

**KERR-McGEE NUCLEAR CORPORATION**

KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73125

August 15, 1980

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. William Nixon
Uranium Fuel Licensing Branch
U. S. Nuclear Regulatory Commission
Washington, D. C. 20553

Dear Mr. Nixon:

On April 15, 1980, we submitted results of the 1979 program for controlled use of treated raffinate produced at the Sequoyah facility as fertilizer. This report confirmed that forage produced on raffinate treated pasture is equivalent in nutritive value to forage produced with commercial nitrogen fertilizer and contains no deleterious by-products.

The 1979 cattle test program further demonstrated that no hazard would exist to animals using the forage or humans consuming the animals.

We now request that License SUB-1010 be amended to permit controlled release of hay grown on land fertilized with treated raffinate in accordance with the procedure described in the attached document. The proposed amendment provides for continued quality evaluation of hay produced on treated raffinate pastures and includes a system for selecting an appropriate forage disposal alternative.

Very truly yours,

A handwritten signature in black ink, appearing to read 'W. J. Shelley'.

W. J. Shelley, Director
Regulation and Control

WJS/hmw

Attachment

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JUSTIFICATION FOR AMENDMENT TO SOURCE MATERIAL LICENSE SUB-1010
(DOCKET 40-8027) TO PERMIT RELEASE OF HAY GROWN ON LAND
FERTILIZED WITH TREATED RAFFINATE

INTRODUCTION

The use of treated raffinate as a nitrogenous fertilizer by Kerr-McGee Nuclear Corporation at its Sequoyah Facility has been extensively studied and reported to USNRC. (1-9)

Testing of land application of treated raffinate began in 1973 and subsequent annual programs have demonstrated the utility and safety of: (1) the system used to treat the raffinate to remove radioactivity and (2) the use of the treated raffinate to fertilize land.

The compositional similarity between treated raffinate and commercial nitrogen fertilizers has also been reported.⁸ During 1977, a larger-scale land application program was undertaken by Kerr-McGee Nuclear to establish the impact of raffinate treatment to 160 acres of previously untreated pasture. The primary objectives of this program were to identify and establish:

- 1) Treated raffinate application rates.
- 2) Impact of treated raffinate on forage quality, the hydrologic environment, and soils.

- 3) Long-term management objectives for use of treated raffinate as fertilizer.

An extensive monitoring system was established for soil, soil-water, surface and ground water and vegetation on the 160-acre test area prior to initial 1977 treated raffinate applications. Following application rates of from 1000 to 1500 lbs. N/acre in 1977, the monitoring program indicated $\text{NO}_3\text{-N}$ levels had increased in the hydrologic system during spring 1978.⁶ To mitigate this condition, nitrogen fertilizer management practices were adopted for the 160-acre test area during the 1978 growing season. These practices focused on balancing plant uptake rates, soil nitrogen capacities, proper timing of treated raffinate applications, and intensive plant and residue management. Success of these combined fertilizer management practices on treatment areas was reported in the 1979 Completion Report.⁷

Forage Removal System

A major component of this nitrogen fertilizer management program involves the alternating use of warm season (Bermudagrass) and cool season (Rye and Fescue) grass species to extend the period of actively growing forage on the treatment areas. This technique requires harvest of bermudagrass in the fall (September) and subsequently, overseeding the pasture with rye and fescue which permits uptake of additional available soil nitrogen from treatment areas.

The following spring (April-May), the mature fescue and rye stands are harvested prior to the active bermudagrass growing season (June-September). In this way, a continuous cropping system is maintained to maximize production of forage biomass and utilization of available soil nitrogen. Removal and establishment of acceptable provisions for disposal of this forage biomass is considered essential to eliminate nitrogen recycling on treatment areas.

As part of an amendment request submitted March 1978 for continued use of treated raffinate on the 160 acre area, Kerr-McGee Nuclear included evaluation of alternative forage removal methods available. These alternatives included: (1) close mowing and baling, (2) burning and (3) grazing. During the fall of 1979, approximately 32,000 bales of bermuda hay were removed by close mowing and baling and stockpiled on the treated raffinate areas. Kerr-McGee requested release of this hay in January 1980 and presented comparative analyses of hay grown on raffinate treated pasture and hay from a control pasture which was treated with (46-0-0) commercial nitrogen fertilizer (Urea).⁹ Results indicated that no appreciable differences existed between control hay and hay grown on the area treated with raffinate. Hay from both areas was suitable for supplement or as a sole source of cattle feed. Subsequently, with completion of the 1979 Cattle-Raffinate test program (April 1980), it has been demonstrated that raffinate treated forage represents a product which is suitable for cattle

grazing and utilization in the human food chain. However, the current license (SUB-1010 Amendment 11 issued June 17, 1980) states: "This license amendment does not authorize the disposal off-site of any materials grown on the areas fertilized with treated raffinate or the grazing of livestock on the fertilized areas".

The following proposal provides a method for evaluating the quality of the annual forage production from raffinate treatment areas and a system for selecting an appropriate forage disposal method.

Proposed Method for Forage Biomass Removal

By employing both cool and warm season grass species, the accumulation of forage biomass is a continuous process on the raffinate treatment areas. Since the quality of hay produced deteriorates over time due to decomposition and weathering, it must be utilized by grazing animals relatively soon after cutting to maintain quality. Under normal practice, this hay would be utilized the first winter following harvest.

Kerr-McGee Nuclear Corporation requests that the following system of forage removal and utilization be approved for raffinate treatment areas:

- 1) Chemical analyses of standing crop forage biomass will be conducted by collecting representative samplings of forage produced following

the last treated raffinate application to the crop during the growing season.

- 2) Chemical analyses will include those parameters (i.e., Ra-226, Th-230, U, P, K, Ca, Mg, Zn, Fe, Cu, B, Mo, Ni, Mn, Pb, Crude Protein, $\text{NO}_3\text{-N}$, and total digestible nutrients) necessary to establish the quality of the forage.
- 3) Qualified agronomist(s) will provide an evaluation as to interpretation of these chemical analyses and a statement that the forage product will or will not be deleterious to grazing animals.
- 4) Kerr-McGee Nuclear Corporation will dispose of accumulated forage biomass in a manner consistent with the evaluation and statement provided by the qualified agronomist(s) under item 3 above.

REFERENCE

1. Test Report Raffinate Treatment Process, February 20, 1974.
2. Test Report Raffinate Treatment Process, March 7, 1975.
3. Test Report on Metal Analysis, OSU, Dr. B. B. Tucker; Letter - September 27, 1976.
4. Test Report, March 19, 1976.
5. Raffinate Program, 1977 Completion Report dated April 17, 1978.
6. Raffinate Program, 1978 Completion Report dated March 2, 1979.
7. Raffinate Program, 1979 Completion Report dated April 15, 1980.
8. Supporting Data for Amendment to Source Material License SUB-1010 - August 13, 1975.
9. "A Comparison of the Raffinate and Ammonium Nitrate of Sources on Chemical Composition on Bermuda Grass Hay", Dr. B. B. Tucker, OSU, January 21, 1980.*

Note: *This report provided comparison of the raffinate and a commercial nitrogen--urea (46-0-0) on chemical composition of bermuda grass hay. The source of commercial N fertilizer on control pasture was not ammonium nitrate.