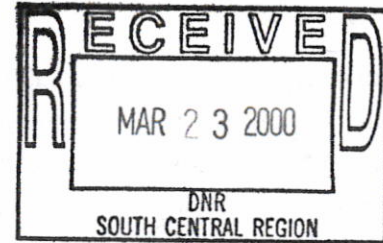




March 21, 2000

25 Kessel Court, Suite 201  
Madison, Wisconsin 53711-6227  
608 273 2886 Tel  
608 273 3415 Fax

Mr. Dino Tisoris  
Wisconsin Department of Natural Resources  
3911 Fish Hatchery Road  
Fitchburg, WI 53711-3266



RE: Dames & Moore Project No. 20011-008  
Status Report - Soil Remediation Activities  
Madison-Kipp Corporation Site  
201 Waubesa Street, Madison, Wisconsin

Dear Mr. Tisoris:

Dames & Moore has prepared this status report to describe remedial efforts completed to reduce the concentrations of contaminants previously identified in the soil in two "hot spots" at the Madison-Kipp Corporation (MKC) site. Verification soil samples indicate that the concentration of tetrachloroethene (PCE), the primary constituent of concern, has been reduced below the 1 mg/kg estimated site specific residual contaminant level (RCL). The estimated site specific RCL is based on the protection of groundwater, and was developed in accordance to Wisconsin Administration Code NR 720.09 by modeling site conditions with the aid of SESOIL. Model results indicate that groundwater quality standards for PCE will not be exceeded at down gradient property boundaries if the concentration of PCE in the soil at the two hot spots is reduced below 1 mg/kg. Based on post-remedial soil sampling conducted to date, no PCE remains in the soil at concentrations in excess of the site specific RCL.

**Background**

Groundwater samples were collected from Geoprobe borings advanced on the MKC property during an initial site investigation completed in September 1994. Chlorinated volatile organic compounds (VOCs), primarily PCE were detected in these groundwater samples. Several phases of investigation were subsequently completed over the next 2 years. VOCs in the soil were found to be limited to an area adjacent to the building, concurrent with a former drainage ditch, and in the area of a former vent for a vapor degreaser. High concentrations were also found along a storm sewer connector pipe, extending from the north end of the building to a storm sewer catchment basin. The two hot spot areas are located adjacent to the east side of the building(southern area), and near the northeast corner of the building (northern area) as shown on Figure 1.

Subsurface soil units are show in a fence diagram included as Figure 2. Stratigraphically, a



Mr. Dino Tsois  
Wisconsin Department of Natural Resources  
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continuous sequence of approximately 8 feet thick of silty clay overlies a fine- to medium-grained sand unit. Groundwater was encountered at an approximate depth of 18 feet in the sand unit, and the sand unit overlies sandstone bedrock encountered at an approximate depth of 31 feet. Soil samples collected within each source area indicated that the vertical extent of contamination was also limited. Higher contaminant concentrations were detected in soil samples collected from the clay, with decreasing concentrations in samples collected from the underlying sand unit. A detailed description of the site investigation results was presented in a progress report submitted to the WDNR on March 20, 1996.

***Site Specific Residual Contaminant Level Estimation***

A site specific residual contaminant level (RCL) for PCE based on the protection of groundwater was estimated by Dames & Moore in accordance to Wisconsin Administrative Code NR 720.09 and WDNR guidance. SESOIL modeling, coupled with AT123D, was performed to establish target concentrations for soil remediation. SESOIL model input and output values are included in Appendix A, and model parameter assumptions are described below.

The following parameters were assumed for the simulation:

Evapotranspiration:	Minimal default value (area is paved)
Length of rainy season:	April through September
Effective porosity (sand):	0.30
Effective porosity (clay):	0.40
Bulk density:	1.4 g/cm <sup>3</sup>
Intrinsic permeability (sand):	10 <sup>-9</sup> cm <sup>2</sup>
Intrinsic permeability (clay):	10 <sup>-14</sup> cm <sup>2</sup>
Fraction organic carbon (sand):	1 percent
Fraction organic carbon (clay):	1 percent

The model parameters for the AT123D simulation included:

Hydraulic conductivity:	10 <sup>-4</sup> cm/sec (from site-specific data)
Hydraulic gradient:	0.01 (from site-specific data)
Distance to property line:	230 m
Thickness of aquifer:	15 m



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The following weather-related data were used (obtained from the NOAA database):

MONTH	TEMP °C	PRECIP (cm)	STORM DURATION (DAYS)	NUMBER OF STORMS
January	-7.39	4.16	0.47	3.48
February	-5	3.38	0.44	3
March	0.85	6.55	0.46	5.05
April	7	8.55	0.47	6.31
May	12.67	6.76	0.38	5.88
June	18.28	9.12	0.36	6.05
July	21.39	8.99	0.31	5.4
August	20.72	7.85	0.3	5.62
September	16.61	7.31	0.29	4.55
October	10.5	5.72	0.29	4.02
November	2.94	5.03	0.37	4.5
December	-3.83	5.16	0.43	4.38

The modeling resulted in an estimation that soil concentrations in the established source area of 4.9 mg/kg would result in groundwater concentrations of 0.5 µg/L or less at the southern property line. In consideration of the small area of residential properties between the MKC facility and Waubesa Street (see Figure 3), the model predicted an acceptable soil concentration in the source area of 2.2 mg/kg. However, to obtain conservative results, Dames & Moore established a target concentration of 1 mg/kg for PCE in the source area as the estimated site specific RCL. This determination resulted in the delineation of two areas in which the PCE concentrations exceeded 1 mg/kg, as shown on Figure 3.

