

PDR

40-2061



KERR-McGEE CHEMICAL CORPORATION

KERR-McGEE CENTER • OKLAHOMA CITY, OKLAHOMA 73125

April 29, 1980

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

William Nixon
Uranium Fuel Licensing Branch
US Nuclear Regulatory Commission
Washington, D. C. 20555

RE: License No. STA-583, Docket No. 40-2061

Dear Mr. Nixon:

At a meeting in Washington on November 13, 1979, you provided comments prepared by NRC and other interested parties on the plan for Decommissioning and Stabilizing our West Chicago Facility. We have reviewed these comments and have responded to them by either altering the text of the plan or discussing our position relative to the comment.

Our response is attached and follows the format of first quoting the comment and then providing either an answer to that comment or a reference to a page in the revised text. In cases where it is noted that a particular page in the text has been changed in response to a comment, conforming changes also have been made in all other sections of the text where that same subject is addressed. Many of the comments were repeated by several reviewers; and, as a consequence, the related comments are covered in a single response.

The original plan contemplated burial of contaminated organic materials in a licensed commercial burial ground. Since that plan was submitted, new regulations severely restrict the amount of material we may send to the burial ground. To overcome this limitation, the revised plan provides for incinerating contaminated combustibles on-site. An application for a license amendment to install and operate the incineration system will be submitted shortly.

The NRC and others commented on the lack of adequate consideration of alternates. Investigation of alternate disposal sites is proceeding but is not as yet complete. The results will be reported to you within 60 days.

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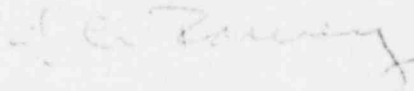
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William Nixon
April 29, 1980
Page Two

The text has not been updated to reflect events which have occurred. The work contemplated under Phase 1A of the Plan has been underway since approval of the Kerr-McGee Radiological Health Plan for NRC Region III. In the event Phase 1A is completed prior to the approval of the decommissioning and Stabilization Plan, we will continue to seek approval of specific decommissioning items in a way that will not prejudice a decision on the full Plan by the NRC. We would continue to provide 24-hour security service, off-site radiation monitoring and act to minimize any additional deterioration of the site as appropriate.

In accordance with your instruction, the revised pages of the text have been distributed to the recipients of the original plan while the responses which did not result in text changes have been sent to the NRC but not to others.

Very truly yours,



J. L. Rainey, President

TABLE OF CONTENTS
KERR-McGEE'S RESPONSE TO
QUESTIONS/COMMENTS
WEST CHICAGO STABILIZATION PLAN

<u>Response Page No.</u>	<u>Chapter</u>	<u>Page</u>	<u>Response (Source)</u>	<u>Question</u>
R-1	S & C	Page i.	paragraph (3) (ISGS)	Question
	S & C	Page i	paragraph (2) (IDPH)	Question 6
R-2	S & C	Page iii,	KM Modification	
iii	S & C	KM Modification		
R-3	S & C	Page iv,	paragraph (2) (IDPH)	Question 5
	S & C	Page v,	(IDPH) Question 7	
	S & C	Page v,	paragraph (3) (ISGS)	Question
		*	*	*
R-4	1	Page 1.1,	KM Modification	
1.1	1	KM Modification		
R-5	1	Page 1.2,	paragraph (3) (ISGS)	Question
R-6	1	Page 1.3,	(UFLB-NRC) Question 2	
1.3	1	Revised		
		*	*	*
2.4	2	Revised Page, Wind Rose Diagram		
R-7	2	Page 2.3	(ANL) Question 28;	(IDPH) Question 8
R-7a	2	Page 2.7	(ANL.) Question 29	
	2	Page 2.7	(ANL) Question 30	
	2	Page 2.17	(ANL) Question 1	
2.3	2	Revised		

KM TABLE OF CONTENTS
WCSP

<u>Response Page No.</u>	<u>Chapter</u>	<u>Page</u>	<u>Response (Source)</u>	<u>Question</u>
2.3a	2	New Page		
2.7	2	Revised		
R-8	2	Page 2.18, paragraph (3)	(ISGS)	Question
	2	Page 2.18, paragraph (5)	(ISGS)	Question
R-9	2	Page 2.19, paragraph (1)	(ISGS)	Question
	2	Page 2.19, paragraph (2), page 2.20, Figure 2.6.2	(ISGS)	Question
2.20	2	Revised		
R-10	2	Page 2.21 paragraph (2)	(ISGS)	Question
R-11	2	Page 2.22, paragraph (3)	(ISGS)	Question
R-12	2	Page 2.35, (ANL)	Question 37	
	2	Page 2.36, (ANL)	Question 32	
2.35	2	Revised		
2.35a,b,c,d	2	New Pages		
2.36	2	Revised		
R-13	2, 3	Letter-Bergstrom/Wright Correspondence	(ISGS)	Question
R-14	2, 3	KM Response-Bergstrom/Wright		
		* * * * *		
R-15	3	General; Dr. R.A. Griffin's Comments;	(ISGS)	Question
R-16	3	Dr. R.A. Griffin's Comments;	(ISGS)	Page 3.24, KM Response
R-17	3	Page 3.24, KM Response	(continued)	
R-18	3	Page 3.9, (IDPH)	Question 9	

KM TABLE OF CONTENTS
WCSP

<u>Response Page No.</u>	<u>Chapter</u>	<u>Page</u>	<u>Response (Source)</u>	<u>Question</u>
R-18	3	Page 3.22	(UFLB-NRC)	Question 3
	3	Page 3.23	(ISGS)	Question
3.22	3	Revised		
3.22a,b	3	New Pages		
R-19	3	Page 3.22, Table 3.2.2(a)	(ANL)	Question 17
	3	Page 3.23, Table 3.2.2(b)	(ANL)	Question 12
3.23	3	Revised		
R-20	3	Page 3.24	(ISGS)	Question/Comments 2, 3 & 4
R-21	3	Page 3.28, 3.31	(ANL)	Questions 11, 13 (ISAG) Question 2
3.28	3	Revised		
3.28a,b	3	New Pages		
3.32	3	Revised		
3.33 - 3.41	3	New Pages.	Tables 3.2.3f, g, h, i, & j	
3.42, 3.43	3	New Page,	Footnotes to Tables 3.2.3f & g	
		* * * * *		
R-22	4	Page 4.1	(ISAG)	Question 4
R-23	4	Pages 4.1, 4.2	(ISAG)	Question 2
R-24	4	Pages 4.1, 4.2	(ISAG)	Question 2 (continued)
R-25, 26, 27 28 & 29	4	KM Response	(ISAG)	Nature of West Chicago Plant Wastes
R-30	4	Page 4.2, paragraph (4)	(ISGS)	Question
	4	Page 4.2	(IDPH)	Question 5
	4	Page 4.3	(UFLB-NRC)	Question 4

KM TABLE OF CONTENTS
WCSP

<u>Response Page No.</u>	<u>Chapter</u>	<u>Page</u>	<u>Response (Source)</u>	<u>Question</u>
R-31	4	Page 4.3	(ANL)	Question 12
4.3	4	Revised		
4.3a	4	New Page		
R-32	4	Page 4.7	(USEPA)	Question 5
	4	Page 4.9	(USEPA)	Question 10(b)
R-33	4	Pages 4.11, 4.16	(USEPA)	Question 7
	4	Page 4.13	(USEPA)	Question 6
R-34	4	Pages 4.14, 4.16	(USEPA)	Question 3
	4	Page 4.14	(IDPH)	Question 3
R-35	4	Page 4.14	(City of West Chicago-City Engineer)	Question 1, 2, 3
R-36	4	Page 4.16	(City of West Chicago-City Engineer)	Question 4, 5
R-37	4	Page 4.17,	KM Modification	
4.17	4	Revised		
4.17a	4	New Page		
R-38	4	Pages 4.17, 6.7	(USEPA)	Question 12(a)
	4	Pages 4.18, 4.22	(USEPA)	Question 4
R-39	4	Page 4.19	(USEPA)	Question 13
4.19	4	Revised		
4.19a	4	New Page		
R-40	4	Page 4.19(d)	(IDPH)	Question 10
	4	Page 4.21	(City of West Chicago-City Engineer)	Question 6
R-41	4	Page 4.22	(UFLB-NRC)	Question 5

KM TABLE OF CONTENTS
WCSP

<u>Response Page No.</u>	<u>Chapter</u>	<u>Page</u>	<u>Response (Source)</u>	<u>Question</u>
R-42	4	Page 4.22	(IDPH)	Question 2
	4	Page 4.22	(IDPH)	Question 11
	4	Page 4.22, paragraph (1)	(ISGS)	Question
R-43	4	Page 4.28	(ANL)	Question 3
	4	Page 4.28	(ANL)	Question 8
4.28	4	Revised		
R-44	4	Page 4.29	(ANL)	Questions 9, 10
R-45	4	Page 4.36	(USEPA)	Question 8
	4	Pages 4.36, 4.38; Page 2, paragraph (2, 3)	(IEPA)	Question
R-46	4	Page 4.36, paragraph (2)	(ISGS)	Question
	4	Pages 4.37, 4.38	(ANL)	Question 4
4.37	4	Revised		
4.38	4	New Page, replaces 4.38, 4.39 and 4.40		
R-47	4	General, page 1, paragraph (4)	(IEPA)	Question
R-48	4	KM Response (continued)		
R-49	4	Page 4.38	(ISGS)	Question
	4	Page 4.41, paragraph (2)	(ISGS)	Question
R-50	4	Page 4.41	(ISAG)	Question 3
		* * * * *		
R-51	5	Pages 5.1, 5.2	(ANL)	Question 31
5.1	5	Revised		
R-52	5	Page 5.3, Table 5.1	(ANL)	Question 14

KM TABLE OF CONTENTS
WCSP

<u>Response Page No.</u>	<u>Chapter</u>	<u>Page</u>	<u>Response (Source)</u>	<u>Question</u>
R-52	5	Page 5.3, Table 5.1	(IDPH)	Question 12
	5	Page 5.3, Table 5.1	(USEPA)	Question 16
5.3		Revised, Table 5.1		
R-53	5	Page 5.7, paragraph (2)	(ISGS)	Question
	5	Page 2.35, 5.7	(ANL)	Question 1.4
R-54	5	Page 5.7, Section 2.6.1	(ANL)	Question 1
5.7	5	Revised		
R-55	5	Page 5.7, paragraph (3)	(ISGS)	Question
	5	Page 5.8, Section 5.6.2	(ANL)	Question 5
	5	Page 5.8, Section 5.6.2	(ANL)	Question 38
5.8	5	Revised		
		*	*	*
R-56	6	Page 6.2	(USEPA)	Question 16(c)
R-57	6	Page 6.4	(USEPA)	Question 14(a)(b)
R-58	6	Page 6.5	(ANL)	Question 24
6.5	6	Revised		
R-59	6	Page 6.7	(USEPA)	Question 12(b)
		*	*	*
R-60	7	Pages 7.1, 7.2, Section 7.2	(ANL)	Question 33
	7	Page 7.2, paragraph (4)	(ISGS)	Question
	7	Page 7.2, Section 7.3.1	(ANL)	Question 6
7.2	7	Revised		
R-61	7	Page 7.3, Section 7.3.2	(ANL)	Question 7

KM TABLE OF CONTENTS
WCSP

<u>Response Page No.</u>	<u>Chapter</u>	<u>Page</u>	<u>Response (Source)</u>	<u>Question</u>
R-61	7	Page 7.3, paragraph (5)	(ISGS)	Question
7.3	7	Revised		
7.3a	7	New Page		
R-62	7	Page 7.3	(IDPH)	Question 13
	7	Page 7.4	(USEPA)	Question 10(a)
R-63	7	Page 7.5	(USEPA)	Question 9
R-64	7	KM Response	(USEPA)	
7.5	7	Revised		
R-65	7	Page 7.6	(UFLB-NRC)	Question 7 (ANL) Questions 25, 26 & 27
7.6	7	Revised		
7.6a	7	New Page		
R-66	7	Page 7.7, Section 7.5.3(b)	(ANL)	Question 34
	7	Page 7.7	(USEPA)	Question 10(c)
7.7	7	Revised		
R-67	7	Page 7.8	(USEPA)	Question 2
R-68	7	Page 7.8	(UFLB-NRC)	Question 8
		Page 7.8	(USEPA)	Question 11(a)(b)(c)
7.9	7	New Page	(RAD Health Program Outline)	
		* * * * *		
R-69	8	Pages 8.2, 8.3	(USEPA)	Question 16
8.2, 8.3	8	Revised		
		* * * * *		

KM TABLE OF CONTENTS
WCSP

<u>Response Page No.</u>	<u>Chapter</u>	<u>Page</u>	<u>Response (Source)</u>	<u>Question</u>
R-70	10	Page 10.2, Section 10.5.1	(ANL)	Question 35
10.2	10	Revised		
		*	* * * * *	
R-71	11	Pages 11.2, 4.22	(IDPH)	Question 2
	11	Pages 11.2, 4.2	(ISAG)	Question 2
R-72	11	Page 11.4	(UFLB-NRC)	Question 1
	11	Page 11.4	(IDPH)	Question 1
	11	Page 11.4	(ISAG)	Question 1(a)(b)(c)(d)
R-73	11	KM Response to Page 11.4		
R-74	11	Page 11.5	(UFLB-NRC)	Question 9
R-75	11	Letter DOE Regional Rep. to J. L. Rainey (KMC)		
		*	* * * * *	
R-76	12	Pages 12.2, 12.3 & 12.4	(ISAG)	Question 1E
	12	Page 12.2, paragraph (5)	(ISAG)	Question
	12	Page 12.3	(IDPH)	Question 4
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COMMENT IDENTIFICATION LIST
WEST CHICAGO DECOMMISSIONING

ANL	Argonne National Laboratory
IEPA	Illinois Environmental Protection Agency
IDPH	Illinois Department of Public Health
ISGS	Illinois State Geological Survey
ISAG	Illinois State Attorney General
USEPA	United States Environmental Protection Agency
UFLB-NRC	Uranium Fuel Licensing Branch - Nuclear Regulatory Commission

KERR-McGEE CHEMICAL CORPORATION
STABILIZATION PLAN
LICENSE STA 583

WEST CHICAGO, ILLINOIS

Date: May 1, 1980

SUBJECT: Kerr-McGee's Response to Questions/Comments on the Stabilization Plan Submitted August 15, 1979.

