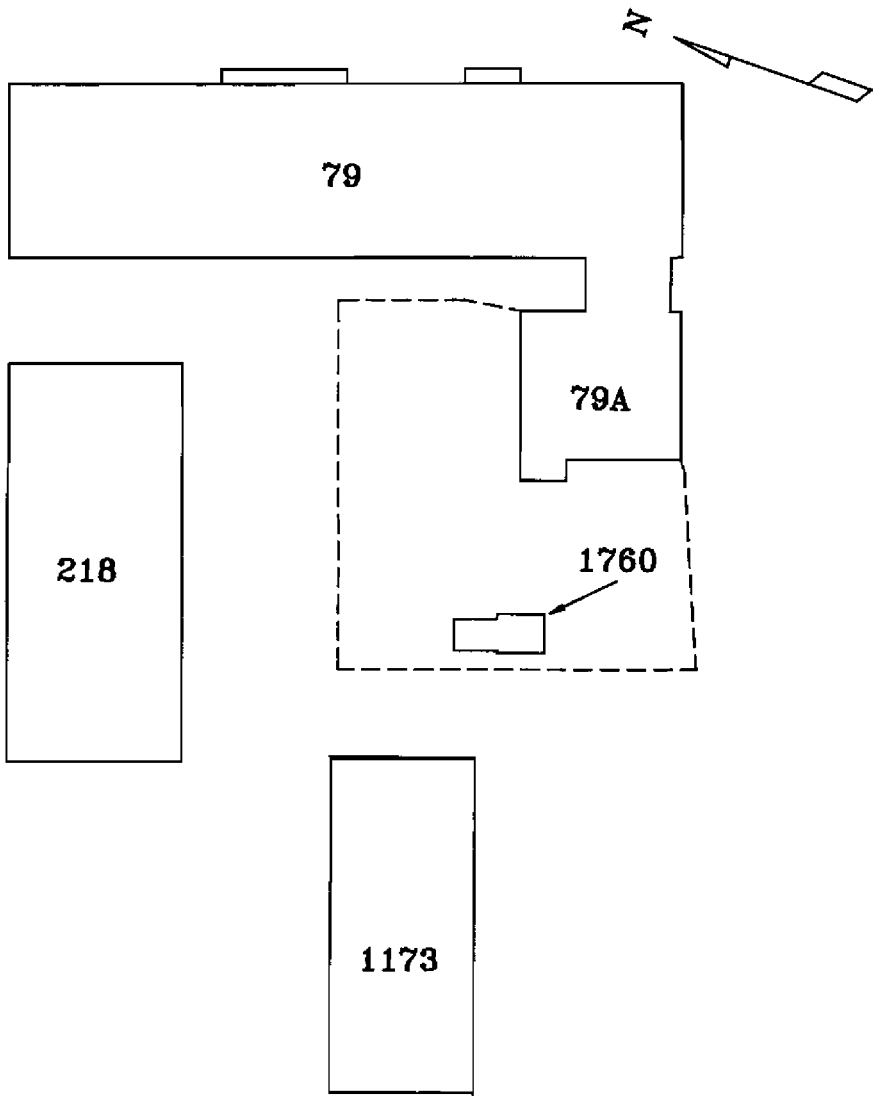
Surveys performed with the IM-253/PD (HV-2 GROSS) did not detect areas greater than or equal to twice background.

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 0.41 pCi/g to a high of 2.62 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. However, three concrete samples with traces greater than the minimum detectable activity were identified. For each sample, the extent of the trace radioactivity was identified by taking additional solid material samples in the surrounding vicinity. Due to the small effort involved, the shipyard remediated each area that was identified. Remediation consisted of excavation of the concrete identified during sampling. During the process of concrete removal, a steel beam embedded in the concrete was removed and disposed of as radioactive material. Following remediation, additional solid material samples were taken in these areas and all were less than 1 pCi/g specific cobalt 60. No traces of cobalt 60 were identified.

