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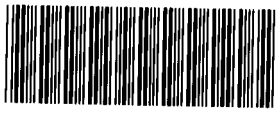

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RMRS Rocky Mountain Remediation Services, L.L.C.
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INTEROFFICE CORRESPONDENCE

DATE: June 29, 1998

TO: D. L. Kidd, Waste Disposal, Bldg. T664A, X5835

FROM: R. G. Smith, Jr., Water Management & Treatment, Bldg. T893B, X7898

SUBJECT: RESPONSES TO KAISER-HILL COMMENTS REGARDING THE 1997 GROUNDWATER MONITORING REPORT FOR THE PRESENT SANITARY LANDFILL, DRAFT FINAL, DATED JUNE 19, 1998 - RGS-001-98

The RMRS Groundwater Operations group has considered the review comments of Stephen Hahn, Kaiser-Hill, presented in a letter addressed to you dated June 23, 1998, and have prepared comment responses as presented below. As we still disagree with some of his comments, it may be necessary to meet with him to resolve the remaining issues, preferably at the earliest mutually agreeable time. The original review comments are italicized followed by our responses in regular type.

(Repeat Comment) The 1997 Groundwater Monitoring Report talks about the groundwater intercept system, how it was constructed, and whether it is functioning or not. The 1996 IM/IRA Report includes drawings and text description of the same system. The IM/IRA Report is more complete in that it describes valves and outlet pipes located above and below the East Landfill Pond. Now, if the intercept system is still in-place and functioning (either properly or improperly) then someone should be able to show me the discharge points, describe which valves are open and which are closed, identify the system operator, measure how much groundwater is being diverted, sample the groundwater, etc. To date, no one has been able to do this for me. Thus, it scares me when you present conclusions in the groundwater report concerning the intercept system, e.g., the southwest side is working more effectively than the northwest side. Convince me first that system is still in place and functioning at all. Then we can talk about improvements to the system that may be needed.

As stated in the introduction, the 1997 Groundwater Monitoring Report serves the primary purpose of reporting the results of annual groundwater quality data in compliance with CDPHE regulations. These results are presented in the context of brief historical and physical descriptions that are intended to familiarize the reader with major features and events that potentially influence groundwater flow and quality. The groundwater intercept system has the potential to significantly affect groundwater flow to and from the landfill and, as such, is relevant for discussion in the report. Discussion of the function of the groundwater intercept system in

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the 1997 Groundwater Monitoring Report is essentially identical to the discussion presented in the 1996 Groundwater Monitoring Report, which was finalized based on last year's comment resolutions. The versions presented in both reports are consistent with the most current interpretation presented in the 1996 IM/IRA Report. Further interpretation is certainly warranted and can be accomplished using various hydrogeological methods; however, Groundwater Operations believes that the 1997 Groundwater Monitoring Report is not the proper vehicle for this type of analysis. Instead, we favor consistency with previously published reports until more definitive evidence is presented based on a careful analysis of the available data.

The lack of appreciable discharge at the terminal outer drain outfalls located east of the dam is potentially indicative of several conditions:

- The outer intercept system never operated effectively or progressively became plugged with time.
- The outer drains were intentionally or accidentally severed during slurry wall construction or eastward expansion of the landfill.
- Outer drain water is diverted to an alternate discharge point, such as the East Landfill Pond.

As S. Hahn points out, little information and few field observations are available to evaluate drain operation and function. In this respect, all scenarios are possible, so any analysis must necessarily rely on information gained from the landfill monitoring well network, including potentiometric elevations and water quality data. For example, using PU&D Yard plume VOCs for tracing the fate of groundwater flow at the upgradient end of the landfill, there appears to be no evidence of groundwater incursion into the southwest boundary of the landfill past the groundwater intercept system. This interpretation remains to be verified with other water quality data. Some relatively detailed analyses of groundwater data have already been conducted (see *Technical Memorandum, Final Work Plan, OU7, Present Landfill and Inactive Hazardous Waste Storage Area, Vol.1, RF/ER-94-00044, 1994*) which led to the conclusion that the drains at least partially intercept groundwater flowing into or out of the landfill.

The drains operate by gravity flow which eliminates the need for a system operator once the outfall destination is determined and configured. Best management practice would favor discharge to the pond rather than the outfalls located east of the dam, as uncontrolled discharges represent a potential compliance liability. Effort to further evaluate drain function using water

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level and quality data will be undertaken as part of the 1997 RFCA Groundwater Monitoring Annual Report.

If we assume that the drain was severed during slurry wall construction (which was apparently designed to allow passage of drain water) or landfill expansion to the east, it is expected that groundwater would discharge from the drain to the subsurface at the point where the drain was breached. Unless plugged, the open portion of the drain upgradient of the cutoff would still function normally and divert groundwater around the upper region of the landfill to the cutoff point. The groundwater would then flow downgradient through landfill materials and eventually emerge at SW097 or as subsurface flow to the pond. In this case the existing outer drain outfalls (SW099 and SW100) would be dry or nearly so. Thus, the absence of a visible discharge at an outfall does not preclude the possibility of a functional intercept system at the upper end of the landfill.

