



CHEM-NUCLEAR SYSTEMS INC.

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PDR

71-6244

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U.S. NUCLEAR REG.
COMMISSION
MAIL SECTION

June 5, 1979

Mr. Charles E. MacDonald
Transportation Branch
Division of Fuel Cycle and
Material Safety
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. MacDonald:

We respectfully request that Certificate of Compliance No. USA/6244/B be amended to reflect the following changes. This request supercedes CNSI requests dated February 21, 1979 and March 23, 1979. ✓

- (1) Revise Drawing No. 6930-1, Rev. D to Rev. E, sheet 1 of 2, which specifies the following:
 - (a) Revise specification 1.4 to require a torque value of 180 foot pounds for cask lid bolts. Attachment 1 to this application is our safety analysis of the revised torque value.
 - (b) Removal of demineralizer and related components from drawing.
- (2) Revise Drawing No. and Sheet from N-69-12-438 sheet 4 of 4 to 6930-1, Rev D Sheet 2 of 2. This drawing specifies the following:
 - (a) Revised grade callout of 3/4" lid bolts from 5 to 8.
 - (b) Revised length of 5/8" overpack bolts from 1 1/4" to 2".
 - (c) Added size and material of cask lid gasket.
 - (d) Same as 1-b.
- (3) Change C of C condition 5 (b) contents to read:
 - (1) Type and form of material
 - (i) Greater than Type A quantities of byproduct material as process solids, either dewatered, solid, or solidified, in secondary containers, or

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(ii) Greater than Type A quantities of byproduct material as solid metal components in secondary containers, as required.

(2) Maximum quantity of material per package -

Not to exceed 10 thermal watts of byproduct material

(4) Revise C of C condition No. 8 to read:

8. The polyurethane lid gasket shall be inspected after each shipment and shall be replaced when any significant seating surface damage is observed.

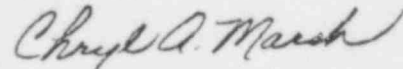
(5) In Condition (a) Packaging (2) Description delete the sentence which reads, "The space between the secondary container and the lead is filled with an aluminum honeycomb material for the Type B packaging".

On March 1, 1979, you advised us that our requests had been classified as a minor amendment and a fee of \$690 was paid.

We trust that the information submitted with this request will permit you to make an early determination of our application. Please contact our office if you have any questions.

Sincerely,

CHEM-NUCLEAR SYSTEMS, INC.



for Louis E. Reynolds
Director
Regulatory Affairs

LER/cm

Enclosures

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SAFETY ANALYSIS FOR CASK LID

BOLTS TORQUED TO 180 FT. POUNDS

From page G-20 of the Engineering Evaluation dated March 16, 1970 the maximum moment is 9.9×10^6 in. lbs.

$$L_L = \text{Maximum load on lid} = \frac{9.9 \times 10^6 \text{ in. lbs.}}{29 \text{ in. moment arm}}$$

$$= 341,379 \text{ lbs.}$$

Total load each bolt must withstand = F_i

$$L_L = (B_n)(F_i) \text{ where } B_n = \text{number of bolts}$$

$$341,379 = (24)(F_i)$$

$$F_i = 14,224 \text{ lbs.}$$

Torque to insure that preload $\geq F_i$

$$T = 0.20 F_i d$$

where F_i = preload

d = bolt diameter

0.20 = coefficient of friction

$$T = (0.20)(14,224)(0.75)$$

$$= 2133 \text{ in lbs} = 178 \text{ ft. lbs.}$$

Use 180 ft. lbs.

Safety factor calculations:

Safety factor for thread shear = $S.F._s$

$$A_s = \pi d l$$

where A_s = area in shear

d = bolt diameter

l = length of thread

$$A_s = (3.14)(0.75)(1.5)$$

$$= 3.53 \text{ in}^2$$

$$S_s = \frac{F_i}{A_s}$$

where F_i = preload

S_s = bolt threads in shear

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$$S_s = \frac{14,224 \text{ lbs}}{3.53 \text{ in.}^2}$$

$$= 4029 \text{ psi}$$

Maximum allowable shear for A-516 material is 17,500 psi = S_m

$$\text{S.F.}_s = \frac{S_m}{S_s} = \frac{17,500}{4029} = 4.34$$

Safety factor for bolt tensile failure = S.F._T

$$S_T = \frac{F_i}{A_B}$$

where S_T = Stress in tensile
 A_B = Area of bolt
 d = Diameter of bolt

$$S_T = \frac{14,224}{0.4416} = 32,210 \text{ psi}$$

Y_B = Yield strength for Grade 8 bolts = 130,000 psi

$$\text{S.F.}_T = \frac{Y_B}{S_T} = \frac{130,000}{32,210} = 4.03$$

The above calculations demonstrate that bolts are safe in shear and tensile.

Reference: Shigley, "Mechanical Engineering Design, 1977 Edition