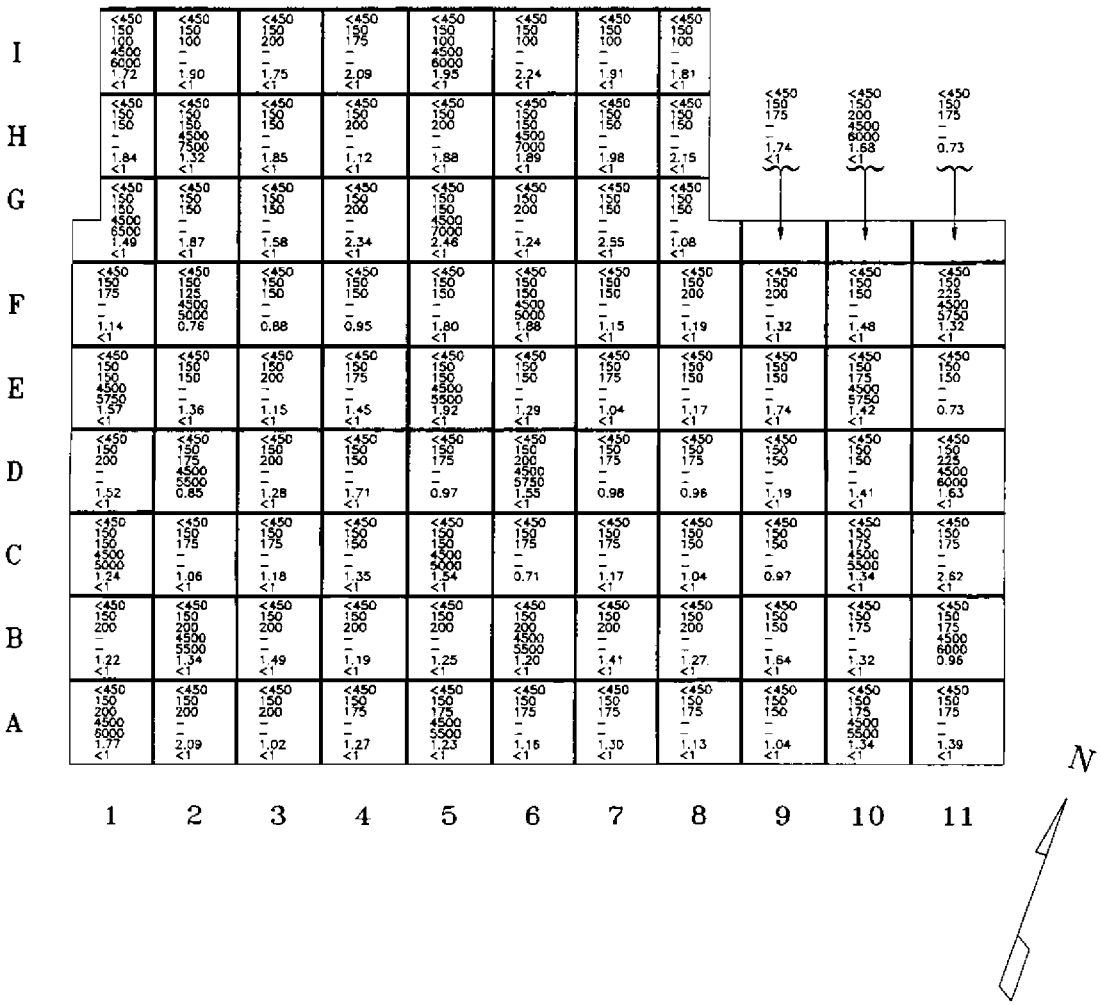
4.2 Bldg. 1760

d. Site Map



4.2 Bldg. 1760

e. Localized Grid Maps

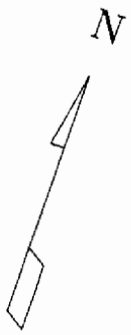


Sample Data
- <450 – IM-247/PD Results [μμCi/20cm²]
- 200 – IM-253/PD (HV-1 PHA) [bkg.]
- 300 – IM-253/PD (HV-1 PHA) [cpm]
- 7000 – IM-253/PD (HV-2 GROSS) [bkg.]
- 7300 – IM-253/PD (HV-2 GROSS) [cpm]
- 1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
- <1 – MCA Specific Co-60 Results [pCi/g]

