

U. S. NAVAL RADIOLOGICAL DEFENSE LABORATORY
SAN FRANCISCO 24, CALIFORNIA

240
25 October 1961

MEMORANDUM

From: Head, Engineering Division
To: Head, Plant Support Branch

Subj: NRDL Radioactive Waste (RADWASTE) Disposal Procedures

- Encl: (1) NRDL Dwg. No. M-58-79 RADIATION SYMBOL
(2) NRDL Dwg. No. M-61-92 WASTE DISPOSAL BLOCK
(3) NRDL Dwg. No. M-61-93 WASTE DISPOSAL DRUM
(4) NRDL INST 4510.1 - Disposal of Radioactive Waste; responsibilities
relative to
(5) NRDL INST 5100.10 - Radiological Safety Precautions
(6) NRDL INST 11350.1 - Disposal of Flammable and Noxious Volatile
Waste Materials

1.0 PURPOSE. The purpose of this memorandum is to record the currently correct radioactive waste disposal practices and procedures of this Laboratory.

2.0 BACKGROUND. Wastes generated as a result of NRDL operations are divided into two broad categories: 1) radioactive and 2) non-radioactive. Each of these two broad categories are again divided into two groups: 1) hazardous and 2) non-hazardous, and each of these groups divided into two classes: 1) liquid and 2) solid (dry).

2.1 TYPES OF COLLECTION CONTAINERS. There are two types of containers used for the collection and temporary storage of non-hazardous radioactive waste (RADWASTE); a fiberboard drum of approximately 3 cubic foot capacity for the solid (dry) wastes, and a polyethylene jug of 5-gallon capacity within a 5-gallon metal bucket for liquid wastes. Additional type of containers will be developed as the need arises.

2.2 MARKING OF COLLECTION CONTAINERS. RADWASTE collection containers within the Laboratory work spaces are marked with the radiation symbol specified by the U. S. Atomic Energy Commission in the Code of Federal Regulations, Title 10, Part 20. The symbol consists of a central disc with three unattached, equally spaced, blades radiating outward. Details are shown on NRDL Dwg. No. M-58-79. This symbol is known as the American Standard Radiation Symbol N-2-1-1960. The containers are marked as follows:

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2.2.1 The exterior of the containers are painted yellow. (FED STD Color #23655. (For liquid wastes the exterior of the metal buckets are painted yellow).

2.2.2 The standard radiation symbol and the words "Caution - Radioactive Material" are placed on the container in magenta (FED STD Color #27142).

2.2.3 The containers are appropriately marked (in any color) "Dry Contaminated Waste Only," or "Contaminated Liquid Waste Only," and "Call Extension 353 when 3/4 full."

2.3 LOCATION AND PROVISION OF COLLECTION CONTAINERS. The location and type of RADWASTE collection containers is determined by the Rad-Safe Branch. The containers are provided by the Plant Support Branch.

3.0 RESPONSIBILITIES OF RADWASTE PRODUCERS. It is the responsibility of the individual investigators using radioactive materials to accomplish the following:

- A. Place radioactive waste materials in the proper waste collection container as required by NRDL INST 5100.10.
- B. Neutralize liquid acid RADWASTE in collection containers as required by NRDL INST 4510.1.
- C. Notify the Plant Support Branch when RADWASTE collection containers are filled to the point when removal is befitting, as required by NRDL INST 4510.1.
- D. Place radiologically contaminated animal carcasses in plastic bags to which formaldehyde has been added, seal the bags and place in metal containers as required by NRDL INST 5100.10.
- E. Advise the Plant Support Branch of any unusual hazard connected with any particular batch of waste materials (i.e., flammable, noxious, toxic, poisonous, corrosive, et cetera) as required by NRDL INST 4510.1 and 11350.1.

4.0 RADWASTE COLLECTION. The procedures observed during the collection of radioactive waste materials are as follows:

- A. In general, only those wastes designated on the written work order are removed from laboratory work areas. If there is any doubt on the part of the collection crew, clarification is requested from the Plant Support Branch Office. For "on the spot" verbal requests to remove waste, authorization is always requested by phoning the branch office.

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4.1 DRY RADWASTE COLLECTION. Dry RADWASTE is removed from the fiberboard drum by carefully lifting out the polyethylene liner bag. The bag is closed after removal by tying the open end by means of a simple overhand knot.

4.1.1 A new liner-bag is placed into the drum as soon as practical after removing the bag containing RADWASTE.

4.1.2 In the event that the drum is too full or that the liner-bag has become torn, the entire drum and contents are removed and another drum with liner-bag inserted is left at the time of the pick-up.

4.2 LIQUID RADWASTE COLLECTION. Liquid RADWASTE is removed by taking the entire polyethylene jug metal bucket collection container to the RADWASTE Storage Area. The cap of the jug is always tightened to prevent spillage before the jug is moved.

4.2.1 All liquid waste is checked for acid content before removal to the Waste Storage Area. A suitable indicator liquid and pellets of sodium hydroxide is always available to completely neutralize the acid.

5.0 TRANSPORTATION OF RADWASTE. All radioactive waste material is transported within NRDL buildings on suitable hand trucks.

- A. All RADWASTE is transported from floor to floor in Building 815 by use of only the Freight Elevator.
- B. RADWASTE is stored temporarily (that is overnight or over a week-end) only in Room 195, pending transportation to the RADWASTE Storage (707) Area.
- C. RADWASTE is transported to the RADWASTE Storage (707) Area by pickup truck, and the following precautions are observed:
 - (1) The polyethylene bags containing RADWASTE are handled carefully to avoid tearing.
 - (2) The liquid RADWASTE jugs, and drums containing dry RADWASTE, are secured to the truck bed with a rope or other reliable means sufficient to prevent accidental upset.
 - (3) The tailgate of the truck is in place, closed and secured before the truck is moved.

