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November 9, 1998

(Via: FedEx)

New Mexico Environmental Department
Hazardous and Radioactive Materials Bureau
2044 Galisteo
P.O. Box 26110
Sante Fe, NM 87502

Attn: Cornelius Amindyas
Environmental Specialist, RCRA Permitting Program

Re: Groundwater Monitoring Waiver
Triassic Park Waste Disposal Facility (Facility)
Chaves County, New Mexico

Dear Mr. Amindyas,

On behalf of the Gandy-Marley Corporation, Montgomery Watson (MW) is pleased to submit this groundwater monitoring equivalency demonstration at the above referenced site. In December 1997, Gandy-Marley submitted a Part A and Part B permit application to construct and operate a hazardous waste treatment, storage and disposal facility. As part of that submittal, a vadose zone groundwater monitoring system was proposed in place of the more traditional system of deep groundwater monitoring wells. The justification for the proposed method of groundwater monitoring is based on the site-specific geologic and hydrologic conditions at the Facility.

The following sections provide a summary of the regulatory authority to allow modification of the groundwater monitoring requirements and the technical justifications required to support the equivalency demonstration.

REGULATIONS

40 CFR § 264.90 states that the owner or operator of a landfill must implement a groundwater monitoring program capable of determining the facility's impact on the quality of ground water in the uppermost aquifer underlying the facility except as otherwise noted in paragraph (b) of § 264.90.

Paragraph (b) (4) states that the Owner or operator's of regulated units are not subject to regulations of 40 CFR 264.90 for releases into the uppermost aquifer under this subpart if:

> *The Regional Administrator finds that there is no potential for migration of liquid from a regulated unit to the uppermost aquifer during the active life of the regulated unit (including the closure period) and the post-closure care period specified under § 264.117. This demonstration must be certified by a qualified geologist or geotechnical engineer. In order to provide an adequate margin of safety in the prediction of potential migration of*

DRAFT

liquid, the owner or operator must base any predictions made under this paragraph on assumptions that maximize the rate of liquid migration.

We are not requesting that the requirements for monitoring releases from the facility be waived, we are only requesting that the method of monitoring be modified from groundwater monitoring wells to vadose monitoring sumps. However, our demonstration or justification for the use of vadoze monitoring in place of groundwater monitoring wells will be based on showing that there is little or no potential for migration of liquids from the regulated unit to the uppermost aquifer. This demonstration will be made in two parts as indicated below:

(1) The potential for migration of hazardous waste or hazardous waste constituents from the facility to the uppermost aquifer, by an evaluation of:
- A water balance of precipitation, evapotranspiration, runoff, and infiltration; and
- Unsaturated zone characteristics

(2) The potential for hazardous waste or hazardous waste constituents which enter the uppermost aquifer to migrate to a water supply well or surface water, by an evaluation of:
- Saturated zone characteristics; and
- The proximity of the facility to water supply wells or surface water.

DEMONSTRATION NUMBER 1

The proposed landfill will be founded in unsaturated materials consisting of Quaternary alluvial sediments, Upper Dockum interbedded siltstones and mudstones, and Lower Dockum mudstone and thinly interbedded siltstone. The side slopes of the landfill will be located in the alluvial sediments and the Upper Dockum. The base of the landfill will be located in the Lower Dockum.

Groundwater has been observed in the Upper Dockum Unit 2,500 feet to the east of the site and in the Lower Dockum Unit 600 to 650 feet below the base of the proposed landfill. Both of these potential aquifers will be evaluated as part of our demonstration.

Water Balance Evaluation

A water balance of the hydrologic system was completed for the site. The mean annual precipitation for the site is estimated to be 10.61 inches which is based on records kept at the Roswell, New Mexico weather station. A regional water balance study (Hunter, 1985) completed in southeastern New Mexico estimated that approximately 96% of the total precipitation is lost to evapotranspiration. Conservatively assuming no surface water runoff and based on the above precipitation and evapotranspiration rates, the net recharge to groundwater is estimated at 0.42 inches per year. This low recharge rate significantly reduces the potential for groundwater contamination from leaks or spills at the proposed landfill.

