

EXTRA

UNITED NUCLEAR
C O R P O R A T I O NIn Reply Refer to: NLS:REK-707 *sek*P. O. BOX 1283
365 WINCHESTER AVENUE
NEW HAVEN, CONN. 06508
777-5361

May 20, 1966

Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division of Materials Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

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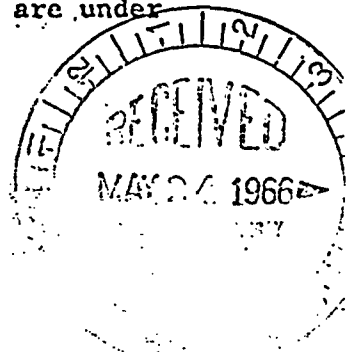
SUBJECT: Shipping Containers

Reference: (1) SNM-33, Section 700
(2) SNM-368, Section 8
(3) SNM-777, Section 700

Dear Mr. Nussbaumer:

The comments and suggested changes recommended in your letter DML:RLL; 70-36, SNM-33, Amendment No. 13; 70-371, SNM-368, Amendment No. 39; and 70-820, SNM-777, Amendment No. 17 dated January 20, 1966 have been considered and factored into the attached revised pages describing shipping containers for references (1), (2), and (3). These revised pages contain changes in the descriptive format, primarily in the narrative description of the containers, plus some up-to-date sketches of certain containers. Included are pages describing the General Purpose Shipping Container (E.E. 2208) which was approved by DML:RLL; 70-36, SNM-33, Amendment No. 14; 70-371, SNM-368, Amendment No. 44; and 70-820, SNM-777, Amendment No. 18 dated February 18, 1966.

The B.E. 1351, 1452, 1483 and 2208 have been drop tested. The B.E. 1886 and 2172 have had engineering evaluations. No structural evaluation is required of the B.E. BA-93 since it is used only for very dilute solutions. This structural evaluation information has been submitted to DML as supporting information for previous review of these containers. Therefore, these containers meet, or are exempted from, the requirements of the proposed revision to Part 71, and should not require re-evaluation upon its adoption. Other currently approved containers, which are not described in this submission, are presently being re-evaluated by UNC. Upon completion of our review, additional shipping containers which meet the revised Part 71 will be submitted for approval. Also, updated shipping procedures are under preparation.

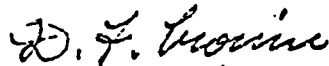


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It should be noted that the revised pages contain no reference to the use of non-commingling certificates. This was done to make the pages reflect the new conditions of proposed, revised Part 71. Until formal adoption of the proposed, revised Part 71, non-commingling certification will be used as currently approved.

Attached are 18 sets of the revised pages for inclusion in the referenced licenses. UNC respectfully requests that DML approve these containers and their use. This approval should supersede all previous amendments and submissions covering these containers.

Very truly yours,



D. F. Cronin
Director of Licensing

DFC/tc

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PAGE 1

Approved

ISSUED May 20, 1966

SUPERSEDES Nov. 24, 1965

SUBJECT: SHIPPING CONTAINERS

SNM-33 : Section 700

SNM-368: Section 8

SNM-777: Section 700

1. Container Number or Identification

B. E. 1351

2. Description of Container

- (1) Inner container: 5' inch high x 6 inch I.D. Schedule 40 pipe with 1/4 inch welded steel plate bottom (approximately 2.4 liters).
- (2) Inner Container Closure: 8 3/4-inch dia. x 1/4-inch steel plate top fastened to inner container by four equally spaced 3/8-inch bolts.
- (3) Inner Container Supports: Upper and lower metal "stools" constructed of 1 inch x 1 inch x 1/8-inch steel.
- (4) Outer Container: 15 gallon drum - specification 6A, 6B, 6C, 6J, 17C or 17 H.
- (5) Outer Container Closure: 16 gage steel head with bolt-locking ring clamp utilizing not less than 3/8-inch steel bolt or lock nut, or equivalent device, with a tamper-proof seal.
- (6) Non-Stacking Device: None

3. Description of Material to be Packaged in Container

- (1) Dry uranium metal, alloys, compounds and uranium bearing solutions.
- (2) Enrichments up to and including fully enriched.

