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MEMORANDUM

TO: Stephanie Stoddard, RCRA Permitting Program

THROUGH: Steve Alexander, Technical Compliance Program Manager *S.M.A.*

FROM: Ron Kern, Technical Compliance Program *R.K.*

DATE: August 18, 1993

SUBJECT: **Review of Data and Regulatory Requirements Related to Groundwater Monitoring at the Sewage Lagoons and Golf Course Main Pond, Kirtland Air Force Base, Albuquerque**

The Technical Compliance Program has completed a review of data and regulatory requirements related to groundwater monitoring at the Sewage Lagoons (SL) and Golf Course Main Pond (GCMP) at Kirtland Air Force Base (KAFB) in Albuquerque. The SL's and GCMP are interim status RCRA units.

Available data and information evaluated include: Groundwater monitoring data (September, 1990 to March, 1993); Administrative Record and Enforcement/Compliance files (Red and Blue files) in the HRMB library; verbal information provided by Bruce Swanton, AIP Program Manager, HRMB. Available regulatory information evaluated include: 40 CFR 265 Subpart F (Groundwater Monitoring); September 10, 1991 Approved Closure Plans for SL's and GCMP.

Pertinent Chronological Information in HRMB Files:

25 June 91: KAFB informed NMED (HRMB) in a meeting that KAFB would request approval for an Alternate Groundwater Monitoring (AGWM) system at the SL's and GCMP. KAFB was informed that they must submit a formal request.

28 June 91: KAFB requested formal approval for the AGWM system. This request was based upon a 1991 report by the United States Geological Survey (USGS) entitled "Ground-Water Quality Data, Kirtland Air Force Base, New Mexico, November - December, 1990". (Note: Pertinent information and conclusions of this report will be discussed later).



- 3 July 91: NMED approved the AGWM system for the SL's and GCMP. NMED stated that no Appendix IX constituents have been detected in the groundwater at these RCRA units.
- 29 July 91: NMED Compliance Order to KAFB based upon 13 June 91 NOV. Compliance Order required KAFB to submit approvable Closure Plans for the SL's and GCMP by September 10, 1991. Closure Plans must include contingency plans for closure in place, plus discussion of health-based risk assessment for soils and sludges, plus commitment to compliance with 40 CFR 265.90 - 265.93.
- 31 July 91: In a letter to NMED, KAFB acknowledged modifications to the assessment monitoring program required by the AGWM system, including semi-annual analysis of Appendix IX VOC's and annual analysis of the complete Appendix IX list for groundwater.
- 18 Nov. 91: NMED approved the September 10, 1991 Closure Plans for the SL's and GCMP and informed KAFB that all concerns of the 29 July 91 Compliance Order have been addressed satisfactorily.
- 8 July 93: In a memorandum from the HRMB Technical Program to the Permitting Program, Chromium in the groundwater was noted as a constituent of concern because it has been detected in excess of the NM WQCC MCL standard in four of the eight monitoring wells at the SL's and GCMP.
- 11 Aug. 93: In a meeting among HRMB Technical, Permitting, and AIP staff, chromium levels detected in the SL and GCMP monitoring wells were discussed with respect to KAFB's request for Clean Closure certification. The consensus agreement was that chromium may be present in the groundwater of both units at levels which may preclude Clean Closure.

KAFB's Alternate Groundwater Monitoring System:

On 28 June 91, KAFB submitted the USGS document "Ground-Water Quality Data, Kirtland Air Force Base, New Mexico, November-December, 1990" as the basis for their request for an AGWM system. The rationale for this request was that monitoring wells (MW) had already been installed at the SL's and GCMP. These sites were not previously approved by NMED. Four MW's were located around the SL's (MW-0501, 0502, 0503, and 0504), and four MW's were located around the GCMP (MW-0602, 0608, 0609, and 0610).

Monitoring wells at the SL's and GCMP are shown on the attached figure. Screen length of all MW's is twenty feet. At the SL's, MW-0504 may be considered as an upgradient well. MW-0501 is a side-gradient well; MW's 0502 and 0503 are downgradient wells. At the GCMP, MW-0610 appears to be an upgradient well, but the water level in the well is approximately 25 feet above the top of the screen. MW-0602 is a side-gradient well; the water level in the well is approximately 110 feet above the top of the screened interval. MW's 0608 and 0609 are also side-gradient wells.

The MW's at the SL's and GCMP do not meet strict regulatory requirements [one hydraulically upgradient and three downgradient MW's at a site; 40 CFR 265.91(a)]. The USGS report indicates, however, because of the proximity of the MW's to the units and the "great" depth to groundwater (480 feet at the SL's; 320 feet at the GCMP), the MW's are located "adequately" to detect water infiltrating from the SL's and GCMP to the groundwater.

The USGS report specifically discusses Chromium at and near KAFB and the SL's and GCMP. The USGS states that the mean "background" Chromium content of soils (101 samples) is 6.77 mg/kg (ppm). The USGS report also states that Chromium in the groundwater probably results from "remnant drilling fluid, fine-grained formation material, or well construction materials."