### *Selection of Remedial Alternatives*

Dames & Moore evaluated potential remedial alternatives for the soil at the MKC site. Soil vapor extraction was eliminated due to the low permeabilities of the soil unit containing the highest



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concentrations of PCE. Source removal by excavation and off-site disposal or treatment was also considered. After consulting with several environmental remediation contractors in May 1997, this option was found to be unworkable for the following reasons:

- Excavation adjacent to the building (an old masonry structure), would be risky and could jeopardize the structural integrity of the two story building;
- Extensive buried utilities are present in and adjacent to each potential source area;
- The proximity of the building would limit the depth to which the an excavation could be completed; and
- There is a high level of vehicle traffic in the area, and excavation activities would significantly interrupt site activities.

A third remedial alternative to remediate impacted soil in place with chemical oxidation was evaluated. The in-situ remedial response evaluated consisted of the injection of BiOx into the contaminated soil mass to react with contaminants. BiOx is a chemical oxidant supplied by BioManagement Services, and consists of a blend of peroxygen compounds that produces hydrogen peroxide as an intermediate, which then breaks down into a hydroxyl ion, a free radical that degrades hydrocarbons. This information was presented and discussed in a meeting between BioManagement Services, Inc., and the WDNR prior to the implementation of the remedial option.

### ***Implementation of the Selected Remedial Response***

The initial application of BiOx reagent was completed between June 28 and July 1, 1998. (The contractor ran out of BiOx and made a separate trip in August to finish the initial application.) The BiOx reagent was mixed on site and applied in each source area. A small diameter steel probe was manually inserted into each contaminated soil mass, and the reagent was injected at a low flow rate under high pressure. Soil remediation services were provided by BioManagement Services, Inc. (BMS) of Tinley Park Illinois in accordance with a WPDES permit approved by the WDNR.

Pilot holes 3/4-inch diameter were drilled through the asphalt pavement as needed, and reagent was injected into the underlying soil units through these pilot holes. Reagent was first applied to the perimeter of each areas; consequently, if the injection would force VOC vapors out of the area, they would pass through soil containing reagent. The spacing of the injection grid was determined in the field, such that the reagent application would overlap. The final spacing of the reagent application points was approximately 5 feet apart. Reagent was injected to a depth of 12 to 15 feet; in this



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manner, it was injected under pressure through the clay layer, into the sand layer.

Verification soil samples were collected on October 5, 1998 three months after the initial injection. These samples were collected from the four locations (two from each of the two source areas), where previous sampling had yielded the highest concentrations. Results for soil samples collected before and after the first phase of remediation are summarized in Table 1. Sample locations are shown on Figure 3. Laboratory reports for samples collected in April 1997 were included in the May 29, 1997 status report. Laboratory reports for verification soil samples are included in Appendix B.

As shown in Table 1, the concentration of PCE declined in soil samples collected in October 1998 after the initial phase of remediation was completed. Prior to remediation, PCE was detected in soil samples collected from the northern area at concentrations between 6,440 mg/kg in the GP-9 sample and 0.3 mg/kg in the GP-18 sample. In soil samples collected from the southern area PCE was detected at concentrations between 5.5 mg/kg in the GP-15 sample and 3.1 mg/kg in the GP-12. After remediation, PCE was detected in verification soil samples collected from the southern area at concentrations below the estimated 1 mg/kg site specific RCL of for PCE. PCE exceeded the RCL in both verification soil samples collected from the northern area. PCE concentrations increased from 0.3 mg/kg in the GP-18 sample to 5.45 mg/kg in the GP-18A sample, but the concentration of cis-1,2-dichloroethene decreased from 6.12 mg/kg to 0.11 mg/kg, and the concentration of total VOCs declined from 8.08 mg/kg to 5.972 mg/kg; a 26-percent reduction in contaminant mass. PCE concentrations declined from 6,440 mg/kg in the April 1997 GP-9 sample to 753 mg/kg in the October 1998 GP-9A sample. This represents an 88-percent reduction in PCE concentrations; a similar percentage decline as observed at the remaining sample locations.

A second BiOx reagent application was completed in December 1998 in the northern area. A verification soil sample was collected in February 1999, and the concentration of PCE in this sample was lower than PCE detected in the April 1997 and October 1998 samples. Because soil sample results indicated that PCE remained above the 1 mg/kg estimated site specific RCL, a third application of BiOx reagent was completed in the northern area in May, 1999. Verification soil samples were collected in June and September 1999 to evaluate the effectiveness of these additional applications. Sample locations are shown on Figure 3. Laboratory reports for verification soil samples collected after the second and third applications are also included in Appendix B.