4. Amount of Material per Container

- (1) Not to exceed 5.7 kgs U-235 as dry metal, alloys, or compounds.
- (2) Not to exceed 350 gms U-235 as solutions.

5. Nuclear Safety Control

- (1) Mass and geometry.

6. Number of Containers per Shipment

- (1) Fissile Class I: None
- (2) Fissile Class II: Not to exceed 9 (4.4 transport units per container).
- (3) Fissile Class III: Not to exceed 19 total (may be mixed with B.E. 1452, 1483, and/or 2208 Containers).

7. Special Restrictions

- (1) Drums will not be stacked.
- (2) When shipping solutions, sufficient absorbent material will be added to inner container to absorb 100% of the solution.
- (3) Containers will be marked in accordance with 49 CFR 73 and 78 (ICC Regulations) and 10 CFR 71 (AEC Regulations)

8. Design Requirements

- (1) Structural Determination: Drop tested.
- (2) Weight Limitations: Not to exceed 75 lbs max. gross weight for container and contents.

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SUBJECT: SHIPPING CONTAINERS
SNM-33 : Section 700
SNM-368: Section 8
SNM-777: Section 700

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B. E. 1351 (continued)

9. Shipping Criteria

- (1) Fissile Class I: None
- (2) Fissile Class II: Must meet "40 unit rule."
- (3) Fissile Class III: Exclusive use of vehicle or courier.

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PAGE 1b

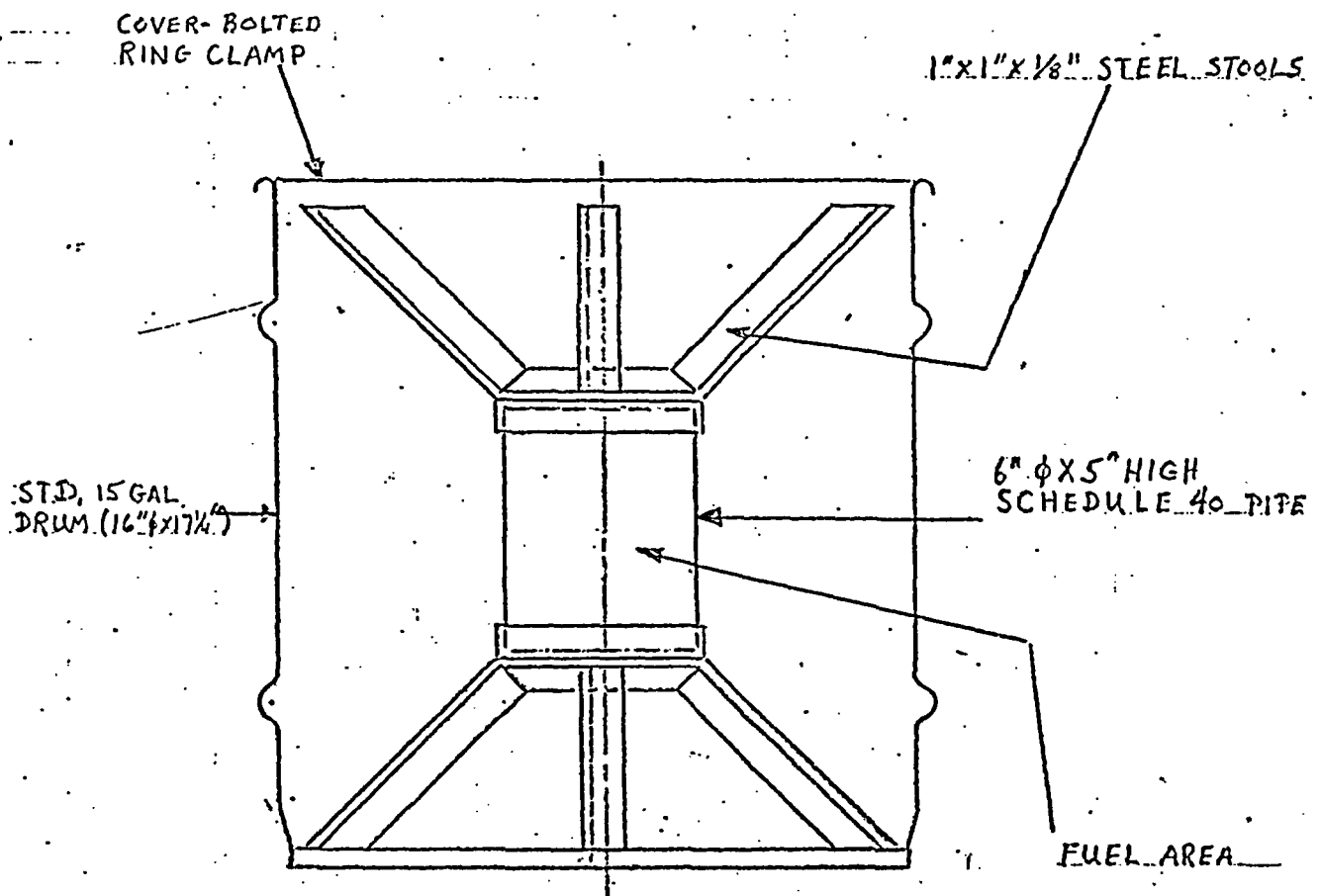
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SUBJECT: SHIPPING CONTAINERS
SNM-33 : Section 700
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B.E. 1351



