UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

Ltr Flora
to Burns

OCT 9 1970

Chairman Seaborg
Commissioner Ray
Commissioner Johnson
Commissioner Thompson
Commissioner Larson

DEEP-WELL DISPOSAL OF WASTES, KERR-McGEE CORPORATION

The Kerr-McGee Corporation is presently licensed to convert uranium mill concentrates to UF_6 at its Sequoyah facility near Gore, Oklahoma. In conjunction with these activities, Kerr-McGee has requested approval to dispose of its liquid wastes by deep-well disposal.

The U.S. Geological Survey and our staff consultant on geohydrology, Dr. Roy L. Warner of the University of Missouri, have reviewed Kerr-McGee's application. The conclusion reached by both USGS and Dr. Warner is that disposal of waste liquids at the proposed site by deep-well injection may constitute a radiological hazard. We plan to deny Kerr-McGee's application based on the unacceptability of the proposed site for disposal of radioactive waste solutions by deep-well injection.

On May 26, 1970, a meeting was held with Kerr-McGee representatives, at which time USGS summarized its preliminary conclusions relative to Kerr-McGee's proposal. During the meeting we discussed several alternative waste handling and treatment methods presently under study by Kerr-McGee, including chemical treatment and pond storage of the waste. Presently, waste raffinates containing the significant radioisotopes are being stored in ponds. Waste scrubber solutions containing natural uranium in concentrations less than 10% of Part 20 limits are being released into the Illinois River following chemical treatment. We believe that the storage of the waste raffinates in ponds is acceptable on an interim basis in view of the geohydrological characteristics of the site and the environmental monitoring program which Kerr-McGee is required to follow.

A copy of the proposed denial is enclosed. I would like to discuss this with the Commission at an early information meeting.

(Signed) HLP

Harold L. Price
Director of Regulation

Enclosure:
Proposed denial ltr to
Kerr-McGee fm L. Johnson

cc w/encl:
Secretary (2)
General Manager (2)
General Counsel (2)

bcc w/encl:
HLPrice, DR
CKBeck, DR
MMann, DR
CLHenderson, DR
SHHanauer, DR
LRRogers, RPS
LRPrice, SLR
LDLowe, CO
LJohnson, DML
RECunningham, DML
CRBuchanan, DML
DFHarmon, DML
St. Br. Dist.
DML
DR

DR	DR
CKBeck	HLPrice
1 /70	1 /70

OFFICE ▶	DML	DML	DML	DML	OGC	DR
CR8SS th T31 R1-2 NAME ▶	DFHarmon/gl	RECunningham	DAVenbauer	LJohnson		
DATE ▶	8/5/70	8/ /70	8/ /70	8/ /70	1 /70	1 /70

FORM AEC-318 (Rev. 9-53) AECM 0240 ★ U.S. GOVERNMENT PRINTING OFFICE: 1969 — 877-999

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

Kerr-McGee Corporation
ATTN: Mr. G. E. Wuller
Nuclear Division - Staff Engineer
Licensing and Regulation
Kerr-McGee Building
Oklahoma City, Oklahoma 73102

Gentlemen:

This refers to your application dated April 10, 1970, for AEC approval to dispose of liquid wastes containing natural uranium, thorium, and other radioactive constituents by injection into your Sequoyah disposal well.

You estimated that the injected waste fluid will be restricted to a distance of 460 feet in five years and 930 feet in 20 years. This estimate was based on a calculation which assumes that the formation porosity and permeability are homogeneous and isotropic and that the flow from the injection well is uniformly radial. Carbonate rock aquifers are notably heterogeneous, and the core analysis provided in your application (Exhibit K) demonstrates this. For example, the data show that permeabilities determined from cores taken in the Arbuckle range from less than 0.1 to 766 millidarcies, and that vuggy porosities range from 0.9 to 13.4 percent. From these data, it can be expected that the rate of movement from the well bore will be extremely variable, from low rates of movement in beds of low permeability to high rates of movement in beds of high permeability. Therefore, we are unable to agree, based on the data provided, with your estimate on fluid movement.

Furthermore, the data presented show mapped faults throughout the area surrounding the disposal site. While the nearest known fault appears to be about one mile east-southeast of the disposal well, the complexity of the site geology is such that other faults or fracture zones closer to the disposal well could exist. Should such faults exist, waste liquids could migrate to an unanticipated and presently unpredictable location, such as an aquifer used for domestic purposes. Such unknown faults or fracture zones would lead to unpredictable fluid movements.

While it is recognized that a monitoring program has been developed to determine, insofar as possible, the hydrological influence of the proposed waste injection, it is important to note that a pollutant in ground water could bypass an array of monitoring wells and escape detection in view of the complexity of the pattern of ground-water flow in the area of your well. Therefore, negative monitoring information on movement of radioactive liquid waste would not necessarily demonstrate containment of the waste. Also, in the absence of a demonstration supporting such a conclusion, we are unable to agree with your statement that corrective action could be taken if radioactive material, above background, were detected at a monitoring location.

Our analysis of the geologic and hydrologic information and data provided in your application indicates that it is probable that the Arbuckle Formation, the proposed disposal horizon, is hydrologically connected with the overlying Simpson, Hunton and Spiro formations. The data further show that the present fluid pressure in all these formations is sufficient to cause formation water to flow to the surface where elevations are low enough at outcrops or where the formations are cut by permeable fault zones that reach the land surface at elevations that are below the potentiometric surface of the confined saline water-bearing aquifers. Therefore, it appears that the injection of additional fluids into the proposed well will cause a further pressure buildup and, as a minimum, force additional formation water, which is reported to contain about 140,000 parts per million total dissolved solids as well as naturally occurring radium, upward along faults or fracture zones to the land surface. The data presented in your application are insufficient to determine precisely when or where the formation water may be forced to the surface by the liquid waste injection. However, because the potentiometric surface is about 550 to 600 feet above sea level, it is possible that this would occur shortly after continuous injection has begun.

In summary, the geologic and hydrologic data and analysis presented in the application do not support a conclusion that waste fluids containing radioactive materials will remain confined. Rather, our analysis of the data indicates that fluids containing radioactive material could enter aquifers used for domestic water, thereby constituting a potential hazard. Additionally, the injection of waste fluids of any type would build up the pressure head in the Arbuckle Formation and result in formation water moving along faults and fracture zones and discharging at or near the land surface.

In view of the foregoing, we are unable to make the findings called for by 10 CFR Part 40, § 40.32. Therefore, your application for deep-well disposal of liquid wastes containing radioactive materials is hereby denied. Pursuant to the provisions of the Commission's regulation 10 CFR Part 2, "Rules of Practice," you may request a hearing on this matter within thirty (30) days from the date of this notice.

FOR THE ATOMIC ENERGY COMMISSION

Lyall Johnson
Acting Director
Division of Materials Licensing

DISTRIBUTION:
St. Br. Dist.

					DR	DR
					CKBeck	HLPrice
					/ /70	/ /70
OFFICE ▶	DML	DML	DML	DGL	OGC	DR
SURNAME ▶	DFHarmonath	REGunningham	DAHuegbaumer	LJohnson		MMann
DATE ▶	9/12/70	9/ /70	9/ /70	9/ /70	/ /70	/ /70

CHESS T31 R3-5

Form AEC-318 (Rev. 9-53)