MALCOLM PIRNIE

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Mr. Sean McGowan
Carpenter Technology Corporation
101 West Bern Street
Reading, PA 19612-4662

Re: Carpenter Technology
Reading, PA
Clarification to Pentoxsd Simulation

Dear Mr. McGowan:

The following responds to USEPA's request for clarification (e-mail correspondence of January 13, 2011) regarding the Malcolm Pirnie Pentoxsd Simulation for the groundwater data from the Carpenter facility in Reading, PA. The following presents the USEPA comment in Bold italics and a response. It is our understanding that you provided a reply to Item 1 and item 2.

3. Can you provide more info on legends (1) and (2) in Table 1?

The intent was to estimate a temporal and spatial average for the 5 wells. Table 1 presents a revised table of PCE and TCE averages.

Parameter values for each well were averaged for 2008 and 2009. See example below for PCE and TCE concentrations in MW-92-07.

		PCE	TCE
MW-92-07			
Apr-08		37	9
Oct-08		31	9
Apr-09		38	11
Oct-09		39	12
AVG MW-92-07		36.25	10.25

On the table the 2008 and 2009 average concentration for TCA was placed in the appropriate cell. The 2-year semi-annual average was calculated for each well for each parameter. See below:

		PCE	TCE
MW-92-07			
Apr-08		37	9
Oct-08		31	9
Apr-09		38	11
Oct-09		39	12
AVG MW-92-07		**36.25**	**10.25**
MW-92-05D			
Apr-08		9	5
Oct-08		10	5
Apr-09		12	5
Oct-09		13	5
AVG MW-92-05D		**11**	**5**
MW-92-04D			
Apr-08		5	12
Oct-08		5	5
Apr-09		5	7
Oct-09		5	5
AVG MW-92-04D		**5**	**7.25**
MW-89-07			
Apr-08		5	5
Oct-08		5	5
Apr-09		5	5
Oct-09		5	5
AVG MW-89-07		**5**	**5**
MW-89-01			
Apr-08		40	10
Oct-08		23	6
Apr-09		36	10
Oct-09		24	7
AVG MW-89-01		**30.75**	**8.25**

The average of these values were used to produce an average concentration for the 5 wells – see below (values in blue were averaged to arrive at the value in red: .

	PCE	TCE
Average All Wells	**17.6**	**7.15**

4. Can you derive the PCE Concentration 21.3 ug/l and TCE concentration 7.4 ug/l?

We identified two math errors in the original concentration table. The actual average concentration for PCE is 17.6 ug/l and the actual average concentration for TCE is 7.15 ug/l. This resulted from the application of excel functions that included some hidden cells with an incorrect reference. This has been corrected in the revised table. Given that the actual average concentrations are lower than those previously reported, the conclusion of the report is still valid that the PCE and TCE concentrations in groundwater represent an acceptable stream loading condition using a very conservative application. The application is more conservative considering that all values of 5 in the data table represent a non-detect condition and the whole value of the non-detect was used in the application rather than the typical application of applying a random number between 0 and the actual detection limit (which is usually less than the actual detection limit). We attach revised Pentoxsd simulations using the revised average concentrations.

If you should have any questions regarding the information transmitted herein, please call me at 267-481-2177.

Regards,
Malcolm Pirnie, Inc.

Michael Edelman, P.G.
Senior Geologist

MALCOLM PIRNIE

Attachments

METHOD FOR ESTIMATNG FLOW, AVERAGE CONCENTRATION AND MASS LOADING TO SURFACE WATER FROM GROUNDWATER

PA DEPARTMENT
OF ENVIRONMENTAL PROTECTION
SWLOAD5B.XLS
A METHOD FOR ESTIMATING
COMTAMINANT LOADING TO SURFACE
WATER
based on
P.A. Domenico (1987)
Modified to Include Retardation

Project:	SWLOAD5B						
Date:	9/6/2010						
Contaminant:	TCE			Prepared by:		BLRWM	
SOURCE CONC (units) mg/l	Ax (ft) >.0001	Ay (ft) >.0001	Az (ft) >=.0001	LAMBDA day-1	SOURCE WIDTH (ft)	SOURCE THICKNESS (ft)	Time (days)
0.00715	2000	200	1.00E-04	0.0008	1000	20	1.00E+99
Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm^3)	KOC	Frac. Org. Carb.	Retard-ation (R)	V (=K*i/n*R) (ft/day)
1.00E+02	0.003	0.2	2.5	58	1.00E-03	1.725	0.8695652

			-93.875	-75.1	-56.325	-37.55	-18.775	0	18.775	37.55	56.325	75.1	93.875
Edge Criterion (mg/l)	0.005	0	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
Higest modeled conc.	0.00674	-1.0438	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
		-2.0876	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
SURFACE WATER LOADING GRID		-3.1314	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
Distance to Stream (ft)	100	-4.1752	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
Plume View Width (ft)	187.75	-5.219	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
Plume View Depth (ft)	10.438	-6.2628	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
		-7.3066	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
		-8.3504	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
PENTOX NEEDED		-9.3942	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665
		-10.438	0.006665	0.0066914	0.006711	0.0067245	0.0067324	0.0067351	0.0067324	0.0067245	0.0067109	0.006691	0.006665