DRAFT

In addition to the regional water balance evaluation, site specific modeling was conducted. The EPA-recommended water balance model, HELP (Hydrologic Evaluation of Landfill Performance) was used. The model provided estimates of the rate of leakage through the liner system for a time range of 70 to 200 years after closure. The HELP model indicated no leakage from the facility (see Volume III of Permit Application). This further demonstrates the low infiltration potential for the site.

Vol VI, Appendix E-2E NOT Vol. III

Unsaturated Zone Characteristics

There are three unsaturated geologic units adjacent to or below the landfill. The Quaternary alluvium and Upper Dockum Units intersect the sides of the landfill. The Lower Dockum Unit is exposed in the base of the landfill. A description of the characteristics of each unit is presented below.

Quaternary Alluvium

The Quaternary alluvial sediments consist of fine grained sands interbedded with silts and clays and are located at the surface. These sediments vary in thickness from 10 to 35 feet at the site. An unsaturated permeability for this material was not confirmed through laboratory testing; however, it was estimated to be 1 x 10^{-4} cm/sec. In order to provide a more robust barrier layer for potential leakage from the landfill in areas that intersect the alluvial deposits, a 16 foot wide low permeability ($k < 1 \times 10^{-7}$) clay liner will be constructed around the perimeter of the landfill from the ground surface down to 2 feet into the Upper Dockum Unit. (See Volume III of Permit Application).

Upper Dockum Unit

The Upper Dockum Unit is comprised of interbedded siltstones and mudstones. This unit covers a large regional area and is approximately 475 feet thick. The siltstones are micaceous indicating a relatively active fluvial depositional environment. Downhole geophysical logs indicate that this unit is approximately 70% siltstone and 30% mudstone. The mudstones and siltstones have a lenticular shape and pinch out abruptly. Which is exemplified by the fact that these lithologies do not correlate over significant horizontal distances (thousands of feet). Laboratory testing of samples from this Upper Dockum Unit indicate that the siltstone has a saturated permeability of 1 x 10^{-5} cm/sec and the mudstone has a saturated permeability of 2 x 10^{-7} cm/sec. An unsaturated permeability was not determined for these materials, however, they are considered to be substantially less than the measured saturated permeability. Groundwater modeling was completed using saturated permeability values, which is considered to be conservative.

Lower Dockum Unit

The Lower Dockum Unit is comprised of a thick accumulation of mainly mudstones with some thin interbedded siltstone which is representative of the low energy lacustrine depositional environment. This unit covers a large

DRAFT

regional area and is approximately 700 feet thick. This unit is much more homogeneous than the overlying Upper Dockum Unit. Laboratory testing on Lower Dockum core samples indicate an average saturated permeability of 6 x 10^{-8} cm/sec. An unsaturated permeability was not determined for the Lower Dockum materials. Groundwater modeling was completed using saturated permeability values which is considered to be conservative.

In summary, the water balance for the site indicates very little net infiltration, and the major geologic units intersecting the landfill are low permeability. Therefore, it is our opinion that there is a low potential for migration of hazardous waste or hazardous waste constituents from the Facility to the uppermost aquifer.

DEMONSTRATION NUMBER 2

The second demonstration assumes that hazardous waste or hazardous waste constituents have entered the uppermost aquifer. This demonstration will evaluate the potential for contaminated water in the aquifer to migrate to surface water or water supply well.

Saturated Zone Characteristics

The saturated and unsaturated zone characteristics such as lithologies, depositional environment, structure and permeability are described in the previous section. Therefore, the saturated zone characteristics are not described again in this section.

Evaluation of Potential Impacts to Surface Water or Water Supply Wells

The potential for hazardous waste or hazardous waste constituents which enter the uppermost aquifer to migrate to surface water or water supply wells was completed using contaminant transport computer modeling. The nearest surface water to the site is the Pecos River which is located 30 miles to the west. The closest water supply wells are located several miles away in the Ogallala Formation which overlies the Upper Dockum. However, since the Upper Dockum becomes saturated approximately 2,500 feet to the east of the site, it was assumed that this was the nearest (worst case) water supply which could become contaminated. Groundwater is also found in the Lower Dockum Unit contained in the Santa Rosa Sandstone. Computer modeling estimating the travel time through the Lower Dockum was not completed because of the low permeability (5.7E-8 cm/sec) nature of the material will act as a barrier layer to flow downward. This low permeability layer will actually act to propagate horizontal flow along the Lower and Upper Dockum contact.