As shown in Table 2, the concentration of VOCs, PCE in particular has declined in samples collected after BiOx reagent was injected into the contaminant soil mass. PCE declined from 6,440 mg/kg



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in the April 1997 sample to 0.515 mg/kg in the September 1999 sample. PCE was degraded to trichloroethene (TCE) and cis-1,2-dichloroethene (cisDCE) during this same period of time, and the concentration of degradation products also declined. TCE declined from 126 mg/kg to non-detect, and cis-1,2-dichloroethene declined from 30.9 mg/kg to 7.79 mg/kg. Petroleum constituents including n-butylbenzene, sec-butylbenzene, ethylbenzene, isopropylbenzene, p-isopropyltoluene, naphthalene, n-propylbenzene, toluene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and total xylene were also present in the April 1997 soil sample. As shown in Table 2, the concentration of petroleum constituents also declined after BiOx was injected into the contaminant mass.

### ***Summary and Conclusions***

VOCs were detected in groundwater samples collected during an initial site investigation completed in September 1994. VOCs were also detected in soil samples collected during subsequent phases of investigation, and two soil source areas were identified. Site investigation results indicate that the primary constituent of concern is PCE, a degreasing solvent formerly used at the MKC facility, and degradation products. Petroleum constituents were also detected in soil samples collected from the northern hot spot.

Site investigation results were subsequently used to develop a site specific RCL for PCE based on the protection of groundwater, and to evaluate potential remedial alternatives. Contaminant transportation modeling was performed, and results indicate that a site specific RCL for PCE of 1 mg/kg will prevent groundwater quality standard exceedances for PCE at the down gradient property line. Site investigation results were also used to evaluate potential remedial alternatives for each hot spot. Soil vapor extraction was eliminated because the highest levels of contamination were present in a fine grained low permeability soil unit. Excavation was also eliminated because of the proximity of the hot spots to the building and difficulties that would be encountered excavating near buried utilities. An in-situ chemical oxidation remedial response was evaluated, and subsequently implemented between June and August 1998. This remedial response consisted of the injection of BiOx, a chemical oxidant consisting of a blend of peroxygen compounds.

Verification soil samples collected in October 1998 after the first application indicate that remedial efforts resulted in decline in contaminant concentrations in each hot spot. The concentration of PCE in soil samples collected from the southern area was detected below the 1 mg/kg site specific RCL for PCE, but exceeded the RCL in a sample collected from the northern hot spot. Two additional applications of BiOx were completed in December 1998 and May 1999. Verification samples



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collected after these application have reduced PCE concentrations below the estimated site specific RCL of 1 mg/kg. Verification soil samples collected from both areas indicate that both hot spots have been remediated to the extent practical. Both areas are also covered with asphalt pavement. The asphalt pavement prevents human contact with the residual contaminants present in the soil. The asphalt pavement also behaves as an impermeable barrier that will protect groundwater by preventing the infiltration of water in each area.

***Recommendations***

Dames & Moore recommends no further action with respect to soil remediation for the MKC site, and requests that the WDNR grant closure on the soil. Groundwater samples will continue to be collected quarterly, and results will be submitted to the WDNR under separate cover.

We are looking forward to your response. Please contact us at (608) 273-2886 with any questions you may have.

Sincerely yours,

**DAMES & MOORE**

Robert, J. Nauta, P.G.  
Senior Hydrogeologist

cc: Jim Lenz - Madison-Kipp Corp.  
Dave Crass - Michael, Best & Friedrich

**Table 1**  
**Soil Sample Results**  
**VOCs detected in Soil Samples Before and After the Initial BiOx Application**

Parameter	Northern Area				Southern Area			
	GP-9 2 - 4 ft. April 4, 1997	GP-9A 2 - 4 ft. Oct. 5, 1998	GP-18 8.5 - 10.5 ft April 4, 1997	GP-18A 8 to 10 ft. Oct. 5, 1998	GP-15 10 - 12 ft. April 4, 1997	GP-15A 10 - 12 ft. Oct. 5, 1998	GP-12 7.5 - 9.5 ft. April 21, 1997	GP-102 6 - 8 ft. Oct. 5, 1998
n-Butylbenzene	0.489	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
sec-Butylbenzene	1.2	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
1,1-Dichloroethane	0.373	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
cis, 1,2-Dichloroethene	30.9	<6	6.12	0.11	<0.027	<0.028	<0.029	0.142
trans-1,2-Dichloroethene	0.489	<6	0.04	<0.032	<0.027	<0.028	<0.029	<0.030
Ethylbenzene	0.283	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
Isopropylbenzene	0.695	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
p-Isopropyltoluene	0.721	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
Naphthalene	3.99	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
n-Propylbenzene	1.67	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
Tetrachloroethene	6,440	753	0.33	5.45	5.54	0.658	3.1	0.534
Toluene	2.06	<6	1.590	<0.032	<0.027	<0.028	<0.029	<0.030
Trichloroethene	126	<6	<0.031	0.342	<0.027	0.28	0.49	0.11
1,2,4-Trimethylbenzene	12.1	<6	<0.031	0.70	<0.027	<0.028	<0.029	<0.30
1,3,5-Trimethylbenzene	6.82	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
Vinyl chloride	<0.160	<6	<0.031	<0.032	<0.027	<0.028	<0.029	<0.030
Total xylenes	6.69	<6	<43	<0.032	<0.027	<0.028	<0.029	<0.030
Total VOCs	6,634.48	753	8.08	5.972	5.54	0.686	3.149	0.786