6.0 STORAGE OF RADWASTE. Waste material stored in the RADWASTE Storage (707) Area pending packaging for ultimate disposal is handled as follows:

- A. All dry RADWASTE in bags is stored on the ground under a protective canvas until such time as enough material has accumulated to warrant packaging for disposal.
- B. All liquid RADWASTE is temporarily stored in sound and reasonably clean 55-gallon drums until pumped into the holding tank.
- C. Contaminated animal carcasses are packaged for disposal when they are taken to the RADWASTE Storage Area.

6.1 HOLDING OF LIQUID RADWASTE. When a sufficient number of drums in the RADWASTE Storage Area have been filled to warrant transfer of the waste to the holding tank, they are assayed by personnel of the Rad-Safe Branch to determine if any of the material may be disposed of in the normal manner.

6.1.1 The designated drums containing liquid RADWASTE are transported to the fenced yard at Buildings 364-365 area.

6.1.2 The drums are opened individually and the contents pumped into the underground liquid RADWASTE holding tank.

6.1.3 The reasonably sound drums are returned to the RADWASTE Storage (707) Area for re-use. The unsound, badly rusted drums are handled and packaged as solid RADWASTE as per paragraph 7.3.

6.1.4 Exacting precautions are taken to avoid spillage of any liquids during the above operations.

6.1.5 Any spill or "accident" is always immediately reported to the Plant Support Branch Office, the Rad-Safe Branch Office, and the Duty Officer. Advice and assistance are requested.

7.0 PACKAGING CONTAINERS FOR SOLID RADWASTE. All solid RADWASTE except hazardous radioactive waste (such as radioactive-nitrocellulose, -perchlorates, -trichloroethylene, -sodium, -zirconium, et cetera) are packaged for ultimate disposal in either of two types of containers: a) the 55-gallon drum, or b) the concrete disposal block.

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7.0.1 The packaging of HAZARDOUS RADWASTE is handled on a special case basis; packed in special drums under the direction of the RAD-Safe Branch.

7.1 PACKAGING-GENERAL REQUIREMENTS. Each type of disposal container requires special packaging methods, however, for satisfactory packaging in either container the following is being accomplished:

- A. The containers are packed in such a manner as to exclude voids.
- B. The packed container is weighted to have a gross weight of not less than 75 pounds per cubic foot. For a 55-gallon drum this minimum gross weight is 550 pounds.
- C. The containers are packed only with dry materials.

7.2 DRUM PACKING. The top of a drum is removed, leaving at least a 3-inch annular ring for the purpose of securely anchoring the concrete (sealing) cap.

7.2.1 If the drums are not reasonably clean and free from oil, grease and "dirt" both inside and out, they are either cleaned or discarded. Only drums free of oil, grease and "dirt" are used.

7.2.2 The drums are pre-weighted with sand (about two cubic feet for a 55-gallon drum) before any radioactive waste is placed in the drums.

7.2.3 Insofar as practical, each drum is filled individually. Once filling of any drum is started, all material taken to the RADWASTE Storage (707) Area for inclusion in drums is placed in that drum. At most, no more than two drums are left partially filled at any time.

7.2.4 Drums are covered at all times (so as to exclude moisture) after the pre-weighting sand has been added until such time as they are sealed off with concrete.

7.2.5 Whenever bags containing animal carcasses are added to the drums, the polyethylene bag is punctured and additional sand added to completely cover the bag. Sand is not necessarily added between each carcass when more than one carcass is put into a drum, however, sand is added to fill the voids and completely cover all carcasses before securing the packaging operations for the day.

7.2.6 All drums are filled with sand as necessary to fill the voids and bring the level of material to within 6 inches (minimum) to 8 inches of the lip (annular ring) of the top of the drum. A pressure relieving vent pipe 1 inch IPS about 24 inches long of which about 20 inches is placed into the drum through the annular ring. Details are shown in NRDL Dwg. M-61-93.

7.3 PACKING CONCRETE "BLOCKS." Concrete Disposal Containers are used for the disposal of large heavy items which are generally placed into the bottom of the container.

7.3.1 Other smaller-sized dry waste items are then packed in and around the larger items in such a manner as to minimize voids.

7.3.2 Each concrete container is individually filled and kept covered with a canvas cover from the time the container is received until the block is sealed with a cap of concrete. The filling of a second block is not started until the first block has been capped.

7.3.3 When the concrete container is filled to the "full-line" a pressure relieving vent pipe is inserted and the concrete block is "capped." Details are shown in NRDL Dwg. M-61-92.

8.0 LABELING OF RADWASTE PACKAGES. The labelling of completed dry RADWASTE packages (concrete blocks and steel drums) is accomplished under the supervision of the Rad-Safe Branch.

8.1 RADIATION SYMBOL MARKING. All RADWASTE packages are marked with the standard radiation symbol (see NRDL Dwg. No. M-58-79), with the symbol and lettering of magenta on a yellow background.

8.2 CONTENTS AND ACTIVITY MARKING. In addition to the standard radiation symbol, all or part of the following information is placed on each package, as directed by the Rad-Safe Branch:

Principal Isotope _____
Most Hazardous Isotope _____
Radiation Level at Surface _____
Radiation Level at 1 meter _____
Date Packaged _____
Packaged by NAVRADLDEFLAB

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8.3 GROSS WEIGHT MARKING. In the case of packaged RADWASTE in steel drums, the gross weight is also stenciled on the container.

8.4 HAZARD RATING MARKING. In addition, all packages of HAZARDOUS RADWASTE are clearly labeled as to their content and hazard rating classification.

9.0 DISPOSAL OF RADWASTE. At the present time the actual disposal of RADWASTE is accomplished by commercial disposal agencies.

