THE HARRISON STEEL CASTINGS CO.

POST OFFICE BOX 60 PHONE 317-762-2481

ATTICA, INDIANA 47918

September 20, 1989

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Log Oct 15
Remitter
Check No. 10582
Amount $230
Fee Category 3 O
Type of Fee AmD
Date Check Rec'd.
Date Completed 10/27/89
By:

U.S. Nuclear Regulatory Commission
Region III
Material Licensing Section
799 Roosevelt Road
Glen Ellyn, IL 60137

Reference: License No. 13-02141-01
Subject: Request for Amendment

Harrison Steel Castings Co. requests that its license be amended as detailed below.

1. A new permanent radiographic facility be added. Enclosed are drawings of the proposed facility which show all details of the shielding, the points of access, the adjacent areas, the visible-audible alarm system, the radiation level calculations and the extreme source exposure positions.

   It may be noted that the proposed facility would be isolated from the rest of the plant, thus, ensuring an inherently lower possibility of exposure to unmonitored individuals.

   The current facility would remain in use until completion and final approval of the new facility including actual radiation level measurements, and then be phased out.

   Through it is anticipated that transportation of the exposure devices from one exposure vault to the other will be infrequent, both vaults are designed to safely contain any of the sources. We ask that the amended license allow the use of any of the exposure devices in either exposure vault. A procedure to be followed when an exposure device is to be moved from one vault to the other is enclosed.

2. A 100-curie cobalt-60 source be added. The source would be the Amersham sealed source model A-424-14. The source would be used for industrial radiography in the Amersham Model 680 exposure device and in Amersham Model 770 or Model 771 source changers for storage and replacement. (These source changers were added to our license October 31, 1986.)

* The 100-curie source would be used only in the new gamma ray facility. Documents currently on file with the NRC adequately cover operating and emergency procedures for the proposed new equipment. The mode[illegible]

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source has been approved under IAEA Certificate No. USA/0165/S, Revision 2. The Model 680 exposure device has been approved under USNRC Certificate No. 9035, Revision 6.

A check in the amount of $ 230.00 in accordance with the fee schedule in 10 CFR Part 170 is included.

Please contact Dave Hollander at 317-762-2481 ext. 237 if there are any questions.

Sincerely yours,

W.D. Hollander

W.D. Hollander
Associate R.S.O.
Harrison Steel Castings Co.

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Procedure for Moving an Exposure Device from One Exposure Vault to the other Exposure Vault

A. Technical Operation Model 491 Cobalt-60 Projector

1. Maintain surveillance with a survey meter during all disassembly and assembly operations.
2. Retract the source into the safe-storage position.
3. Survey the source tube and front of the projector to verify the source is safely stored.
4. Disconnect the source tube from the source tube connector.
5. Replace the shipping plug.
6. Carefully coil the control cable around the control unit and return it to the compartment in the projector.
7. Move the projector, source tube and tripod stand to the other exposure vault.
8. Remove the control unit from the projector and carefully uncoil the control cable. Place the control unit in the shielded area outside the exposure vault.
9. Remove the shipping plug.
10. Reconnect the source tube to the source tube connector.
11. Verify that the control unit and warning systems are properly working.
12. Survey the area to verify that the souce has returned to the safe-storage position.
13. Make entries in the daily equipment inspection sheet detailing the relocation of the projector, the equipment checks and surveys made, and the results of these checks and surveys.

B. Amersham Model 660 Iridium-192 and Model 680 Cobalt-60 Projectors

- should not be moved from new facilities

1. Maintain surveillance with a survey meter during all disassembly and assembly operations.
2. Retract the source into the safe-storage position.
3. Survey the source tube and front of the projector to verify the source is safely stored.
4. Rotate the selector ring to the LOCK position. If it will not rotate to the LOCK position, the source isn't fully retracted.

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5. Disconnect the source tube from the source tube connector and install the storage plug.

6. Unlock the projector and rotate the selector ring to the CONNECT position. When the selector ring reaches the CONNECT position, the control cable connector will partially disengage from the projector.

7. Slide the control cable connector collar over the jaws away from the projector.

8. Open the connector jaws and disconnect the swivel-type connector by depressing the spring-laded locking pin towards the projector with the thumb nail and separating the male and female connections.

9. Replace the storage cover on the projector connector and rotate the selector ring to the LOCK position. Remove the key and engage the lock to secure the projector.

10. Remove the contol cables through the wall access tube in the first vault and run them through the wall access tube in the second vault.

