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January 29, 1990

John H. Frye III, Esq.
Chairman
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Re: Kerr-McGee Chemical Corporation (West Chicago Rare Earths Facility), Docket No. 40-2061-ML, ASLBP No. 83-495-01-ML

Dear Judge Frye:

My copy of the transcript of the recent hearing does not include Kerr-McGee Exhibits 3 through 5. Although I believe I provided copies to the reporter, they may have been misplaced. I enclose additional copies of Exhibits 3 through 5 for insertion in the transcript at pages 827, 833, and 838, respectively.

Very truly yours,

Richard A. Meserve
Counsel for
Kerr-McGee Chemical Corporation

RAM:lmb
Enclosures

cc: Service List

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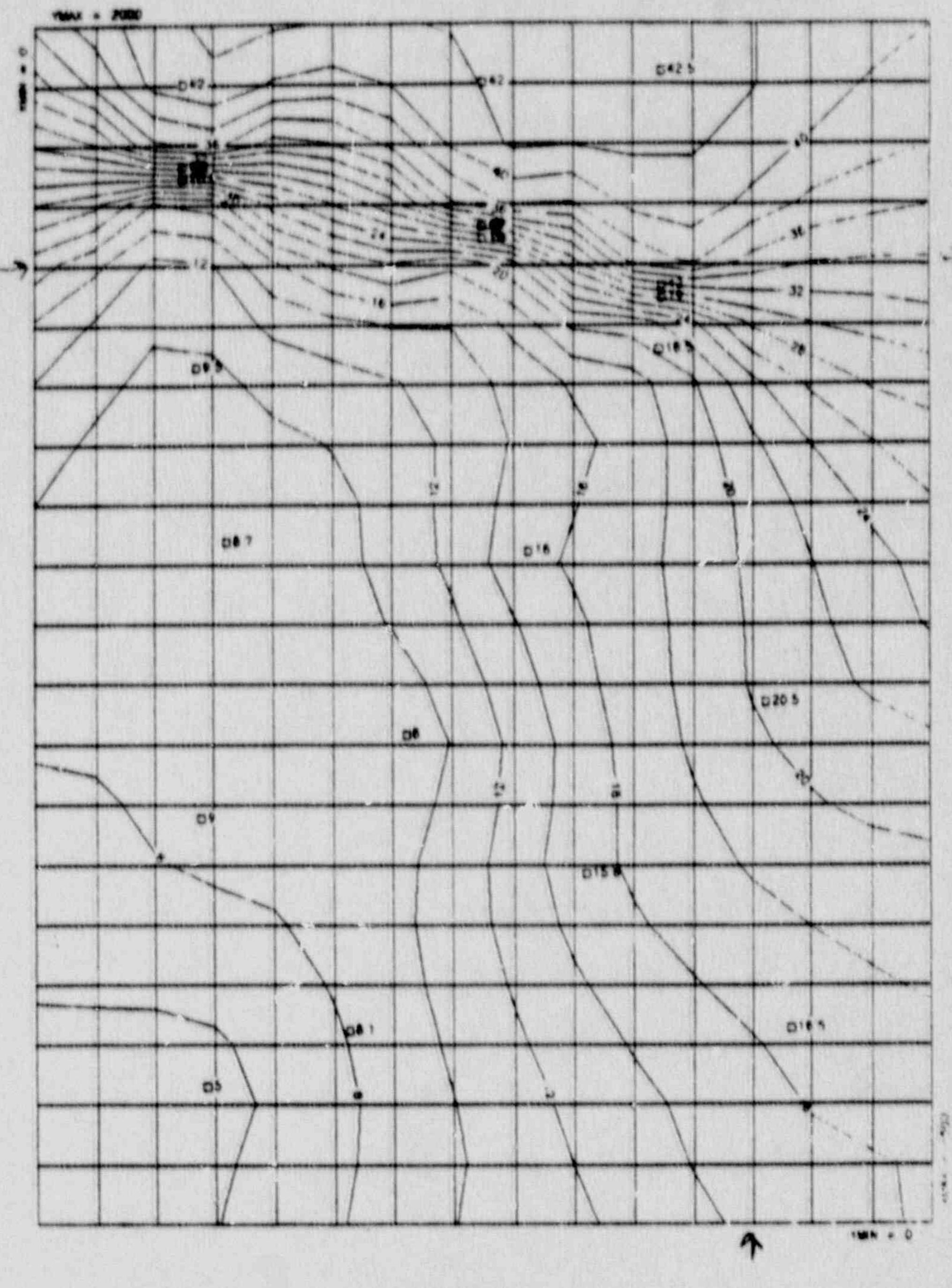
Kerr-McGee Exhibit 3