9.1 DISPOSAL OF LIQUID WASTES. When the holding tank is from 3/4 to 7/8 full, the Operations Branch (Code 244) is notified and a sample is taken and turned over to the Rad-Safe Branch to determine the Specific Activity, the pH value, and the principal radio-isotopes.

9.1.1 The Operations Branch initiates a stub requisition for disposal.

9.2 DISPOSAL OF SOLID WASTE PACKAGES. When a concrete block and/or a sufficient quantity of drums are ready for disposal the Operations Branch is notified.

9.2.1 The Operations Branch initiates a stub requisition for disposal.

10.0 SPECIAL PRECAUTIONS. In the event of an emergency or an accident involving any radioactive or hazardous waste material, the Plant Support crews immediately notify the Laboratory Duty Officer, Plant Support Office and the Rad-Safe Branch Office. Instructions and assistance are furnished.

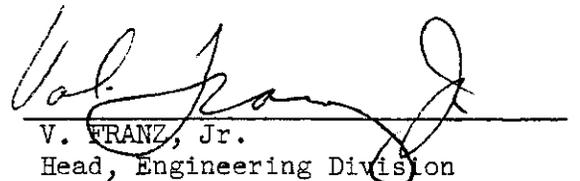
10.0.1 Special waste problems not covered herein are referred to the Rad-Safe Branch.

10.1 STORAGE PRECAUTIONS. Packed containers of ordinary RADWASTE, hazardous RADWASTE and hazardous waste materials (chemicals and/or metals) are stored in three (3) separate areas.

SATISFACTORY TO:



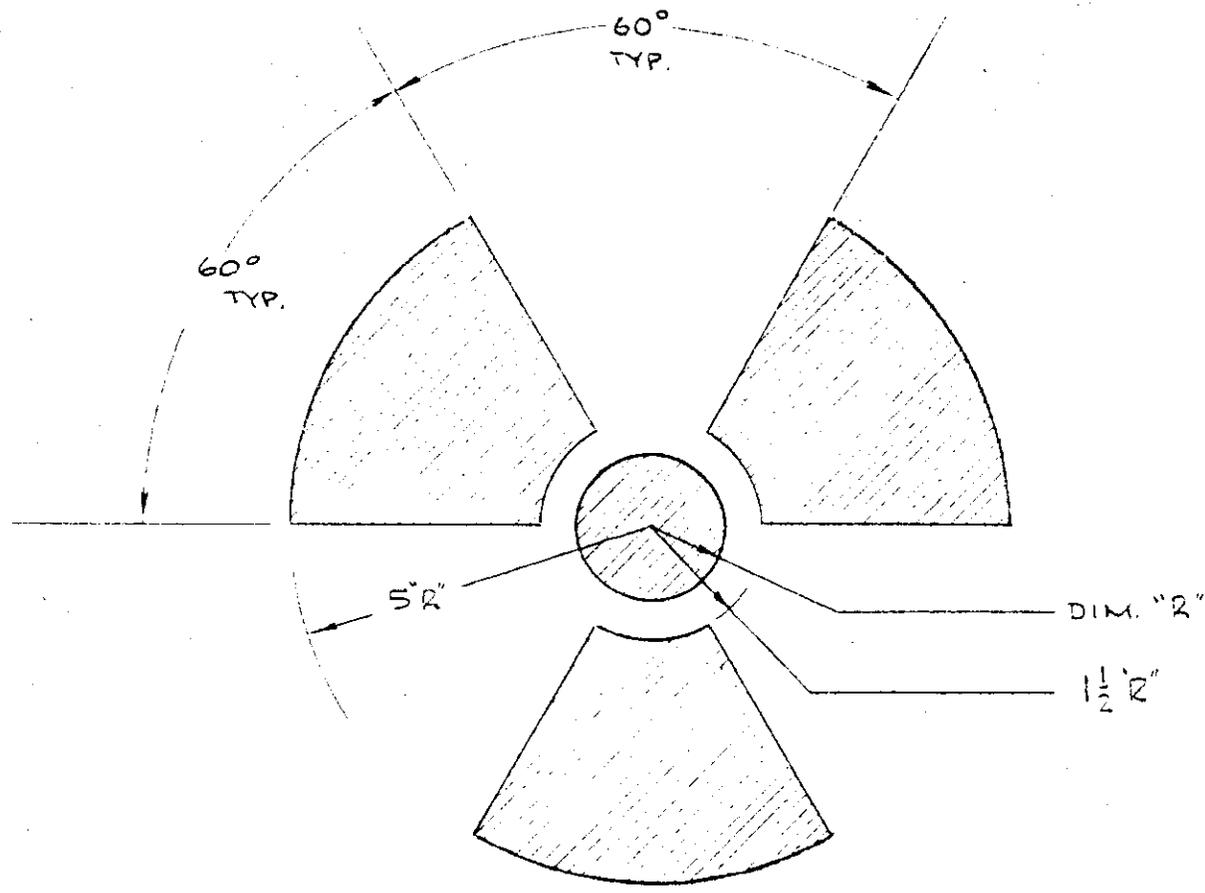
A. L. BAIETTI
Head, Health Physics Division



V. FRANZ, Jr.
Head, Engineering Division

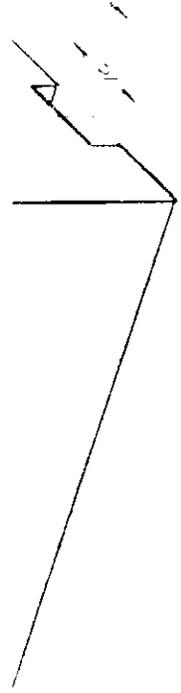


UNIT ST/ 3 NAVAL RADIOLOGICAL DE. SE LABORATORY		SCALE N. 4E	DATE APR. 21, 58	PROJECT
DRAWN BY S. W. LEE	TITLE <u>RADIATION</u> <u>SYMBOL</u>	DRAWING NO. M-58-79		ALT.
CHECKED FJA		SATISFACTORY TO <i>F. A. DeSoto</i>		
APPROVED		DATE		



