Attachment Two

SAFETY ANALYSIS REPORT

For

MODEL CNS 1-13C TYPE B SHIPPING PACKAGING

REVISION 2

JULY 1999

Submitted by:

Chem-Nuclear Systems, LLC
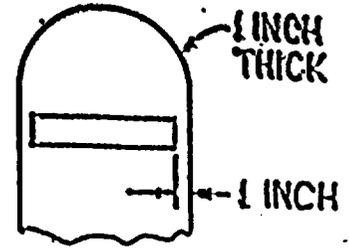140 Stoneridge Dr.
Columbia, S.C. 29210

2.5.1 Lifting Devices (continued)

d. Tension in Lug

$$\sigma_t = \frac{P}{A} \qquad \sigma_t = \frac{(38,925)lbs.}{(2) \times (1)in. \times (1)in.} = 19,460 \text{ psi}$$

$$\text{Safety Factor} = \frac{\sigma_y}{\sigma_t} = \frac{(30,000)psi}{(19,460)psi} = 1.54$$
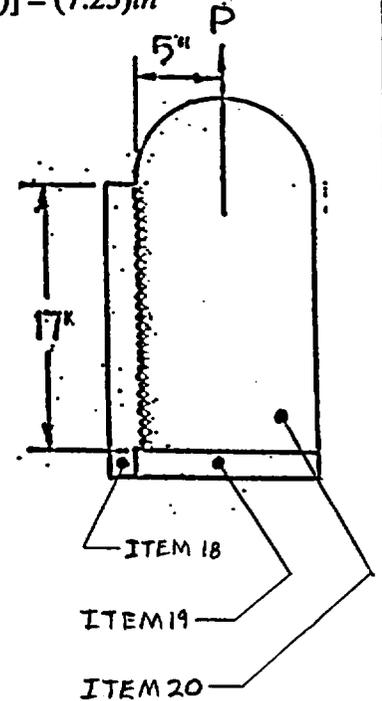
e. Vertical Welding on Lug

Assuming 3/8 in. fillet welds on each side, except 1/8 in. weld for 2 1/8 in. length in area of each bolt hole. Also, this analysis neglects the bottom plate.

$$A_w = [(2) \times (12)in. \times (3/8)in. \times (.707)] + [(2) \times (5)in. \times (1/8)in. \times (.707)] = (7.25)in^2$$

(i) Shear Stress (σ_s)

$$\sigma_s = \frac{P}{A_w} \qquad \sigma_s = \frac{(38,925)lbs.}{(7.25)in^2} = (5,369)psi$$

$$\text{Safety Factor} = \frac{\sigma_{ys}}{\sigma_s} = \frac{(17,320)psi}{(5,371)psi} = 3.22$$

2.5.1 Lifting Devices (continued)

f. Bending Stress (σ_b) $\qquad \sigma_b = \frac{M \times c}{I} \qquad M = P \times L$

$$I = 2[\frac{b \times h^3}{12}] \quad \text{(Two sides)}$$

Locating the Neutral Axis $\quad N.A. = \frac{\sum AY}{\sum A}$

Throat of 3/8" weld = 3/8" X .707 = .265 in.
Throat of 1/8" weld = 1/8" X .707 = .0884 in.

$$N.A. = \frac{.265 \times [(4.1875 \times 2.09) + (1.375 \times 7) + (7.1875 \times 13.40)] + .088[(2.125 \times 5.25) + (2.125 \times 8.75)]}{2(.0884 \times 2.125) + (.265 \times 4.1875) + (.265 \times 1.375) + (.265 \times 7.1875)}$$

$$N.A. = 8.8$$

ITEM 18
ITEM 19
ITEM 20

Calculations for the five weld segments follow:

$$I_{x-x} = 2 \times [\frac{1}{12} \times .265 \times (4.1875)^3 + .265 \times 4.1875 \times (6.706)^2] = (103.05)in.^4$$

$$I_{x-x} = 2 \times [\frac{1}{12} \times .088 \times (2.125)^3 + .088 \times 2.125 \times (3.55)^2] = (4.854)in.^4$$