All concentrations reported in mg/kg  
BiOx applications were completed in June and August 1998.



mg/kg  
ppm

ppm

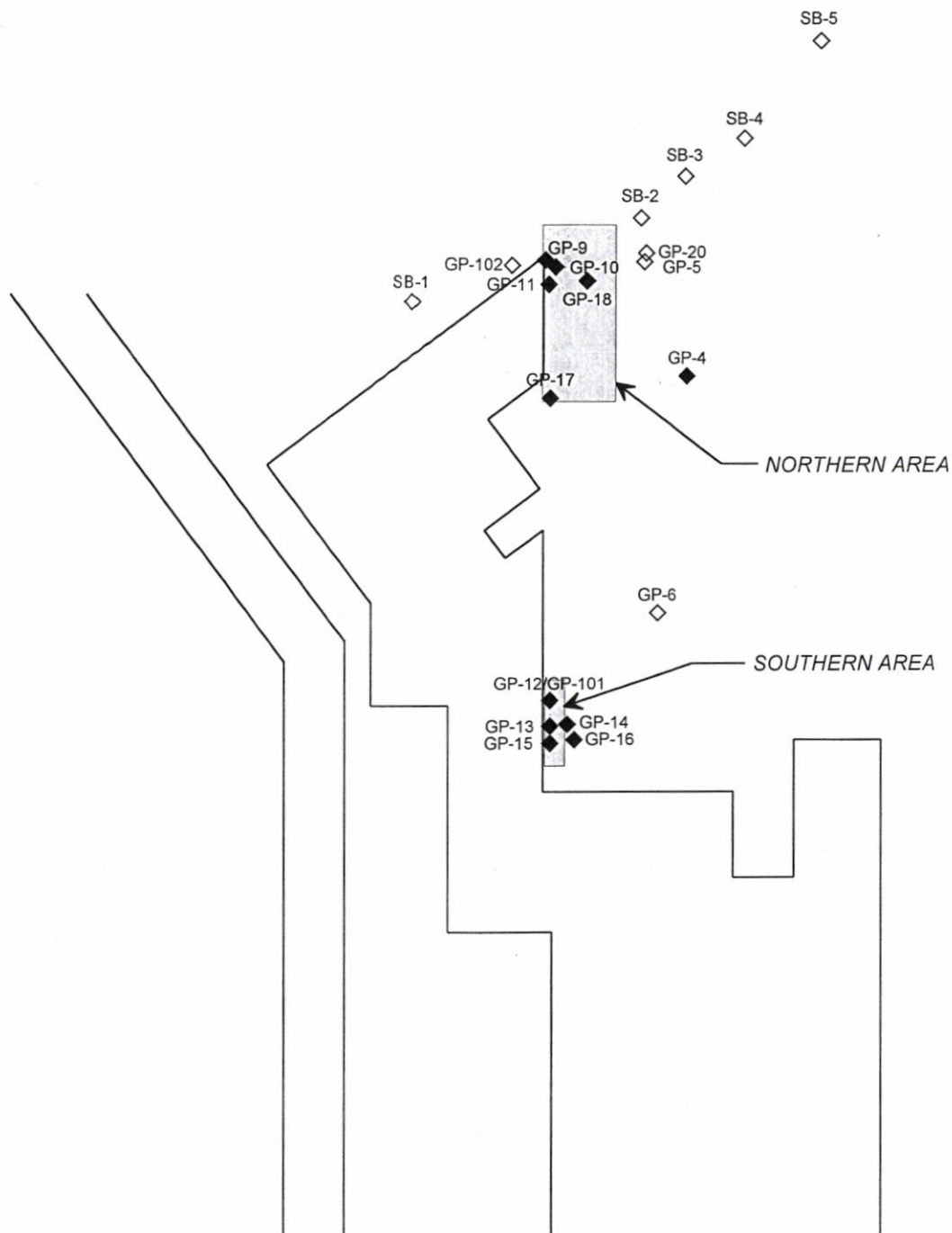
**Table 2**  
**Soil Sample Results**  
**VOCs detected in Soil Samples Before and After BiOx Applications at the GP-9 Location**

Parameter	April 4, 1997 GP-9 2 - 4 ft.	Oct. 5, 1998 GP-9A 2 - 4 ft.	Feb. 24, 1999 Confirmation 4 ft.	June 11, 1999		Sep. 23, 1999 HA-301 4 ft.
				HA-1	HA-2	
n-Butylbenzene	0.489	<6	<0.34	<0.032	<0.16	<0.031
sec-Butylbenzene	1.2	<6	<0.34	<0.032	<0.16	0.083
1,1-Dichloroethane	0.373	<6	<0.34	<0.032	<0.16	0.059
cis, 1,2-Dichloroethene	30.9	<6	8.77	2.020	2.02	7.79
trans-1,2-Dichloroethene	0.489	<6	<0.34	<0.032	<0.16	<0.031
Ethylbenzene	0.283	<6	<0.34	<0.032	<0.16	<0.031
Isopropylbenzene	0.695	<6	<0.34	<0.032	<0.16	0.040
p-Isopropyltoluene	0.721	<6	<0.34	<0.032	<0.16	0.110
Naphthalene	3.99	<6	<0.34	<0.032	<0.16	0.072
n-Propylbenzene	1.67	<6	<0.34	<0.032	<0.16	0.057
Tetrachloroethene	6,440	753	32.9	193	10.7	0.515
Toluene	2.06	<6	<0.34	<0.032	<0.16	<0.031
Trichloroethene	126	<6	4.93	8.84	3.14	<0.031
1,2,4-Trimethylbenzene	12.1	<6	<0.34	0.069	0.528	0.201
1,3,5-Trimethylbenzene	6.82	<6	<0.34	<0.032	0.188	0.089
Vinyl chloride	<0.160	<6	<0.34	<0.032	<0.16	0.503
Total xylenes	6.69	<6	<0.48	<0.044	0.352	<0.044
<b>Total VOCs</b>	<b>6,634.48</b>	<b>753</b>	<b>46.6</b>	<b>203.929</b>	<b>19.654</b>	<b>9.519</b>