4.2 Bldg. 1760

e. Localized Grid Maps

	1	2	3	4	5	6	7	8
Q	<450 150 150 – – 1.61 <1	<450 150 150 – – 1.34 <1	<450 150 175 – – 1.94 <1	<450 150 150 4500 5000 1.47 <1	<450 150 150 – – 1.67 <1	<450 150 150 – – 1.99 <1	<450 150 150 – – 1.77 <1	<450 150 125 4500 4500 1.65 <1
P	<450 150 100 – – 1.39 <1	<450 150 150 – – 1.47 <1	<450 150 100 4500 4500 1.81 <1	<450 150 75 – – 1.71 <1	<450 150 100 – – 1.91 <1	<450 150 100 – – 1.64 <1	<450 150 150 4500 4750 2.13 <1	<450 150 100 – – 2.25 <1
O	<450 150 150 – – 2.10 <1	<450 150 150 4500 6000 1.89 <1	<450 150 150 – – 1.75 <1	<450 150 150 – – 1.52 <1	<450 150 100 – – 1.57 <1	<450 150 150 4500 5500 1.67 <1	<450 150 150 – – 2.16 <1	<450 150 100 – – 1.87 <1
N	<450 150 150 4500 5000 <0.41	<450 150 150 – – 1.77 <1	<450 150 150 – – 1.90 <1	<450 150 150 – – 1.54 <1	<450 150 100 4500 6000 1.58 <1	<450 150 100 – – 1.33 <1	<450 150 150 – – 2.05 <1	<450 150 150 – – 2.20 <1
M	<450 150 200 – – 1.61 <1	<450 150 175 4500 5500 2.03 <1	<450 150 175 – – 1.79 <1	<450 150 175 – – 1.36 <1	<450 150 175 – – 2.08 <1	<450 150 175 4500 5250 1.88 <1	<450 150 150 – – 2.20 <1	<450 150 175 – – 1.20 <1
L	<450 150 175 – – 1.84 <1	<450 150 200 – – 2.54 <1	<450 150 175 – – 2.04 <1	<450 150 200 4500 4750 1.53 <1	<450 150 175 – – 2.03 <1	<450 150 200 – – 2.47 <1	<450 150 175 – – 2.09 <1	<450 150 175 4500 5000 2.29 <1
K	<450 150 200 – – 1.78 <1	<450 150 175 – – 1.11 <1	<450 150 250 4500 5000 2.10 <1	<450 150 200 – – 1.79 <1	<450 150 225 – – 2.15 <1	<450 150 225 – – 1.98 <1	<450 150 250 4500 5000 1.96 <1	<450 150 250 – – 1.69 <1
J	<450 150 150 – – 1.96 <1	<450 150 100 4500 5500 1.47 <1	<450 150 200 – – 1.70 <1	<450 150 150 – – 1.94 <1	<450 150 150 – – 1.46 <1	<450 150 100 4500 6000 1.60 <1	<450 150 200 – – 1.93 <1	<450 150 200 – – 1.78 <1



Sample Data

<450 – IM-247/PD Results [μμCi/20cm²]
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]

4.2 Bldg. 1760

f. Prior to Photographs

Building 1760 Slab

4.2 Bldg. 1760

g. After Photographs

Building 1760 Slab

4.3 Dry Dock 5 S5W Refueling Foundations

a. Introduction:

The Dry Dock 5 S5W Refueling Foundations are located between Dry Dock 5 and Building 247 in grid D-7 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:** There are three concrete foundations area of various sizes, areas "A" and "B" approximately 24' by 36' and area "C" approximately 21' by 33'.

(2) **Brief History:**

(a) **Use:** Portable refueling facilities including a change area, dockside refueling module, an M-130 module, and two controlled storage modules were mounted on these foundations. These facilities were used to support refueling and overhaul of S5W submarines in the late 1960's and early 1970s.

(b) **Radiological History:** These areas had facilities on them which were controlled as controlled surface contamination areas while in use. The facilities had herculite floors over the concrete. Spills of radioactive liquid and spreads of contamination in the tens of thousands of $\mu\mu Ci/100cm^2$ occurred in the facilities. The areas were decontaminated until loose surface contamination levels were less than 450 $\mu\mu Ci/100cm^2$ and fixed radioactivity were less than 450 $\mu\mu Ci/20cm^2$.

(3) **Survey Requirements:**

(a) Group 4 survey.

b. Discussion:

Dry Dock 5 S5W Refueling Foundations "A", "B",and "C" were divided into a total of 250 grids measuring approximately 3' by 3'. 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). Solid material samples were taken from each grid with the exception of grids D-6, D-7, E-6, and E-7 of foundation "A" which were unpainted metal. Additionally, solid material samples were taken from selected structrural joints and crevices. Results from these samples were incorporated into the report by utilizing the higher of the normal grid sample or the joint/crevice sample result.

A total of 246 solid material samples were taken from these areas. Each solid material sample was removed from the grid location indicating the area of

4.3 Dry Dock 5 S5W Refueling Foundations

highest potential. The following typical naturally occurring radionuclides were identified during isotopic analysis of solid material samples: lead 212, lead 214, beryllium 7.