SKETCH 700-1

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ISSUED May 20, 1966

SUPERSEDES Nov. 24, 1965

SUBJECT: SHIPPING CONTAINERS

SNM-33 : Section 700

SNM-368: Section 8

SNM-777: Section 700

1. Container Number or Identification
B. E. 1452
2. Description of Container
 - (1) Inner Container: 5 inch I.D. Schedule 40 Pipe not to exceed 30 inches in length.
 - (2) Inner Container Closure: Standard threaded pipe caps with at least 5 threads engaged.
 - (3) Inner Container Supports: 4 to 8 spokes constructed of 3/16-inch x 2 inch x 2 inch angle iron attached to upper and lower portion of inner container.
 - (4) Outer Container: 55 gallon drum - Specification 6A, 6B, 6C, 6J, 17C, or 17H.
 - (5) Outer Container Closure: 16 gage steel head with bolt locking ring clamp utilizing not less than 3/8-inch steel bolt or lock nut, or equivalent device, with a tamper-proof seal.
 - (6) Non-Stacking Device: None
3. Description of Material to be Packaged in Container
 - (1) Dry uranium metal, alloys, and compounds.
 - (2) Enrichments up to and including fully enriched.
4. Amount of Material per Container
 - (1) Not to exceed 10 kgs U-235.
5. Nuclear Safety Control
 - (1) Mass and geometry.
6. Number of Containers per Shipment
 - (1) Fissile Class I: None
 - (2) Fissile Class II: Not to exceed 9 (4.4 transport units per container).
 - (3) Fissile Class III: Not to exceed 19 total (May be mixed with B.E. 1351, 1483, and/or 2208 Containers).
7. Special Restrictions
 - (1) Drums will not be stacked.
 - (2) When shipping uranium-bearing salts which are soluble in water or will thermally decompose during the standard one hour fire test, each container will be limited to 350 grams U-235.
 - (3) Containers will be marked in accordance with 49 CFR 73 and 78 (ICC Regulations) and 10 CFR 71 (AEC Regulations).
8. Design Requirements
 - (1) Structural Determination: Design evaluation.
 - (2) Weight Limitations: Not to exceed 120 lbs. in inner container.
9. Shipping Criteria
 - (1) Fissile Class I: None
 - (2) Fissile Class II: Must meet "40 unit rule."
 - (3) Fissile Class III: Exclusive use of vehicle or courier.

