80th RESTORATION ADVISORY BOARD MEETING
FORMER NAVAL CONSTRUCTION BATTALION CENTER DAVISVILLE
NORTH KINGSTOWN, RHODE ISLAND
NOTES FROM THE 22 MARCH 2012 MEETING

The 80th Restoration Advisory Board (RAB) meeting was held at the Quonset Development Corporation (QDC) Conference Center at 95 Cripe Street in North Kingstown, Rhode Island. The meeting agenda for the 80th RAB is included as Attachment A. The attendance list for the 80th RAB is included as Attachment B.

David Barney, the Navy's BRAC Environmental Coordinator, convened the meeting at approximately 7:00 PM on 22 March 2012.

NEXT RESTORATION ADVISORY BOARD MEETING

The next RAB meeting will be held on 20 September 2012 at 7:00 PM at the QDC Conference Center. The Navy will send out postcards prior to the next RAB meeting reminding the public of the date, time, and location of the next meeting.

LONG-TERM MONITORING UPDATES

Scott Anderson gave a brief update on long-term monitoring schedules:

Tetra Tech will be at Allen Harbor Landfill completing the first quarterly Monitoring Event (ME) of the year, (ME 39) beginning next week. The next sampling event at Allen Harbor Landfill (ME 40) is scheduled for June 2012. (*Post meeting note: Per recent agreement between Navy, EPA Region I, and RIDEM, ME40 will be conducted in the Fall of 2012.)*

Tetra Tech completed ME 15 and the Source Area Investigation at Calf Pasture Point last October. The next field event at Site 07 will be conducted in June 2012.

PRESENTATION: PREDICTING DENSE NON-AQUEOUS PHASE LIQUID (DNAPL) SOURCE ZONE AND PLUME RESPONSE USING SITE-MEASURED CHARACTERISTICS

Mr. Michael Brooks (EPA ADA Hydrogeologist) presented an update to the hydrogeological investigations being conducted by EPA ADA at Site 07 (Calf Pasture Point). In overview, these investigations are being conducted to more comprehensively understand the potential for contaminant migration from Site 07 source areas to downgradient locations (including the Site 07 shoreline). The EPA is currently in the data collection phase; data interpretation will likely be completed in 2013.

The difficulty and expense associated with source-zone and plume characterization of dense non-aqueous phase liquids (DNAPL), such as trichloroethene (TCE), represents a challenge at contaminated sites such as Site 07. Identification of cost-effective remedial options that decrease human health and ecological risks, provide regulatory compliance, and minimize the need for long-term stewardship is a priority. Predicting the relationship between DNAPL source-zone changes and downgradient plume response is critical to making informed site management decisions—especially those related to remedial actions. Thus, it is vital that source zone and plume characterization be conducted within a framework that is consistent with appropriate predictive models for contaminant migration at a site. The objective of this project is to demonstrate effective field-scale approaches that forge linkages between characterization, prediction, and decision making at DNAPL sites.

This project is intended to determine "source-strength functions" (migration of contaminant mass through time from the source to downgradient areas), using existing historical site data supplemented with limited flux- and core-based groundwater sampling, for site evaluation and management purposes. Additionally,

this project will characterize near-source plume response to source-mass depletion to provide the understanding needed to predict long-term plume responses and to link characterization of the near source, short-term responses to the likely long-term behavior of the dissolved plume (i.e., how will VOC concentrations in the groundwater aquifer change over time [both spatially and in terms of concentration]?). The knowledge gained from the field site data and experiments will be used to provide guidance on the recommended level of source zone characterization needed to adequately predict source-strength functions and plume response.

M. Brooks has created 3 "control zones/planes" (please see Attachment C) for the investigation of the Site 07 groundwater plume. The control planes are designed to intersect the groundwater (and the contamination that it contains) as it flows from the source areas to the downgradient areas. The first is located at MW07-15D, which is in the vicinity of the source area. The second control plane is located downgradient of the source area at MW07-17D, and the third control plane was established between MW07-09 and MW07-39 where VOC concentrations to the north of the plane have been observed decreasing while VOC concentrations to the south of the plane are increasing. At MW07-17D, EPA installed 9 Geoprobe wells trending in an easterly direction. At MW07-15D EPA installed 5 wells trending toward the northeast. And between MW07-09 and MW07-39, EPA installed 8 wells. Once these wells were installed, a third passive flux meter (PFM) deployment was conducted at the site that included all the new wells and selected existing monitoring wells along the flowpath between the 3 control planes. (PFM meters measure VOC mass discharge at certain vertical positions within the aquifer.) Data from the third PFM deployment was used to calculate total VOC mass discharge at each of the 3 control planes. VOC mass discharge was calculated to be 5 g/day at the control plane located at MW07-15D, 45 g/day at the control plane located at MW07-17D and 427 g/day at the control plane between MW07-09 and MW07-39. The result for MW07-09 and MW07-39 was averaged between the shallow/intermediate and deep groundwater zones.

As noted above, the data currently being collected by the EPA will be evaluated by the EPA, RIDEM, and the Navy to more fully understand the potential for contaminant migration in the groundwater at Site 07. In turn, this information can be used to help guide the appropriate level of effort in the long term monitoring program to ensure continued protectiveness of site receptors.

After M. Brook's presentation, a member of the audience asked if the trap rock placed on the access road to Calf pasture Point would be removed so the site could return to its natural state for the walkers and bike riders. D. Barney of the Navy stated that the rock had been placed there to support heavy trucks and equipment needed for the source area removal conducted at Site 07 in 2011. D. Barney stated that the Navy would coordinate with the Town before implementing any effort to modify/restore the road.