All concentrations reported in mg/kg  
BiOx applications were completed in June and August 1998, December 1998, and May 1999.

ppm

**FIGURES**



- ◇ NO VOCs DETECTED IN SOIL SAMPLE
- ◆ VOCs DETECTED IN SOIL SAMPLE



NORTH

SCALE IN FEET



MADISON-KIPP CORPORATION  
MADISON, WISCONSIN

FIGURE 1  
LOCATIONS OF HOT SPOTS  
TARGETED FOR REMEDIATION



DAMES & MOORE

DATE: FEBRUARY 2000

PROJ. No.: 20011-008

SB-5



SB-4



SB-3



SB-2



GP-9



GP-101



SB-1



GP-10



GP-11



GP-18



WAUBESA STREET

GP-4



GP-17



GP-6



GP-12



GP-14



GP-15



GP-16



GP-13/GP-102



SOIL BORING WITH CONCENTRATIONS  
GREATER THAN 1000 µg/kg



SOIL BORING WITH CONCENTRATIONS  
GREATER THAN 500 µg/kg BUT LESS  
THAN 1000 µg/kg



SOIL BORINGS WITH CONCENTRATIONS  
LESS THAN 500 µg/kg



APPROXIMATE AREA EXCEEDING  
1000 µg/kg



NORTH

SCALE IN FEET



MADISON-KIPP CORPORATION  
MADISON, WISCONSIN

FIGURE 3

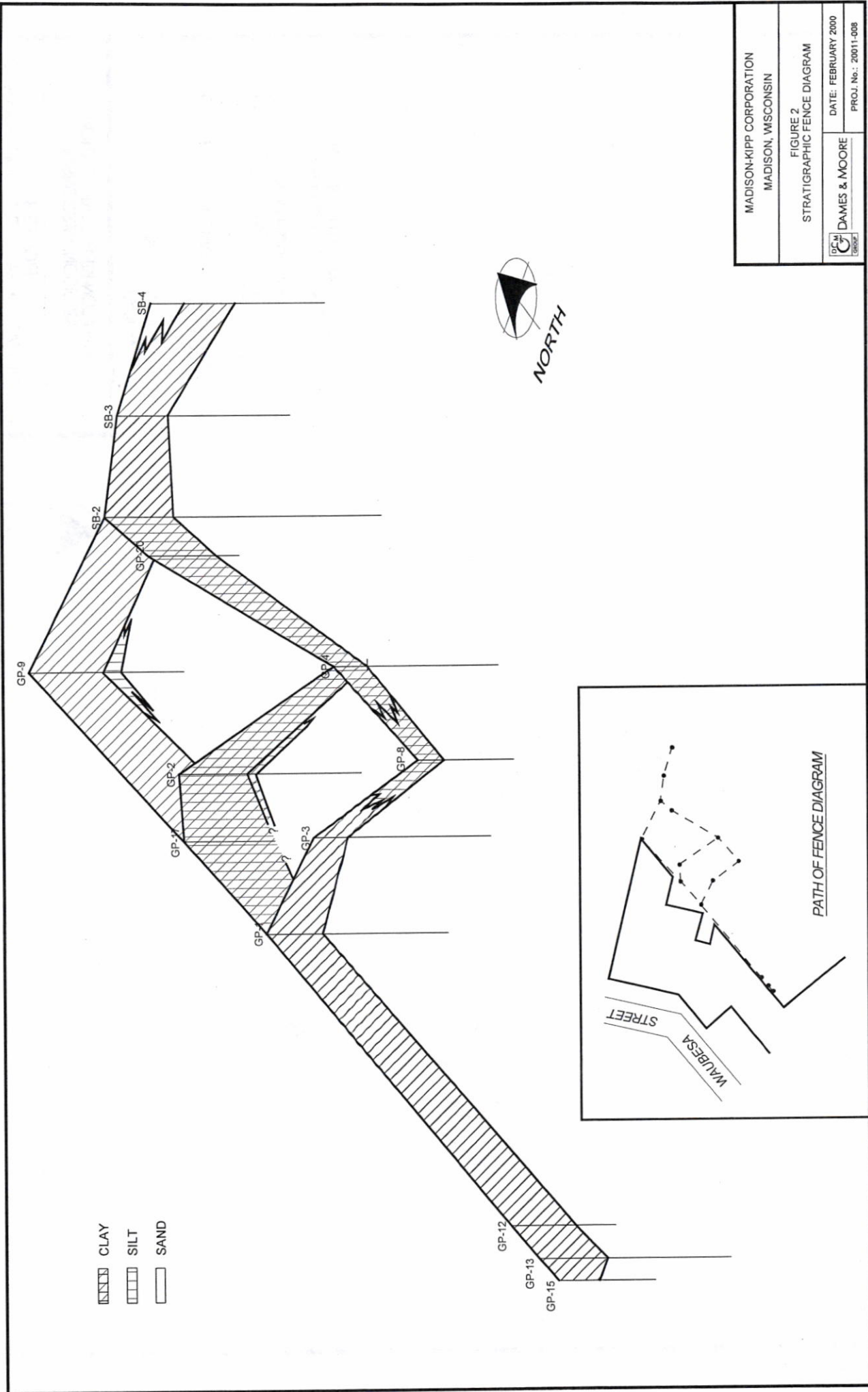
APPROXIMATE AREA OF CLAY CONTAMINATION  
CONCENTRATIONS GREATER THAN 1000 µg/kg



DAMES & MOORE

DATE: FEBRUARY 2000

PROJECT NO.: 20011-008



MADISON-KIPP CORPORATION  
MADISON, WISCONSIN

FIGURE 2  
STRATIGRAPHIC FENCE DIAGRAM

DATE: FEBRUARY 2000

PROJ. No.: 20011-008

**DAMES & MOORE**  
ENGINEERS

**APPENDICES**

**APPENDIX A**

**SESOIL AND AT123D MODEL RESULTS**

# Fax Sheet



**DAMES & MOORE**

A DAMES & MOORE GROUP COMPANY

633 Seventeenth Street, Suite  
2500  
Denver, CO 80202

Telephone - (303) 294-9100  
Fax - (303) 299-7901

TO:  
Bob Nauta

COMPANY:  
Dames & Moore

FAX NUMBER:  
Madison

FROM: Peter Townsend / Mike Rieser

DATE: 3/20/98

SUBJECT: Summary of SESOIL/AT123D Model Results  
NO OF PAGES: 2

Below is a summary of the estimated maximum permissible soil concentrations for PCE in order to meet the MCLs at the given POCs. Two scenarios were considered:

1. A grassy area approximately 145 m from the POC
2. A paved area approximately 230 m from the POC

Analyte	Groundwater PCE Standard ( $\mu\text{g/L}$ )	Maximum Permissible PCE Soil Concentration at Time Zero ( $\mu\text{g/kg}$ )
Paved Area 230 m from boundary	0.5	4,900
Grassy Area 145 m from boundary	0.5	2,200

Attached are summaries of the input data for the two cases. Call if you have questions or require a more detailed explanation/write-up.