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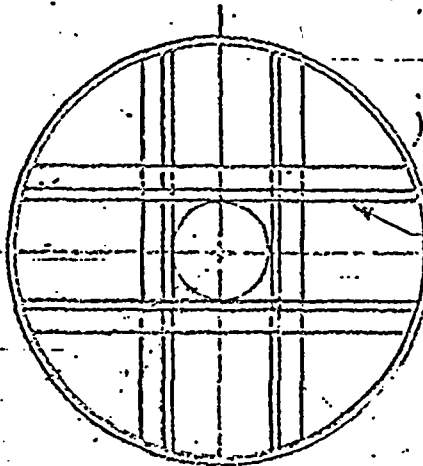
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SUBJECT: SHIPPING CONTAINERS
SNM-33 : Section 700
SNM-368: Section 8
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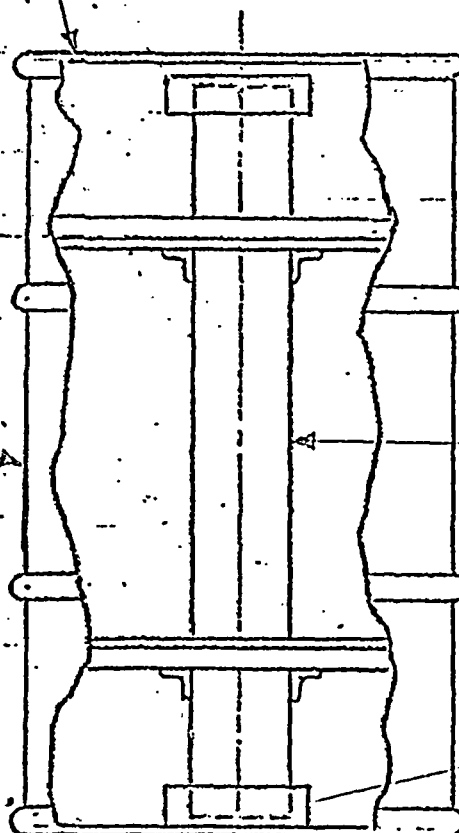
B.E. 1452



3 1/2" X 2" X 2" ANGLE
IRON WELDED TO
TOP & BOTTOM

COVER - BOLTED
RING CLAMP

STD. 55 GAL.
DRUM (22 1/2" ϕ X 34")



5" SCH. 40 PIPE

STD 5" THREADED
PIPE CAP

SKETCH 700-2

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R. E. Kufel 5-20-66

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SUBJECT: SHIPPING CONTAINERS

SNM-33 : Section 700

SNM-368: Section 8

SNM-777: Section 700

ISSUED May 20, 1966

SUPERSEDES Nov. 24, 1965

1. Container Number or Identification

B.E. 1483

2. Description of Container

- (1) Inner Container: 5 1/4-inch I.D. x 36 inch long 0.325 inch thick seamless steel pipe with 10 inch dia. x 1/4-inch steel plate welded to bottom and 10 inch O.D.-6 inch I.D. x 1/4-inch steel flange welded to top.
- (2) Inner Container Closure: 10 inch dia. x 1/4-inch steel plate top fastened to inner container by four equally spaced 9/16" bolts.
- (3) Inner Container Supports: 4 spokes constructed of 1 inch schedule 40 pipe attached to top and bottom of inner container.
- (4) Outer Container: 65 gallon drum-Specification 6A,6B,6C,6J,17C or 17H.
- (5) Outer Container Closure: 16 gage steel head with bolt-locking ring clamp utilizing not less than a 3/8-inch steel bolt or lock nut, or equivalent device, with a tamper-proof seal.
- (6) Non-stacking Device: 1/8-inch x 2 1/2-inch metal strap forming blunted point.

3. Description of Material to be Packaged in Container

- (1) Dry uranium metal, alloys and compounds.
- (2) Enrichments up to and including fully enriched.

4. Amount of Material Per Container

- (1) Not to exceed 10 kgs U-235.

5. Nuclear Safety Control

- (1) Mass and geometry.