Comments are answered in relation to the Chapters. Order of answers bear no relationship to source of questions.

SUMMARY AND CONCLUSIONS (S&C)

Page i, paragraph (3) (ISGS) Question:

Substantial migration of chemical wastes has occurred from the site into both shallow groundwater and the underlying dolomite aquifer. Measureable radioactivity has been consistently found in well B-2 as well as in soil samples from beneath the site.

KM Response: WCSP, page i

Since the plant ceased operations in 1973, it is Kerr-McGee's opinion that very little material has migrated to the shallow groundwater or the dolomite aquifer. Data from monitor wells in the glacial sediments do not support the contention that substantial migration of chemical wastes has occurred since plant shutdown.

Kerr-McGee believes that (based on subsequent analysis) the well and/or soil samples were accidentally contaminated from surface runoff water leaking around the well casings.

No Revision in Text

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Page ii, paragraph (2) (IDPH) Question 6:

Kerr-McGee Chemical Corporation should not preclude the possibility of moving material if alternative plans instead of preferred plans are adopted.

KM Response: WCSP, page ii

Kerr-McGee is continuing to review alternate plans and does not preclude the possibility of moving material.

No Revision in Text

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Summary and Conclusion (cont'd)

Page iii, KM Modification

Text is revised to include statement on neutralization.

* * * * *

Summary and Conclusions (cont'd)

Page iv, paragraph (2) (IDPH) Question 5:

If on-site disposal is selected, permanent markers should be constructed which describe composition of buried materials and the precautions recommended in future use of the disposal site. Also, markers should be placed at the location of the 77 "hot-spots" so that precautions can be taken if the material should ever be excavated.

KM Response: WCSP, page iv

Although these locations do not present a health and safety hazard to the public, Kerr-McGee intends to comply fully with Nuclear Regulatory Commission (NRC) regulations and license conditions.

No Revision in Text

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Page v, (IDPH) Question 7:

If groundwater level would rise to region occupied by clay liner, what adverse effects would this problem pose?

KM Response: WCSP, page v

A hydrogeological review of the area shows that high permeable sand and gravel in the glacial aquifer at the site precludes the formation of a groundwater mound unless an impoundment, such as a pond, is present.

No Revision in Text

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Page v, paragraph (3) (ISGS) Question:

Comment: Many strip mines have large areas which do not fill with water and, except for local clubs, only two areas owned by the state are being developed for recreational activities.

KM Response: WCSP, page v

Strip mines in a humid climate will have a tendency to collect rainfall and runoff. If they do not develop standing water, then (in all likelihood) they do not have a low-permeable rock as a base and sides and, therefore, must be modified extensively to be made into an acceptable disposal site.

No Revision in Text

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Chapter 1

Page 1.1, KM Modification

Text is revised to include statement on neutralization.

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Chapter 1

Page 1.2, paragraph (3) (ISGS) Question:

The existing monitoring wells are all finished in shallow sand and gravel (less than 35 feet). Perhaps a monitoring well sealed in the upper dolomite bedrock should be found nearby or installed.

KM Response: WCSP, page 1.2

Monitor well locations and zones of observation were discussed in detail with the IEPA. It is Kerr-McGee's opinion that the proposed groundwater monitoring plan is adequate and satisfied the IEPA.

No Revision in Text

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Chapter 1 (cont'd)

Page 1.3 (UFLB-NRC) Question 2:

In various places in the plan, reference is made to removal of fencing around the disposal site and to a 3-year period for monitoring the Disposal Sites. If on-site stabilization is approved, decisions as to fence removal and termination of monitoring will be made by NRC based on the results of an on-going Kerr-McGee monitoring program. The length of the monitoring program cannot be now established.

KM Response: WCSP, page 1.3

Kerr-McGee intends to comply fully with Nuclear Regulatory Commission (NRC) regulations and license conditions.

Text is Revised.

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Chapter 2

Page 2.3, paragraph (1) (ANL) Question 28:

Section 2.1.2 A wind rose is presented which was compiled from data taken at Commonwealth Edison's Dresden Nuclear Site near Morris, Illinois which is nearly 40 miles southwest of the Kerr-McGee plant. Chicago's O'Hare and Midway Airports, two first-order National Weather Service Stations, are about 20 miles away and Du Page County Airport, which reports hourly observations to the National Climatic Center in Asheville, is within five miles of the site. The data from these locations (preferably those from O'Hare) are probably more representative of the wind patterns in West Chicago.

KM Response: WCSP, page 2.4

A wind rose diagram from data taken at the National Weather Service at O'Hare airport is in the revision on page 2.4.

Text Revised

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Page 2.3 and 2.17 (IDPH) Question 8:

In the worst case storm or otherwise, to what level will the groundwater rise in the waste disposal area?

KM Response: WCSP, page 2.3 and 2.17

A storm drain is located at an elevation of 728 feet and according to ANL reports, groundwater level at the West Chicago site was measured from 720 to 734 feet.

The worst case storm depends upon the conditions stated by the scenarist. The practical limits to groundwater elevation will be, of course, at grade surface existing at some distance from the storm sewer. With the storm sewer, however, a permanent elevation in the groundwater level could not occur.

No Revision in Text

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Chapter 2 (cont'd)

Page 2.7 (ANL) Question 29:

Section 2.1.4. The table of tornado frequency trend over the past century as it appears has serious implications. It should be discussed in further detail or the table should be eliminated. The pertinent information is the probability of a tornado strike. A conservative estimate, but an estimate none the less, can be determined from Thom's article* in Monthly Weather Review, 1963.

*Thom, H.C.S. "Tornado Probabilities", Monthly Weather Review, October December, 1963.

KM Response: WCSP, page 2.7

Text Revised.

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Page 2.7 (ANL) Question 30:

Section 2.2. There is no baseline information on NO_x concentrations. As you show in Section 5.1, diesel engines will emit this pollutant. What is the present NO_x concentration in the West Chicago area?

KM Response: WCSP, page 2.7

Revised page 2.7, Section 2.2 and 2.3

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Page 2.17 Section 2.6.1 (ANL) Question 1:

There is no discussion of off-site surface water (e.g., Kress Creek and West Branch Du Page River). These streams ultimately receive runoff from the site and should be included in vicinity drainages discussions especially Kress Creek as this creek is mentioned later in Sections 7, 8 and 9. Impacts on these streams should be discussed in Section 5.

KM Response: WCSP, page 2.17 and 5.7 are revised

Text Revised

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Chapter 2

Page 2.18, paragraph (3) (ISGS) Question:

Monitoring well B-5, which was drilled to the top of the dolomite aquifer and reportedly plugged back so a shallow well could be installed, may not have been sufficiently sealed. This may allow for transport of contaminated groundwater directly into the underlying bedrock down the borehole.

KM Response: WCSP, page 2.18

There is no evidence to show that well B-5 was improperly sealed. Kerr-McGee has accepted the consultant's description of the plug-back procedure done on this well as reliable.

No Revision in Text

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Page 2.18, paragraph (5) (ISGS) Question:

Although it is likely that water levels in the dolomite aquifer declined as a result of pumping, it is highly improbable that geologically-recent water levels in the dolomite were ever close to that for the glacial drift. The condition that exists is a natural result of the downward infiltration of precipitation and groundwater through the fine-grained glacial materials which overlie the bedrock. This is not a "perched" water-table condition. The glacial aquifer is not isolated from the bedrock aquifer, as evidenced by the extent of chemical pollution of groundwater in the dolomite. The potential is definitely there for the downward flow of groundwater and contaminants; however, as the report concludes, the thick sequence of fine-grained materials probably restricts the total flow of groundwater.

KM Response: WCSP, page 2.18

Reference to the attached figure, Figure 52 (Ziezal et. al.) and labeled as Figure 4 in the ANL report shows that the "natural" or "pre-pumping" piezometric surface of the dolomite aquifer would have been about 720 feet elevation in this area of West Chicago. (The closed contours of the pumping depression around West Chicago are the result of groundwater withdrawals by man.) The groundwater level elevations for the five bore holes on the disposal site are reported in the appendix of the ANL report as being from 720 to 734 feet elevation. Hence, the conclusion that the water levels for those two aquifers were similar under natural conditions.

If the water level in the glacial aquifer did not drop as the piezometric surface of the underlying dolomite aquifer was pulled down, then a "perching" condition would in fact be established. This continues to be the Kerr-McGee interpretation of the aquifer responses over the past 30 to 50 years.

No Revision in Text

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Chapter 2 (cont'd)

Page 2.19, paragraph (1) (ISGS) Question:

Although deteriorated or even open well casings probably exist in the vicinity of the site, it is not likely that this is the sole cause of groundwater contamination in the bedrock. The extent of pollutant loading undoubtedly allowed for natural migration of contaminants through permeable zones in the glacial drift to the bedrock.

KM Response: WCSP, page 2.19

WCSP plan does not state that open well casings are the sole cause of groundwater contamination in the bedrock. The plan acknowledges that "a hydraulic gradient is present for downward flow ..." (p. 2.18).

No Revision in Text

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Page 2.19, paragraph (2), page 2.20, Figure 2.6.2 (ISGS) Question:

The water levels used to construct Figure 2.6.2 do not represent those from 1976 as stated. They were from well log records, which span more than 30 years, collected by the Illinois EPA.

KM Response: WCSP, page 2.20

The figure, with title, was reproduced from the ANL report on hydrogeology. ANL informed Kerr-McGee on October 9, 1979, that the map was prepared from data from different dates and incorrectly titled.

An ANL discussion about background data and map preparation is reprinted beneath Figure 2.6.2, page 2.20.

Page 2.20 is revised

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Chapter 2 (cont'd)

Page 2.21, paragraph (2) (ISGS) Question:

Are there data to prove that the water table since 1975 has dropped below the elevation of the storm sewer? Since the storm sewer has continued to discharge water, it is likely that it intersects the water table prior to discharging into Kress Creek.

Secondly, the report states that the analyses in Table 2.6.3b may reflect groundwater discharge to the sewer rather than surface runoff from the site. However, the groundwater directly beneath the site which has discharge into the sewer has derived most of its contaminant load directly from the wastes on the site during infiltration.

KM Response: WCSP, page 2.21

Sheet "D" of the drawings at the back of the Kerr-McGee plan shows the position of the bottom of the storm drain in Sta. 5+50 North Plan Cross Section to be at 728 feet elevation. This is very near well B-3, location shown on drawing sheet "B". In the appendix of the ANL report, the water level elevation for well B-3 in 1976 was reported to be 727 feet, approximately 1 foot below the storm-drain elevation.

Kerr-McGee has never maintained that groundwater in the glacial sediments in the vicinity of the disposal site was unaffected by disposal operations at the site. Some of the chemical constituents found in the monitor wells and in the Kress Creek discharge were undoubtedly derived from past operations' at the site.

No Revision to Text

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Chapter 2 (cont'd)

Page 2.22, paragraph (3) (ISGS) Question:

The natural movement of groundwater may help "flush out" dissolved solids; however, natural infiltration continues to leach wastes contributing additional contaminants to the groundwater system. Also, measurable radioisotopes have been found in groundwater in the glacial drift.

KM Response: WCSP, page 2.22

The present disposal site has residue piles which have developed a crust over them after years of exposure. Near the piles, 4 of the 5 original ponds continue to be significant depressions which collect rainfall and runoff. The basic concepts of groundwater recharge strongly indicate that the pond areas are logically the points of significant groundwater recharge--places where water is allowed to stand long enough to infiltrate. The piles, on the other hand, generally cause rainfall to become surface runoff and, therefore, preclude any significant groundwater recharge through the piles. Present day avenues for groundwater recharge would be through ponds rather than through the piles. There is no evidence that present day leaching of the piles is occurring. But recent tests have shown that the piles are non-homogeneous and in part acidic. They will be neutralized with lime under the plan as revised.