The next question from the audience was addressed to M. Brooks; what information did he hoped to gain from the data he was collecting and would additional data be collected at the site? M. Brooks stated that additional well installation and/or data collection was anticipated. As noted previously, he hopes that the data collected will support long term decision making for the site. D. Barney asked him if he could go back in time to day 1 of the release and predict the future of the plume. M. Brooks stated that he could go back to the time of the release and estimate the initial mass discharge at the site. However, based on the currently available data, there would be a lot of uncertainty in that estimate and any predictions regarding the future of the plume.

ARMY CORPS NIKE SITE UPDATE

Mr. Casey Haskell of the United Stated Army Corps of Engineers (USACE) provided an update on the status of the environmental investigation of the Nike site. A Draft Remedial Investigation (RI) report has been prepared but will not be finalized due to data gaps in the information needed to complete the report. The USACE will resolve the data gaps and combine the RI report with the Feasibility Study (FS) report. The USACE has switched contractors and hopes to conduct additional investigations this summer (2012) to fill the RI data gaps. The USACE hopes to complete RI/FS within the next year.

R. Gottlieb asked if the USACE had developed a work plan for the summer 2012 investigation. Mr. Haskell stated that they will, and it will include an updated risk assessment work plan prepared per EPA guidelines. The new contractor is tasked with the development and implementation of the work plan.

Mr. Haskell indicated that residential stakeholder (i.e. Carriage Hill Residents) concerns regarding the potential for vapor intrusion into off-site buildings were identified during the development of the sites public involvement plan. Mr. Haskell stated that USACE doesn't feel that there is a high likelihood that VI is an issue to the residents of Carriage Hill because there is no evidence of groundwater contamination at levels in excess of the MCL in project wells located in Candlewood Drive or shallow groundwater underneath the neighborhood. Mr. Haskell also stated that USACE would still like to collect samples from the Carriage Hill Association wetlands, located immediately north of the Nike PR-58 project site, to adequately determine if there are any shallow groundwater impacts in the area between the Nike property and the Carriage Hill neighborhood. Mr. Haskell stated that USACE has a public presentation meeting scheduled for May 3rd at 0600PM at QDC's annex building, which will present the findings of the Draft RI and present VI to residents and other stakeholders and request permission once again from Carriage Hill Residents to access their common land areas to sample for Nike contaminants. Mr Haskell went on to state that the USACE has requested access to Carriage Hill Association common lands on several previous occasions since 2007, but have not been allowed to access any areas. USACE does not intend to ask for access again after this May 3rd meeting.

Mr. Haskell stated that the USACE has completed the 2nd round of indoor air investigation work at the Babcock Road DPW facility. As a part of this effort the USACE conducted a baseline indoor air risk screening evaluation and no Nike PR-58 COCs were detected in indoor air above un-acceptable risk levels. USACE will continue to monitor groundwater in the vicinity of the DPW as part of the RI efforts at the Nike PR-58 site. Mr. Haskell stated that results of the draft DPW indoor air investigation were provided electronically (via USACE ftp site download) to stakeholders, including RIDEM and EPA for comments. C Williams and R Gottlieb requested a DVD and hard copy, respectively, of the indoor evaluation report; Mr. Haskell will forward the document as requested. C. Williams asked if the indoor evaluation will be incorporated into the RI, Mr. Haskell confirmed that it will.

Mr. Haskell stated that the Draft RI recommendations will be considered in the development of the work plan. He further noted that the USACE will be investigating data gaps regarding DNAPL reportedly observed during drilling (observed in the circulation wash tub) at one of the wells previously installed at the site. Also, the USACE hopes to install additional wells in the Carriage Hill area (to the north) to evaluate Site contaminants in the shallow groundwater. Although the USACE has been denied access to this area many times, they will make one more attempt to collect the data. It should be noted that contamination has not been detected in wells located along the road to the north of the base. The USACE is planning a public meeting on the evening of May 3rd and will be sending invitations as soon as the meeting time has been established.

R. Gottlieb of RIDEM asked if the USACE would be responding to RIDEM comments to the RI; Mr. Haskell stated that responses would be prepared if RIDEM so requested. He also assured Mr. Gottlieb that all RIDEM comments would be addressed during the preparation of the final RI document.

SITE 16

L. Sinagoga of Tetra Tech stated that the draft final and final Feasibility Study (FS) reports for Site 16 are scheduled to be published in the spring/early summer of 2012. Then, the Proposed Plan will be published stating the preferred remedial alternative for the site; there will be a public meeting for the Proposed Plan. Mr. King (QDC) asked, what is the anticipated preferred alternative for Site 16? L. Sinagoga explained that the FS identifies a range of remedial alternatives and technologies for soil and groundwater at Site 16; the Navy will evaluate and select from among the alternatives presented in the FS. D. Barney indicated that the Navy is currently evaluating the FS alternatives and is using a number of factors to select the preferred alternative for Site 16.
(Post meeting note: The National Contingency Plan factors used to evaluate FS alternatives are:

- *Protectiveness of Human Health and the Environment*

- *Attainment of Federal and State Standards*
- *Long-term Effectiveness*
- *Reduction of Contaminant Mobility, Toxicity, and Volume through Treatment*
- *Short-term Effectiveness*
- *Implementability*
- *Cost Effectiveness*
- *State Acceptance*
- *Community Acceptance)*

The Navy hopes to publish the Record of Decision (ROD) for Site 16 by the end of this year.

CED/QDC OUTFALL

L Sinagoga explained that the Navy is moving toward finalization of the environmental documents for CED area and the associated QDC Outfall 001 area. In the CED area, a risk assessment was conducted for the soil contamination at the 4 sites that comprise the CED area. That assessment will be the basis of any remedial action recommended for the CED area. The Outfall 001 area, which is associated with the CED area, includes pipelines and catch basins and an outfall to the northeast of the CED area. Environmental contamination was detected in soils and sediments collected from this pipeline and outfall area. The Navy has determined that additional environmental investigations will be necessary for this area.