### Explanation

The "maximum permissible soil concentration" represents the soil concentration at time zero (after clean up) that will result in ground-water concentrations not to exceed MCLs at the receptor well (POC).

The soil column, from surface to the watertable, is as follows: 8 feet of clay with contamination present, 6 feet of sand with contamination present, and 4 feet of clean sand.

Given the current site geometry, the peak concentration plot exceeded the capability of the SESOIL/AT123D models maximum simulation time. It was therefore necessary to extrapolate the maximum concentrations at the site boundary for both the grassy area and paved area simulation.



For the grassy area simulation SESOIL calculated the net infiltration based on the hydrological properties input into the model, and the resulting net infiltration was 10 cm/year. For the paved area simulation, the precipitation was adjusted to result in a net infiltration of 0.8 cm/year, which is 1% of total precipitation.

The SESOIL model would not allow a clay layer intrinsic permeability of  $1\text{E-}14\text{ cm}^2$ , so the value was adjusted up to the minimum allowable value of  $2\text{E-}10\text{ cm}^2$ . This change will result in the model producing a conservative estimate for the maximum soil concentrations.

**The following chemicals were selected:**

PCE

**Data for Fate and Transport Models****Sesoil Model - Deterministic****Model Control Parameters**

Simulation Time (max=100) [years]	100
Number of soil layers	3
Sublayers in layer 1	1
Sublayers in layer 2	1
Sublayers in layer 3	1
Volatile emissions:	No

**Climate Parameters**

Surface Temperature [C]	7.89
Evapotranspiration [cm/day]	0
Precipitation [cm/yr]	78.58
Storm duration [days]	0.38
Number of storms [yr <sup>-1</sup> ]	58.24
Length of Rainy Season [months]	6

**Soil Column Data**

Effective porosity [-]	0.3
Dry Wt. Soil Bulk Density [g/cm <sup>3</sup> ]	1.4
X-dimension of the source [m]	4.5
Y-dimension of the source [m]	6.1
Layer 1	
Thickness of Layer [m]	2.4
Intrinsic Permeability [cm <sup>2</sup> ]	2.0E-10
Fraction Organic Carbon [-]	0.01
PCE Load [kg]	0.0
Layer 2	
Thickness of Layer [m]	1.5
Intrinsic Permeability [cm <sup>2</sup> ]	1.0E-9
Fraction Organic Carbon [-]	0.01
PCE Load [kg]	0.0
Layer 3	
Thickness of Layer [m]	1.2
Intrinsic Permeability [cm <sup>2</sup> ]	1E-9
Fraction Organic Carbon [-]	0.01
PCE Load [kg]	0.15