Use of the term "measurable" in the Kerr-McGee plan was in context of "environmental significance" rather than in the strict sense of "detectable." The ANL report clearly presents data showing that radioactivity levels "do not exceed (in fact, do not even approach) those specified in 10 CFR 20." (p. 59)

Text is Revised

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Chapter 2 (cont'd)

Page 2.35 (ANL) Question 37:

The applicant has erroneously stated in the first paragraph of Section 2-8.2, page 2.35 that no aquatic biota exist in the disposal site. They should state that the ponds in the disposal site contain biota typifying farm ponds in the area. However, due to chemical and/or physical stresses the ponds contain more pollution tolerant biota.

KM Response: WCSP, page 2.35 revised

Text is Revised

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Page 2.36 (ANL) Question 32:

Page 2.36. Units needed for Fecal Coliform Count.

KM Response: WCSP, page 2.36 is revised

Units are expressed as colonies per 100 ml.

Text is Revised

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Chapters 2, 3

(ISGS) Question: Comments from Bergstrom, August 5, 1976, (Bergstrom/Wright Correspondence)

Mr. Gary Wright
Division of Radiological Health
Department of Public Health
535 West Jefferson Street
Springfield, Illinois 62761

Dear Mr. Wright:

This letter summarizes the Illinois State Geological Survey's review of Kerr-McGee Chemical Corporation's proposal to dispose of thorium-bearing solid wastes at their plant site at West Chicago, in NW1/4, NE1/4, NE1/4, Section 16, T39N, R9E., Du Page County. We have examined Kerr-McGee's report and data, the Illinois Environmental Protection Agency's field reports, geologic report, and analytical data on the site, and relevant data and reports in our own files.

We note that no hydrogeologic data are available on subsurface conditions at the disposal site. The nearest water wells whose logs give some indication of the nature of the glacial deposits overlying the Silurian bedrock are several hundreds of feet away from the site. Because the glacial deposits are quite variable at West Chicago and substantial beds of sand and gravel are encountered in many wells, we recommend that drilling be undertaken on the site and that the earth materials down to bedrock be carefully sampled to determine the sequence and nature of the unconsolidated deposits. The samples should be taken with a split-spoon and/or Shelby-tube sampler, analyzed for texture, origin, and other pertinent physical properties, and preserved for further examination by the Geological Survey. Several of the test holes should go to bedrock.

We consider that proof of the subsurface conditions is at least as critical at this site as it is at conventional sanitary landfill sites where subsurface exploration is required procedure.

Another hydrogeologic matter that concerns us is that there has been no consideration of the possible affects of regrading the site and creating a mound of earth fill, consisting largely of thorium waste. At other sites in Illinois where earth mounds have been created, groundwater mounds have commonly developed under them. Frequently springs of leachate appear on the flanks of the mound. We believe that the proposed operation at West Chicago raises the possibility that springs containing radio-nuclides and other metals will form at the surface. This possibility and the fact that the waste materials could have effects on the shallow groundwater reservoir suggest that monitoring of the site should also be a required part of the plan. At present, there are no sampling points for groundwater at the site.

Chapter 2, 3

ISGS

KM Response: To Bergstrom's Comments, WCHS, page 3.24

These comments are addressed in Chapters 2, 3 and 4. Discussions on the hydrologic concerns of using West Chicago as a disposal site are found on page v., Summary and Conclusions and in the response to the ISGS, page 2.18. Comment to initial ISGS question on the clay liner and potential groundwater mound is the same as that raised in the Bergstrom/Wright correspondence.

No Revision in Text

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Chapter 3 General

(ISGS) Question: Statements of Dr. R. A. Griffin, August 5, 1976
(Bergstrom/Wright Correspondence).

Dr. Robert A. Griffin of our Geochemistry Section makes the following observations relative to Kerr-McGee's analysis of their waste-disposal plan.

Kerr-McGee's basic premise is that thorium compounds are so insoluble that they will not go into solution in hazardous concentrations and will, therefore, not contaminate groundwater. They conclude that mixing lime with the solids will maintain a high pH and reduce the quantity of radioactive materials leached from the solid waste materials.

The solubility of ThO_2 at pH 3 is about 5×10^{-6} M (1.2 ppm) and goes to a minimum solubility above pH 6. Thus, ThO_2 has a low solubility but can't really be termed "insoluble." Thorium forms stable complexes with fluoride ion and with oxygen donor ligands. Therefore, the presence of fluoride or organic compounds in the waste could significantly increase the solubility of the thorium compounds.

The results of the leaching tests indicate that the wastes are a significant potential pollution hazard. The level of radioactivity leached from the solids is 100-10,000 times greater than is allowed in public water supplies, and the groundwater 9 feet below the site contains more than 16 times the amount of radioactivity normally found in groundwater.

The interpretation of the data by Mr. Van De Steeg in his December 16, 1975 communication is oversimplified and inaccurate. The conclusion that "alkaline solutions leach less radium from the samples than neutral or acidic solutions" is not supported by the data. Over half the samples leached with the alkaline solution contained more radioactivity in their effluent than those leached with the neutral solution. One of the effluents from the alkaline leaching contained more and three other effluents about the same amount of radioactivity as obtained from the acid leaching solution.

The second conclusion that "the presence of carbonates or bicarbonates increases the amount of radioactive materials leached" cannot be supported by the data presented for the reasons given above. I suggest that the pH and Na^+ ion content were important parameters that probably had more influence on the leaching than the carbonates.

The third conclusion that "the principal radioactive materials in the leach effluents are thorium and thorium daughters other than radium-224" is also not supported by the data and is based on faulty logic. The similar radioactive content of the two leaching fractions could be due to fast leaching of slowly soluble compounds, i.e., non-equilibrium conditions in the columns. The March 24, 1976

Chapter 3

ISGS

isotope analysis of the composite leach solution also shows the conclusion to be false. No thorium at all was detected and the major isotopes found were Ra-224, Ra-226, U-238 and U-234.

Mr. Van De Steeg states that the volume of water leached through the columns is equal to about 10 years of rainfall in the Chicago area. However, if the materials are of as low a solubility as Kerr-McGee claims, rapid leaching with a large volume of water may actually dilute the concentration of radioactivity. The concentration of radioactivity leached by slow percolations with one year's equivalent of rainfall may actually be much greater than the values listed in the tables.

Due to the high pollution potential of these wastes, adequate safeguards should be taken before disposing of them on the land. The high molecular weight (232) and cationic nature of thorium indicate that it should be tightly and preferentially adsorbed by clay minerals from pure solutions, especially at pH values above 6. This implies that if an adequate thickness of calcareous clayey material were placed between the waste and the groundwater, no contamination of the groundwater should occur. However, thorium readily forms complexes with fluoride and organic compounds that will increase its mobility through clay materials. Therefore, mixing of the thorium and other wastes or any other soluble salts should be avoided. I would recommend that the thorium hydrate solids (sample 9 - process intermediates) not be disposed of at this site, but should be hauled to a more secure disposal facility.

KM Response: WCSP, page 3.24

The detailed analysis of the sludge and tailings samples presented on Tables 3.2.3f and g, respectively, answer many of the differences of opinion occasioned by statements of Dr. Van De Steeg of Kerr-McGee's Technical Center on December 16, 1975 and Dr. Griffin's comments. However, they will be spoken to specifically where applicable.

Thorium solubility has a concentration of 1.2 ppm at pH 3 and less than 10^{-6} ppm at pH 9 (Encyclopedia of Chemical Technology, 2nd Edition, 1966, Kirk-Othmer). While it is perhaps semantically incorrect to call 10^{-6} ppm insoluble, nevertheless, for purposes of this discussion, this slight solubility reduces the credibility of significant leaching of thorium due to rain water seepage.

Further, thorium forms complexes suggested by Dr. Griffin only in the presence of strong acid concentrations. At normal pH, thorium fluoride is so slightly soluble that formation of these complexes in the waste pile is not credible.

Chapter 3 (cont'd)

ISGS

Review of the new leaching work done along with the results of neutralizing which occurred during this leach test, demonstrates that upon neutralization, the leachate formed would not contain significant quantities of radioactivity.

Dr. Van De Steeg's conclusion is based upon the fact that strongly alkaline solutions contain less bicarbonate, therefore, will leach less radium than neutral or acidic solution containing measurable quantities of bicarbonate as a leaching agent.

The anomaly of radium-226 increasing in the neutralized composite (sample 29) over the average seen elsewhere is believed to have been caused by the presence of high Ra-226 in the lime.

The data shown for the neutralized composite of samples 28 and 29 on Table 3.2.3f and g are those analyzed after 24 hours of leaching. We believe that this data is comprehensive in supporting our belief that the neutralized residues and tailings material will not leach any environmentally significant amounts.

Thorium hydrate solids have been removed from any consideration of burial at this site.

No Revision in Text

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Chapter 3 (cont'd)

Page 3.9 (IDPH) Question 9:

Page 3.9 - Please give chemical decay products and other potential problems which might result from disposal of rubber lined tanks.

KM Response: WCSP, page 3.9

Rubber lined tanks have outstanding resistance to weathering, various chemicals, oils and impact. They also feature high temperature resistance, extensibility and resilience. These properties coupled with removal and clean out of residuals or other items of equipment which may now be stored in the tanks, will reduce the opportunity for chemical action. Hence, the potential problem of forming chemical decay products is not significant.

No Revision in Text.

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Page 3.22 (UFLB-NRC) Question 3:

Tailings material is present in Kress Creek as a direct result of lack of control of tailings in the past. Kerr-McGee should address the problem of, and responsibility for, cleanup of Kress Creek.

KM Response: WCSP, page 3.22

Added to text Section 3.2.1.4 Tailings Waste Kress Creek.

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Page 3.23 (ISGS) Question:

The leachability and the hazardous nature of the 11,000 cubic feet of rare earth compounds stored in Building 19 should be addressed prior to final disposal.

KM Response: WCSP, page 3.23

These compounds will either be sold or neutralized with a lime slurry and disposed of by the method described in Section 4.19.

No Revision in Text.

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Chapter 3 (cont'd)

Page 3.22, Table 3.2.2(a), revised Appendix II, page 3 (ANL) Question 17:

Sludge pile volume is given here as $650 \times 10^3 \text{ ft}^3$. In Table 3.2.2(a) (page 3.22) it is given as $86 \times 10^3 \text{ ft}^3$. The same $650 \times 10^3 \text{ ft}^3$ value is used to represent the volume of the residue pile; however, the residue pile is clearly more voluminous than the sludge pile, please clarify.

KM Response: WCSP, page 3.22

The estimated volumes given in Table 3.2.2(a) are correct. The residue pile is the larger of the two. The sludge pile estimated in Appendix II is revised.

No Revision in Text; Appendix II Revised

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Page 3.23, Table 3.2.2(b) (ANL) Question 12:

Based on the volume, density, and activity concentration of U given elsewhere in the document, the mass of U_3O_8 in the sediment pile should be close to 1000 pounds. Why is the value given here (2800 lbs) so much higher?

KM Response: WCSP, page 3.23

Table 3.2.2(b) has been revised based on the data given in Table 3.2.3f and g.

Revised page 3.23

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Chapter 3 (cont'd)

Page 3.24 (ISGS) Question:

Comment 2: Long-term leaching by infiltrating rain water has already resulted in both radioactive and metal contamination of shallow groundwater. (See comments on leaching tests in attached material.)

Comment 3: The data in Table 3.2.3a do not indicate that groundwater quality is acceptable. Extensive chemical contamination is evident.

Comment 4: As subsequent analyses prove radioactive contamination in well B-2 was not "accidental"; and if it were, their methods would not prove it so.

KM Response: WCSP, page 3.24

The present condition of the residue and sludge piles has reached a level of stabilization. There is no evidence that present day leaching is contributing to the radioactive and metal contamination of shallow groundwater.

Results of extensive chemical tests are shown in Table f through j. Tests were conducted according to IEPA and USEPA-RCRA criteria. Heavy metal and radioactive species were found to be significantly lower.

It is Kerr-McGee's intention to strive to prevent impacts on groundwater quality. A comprehensive discussion on sampling data is found on pages 3.28 through 3.42.

No Revision in Text

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Chapter 3 (cont'd)

(ANL) Question 11:

The radiological analysis is well structured but needs to be better documented and extended in the following areas: (1) the basis for the radionuclides's activity concentrations in the sludge and residue piles is not adequate, (2) (Not applicable to this page. See Appendix II.)

(ANL) Question 13:

(Page 3.31, Table 3.2.3e). The isotopic analyses given here for the sludge and ore residues are based on a single sample from each. This is not adequate. It is suggested that at least 12 samples be taken, at three locations on each residue pile and at two depths per location. The samples should be broken down by particle sizes into <10 μm , 10 to 50 μm , 50-100 μm and several standard size groupings above 100 μm . The activity concentrations of the three smallest particle size groups should be measured.

Page 3.28, paragraph (4) (ISAG) Question 2:

There is insufficient data at the present in the Stabilization Report to be able to determine whether or not the material to be buried is or is not of a hazardous nature. The Stabilization Plan does not provide a comprehensive list of the materials proposed to be buried. Further, leachability tests have not been conducted on certain known elements such as fluorides and nitrates.

KM Response:

Revised page 3.28, and the addition of Tables 3.2.3f, g, h, i and j responds to the above questions.