Average Groundwater Concentration	0.00671	mg/l	
Plume Flow	0.00679	cfs	0.00439 MGD
Mass Loading to Stream	111.68	mg/day	

PENTOXSD

Modeling Input Data

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
833	80.00	310.65	355.00	0.00000	0.00	☑

Stream Data

	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Rch Velocity (fps)	Rch Trav Time (days)	Tributary Hard (mg/L)	Tributary pH	Stream Hard (mg/L)	Stream pH	Analysis Hard (mg/L)	Analysis pH
Q7-10	0.1	0	117	0	0	0	0	0	100	7	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
	Act 2	0	0	0.00439	0	0	0	0	0	100	7

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
TRICHLOROETHYLENE	6.71	0	0.5	0.5	0	0	0	0	1	0

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
833	74.00	185.50	880.00	0.00000	0.00	☑

Stream Data

	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Rch Velocity (fps)	Rch Trav Time (days)	Tributary Hard (mg/L)	Tributary pH	Stream Hard (mg/L)	Stream pH	Analysis Hard (mg/L)	Analysis pH
Q7-10	0.1	0	0	0	0	0	0	0	100	7	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
		0	0	0	0	0	0	0	0	100	7

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
TRICHLOROETHYLENE	0	0	0.5	0.5	0	0	0	0	1	0

PENTOXSD Analysis Results

Hydrodynamics

SWP Basin	Stream Code:	Stream Name:
03F	833	SCHUYLKILL RIVER

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope	Depth (ft)	Width (ft)	WD Ratio	Velocity (fps)	Reach Trav Time (days)	CMT (min)
Q7-10 Hydrodynamics											
80.000	117	0	117	0.00679	0.004	1.0184	141.00	138.46	0.8148	0.45	421.834
74.000	169.5	0	169.5	NA	0	0	0	0	0	0	NA
Qh Hydrodynamics											
80.000	477.07	0	477.07	0.00679	0.004	1.8901	141.00	74.602	1.7901	0.2048	166.851
74.000	659.60	0	659.60	NA	0	0	0	0	0	0	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
80.00		Act 2

AFC

Q7-10: CCT (min) 15 PMF 0.188 Analysis pH 7 Analysis Hardness 100

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
TRICHLOROETHYLENE	0	0	0	0	2300	2300	7470000

CFC

Q7-10: CCT (min) 421.834 PMF 1 Analysis pH 7 Analysis Hardness 100

Parameter	Stream Conc. (µg/L)	Stream CV	Trib Conc. (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
TRICHLOROETHYLENE	0	0	0	0	450	450	7750000

THH

Q7-10: CCT (min) 421.834 PMF NA Analysis pH NA Analysis Hardness NA

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
TRICHLOROETHYLENE	0	0	0	0	NA	NA	NA

CRL

Qh: CCT (min) 166.851 PMF 1

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
TRICHLOROETHYLENE	0	0	0	0	2.7	2.7	189669.9

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
03F	833	SCHUYLKILL RIVER

RMI	Name	Permit Number	Disc Flow (mgd)
80.00		Act 2	0.0044

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
TRICHLOROETHYLENE	6.71	INPUT	10.469	189669.9	CRL

METHOD FOR ESTIMATNG FLOW, AVERAGE CONCENTRATION AND MASS LOADING TO SURFACE WATER FROM GROUNDWATER

Project: SWLOAD5B
Date: 9/6/2010
Contaminant: PCE
Prepared by: BLRWM

PA DEPARTMENT
OF ENVIRONMENTAL PROTECTION
SWLOAD5B.XLS
A METHOD FOR ESTIMATING
COMTAMINANT LOADING TO SURFACE
WATER
based on
P.A. Domenico (1987)
Modified to Include Retardation

SOURCE CONC (units) mg/l	Ax (ft) >.0001	Ay (ft) >.0001	Az (ft) >=.0001	LAMBDA day-1	SOURCE WIDTH (ft)	SOURCE THICKNESS (ft)	Time (days)
0.0176	2000	200	1.00E-04	0.0008	1000	20	1.00E+99

Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm^3)	KOC	Frac. Org. Carb.	Retard-ation (R)	V (=K*I/n*R) (ft/day)
1.00E+02	0.003	0.2	2.5	58	1.00E-03	1.725	0.8695652

			-93.875	-75.1	-56.325	-37.55	-18.775	0	18.775	37.55	56.325	75.1	93.875
Edge Criterion (mg/l)	0.005	0	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
Higest modeled conc.	0.01658	-1.0438	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
		-2.0876	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
SURFACE WATER LOADING GRID		-3.1314	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
Distance to Stream (ft)	100	-4.1752	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
Plume View Width (ft)	187.75	-5.219	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
Plume View Depth (ft)	10.438	-6.2628	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
		-7.3066	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
		-8.3504	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
PENTOX NEEDED		-9.3942	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407
		-10.438	0.016407	0.016471	0.016519	0.0165525	0.0165722	0.0165787	0.0165722	0.0165525	0.0165191	0.016471	0.016407