1. SYMBOL SHALL BE AFFIXED ABOVE WORDS "CAUTION RADIOACTIVE MATERIAL"
2. CROSS-HATCHED AREA IS TO BE MAGENTA
3. BACKGROUND IS TO BE YELLOW.
4. THIS DWG. IS MADE IN ACCORDANCE WITH THE CODE OF FEDERAL REGULATIONS, TITLE 10, PART 20, SECTION 20.203

ENCLOSURE (1)



DISPOSAL BLOCK

INCL. 175 BINL. 40 x 40 x 40"
 CAPACITY 80 CUB. FT.
 TYPICAL WEIGHT 10,000 - 11,700 LBS
 TYPICAL DIMENSIONS 127 BAKES

REFERENCE DWG - M-56-73

REVISIONS USED SHALL
 BE IDENTIFIED BY DATE
 AND NUMBER OF REVISIONS
 (DO NOT EXCEED 40 FT.)

REVISION	DATE	DESCRIPTION	BY	APP
UNITED STATES NAVAL RADIOLOGICAL DEFENSE LABORATORY SAN FRANCISCO 24, CALIFORNIA				
DRAWN CHECKED SLOPE APPROVED PROF. ENGINEER SUPERVISOR DESIGN APPROVAL	DRAWN <i>[Signature]</i> <i>[Signature]</i> CHECKED <i>[Signature]</i> <i>[Signature]</i>	WASTE DISPOSAL BLOCK GENERAL ARRANGMENT & DETAILS	SCALE PROJECT	TECH MEMO DRAWING NUMBER M-61-92