* * * * *

Chapter 4

Page 4.1 (ISAG) Question 4:

The Stabilization Plan should demonstrate that it complies with regulations promulgated pursuant to the Resource Conservation Recovery Act and the Uranium Mill Tailings Act of 1979. In particular note proposed regulations on the Landfill Disposal of Solid Waste, 44 F.R. 18138 (3/26/79); Solid Waste Disposal Facilities Classification Guidelines, 43 F.R. 4942 (2/6/78); Standards Applicable to Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities (USEPA Draft Guidelines) (9/12/78 and 9/25/78) and Uranium Mill Tailings Licensing Criteria Relating to Construction of Major Plants, 44 F.R. 50012, 50015 (9/7/79). Further, the USEPA definition of what is a hazardous waste as articulated in forthcoming regulations pursuant to Section 3001 of the Resource Conservation and Recovery Act will be critical to a final decision. The most recent estimate of the promulgation date of most of the Section 3001 regulations is April of 1980. See, "Administrator's Third Quarterly Report on the Status of Development of Regulations Under the Resource Conservation and Record Act of 1976" dated October 15, 1979 as submitted pursuant to court order in State of Illinois vs. Costle, U.S. District Court for the District of Columbia (Civ. Act. 78-1689).

KM Response: WCSP, page 4.1

Kerr-McGee conducted tests to examine leachates under USEPA-RCRA for radioactive and non-radioactive species. Chapter 3 of the Stabilization Plan was revised to include analytical results of these test(s).

No Revision in Text.

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Chapter 4 (cont'd)

Page 4.1, 4.2 (ISAG) Question 2:

If the material to be buried is of a hazardous nature (either radiologically or chemically) then on-site burial is unsuitable. The hydrology and geology of the land are inappropriate for the burial of hazardous chemical or radioactive material. The geology of the site is not suitable for long-term containment of leachable solid waste due to the relatively high permeability of the soil. The potential for migration and pollution of the groundwater is significant. Evidence of this is the former use of this site for the percolation ponds and the degradation of the groundwater quality in the area.

The water table is relatively high in certain areas of the site and contamination of this aquifer in the past has been significant. Further, the potential for future contamination exist. We are unable to assess the potential for future contamination resulting from the construction activities associated with the excavations, dredging and operations.

To compensate for this, Kerr-McGee proposes to construct an artificial clay liner of 10 feet of clay under the material from the factory and a two foot artificial clay cap over the entire burial site. There is scant evidence about the suitability of artificial clay liners.

The use of a compacted clay liner as an engineering modification to the site is not acceptable because it is not a proven technology and cannot be relied upon for long-term containment. There is no evidence to show that clay type soil may be recompacted to achieve a permeability coefficient of 10^{-8} cm/sec. Further, such a device is inconsistent with Illinois Environmental Protection Agency's internal standard which requires a 10 foot liner of in-situ clay like soil. This problem is particularly acute in view of the location of the Kerr-McGee site within a popular residential area.

However, on the basis of the Stabilization Plan and the meeting held between members of the Attorney General's staff and Kerr-McGee technical staff on October 12, 1979, it appears that Kerr-McGee does not base its plan upon the suitability of the clay liner. Rather, Kerr-McGee believes that the material to be buried is not of a hazardous nature based on leach tests they conducted.

There is insufficient data at the present in the Stabilization Report to be able to determine whether or not the material to be buried is or is not of a hazardous nature. The Stabilization Plan does not provide a comprehensive list of the materials proposed to be buried. Further, leachability tests have not been conducted on certain known elements such as fluorides and nitrates.

On the basis of our October 12 meeting, Kerr-McGee has agreed to take certain steps to try to provide all the parties a list of what elements are contained in the material to be buried. Kerr-McGee technical staff would research their files and attempt to identify the raw materials used in their process operations and will attempt to do a material

Chapter 4 (cont'd)

Pages 4.1, 4.2 (ISAG) Question 2: (cont'd)

balance to identify those substances expected to be found in the waste streams of all the operations conducted at this plant. Tests may then have to be conducted on some of this material. Further, Kerr-McGee has committed itself to performing leachability tests on fluorides and nitrates and providing the parties with copies of the results. An informed assessment may then be made regarding the suitability of on-site disposal.

KM Response: WCSP, pages 4.1, 4.2

If a specific location for disposal of these waste materials is found which meets the criteria of all interested parties and is reasonable in terms of cost, Kerr-McGee will consider amendment of its plan now before the NRC to incorporate this conclusion.

In the meantime, a secure and stable clay formation is planned for use at the present West Chicago Disposal Site. To ensure reduced levels of contamination, Kerr-McGee plans to neutralize the waste material with lime. Kerr-McGee believes that the combination of clay liner and cover and waste neutralization will support stabilization and prevent environmentally significant water contamination above acceptable levels at the West Chicago Site.

A discussion on the nature of West Chicago plant wastes is attached as part of the response to Question 2, ISAG. Chapter 3 was revised to include recent analytical data on residue and pond sludge waste. Results on fluorides and nitrates are also included as part of the leachability tests.

No Revision in Text

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Chapter 4

ISAG

KM Response: WCSP, General.

NATURE OF WEST CHICAGO PLANT WASTES

To aid in understanding the nature of the wastes generated by operations at the West Chicago plant, following is a summary of the material input into the operation and output as products sold and wastes generated.

Waste materials were generated either as solids - such as filter cakes, etc., and trucked to the disposal site - or liquids containing dissolved salts and suspended materials, which were accumulated in the infiltration ponds.

In this summary, the wastes are considered to be of two kinds: (1) solids, represented by the accumulated residues described in the Stabilization Plan, originally transported to the disposal site as solid materials, or generated by precipitation in the liquid waste streams and the infiltration ponds, and (2) dissolved materials in aqueous waste streams.

For solid wastes, the time span considered is 1954 through 1973. This covers operation from the start of the "thorium expansion" in 1954 to shut-down in 1973. The quantity of solids remaining from operations prior to 1953, which were transferred to the disposal site in the early 1950's, is negligible compared to the solids accumulated since 1954, and are not essentially different in composition from them.

For dissolved materials in liquid wastes, only those products in the period 1970-1973 are estimated. The 1970-1973 dissolved materials in the wastes are not essentially different in composition from wastes generated before 1970.

Only the kinds of purchased chemicals (other than ore) introduced into the West Chicago plant processes are presented here. Quantification of the input of these chemicals serves no useful purpose in understanding the nature of the wastes, since they all left the chemical processing operations as part of rare earth and thorium products sold, or entered the waste streams as unrecoverable process chemicals or reaction products.

Ore input, 1954-1973/Rare Earth and Thorium Material Balance

Table 1 summarizes ore input, and Table 2 summarizes output as rare earth and thorium products sold and entering the waste system. Rare earth and thorium values are expressed as oxides (RE oxide and ThO_2) regardless of their actual compound form. Average rare earth content of the monazite and bastnaesite ores used was taken as 54% RE oxide, and the average thorium content of the monazite used was taken at 4% ThO_2 . Recovery of both rare earths and thorium as saleable products was 75%, with 25% passing into the waste stream.

Table 1. Ore Input, 1954-1973

<u>Years</u>	<u>Ore</u>	<u>Tons</u>	<u>Tons Contained Oxides</u>	
			<u>RE Oxide</u>	<u>ThO₂</u>
1954-1962	monazite	60,000		
1963	none			
1964-1969	monazite	4,980	44,226	3,276
	bastnasite	8,520		
1970-1973	monazite	3,320		
	bastnasite	5,080		
TOTAL		81,900	44,226	3,276

Table 2. Rare Earth-Thorium Material Balance, 1954-1973 Cumulative

Rare earth input	44,226 tons contained RE oxide
output as products*	33,170 tons contained RE oxide
output to waste	<u>11,056</u> tons contained RE oxide
Total	44,226 tons contained RE oxide
Thorium input	3,276 tons contained ThO ₂
output as products*	2,457 tons contained ThO ₂
output to waste	<u>819</u> tons contained ThO ₂
Total	3,276 tons contained ThO ₂

*Products are those described in the Stabilization Plan.

Solid Wastes. Except for small amounts of leachable materials resulting from entrained liquid wastes, the solid residues on the disposal site consist of:

- (1) Gangue and unreacted ores: These will contain an estimated 5 to 10% of the rare earth-thorium input in the form of unreacted monazite and bastnasite ores. Gangue minerals include silica, quartz, barite, zircon, ilmenite, rutile, fluorspar, apatite, and other minerals commonly associated with monazite and bastnasite.
- (2) Barium sulfate: Barium was always added to the initial "cracking" process for monazite ore to serve as a carrier for radium and mesothorium. In addition, one of the rare earth optical polish processes used barium carbonate as a recycled reactant, and barium losses from this process would end up as insoluble barium sulfate in the waste streams.
- (3) Insoluble rare earth and thorium compounds: Rare earths and thorium materials entered the liquid waste streams as water soluble salts and as insoluble compounds in water slurry form. The liquid waste streams contained sufficient fluoride, phosphate, carbonate and hydroxide anions to completely precipitate both rare earths and thorium as the corresponding insoluble compounds. These insolubles accumulated in the infiltration ponds and were periodically dredged out. The addition of sulfuric acid to the infiltration pond system, required to keep the ponds operating, had no effect on the insolubility of the rare earth and thorium insolubles; hydroxides or carbonates in the slightly acid liquid environment were converted to insoluble fluorides and phosphates.
- (4) Soil, gravel and related materials.

Soluble components of liquid wastes. Table 3 lists the annual amounts of soluble components of entering the liquid wastes, after neutralization of the wastes with sulfuric acid to pH 3. Time period is for the years 1970-1973.

Table 3. Soluble Components of Liquid Waste, 1970-1973

<u>Component</u>	<u>Tons per year</u>
Sodium sulfate, Na_2SO_4	4,236
Sodium chloride, NaCl	2,675
Sodium fluoride, NaF	638
Sodium phosphate, NaH_2PO_4	220
Ammonium chloride, NH_4Cl	94
Ammonium sulfate, $(\text{NH}_4)_2\text{SO}_4$	38
Calcium chloride, CaCl_2	15
Ethylenediaminetetracetic acid	<u>1</u>
TOTAL ANNUAL DISSOLVED SOLIDS	7,917 tons

Approximate concentration of dissolved solids - 0.13 pound per gallon after neutralization.

Chemical input, exclusive of ores. The chemicals listed in Table 4 were purchased for processing operations. These materials went out as components of rare earth and thorium products, or ended up in the waste streams. Many of these were recovered to the extent possible and recycled in processing.

Table 4. Purchased Chemicals for Processing

	<u>Note</u>		
Sulfuric acid, 98 and 104%			
Caustic soda, 50%			
Hydrochloric acid, 33%			
Sodium sulfate	(1)		
Barium chloride	(1)		
Sodium carbonate			
Hydrofluoric acid, 70%			
Nitric acid, 68%			
Ammonium nitrate			
Ammonia Oxalic acid	(1)		
Ethylenediaminetetracetic acid	(1)	(2)	
2-ethylhexyl phosphate	(1)	(2)	(3)
Kerosene	(1)	(2)	(3)

Notes

- (1) Extensive recycling.
- (2) Essentially all completely recycled; losses were small.
- (3) Inventory of about 10,000 gallons of 20% solution of the ethylhexyl phosphate was dumped on the disposal site after the shutdown in 1973. The "Registry of Toxic Effects of Chemical Substances," 1976 edition, gives toxicity data for 2-ethylhexyl phosphate, which indicates low toxicity: LD₅₀ rat = 4940 mg/kg; intraperitoneal muscular, rat LD_{L0} = 63 mg/kg; skin, rabbit LD₅₀ = 1250 mg/kg.

Chapter 4 (cont'd)

Page 4.2, paragraph (4) (ISGS) Question:

Monitoring well B-2 should be overdrilled and plugged to ensure sealing.

KM Response: WCSP, page 4.2

The condition of all monitoring wells will be inspected and repairs, replacement and/or sealing performed as necessary.

No Revision in Text

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Page 4.2 ((IDPH) Question 5:

If on-site disposal is selected, permanent markers should be constructed which describe composition of buried materials and the precautions recommended in future use of the disposal site. Also, markers should be placed at the location of the 77 "hotspots" so that precautions can be taken if the material should ever be excavated.

KM Response: WCSP, page 4.2, 4.41

The Disposal Site will not present a health and safety hazard to the public. While the Site remains under license, Kerr-McGee will comply with Nuclear Regulatory Commission (NRC) regulations.

Under current law, the Site will be transferred to the State of Illinois or Federal Government prior to the termination of the NRC license.

Argonne has concluded that the 75 thorium residual areas are not health or safety hazards; the plan states that Kerr-McGee will remove the material from one area.

No Revision in Text

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Page 4.3 (UFLB-NRC) Question 4:

If on-site stabilization is selected, rain water may collect in the lined area before the area is capped and the water may be contaminated. Provisions for sampling the water and for disposal of the water should be included in the plan.

KM Response: WCSP, page 4.3

Water accumulated will be sampled, analyzed, neutralized, if necessary, and pumped to pond #4 for disposal.

Text is revised.

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Chapter 4 (cont'd)

Page 4.3 (ANL) Question 12:

No mention is made of dewatering at all. At least a small paragraph as to why this is not necessary seems in order. If it is still contemplated, details are needed in the report.