$$I_{x-x} = 2 \times [\frac{1}{12} \times .265 \times (1.375)^3 + .265 \times 1.375 \times (1.8)^2] = (2.476)in.^4$$

$$I_{x-x} = 2 \times [\frac{1}{12} \times .088 \times (2.125)^3 + .088 \times 2.125 \times (.05)^2] = (.14)in.^4$$
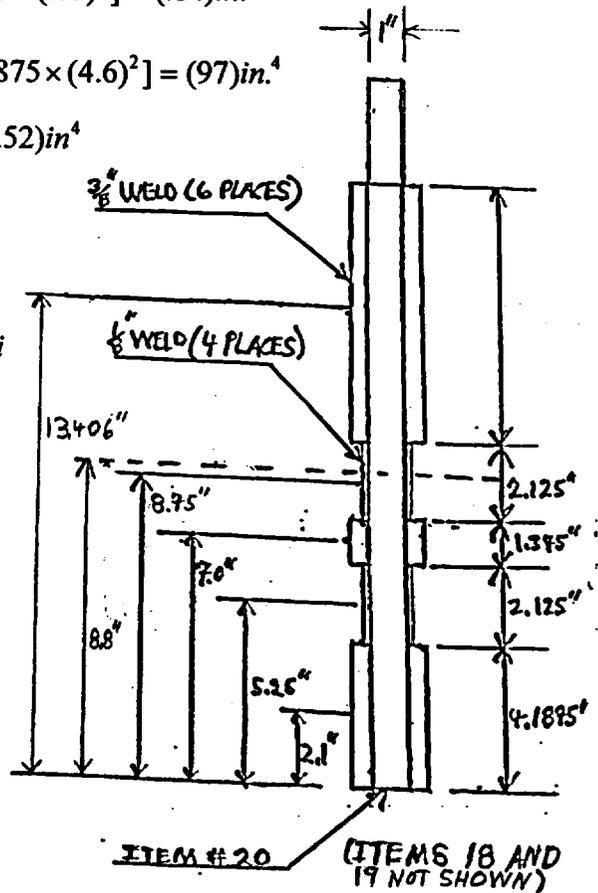
$$I_{x-x} = 2 \times [\frac{1}{12} \times .265 \times (7.1875)^3 + .265 \times 7.1875 \times (4.6)^2] = (97)in.^4$$

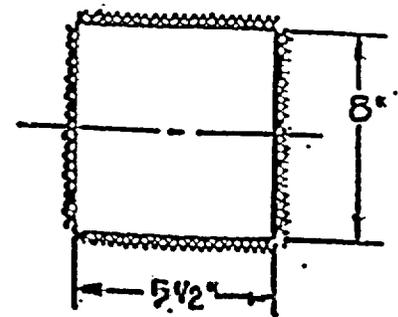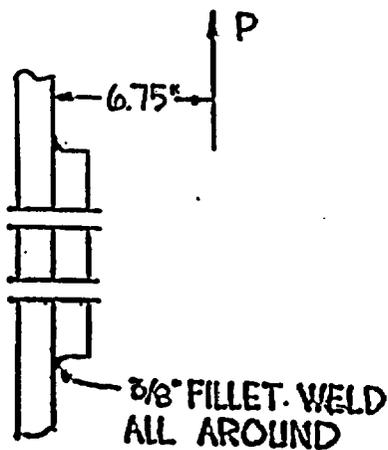$$I = 103.05 + 4.854 + 2.476 + .14 + 97 = (207.52)in^4$$

L = 5 in.
c = 8.8 in.

$$\sigma_b = \frac{(38,925)lbs. \times (5)in. \times (8.8)in.}{(207.52)in.^4} = 8,253 psi$$

$$\text{Safety Factor} = \frac{(30,000)psi}{(8,253)psi} = 3.64$$

(2)   Welding on Cask Reinforcing Plate.