6. Number of Containers per Shipment

- (1) Fissile Class I: None
- (2) Fissile Class II: Not to exceed 9 (4.4 transport units per container).
- (3) Fissile Class III: Not to exceed 19 total (may be inter-mixed with B.E. 1351, 1452, and/or 2208 containers).

7. Special Restrictions

- (1) Drums will not be stacked.
- (2) When shipping uranium-bearing salts which are soluble in water or will thermally decompose during a standard one hour fire test, each container will be limited to 350 grams U-235.
- (3) Containers will be marked in accordance with 49 CFR 73 and 78 (ICC Regulations) and 10 CFR 71 (AEC Regulations).

8. Design Requirements

- (1) Structural Determination: Drop tested.
- (2) Weight Limitations: Not to exceed 120 lbs in inner container.

9. Shipping Criteria

- (1) Fissile Class I: None
- (2) Fissile Class II: Must meet "40 unit rule."
- (3) Fissile Class III: Exclusive use of vehicle or courier.

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SUBJECT: SHIPPING CONTAINERS

SNM-33 : Section 700

SNM-368: Section 8

SNM-777: Section 700

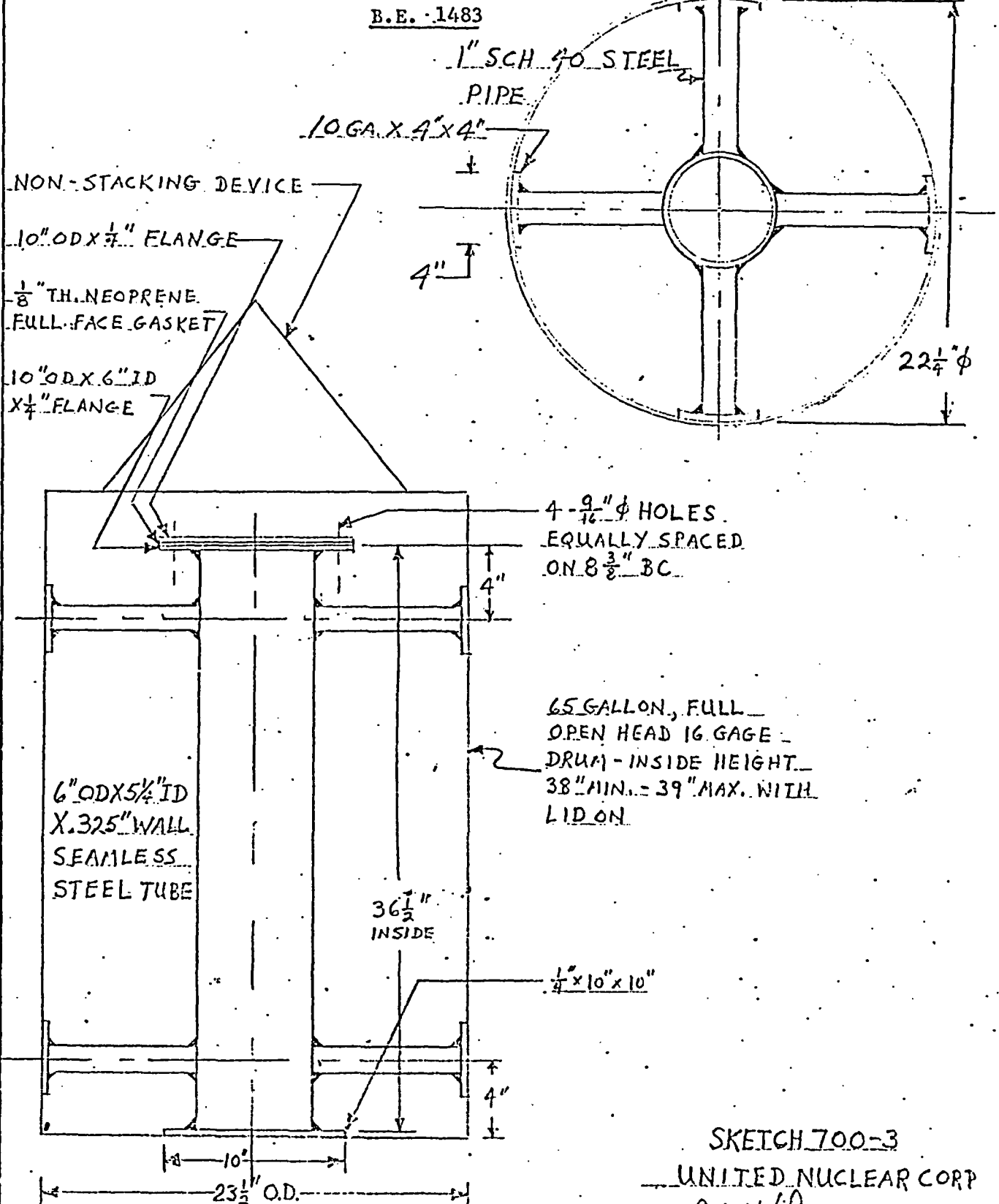
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SKETCH 700-3

