APR 19 1985

Note to Jerry Everett, Region IV

FROM: Vandy L. Miller, MLB, FC, NMSS

SUBJECT: HALLIBURTON AMENDMENT REQUEST, 18455

We have reviewed your draft deficiency letter to Halliburton, which was sent to us on April 5, 1985. We recommend that the following requests be added to the letter:

1. An upper limit on the amount of iridium-192 to be injected; e.g. 10 millicuries. (If the injection exceeds the amount, then a specific license amendment would be required for any disposal by burial.)

2. Data to support their contentions th[illegible]idium will stick to the sand and not migrate.

3. A commi[illegible]o include in the report to NRC confirmation that the landowner and well operator have been notified and approved the burial.

4. Specify the minimum depth of the water table below a proposed burial site.

5. Specify the minimum distance to an occupied building; e.g., 200 yards.

In the event exact data is not received from the licensee, we have requested the Division of Waste Management do a "worst case" analysis for 10 millicuries of iridium-192. You may wish to delay sending the deficiency letter until we get the results.

for Vandy L. Miller

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 1000
ARLINGTON, TEXAS 76011

NMSS:CLC
Mail Control No. 030-05900

Halliburton Company
ATTN: Mr. Dan G. Kelly
1015 Bois D'Arc
Duncan, Oklahoma 73533

Gentlemen:

This refers to your application dated November 19, 1984, to amend your byproduct material license. We have completed review of your application and have the following comments and need for additional information:

1. In your letter you stated that all well locations are access controlled. In addition to access to the disposal site being restricted by the overlying earth, describe other controls that will be established to prevent access to the material and describe how these controls will be maintained for a period of 10 half-lives after each disposal.

2. Confirm that a written report will be sent to the NRC Region IV Office whenever licensed material is buried after a sand-out. The report should include the amount of sand and licensed material involved in the disposal, the well location and identification, the name of the well owner and drilling company, the results of a contamination survey performed after the disposal, and any other particulars involving the disposal of licensed material.

We shall continue review of your application upon receipt of the information and revisions requested above, in duplicate.

Sincerely,

C. L. Cain
Nuclear Materials Safety Section

Enclosures:
As stated

Frac Sand

$^{Ir\text{-}192}$

1 mCi / 4,000 lbs. of sand 4 lbs. sand / gallon

∴ 1 mCi / 1000 gallons (or 1 mCi/gallon)

$$\frac{1\ mCi}{1000\ gallons} \cdot \frac{1000\ mCi}{mCi} \cdot \frac{gallon}{3785.33\ ml} = 2.642\ E\text{-}4\ \frac{mCi}{ml}$$

$MPC_R = 1E\text{-}3\ mCi/ml$ $\frac{2.642\ E\text{-}4}{1E\text{-}3} = 0.264$ times MPC_R

$MPC_u = 4E\text{-}5\ mCi/ml$ $\frac{2.642\ E\text{-}4}{4E\text{-}5} = 6.6$ times MPC_u

$T_{1/2}$ $Ir\text{-}192 = 74.3$ d

$$A = A_0 \exp\left(\frac{-\ln 2}{T_{1/2}} t\right) \Longrightarrow t = \left(\frac{-T_{1/2}}{\ln 2}\right) \ln\left(\frac{A}{A_0}\right)$$

Decay time to reach MPC_u:

$$t = \frac{74.3}{-\ln 2} \cdot \ln\left(\frac{1}{6.6}\right) = 202 \text{ days} \quad (\sim 7 \text{ months})$$

(2.7 half-lives)

Note that burial of frac sand usually has the water removed; therefore, these estimates may be invalid.