

NMS 8

U.S. NUCLEAR REGULATORY COMMISSION
Region IV
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DIVISION OF NUCLEAR MATERIALS SAFETY

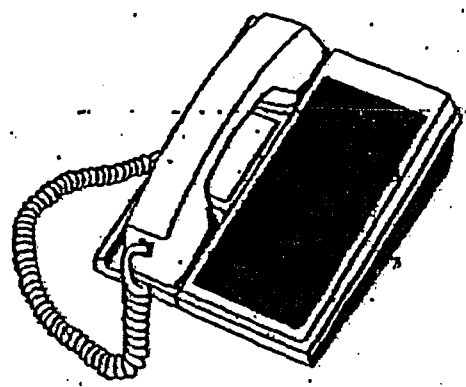
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MESSAGE FROM: LOUIS CARSON - DMS - RIV

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UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 WASHINGTON, D.C. 20555-0001

December 18, 1995

MEMORANDUM TO: Ross Scarano, Director
 Division of Radiation Safety
 and Safeguards, RIV

FROM: Margaret V. Federline, Acting Director *M.V. Federline*
 Division of Waste Management, NMSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST - PROTECHNICS INTERNATIONAL'S
 GENERIC 20.2002 REQUEST

As requested in your memorandum dated August 17, 1995, the Low-Level Waste and Decommissioning Projects Branch staff has completed review of Protechnics International's request for a generic authorization to bury radioactive materials pursuant to 10 CFR 20.2002. ~~The review has determined that the generic request for on-site burial of flowback sand can be approved with certain restrictions.~~

In their request, Protechnics committed to keeping the total concentration of radioactivity in the flowback sand below 0.001 $\mu\text{Ci/g}$ (or 1000 pCi/g). However, there was no information concerning the number of isotopes to be used for each well injection. ~~It was assumed that for each injection, only a single isotope was used, thereby its concentration in the flowback sand would be equal to 1000 pCi/g. This is the maximum possible concentration for each isotope. If more than one isotope was injected into a well, the concentration of each isotope in the flowback sand would be less than 1000 pCi/g. The 1000 pCi/g concentration was then compared to the concentration of each isotope necessary to produce a dose of 15 mrem/yr to a resident farmer.~~

~~The attached table lists the isotopes and maximum activities which Protechnics is authorized to inject into a well. The table also lists the soil concentration of each isotope that would result in a 15 mrem/yr dose to a resident farmer assuming one meter to the groundwater, as listed in NUREG-1500 Working Draft Regulatory Guide on Release Criteria for Decommissioning: NRC Staff's Draft for Comment. As shown on the chart, the only isotopes which will produce a dose of less than 15 mrem/yr with a concentration 1000 pCi/g are Au-198 and Cr-51. However, the concentration of Rb-86 is very close to its concentration limit and would increase the dose only slightly. I-131 and Xe-133 have very short half-lives and would decay to unrestricted release limits in 8 days and thereby would have little impact on a resident farmer. Based on the above information, when the flowback sand contains any or all of these isotopes (Au-198, Cr-51, Rb-86, I-131, and Xe-133), the sand can be buried on-site in burial pits with no restrictions except to have a total concentration of 1000 pCi/g or less.~~

Contact: Heather Astwood, DWM
 415-5819

-2-

The remaining isotopes, Ir-192, Sc-46, Zr-95, and Sb-124 exceed the concentration which would result in a dose of 15 mrem/yr to a member of the public and therefore, these isotopes will require restrictions when buried on-site.

For the restricted isotopes, there are two potential scenarios in which a member of the public could receive a dose greater than 15 mrem/yr. The first is if a member of the public dug into the burial. To prevent this from occurring, Protechnics should be required to maintain control over the burial until the activity has decayed to releasable levels. Of the isotopes requiring restrictions, the one with the longest half-life and lowest allowable soil concentration is Sc-46. Its half-life is 83 days and acceptable soil concentration is 10.8 pCi/g. If the initial concentration of Sc-46 in the sand is 1000 pCi/g it would take approximately 1.6 years for the isotope to decay to unrestricted release limits. Therefore, Protechnics should be required to maintain control of the site for 1.6 years. Control could be defined as a fence around the burial site, which limits access and a sign posting no trespassing.

The second potential pathway is to a member of the public via the groundwater. As seen on the chart, the concentration of the sand being buried is a fraction of the activity being injected into the well, therefore there is little potential for the burial to significantly increase the impact on the aquifer being tested by the injections. However, the burial could affect other groundwater aquifers in the area. Any aquifer which is located below the burial site but above the zone where the isotopes are being injected has the potential to be contaminated. The information Protechnics submitted indicated that a majority of the contamination in the flowback sand is located on man-made beads (Zero-Wash) which retain the radioactive material and prevent it from leaching into the groundwater. If this is the case, there will be little impact on groundwater below the burial. However, Protechnics should be required to demonstrate that the radioactive material will remain on the beads and not migrate out of the burial pit. If this cannot be proven, Protechnics should demonstrate that the contamination will not flow off-site or to a residential well before it decays to acceptable levels. In other words, the contamination should not reach the nearest down-gradient site boundary or residential well in less than 1.6 years. The calculations Protechnics performs to determine that contamination does not migrate or will not reach a residential well should be maintained with the disposal records for each burial, and all records should be made available for NRC inspection.