LIST OF MATERIAL

QUANTITIES SHOWN ARE FOR

PC NO

NAME

NO REG

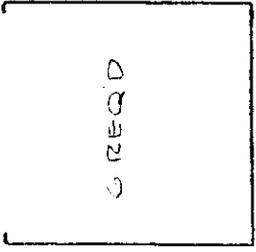
MATL

MATL SPECS

STOCK SIZE

REMARKS

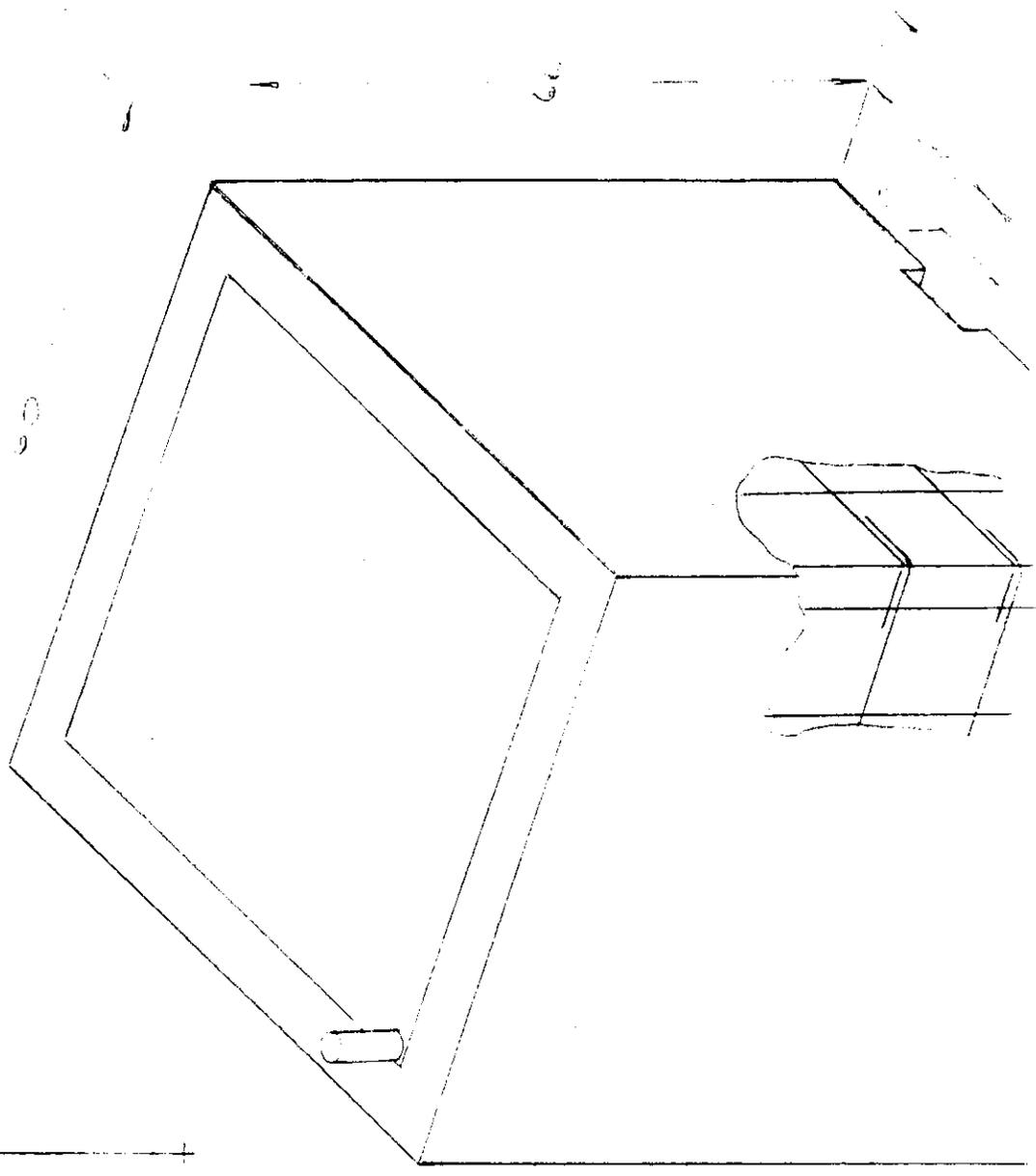
4 2



54

10 REQ'D

ALL DETAILS FORMED



2 MESH 4 IN
 CH END OF PIPE
 POLYETHYLENE
 SHEET OVER -
 IN TIME ASSEMBLY
 TAPED TO PIPE

PTL
 11/1/68

1/2 310 3 MAY 61

TITLE
WASTE DISPOSAL DRUM

PROJECT NO.
M-61-93

ALTERATION
0

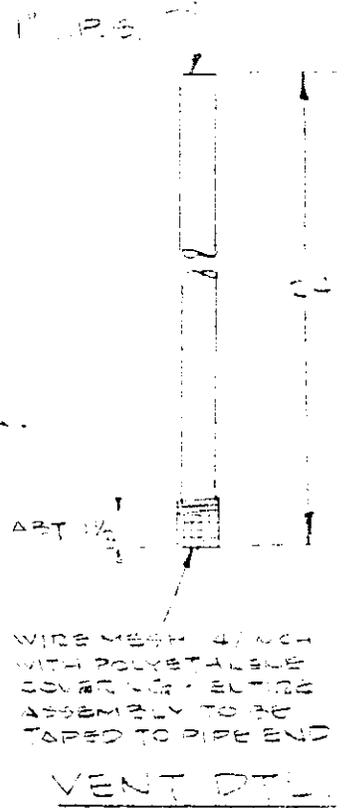
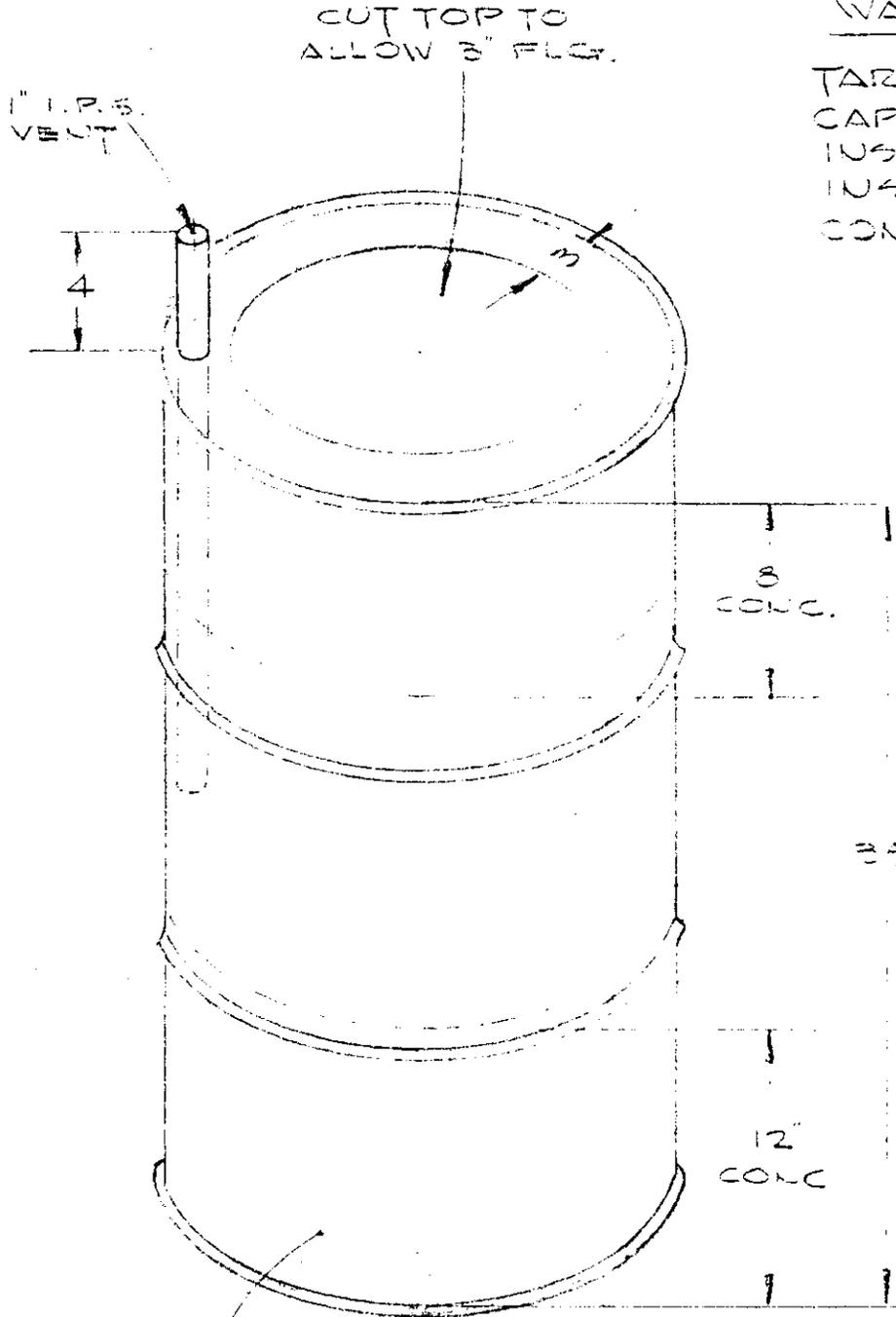
DRAWN BY
POND