**Sesoil Chemical Specific Parameters**

PCE	
Solubility [mg/l]	150
Diffusion Coeff. in Air [cm <sup>2</sup> /s]	0.074
Henrys Constant [Atm/m <sup>3</sup> /mol]	0.6257
Koc [ug/gOC/ug/ml]	265.0
Degradation Rate Constant in Unsaturated Zone [1/days]	0.01
Vapor Pressure [mmHg]	10
Diffusion Coeff. in Water [cm <sup>2</sup> /s]	7.5E-06

**AT123D Model - Deterministic****Model Control Parameters**

Infinite aquifer (y)	Yes
Infinite in depth	No
Type of source	—
Simulation Time (years)	100

**Media Specific Parameters**

Effective Porosity [-]	0.3
------------------------	-----

Hydraulic Conductivity [m/yr]	31.54
Hydraulic Gradient [-]	0.01
Longitudinal Dispersivity [m]	15
Transverse Dispersivity [m]	1.5
Vertical Dispersivity [m]	0.15
Dry Wt. Soil Bulk Density [g/cm**3]	1.4
Fraction Organic Carbon [-]	0.00
Thickness of the aquifer [m]	15

#### Receptor Well Geometry

X Coord - of Well [m]	25
Y Coord - of Well [m]	3.05
Z Coord - Top of Screen [m]	0
Z Coord - Bottom of Screen [m]	15

#### Source Geometry

Length of source in X-dir [m]	—
Length of source in Y-dir [m]	—
Thickness of source in Z-dir [m]	—

PCE —

#### Chemical Specific Parameters for each chemical

Pt	
KOC [ug/gOC/ug/ml]	265.0
Degradation Rate Constant in Saturated Zone [0.0days]	
Molecular Diff Coeff [cm^2/s]	7.5E-06

#### Data for Risk Assessment

##### Body Weight and Lifetime - Deterministic

Average Weight (kg)	—
Lifetime (yrs)	—

##### Drinking Water

Exposure Frequency [days/yr]	—
Exposure Duration [years]	—
Ingestion Rate [liters/day]	—

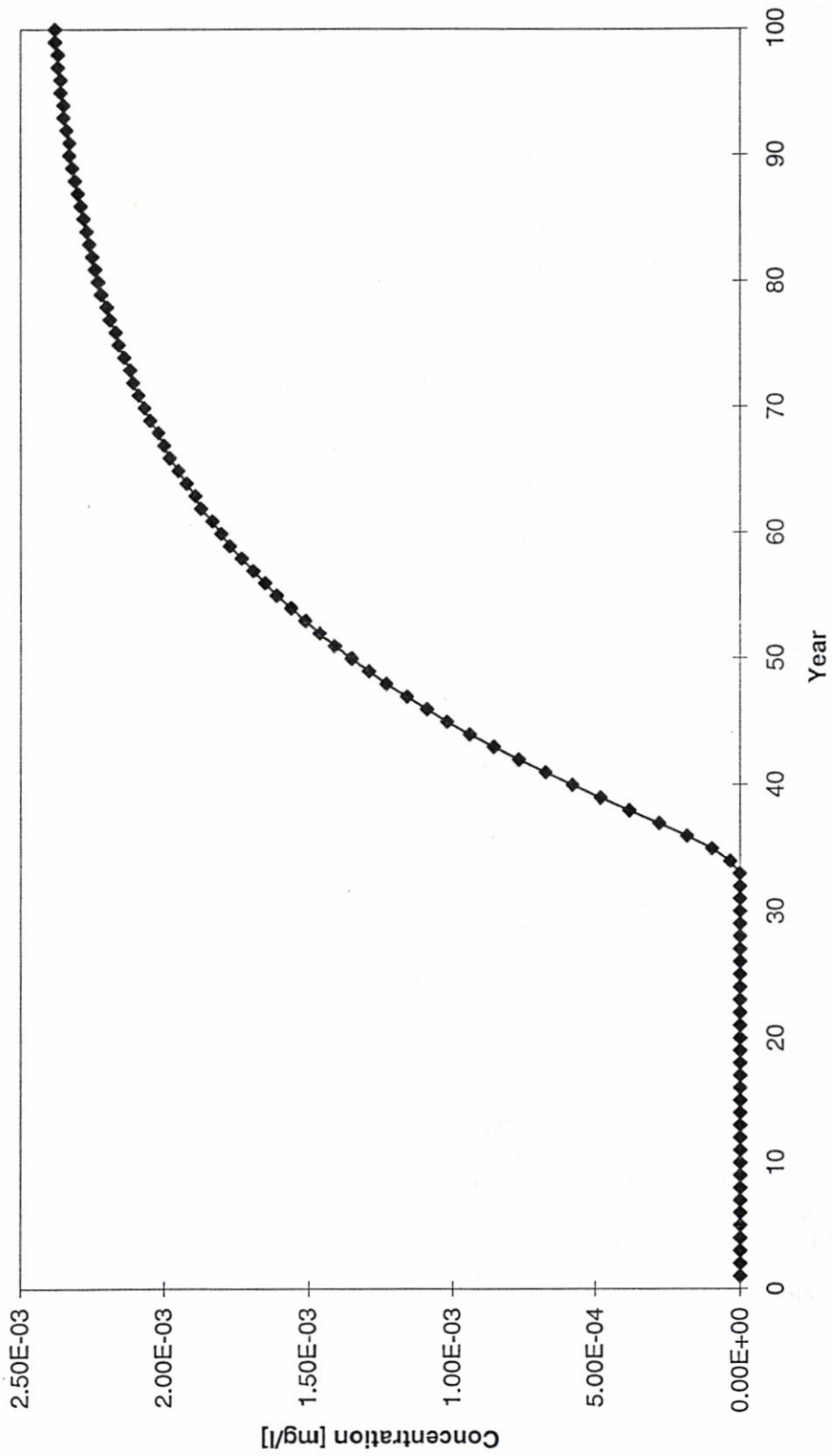
##### Drinking Water Chemical Specific Parameters