The construction materials present in the S5W Foundations were concrete and unpainted metal for a portion of the "A" Foundation. For the concrete areas, an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) background of 75 counts per minute, and an IM-253/PD (HV-2 GROSS) of 4,000 counts per minute were based on background radiation levels obtained from Building 1489. For the unpainted metal portion of "A" Foundation an IM-247/PD background of 40 counts per minute, an IM-253/PD (HV-1 PHA) of 100 counts per minute, and an IM-253/PD (HV-2 GROSS) of 3,000 counts per minute were based on background radiation levels obtained from Building 1891.

c. Summary:

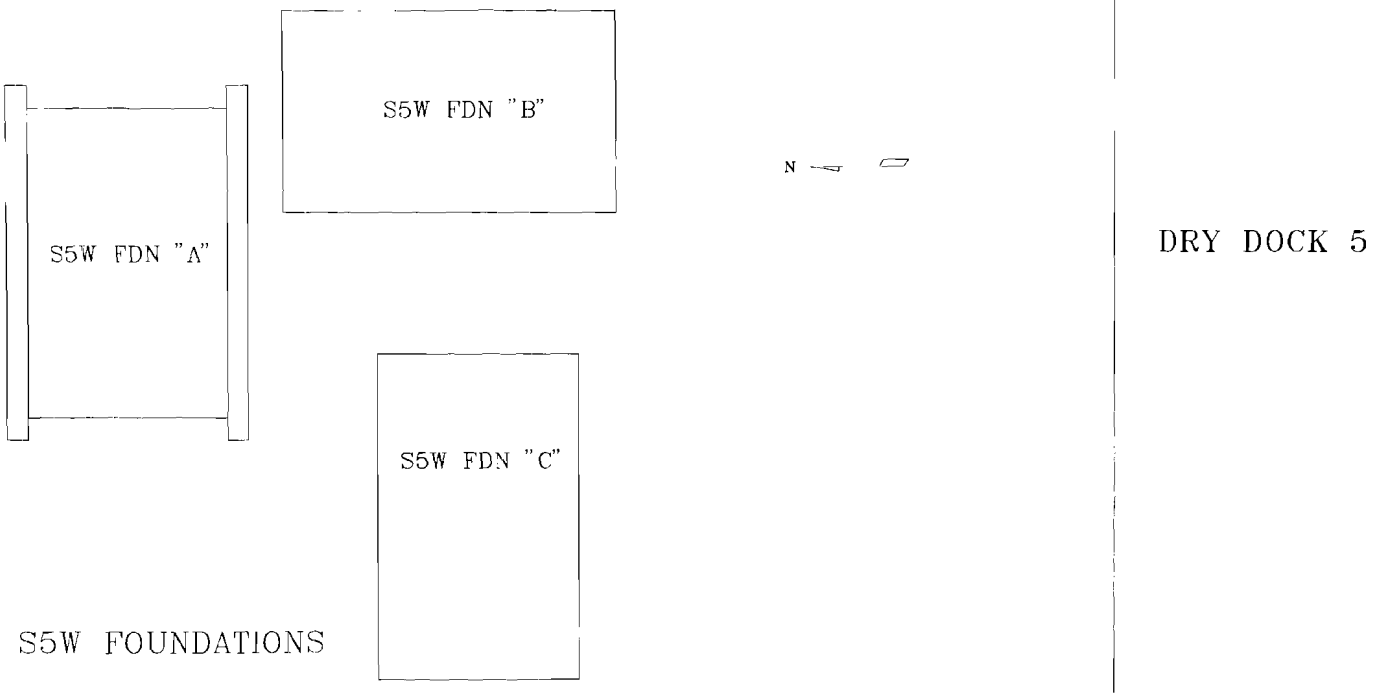
Surveys performed with the IM-247/PD did not detect areas greater than 450 $\mu\mu Ci/20cm^2$.

Surveys performed with the IM-253/PD (HV-1 PHA) detected 187 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.

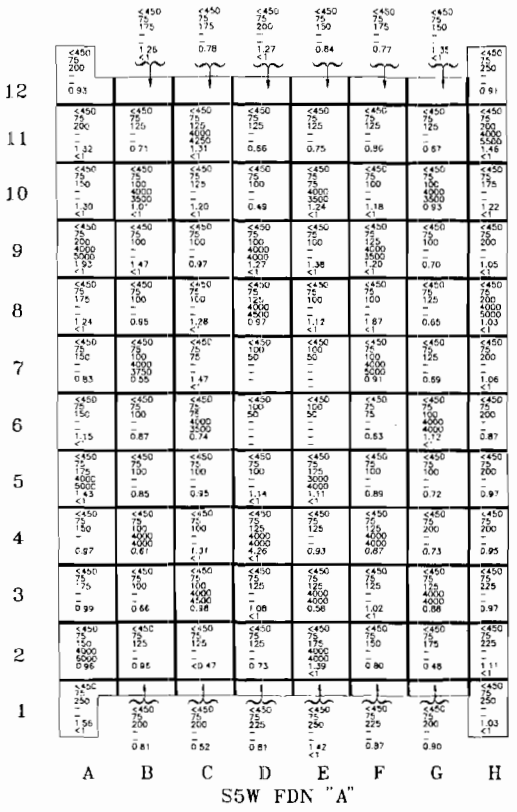
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of less than 0.47 pCi/g to a high of 4.26 pCi/g.