The travel time estimate generated by the saturated steady state computer model are conservative due to conservative input parameters which are listed below.

- The model assumed a saturated hydraulic conductivity of the Upper Dockum siltstone only which is two orders of magnitude greater than the hydraulic conductivity of the Upper Dockum mudstone.

DRAFT

- The model assumed that the siltstone is horizontally continuous to the saturated portion of the Upper Dockum. As discussed previously, the siltstone and mudstone in the Upper Dockum are lenticular and pinch out.

- The model assumed that no absorption or adsorption of the chemical would occur during transport.

Based on the above conservative assumption, the groundwater modeling estimates that it would take a contaminant approximately 7,920 years to travel from the perimeter of the landfill to the nearest saturated portion of the Upper Dockum aquifer which is located 2,500 feet away (see Volume I of Permit Application).

Additional computer modeling was completed using an unsaturated flow model. This type of model is representative of the unsaturated conditions of the Upper Dockum unit which surround the proposed landfill and have been described previously. Modeling was done on four different scenarios which are described below with the resulting travel times (see Volume I of Permit Application).

- Contaminant travel time from the perimeter of the landfill to the saturated Upper Dockum located 2,500 feet to the east of the landfill (3.4 billion years).

- Contaminant travel time between the base of the landfill and the saturated Lower Dockum located 600 feet below the landfill (4,084,674 years).

- Contaminant travel time through the clay liner located around the perimeter of the landfill in the zone of alluvial deposits (866 years).

- Contaminant travel time through the clay liner and alluvial deposits to the saturated Upper Dockum unit, 2,500 feet to the east of the landfill (574,507,913 years).

In summary, the low permeability characteristics of the geologic units intersecting the landfill, combined with the large distances to surface water or potential water supply wells, results in a very low potential for contamination from the facility.

PROPOSED GROUNDWATER MONITORING PROGRAM

Based on the above demonstrations, it is proposed that an alternative method to monitoring groundwater quality be used other than that outlined in 40 CFR § 264.90. The proposed method of monitoring groundwater will be to monitor the vadose sump of the landfill on a daily basis. In our opinion, this method is more rigorous and more protective of human health and the environment than placing monitoring wells outside the perimeter of the landfill because the monitoring system in this case is directly underneath the waste and has the shortest distance to travel for detection. If monitoring wells were placed 2,500 feet away, it is estimated that the amount of time required before detection would be many years. By monitoring the vadose sump, this provides the quickest allowable time to

DRAFT

determine if contaminates are escaping from the liner system. Details of the proposed vadose zone monitoring system are presented in Volume III of the permit application.

We hope this letter adequately explains our rationale for proposing an alternative groundwater monitoring system. If you have any questions, please contact us.

Sincerely,

Montgomery Watson
Patrick Corser, P.E.

cc: Dale Gandy
Ken Schultz
Trey Greenwood
Jim Bonner

Reference:

Hunter, Regina L. 1985. *A Regional Water Balance for the Waste Isolation Pilot Plant (WIPP) and Surrounding Areas*, Sandia National Laboratories

FAX

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From:	Patrick Corser - MW	**Reference:**	602
Fax No:	505-827-1544	**Charged Amt:**	
Subject:	**Groundwater Monitoring Triassic Park Facility**	**No. of Pages: (including cover)**	7

Cornelius,

Attached is a DRAFT of a letter requesting ~~modification of the~~ a waiver groundwater monitoring ~~method~~ for the Triassic Park Facility. Per your request, we are sending a draft for your review prior to submitting a final.

Regards,

Patrick Corser

If you do not receive all pages, or if there are any problems with this transmission, please call 970-879-6260