

MEMORANDUM



MONTGOMERY WATSON
Mining Group

Date: December 2, 1999
To: Pat Corser
From: Leah Wolf
Dave Ellerbroek
Subject: Triassic Park Facility Travel Times

Travel times to the bottom of the vadose zone and to the receptor well as well as corresponding concentrations were determined for 11 MULTIMED runs. The receptor well was located a horizontal distance of 1 meter from the site. The following input parameters were varied for each run. A comparison of parameters and results is presented in Table 1.

- Infiltration Rate
- Unsaturated Zone Porosity
- Longitudinal Dispersivity

Triassic1 was based on an exact duplicate of the data provided by Edward Hansen. Infiltration and saturated hydraulic conductivity rates were held constant while the unsaturated zone porosity and longitudinal dispersivity were varied during the simulations reported as Triassic2 through Triassic4. The infiltration rate was changed in Triassic5 through Triassic8 runs to reflect the leakage rate determined from a previous HELP model presented in Part A and Part B Permit Application for the Triassic Park Hazardous Waste Facility, Volume VI, Appendix E-28, December 1997. This leakage rate was increased by a factor of ten for input into MULTIMED. The travel times were particularly sensitive to changes in infiltration rate and unsaturated zone porosity as seen in Table 1.

Two runs were completed for the Lea County Facilities. Many of the same input parameters for the Triassic Park runs were used during the Lea County runs. A list of the significant parameters used for each the Triassic Park and Lea County Facilities is presented in Table 2. The parameters for the Lea County runs were taken from the Weaver Boos & Gordon Report. The infiltration rate was not mentioned in the report so the infiltration rate from the Triassic Park runs was utilized. The Lea County2 run uses an infiltration rate necessary to obtain a travel time greater than 800 years. This derived infiltration rate was input into the Triassic9 run.

In summary, our analysis indicates that using realistic, yet conservative, values for effective porosity results in a travel time of almost 2300 years to the base of the vadose zone at the Triassic Park Facility. Our analysis also indicates that the infiltration rates and porosity values suggested by NMED would result in a travel time to the base of the vadose zone of approximately 350 years at the Lea County Landfill.

Table 1
Comparison of Parameters for the Lea County and Triassic Park Facilities

	Infiltration Rate (in/yr)	Infiltration Rate (m/yr)	Unsaturated Zone Porosity	Longitudinal Dispersivity (m)	Saturated Hydraulic Conductivity (cm/sec)	Travel Time to Bottom of Vadose Zone (years)	Concentration at Bctfom of Vadose Zone (ng/L)	Travel Time to Receptor Well (years)	Concentration at Receptor Well (mg/L)
Hansen	0.591	1.50E-02	0.05	1.00	4.72E-08	NA	NA	500	2.9172E-04
Triassic1	0.591	1.50E-02	0.05	1.00	4.72E-08	498	7.495E-02	500	2.9172E-04
Triassic2	0.591	1.50E-02	0.23	1.00	4.72E-08	2291	6.499E-02	2300	4.3682E-03
Triassic3	0.591	1.50E-02	0.23	0.70	4.72E-08	2255	2.73E-02	2300	1.8732E-02
Triassic4	0.591	1.50E-02	0.05	0.70	4.72E-08	490.3	3.255E-02	500	2.2278E-02
Triassic5	0.010	2.52E-04	0.05	1.00	4.72E-08	25570	8.925E-04	26000	8.3034E-05
Triassic6	0.010	2.52E-04	0.23	1.00	4.72E-08	116400	1.097E-03	NA	NA
Triassic7	0.010	2.52E-04	0.23	0.70	4.72E-08	124400	5.234E-03	NA	NA
Triassic8	0.010	2.52E-04	0.05	0.70	4.72E-08	27330	1.862E-02	27500	3.7345E-05
Triassic9	0.256	6.50E-03	0.05	1.00	4.72E-08	1149	7.495E-02	1150	1.0457E-05
Lea County	0.591	1.50E-02	0.04	1.00	1.25E-08	347.7	6.157E-03	400	2.3013E-02
Lea County2	0.256	6.50E-03	0.04	1.00	1.25E-08	802.4	6.157E-02	825	4.0488E-02

Regional Recharge Rate = 0.42 in/yr (Part B Permit Volume 1, Section 3.5.2)

Table 2
Input Parameters into MULTIMED

	Lea County	Triassic Park1
Unsaturated Zone		
Infiltration Rate (m/yr)	NA*	1.50E-02
Saturated K (cm/hr)	4.50E-05	1.70E-04
Effective Porosity	0.04	0.05
Residual Water Content	0.116	0.05
Air Entry Pressure Head (m)	0.7	0.1
Alfa Van Genuchten	0.005	0.005
Beta Van Genuchten	1.09	1.09
Depth of Unsaturated Zone (m)	182	183
Longitudinal Dispersivity (m)	1.00	1.00
Saturated Zone		
Hydraulic K (cm/hr)	9.29E-05	3.42E-04
Hydraulic gradient	0.014	0.01
Effective porosity	0.05	0.3
Distance from receptor well (m)	1.00	1.00
Longitudinal Dispersivity (m)	Default	Default
Transverse Dispersivity (m)	Default	Default
Vertical Dispersivity (m)	Default	Default

* Not available from the Weaver Boos & Gordon Inc. report
Used the same Infiltration rate as Triassic Park Run #1

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Steve,

Attached is a summary of travel times determined by several MULTIMED trials for Lea County and Triassic Park Facilities. Please let us know if you have any questions. We will give you a call at 1:00 p.m. in order to discuss these results.

Thank you,

Leah Wolf

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