CHECKED BY
JWC

DATE
4 07 1961

55 GAL DRUM FOR
WASTE DISPOSAL

TARE WT.	550 LBS
CAPACITY	3.2 CU. FT.
INSIDE DIA.	22 IN.
INSIDE HT.	33 IN.
CONCRETE:	4TD. 5 1/2 SACK MIX

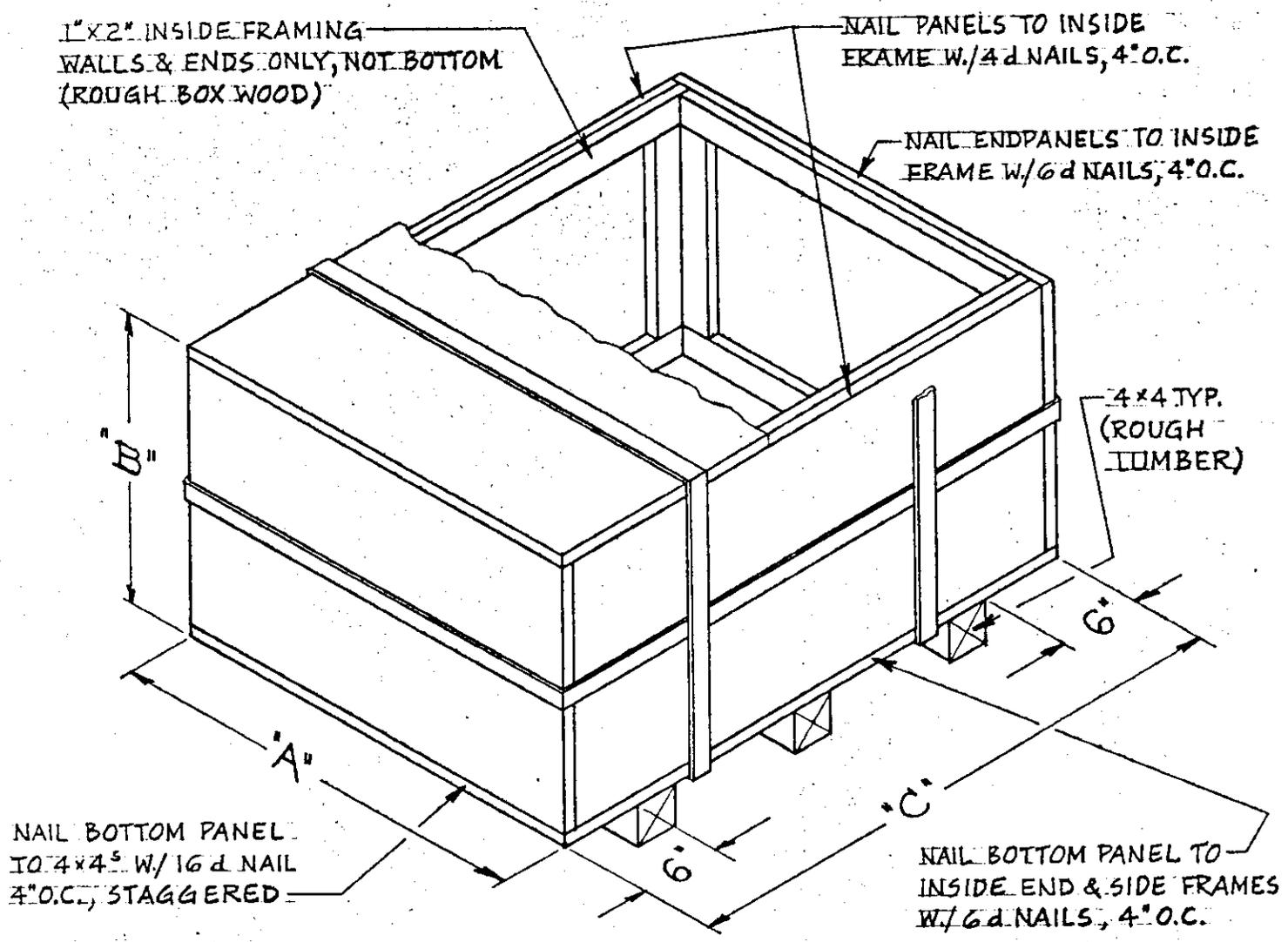


STD. 55 GAL. DRUM

GENERAL ARRGT.

ENCLOSURE (3)

U.S. NAVAL RADIOLOGICAL DEFENSE LABORATORY SAN FRANCISCO 24 CALIFORNIA		SCALE NONE	DATE 8-26-64	PROJECT NO.
TITLE RADWASTE DISPOSAL BOX		DRAWING NO. 250C-769	ALTERATION	
DRAWN BY G.S.	CHECKED BY	APPROVED BY	SATISFACTORY TO	DATE



