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ARKANSAS DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY

MEMORANDUM

CSN: 72014.4. Permit No. /23-581 Media: Air, Water, Solid, Hazardous Sort: Permit Compliance, Legal, Misc.

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TO

Tom Boston, Chief, Solid Waste Division

Larry Wilson, Deputy Director

FROM

Tony Morris, Geologist Supervisor, SWD

DATE

9-AUG-1991

SUBJECT

Response to Sunray Sanitation Letter

and Enclosures

A letter from Tony Morris dated July 8, 1991 was sent to Mr. Bob Baxter of Sunray Sanitation. The company was in the process of developing plans for a permit modification for final closure of the two permitted landfills (Sites 3 and 4). The letter indicated the staff was willing to work with the company to develop additional capacity, however the revised design must include some additional environmental safeguards. To justify the staffs' request for improved leachate collection capability and groundwater monitoring at the landfill complex, several graphs of water quality were included in the letter. The graphs depicted quite variable water chemistry between wells in the nine well monitoring system presently in place.

Accompanying Mr. Baxter's response to the Solid Waste Division staffs' concerns were reviews of the data by Edward Clement and Kirk Ellis of S.C.S. Engineers and Dan McCullough and Mark Witherspoon of James L. Grant and Associates, Inc. The following is a discussion of relevant points listed by the company's consultants:

- S.C.S. Engineers state that 10 ppb is the detection limit for the organic parameters listed in E.P.A. Methods 624 and 625.

The detection limits for the various organics are clearly shown in the referenced documents. Organic compounds can be detected at lower concentrations than 10 ppb with confidence as indicated in the methods.

The S.C.S. Engineers may be confusing the 10 ppb Practical Quantitation Limit in the Environmental Protection Agency's Contract Laboratory Program with the method detection limit. This 10 ppb value only applies to laboratories performing contract analytical work for the E.P.A.

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- Both consultants state that the wells with the lowest water quality are the "up gradient" wells. They implied that the organic chemicals, consisting of various industrial solvents, are moving on site from the northwest.

The surrounding land use is almost exclusively agricultural, consisting of poultry and cattle farming and some fruit orchards. The halogenated organics detected in the monitor well system have very limited or no use in the agricultural industry. They are typically utilized as industrial solvents in degreasing operations. Since there are no known manufacturing industries in the general area it is a safe assumption that the landfill is the source of these compounds.

- James L. Grant and Associates submitted a statistical evaluation of two parameters in the monitor well system. The two indicator parameters were Chloride and Total Dissolved Solids (T.D.S.). Values for these two parameters were evaluated statistically, in each well, for increases. No increasing trends were noted by the company, even though there is an obvious difference in water chemistry between wells.

concentron that due to the arrive

produce from the same aquifer and are located within a small geographic area, water chemistry between wells should be similar. Since the monitor well system was installed approximately a decade after disposal operations began, evaluating individual wells statistically when they have already been impacted is not a valid approach. A safer method of monitoring a waste disposal facility in a fractured carbonate formation is to view the wells as a system and note water chemistry changes between wells which was the approach taken by the staff.

statistically to other wells in the system. The water chemistry graphs submitted to the company by the staff clearly depict a difference in water quality between wells. In addition, attached to this memo are the results of statistical comparisons of T.D.S. values between wells. In these comparisons Cochrons Approximation of the Behrens-Fisher T-Test at the .05 level of significance was used. Relatively clean wells were compared to obviously impacted wells. In each case a significant statistical difference was noted.

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- Both consultants pointed out the fact that potentiometric maps for the site indicate a clear northwest - southeast flow direction. They maintain that since the wells with the highest potentiometric levels have the poorest water quality, the landfills are not affecting the aguifer.

Stature documenting

A good example of this is at the Northwest Arkansas Solid Waste Management Landfill east of Springdale. This facility is also situated within the Boone Formation. Potentiometric maps prepared by Wyndal Goodman indicated a northeast flow direction within the aquifier. However, a dye trace conducted on the site indicated a 90 degree different direction of movement of the injected dye. This case clealry indicates the difficulty in reliably monitoring waste disposal facilities within the Boone Formation.