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ISSUED May 20, 1966

SUPERSEDES New

SUBJECT: SHIPPING CONTAINERS
SNM-33 : Section 700
SNM-368: Section 8
SNM-777: Section 700

1. Container Number of Identification
B. E. 2208 - General Purpose Shipping Container
2. Description of Container
 - (1) Inner Container: 5 inch I.D. Schedule 40 pipe.
 - (2) Inner Container Closure: Standard threaded pipe caps with at least 5 threads engaged.
 - (3) Inner Container Supports: 4 to 6 spokes constructed of 1 inch schedule 40 pipes welded to pipe caps and 3/16-inch x 3 inch support ring.
 - (4) Outer Container: 55 gallon drum-Specification 6A,6B,6C,6J,17C, or 17H.
 - (5) Outer Container Closure: 16 gage steel head with bolt-locking ring clamp utilizing not less than a 3/8-inch steel bolt or lock nut, or equivalent device, with a tamper-proof seal.
 - (6) Non-stacking Device: None.
3. Description of Material to be Packaged in Container
 - (1) Dry uranium metal, alloys and compounds.
 - (2) Enrichments up to and including fully enriched.
4. Amount of Material Per Container
 - (1) Not to exceed 10 kgs U-235.
5. Nuclear Safety Control
 - (1) Mass and geometry.
6. Number of Containers per Shipment
 - (1) Fissile Class I: None
 - (2) Fissile Class II: Not to exceed 9 (4.4 transport units per container).
 - (3) Fissile Class III: Not to exceed 19 total (may be intermixed with B.E. 1351, 1452, and/or 1483 containers).
7. Special Restrictions
 - (1) Drums will not be stacked.
 - (2) When shipping uranium bearing salts which are soluble or will thermally decompose during a standard one hour fire test, each container will be limited to 350 grams U-235.
 - (3) Containers will be marked in accordance with 49 CFR 73 and 78 (ICC Regulations) and 10 CFR 71 (AEC Regulations).
8. Design Requirements
 - (1) Structural Determination: Drop tested.
 - (2) Weight Limitations: Not to exceed 132 lbs in inner container.
9. Shipping Criteria
 - (1) Fissile Class I: None
 - (2) Fissile Class II: Must meet "40 unit rule."
 - (3) Fissile Class III: Exclusive use of vehicle or courier.

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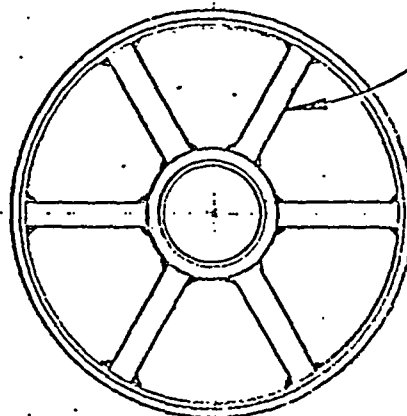
SUBJECT: SHIPPING CONTAINERS

