KERR-McGEE CORPORATION
KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73125

November 25, 1996

Mr. Stewart Brown
Low-Level Waste & Decommissioning Projects Branch
Division of Waste Management
Office of Nuclear Materials Safety & Safeguards
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Docket No. 70-3073
License No. SNM-1999

Dear Mr. Brown:
Kerr-McGee Corporation (KMC) submitted Final Radiation Survey of Haul Road Corridor NRC in May, 1996. The Oak Ridge Institute for Science and Education (ORISE) subsequently performed a confirmatory survey of the area. The survey, ORISE's confirmatory survey, and KMC's responses to NRC comments on the final survey report confirmed that this area is releasable under existing criteria. NRC concurred with this analysis in a letter dated October 22, 1996, and released KMC from radiological monitoring and procedural requirements in this area. However, NRC did not release these areas from license SNM-1999, citing three concerns:

Potential subsurface contamination,

Migration of licensed material from RMAs into the haul road corridor, and

Potential groundwater contamination.

The purpose of this letter is to address those concerns.

Potential Subsurface Contamination
KMC has identified three factors related to the potential for subsurface contamination: buried rubble from demolished licensed facilities, vertical migration from surficial contamination, and spots exhibiting elevated exposure rates in the 1990 radiological characterization survey.

Buried rubble was released under the supervision of the Oklahoma Department of Environmental Quality (ODEQ), at that time part of the Oklahoma State Department of Health. KMC described the survey procedure in its response to NRC comments on the final survey report. The rubble was releasable for unrestricted use and does not represent potential contamination.

NL10/1

Surficial soil samples were collected from the top 15 cm (6 inches) for the final survey of the haul road corridor. All licensed material discovered in the haul road areas was thorium, which adsorbs strongly to the clayey soils present at the Cushing site. Although there was no reason to suspect vertical migration of thorium from surficial soils, subsurface soil samples were collected from three locations. This work was performed during the delineation of areas of elevated activity. The attached summary of the subsurface investigation shows there was no evidence that licensed material migrated vertically into subsurface soils. Since this data was collected from areas where the potential for subsurface contamination by vertical migration was greatest, there is no reason to believe migration of licensed material from surface sources is occurring elsewhere in the haul road corridor.

The radiological characterization survey conducted in 1990 and reported to the ODEQ in 1991 consisted of exposure rate measurements taken on a ten meter grid over the entire site. Several areas exhibiting greater than 15 μR/hr were located in haul road areas. Anecdotal information indicated that most of these areas of elevated exposure rates were due to naturally occurring radioactive material, such as firebrick. However, one spot containing thorium in excess of the Branch Technical Position (BTP) Option 1 limit was identified. Surficial soils were removed, and the area was resampled and found to meet release criteria. This data was reported in KMC's response to NRC comments on the final survey report dated August 30, 1996.

KMC is confident that its survey and testing for subsurface contamination support the conclusion that there is no reason to withhold release of these areas from the license. Absent some evidence to the contrary, NRC should not use this concern as a reason to impede the release of these areas from the license.

Migration of Licensed Material From RMAs into the Haul Road Corridor

Radioactive Materials Areas (RMAs) were delineated by scanning surveys of areas indicating elevated activity. Suspect areas were identified in both the 1990-1991 survey, and from subsequent sampling and surveying of the site for site characterization. RMAs extend beyond the area containing licensed material above the BTP Option 1 limit to ensure that there is an adequate "buffer zone" around all soils that will require decommissioning. In addition, the outer perimeters of RMAs near the haul road area support a good vegetative cover. The vegetation prevents migration of licensed material by transportation of soil particles by wind and water. Except for RMA-11, the licensed material in these RMAs consists exclusively of thorium, which sorbs strongly to the clayey soils at the Cushing site and is not likely to migrate via a surface water pathway. RMA-11 contains both uranium and thorium, is separated from the haul road corridor by approximately 500 feet of dense grass cover.