OPEN MEETING

D. Barney opened the meeting for questions. No one had further questions; the meeting was concluded.

Tonight's meeting concluded at approximately 7:50 P.M.

ATTACHMENT A
AGENDA

AGENDA
FORMER NCBC DAVISVILLE
80th Restoration Advisory Board (RAB) Meeting

Date: March 22, 2012
Time: 7:00 P.M.
Location: 95 Cripe Street, North Kingstown, Rhode Island

RAB Meetings – Next Meeting Date, Thursday September 27, 2012

Long-Term Monitoring Program Updates

- Site 09: Allen Harbor Landfill
- Site 07: Calf Pasture Point

EPA Presentation: Site 07 Source Area Investigation

USACE Presentation: Update on NIKE PR 58 Site

Site 16 Feasibility Study and Proposed Plan Update

CED Area and QDC Outfall 001 Update

ATTACHMENT B
ATTENDANCE LIST

FORMER NCBC DAVISVILLE
RAB MEETING ATTENDANCE LIST
22 MARCH 2012 – 7:00 PM
95 CRIPE STREET – QDC CONFERENCE CENTER

Name	Affiliation	Phone	email
RICH GOTTLIEB	RIDEM	401-222-2797x7138	RICHARD.GOTTLIEB@DEM.RI.GOV
CASEY HASKELL	USACE	978-318-8398	CASEY.J.HASKELL@USACE.ARMY.MIL
Larry McBride	Resident	401-295-7832	
STEVEN KING	QDC	401-295-0044	SKING@QUONSET.COM
Christine Williams	USEPA New England	6179181384	williams.christine@epa.gov
LeeAnn SINAGOGA	T+	412-921-8887	LEEANN.SINAGOGA@tetratech.com
DAVE BARNEY	NAVY BRAC	617-753-4658	david.a.barney@navy.mil
Jeff Dale	NAVY	215-897-4914	jeffrey.M.Dale@navy.mil
Scott R. Anderson	Tt	412-921-8608	Scott.Anderson@tetratech.com
Joseph Logan	Tt	412-921-7231	joe.logan@tetratech.com
Robin Clark	TT	9784745456	robin.clark@tetratech.com

FORMER NCBC DAVISVILLE
RAB MEETING ATTENDANCE LIST
22 MARCH 2012 – 7:00 PM
95 CRIPE STREET – QDC CONFERENCE CENTER

Name	Affiliation	Phone	email
Michael C. Brooks	U.S. EPA	580-436-8982	brooks.michael@epa.gov
Don Reiner	Town of N.K	401-288-1571	
Susan Licardi	NK H2O	401 268 1520	slicardi@northkingstown.org
ED TURNER	SEABEE VETS	401 884-1929	CBETX1DVE@CHARTER.NET
JAY O'Brien	NK citizen	401/884-8584	JAYESS1@hotmail.com

ATTACHMENT C
EPA-ADA PRESENTATION
(MICHAEL BROOKS)

March 22, 2012

PREDICTING DNAPL SOURCE ZONE AND PLUME RESPONSE USING SITE-MEASURED CHARACTERISTICS

Project Number (ER-1613)

UF | UNIVERSITY of FLORIDA

PURDUE

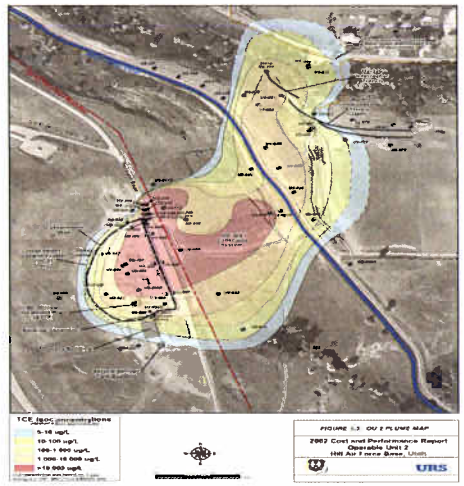
DoD | EPA | DOE

SERDP

Technical Objective

This project proposes to demonstrate effective field-scale approaches that forge linkages between characterization, prediction, and decision making at DNAPL sites.