KM Response: WCSP, page 4.3

In the early 1950's, a borrow pit was excavated on the disposal site as a source of foundation material for Building #9 on the building site. For practical reasons, the excavation was extended only to the water table which was approximately 20 feet in depth at that time. Shortly thereafter, this excavation became the number one disposal pond for plant waste liquid and sludge.

Since the Stabilization Plan was submitted in August, 1979, Kerr-McGee has drilled and sampled the sludge in Pond #1 to determine its physical characteristics. It will be necessary to use a dredge to remove the solids. Groundwater information obtained from nearby wells indicates that the water table may be found several feet above the base of the sludge. In the event that significant groundwater is encountered, the Plan will include dredging of all solids and (with the use of end-dump methods) fill will be placed in the excavation and a control sump will be constructed at the water table elevation to remove liquids, as clean fill is placed, so as not to create a mounded water table condition. The liquid collection in the sump will be pumped to Pond #4 for evaporation. This pond has been noted to be tight, permitting very little seepage.

If groundwater inflow problems are major, Kerr-McGee will use sheet piling driven into the clay layer beneath Pond #1 to control groundwater.

Page 4.3 was revised with additional comments.

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Chapter 4 (cont'd)

Page 4.7 (USEPA) Question 5:

RADIOACTIVE MATERIALS MAY BE LEACHED INTO WATER TABLE.

Figure 4.4 shows ore residue and building rubble placed directly on the surface. Tables 3.2.3c and 3.2.3d do not show that waste samples were tested for leachability of uranium, thorium, or radium. Unless some assurance can be produced that radioactive species will not be transported into the water table, all of this material should be placed within the clay liner also.

KM Response: WCSP, page 4.7, Figure 4.4; page 4.19

Leachability data on waste samples is shown in Tables 3.2.3f and g.

The procedure for handling the ore residue and building rubble is discussed in the revision page 4.19.

Text is revised

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Page 4.9 (USEPA) Question 10(b):

The Eberline E-120 with HP-190 probe is primarily a beta-gamma instrument. An alpha probe would be much more appropriate in light of the predominant contamination.

KM Response: WCSP, page 4.9

Alpha survey instruments are also used.

No Revision in Text

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Chapter 4 (cont'd)

Pages 4.11, 4.16 (USEPA) Question 7:

PROVISIONS FOR FUTURE SITE MAINTENANCE NOT EXPLICIT.

Maintenance of the site after disposal has been completed is not clearly set forth. Several questions remain including:

- 1) Who will survey the site (at what intervals)?
- 2) Who will check for erosion (and repair it)?
- 3) Who will check for damage to the clay cap, including cracks and penetrations of animals and insects (and repair it)?
- 4) Who will be responsible for site security?
- 5) Further, who will be financially responsible for these tasks?

KM Response: WCSP, pages 4.11 4.16

It is clearly stated in the text of the stabilization plan that the NRC license will continue for a period during which KM would perform the functions questioned. At some future date, ownership of the site will revert to either the state or the federal government as provided in the Uranium Mill Tailings Radiation Control Act.

No Revision in Text

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Page 4.13 (USEPA) Question 6:

PROVISIONS FOR TEMPORARY STORAGE OF RADIOACTIVE MATERIALS NOT EXPLICIT.

Contaminated materials will be stored for shipment offsite or for onsite burial. It is not clear where they will be stored, how they will be protected, how they will be surveyed, and with what frequency they will be surveyed.

KM Response: WCSP, page 4.13

Provisions for temporary storage of radioactive materials is discussed in the Kerr-McGee Radiological Health Program. Related instructions are covered in the Radiation Control Policy and Safety Manual.

No Revision In Text

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Chapter 4 (cont'd)

Pages 4.14, 4.16 (USEPA) Question 3:

THE SAMPLING WELLS MAY BECOME RADON VENTS.

- a) The two sampling wells at the west end of area 1 may become radon vents unless properly controlled. If radon buildup is to be assessed then perhaps more widely separated wells would be desirable.
- b) It is not clear whether sealed wells will penetrate the clay cap. If they do then a possible radon vent may be created.

KM Response: Pages 4.14, 4.16

More widely separated wells would not serve the purpose intended for the two sampling wells. If it is concluded that these two wells may become radon vents, anti-diffusion collars could be placed upon them. It is not expected that the material contained in area 1 will be a major source of radon.

No Revision in Text.

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Page 4.14 (IDPH) Question 3:

Sewer relocation in the southern part of the site was deemed necessary by the KMCC Decommissioning Plan of December, 1978. Why is this not mentioned in the Stabilization Plan of August, 1979?

KM Response: WCSP, page 4.14

Relocation of the sewer of the southern part of the site thought necessary in 1978 is not believed to be required under the current Plan.

No Revision in Text.

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Chapter 4 (cont'd)

Page 4.14 (City of WC-City Eng) Questions 1, 2, 3:

The following points should be brought to the NRC and Kerr-McGee's attention:

- 1) The proposed detention basin must be designed in accordance with our Storm Water Storage Area ordinance. This will require a low flow pipe system through the basin, the proper release structure and other details. These items will be required prior to the issuance of a permit for the Storm Water Storage Area which is called to be constructed in the first phase of their proposed work.
- 2) The proposed work must be in compliance with the City's Soil and Erosion Control ordinance. The problem of on site erosion is mentioned in the report as is the use of the Storm Water Storage Area as a silting basin, but the details of the silting basin, etc., must be provided before any site work is started.
- 3) All water and sewer services to the site must be disconnected from the City mains upon completion of the site work.

KM Response: WCSP, page 4.14

The detention basin and property work will be in compliance with the ordinances. Some detailed engineering work remains to be accomplished prior to commencement of earth work.

All water and sewer services will be disconnected from the city mains upon completion of reclamation.

No Revision in Text

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Chapter 4 (cont'd)

Page 4.16 (City of WC-City Eng) Questions 4, 5:

- 4) The location of the proposed access road should be along private property South of the site directly onto Roosevelt Road. The Plan mentions the possibility of utilizing Joliet Street from approximately the West Chicago Manor to Roosevelt Road. This should not be allowed for two reasons: 1) The City, in cooperation with the State and Federal Governments, plans to widen and resurface Joliet Street some time in the next two years. This work would interfere with the proposed Kerr-McGee Plan. 2) The routing of traffic to Joliet Street would disrupt the residential traffic along Joliet Street. Routing trucks directly South would inconvenience only a commercial and industrial area.
- 5) Adequate provisions must be made to control dust on the haul roads within the site and off site.

KM Response: WCSP, page 4.16

Kerr-McGee has stated on page 4.28 that plans for installation and use of the new access road will be coordinated through the City Traffic Department. This access road would connect with Joliet Road approximately 1/4 mile North of Roosevelt Road. A traffic survey conducted on Joliet Road revealed that the number of vehicles observed (6000 vehicles per 24 hours) was nearly 3 times less than the traffic observed (16,000 vehicles per 24 hours) on Roosevelt Road. Entry of traffic from the Disposal Site onto Joliet Road is on level ground, while traffic entering Roosevelt Road must negotiate a dip in the road to allow for a railroad underpass. The traffic survey also concluded that visibility is better for Disposal Site traffic when entering or exiting onto Joliet Road. Additionally, posted speed limits on Joliet Road are lower than the speed limits posted on Roosevelt Road.

No Revision in Text

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Chapter 4 (cont'd)

KM Modification: WCSP, page 4.17, Volumned Waste Reduced by Incineration.

The use of an incinerator will be subject to a separate licensing by NRC.

Text is Revised

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Chapter 4 (cont'd)

Pages 4.17, 6.7 (USEPA) Question 12(a):

CONTROL OF LIQUID RADIATION WASTE

- a) On pages 4.17 and 6.7 it is specified that a nozzle-fog system will be used to keep down airborne contamination. This will generate a liquid radiation waste. What provision will be made to control this secondary waste?

KM Response: WCSP, pages 4.17, 6.7

Page 4.17 states that the water used for fogging will be returned to a lagoon; contaminants will be precipitated and filtered from the water.

No Revision in Text

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Pages 4.18, 4.22 (USEPA) Question 4:

CONTAMINATED TOPSOIL MAY BE USED AS COVER

It appears that some contaminated excavation material and topsoil may be used over the clay cap as cover (page 4.18, Area 1, (b) and page 4.22, Disposal Site, (b)). In no case should clay or topsoil materials be used, either from onsite or offsite, when they will contribute to the radioactive emissions of the waste site.

KM Response: WCSP, pages 4.18, 4.22

Any material selected for use as a cover of the pile will contain radium (See page 2.39) and emit radon whether it is from the site or off the site since the general soil of Illinois contains a detectable quantity of radium. Sources will be screened in order to minimize this effect.

No Revision in Text

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Chapter 4 (cont'd)

Page 4.19 (USEPA) Question 13:

On page 4.19, it is stated that a dragline will be used to excavate ponds 2 and 3. How will this dragline, and indeed all machines and tools be decontaminated after use? Where will the waste go?

KM Response: WCSP, pages 4.19, 4.19a

Text is revised

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Chapter 4 (cont'd)

Page 4.19(d) (IDPH) Question 10:

If these sediment materials are wet, they could later cause subsidence problems.

KM Response: WCSP, page 4.19(d)

While the sediment materials are wet and the moisture content is relatively high, as demonstrated by Table 3.2.3c, such a condition does not necessarily cause subsidence. Placement of the materials and subsequent compaction by machine will assure that such subsidence experienced is minimal.

No Revision in Text

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Page 4.21 (City of WC-City Eng) Question 6:

As a final determination of the ultimate use of the site has not been made, I feel the City should examine the existing park and open space availability in the southern section of the City and determine if this land will blend into the existing open area. The West Chicago Park District recently improved an area of land West of the Kerr-McGee site called Pioneer Park. It may be feasible and desirable to connect these two parcels of property so as to enhance the nature and variety of activities available to the residents of the City of West Chicago.

KM Response: WCSP, page 4.21

Kerr-McGee believes that the final topography of the Site reclaimed by grading, landscaping and revegetation will improve the land for selective future use.

No Revision in Text

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Chapter 4 (cont'd)

Page 4.22 (UFLB-NRC) Question 5:

If contaminated water is detected in the lined area after stabilization is completed, how would the water be handled?

KM Response: WCSP, page 4.22

During the monitoring program, detectable water will be analyzed for radioactive and non-radioactive parameters. If the water is polluted, it will be pumped and transported to a waste disposal site.

No Revision in Text

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Chapter 4 (cont'd)

Page 4.22 (IDPH) Question 2:

If the material is disposed on-site, IDPH believes clay should surround all material. The more leachable material should be surrounded by a separate liner. This would provide a more conservative method of disposal.

KM Response: WCSP, page 4.22

Leachable materials will be subjected to a lime (CaO) treatment. Kerr-McGee believes this approach coupled with a clay cover is a reasonable and conservative method of disposal.

See Revision in Text, page 4.19

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Page 4.22 (IDPH) Question 11:

Radiological Survey (a) - The pressurized ion chamber in addition to being calibrated over a wide range of energies should have a known efficiency calibrated for the 239 kev gamma of Pb-212. In addition, the survey should be conducted at ground level as well as at one meter so that dose extrapolations may be made to other points.

KM Response: WCSP, page 4.22

The pressurized ion chamber will be calibrated over a wide range including 239 kv gamma of Pb-212. Radiological surveys will be conducted to determine levels of radiation at ground level as part of the routine to support work programs.

No Revision in Text

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Page 4.22, paragraph (1) (ISGS) Question:

Any permanent cover over the disposal areas will require periodic maintenance as a result of unavoidable settlement of the fill.

KM Response: WCSP

Routine periodic inspection of cover is discussed in Section 7.2 (pages 7.1 and 7.2), Monitoring Program for Site Surface and Vicinity. Appropriate maintenance, will be performed as necessary.

No Revision in Text

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Chapter 4 (cont'd)

Page 4.28 (ANL) Question 3:

More discussion is needed concerning location, mitigative measures and reclamation of borrow areas.

(ANL) Question 11:

There are still no specifics on borrow area, location, potential impacts and mitigative and reclamation measures.

KM Response: WCSP, page 4.28

Questions 3 and 11 from ANL are discussed in the revision on page 4.28.

Text is revised.

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Page 4.28 (ANL) Question 8:

In the Summary and Conclusions, Kerr-McGee states that "the most significant negative impact of Kerr-McGee's plan on the residents of West Chicago will be the increase in truck traffic in vicinity of the facility during implementation of the plan" (page iv). On page 4.28 of the ER, it states "Kerr-McGee is exploring means to minimize the inconvenience to the community, including the use of railroad transportation to bring clean materials on site". However, the preferred plan limits transport of materials to the site by truck. The revised ER should indicate how local agencies will be involved in the transportation planning for decommissioning including routes, road repair, and signing. Will there be local agency approval of the traffic plan?

KM Response: WCSP, page 4.28

Text is revised.

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Chapter 4 (cont'd)

Page 4.29 (ANL) Question 9, 10:

- 9) The ER concludes on page 4.29 that noise emission levels are not anticipated to be a health hazard. However, no current noise levels have been measured at the site. The noise levels from heavy equipment at the site have not been cited nor have the noise levels to nearby residences been calculated. These calculations should be made and reflect both indoor and outdoor noise levels due to onsite heavy equipment; and include noise due to truck traffic entering the site from the proposed routes of travel.
- 10) There should be some provision for traffic coordination and monitoring during the three year decommissioning process.