KMC is confident that there is insignificant potential for licensed material to migrate from RMAs to the haul road corridor. Absent some evidence to the contrary, NRC should not use this concern as a reason to impede the release of these areas from the license.

Potential Groundwater Contamination

KMC, NRC, and ODEQ met at the Cushing site in January, 1996 to discuss the radiological characterization of groundwater at the site. NRC and ODEQ jointly agreed upon a concept which was forwarded in a work plan entitled, Workplan, Evaluation of Licensed Materials Migration via Groundwater Pathways, submitted October 23, 1996. Although this report was so recently submitted, the concepts contained therein have been accepted by NRC and ODEQ for nearly a year. Key to the groundwater characterization plan is the concept that, for thorium contamination, sampling of subsurface soil beneath areas of elevated activity may validate the contention that thorium has not impacted groundwater from all RMAs except RMA-3, RMA-10, and RMA-11. RMAs 3 and 10 are not hydrologically upgradient from haul road areas, so potentially contaminated groundwater would not affect the haul road areas.

Acid hydrocarbon sludge pits have been present at the site since the 1940s. Migration of non-radioactive contaminants from the acid sludge pits has been shown not to extend more than 25 feet vertically from the pits. Groundwater discharges laterally to topographic surface drainage pathways. Licensed material present in the trash dump, which is less mobile than the acid in the sludge pits, has only been present since the 1960s. It is not reasonable to assume that licensed material could migrate over 300 feet (3-10 times as far as acid-impacted groundwater has migrated) in far less time. Absent some evidence to the contrary, NRC should not use this concern as a reason to impede the release of these areas from the license.

If you have any questions or comments regarding these responses or the attached information, please call me at (405) 270-2694.

Sincerely,

Jeff Lux
Project Manager

xc: C.L. Cain, NRC Region IV
Rick Reiley, Cushing Citizens' Oversight Committee
Gene Smith, ODEQ
Darrell Shults, ODEQ

SUBSURFACE SOIL INVESTIGATION
HAUL ROAD CORRIDOR FINAL SURVEY

Subsurface soil samples were collected from the haul road corridor from locations with the maximum potential for migration to the subsurface. Historical site photographs show a refinery road running in a north-south direction through the eastern portions of blocks 40 and 52. It is possible that there was a bar ditch or drainage swale on the side of that road that could have received thorium contaminated wastewater. There is a line of elevated radiological readings running along that approximate route. Analysis of surficial soil samples show that the only identifiable licensed material is thorium.

At one location, Block 52-East 80-South 10, a "hot spot" containing greater than 3 times the guideline value of thorium was identified. A ten-meter square was fenced and posted as a radioactive materials area. Because this sample location was in a radioactive materials area cut out from final survey unit 52A, surficial soil activity at this location was not included in Final Radiation Survey of Haul Road Corridor.

Several other soil samples yielded in results in excess of the BTP Option 1 limit. The maps included in Appendix B to Final Radiation Survey of Haul Road Corridor show the locations of soil that exceeded the limit. The level of contamination that exceeds Option 1 limits extends no more than two meters in width and progresses along the drainage ditch in a north-south direction.

KMC considered the greatest potential for subsurface migration of licensed material to exist beneath the centerline of the drainage swale. Three sample locations along this centerline, where the concentration of licensed material exceeded the limit, were selected for subsurface sampling. Soil samples were collected at 1/4 meter intervals to a depth of 1 meter. The sample locations, depths, and multiple of Option 1 limits follow.

LOCATION	FRACTION OF LIMIT WITH DEPTH				
	Surface	0.25 M	0.5 M	0.75M	1.0M
Block 52-East 80-South 9	1.81	0.22	0.01	-0.09	-0.08
Block 52-East 71-South 70	1.47	0.13	-0.01	0.03	-0.14
Block 40-East 86-South 95	1.42	0.04	0.17	-0.04	0.02

Some of the fraction-of-the-limit values are negative because mean background values were subtracted from soil count data, resulting in some negative net concentrations. Examination of the data shows that for the two samples that exceed 10% of the limit, the driving factor is the U-234 concentration, which is a calculated value based on U-238 and U-235 concentrations. For concentrations so near background, the U-234 calculation is unreliable because the variability in enrichment appears large even when the uranium is natural.