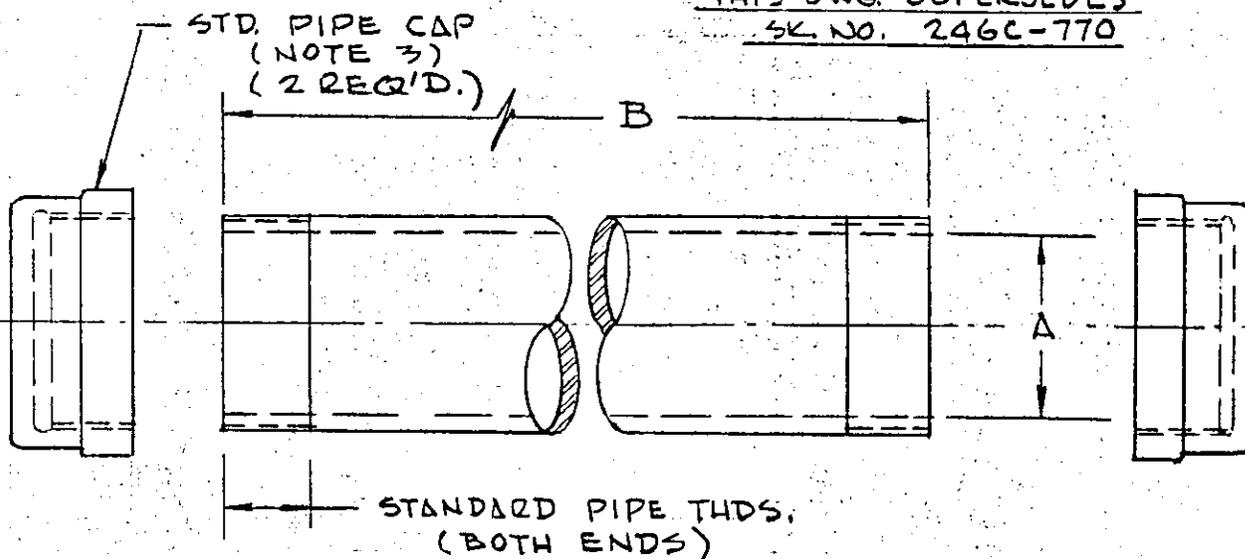
BOX SCHEDULE			
	"A"	"B"	"C"
TYPE I	44	24 5/8	9 1/2
TYPE II	44	24 5/8	36

- GENERAL NOTES:
1. MAKE BOX FROM 5/8" THICK PLYWOOD GRADE C-D INTERIOR UNSANDED.
 2. USE CEMENT COATED NAILS.
 3. INSTALL 3/4" WIDE STEEL BANDS AS SHOWN AFTER PACKING IS COMPLETED.

Appendix I

U.S. NAVAL RADIOLOGICAL SAN FRANCISCO 24		ENSE LABORATORY LIFORNIA		SCALE NONE	DATE NOV. 30, '64	PROJECT NO.
TITLE - RADWASTE CONTAINER (SPEC. 22)		DRAWING NO. 246C-794		ALTERATION		
DRAWN BY S.W. LEE	CHECKED BY FJA	APPROVED BY R/M	SATISFACTORY TO		DATE	

THIS DWG. SUPERSEDES
SK. NO. 246C-770

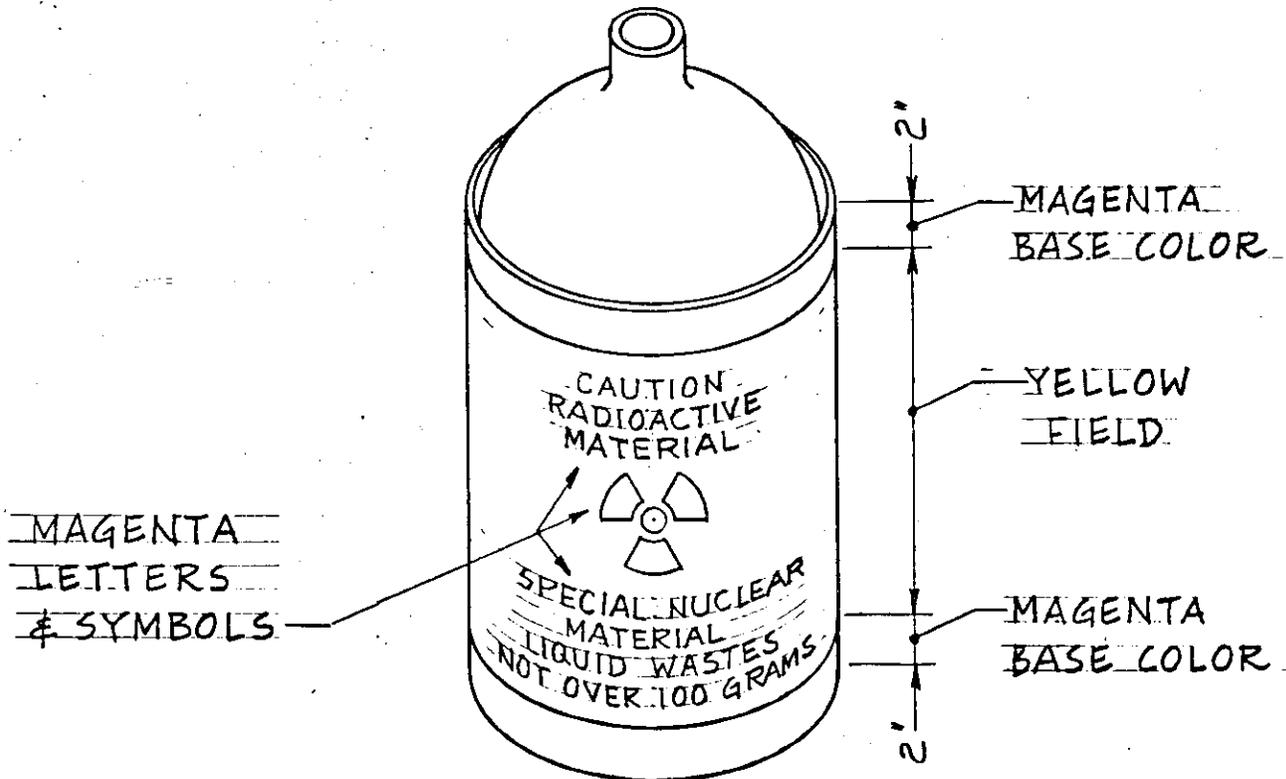


PIPE SCHEDULE		
TYPE	DIM. "A" (I.P.S.)	DIM. "B"
1	2"	12"
2	3"	12"
3	4"	12"
4	6"	16"

NOTES:

1. CONTAINER TO MEET I.C.C. SPECIFICATION 22.
2. ALL PIPES TO BE SCHED. 40 STD. WROUGHT STEEL.
3. ALL PIPE CAPS TO BE SCHED. 40 STD. MALLEABLE IRON.
4. APPLY WHITE LEAD TO THREADS AS REQUIRED FOR WATER TIGHT INTEGRITY.