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED:

DWG. NO. C-110-E-0005, REV. 6 "CNS 1-13C SHIPPING CASK" SHEET 1 OF 3

WITHIN THIS PACKAGE...OR, BY SEARCHING USING THE DRAWING NUMBER: C-110-E-0005, REV. 6

NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

D-1

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SHEET 2 OF 3
"CNS 1-13C SHIPPING CASK"

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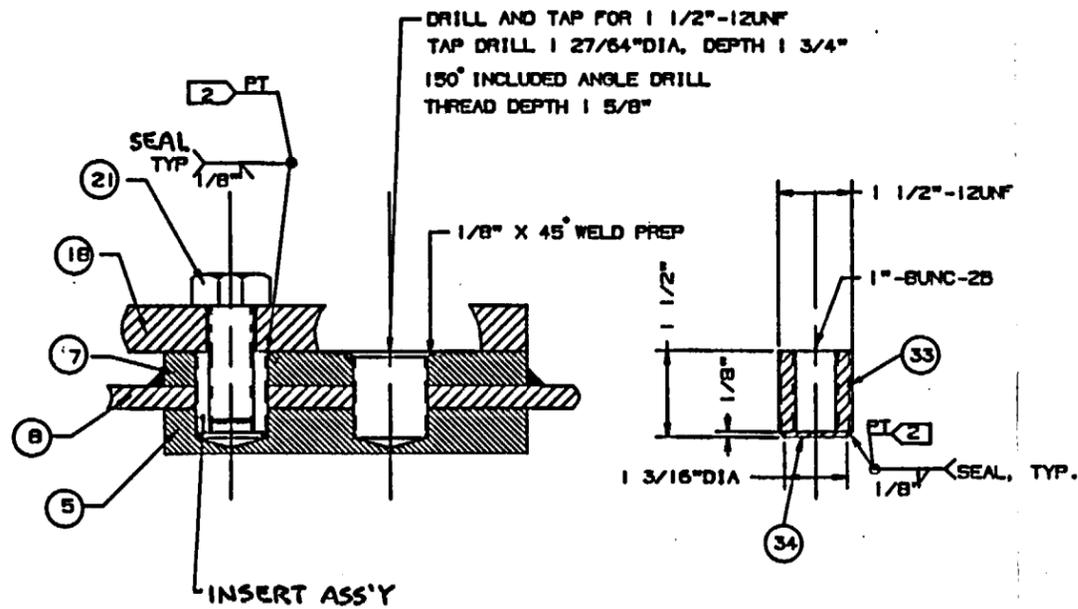
D-2

DRILL AND TAP FOR I 1/2"-12UNF
TAP DRILL I 27/64"DIA, DEPTH I 3/4"
150° INCLUDED ANGLE DRILL
THREAD DEPTH I 5/8"

PT 2

SEAL
TYP 1/8"

21

18

1/8" X 45° WELD PREP

I 1/2"-12UNF

I"-8UNC-2B

17

1 1/2"

33

8

1/8"

PT 2

5

1 3/16"DIA

1/8"

SEAL, TYP.

34

INSERT ASS'Y

INSERT ASS'Y
CONSISTS OF ITEMS
33 34

NOTES:
1) FOR GENERAL NOTES AND BILL OF MATERIALS SEE SHEET I OF 3
2) WELDS SHALL BE LIQUID PENETRANT (PT) INSPECTED IN ACCORDANCE WITH ASME
CODE SECTION III, DIV I, SUBSECTION NB, ARTICLE NB-5000 AND SECTION V, ARTICLE 6

99082402630I

DIMENSIONS ARE IN INCHES UNLESS NOTED	PROJECT No. 25889	FSCM NUMBER	CHEM-NUCLEAR SYSTEMS, INC.		
DO NOT SCALE PRINT	FILE I.D. 0014030	54643			
TOLERANCES (UNLESS NOTED)	DRAWN BY KIRREHEN 11/24/92		CNSI 1-13C		
HOLE DIA & LOC. ± 1/32 DEC. .X ± .1			SHIPPING CASK		
DEC. .XX ± .01 DEC. .XXX ± .005	CHECKED BY 11/24/92				
ANGLES ± 1° FRACTIONS ± 1/8					
DOES NOT APPLY TO REFERENCE DIMENSIONS	ENGINEER 11/24/92				
	QUALITY ASSURANCE 11/24/91		SIZE	DRAWING NUMBER	REV.
	APPROVAL 11/24/92		E	C-110-E-0005	6
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