The data clearly indicates that licensed material does not extend more than 0.25 meters (9 inches) below the surface. Contamination is confined to the shallow surficial material only.

Soil Sample Database

MCA	Sample ID	Weight in grams	Block	East	South	Sample Description	Depth		U-234 pCi/g	U-235 pCi/g	U-238 pCi/g	Th-232 pCi/g	Ra-226 pCi/g	Option	Analysis Date
3	04246078	26	52	71	70	S52B52E71S70-0-U.D.	0		8.60	0.36	4.77	6.98	1.72		4/30/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.27	2.67	0.64	0.80		
3	05026005	32	52	71	70	S0B52E71S70-.25-U.D.	0.25		6.90	0.26	0.73	1.09	1.00		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.14	1.20	0.28	0.39		
3	05026006	31	52	71	70	S0B52E71S70-.5-U.D.A.	0.5		2.06	0.09	1.96	1.01	0.54		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.16	1.49	0.33	0.46		
3	05026007	33	52	71	70	S0B52E71S70-.75-U.D.	0.75		5.57	0.19	0.00	0.93	0.34		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.17	0.21	0.31	0.46		
3	05026008	35	52	71	70	S0B52E71S70-1-U.D.A.	1		1.23	0.04	0.02	0.85	0.49		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.16	1.42	0.34	0.48		
3	04246123	27	52	80	9	S52B52E80S9-0-U.D.A.	0		7.91	0.30	1.44	7.46	1.59		4/30/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.33	3.24	0.81	1.01		
3	05026001	29	52	80	9	S0B52E80S9-.25-U.D.A.	0.25		7.87	0.31	2.06	1.16	0.80		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.20	1.76	0.39	0.55		
3	05026002	32	52	80	9	S0B52E80S9-.5-U.D.A.	0.5		3.52	0.13	0.35	1.12	0.59		5/6/93
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.19	1.64	0.39	0.54		
3	05026003	31	52	80	9	S0B52E80S9-.75-U.D.A.	0.75		0.00	0.01	1.81	0.99	0.73		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.17	1.75	0.41	0.58		
3	05026004	28	52	80	9	S0B52E80S9-1-U.D.A.	1		0.53	0.03	0.72	1.13	0.82		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.21	1.97	0.48	0.67		

Soil Sample Database

MCA	Sample ID	Weight in grams	Block	East	South	Sample Description	Depth		U-234 pCi/g	U-235 pCi/g	U-238 pCi/g	Th-232 pCi/g	Ra-226 pCi/g	Option	Analysis Date
3	04086009	23	40	86	95	S0B40E86S95-0-U.D.A	0		0.00	0.00	0.00	8.20	1.02		4/12/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.61	0.61	0.65	0.85		
3	04256040	17	40	86	95	S40B40E86S95-0-U.D.	0		1.12	0.06	2.43	3.70	0.94		5/1/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.33	3.18	0.74	0.97		
3	05026009	32	40	86	95	S0B40E86S95-.25-U.D.	0.25		5.85	0.23	1.70	0.63	1.46		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.17	1.48	0.33	0.49		
3	05026010	32	40	86	95	S0B40E86S95-.5-U.D.A	0.5		5.54	0.21	1.23	1.41	0.58		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.22	2.03	0.46	0.62		
3	05026011	32	40	86	95	S0B40E86S95-.75-U.D.	0.75		0.55	0.05	2.86	0.97	1.12		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.22	2.21	0.49	0.70		
3	05026012	32	40	86	95	S0B40E86S95-1-U.D.A.	1		3.45	0.14	0.99	1.09	0.87		5/6/96
						Count Time in Sec.: 300		(+/-)2 sigma Uncertainty		0.14	1.23	0.29	0.41		