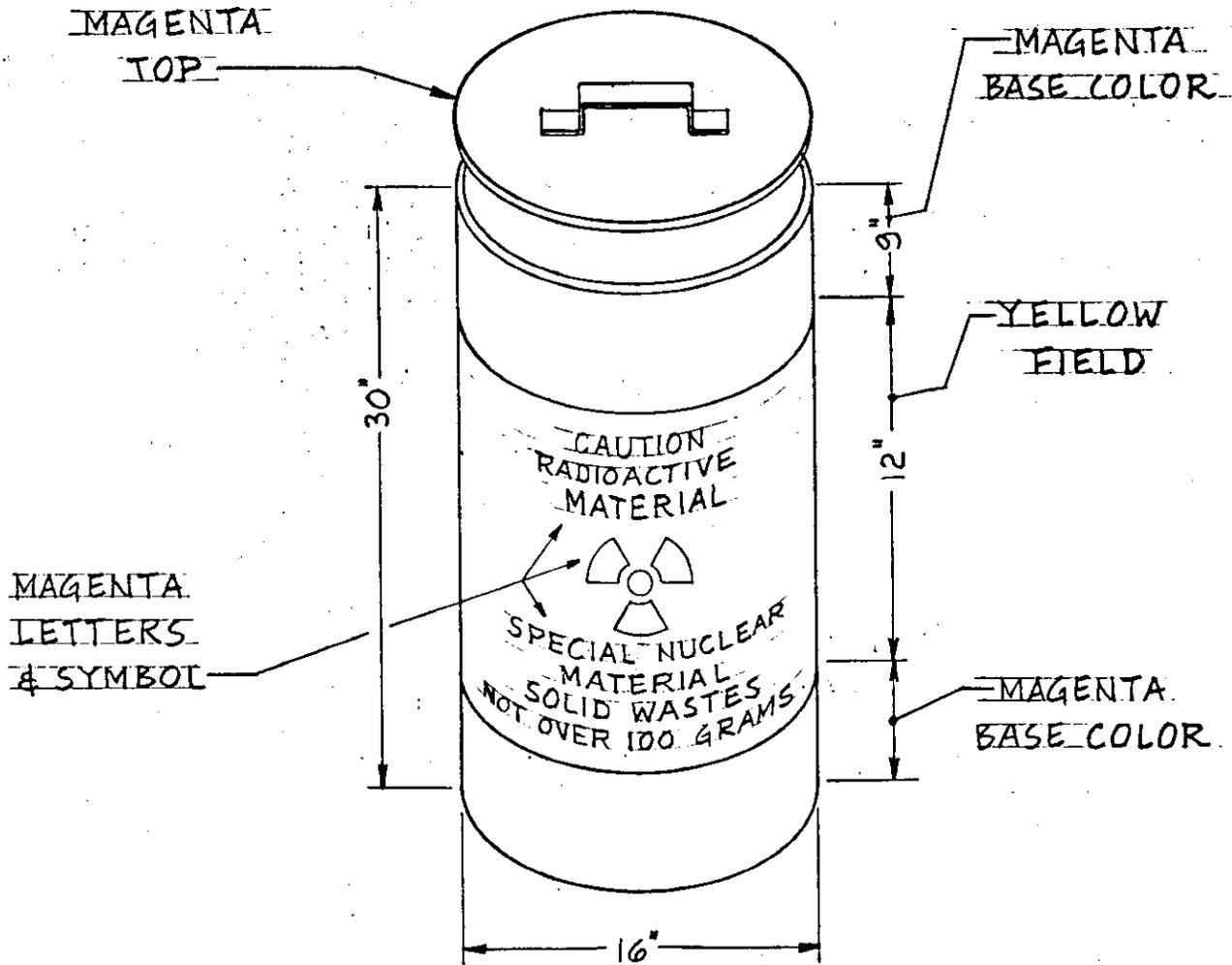
REVISIONS		TITLE	5NM LIQUID RADWASTE CONTAINER
		NAVAL RADIOLOGICAL DEFENSE LABORATORY SFNS SAN FRANCISCO, CALIFORNIA	
		DRAWN BY	G.S., 12-23-64
SCALE		APPROVED	M-64-100
NONE			



GENERAL NOTES:

1. CONTAINER MATERIAL: STANDARD 5 GAL. STEEL BUCKET.
2. CONTAINED JUG TO BE VIRGIN NATURAL POLYETHYLENE
3. RADIATION SYMBOL TO BE 4" DIA., ALL OTHER DIMENSIONS AS PER NRDL-DRAWING M-58-79.
- LETTERS TO BE 3/4" HIGH MIN.
4. SAME DESIGN ON OPPOSITE SIDE OF CONTAINER.
5. ALL DIMENSIONS ARE APPROXIMATE.

REVISIONS		TITLE	SNM SOLID RADWASTE CONTAINER
		NAVAL RADIOLOGICAL DEFENSE LABORATORY SFNS SAN FRANCISCO, CALIFORNIA	
		DRAWN BY	G.S., 12-23-64
SCALE		APPROVED	M-64-99
NONE			



GENERAL NOTES:

1. CONTAINER MATERIAL: FIBER DRUM.
2. CONTAINER TO BE LINED WITH REMOVABLE POLYETHYLENE BAG.
3. RADIATION SYMBOL TO BE 4" DIA., ALL OTHER DIMENSIONS AS PER NRDL-DRAWING M-58-79.
4. SAME DESIGN ON OPPOSITE SIDE OF CONTAINER.
5. ALL DIMENSIONS ARE APPROXIMATE.