SNM-33 : Section 700

SNM-368: Section 8

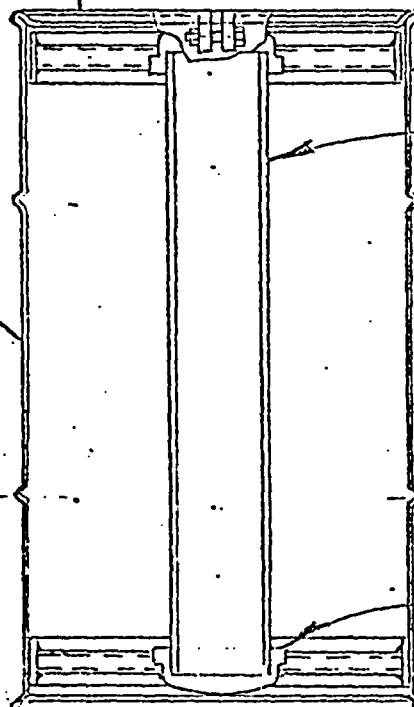
SNM-777: Section 700

B.E. 2208



1" (SCH. #40) PIPE
WELD TO PIPE CAP
AND RING

COVER - BOLTED RING
WITH RUBBER GASKET



RING $\frac{3}{16}$ " x 3" STEEL
(TOP & BOTTOM)

5" (SCH. 40) PIPE

STD. 55 (17-H) DRUM
16 GA. (22 1/2" ID x 34")

STD. 5" THREADED
PIPE CAP

SKETCH 700-4

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Sketch - 5-21-66

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SUBJECT: SHIPPING CONTAINERS
SNM-33 : Section 700
SNM-368: Section 8
SNM-777: Section 700

ISSUED May 20, 1966

SUPERSEDES Nov. 24, 1965

1. Container Number or Identification

B. E. 1886

2. Description of Container

- (1) Inner Container: 14 inch dia. x 94 inch long cylinder constructed of 16 gage steel with a 14 1/8-inch dia. x 1/8-inch thick steel, seal welded bottom plate and a 16 1/2-inch dia. x 1/4-inch steel, seal welded flange at top. A 1/4-inch thick steel cruciform loading rack is bolted to the inside with two 1/2-inch bolts.
- (2) Inner Container Closure: 16 1/2-inch dia. x 1/4-inch steel plate fastened to inner container by eight equally spaced 7/16-inch bolts.
- (3) Inner Container Supports: 8 spokes constructed of 2 inch schedule 40 pipes welded to 1/4-inch x 3 inch x 14 inch steel inner ring and welded to 1/4-inch x 3 inch x 36 inch steel outer ring-supports attached to top, bottom, and middle of inner container and tack welded to outer container.
- (4) Outer Container: 36 inch I.D. x 99 inch long extended drum constructed of 16 gage steel.
- (5) Outer Container Closure: 16 gage steel head with rubber gasket (water tight) and bolt locking ring clamp utilizing a 5/8-inch steel bolt or lock nut with a tamper-proof seal.
- (6) Non-stacking Device: None.

3. Description of Material to be Packaged in Container

	Type A	Type B
(1) Fuel	UO ₂ + ThO ₂ Rods	UO ₂ Rods
(2) Cladding	Metallic	Metallic
(3) Enrichment	4.4%	6%
(4) H/U-235(in container)	227	71.5
(5) Fuel Envelope	7.813" x 7.813"	7.813" x 7.613"
(6) Fuel Length	60 inches	48 inches
(7) Height to Diameter	4.34	6.3

4. Amount of Material Per Container

- (1) Type A: Not to exceed 4 elements with 4.5 kgs U-235.
- (2) Type B: Not to exceed 3 elements with 4.8 kgs U-235.

