

Brown
Region IV

ADPH
40-3027

OCT 15 1970

Herr-McCee Corporation
ATTN: Mr. G. E. Muller
Nuclear Division - Staff Engineer
Licensing and Regulation
Herr-McCee 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 450 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 768 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.

8507310338 850530
PDR FOIA
BURR85-229 PDR

OCT 15 1970

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.

OCT 15 1970

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 discharge 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

Signed by
Lyall Johnson

Lyall Johnson
Acting Director
Division of Materials Licensing

DISTRIBUTION:

St. Br. Dist.

PDR

State Health
Docket file

DR R/F

C. Buchanan, DML

L. Johnson, DML

R. Cunningham, DML

DP	DS
10/14/70	10/14/70
10/14/70	10/14/70

OFFICE	DP	DS	EC	EC	CC	DR
RESS T31 R3-5	RE Buchanan	RE Cunningham	RE Buchanan	RE Johnson		
SURNAME	RE Buchanan	RE Cunningham	RE Buchanan	RE Johnson		
DATE	8/11/70	8/11/70	8/11/70	10/15/70	1/1/70	1/1/70

U. S. Atomic Energy Commission
Region IV, Division of Compliance
11395 West Colfax Ave., Room 200
Denver, Colorado 80215

U.S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
ANALYTICAL CHEMISTRY BRANCH

REFERENCE: HEALTH & SAFETY
DIVISION

ROUTINE SPECIAL Y

SAMPLE RECORD SHEET

SERIAL NO.

SAMPLE FROM: Kerr-McGee - Oklahoma

SAMPLES RECEIVED:

ANALYZED BY:

COLLECTED BY: G. D. Brown

ANALYSIS COMPLETED:

DATE SUBMITTED: October 26, 1970

SAMPLE			SAMPLE DESCRIPTION	ANAL. FOR	INST. USED	QUANT. USED	TIME CNTD.	COUNT TIME	TOTAL COUNT	GROSS COUNT C/	BKGD. C/	NET COUNT C/	RESULTS D/
NO.	DATE	HOUR											
1			Settling basin effluent	U nat									
				226 Ra									
				230 Th									
			Bypass discharge	U nat									
				226 Ra									
				230 Th									

NOTIFIED: TIME: RESAMPLING YES

RECOMMENDED: NO

APPROVED:

SECTION CHIEF

U.S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
ANALYTICAL CHEMISTRY BRANCH

REFERENCE: HEALTH & SAFETY
DIVISION

SAMPLE RECORD SHEET

SERIAL NO. _____

SAMPLES RECEIVED:

ANALYZED BY:

ANALYSIS COMPLETED:

ANAL.
FORINST.
USEDQUANT
USEDTIME
CNTD.COUNT
TIMETOTAL
COUNT

GROSS
COUNT
C/

BKGD.
C/

NET
COUNT
C/

RESULTS

SAMPLE

SAMPLE DESCRIPTION

NO.	DATE	HOUR
-----	------	------

2

Surface Soil
(only that uranium that is leachable.)

U. nat.

NOTIFIED: _____ TIME: _____ RESAMPLING YES _____

RECOMMENDED: NO _____

APPROVED: _____
SECTION CHIEF

ROUTINE _____ SPECIAL _____

SERIAL NO. _____

[illegible]

NOTIFIED: _____ TIME: _____ RESAMPLING YES _____

RECOMMENDED: NO _____

APPROVED: _____
SECTION CHIEF

U. S. Atomic Energy Commission
Region IV, Division of Compliance
10395 West Colfax Ave., Room 200
Denver, Colorado 80215

U.S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
ANALYTICAL CHEMISTRY BRANCH

REFERENCE: HEALTH & SAFETY
DIVISION

51469

ROUTINE SPECIAL X

SAMPLE RECORD SHEET

SERIAL NO. SAMPLE FROM: Kerr-McGee - OklahomaSAMPLES RECEIVED: ANALYZED BY: RB, SbmCOLLECTED BY: G. D. BrownANALYSIS COMPLETED: Nov 10, 1970DATE SUBMITTED: October 26, 1970

SAMPLE			SAMPLE DESCRIPTION	ANAL. FOR	INST. USED	QUANT. USED	TIME CNTD.	COUNT TIME	TOTAL COUNT	GROSS COUNT chr	BKGD. chr	NET COUNT chr	A ^o c/hr	RESULTS D/ mc/ml
NO.	DATE	HOUR												
1			Settling basin effluent	U nat		0.1				38	1.2	36.8		1.6×10^{-7}
				²²⁶ Ra	SC37	500	¹⁴⁴⁵ 11-9-70	60	63	63	10	53	84	$< 3 \times 10^{-9}$
				²³⁰ Th	6A1	500		455	2315	305	262	43	169±28	$< 2 \times 10^{-8}$
2			Bypass discharge	U nat		0.1				9	1.2	7.8		3.0×10^{-8}
				²²⁶ Ra	SC38	500	¹⁵⁴⁵ 11-7-70	60	31	31	8	17	31	$< 3 \times 10^{-7}$
				²³⁰ Th	8B1	500		36	1198	1777	262	1735	677±227	$(1.1 \pm 0.1) \times 10^{-7}$

NOTIFIED: TIME: RESAMPLING YES RECOMMENDED: NO APPROVED: SECTION CHIEF

U.S. ATOMIC ENERGY COMMISSION
IDAHO OPERATIONS OFFICE
ANALYTICAL CHEMISTRY BRANCH

REFERENCE: HEALTH & SAFETY
DIVISION

ROUTINE SPECIAL X

SAMPLE RECORD SHEET

SERIAL NO.

51470

SAMPLE FROM: ~~Kerr-McGee - Oklahoma~~

SAMPLES RECEIVED:

Nov. 2 1970

ANALYZED BY:

RE

COLLECTED BY: C. D. Brown

ANALYSIS COMPLETED:

Nov. 5 1970

DATE SUBMITTED: October 26, 1970

[illegible]

NOTIFIED: _____ TIME: _____ RESAMPLING YES _____

RECOMMENDED: NO _____

APPROVED:

SECTION CHIEF