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.

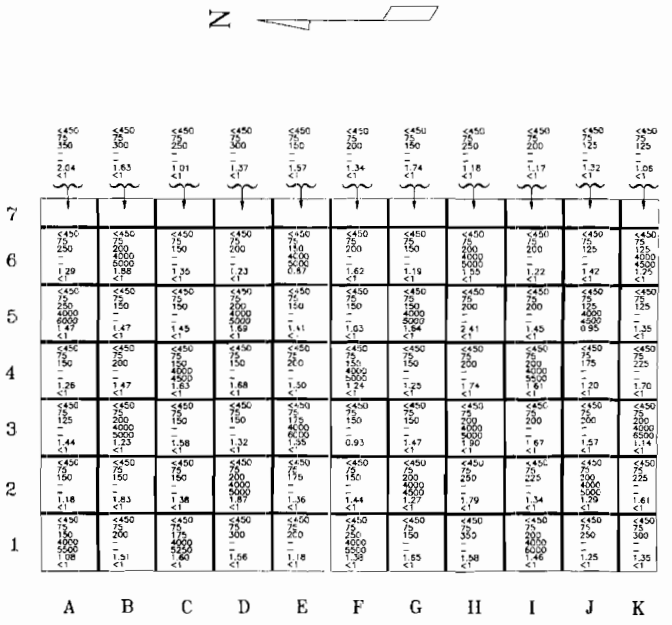

S5W FDN "B"
S5W FDN "A"
S5W FDN "C"
N
DRY DOCK 5
S5W FOUNDATIONS

4.3 Dry Dock 5 S5W Refueling Foundations

e. Localized Grid Maps



S5W FDN "A"



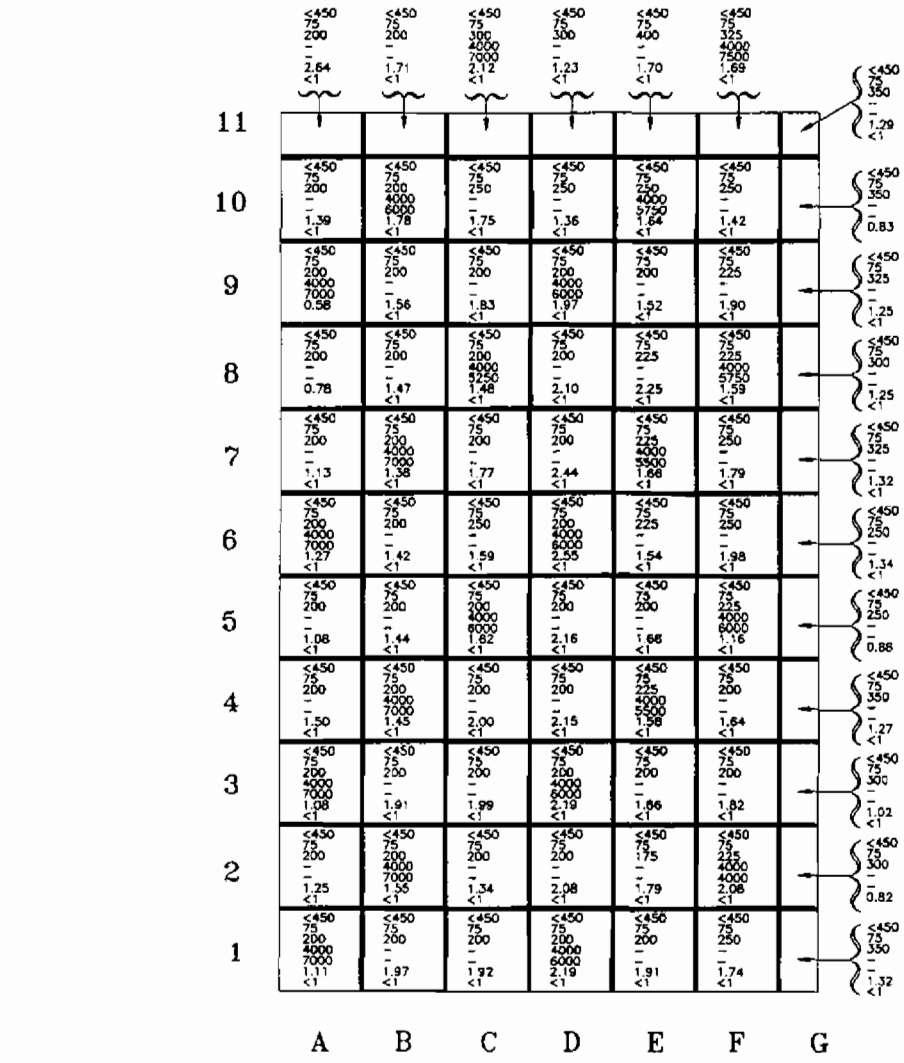
S5W FDN "B"