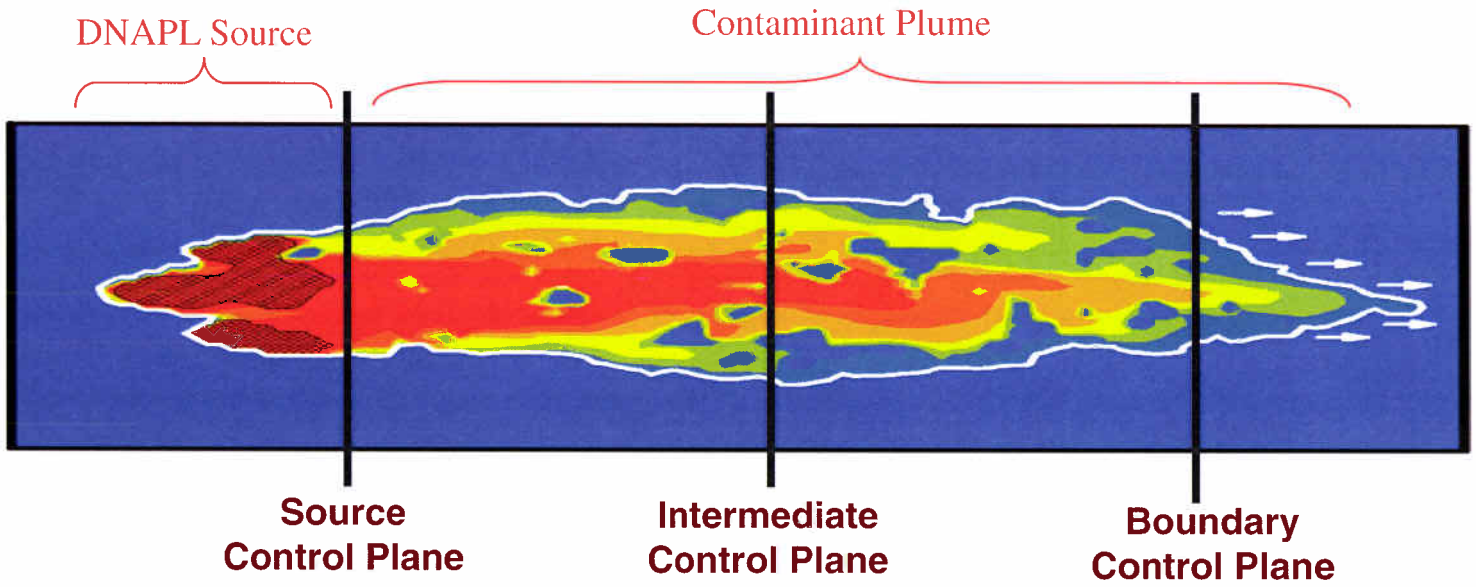
- Develop source-strength functions based on existing historical site data supplemented with flux- and core-based sampling;
- Extend to the field-scale our ability to predict DNAPL source depletion through dissolution, based on *a priori* characterization;
- Characterize the near-source plume response to source-mass depletion;
- Link characterization of near-source, short-term responses to long-term behavior
- Provide recommended guidance on the level of source-zone characterization needed to determine source-strength functions and plume response.



SERDP Project ER-1613

Technical Objective: Estimate source-strength function (SSF) from historic data, and supplement with flux-based sampling.

Source-strength function = mass discharge from source zone as a function of time.



Five approaches for estimating source strength functions $M_D(t)$ from existing site data (without extensive further characterization)

Spatial transects	• Mass discharge transects located different distances from the source zone within the contaminant plume • Source function models fit to plume transects
Temporal transect	• Mass discharge transect measured at different times • Source function models fit to temporal discharge
Individual wells	• Fit C(t) monitoring well data, assess the distribution of parameters
Global fit of all field data	• Global fit of a source function and transport model to all C(t) monitoring well data
Active pumping wells	• Fit source function model to mass discharge data, $M_D(t)$, from pumping wells in or near the source zone

Calf Pasture Point (CPP) - Activities

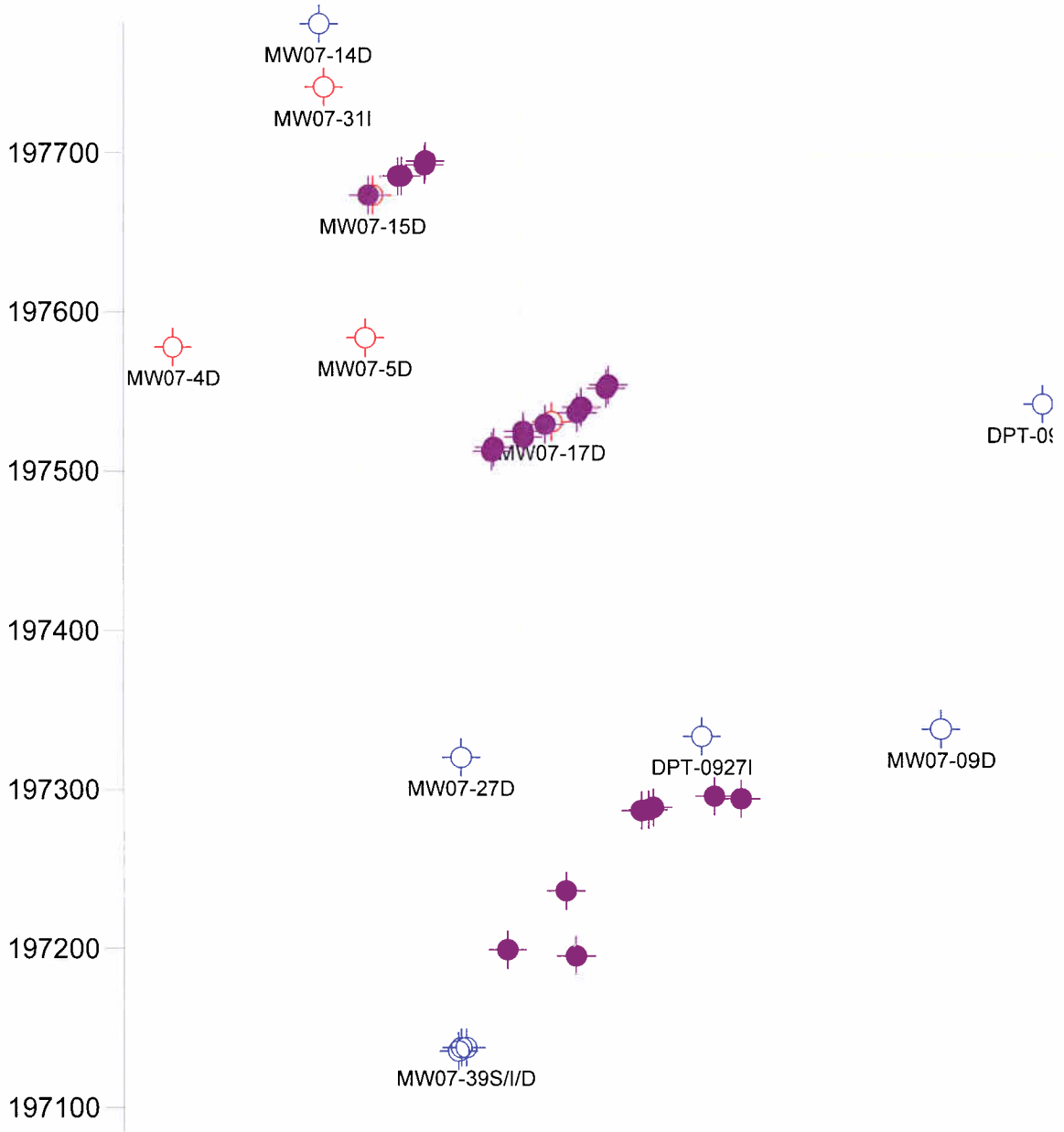
- Historic data analysis to estimate SSF
- First PFM deployment
- Water well sampling
- Second PFM deployment
- Particle size analysis
- Well installations
- Third PFM deployment