(Repeat Comment) I also get scared when you conclude, "there aren't enough data to perform statistical analyses." Please identify the regulation/driver that requires us to perform statistical analyses. If the regulations require that we sample only one upgradient well and three downgradient wells, then I suspect (however, I am not a hydrogeologist or a statistician) there is no requirement to perform statistical analyses. And if that's the case, then we should stop whining in the groundwater report about insufficient data. However, if we are required to perform statistical analysis, then we should justify in the groundwater report why we cut the number of downgradient wells sampled in 1997 by 62 percent compared to 1996. That was done after you concluded in 1996, "there aren't enough data to perform statistical analyses."

Regarding the comment concerning statistical analyses, RCRA requires a statistical approach for detecting contaminant releases to groundwater based on upgradient versus downgradient comparisons, and has since RCRA interim status requirements for groundwater monitoring were promulgated in 1980. Under RCRA, statistical analysis of groundwater data is required regardless of the number of upgradient and downgradient wells, although one upgradient well and three downgradient wells is commonly cited as a minimum arrangement. The RCRA groundwater monitoring requirements for RFETS RCRA units have eased since implementation of the IMP; however, we are still required to compare mean values of upgradient to downgradient analytical results (see IMP, May 1998, page 3-31), with the addition that trend plots are required for discerning increasing concentration trends. These plots have been prepared and will be incorporated into the final report. None of these wells show increasing analyte trends with time. The insufficient data problem has recently been addressed by increasing the frequency of well monitoring from semi-annual to quarterly.

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The reference to a 62 percent reduction in downgradient wells sampled between 1996 and 1997 is confusing and contradicts the information presented in both reports. In both reports, wells 4087, B206989, and 52894 are used to determine downgradient groundwater quality. Of the other downgradient wells mentioned in the 1996 Groundwater Monitoring Report (see page 29), B207089 (now abandoned) and 53094 monitor the LHSU and, as such, are excluded from the landfill monitoring program. Discussion of these wells will be eliminated in the final report to prevent any potential confusion. Well 52994, a weathered bedrock well, is part of the monitoring program, but is routinely dry and was unavailable for sampling in 1996 and 1997. No downgradient monitoring wells were cut from the program in 1997, as stated in S. Hahn's comment.

(Repeat Comment) Section 9.0 (and elsewhere) presents the conclusion, "Groundwater in the vicinity of the Present Landfill generally flows to the east, with the flow components converging toward the East Landfill Pond." What's missing from this flow model is the concept that most groundwater entering the pond evaporates or is pumped to the adjacent watershed. Only a small fraction of groundwater that enters the pond escapes by seeping through the clay core and cutoff wall of the dam. In my mind, this explains why downgradient wells are frequently dry and why metals concentrations (but not VOCs concentrations) are somewhat elevated in the downgradient wells.

The conceptual description of the flow model was enhanced in paragraph 9 of Section 2.0 (page 3) of the draft final report to reflect the factors mentioned in his comment. Other portions of the text, including Section 9.0, will be revised to reiterate these concepts.

Evaporative concentration of inorganics and volatilization of VOCs from pond water are undoubtedly major contributing factors that determine groundwater quality below the dam. Natural enrichment caused by seasonal desaturation resulting from evapotranspiration demands and upward seepage of more highly mineralized LHSU groundwater are also potential contributing factors. Actually, the story may be even more complicated because nitrate/nitrite concentrations found in well B206989 are much higher than indicated by either historical pond water and natural bedrock groundwater nitrate/nitrite concentrations. A brief discussion of these processes will be added to the report and conclusions section to explain the trends of selected contaminants in downgradient wells.

(New Comment) The groundwater report contains two different purpose statements for performing groundwater monitoring: 1) "... a determination of the impact of the Present Landfill on water quality in the uppermost aquifer (Section 1.0, First Paragraph)," and 2) "... to detect potential excursions of contamination beyond an established point of compliance based on

comparison of upgradient and downgradient groundwater quality (Section 4.0, First Paragraph). I've read Section 9.0—Conclusions several times, and I can't find anything that talks about "impacts" or "excursions."

Furthermore, Section 9.0 of the 1997 Groundwater Report appears to be copied word-for-word from Section 9.0 of the 1996 Groundwater Report. Considering the nature of changes which have occurred from 1996 to 1997, this seems very unusual. Some of the changes are, reduced number of downgradient wells sampled, lots of wells abandoned, seep collection and treatment system fully operational, and PU&D Yard plume investigation completed.

Section 9.0 will be revised to include conclusions regarding impacts and excursions, and additional changes to the landfill monitoring program.

slm

cc:
N. P. Cypher
J. E. Law
S. H. Singer
RMRS Records

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