

UNITED NUCLEAR
CORPORATION
CHEMICALS DIVISION
FEBRUARY 24, 1964

70-36
EXTRA
6pgs

S-8

ROUTE 21-A
HEMATITE, MISSOURI

MR. EBER PRICE
U. S. ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

ATTENTION: MR. DONALD NUSSBAUMER

SUBJECT: SNM-33 AMENDMENT TO INCLUDE SHIPPING CONTAINER BE-1351

REFERENCE: OUR LETTER OF DECEMBER 4, 1963

GENTLEMEN:

THE FOLLOWING IS SUBMITTED IN ACCORDANCE WITH OUR DISCUSSION OF FEBRUARY 20th PERTAINING TO AMENDMENT OF SPECIAL NUCLEAR MATERIAL LICENSE SNM-33 TO INCLUDE OUR SHIPPING CONTAINER IDENTIFIED AS BE PERMIT 1351. PLEASE MAKE THE FOLLOWING CHANGES IN "GENERAL INFORMATION AND PROCEDURES APPLICABLE TO THE HANDLING OF SPECIAL NUCLEAR MATERIAL" AS REVISED THROUGH DECEMBER 15, 1963:

PARAGRAPH 701. SUMMARY LISTING

BE PERMIT 1351

REFERENCE DRAWINGS:

REPLACE SK-5 WITH SK-5, REVISED FEBRUARY 24, 1964

REPLACE SK-23-1 WITH SK-23-1 REVISED FEBRUARY 24, 1964

PARAGRAPH 702.8 BE PERMIT 1351

REPLACE THE ENTIRE PARAGRAPH WITH THE FOLLOWING:

BE PERMIT 1351

THE ASSEMBLED ARRANGEMENT OF THE CONTAINER IS SHOWN ON SKETCH SK-5 REVISED 2/24 WITH DETAILS OF THE SUPPORTING STOOLS AND INNER POT OR CONTAINER SHOWN ON SKETCHES SK-23 AND SK-23-1, REVISED FEBRUARY 24, 1964.

THE MATERIALS TO BE SHIPPED WILL CONSIST OF DRY URANIUM COMPOUNDS AND METAL BISCUITS. DRY URANIUM COMPOUNDS WILL BE PACKAGED IN 350 CC POLYETHYLENE BOTTLES WITH SELF SEALING SCREW ON LIDS, HERMETICALLY SEALED METAL CANS (FIVE INCH DIAMETER BY FOUR INCHES) SIMILAR TO ONE POUND VACUUM PACKED COFFEE CANS. BROKEN BISCUITS WILL ALSO BE PACKAGED IN THIS CAN. UNBROKEN BISCUITS WILL BE PACKAGED IN SIMILAR METAL CANS WHICH MEASURE 5½ INCHES IN DIAMETER AND 4 3/4 INCHES IN HEIGHT. THREE POLYETHYLENE

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BOTTLES OR ONE CAN OF EITHER TYPE FILL THE INNER CONTAINER. FOAM GLASS, PLASTER OF PARIS OR OTHER SUITABLE NON-ABSORBENT MATERIAL WILL BE USED TO FILL THE EXCESS SPACE AROUND THE BOTTLES. THIS WILL LIMIT THE VOLUME AVAILABLE TO INLEAKING WATER TO ONLY THE VOIDS WITHIN THE SPECIAL NUCLEAR MATERIAL. THIS WILL BE DONE ONLY AS NECESSARY TO LIMIT THE H/U-235 RATIO TO CORRESPOND TO TABLE IV OF TID-7016, REV. 1 AS REVISED BY "INFORMATION TO BE CONTAINED IN APPLICATION FOR RENEWAL OF SPECIAL NUCLEAR MATERIAL LICENSE FOR QUANTITIES OF URANIUM ENRICHED IN THE U-235 ISOTOPE IN EXCESS OF 500 GRAMS OF U-235".

THE BULK DENSITY OF THE COMPOUNDS MAY BE AS HIGH AS 6 GRAMS PER CC WITH INDIVIDUAL PARTICLE DENSITIES AS HIGH AS 10 GRAMS PER CC.

THE FOLLOWING IS A TABULATION OF DATA CALCULATED ON THE ASSUMPTION THAT WATER FILLS THE VOID SPACES OF THE MATERIAL ONLY. FROM THIS TABULATION IT CAN BE SEEN THAT SAFETY OF THE INDIVIDUAL CONTAINER IS ASSURED.

URANIUM COMPOUNDS

VOLUME OF POT SHOWN ON DRAWING SK-23 IS 2316 CC.
MAXIMUM BULK VOLUME OF MATERIAL 1280 CC.
MAXIMUM WEIGHT OF MATERIAL 7680 GMS.
NET VOLUME OF MATERIAL 768 CC.