CPP - Well Installation

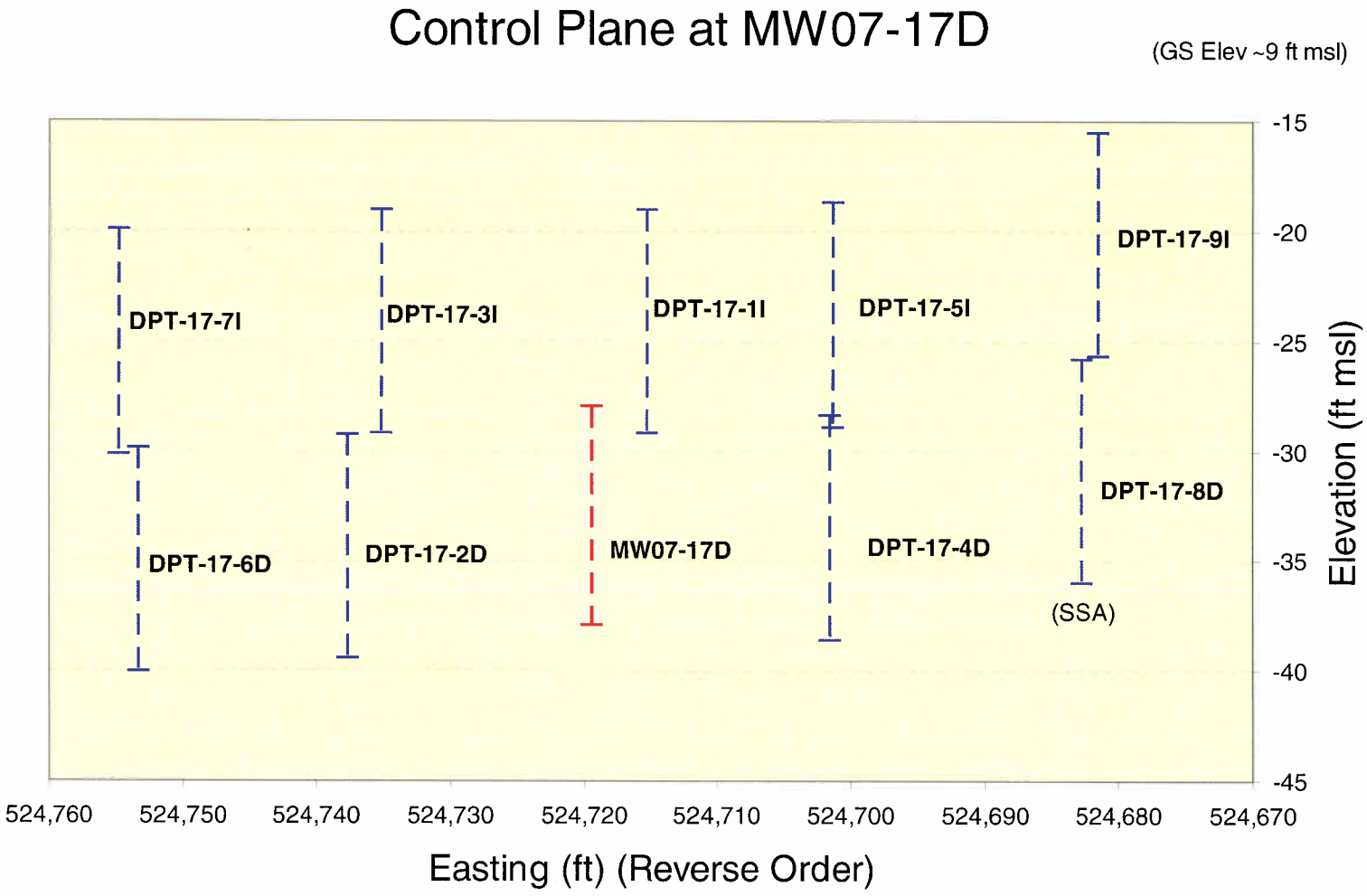
DPT Well Installation

2-Aug-2011
through
11-Aug-2011

Geoprobe pre-packed well screens, 10 slot with 20/40 filter pack