The application package received from Protechnics contained little information concerning the environment surrounding a typical well site. Therefore, several important assumptions were made concerning the environment in which the burials will take place (i.e., one meter to the groundwater, remote area away from residential wells, high sorption capability of Zero-Wash beads). If these assumptions are incorrect, or do not pertain to all areas where burials are going to occur, the burials should not be permitted without sufficient additional information justifying the suitability of the burials. It is Protechnics' responsibility to ensure that the burials are performed in accordance with the directions above.

We have reviewed this proposed action as if it were a request for on-site burial, at multiple locations, in accordance with 10 CFR 20.2002. These actions would comply with the regulations for on-site burials in 10 CFR 20.2002 which requires the dose to the public to be less than the public dose limit. ~~Protechnics would be required to maintain records of the burials in accordance with record keeping requirements in 10 CFR 20.2108(a).~~ The regulations also state that the doses should be as low as reasonably achievable (ALARA). The information which Protechnics submitted stated that this type of burial would reduce the exposure to the worker by not requiring the workers to clean-up, containerize, and handle the radioactive materials.

We will be interested in your experience implementing this action at the Protechnics sites. After sufficient experience is gained, please share this experience with us so we can consider the need to develop a Policy and Guidance Directive on disposal of flowback sands in accordance with 20.2002.

If you have any questions, please contact Heather Astwood of my staff on (301) 415-5819.

Attachment: As stated

Docket No. 30-30429
License No. 42-26928-02

Isotope	Half-life	Maximum activity (pCi) per well	Sand Conc. (pCi/g) if total conc is 0.001 μ Ci/g	Soil conc (pCi/g) in NUREG-1500 for 15 mrem/yr
I-131	8 d	2E+11	1000	543
Ir-192	73 d	2.5E+12	1000	30.4
Sc-46	83 d	1.5E+12	1000	10.8
Au-198	2.6 d	3E+12	1000	1540
Zr-95	64 d	2.5+11	1000	18.6
Xe-133	5.2 d	3E+11	1000	--
Cr-51	27.7 d	7.5E+11	1000	1980
Sb-124	60 d	1E+12	1000	15.8
Rb-86	18.6 d	1.5E+12	1000	879

Table 1. Possible isotopes to be injected into a well and the NUREG 1500 soil concentration which will produce approximately 15 mrem/yr.

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Docket No. 30-30429 01
License No. 42-26928-02

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

DEC 01 1993

MEMORANDUM FOR: *JH* John E. Glenn, Chief
Medical, Academic and Commercial
Use Safety Branch
Division of Industrial and
Nuclear Safety, NMSS

FROM: John H. Austin, Chief
Decommissioning and Regulatory
Issues Branch
Division of Low-Level Waste Management
and Decommissioning, NMSS

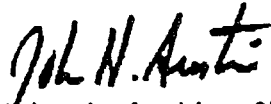
SUBJECT: TECHNICAL ASSISTANCE REQUEST FROM PROTECHNICS INTERNATIONAL,
INC., FOR GENERIC AUTHORIZATION TO BURY RADIOACTIVE FRAC
SANDS PURSUANT TO 10 CFR PART 20.2002

This is in response to your memorandum dated Oct. 26, 1993, concerning a request from Protechnics International, Inc. for generic authorization to bury frac sands that are contaminated with radioactive material at temporary job sites.

As your memorandum stated, NRC has approved the burial of frac sands on a case-by-case basis, but is continuing to consider the approval of generic burials. In a response to your office dated May 6, 1991, staff indicated that NUREG/CR-5512 should be finalized and published before a decision concerning generic burials could be completed.

At this time, NUREG/CR-5512 has not been completed in a satisfactory manner and thus, can not be used to support a generic authorization. However, the Enhanced Participatory Rulemaking (EPR) process is currently being used by the Commission to develop residual radioactive contamination criteria. Although the EPR is not specifically intended for this type of application, the results of the rulemaking, scheduled to be finalized by May of 1995, could be extended to cover these cases.

Therefore, the staff believes that decisions concerning generic approval should be postponed until after the EPR process has been completed. Until that time site specific requests will continue to be considered on a case-by-case basis.



John H. Austin, Chief
Decommissioning and Regulatory
Issues Branch
Division of Low-Level Waste Management
and Decommissioning, NMSS