LEGEND

16 — SATURATED THICKNESS IN FEET

0 — 500

SCALE IN FEET

JAMES L. GRANT & ASSOCIATES
geotechnical engineering • management • computer science
ENGLEWOOD, COLORADO

FIGURE 2-164

E STRATUM SATURATED THICKNESS (ft)

KERR-MCGEE WEST CHICAGO PROJECT

Kerr-McGee Exhibit 4

X4

Leachate Plumes in Ground Water From Babylon and Islip Landfills, Long Island, New York

By GRANT E. KIMMEL *and* OLIN C. BRAIDS

GEOLOGICAL SURVEY PROFESSIONAL PAPER 1085

Prepared in cooperation with the Suffolk County Department of Environmental Control

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON: 1980

LEACHATE PLUMES IN GROUND WATER FROM BABYLON AND ISLIP LANDFILLS, LONG ISLAND, NEW YORK

By Grant E. Kimmel and Olin C. Braids

ABSTRACT

Landfills operated by the Towns of Babylon and Islip in southwest and central Suffolk County contain urban refuse, incinerated garbage, and scavenger (cesspool) waste; some industrial refuse is deposited at the Babylon site. The Islip landfill was started in 1933, the Babylon landfill in 1947. The landfills are in contact with and discharge leachate into the highly permeable upper glacial aquifer (hydraulic conductivity 190–500 feet per day). The aquifer is 74 feet thick at the Babylon landfill and 170 feet thick at the Islip landfill. The leachate-enriched water occupies the entire thickness of the aquifer beneath both landfills, but hydrologic boundaries retard downward migration of the plumes to deeper aquifers. The Babylon plume is 1,900 feet wide at the landfill and narrows to about 700 feet near its terminus 10,000 feet from the landfill. The Islip plume is 1,400 feet wide at the landfill and narrows to 500 feet near its terminus 5,000 feet from the landfill.

Hydrochemical maps and sections show the distribution of the major chemical constituents of the plumes. The most highly leachate-enriched ground water obtained was from the Babylon site; it contained 860 mg/L (milligrams per liter) sodium, 110 mg/L potassium, 565 mg/L calcium, 100 mg/L magnesium, 2,700 mg/L bicarbonate, and 1,300 mg/L chloride. Sulfate was notably absent or in low concentration in most parts of both plumes. Nitrogen in plume water was mostly in the form of ammonium, and concentrations as high as 90 mg/L were found; concentrations of nitrogen as N in the plume were less than 10 mg/L. As much as 440 mg/L iron and 190 mg/L manganese were found in the leachate-enriched water. Samples were also tested for arsenic, boron, cadmium, cobalt, chromium, copper, mercury, nickel, lead, selenium, strontium, and zinc. Boron was more or less ubiquitous and was found in concentrations as high as 2 mg/L. Organic carbon was found in concentrations as high as 2,250 mg/L in the most highly leachate-enriched water but attenuated rapidly to less than 20 mg/L. Dissolved-solids concentrations near the landfills were between 400 and 3,000 mg/L at Babylon and between 500 and 1,500 mg/L at Islip.

Ground-water temperatures near the landfills exceed those in ambient water by as much as 7°C at Babylon and 16°C at Islip. Heat contributed by the landfills was mostly dissipated with 0.4 mi of the landfill, but at Islip, the warm leachate-enriched water extended 0.5 mi downgradient.