5. Nuclear Safety Control

- (1) Mass

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SNM-33 : Section 700

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SNM-777: Section 700

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B.E. 1886 (continued)

6. Number of Containers per Shipment

- (1) Fissile Class I: None
- (2) Fissile Class II: Not to exceed 16 (2.5 transport units per container)
- (3) Fissile Class III: Unlimited

7. Special Restrictions

- (1) Drums will not be stacked.
- (2) Containers will be arrayed in two columns.
- (3) Containers will be marked in accordance with 49 CFR 73 and 78 (ICC Regulations) and 10 CFR 71 (AEC Regulations)

8. Design Requirements

- (1) Structural Determination: Design evaluation
- (2) Weight Limitations:
 - a. Total weight of container - 725 lbs.
 - b. Weight of contents - 600 lbs.
 - c. Total weight - 1300 lbs.

9. Shipping Criteria

- (1) Fissile Class I: None
- (2) Fissile Class II: Must meet "40 unit rule."
- (3) Fissile Class III: Exclusive use of carrier or courier.

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SUBJECT: SHIPPING CONTAINERS

SNM-33 : Section 700

SNM-368: Section 8

SNM-777: Section 700

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SUPERSEDES Nov. 24, 1965

1. Container Number or Identification
B.E. BA-93
2. Description of Container
 - (1) Inner Container: Polyethylene Liner - Specification 2S.
 - (2) Outer Container: 55 gallon drum - Specification 6J.
 - (3) Outer Container Closure: 16 gage steel head with bolt - locking ring clamp utilizing not less than a 3/8-inch steel bolt or lock nut, or equivalent device, with a tamper proof seal.
3. Description of Material to be Packaged in Container
 - (1) Uranium bearing pickle liquors, elutriation solutions, laboratory wastes and other solutions.
 - (2) Enrichments up to and including fully enriched.
4. Amount of Material Per Container
 - (1) Maximum concentration not to exceed 5 grams U-235 per liter of solution.
 - (2) Not to exceed 800 grams U-235 per container.
5. Nuclear Safety Control
 - (1) Mass and concentration
6. Number of Containers per Shipment
 - (1) Fissile Class I: None
 - (2) Fissile Class II: Not to exceed 180 (.22 transport units per container).
 - (3) Fissile Class III: Unlimited
7. Special Restrictions
 - (1) When shipping laboratory wastes where precipitation is a possibility, each drum will be limited to a concentration of 2 grams U-235 per liter OR 350 grams, whichever is less. In addition, 1 gram of cadmium nitrate will be added to the laboratory waste solutions.
 - (2) Containers will be marked in accordance with 49 CFR 73 and 78 (ICC Regulations) and 10 CFR 71 (AEC Regulations).
8. Design Requirements
 - (1) None Required
9. Shipping Criteria
 - (1) Fissile Class I: None
 - (2) Fissile Class II: Must meet "40 unit rule."
 - (3) Fissile Class III: Exclusive use of vehicle or courier.

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SUBJECT: SHIPPING CONTAINERS

SNM-33 : Section 700

SNM-368: Section 8

SNM-777: Section 700

1. Container Number or Identification
B. E. 2172
2. Description of Container
 - (1) Inner Container: Plastic wrappers or bags (sealed); heavy duty paper (sealed); plastic or metal jars, bottles, or boxes; etc.
 - (2) Outer Container: 5 inch I.D. x 12 foot long schedule 40 pipe.
 - (3) Outer Container Closure: Standard threaded pipe caps with at least 5 threads engaged.
3. Description of Material to be Packaged in Container
 - (1) Dry uranium metal, alloys and compounds.
 - (2) Enrichments up to and including fully enriched.
4. Amount of Material per Container
 - (1) Not to exceed 10 kgs U-235
5. Nuclear Safety Control
 - (1) Mass and geometry
6. Number of Containers per Shipment
 - (1) Fissile Class I: None
 - (2) Fissile Class II: None
 - (3) Fissile Class III: Not to exceed 1.
7. Special Restrictions
 - (1) Containers will be marked in accordance with 49 CFR 73 and 78 (ICC Regulations) and 10 CFR 71 (AEC Regulations).
8. Design Requirements
 - (1) None required
9. Shipping Criteria
 - (1) Fissile Class I: None
 - (2) Fissile Class II: None
 - (3) Fissile Class III: Exclusive use of vehicle.