ENRICHMENT	H/U-235	SAFE MASS* KG U-235	KG U-235** PER CONTAINER
93	2.1	9.0	6.3
50	4	7.3	3.4
10	20	3.6	.63
5	40	3.6 LITERS	.32

*FROM TABLE IV OF TID-7016, REVISION 1 AS REVISED BY "INFORMATION TO BE CONTAINED IN APPLICATION FOR RENEWAL OF SPECIAL NUCLEAR MATERIAL LICENSE FOR QUANTITIES OF URANIUM ENRICHED IN THE U-235 ISOTOPE IN EXCESS OF 500 GRAMS OF U-235".

**CALCULATED ON UO_2 BASIS.

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URANIUM METAL

ENRICHMENT	MAXIMUM TOTAL WEIGHT U, KG	Kg U-235 PER CONTAINER	H/U-235*	SAFE MASS** Kg U-235
93%	10.8	10	1.0	10
77%	13	10	.75	10
50%	13	6.5	1.1	10
10%	13	.13	56	3.6 LITERS
5%	13	.065	110	3.6 LITERS

*CALCULATED BASED ON WATER UP TO HEIGHT OF BISCUITS ONLY AND A URANIUM DENSITY OF 18.8 GRAMS/CC.

**FROM TABLE IV, TID-7016, REVISION 1 AS REVISED BY "INFORMATION TO BE CONTAINED IN APPLICATION FOR RENEWAL OF SPECIAL NUCLEAR MATERIAL LICENSE FOR QUANTITIES OF URANIUM ENRICHED IN THE U-235 ISOTOPE IN EXCESS OF 500 GRAMS OF U-235".

THE INTERNAL CONSTRUCTION OF THE CONTAINER IS SHOWN ON DRAWING SK-5 REVISED FEBRUARY 24, 1964 AND SK-23-1 REVISED FEBRUARY 24, 1964. THE 15 GALLON DRUM IS A STANDARD ICC TYPE 37-A-350 DRUM FABRICATED FROM 20 GAUGE STEEL. THIS DRUM WAS DROP TESTED FROM A HEIGHT OF 30 FEET. A DROP ON THE END RESULTED IN LESS THAN A FIVE PERCENT CHANGE IN THE SPACING BETWEEN THE BOTTOM OF THE DRUM AND BOTTOM OF THE "POT". A DROP ON THE SIDE RESULTED IN A MAXIMUM REDUCTION OF $1\frac{1}{4}$ " ON THE DIAMETER OF THE DRUM (CORRESPONDING TO A MAXIMUM REDUCTION OF $1\frac{1}{4}$ " IN THE SPACING BETWEEN THE DRUM AND POT ON THE SIDE OF THE IMPACT). THE MINIMUM DRUM DIAMETER IS THEREFORE $14\frac{3}{4}$ ". THE NET VOLUME OF THE DRUM AFTER THE DROP IS THEREFORE 1.7 CUBIC FEET. FROM FIGURE 23 OF TID-7016, REVISION 1, AT LEAST 20 SUCH UNITS IS A SAFE QUANTITY.

PHOTOGRAPHS OF THE DROP TESTS ARE ENCLOSED. (NOTE: THE END DROP WAS MADE WITH A CONTAINER BEFORE THE MODIFICATIONS SHOWN ON THE REVISED SKETCHES SK-5 AND SK-23-1 WERE MADE. THESE MODIFICATIONS WILL NOT EFFECT THE RESULTS OF THE END DROP.) FIVE ADDITIONAL COPIES OF THESE PHOTOGRAPHS WILL BE SENT WITHIN A WEEK.

THE RESULTS OF THE $3\frac{1}{2}$ FOOT DROP TEST ONTO A 6" DIAMETER ARE EVALUATED FOLLOWING PROCEDURES OUTLINED BY MR. CHRISTIAN BECK. THE GROSS WEIGHT OF THE DRUM AND CONTENTS IS 75 POUNDS. USING 30 TIMES THIS WEIGHT AS THE FORCE TENDING TO SHEAR THE DRUM WALL, THE RESULTING SHEAR STRESS IS;

$$s = \frac{30 \times 75}{\pi \times 6 \times 0.359} = 3330 \text{ PSI}$$

WHERE .0359 IS THE THICKNESS OF THE DRUM WALL.

THE ALLOWABLE SHEAR STRESS FOR THESE CONDITIONS IS 20,000 PSI AND IT CAN BE CONCLUDED THAT THE WALL OF THE DRUM WILL NOT SHEAR UNDER THESE CONDITIONS.