According to many researchers, potentiometric maps are not even good indicators of general groundwater flow in karst aquifers. While the Boone Formation is not a classic karst aquifer in the area of the Sunray Landfill complex,

Therefore, contaminant movement in the area is uncertain and can not be predicted by potentiometric maps.

In conclusion, the staff is convinced that the landfills are impacting the quality of groundwater in the area. Since the closure modification will provide as much as 65 months (5.5 years) of additional disposal capacity, it would be in the best interest of the area to limit the amount of leakage from the facility into the aquifer. This can be accomplished by improving the cap design and installing a number of leachate removal wells into the waste mass.

WELL NAME IS W2
PARAMETER IS TDS
MEAN (AVE.) IS 132.5
STANDARD DEVIATION IS 18.2939
NUMBER OF DATA POINTS IS 13
MEAN ABSOLUTE DEVIATION IS 15.23077
WELL NAME IS WI
PARAMETER IS TDS
MEAN (AVE.) IS 522.8847
STANDARD DEVIATION IS 20.95049
NUMBER OF DATA POINTS IS 13

HEAN ABSOLUTE DEVIATION IS 15.93492

SUMMARY OF STATISTICAL TESTS ON 8/8/91 CONFIRMATION SAMPLES

WELL	PARAM	SAMPLE BK MEAN	KEAN G	އ	ŤĊ	SIGNIFICANT DIFFERENCE AT .05 LEVEL?
V 1	TDS	522.8847	132.5	50.60683	1.782721	YES (NOTE 1)

1. ANY SIGNIFICANT DIFFERENCES OCCURRING IN CONFIRMATION TESTS ARE REPORTABLE. REFER TO 40 CFR 264.98(h) OR SPECIFIC STATE RULES FOR REPORTING REQUIREMENTS.

WELL NAME IS WA PARAMETER IS TOS MEAN (AVE.) IS 185.5769 STANDARD DEVIATION IS 20.82251 NUMBER OF DATA POINTS IS MEAN ABSOLUTE DEVIATION IS 16.30178 WELL NAME IS W9 PARAMETER IS TOS MEAN (AVE.) IS 465.6769 STANOARD DEVIATION IS 42.37077 NUMBER OF DATA POINTS IS MEAN ABSOLUTE DEVIATION IS 30.91006

SUMMARY OF STATISTICAL TESTS ON RUN CONFIRMATION SAMPLES

WELL ID	PARAN	SAMPLE B	KG Yean	T‡	T C	SIGNIFICANT DIFFERENCE AT .05 LEVEL?
K3	TDS	455.5769	185.5769	21.39161	1.782721	YES (NOTE 1)

1. ANY SIGNIFICANT DIFFERENCES OCCURRING IN CONFIRMATION TESTS ARE REPORTABLE.

REFER TO 40 CFR 264.98(h) OR SPECIFIC STATE RULES FOR REPORTING REQUIREMENTS.

METT NAME IZ #8	
PARAMETER IS TDS	
MEAN (AVE.) IS	228.3583
STANDARD DEVIATION IS	104.8949
NUMBER OF DATA POINTS IS	12
MEAN ABSOLUTE DEVIATION IS	58.76388
WELL NAME IS W?	
PARAMETER IS TDS	
HEAN (AVE.) IS	553.4583
	54.56084
NUMBER OF DATA POINTS IS	12
MEAN ABSOLUTE DEVIATION IS	10 01000

SUMMARY OF STATISTICAL TESTS ON 8/8/91 CONFIRMATION SAMPLES

VELL LD	PARAH	SAMPLE MEAN	BEG HEAN	އ	TC	SIGNIFICANT DIFFERENCE AT .05 LEVEL?
¥7	TDS	553.458	3 228.958	•	1.796326	YES (NOTE 1)

1. ANY SIGNIFICANT DIFFERENCES OCCURRING IN CONFIRMATION TESTS ARE REPORTABLE.
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