KM Response: WCSP, page 4.29

Since specific equipment has not been selected for the work site, specific noise levels cannot be estimated. Application of the methods described in "Handbook of Noise Control", result in calculated noise levels of 66 to 84 dB. Upon selection of specific equipment, these estimates will be refined.

Plans for the traffic pattern will be coordinated with the City Traffic Department. Liaison with City Traffic Engineers will be maintained throughout the Stabilization program.

No Revision to Text

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Chapter 4 (cont'd)

Page 4.36 (USEPA) Question 8:

SUPERVISION OF THE RADIATION MONITORING PROGRAM

On page 4.36, it is stated "a qualified, registered professional soil engineer" will be employed to monitor clay compaction. It is stated "a qualified, board certified professional health physicist" will be employed to supervise the radiation monitoring program. What provisions will be made in this regard?

KM Response: WCSP, page 4.36

An onsite practicing qualified health physicist has been provided and his activities will be functionally supervised by our certified professional health physicist in accordance with the Kerr-McGee Radiological Health Program.

No Revision to Text

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Pages 4.36, 4.38; Letter, Page 2, paragraph (2, 3) (IEPA) Question:

Section 4.4.10 (page 4.36), Control of Clay Placement, contains data on only one source of clay soil, from an unspecified location, and of the three permeability tests performed on the material, (page 4.38) all exhibited permeabilities higher than 1.0×10^{-8} cm/sec.

Again, the Agency must recommend against the onsite disposal of Kerr-McGee's non-radioactive chemical waste at its West Chicago, Illinois facility.

KM Response: WCSP, pages 4.36, 4.38

An additional search has been made for clays in the West Chicago area and are reported in the revised plan. Soil engineers have advised that the application of Bentonite on clay courses will ensure an implaced permeability of 10^{-8} cm/sec.

Text is Revised. See page 4.38

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Chapter 4 (cont'd)

Page 4.36, paragraph (2) (ISGS) Question:

Although the use of montmorillonite based clays with a high exchange capacity for pollutant containment may be recognized, the clayey soils in the vicinity of West Chicago are not montmorillonite based; they are illite based with quite low exchange capacity.

Pages 4.37 and 4.38 (ANL) Question 4:

What is the source (location) of silty, clay deposits tested as liner and cap material?

KM Response: WCSP, page 4.36

Soil consultants are undertaking a comprehensive review of the best location available that can be economically obtained and logistically supported.

Text is Revised. See pages 4.37 and 4.38

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Chapter 4 (cont'd)

Page 1, paragraph (4) (IEPA) Question:

These comments address only the proposed disposal of non-radioactive wastes at Kerr-McGee's West Chicago facility. Permitting authority for the radioactive waste disposal rests with NRC and the Illinois Department of Public Health.

By reference, we are re-submitting written comments made to you by John S. Moore, Manager, Division of Land/Noise Pollution Control, dated March 6, 1979.

To iterate: The Agency would not consider onsite disposal of the non-radioactive chemical waste unless the minimum geological requirements of this Division are met. These requirements consist, in part, of at least 10 feet of clay, with a permeability not exceeding 1.0×10^{-8} cm/sec., on both the bottom and sides of any excavation. Should any more permeable layers of materials be encountered during the construction, they must be overexcavated and backfilled with a minimum of 10 feet of the 1.0×10^{-8} cm/sec. permeability clay. No general plans which consider artificial liners or less than 10 feet of the required clay would be acceptable to this Agency.

The latest Kerr-McGee Decommissioning and Stabilization Plan ignores the above requirement as did the prior plan in Disposal Areas 2 and 3. (See Site Plan - page 4.4 and Cross Section Sheet D.)

KM Response: WCSP, page 4.4 (Cross Section Sheet D) page 4.38

Kerr-McGee, as a result of several discussions with the IEPA, planned the lining of Area 1 in accordance with IEPA's suggestion of 10 feet of clay with permeability not exceeding 10^{-8} cm/sec. This liner was to be provided because the nature of the material planned for storage in Area 1; i.e., plant equipment and metallic wastes which could result in unforeseen solubility and leachability.

Applying this same liner design to Areas 2 and 3 does not seem justified to Kerr-McGee for the following reasons:

- 1) Further investigation of the residue material to be stabilized has resulted in recognizing the desirability of neutralizing the residues by the addition of sufficient lime to ensure a pH of at least 8. As demonstrated on Tables 3.2.3f and g, such neutralization reduces the leaching characteristics of the residues to a level that is relatively insignificant and within acceptable limits of the proposed RCRA Regulations.
- 2) The placement of a clay liner of a 10 foot thickness and 10^{-8} cm/sec. permeability requested for Areas 2 and 3 would result in the formation of a container with limited permeability on the top and greatly restricted permeability on the bottom. In the event

of even minor leakage, liquid would accumulate on the bottom liner and over a period of time gradually fill the container. At some future time, seeps at the junction of the top and side would result in what would be considered a "leachate spring." There is no sound technical or economic argument for encapsulating the wastes which will be in Areas 2 and 3. The low permeable surface cover will allow extremely low infiltration through these wastes. The small amount of leaching which might occur would be virtually undetectable in the groundwater flowing beneath the disposal site.

- 3) Given the control proposed for the placement and compaction of the surface cap and the absence of a possibility of a hydraulic head on such surface cap, significant leakage through the cap is not believed to be a creditable occurrence in our view.
- 4) RCRA proposals for this area of the country require significantly less thickness of liner and allow a higher permeability by a factor of 10.
- 5) Other agencies with expertise in this field such as the USGS, support the RCRA conclusions that when containment is necessary, the design should permit the controlled release of any leachable components within the waste area.

As a consequence of these conclusions, the text has not been revised to respond.

The second comment on page 4.36 has been responded to by revising the data on clay soils.

No Revision in Text

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Chapter 4 (cont'd)

Page 4.38 (ISGS) Question:

Although the specifications call for a clay liner and cover with a permeability of less than 10^{-8} cm/sec., the results of the laboratory tests on samples of clay from the vicinity indicate that all have coefficients of permeability greater than 10^{-8} cm/sec., as much as 10 times greater (and these results are apparently for highly compacted samples).

KM Response: WCSP, page 4.38

Kerr-McGee intends to use the best locally-derived clay which can be found for the clay-liner base, sides, and top. Additionally, the clay will be compacted within reasonable working limits to attain the lowest possible permeability. It is of interest to note that proposed RCRA rules state--"Low permeability liner materials are specified as those with permeability equal to or less than 1×10^{-7} cm/sec., which is typical of tight clay soils" (Federal Register 12-18-79, Page 18140).

No Revision in Text

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Page 4.41, paragraph (2) (ISGS) Question:

The suitability for disposal of the radioactive wastes from Reed-Kepler Park in the unlined disposal area #3 should be addressed.

KM Response: WCSP, page 4.41

Since radioactive wastes from Reed-Kepler Park are of similar materials to that considered for disposal area #2, their characteristics should not be any different than materials in area #2.

No Revision in Text

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Chapter 4 (cont'd)

Page 4.41 (ISAG) Question 3:

The Stabilization Report is inadequate due to its failure to consider those sites within the West Chicago area where thorium has been deposited and which if it were disturbed would result in radioactive levels in excess of those 10 CFR, Part 20.

Argonne National Laboratories has identified some 75 thorium residual areas within West Chicago where thorium from Kerr-McGee predecessor-in-interest has been deposited. Many of these sites, if disturbed, would contain radioactive levels in excess of those levels permitted by 10 CFR 20, Part 20. These sites pose both a present and a future health hazard to the citizens of West Chicago and Illinois.

Kerr-McGee's Stabilization Plan proposes only that it will exhume and safely dispose of one site which, without being disturbed, has levels of radiation in excess of 10 CFR, Part 20. Kerr-McGee also indicates that it will provide space in its onsite burial ground, without accepting legal responsibility for the thorium residuals located at Reed-Keppler Park, providing someone else will exhume the material transported to Kerr-McGee's burial site.

There can be no question that the material found at the 75 West Chicago residual sites in question are generated by Kerr-McGee predecessor-in-interest. Materials identical to the material at the Kerr-McGee site and there is no other generated in the area of the thorium tailings. This is a conclusion which is arrived at by researchers for Argonne National Laboratories in "Thorium Residuals in West Chicago, Illinois" (NUREG CR-0413).

Therefore, Kerr-McGee must propose as part of its Stabilization Plan a safe and adequate method of identifying, exhuming, transporting, storing and disposing of the thorium tailings at those sites in West Chicago which cannot meet the release criteria of the NRC regulations if disturbed.

In discussing this issue with Kerr-McGee officials at our meeting of October 12, 1979, they raised the question of whether the problem of thorium residuals can be considered in a separate plan. The Attorney General's Office has no objection to not including the Thorium Residual Plan in the Stabilization Plan so long as: 1) a Thorium Residual Plan is developed as expeditiously as possible and 2) the Stabilization Plan does not preclude any reasonable options for the disposing of thorium residual piles and approval for the plans be given concurrently.

KM Response: WCSP, page 4.41

Kerr-McGee does not believe that disposal of the residue areas within West Chicago lies within the scope of the Stabilization Plan for the Site.

No Revision in Text

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Chapter 5

Pages 5.1, 5.2 (ANL) Question 31:

The mass emissions of NO_x, SO₂, and particulates from vehicular traffic are given. What are the temporal dimensions of these releases? How do you know the air quality will be impacted to a small extent? Did you estimate short-term, down wind concentrations for conditions of poor diffusion?

KM Response: WCSP, pages 5.1, 5.2

The mass emissions are the totals calculated for the releases during the three phases of the reclamation.

Short-term down wind concentrations were not calculated.

Text is revised; first sentence under Section 5.1 was modified.

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Chapter 5 (cont'd)

Page 5.3, Table 5.1 (ANL) Question 14:

The units of the values given in this table should be provided.

Page 5.3, Table 5.1 (IDPH) Question 12:

What are the units on this table?

Page 5.3, Table 5.1 (USEPA) Question 16:

Dose rates have no units.

KM Response: WCSP

Millirem (mrem) is the correct unit for Table 5.1

Text is revised

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Chapter 5 (cont'd)

Page 5.7, paragraph (2) (ISGS) Question:

Groundwater quality may be gradually improving, but how does this imply that a stable condition has been established? Liquid discharges have ceased, but undoubtedly leaching has continued with a corresponding decrease in the pollutant load on the groundwater system.

KM Response: WCSP

The cessation of liquid discharges has reduced the potential impact to the groundwater quality. This implies that the present condition of the residue and sludge piles has reached a level of stabilization. The pond areas are the logical candidates for groundwater recharge, while the piles generally cause rainfall to become surface runoff and, therefore, preclude any significant groundwater recharge through the piles. There is no evidence that present day leaching of the piles is occurring.

No Revision in Text

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Pages 2.35, 5.7 (ANL) Question I.4:

There is still no adequate characterization of site area terrestrial biota.

KM Response: WCSP, page 2.35, page 5.7

Page 2.35 is revised to include a discussion on terrestrial biota.

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Chapter 5 (cont'd)

Page 5.7, Section 2.6.1, 5.7 (ANL) Question 1:

There is no discussion of offsite surface water (e.g., Kress Creek and West Branch Du Page River). These streams ultimately receive runoff from the site and should be included in vicinity drainages discussion especially Kress Creek as this creek is mentioned later in Sections 7, 8 and 9. Impacts on these streams should be discussed in Section 5.

KM Response: WCSP, page 5.7

Section 2.6.1 was revised and the impacts of surface water upon Kress Creek and West Branch Du Page River is described on page 5.7.

Text is Revised

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Chapter 5 (cont'd)

Page 5.7, paragraph (3) (ISGS) Question:

The purpose of the cover and stabilization effort is to reduce, not prevent, potential impacts on groundwater quality. It should be recognized that infiltration will continue to slowly leach the waste materials although theoretically at lower rates.

KM Response: WCSP, page 5.7

With proper cover placement and maintenance, the infiltration can be reduced to an undetectable amount using practical methods of measurements. In such a situation, the cover may be considered to be preventing a potential impact to the groundwater quality. It is Kerr-McGee's intention to strive to prevent infiltration.

No Revision in Text

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Page 5.8, Section 5.6.2 (ANL) Question 5:

Please explain how recharge will improve Kress Creek water quality.

Page 5.8, Section 5.6.2 (ANL) Question 38:

In Section 5.6.2 (page 5.8) the applicant should add that the onsite aquatic biota will be eliminated. However, their elimination will not be of significance as the species inhabiting these ponds are common and generally distributed over the Midwest.

KM Response: WCSP, page 5.8, Section 5.6.2

Text is revised.

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Chapter 6

Page 6.2 (USEPA) Question 16(c):

Additional Points

Unequivocal statements of no adverse impacts in such sections as 6.1.1.1, 8.4.1., 8.6.1 and 8.6.2 are unfounded and speculative.

KM Response: WCSP

The statement of no adverse impacts was addressed in the rewrite of Sections 8.4.1, 8.6.1 and 8.6.2. The statement does not appear in Section 6.1.1.1.