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FINALLY, SINGLE LAYER SHIPMENTS ARE SPECIFIED. "DO NOT DOUBLE STACK" WILL BE STENCILED ON EACH OUTSIDE CONTAINER. EXCEPT FOR EXCLUSIVE USE SHIPMENTS, CARRIER CERTIFICATION WILL BE OBTAINED FROM EACH CARRIER ENROUTE THAT HE WILL NOT CO-MINGLE ANY SHIPMENT WITH ANY OTHER SHIPMENT OF RADIOACTIVE OR SPECIAL NUCLEAR MATERIAL. THIS CERTIFICATION WILL INCLUDE HANDLING PROCEDURES AT TRANSSHIP POINTS.

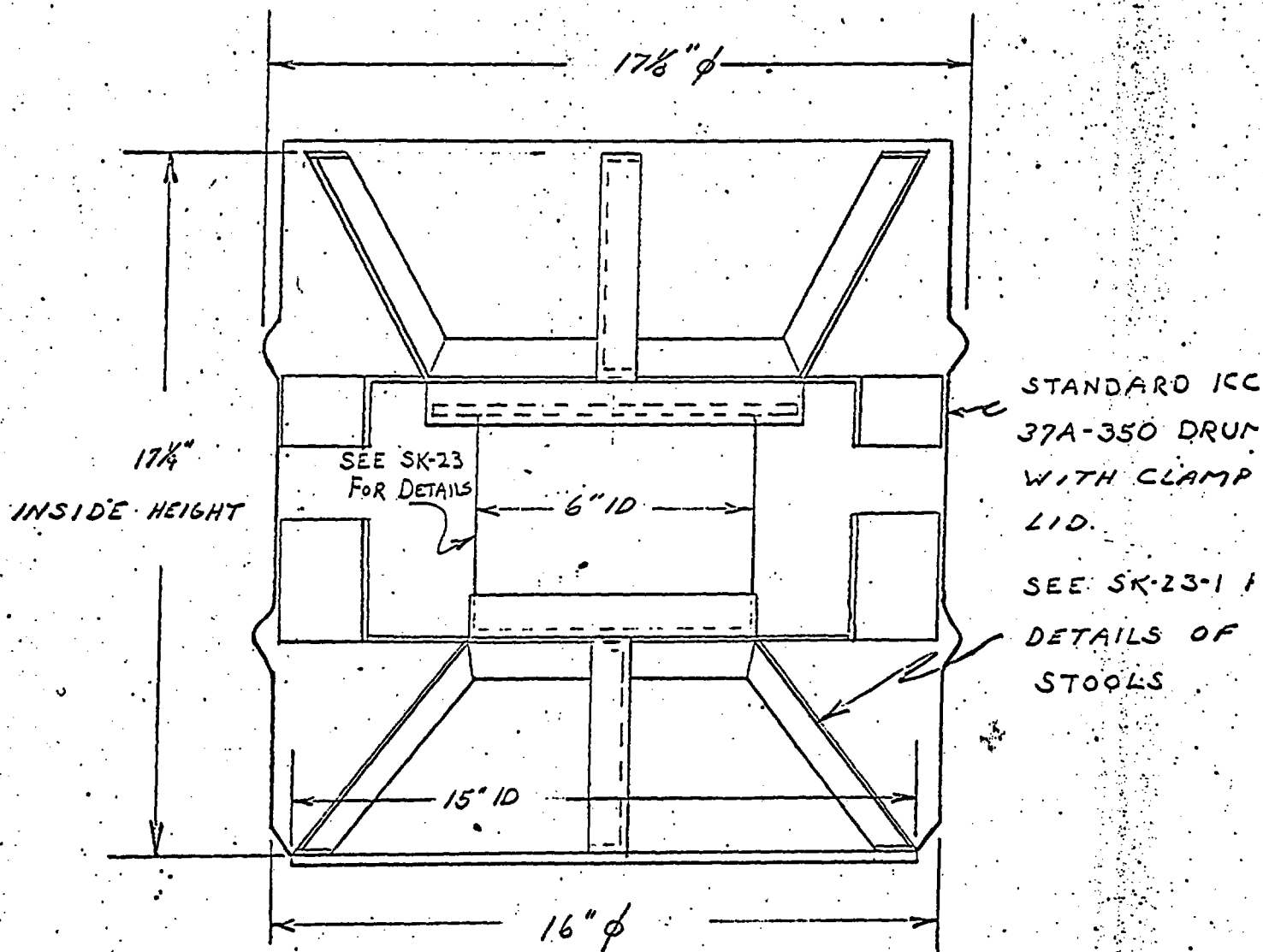
YOUR PROMPT ATTENTION TO THIS REQUEST IS RESPECTFULLY REQUESTED. AS WAS DISCUSSED, WE HAVE SCHEDULED THE SHIPMENT OF 20% ENRICHED METAL DURING THE WEEK OF FEBRUARY 24th. PLEASE DO NOT HESITATE TO CALL COLLECT IF THERE ARE ANY UNANSWERED QUESTIONS.