Average Groundwater Concentration 0.01651 mg/l

Plume Flow 0.00679 cfs 0.00439 MGD

Mass Loading to Stream 274.91 mg/day

PENTOXSD

Modeling Input Data

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
833	80.00	310.65	355.00	0.00000	0.00	☑

Stream Data

	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Rch Velocity (fps)	Rch Trav Time (days)	Tributary Hard (mg/L)	Tributary pH	Stream Hard (mg/L)	Stream pH	Analysis Hard (mg/L)	Analysis pH
Q7-10	0.1	0	117	0	0	0	0	0	100	7	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
	Act 2	0	0	0.00439	0	0	0	0	0	100	7

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
TETRACHLOROETHYL-ENE	16.51	0	0.5	0.5	0	0	0	0	1	0

Stream Code	RMI	Elevation (ft)	Drainage Area (sq mi)	Slope	PWS With (mgd)	Apply FC
833	74.00	185.50	880.00	0.00000	0.00	☑

Stream Data

	LFY (cfsm)	Trib Flow (cfs)	Stream Flow (cfs)	WD Ratio	Rch Width (ft)	Rch Depth (ft)	Rch Velocity (fps)	Rch Trav Time (days)	Tributary Hard (mg/L)	Tributary pH	Stream Hard (mg/L)	Stream pH	Analysis Hard (mg/L)	Analysis pH
Q7-10	0.1	0	0	0	0	0	0	0	100	7	0	0	0	0
Qh		0	0	0	0	0	0	0	100	7	0	0	0	0

Discharge Data

Name	Permit Number	Existing Disc Flow (mgd)	Permitted Disc Flow (mgd)	Design Disc Flow (mgd)	Reserve Factor	AFC PMF	CFC PMF	THH PMF	CRL PMF	Disc Hard (mg/L)	Disc pH
		0	0	0	0	0	0	0	0	100	7

Parameter Data

Parameter Name	Disc Conc (µg/L)	Trib Conc (µg/L)	Disc Daily CV	Disc Hourly CV	Steam Conc (µg/L)	Stream CV	Fate Coef	FOS	Crit Mod	Max Disc Conc (µg/L)
TETRACHLOROETHYL-ENE	0	0	0.5	0.5	0	0	0	0	1	0

PENTOXSD Analysis Results

Hydrodynamics

SWP Basin	Stream Code:	Stream Name:
03F	833	SCHUYLKILL RIVER

RMI	Stream Flow (cfs)	PWS With (cfs)	Net Stream Flow (cfs)	Disc Analysis Flow (cfs)	Reach Slope	Depth (ft)	Width (ft)	WD Ratio	Velocity (fps)	Reach Trav Time (days)	CMT (min)
Q7-10 Hydrodynamics											
80.000	117	0	117	0.00679	0.004	1.0184	141.00	138.46	0.8148	0.45	421.834
74.000	169.5	0	169.5	NA	0	0	0	0	0	0	NA
Qh Hydrodynamics											
80.000	477.07	0	477.07	0.00679	0.004	1.8901	141.00	74.602	1.7901	0.2048	166.851
74.000	659.60	0	659.60	NA	0	0	0	0	0	0	NA

PENTOXSD Analysis Results

Wasteload Allocations

RMI	Name	Permit Number
80.00		Act 2

AFC

Q7-10: CCT (min) 15 PMF 0.188 Analysis pH 7 Analysis Hardness 100

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
TETRACHLOROETHYL-ENE	0	0	0	0	700	700	2270000

CFC

Q7-10: CCT (min) 421.834 PMF 1 Analysis pH 7 Analysis Hardness 100

Parameter	Stream Conc. (µg/L)	Stream CV	Trib Conc. (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
TETRACHLOROETHYL-ENE	0	0	0	0	140	140	2410000

THH

Q7-10: CCT (min) 421.834 PMF NA Analysis pH NA Analysis Hardness NA

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
TETRACHLOROETHYL-ENE	0	0	0	0	NA	NA	NA

CRL

Qh: CCT (min) 166.851 PMF 1

Parameter	Stream Conc (µg/L)	Stream CV	Trib Conc (µg/L)	Fate Coef	WQC (µg/L)	WQ Obj (µg/L)	WLA (µg/L)
TETRACHLOROETHYL-ENE	0	0	0	0	0.8	0.8	56198.48

PENTOXSD Analysis Results

Recommended Effluent Limitations

SWP Basin	Stream Code:	Stream Name:
03F	833	SCHUYLKILL RIVER

RMI	Name	Permit Number	Disc Flow (mgd)
80.00		Act 2	0.0044

Parameter	Effluent Limit (µg/L)	Governing Criterion	Max. Daily Limit (µg/L)	Most Stringent WQBEL (µg/L)	Most Stringent WQBEL Criterion
TETRACHLOROETHYL-ENE	16.51	INPUT	25.758	56198.48	CRL