11. Move the projector and source tube to the second vault.

12. Unlock the projector with the key and turn the selector ring from the LOCK position to the CONNECT position. When the ring is in the CONNECT position, the storage cover will disengage from the projector.

13. Slide the control cable collar back and open the jaws of the control cable connector. This exposes the male position of the swivel connector.

14. Engage the male and female positions of the swivel connector by depressing the spring-loaded locking pin toward the projector with the thumbnail. Release the locking pin and test that the connection has been properly made.

15. Close the jaws of the control cable connector over the swivel-type connector.

16. Rotate the selector ring to the LOCK position.

17. Remove the storage plug and reconnect the source tube.

18. Unlock the projector and rotate the selector ring to the OPERATE position.

19. Verify the proper operation of the controls and alarm system.

20. Survey the area to verify the source has returned to the safe-storage position.

21. Make entries on the daily equipment inspection sheet detailing the relocation of the projector, the equipment checks and surveys made, and the results of these checks and surveys.

1) Data Used

a) Specific Gamma Ray Constant (R/hr per Curie) at 1 foot for Cobalt 60; 14.0

b) Half-value layer for Cobalt 60 source and construction grade concrete (4000 psi, non-airentrained, 5-5 1/2" slump, density of 145 #'s per cubic foot); 2.4"

c) Estimated half-value layer for Cobalt 60 source and packed heap moulding sand (density of 120 #'s per cubic foot less than 4% water); 9"

d) Tables used

i) Transmission of Gamma Rays from Ir^{92}, Cs^{137}, and Co^{60} in concrete

e) Maximum permissable exposure level; 2.0 mR/hr

2) Equations used

a) $\frac{I_0}{I_s} = \frac{d_s^2}{d_0^2}$

b) $I_s = I_0 t$

c) $\frac{I_0}{2^X} = I_s$

Where I_0 = intensity at initial position

I_s = intensity at reference distance s

d_0 = distance from source at initial postion (normally 1 foot)

d_s = distance from source

t = transmission factor from table

X = # of half-value layers

3) Calculations of exposure levels

** NOTES i) The estimated half-value layer for sand is based on our experience using sand as a shielding media. A complete exposure survey will be conducted after construction and additional shielding added if neccesary.

ii) Refer to attached drawing for locations for which calculations were made.

iii) I_0 at 1 foot for 110 curie source = 1540 R/hr

A) I_s at 4' from source

i) $\frac{1540 \text{ R/hr/ft}}{(4')^2} = 96.25 \text{ R/hr}$; eqn. 2a

ii) $\frac{47"}{2.4"} = 19.25$ HVL's ;

iii) $\frac{96.25 \text{ R/hr}}{2^{19.58}} = .12 \text{ mR/hr}$; eqn. 2c

B) I_s at 4' from source

i) 96.25 R/hr ; see A)i)

ii) $\frac{16"(2)}{2.4"} + \frac{52'(12")}{9"} = 82.67$ HVL's

iii) $\frac{96.25 \text{ R/hr}}{2^{82.67}} = 1.25 \text{ E-}20 \text{ mR/hr}$

C) I_s at 13.42' from source

i) $\frac{1540 \text{ R/hr/ft}}{(13.42')^2} = 8.55 \text{ R/hr}$

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ii) $\frac{16"}{2.4"} + \frac{28"(12")}{9"} = 44$ HVL's

iii) $\frac{8.55\ R/hr}{2^{44}} = 4.86\ E-10$ mR/hr

D) I_s at 7.42' from source

i) $\frac{1540\ R/hr/ft}{(7.42')^2} = 27.97\ R/hr$

ii) $\frac{45"}{2.4"} = 18.75$ HVL's

iii) $\frac{27.97\ R/hr}{2^{18.75}} = .06$ mR/hr

E) I_s at 10' from source

i) $\frac{1540\ R/hr/ft}{(10')^2} = 15.4\ R/hr$

ii) $\frac{16"}{2.4"} + \frac{60"}{9"} = 13.33$ HVL's

iii) $\frac{15.4\ R/hr}{2^{13.33}} = 1.53$ mR/hr

F) I_s at 4' from source

i) 96.25 R/hr

ii) $\frac{16"(2)}{2.4"} + \frac{7.75'(12")}{9"} = 23.67$ HVL's

iii) $\frac{96.25\ R/hr}{2^{23.67}} = 7.2\ E-3$ mR/hr

4) Specifications on sand fill

A) 92.5% silica sand (average grain size 212-297 micron), density = 100 to 130 lbs/ft^3

B) 6.5% Western (sodium) Bentonite

C) 1% other additives i.e. fly ash