RESPECTFULLY YOURS,



L. J. SWALLOW

LJS:JB
AEC: 6



SK-5 REVISED 2/24/64

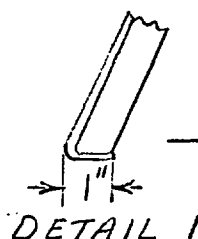
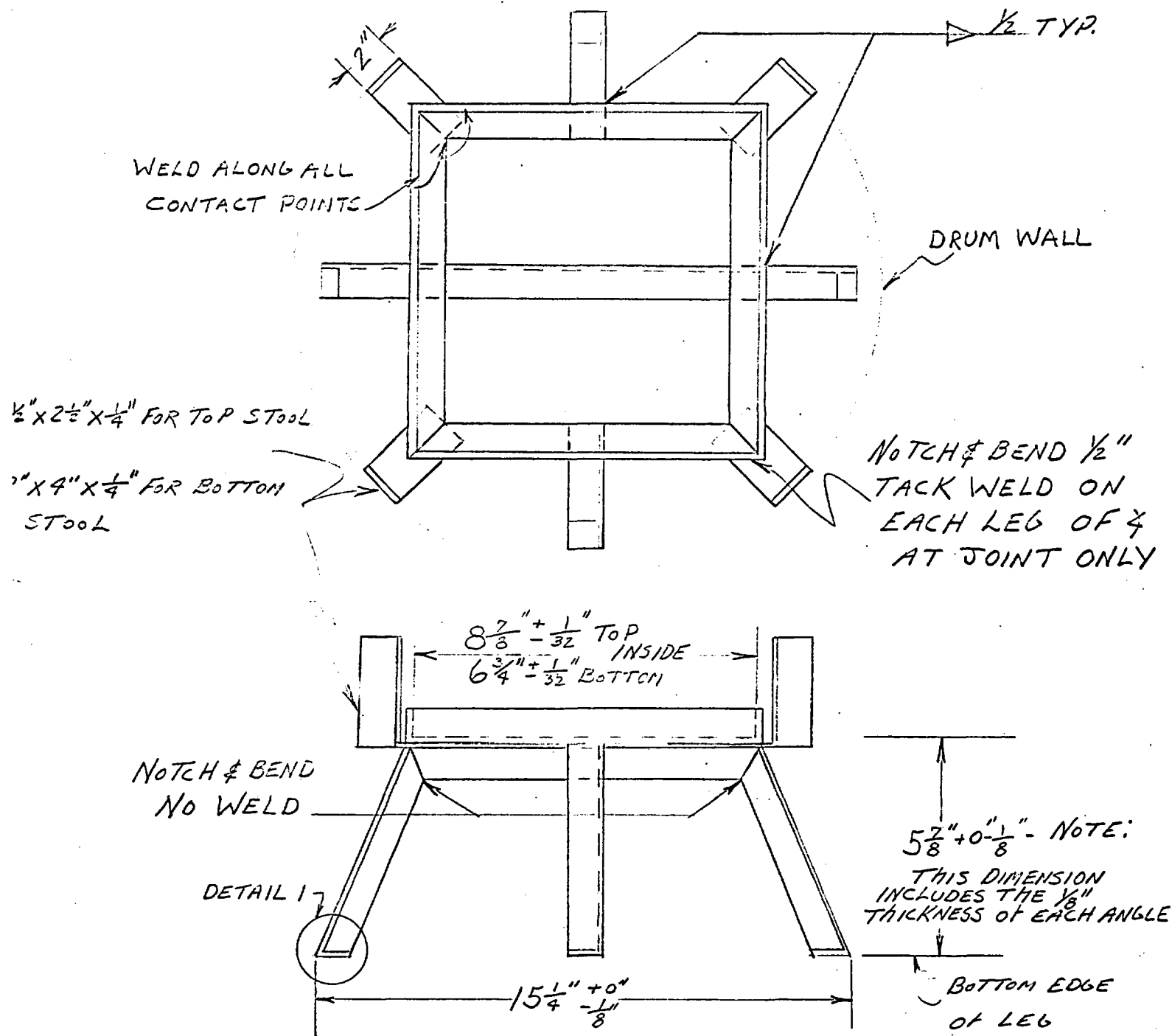
SHIPPING CONTAINER FOR DRY
COMPOUNDS & METALS

BE PERMIT 1351

BY _____ DATE _____
CHKD. BY _____ DATE _____

SUBJECT DRUM CONSTRUCTION METAL
SLIDING DOOR WITH
STOOL DETAILS

SHEET NO. _____ OF _____
JOB NO. SK-23-1 REVISED
2/24/69



TRIM 1 LEG & BEND
2ND OF $\frac{1}{4}"$ AS SHOWN
NO WELD

ALL MATERIAL: $1" \times 1" \times \frac{1}{8}"$ &
NO PAINTING