PCE	
Bioavailability [fraction]	—

##### Oral Dose

PCE	
Slope Factor [ 1/(mg/kg-day) ]	—
Reference Dose [mg/kg-day]	—

Concentration in Groundwater Over Time for PCE



**The following chemicals were selected:**

PCE

**Data for Fate and Transport Models****Sesoil Model - Deterministic****Model Control Parameters**

Simulation Time (max=100) [years]	100
Number of soil layers	3
Sublayers in layer 1	1
Sublayers in layer 2	1
Sublayers in layer 3	1
Volatile emissions:	No

**Climate Parameters**

Surface Temperature [C]	7.89
Evapotranspiration [cm/day]	0
Precipitation [cm/yr]	63.5
Storm duration [days]	0.38
Number of storms [yr <sup>-1</sup> ]	58.24
Length of Rainy Season [months]	6

**Soil Column Data**

Effective porosity [-]	0.3
Dry Wt. Soil Bulk Density [g/cm <sup>3</sup> ]	1.4
X-dimension of the source [m]	4.5
Y-dimension of the source [m]	6.1
Layer 1	
Thickness of Layer [m]	2.4
Intrinsic Permeability [cm <sup>2</sup> ]	2.0E-10
Fraction Organic Carbon [-]	0.01
PCE Load [kg]	0
Layer 2	
Thickness of Layer [m]	1.5
Intrinsic Permeability [cm <sup>2</sup> ]	1.0E-9
Fraction Organic Carbon [-]	0.01
PCE Load [kg]	0
Layer 3	
Thickness of Layer [m]	1.2
Intrinsic Permeability [cm <sup>2</sup> ]	1E-9
Fraction Organic Carbon [-]	0.01
PCE Load [kg]	0.34

**Sesoil Chemical Specific Parameters**

PCE	
Solubility [mg/l]	150
Diffusion Coeff. in Air [cm <sup>2</sup> /s]	0.074
Henrys Constant [Atm/m <sup>3</sup> /mol]	0.6257
Koc [ug/gOC/ug/ml]	265.0
Degradation Rate Constant in Unsaturated Zone [1/days]	0.01
Vapor Pressure [mmHg]	10
Diffusion Coeff. in Water [cm <sup>2</sup> /s]	7.5E-06

**AT123D Model - Deterministic****Model Control Parameters**

Infinite aquifer (y)	Yes
Infinite in depth	No
Type of source	—
Simulation Time (years)	100

**Media Specific Parameters**

Effective Porosity [-]	0.3
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Hydraulic Conductivity [m/yr]	31.54
Hydraulic Gradient [-]	0.01
Longitudinal Dispersivity [m]	15
Transverse Dispersivity [m]	1.5
Vertical Dispersivity [m]	0.15
Dry Wt. Soil Bulk Density [g/cm**3]	1.4
Fraction Organic Carbon [-]	0.00
Thickness of the aquifer [m]	15

#### Receptor Well Geometry

X Coord - of Well [m]	25
Y Coord - of Well [m]	3.05
Z Coord - Top of Screen [m]	0
Z Coord - Bottom of Screen [m]	15

#### Source Geometry

Length of source in X-dir [m]	—
Length of source in Y-dir [m]	—
Thickness of source in Z-dir [m]	—

PCE —

#### Chemical Specific Parameters for each chemical

PCE	
K <sub>OC</sub> [ug/gOC/ug/ml]	265.0
Degradation Rate Constant in Saturated Zone [1/days]	0.0
Molecular Diff Coeff [cm <sup>2</sup> /s]	7.5E-06

#### Data for Risk Assessment

##### Body Weight and Lifetime - Deterministic

Average Weight (kg)	—
Lifetime (yrs)	—

##### Drinking Water

Exposure Frequency [days/yr]	—
Exposure Duration [years]	—
Ingestion Rate [liters/day]	—

#### Drinking Water Chemical Specific Parameters

PCE	
Bioavailability [fraction]	—

##### Oral Dose

PCE	
Slope Factor [ 1/(mg/kg-day) ]	—
Reference Dose [mg/kg-day]	—

Concentration in Groundwater Over Time for PCE