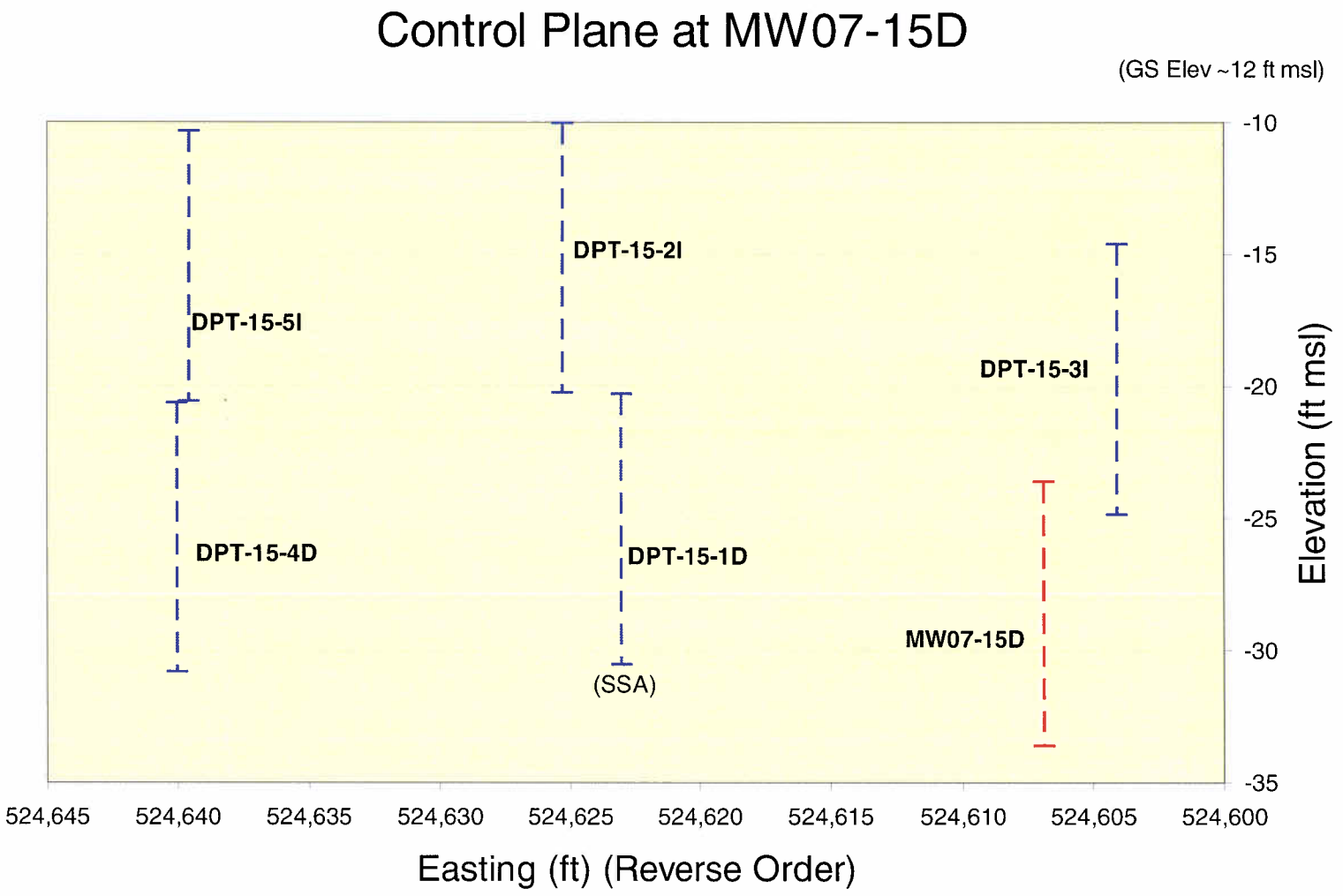


CPP – Well Installation Summary



Plotted as a function of Easting (ft), not CP distance

CPP – Well Installation Summary

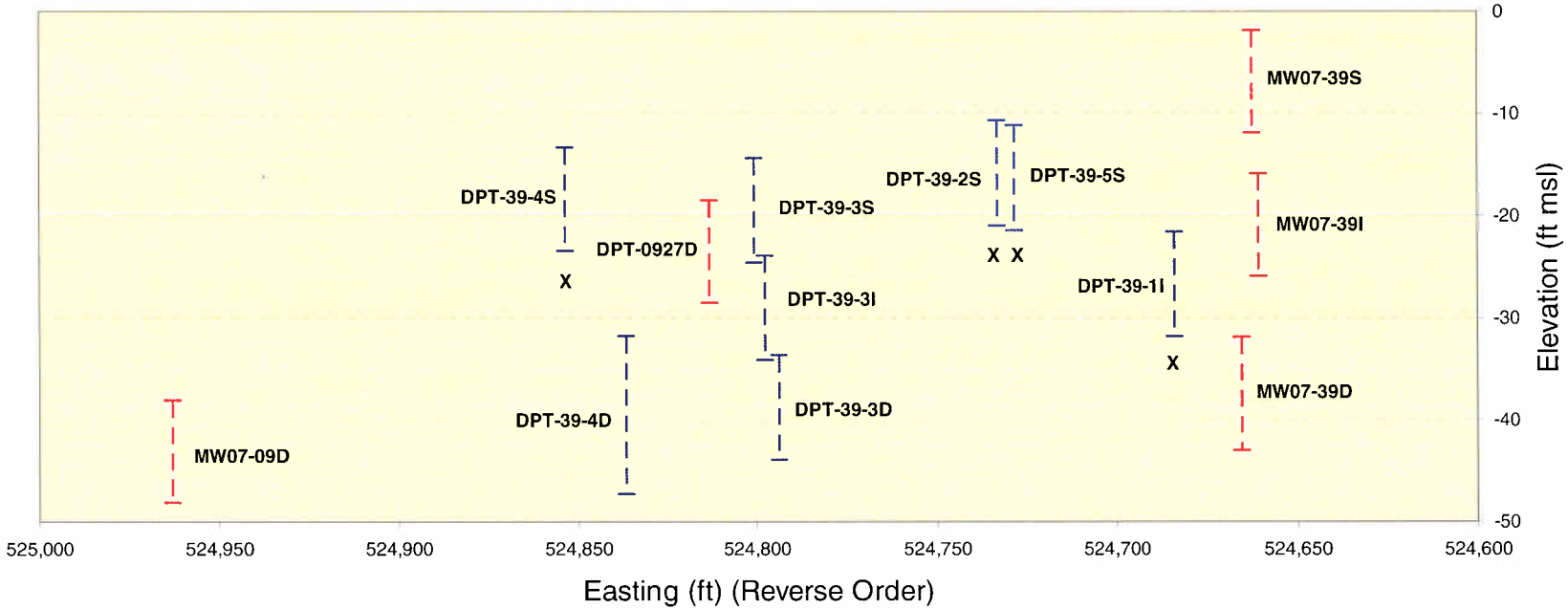