Sample Data

<450 – IM-247/PD Results [µµCi/20cm²]
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]

4.3 Dry Dock 5 S5W Refueling Foundations

e. Localized Grid Map



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

4.3 Dry Dock 5 S5W Refueling Foundations

f. Prior To Photographs

S5W Refueling Foundations

4.3 Dry Dock 5 S5W Refueling Foundations

f. Prior To Photographs

S5W Refueling Foundations

4.3 Dry Dock 5 S5W Refueling Foundations

f. Prior To Photographs

S5W Refueling Foundations

4.3 Dry Dock 5 S5W Refueling Foundations

g. After Photographs

S5W Refueling Foundations

4.3 Dry Dock 5 S5W Refueling Foundations

g. After Photographs

S5W Refueling Foundations

4.3 Dry Dock 5 S5W Refueling Foundations

g. After Photographs

S5W Refueling Foundations

4.4 Dockside Training Support Enclosure (DTSE)

a. Introduction:

The Dockside Training Support Enclosure (DTSE) is located in grid C-6 of the Charleston Naval Shipyard map (Figure 10).

(1) **Description:**

This building was constructed of steel framing with aluminum siding on the walls and roof. The concrete slab, approximately 23' wide by 33'6" long, was covered by a seamless vinyl floor. In the center of the deck is the reactor mock up, a concrete pit approximately 7' wide by 7' long by 9'6" deep.

(2) **Brief History:**

(a) **Use:** This facility enclosed the M-130 fluid system and the reactor mock up. In addition, it provided a support structure for the training Reactor Access Enclosure (RAE).

(b) **Radiological History:** The DTSE has been controlled as a Controlled Surface Contamination Area (CSCA) and a Radiologically Controlled Area (RCA). Radioactive liquid on a few occasions leaked from the M-130 fluid system but the spill areas were decontaminated to less than 450 $\mu\mu Ci/100cm^2$. Loose surface contamination levels were otherwise maintained less than 450 $\mu\mu Ci/100cm^2$.

(c) **Items removed:** The enclosure building, the M-130 fluid system, and the floor covering were removed and disposed of as radioactive waste.

(3) **Survey Requirements:**

Group 4 surveys were required for the slab and pit.

b. Discussion:

The slab and pit were divided into 3' by 3' grids.

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

4.4 Dockside Training Support Enclosure (DTSE)

The IM-247/PD and the IM-253/PD (HV-1 PHA and HV-2 GROSS) backgrounds used for the concrete slab and pit were 40, 200, and 5,500 counts per minute respectively. These radiation levels were based upon background levels obtained from Building 21.

A total of 119 solid material samples were taken. Each solid sample was removed from the grid location indicating the area of highest potential. The following naturally occurring radionuclides were typical isotopes identified during analysis of solid material samples: lead 212 and lead 214.

c. Summary:

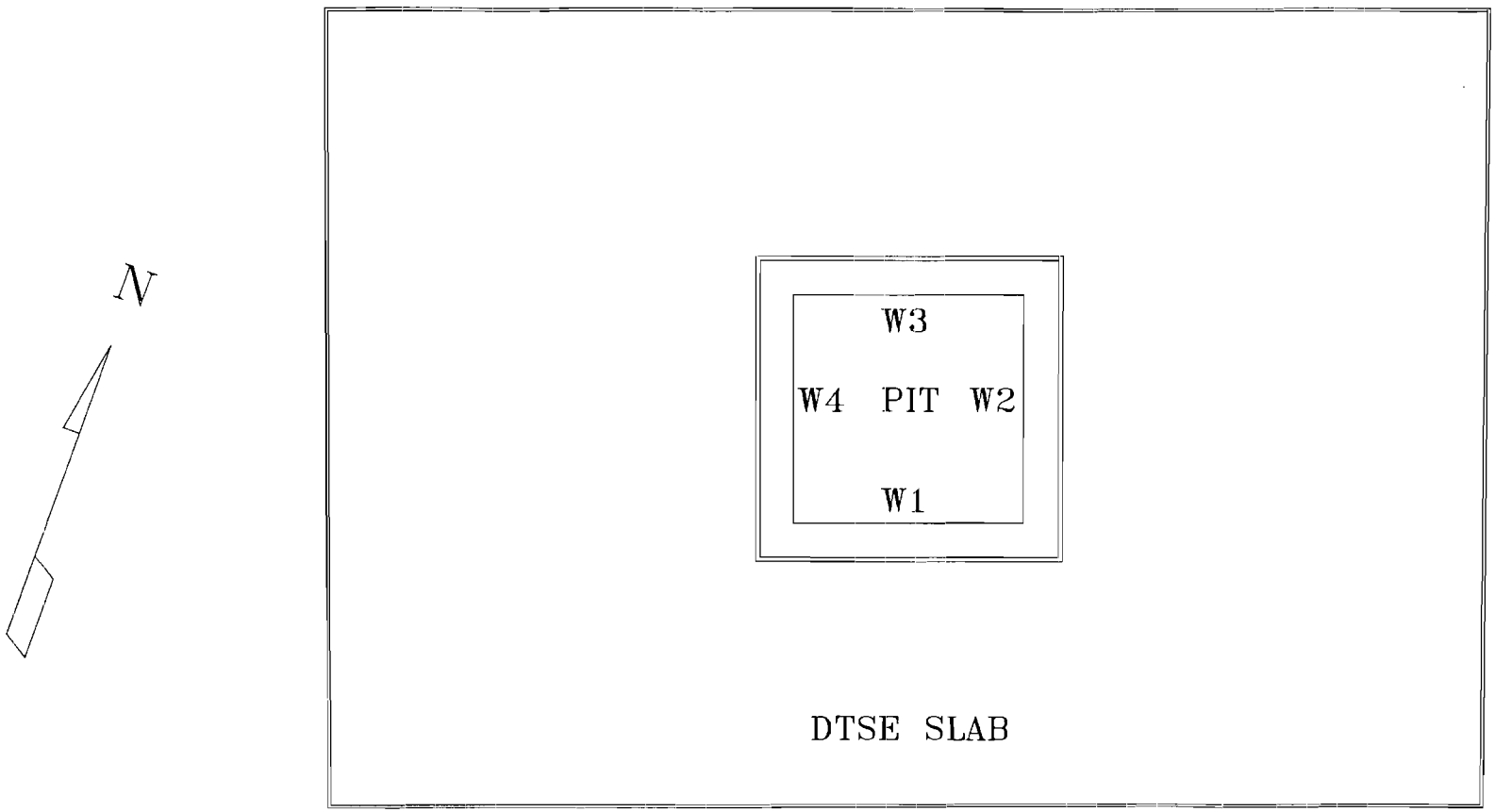
Surveys performed with the IM-247/PD did not detect areas greater than 450 $\mu\mu Ci/20cm^2$.

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.

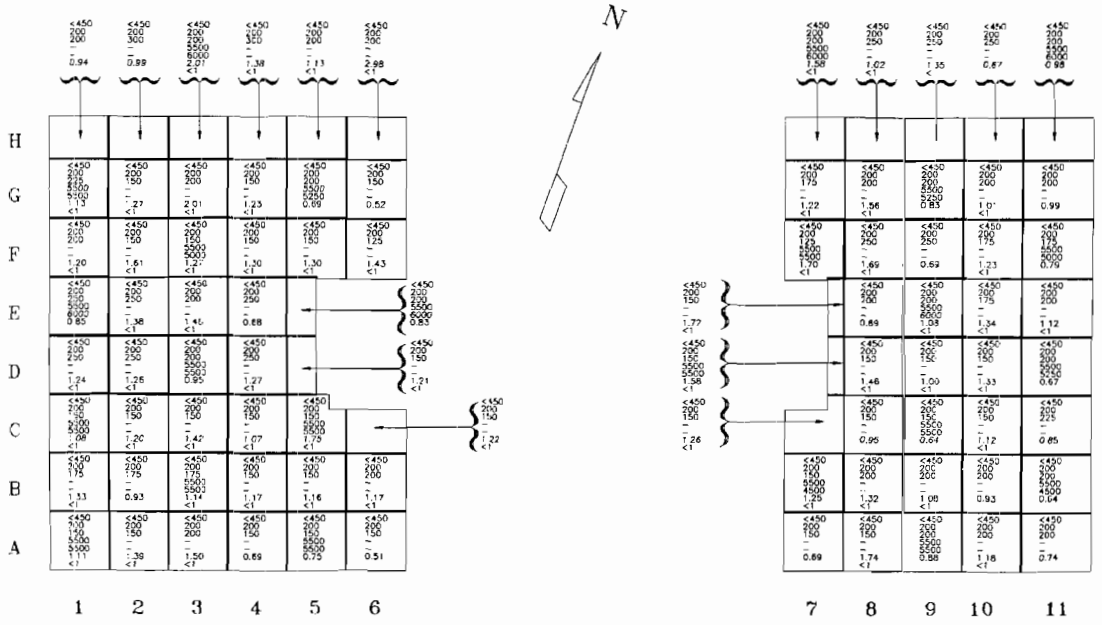
Analysis performed on solid material samples with the multi-channel analyzer (MCA) detected gross gamma equivalent cobalt 60 levels ranging from a low of 0.51 pCi/g to a high of 2.98 pCi/g.