NMED, Regulatory, and Closure Plan Requirements:

A regulatory result of petitioning for an AGWM system is that the owner/operator (O/O) accepts that there is groundwater contamination at the unit [40 CFR 265.90(d)] which requires assessment monitoring. As part of the AGWM system, the O/O must submit a Groundwater Quality Assessment Plan (Plan). The USGS report and the Closure Plans apparently constitute this Plan. Within the Plan, the O/O must specify sampling and analytical methods as well as evaluation procedures [40 CFR 265.93(d)(3)]. Sampling and analytical methods are discussed in the Closure Plans; data evaluation procedures are not specifically discussed in any document.

Pursuant to 40 CFR 265.90(d)(4), the O/O must make quarterly groundwater determinations as part of the Plan. In lieu of this requirement, however, NMED apparently stipulated semi-annual analysis for Appendix IX VOC's for all MW's and annual analysis for the full Appendix IX list for all MW's (See chronological information for 31 July 91 above). Subsequently, NMED received complete annual data (June, July) for 1992. NMED has not yet received annual data for 1993. Semi-annual data (approximately January) for 1992 was received only for MW's 0602, 0608, and 0610.

Semi-annual data for 1993 was received only for MW's 0502 and 0610.

The Closure Plans (September 10, 1991) for the SL's and GCMP address groundwater quality assessment and conclude that there are no hazardous waste constituents in the groundwater at these two units.

Groundwater Monitoring Data:

In an 8 July 93 memorandum, the HRMB Technical Program determined that Chromium in the groundwater was the only constituent of concern at the SL's and GCMP.

The SL's and GCMP both have solid materials (sludges) remaining in them. Based upon KAFB sampling and analysis (September, 1990), maximum Chromium content of these "sludges" is 2100 ppm in the SL's and 100 ppm in the GCMP. EP Tox analyses indicated that neither sludge was of regulatory concern.

Soils were sampled downhole (maximum depth of 100 feet) during the drilling of the MW's at the SL's and GCMP. Maximum Chromium content of soils was 27 ppm at the SL's and 14 ppm at the GCMP. These levels exceed the 6.77 ppm Chromium considered as "background" by KAFB. EP Tox analyses again indicated that the levels of Chromium in the soils beneath these units are not of regulatory concern.

Although the sludges and soils beneath the SL's and GCMP are not of regulatory concern, the elevated levels of Chromium in these media may indicate that Chromium detected in the groundwater is related to these RCRA units.

Chromium data from the six known groundwater sampling events at the SL's and GCMP are summarized below (Note: concentrations are in ppb total Chromium; NM WQCC MCL for Chromium = 50 ppb):

KAFB - GROUNDWATER CHROMIUM LEVELS (ppb)

<u>Sewage Lagoons</u>	<u>9/90</u>	<u>1/91</u>	<u>3/91</u>	<u>6/91</u>	<u>1/92</u>	<u>7/92</u>
MW-0501	140*	2.4	28	ND	7.5	ND
MW-0502	45	ND	3.7	ND	ND	ND
MW-0503	120*	82*	37	24	55*	12
MW-0504	29	6.1	5.9	3.3	3.3	28
<u>Golf Course Main Pond</u>						
MW-0602	240*	13	19	11	ND	17
MW-0608	38	8.3	75*	11	11	ND
MW-0609	31	47	28	7.6	25	28
MW-0610	51*	14	53*	15	12	ND

[NOTE: Chromium values with an asterisk (*) exceed the NM WQCC MCL; ND = Non Detect]

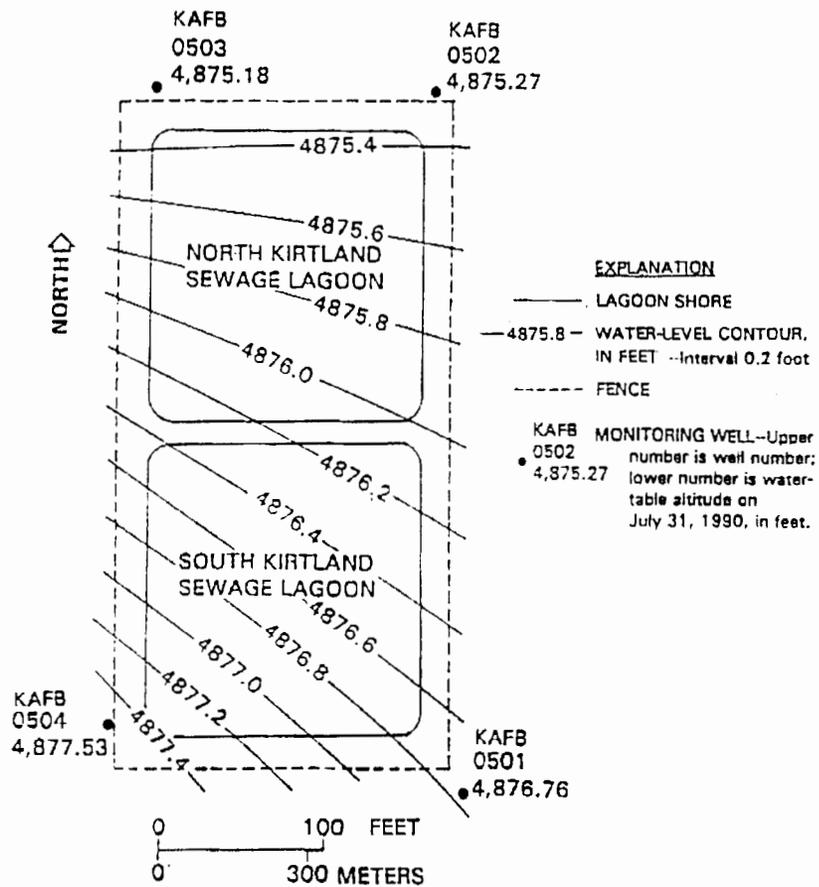
Conclusions:

For the following reasons, the Chromium in the groundwater beneath the SL's and GCMP may have originated from these units and may currently require further delineation:

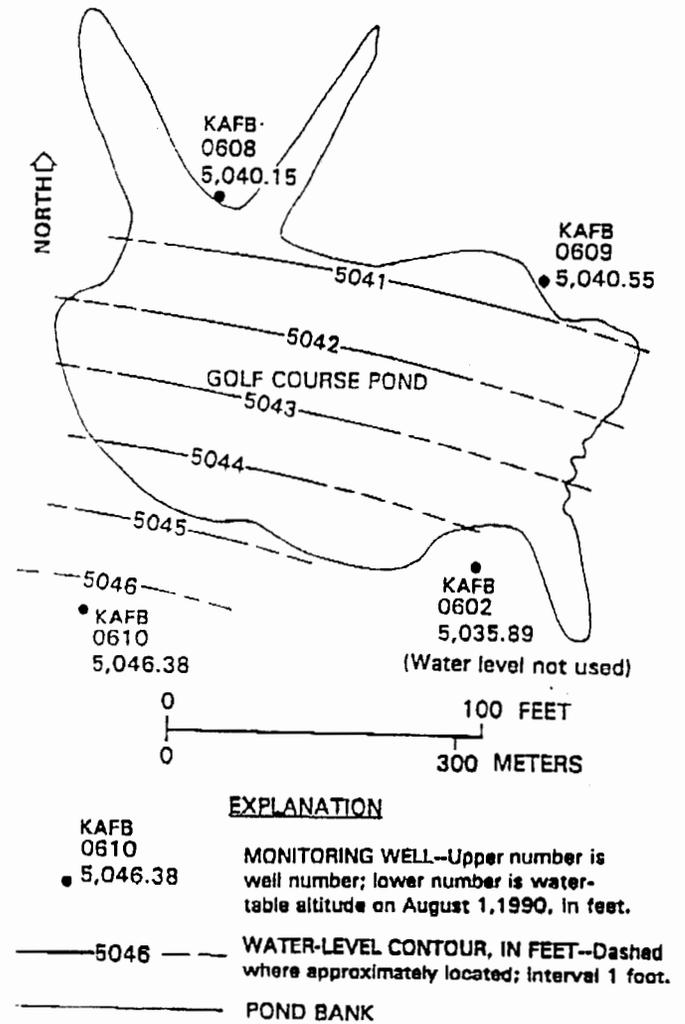
1. The SL's and GCMP were in use from 1962 until October, 1987 (25 years). These units were presumably filled with liquid during this period which would have aided infiltration of fluid downward toward the groundwater. Groundwater mounding beneath these units may have also occurred resulting in dispersal of any hazardous constituents locally in all directions.
2. The hydraulic gradients and flow directions of groundwater at the SL's and GCMP may have also changed with time due to pumping from production wells at KAFB. [Note: There is a production well within approximately one quarter (1/4) mile from the SL's and one production well within approximately one mile from the GCMP].
3. As part of the AGWM system and groundwater quality report, the USGS reported that nitrate and nitrite from the SL's and GCMP were detected in the groundwater beneath these units. If these inorganic compounds reached groundwater, other hazardous constituents from the SL's and GCMP may have also reached groundwater.
4. KAFB has not provided NMED with factual data related to their contention that Chromium in the groundwater probably results from "remnant drilling fluid, fine-grained formation material, or well construction materials." Additional monitoring wells, drilled and constructed without chromium-bearing materials, may be required to determine possible source(s) of chromium in the groundwater. Proper well development and purging procedures prior to sampling may help determine if Chromium concentration is related to fine-grained formation material.
5. Chromium concentrations in sludges and soils beneath the SL's and GCMP exceed "background" levels and are sufficiently high to suggest that these media may have been and continue to be a source for Chromium detected currently in the groundwater.
6. Because "pathways" of mobile components through the vadose zone have not been adequately characterized, concentrations of Chromium detected in the groundwater with the current monitoring well network may not be indicative of maximum concentrations of Chromium in the groundwater downgradient from the SL's and GCMP.

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cc: Barbara Hoditschek, Permitting
File



Water-table contour map of the sewage lagoons area.



Water-table contour map of the golf course pond area