Plotted as a function of Easting (ft), not CP distance

CPP – Well Installation Summary

Control Plane at MW07-39S/I/D

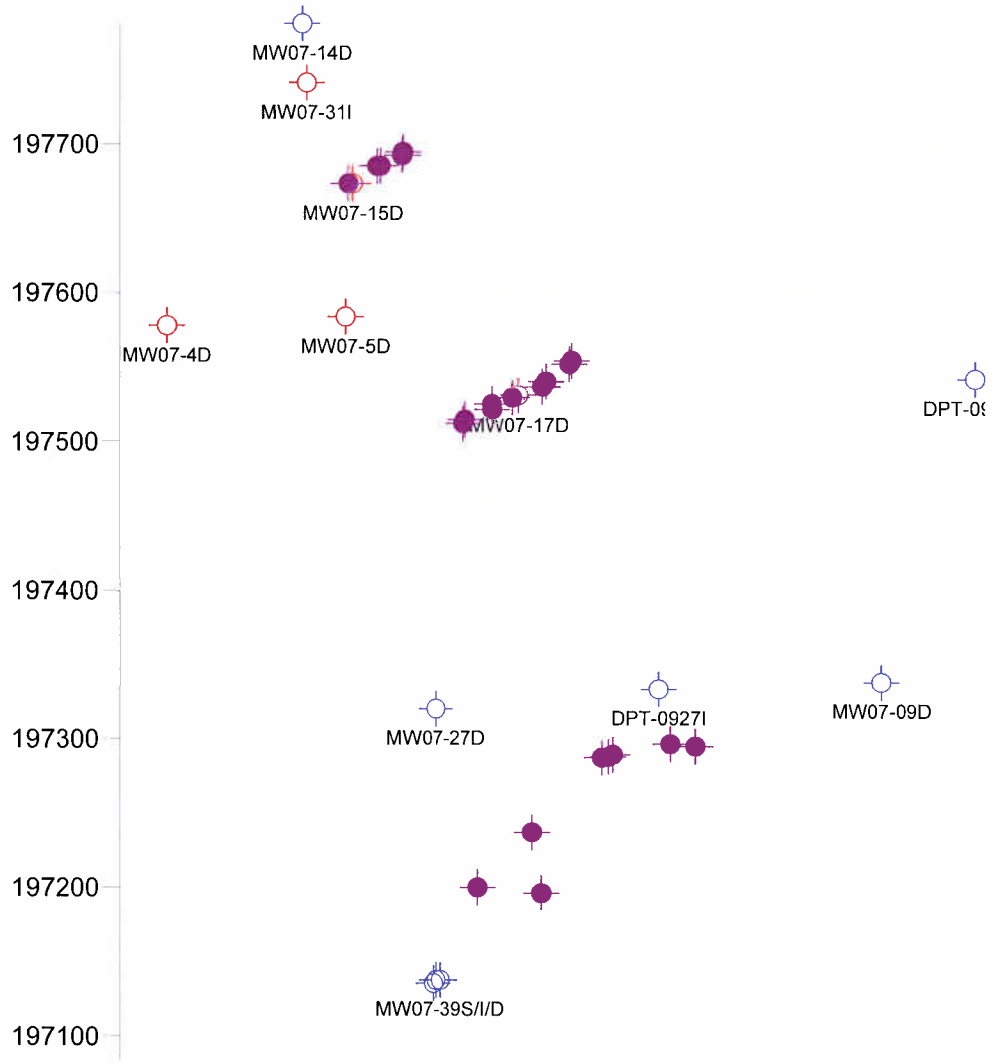
(GS Elev ~7 to 8 ft msl)



