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DOCKET NO.: 40-8027, Amendment No. 13

APPLICANT: Kerr-McGee Nuclear Corporation

FACILITY: Sequoyah Uranium Hexafluoride Production Plant

SUBJECT: SAFETY EVALUATION REPORT - LICENSE AMENDMENT APPLICATION TO AUTHORIZE THE USE, ON A PERMANENT BASIS, OF TREATED SOLVENT EXTRACTION RAFFINATE AS A FERTILIZER MATERIAL ON KM OWNED LAND IN HASKELL COUNTY, OKLAHOMA

REVIEWER: W. A. Nixon

Background

Commencing in 1973 and repeated each year through April 1, 1979, USNRC has issued Amendments to license SUB-1070 to authorize a test program to investigate the effects of using treated raffinate as a fertilizer material under closely controlled conditions on Kerr-McGee (KM) owned land. On June 17, 1980 authorization was granted to use barium treated neutralized solvent extraction raffinate for fertilizer on a permanent basis on KM owned land adjacent to the Sequoyah UF₆ Production Plant.

The treated raffinate solution contains mainly ammonium nitrate and metal salts along with small quantities of uranium and its decay products. The concentration of the radionuclides in the solution are all at least one order of magnitude below the 10 CFR 20 allowable concentration for release to unrestricted areas. Descriptions and safety evaluations of the tests can be found in KM submittals and in Safety Evaluation Reports dated May 4, 1977, July 7, 1978, April 13, 1979 and June 17, 1980.

By letter dated April 13, 1981, KM requested authorization to use the treated raffinate as fertilizer on land owned by the company in Haskell County, Oklahoma. The land is the site of a KM owned underground coal mine (now shut down) about 20 miles south (45 miles by road) of the Sequoyah plant.

Discussion

1. Treated Raffinate

The concentration of the radionuclides in the treated raffinate are at least one order of magnitude below the allowable concentration for release to an unrestricted area; therefore, the probability of contaminating the site by

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the raffinate testing is unlikely and this has been demonstrated by results obtained during several years of testing. Reports submitted by KM have shown that there were no measurable increases of radionuclides (U, Th and Ra) in the samples of soil, vegetation and water taken from the testing area. Further, the environmental impacts resulting from the use of treated raffinate during the past few years are the same as those that would be expected from the use of commercially available ammonium nitrate fertilizer. Finally, in a 1979 test, no differences were detected between cattle grazed on pasture treated with commercial fertilizer and those grazed on pasture treated with ammonium nitrate contained in treated raffinate.

The concentrations of heavy metals in the treated raffinate vary because of variations in plant feed and variations in waste treatment operations. Concentrations of heavy metals will exceed drinking water standards and will, in some cases, exceed the recommended maximum concentrations of heavy metals in irrigation water. The quantities of heavy metals applied to the soil through use of treated raffinate as fertilizer would not, except possibly for molybdenum, exceed the quantities that would be applied through continuous use of irrigation water at the recommended limit of heavy metal content. Past analyses of vegetation grown using treated raffinate have shown that the heavy metal content of the vegetation was below the maximum tolerable dietary level for domestic animals established by the National Academy of Sciences. To help assure that use of raffinate as fertilizer at the Haskell County site does not result in excess accumulation of heavy metals in the soil or in vegetation, a condition has been added to require analysis of treated raffinate for a broad range of potentially significant elements and analysis of soil and vegetation for those heavy elements important in animal feeding.

2. The Site

The Haskell County site is located 20 miles south of the Sequoyah UF₆ plant. The land is relatively flat with elevations ranging from about 470 to 620 feet MSL. The Sans Bois and Mule Creeks flow through the area. There are no occupied houses on the site and the site is surrounded by low population density farm lands. At present the site is 63% woodlands, 31% open land, 2% improved pasture and 4% industrial (the coal mine facility). Portions of the site, mainly low areas which could be subject to flooding and land immediately bordering streams, will not be used for raffinate application. In addition, a condition has been added to preclude use of raffinate fertilizer within 100 feet of any occupied residence, business or school. The site was visited by W. A. Nixon in the spring of 1981. The Haskell County land appears suitable for use in the KM fertilizer program.

3. The Fertilization Program

The program proposed by KM for the Haskell County site is quite similar to the current program in use for land near the Sequoyah plant. The maximum rate of treated raffinate application will be 700 lb N/acre/year. Individual applications will be about 200 lb N/acre and will be applied

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to coincide with optimum plant growth and with consideration to soil profile nitrogen and proper plant and residue management. Soil profile nitrate analysis will be the primary environmental monitoring control. These analyses will be made following each fertilizer application. Additional environmental monitoring will include a limited program for vegetation, surface water and groundwater analysis for U, Ra-226 and, if appropriate, NO₃-N.

Oklahoma State University Extension Agronomists who have been involved with the treated raffinate land application program since 1974 will continue to provide recommendation for the Choctaw area.

4. Raffinate Transportation

KM proposes to transport treated raffinate in 8000 gallon tank trucks from the Sequoyah plant to the Haskell County site. The road distance is about 45 miles and about 400 truck trips per year will be made. KM estimates, based on motor carrier accident frequency data, that the accident frequency would be one in every 14.3 years. Transport of treated raffinate is not significantly more hazardous than transport of commercial aqueous nitrogen fertilizer solutions because the radioactivity content of the treated raffinate is very low. If an accident were to occur, conventional cleanup procedures for chemical releases could be used; no special procedures due to the radioactivity content of the treated raffinate would be necessary.

5. Reports

A condition has been added to require that information on the use of treated raffinate at the Haskell County site be included in the annual report on the fertilizer program prepared by KM.

Conclusion

Based on the results of earlier test applications of treated raffinate as fertilizer, and subject to the conditions described above, I conclude approval of the application for use of treated raffinate on a permanent basis at the Haskell County site will not constitute an undue risk to public health and safety or have significant adverse environmental impacts. I recommend that the amendment, as conditioned, be approved.

Original Signed by
W. A. Nixon

W. A. Nixon
Uranium Process Licensing Section
Uranium Fuel Licensing Branch
Division of Fuel Cycle and
Material Safety

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