No Revision in Text

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Chapter 6 (cont'd)

Page 6.4 (USEPA) Question 14(a)(b):

CONSEQUENCES OF A LARGE RELEASE

On page 6.4 the dose calculation was not weighted for the quantities of ThO_2 and U_3O_8 present. Rather than 10% of the dose for the GEIS accident, the dose should be the same (see attachment, IV).

If a large release occurred, what provisions would be made for monitoring, dose assessment, and cleanup in the surrounding residential and commercial areas?

KM Response: WCSP, page 6.4

The dose was weighted in terms of combined specific activity for the same total release as a model mill and the anticipated dose is approximately 10% of that of GEIS estimate. (Page 6.5 is revised.)

A large release would result in a careful survey and cleanup of any contaminated surrounding areas. If conditions favored a large release, radiation would be removable. Deposits on buildings would be "hosed down" or rinsed into a portable trough and pumped into containers such as drums for waste disposal. Portable items, park benches, street signs, etc., would be sprayed or replaced if the radiation levels warranted the action. Several inches of soil would be removed and disposed of in waste drums. Obviously, coordination and liaison with regulatory agencies would be an immediate action level in the case of a large release. While general support may be provided by regulatory agencies, it is quite obvious that direct support from the onsite contractor would be standard procedure.

No Revision in Text on page 6.4

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Chapter 6 (cont'd)

Page 6.5 (ANL) Question 24:

ACCIDENT ANALYSIS

The tornado strike analysis given in the Uranium Milling GEIS is based, among other considerations, on dispersion of 100% of any uncontained yellowcake produce and dispersion of 15% of contained product. Since the residues and sludge at West Chicago are uncontained, more of the material could potentially be dispersed.

KM Response: WCSP, page 6.5

Text is revised

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Chapter 6 (cont'd)

Page 6.7 (USEPA) Question 12(b):

CONTROL OF LIQUID RADIATION WASTE

On page 6.7, it is specified that decontamination fluid will be reused. This will concentrate the radiation waste. What provisions will be made to monitor the contamination and control the resulting exposure?

KM Response: WCSP, page 6.7

Radioactive liquids or potentially contaminated liquids will not be discharged. The pH will be measured and the solutions neutralized if necessary with subsequent determination by radiation counting techniques. Concentrations of unidentified beta-gamma or alpha activity in liquid waste will be measured to limit solutions discharged to $\leq 3 \times 10^{-7}$ $\mu\text{Ci/ml}$.

No Revision in Text

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Chapter 7

Pages 7.1, 7.2, Section 7.2 (ANL) Question 33:

There is no description of the monitoring program, please provide.

KM Response: WCSP, pages 7.1, 7.2

The Kerr-McGee Radiological Health Program submitted to NRC Region III, describes the monitoring program in greater detail.

No Revision in Text

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Page 7.2, paragraph (4) (ISGS) Question:

Monitoring wells should monitor the shallowest sand and gravel aquifer if saturated.

KM Response: WCSP, page 7.2

The monitor wells, completed and proposed, will monitor the shallowest sand and gravel aquifer.

No Revision in Text

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Page 7.2, Section 7.3.1 (ANL) Question 6:

It would seem more appropriate to have monthly samples of Kress Creek outlet during excavation and grading activities plus during heavy runoff periods.

KM Response: WCSP, page 7.2

Text is revised.

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Chapter 7 (cont'd)

Page 7.3, Section 7.3.2 (ANL) Question 7:

No mention is made of monitoring nearby offsite wells penetrating the dolomite aquifer. It would appear prudent to monitor some of these (closest ones) perhaps on an annual basis at least through the first five years after decommissioning.

KM Response: WCSP, page 7.3

Text is revised

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Page 7.3, paragraph (5) (ISGS) Question:

The installation of a cover will reduce, not prevent, infiltration so the appearance of water in the encapsulated area may not indicate the failure of a specific portion of the cover. The quality of shallow groundwater will also not serve as a good indicator of cover integrity. Continued leaching is to be expected even from the encapsulated area; however, the degree of contamination of shallow groundwater precludes the recognizance of anything but very large additional releases of pollutants from the disposal area.

KM Response: WCSP, page 7.3

It is inconceivable that the extreme modification proposed by Kerr-McGee for the site could make it a more pollutant source than it was in the past or than it is in its present idle condition. While there can never be an iron-clad guarantee that no chemical constituent--however small in quantity--will ever leave the site, Kerr-McGee attempted to resolve the problem (through discussions with all parties involved) within the realm of a practical approach.

Leachable materials will be neutralized with a lime slurry, thus further reducing the concentration of pollutants that may be present in the leachate.

No Revision in Text at this Time

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Chapter 7 (cont'd)

Page 7.3 (IDPH) Question 13:

KMCC states that clay cover will be repaired if a leachate problem exists. Should not other parts of clay liner also be repaired if necessary?

KM Response: WCSP, page 7.3

Hydrological information suggests that the most likely leachate formation would develop from an infraction in the clay cover. Kerr-McGee contends that 10 feet of compacted clay installed as the bottom layer of the clay liner is unlikely to yield or breach in a manner that would cause pollution in excess of groundwater constituency.

The clay cover and liner will be repaired as necessary.

No Revision in Text

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Page 7.4 (USEPA) Question 10(a):

a) Section 7.5 limits monitoring to assessment of external dose rates. Since the primary radioactive hazards are alpha emitters, a strong program of internal dose assessment is in order. This should include bioassay.

KM Response: WCSP, page 7.4

The Kerr-McGee Radiological Health Program provides for assessment of airborne material and bioassay if 520 mpc-hours per quarter is exceeded or threatened.

No Revision in Text

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DEFICIENCIES IN THE MONITORING PROGRAMS ARE PREVALENT

Section 5.7 states that 12 tons of dust contaminated with uranium, thorium and their daughter products will be generated during decommissioning and stabilization. A detailed plan to keep exposures as low as reasonably achievable for the occupational workforce and for the general public is not provided. Deficiencies in the plan as provided are evidenced by examples from Section 7.5.2.

- a) The Eberline RASP-1 is incorrectly identified as an air sampler. It is an alpha probe.
- b) The lapse time for gross alpha counting is not stated.
- c) The "appropriate locations" for the continuous air sampling are not specified.
- d) "Continuous" air sampling for the general public should be continuous, not just during working hours.
- e) Criteria for collecting "breathing zone" samples are not specified. "As needed" is vague.
- f) "Periodically" is too vague for the issuance of personnel air samplers.
- g) Assessment of internal exposure, through bioassay, is not mentioned.
- h) Quarterly samples of groundwater during implementation may be too infrequent.
- i) When groundwater samples exceed 10 CFR 20 limits, the place for reporting is not specified.
- j) No reference is made to the National Interim Primary Drinking Water Regulations with regard to groundwater samples, especially as they apply to radioactive constituents.
- k) No provision is made to sample surface water runoff into Kress Creek in spite of the fact it is stated in Section 6.1.1.2 that "Radioactivity dispersal of mostly insoluble material would not likely be airborne but rather water-borne to sewers and runoff watercourses."
- l) It is vague to say that "Kerr-McGee does not expect the implementation of the plan to increase the dose to the neighbors..." Specifics are in order.
- m) The above quote finishes "...from gamma radiation." This could be read that Kerr-McGee expects increases in beta and/or alpha dose to its neighbors. The import of the restriction should be addressed.
- n) No attempt is made to measure for contaminated sediment.

Chapter 7 (cont'd)

USEPA

KM Response: WCSP, Section 7.5.2, page 7.5

It is stated that the pile will be kept wetted while being worked into its new shape. Air monitors located in the direction of residences will be operated to insure that exposures will be kept as low as reasonably achievable.

- a) Eberline RAS-1 was the correct designation.
- b) The counting procedure was not intended to be included in the stabilization plan.
- c) Locations are now established for air sampling.
- d) We plan to take 24-hour continuous samples as stated.
- e) The need is determined by the description on the work permit as described in our Radiological Health Program.
- f) "Periodically" demonstrates that the work proposed herein has not been previously performed so no history exists. When data is assembled from early assignments and airborne concentrations, "periodically" may become daily or on an as needed basis as described previously.
- g) Bioassay is provided for in the Radiological Health Program.
- h) Quarterly samples are adequate in view of the slow rate of groundwater movement.
- i) If the 10 CFR 20 limit is exceeded, this will be reported as required by current NRC regulations.
- j) The purpose of this monitoring program is to provide information on the groundwater during the implementation of the plan and thereafter.
- k) Text has been revised to provide for surface water monitoring.
- l) Kerr-McGee does not expect that implementation of the plan will increase the gamma dose to the neighbors which is the context of this sentence. Alpha dose changes are discussed in Chapter 5.
- m) The reference is not speaking to the subject of alpha or beta dose. We were very specifically ignoring this since it is covered separately.
- n) We covered the comment on contaminated sediment in Section 7.5.2(E) on page 7.7.

Text is Revised

* * * * *

Chapter 7 (cont'd)

Page 7.6 (UFLB-NRC) Question 7:

The criteria for surface water sampling and analysis during stabilization operations as given on page 7.6 is inadequate. Quarterly sampling is too infrequent and the analyses to be performed are not listed.

(ANL) Questions 25, 26, 27:

25. What is the frequency of air sampling during dusty work conditions? What will be the basis for background levels of air particulate activity?

26. With regard to the continuous air sampling that will be conducted during the time any work is being performed, how often will the samples be analyzed?

27. Background measurements should not be taken close to the site; a minimum distance of 500 meters and a maximum of one km would be more appropriate than "within a radius of one-half mile."

KM Response: WCSP, page 7.6

The responses to questions NRC-7; ANL-25, 26, 27 are discussed on revised page 7.6.

Text is Revised.

* * * * *

Chapter 7 (cont'd)

Page 7.7 Section 7.5.3(b) (ANL) Question 34:

Radiation Monitoring after Completion of Phase III. No indication of frequency or type of monitoring.

KM Response: WCSP, page 7.7

Text is Revised

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Page 7.7 (USEPA) Question 10(c):

c) Section 7.5.3 states that in the post Phase III monitoring gamma scans will be made of the site. Since radon emissions are a larger problem, alpha scans would be essential. A reporting process for anomalies should be stated.

KM Response: WCSP, page 7.7

c) Alpha scans will not determine radon emission levels.

No Revision in Text

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Chapter 7 (cont'd)

Page 7.8 (USEPA) Question 2:

THE RADIOLOGICAL STANDARDS FOR THE STABILIZED WASTE AVOID THE
PRIMARY HAZARD ALPHA EMISSION

The Kerr-McGee plan sets an external gamma radiation level of .05 mR/hour over the stabilized waste site, based upon the Surgeon General's standards for Grand Junction, Colorado (page 7.8).

- a) The GEIS rejects these standards as improper for tailings disposal "(The) Surgeon General limits were developed for a remedial action situation where options (were) limited as distinguished from the (tailings) situation ...where the same constraints do not present themselves." (Volume I, page 18).
- b) mR is an exposure unit reserved for x-rays and gamma rays. The primary problem here is alpha emission from radon gas. Monitoring should be directed at the primary hazard and this should be reflected in the units.

KM Response: WCSP, page 7.8

- a) The Draft GEIS statements have no present legal affect and are not applicable for this unique situation in the absence of EPA standards for radiological release.
- b) Kerr-McGee knows that mR is reserved for gamma rays and it is a secondary type of hazard but we believe that it should be addressed.

No Revision in Text

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Chapter 7 (cont'd)

Page 7.8 (UFLB-NRC) Question 8:

Criteria given for stabilized wastes and for decontaminated ground areas on page 7.8 are not acceptable. The GEIS on Uranium Milling includes criteria acceptable to the staff. These criteria include, for buried wastes, a calculated radon release rate of $2 \text{ pCi/m}^2\text{-s}$ and direct gamma exposure of essentially background. Criteria for decontaminated mill sites are given in Appendix J, Volume II, of the Draft GEIS on Uranium Milling (NUREG-0511).

KM Response: WCSP, page 7.8

Data has been recalculated, appears in the revised edition of Appendix II.

* * * * *

(USEPA) Question 11(a) (b) (c):

11) Details on Plans to Meet Applicable Regulations and Regulatory Guides are weak.

a) Details on meeting the requirements of 10 CFR 20 are missing. Specifically needed are:

- 1) types and frequencies of surveys, including alpha,
- 2) provisions for personal monitoring, including bioassay,
- 3) provisions for protective clothing and masks,
- 4) provisions for physicals and mask fit tests,
- 5) provisions for records of surveys and radiation monitoring,
- 6) provisions for reporting to required agencies and to the individual, and
- 7) provisions for specific actions when monitoring shows high levels of contamination or exposure becomes excessive.

b) No references are made to applicable NRC Regulatory Guides.

c) No reference is made to the EPA National Interim Primary Drinking Water Regulations.

KM Response: WCSP, pages 7.8, 7.9

a) Details meeting the requirements of 10 CFR 20 are presented in the Kerr-McGee Radiological Health Program for West Chicago.

b,c) There are no NRC Regulatory guides which cover thorium and water standards have not been established under the applicable statute.

* * * * *

Chapter 8

Pages 8.2, 8.3 (USEPA) Question 16:

Additional Points

c) Unequivocal statements of no adverse-impacts in such sections as 8.4.1, 8.6.1 and 8.6.2 are unfounded and speculative.