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.


N
W3
W4
PIT
W2
W1
DTSE SLAB

4.4 Dockside Training Support Enclosure (DTSE)

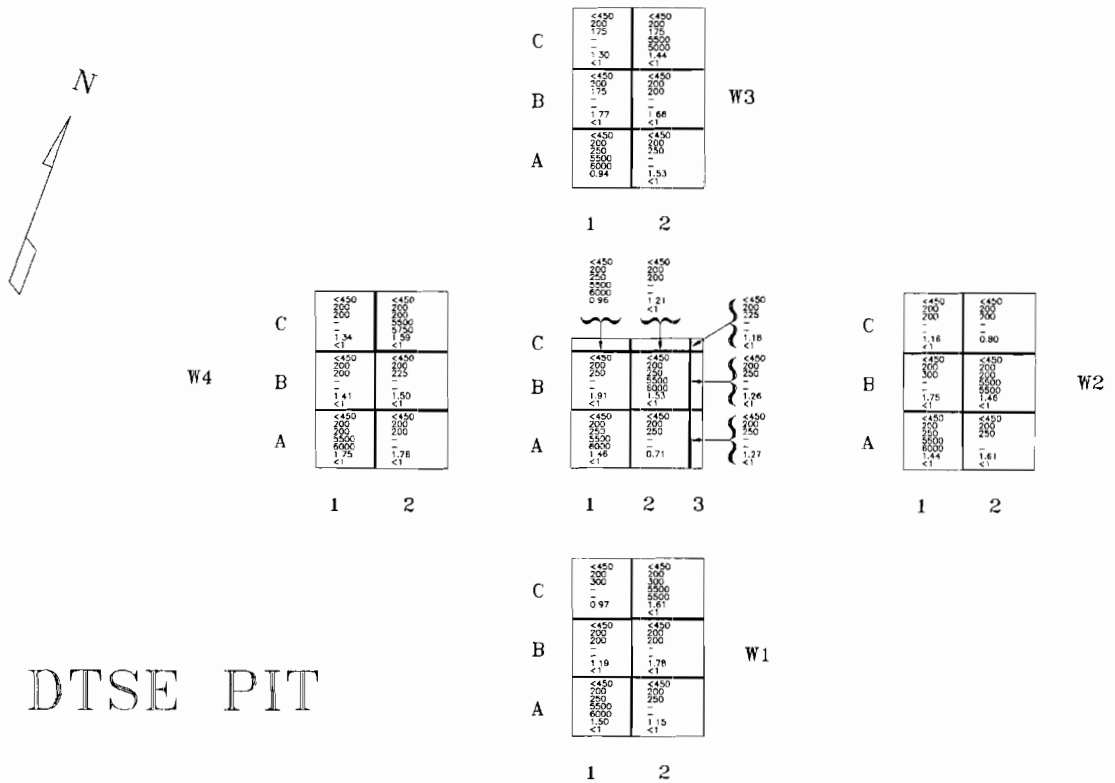
e. Localized Grid Maps



Sample Data
- <450 – IM-247/PD Results [μμCv/20cm²]
- 200 – IM-253/PD (HV-1 PHA) [bkg.]
- 300 – IM-253/PD (HV-1 PHA) [cpm]
- 7000 – IM-253/PD (HV-2 GROSS) [bkg.]
- 7500 – IM-253/PD (HV-2 GROSS) [cpm]
- 1.82 – MCA Gross Gamma Eq. Co-60 [pCi/g]
- <1 – MCA Specific Co-60 Results [pCi/g]

4.4 Dockside Training Support Enclosure (DTSE)

e. Localized Grid Maps



Sample Data

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

4.4 Dockside Training Support Enclosure (DTSE)

f. Prior to Photographs

Viewing north side of DTSE.

4.4 Dockside Training Support Enclosure (DTSE)

f. Prior to Photographs

Viewing DTSE slab and pit cover.

4.4 Dockside Training Support Enclosure (DTSE)

g. After Photographs

Viewing DTSE slab and pit cover.