The entrance of leachate into the less dense ground water as pulsations after rainfall may explain the presence of high leachate enrichment near the bottom of the aquifer. A comparison of the physical characteristics of leachate-enriched ground water with those of ambient water suggests that the downward movement of leachate results from its greater density.

Simulation of the movement and dispersion of the Babylon plume with a mathematical dispersion model indicated the coefficient of longitudinal dispersion to be about 60 ft^2/d (feet squared per day) and the ground-water velocity to be 1 ft/d. However, the velocity determined from the hydraulic gradient and public-supply wells in the area was 4 ft/d; this velocity would cause a plume four times as long as that predicted by the mathematical dispersion model. At the Islip site, the plume was one-third the length calculated on the basis of the age of the landfill. The shortness of the plumes has not been explained; it may be a result of the leachate's having been too dilute to form a plume during the early years of the landfills.

INTRODUCTION

ALTERATION OF GROUND WATER BY LANDFILL LEACHATE

Reports of ground-water alteration from landfills in humid environments (Hughes and others, 1969), semihumid environments (Andersen and Dornbush, 1968) and arid environments (State of California, 1954) generally conclude that landfill leachate deteriorates ground-water quality, sometimes even where the landfill is hundreds of feet above the water table (Apgar and Langmuir, 1971).

Deterioration of ground water and surface water by leachate from solid-waste landfills has become a problem of general concern. Where precipitation causes leachate to seep from a landfill to ground water, the high dissolved-solids concentrations and injurious substances in the solution may adversely affect local water supplies.

The deterioration of water resources, especially of public drinking supplies, can threaten the health and economy of an area. The drinking water for most of Long Island is pumped from a large ground-water reservoir separated from the mainland by saltwater, and this reservoir is the source of freshwater for several million inhabitants over about 80 percent of the island. Contamination by wastewater and other materials deposited on or beneath the land surface is a major concern in the management of Long Island's ground-water reservoir (Perlmutter and Koch, 1971, 1972). Deterioration of ground water by landfills on Long Island was surmised but undocumented until this study.

PURPOSE AND SCOPE OF REPORT

In 1971, a cooperative program between the U.S. Geological Survey and the Suffolk County Department of Environmental Control was established to investi-

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Kerr-McGee Exhibit 5

Table E.7. Peak Chemical Concentrations and Times of Occurrence at the Downgradient Positions within the 1,000-Year Period[a]

Chemical Species	Proposed Action	Alt. A	Alt. B	Alt. C	Alt. D
	Peak Concentration (µg/L) at Midpoint of Downgradient Waste Pile Edge[b]				
Antimony	8.0	2,000	2,000	8[illegible]	3,800
Arsenic	1.0	240	240	11	470
Cadmium	0.38	92	92	4.0	180
Chromium	0.93	180	180	2.5	11
Copper	1.7	330	330	4.6	20
Lead	11	560	560	8.5	0[d]
Mercury	0.017	0.84	0.84	0.013	0
Selenium	<32	<7,700	<7,700	<340	<15,000
Silver	0.063	3.1	3.1	0.048	0
Zinc	5.6	1,100	1,100	15	64
Cyanide	31	3,800	3,800	370	8,400
	Peak Concentration (µg/L) at Site Boundary[c]				
Chemical Species	Proposed Action (73 m)	Alt. A (46 m)	Alt. B (46 m)	Alt. C (46 m)	Alt. D (46 m)
Antimony	8.0	1,800	1,800	38	2,100
Arsenic	1.0	220	220	4.8	260
Cadmium	0.38	82	82	1.8	97
Chromium	0.92	0.36	0.36	0[d]	0
Copper	1.7	0.67	0.67	0	0
Lead	11	0	0	0	0
Mercury	0.017	0	0	0	0
Selenium	<32	<6,900	<6,900	<150	<8,100
Silver	0.063	0	0	0	0
Zinc	5.5	2.1	2.1	0	0
Cyanide	31	3,400	3,400	310	3,800