KM Response: WCSP

Text is revised

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Chapter 10

Page 10.2, Section 10.5.1 (ANL) Question 35:

Should read "...commitment of terrestrial biotic habitat will occur."

KM Response: WCSP, page 10.2

Text is revised

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Chapter 11

Pages 11.2, 4.22 (IDPH) Question 2:

If the material is disposed onsite, IDPH believes clay should surround all material. The more leachable material should be surrounded by a separate liner. This would provide a more conservative method of disposal.

Pages 11.2, 4.2 (ISAG) Question 2:

If the material to be buried is of a hazardous nature (either radiologically or chemically) then onsite burial is unsuitable. The hydrology and the geology of the land are inappropriate for the burial of hazardous chemical or radioactive material. The geology of the site is not suitable for long-term containment of leachable solid waste due to the relatively high permeability of the soil. The potential for migration and pollution of the groundwater is significant. Evidence of this is the former use of this site for the percolation ponds and the degradation of the groundwater quality in the area.

KM Response: WCSP, pages 4.2, 11.2

Revision in Chapter 4 addressed the above questions from IDPH and ISAG.

No Revision in Text

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Chapter 11 (cont'd)

Page 11.4 (UFLB-NRC) Question 1:

The discussion of alternatives to onsite stabilization should be expanded. There is, currently, too little information and analysis presented to lead to the conclusion that onsite stabilization should be the preferred solution. Further, the reasons given for the rejection of potential alternatives are, in some cases, weak.

Page 11.4 (IDPH) Question 1:

Insufficient consideration of offsite disposal alternatives has been given. Consideration was not given to the feasibility of disposal at United States Department of Energy or Department of Defense installations or alternative modes of transportation such as barges on the Great Lakes. Also, dose calculations for offsite disposal alternatives were not provided (Appendix II, page 16, et al). Dose estimates provided for onsite disposal did not consider Thoron (Rn-220).

Page 11.4 (ISAG) Questions 1(a)(b)(c)(d):

a) Kerr-McGee does not consider all reasonable suitable sites within a 150 mile radius. Rather it has merely considered two such sites. Kerr-McGee seems to dismiss other open pit mines because of their recreation potential and tendency to fill up with water. Kerr-McGee incorrectly assumes that these conditions are true of all strip mines or even the majority of them. Further, even sites with water may be suitable if dewatering of the site is considered in the site preparation plan. Kerr-McGee must analyze all geologically suitable strip mine sites within a reasonable distance from its West Chicago facility.

b) Kerr-McGee has arbitrarily limited consideration of alternative sites (except for licensed low-level sites) to those within 150 miles. There are other suitable sites beyond 150 miles within a reasonable distance of the West Chicago facility which should be considered.

c) Kerr-McGee dismisses Argonne National Laboratories as a potential site on the basis of a letter received from the Department of Energy stating that Argonne would be unavailable. DOE is not intractable and if Argonne National Laboratories should prove to be the most superior site, DOE may be willing to reconsider its position. Argonne National Laboratories should be analyzed for geological suitability.

d) Kerr-McGee has failed to consider the use of property already owned by the Company off of the West Chicago site.

* * * * *

Chapter 11 (cont'd)

KM Response: WCSP, page 11.4

The above questions and comments from UFLB-NRC, IDPH and ISAG are concerned with alternatives to onsite stabilization.

In December of 1979, a representative of Kerr-McGee's Hydrologic staff spent 10 days in the field visiting 60 of the 220 limestone/dolomite quarries, 20 of the 21 clay and shale pits, and 3 of the 8 major coal mining areas. Several mining sites had been checked in the earlier investigation. At each of the sites the following conditions have been tabulated: geology, surface hydrology, groundwater hydrology, present condition, related mineral resource, population density and distance from West Chicago. The new information has been tabulated, and maps of locations visited are available for review.

The greatest problem encountered in the field investigations was the inaccessability of sites; virtually all are areas of restricted access.

Kerr-McGee believes, as a private industrial concern, that the near term effort to singularly find and develop a local for offsite disposal is indefinitely protracted. To expand our offsite investigation will require at least two conditions:

- 1) The City of West Chicago, Kerr-McGee and all interested state and federal agencies should join in a cooperative effort to determine whether a reasonable and sound alternative site exists in Illinois for the waste materials now located at West Chicago. This search should be carried on expeditiously and thoroughly, with the goal of finding the most acceptable site for the West Chicago waste materials, given the situation as it exists today.
- 2) If a specific location for disposal of these waste materials is found through this effort, which meets the criteria of all interested parties and is reasonable in terms of cost, Kerr-McGee will consider amendment of its plan now before the NRC to incorporate this conclusion.

Kerr-McGee will evaluate identified alternate sites as to environmental, safety and commitment of resources during its response on alternate sites, and will submit reused pages.

In the meantime, Kerr-McGee maintains its position as to the adequacy of the plan that was filed with the NRC on August 15, 1979, as amended by its submission of May 1, 1980.

No Revision in Text at this Time

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Chapter 11 (cont'd)

Page 11.5 (UFLB-NRC) Question 9:

A copy of the letter from DOE denying the use of Argonne or Fermilab as disposal sites should be included in the plan.

KM Response: Pages 11.4, 11.5

A copy of the letter from DOE is attached. On April 8, 1980, Mr. Robert Bauer confirmed that Argonne was not available as a disposal site. Any consideration for future waste burial will be limited to that originally scheduled for weapons facilities.

No Revision in Text

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Department of Energy
Chicago Operations and Regional Office
9800 South Cass Avenue
Argonne, Illinois 60439

JUL 23 1979

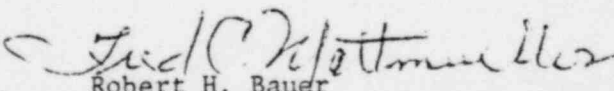
Mr. J. L. Rainey, President
Kerr-McGee Chemical Corporation
Kerr-McGee Center
Oklahoma City, Oklahoma 73125

Dear Mr. Rainey:

Please refer to your letter dated July 12, 1979. Present policy will not allow the use of Argonne National Laboratory (ANL) or Fermi National Accelerator Laboratory (FERMILAB) as a radioactive waste disposal site. The Atomic Energy Commission (AEC) [predecessor to the Department of Energy (DOE)], promulgated on May 29, 1963, its policy to dispose of all radioactive waste generated by its licensees at commercial burial sites. The regulations and policies for waste management of the AEC were adopted by DOE. The radioactive wastes generated by Government-owned facilities would also be disposed of at commercial facilities unless disposal facilities existed onsite. The exception to this requirement is wastes containing greater than 10 nanocuries per gram (10 nci/gm) of transuranics where retrievable storage is required. Consistent with this policy, both ANL and FERMILAB dispose of their wastes at commercial burial sites when it contains less than 10 nci/gm of transuranics. No disposal facilities exist at either ANL or FERMILAB, nor can any be established and be consistent with the current policy.

If additional information is needed, please contact Edward J. Jascewsky on 312-972-2254.

Sincerely,


Robert H. Bauer
Regional Manager/Regional Representative

cc: J. Keppler, Director, Region III-U. S.
Nuclear Regulatory Commission, w/cy referenced letter

R-75

JUL 25 1979

REC'D/J.L.R.

Chapter 12

Pages 12.2, 12.3 and 12.4 (ISAG) Question 1E:

E) Kerr-McGee's cost benefit summary is inadequate. It has compared only the comparative economic cost of the various sites and has not considered environmental, safety and irretrievable commitment of resources.

KM Response: WCSP, pages 12.2, 12.3 and 12.4

Kerr-McGee will evaluate identified alternate sites as to environmental, safety, and commitment of resources during its response on alternate sites, and will submit revised pages.

No Revision in Text at this Time

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Page 12.2, paragraph (5) (ISAG) Question:

Comment: The Illinois State Geological Survey did not "look" for suitable alternative disposal sites.

KM Response: WCSP, page 12.2

It is true that the Illinois State Geological Survey did not look for suitable alternative disposal sites. Their suggestions were only of a general nature. The ISGS has indicated that upon the determination of candidate sites, they will provide us with information that they might possess on those sites.

No Revision in Text

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Page 12.3 (IDPH) Question 4:

What funds are held for the sole purpose of maintaining and repairing the West Chicago site?

KM Response: WCSP, page 12.3

Kerr-McGee will comply with NRC standards when established.

No Revision in Text

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APPENDIX II

KERR-McGEE CHEMICAL CORPORATION STABILIZATION PLAN LICENSE STA 583

WEST CHICAGO, ILLINOIS

SUBJECT: Kerr-McGee's Response to Questions/Comments on the Stabilization Plan, Appendix II.

Answers to comments appear in Appendix II which was completely revised by Dames & Moore.

Appendix II

The following questions and/or comments refer to Appendix II and are concerned with estimates of the critical organ doses that were calculated from Kerr-McGee's decommissioning plan of the West Chicago Facility.

(ANL) Question

15. (Appendix II, page 1) Why is Rn-220 (thoron) dose effect not considered? High concentrations of Ra-224 exist in both the sludge and residue piles, so that the dose from thoron decay products could be non-trivial at short distance.
16. (Appendix II, page 3, 2.1.1.1) Ra-226 activity concentrations in the residues and sludge are determined from too few samples (only one each). The materials comprising the residues and sludge can be expected to be very heterogeneous (ANL tests strongly indicate this), so that results based on single samples cannot be taken to accurately represent the average activity concentrations that exist in the residues and sludge.
18. (Appendix II, page 4.2.1.3) 550 pCi Ra-226/g for an average value of the reclaimed residues appears to be an arithmetic average of sludge and residue activity concentrations. The effective average of the reclaimed residues should be a weighted average of sludge and residues, since masses of sludge and residues are not equal. This same comment applies for bulk density.
19. (Page 5, 2.2.1) Concerning Table 2 of Reference 1, the table cannot be found within the Stabilization Plan and Reference 1 is not a published document, please provide or include a copy of Table 2.

(ANL) Questions (cont'd)

20. (Appendix II, page 11, Table 3.1-1) The whole-body dose conversion factor for Th-232 should be higher by an order of magnitude (i.e., 0.22×10^8). This is a significant difference, one which can increase the total whole-body dose by over 30%. Was the correct value used in the calculations?
21. (Appendix II, page 9, 3.1) The source term is modified (assume multiplied) by a factor of 0.238 to simulate a continuous one year release. This implies that an actual release period of 87 days, continuous, is expected. However, on page 6, a 1440 hour (60 day), continuous release is cited. On page 4.20, eight weeks is allowed for grading the ore pile in Area 2. On page 5.1, the last paragraph implies that operations will not be on a continuous basis. Thus, eight weeks equals 56 working days which (divided by three) is about 18 continuous days. Please clarify and indicate which is the correct release period expected.
22. Since the release period will be of short duration, the annual average meteorological conditions may not apply and an appropriate seasonal average (e.g., summer) should be used instead.

(USEPA) Questions

15. DAMES AND MOORE STUDY

- a) Reference 1 is used extensively and yet, it is not available for review because it is a personal communication. This document should be made available.
- b) It is not clear how the values in Sections 2.1.2 and 2.2 are calculated. A more detailed description is necessary.
- c) Why is the adult chosen as the critical person instead of a child? With the surrounding residential area, this would seem more appropriate.
- d) Page 2 - J has no units
- Ra should have units of pCi/m³
Page 19 - Does t = material thickness?
- In f(Ji) there is an unmatched parentheses
What is the correct form of the equation?

Addendum to "Comments on Radiological Aspects of Kerr-McGee Stabilization Plan"

U.S. Environmental Protection Agency
Larry Jensen, Radiation Specialist

With regard to the Appendix II study prepared by Dames & Moore

- 1) WIND FREQUENCIES BY STABILITY CLASS FOR EACH SECTOR DO NOT SUM TO 100%

Airem 3 input data for wind frequencies by stability class for each sector are given on pages B-1, C-1, and D-1. In each case the total frequency is 33.33%, not 100%. It is not clear upon what basis this reduction is made. If this is an attempt to only calculate dose for an 8 hour working day as seems apparent from Section 7.5.2 (A) of the main text, then this is objectionable because dose for the surrounding community is being accumulated on a continuous basis. The tailings and sludge piles and also the capped disposal area are indeed continuous, not intermittent, emitters.

- 2) A POINT SOURCE IS ASSUMED FOR DOSE ESTIMATE CALCULATIONS

If the source were small or the affected individuals were far removed from the source an assumption of a point source might be valid. The smallest source is the tailings pile, 41 meters x 41 meters x 11 meters. This is not small. The nearest dose calculation begins at 150 meters. This is not far removed from the source. An area source computer program would be more appropriate. A variation of AIREM for a distributed source, AREAC (Area Source Radiological Emission Analysis Code) is available from the U.S. Environmental Protection Agency, Environmental Analysis Division, Washington, D. C.

KM Response, Appendix II

Answers to questions/comments are found in the attached edition of Appendix II which was completely revised by Dames & Moore.

* * * * *

(ANL) Question

23. (Appendix II, page 9) What population distribution was used in the calculation of population dose? What is the basis of this population distribution?

KM Response, Appendix II

An addendum to Appendix II is attached and discusses the basis of population distribution.

* * * * *