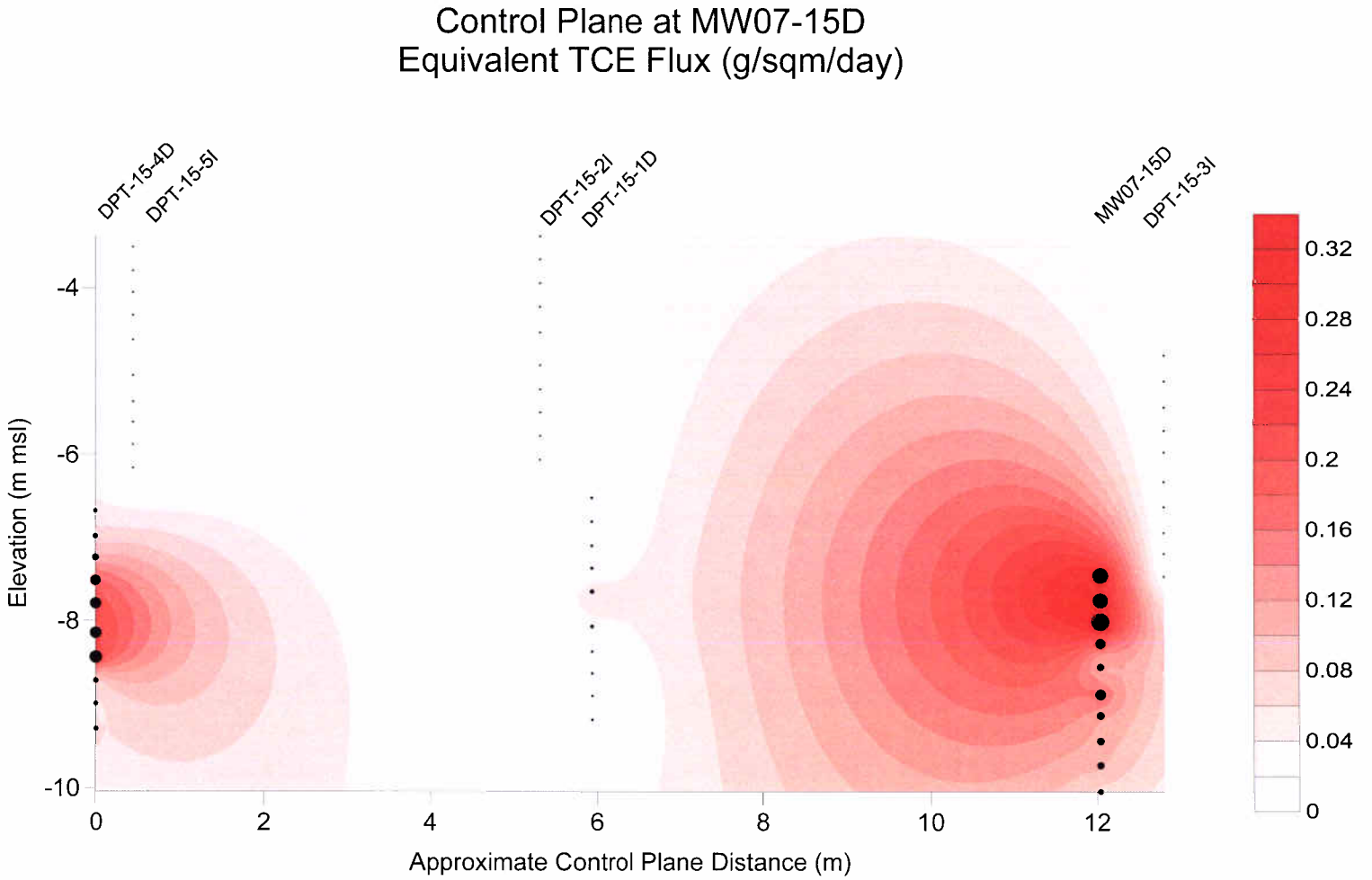
Plotted as a function of Easting (ft), not CP distance

CPP - Third PFM Deployment

23-Sept-11 to 18-Oct-11 / 29 Wells



CPP - Third PFM Deployment

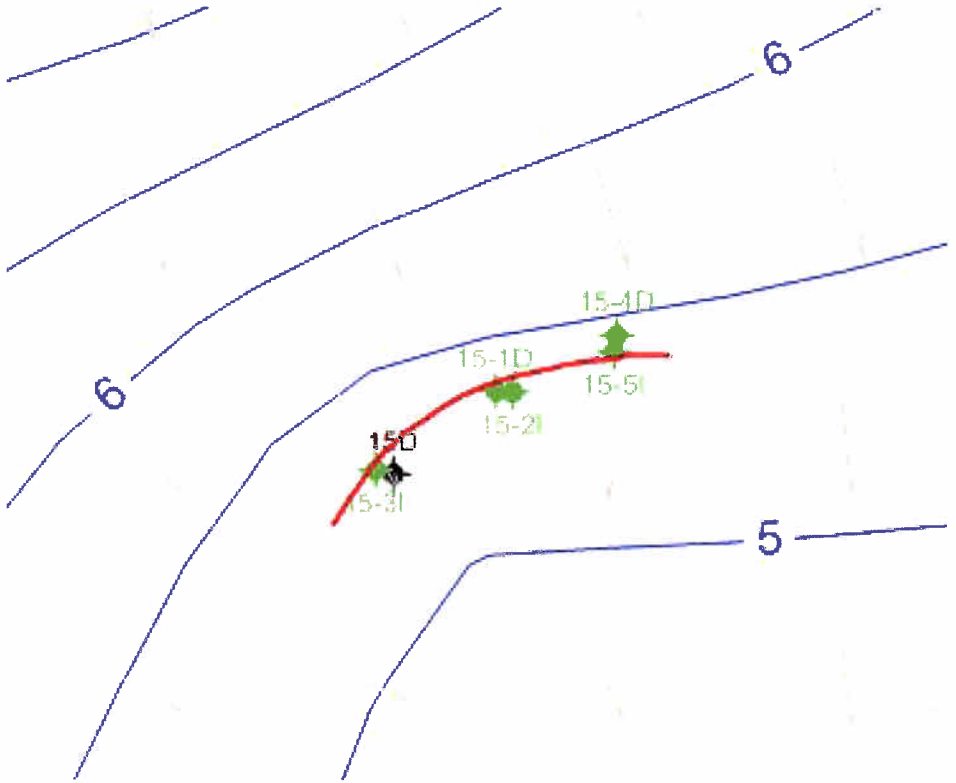


- Mass Discharge = 5 g/day.
- Kriging Interpolation w/in Surfer Software.
- Control plane based on average water elevations during 3rd PFM deployment.

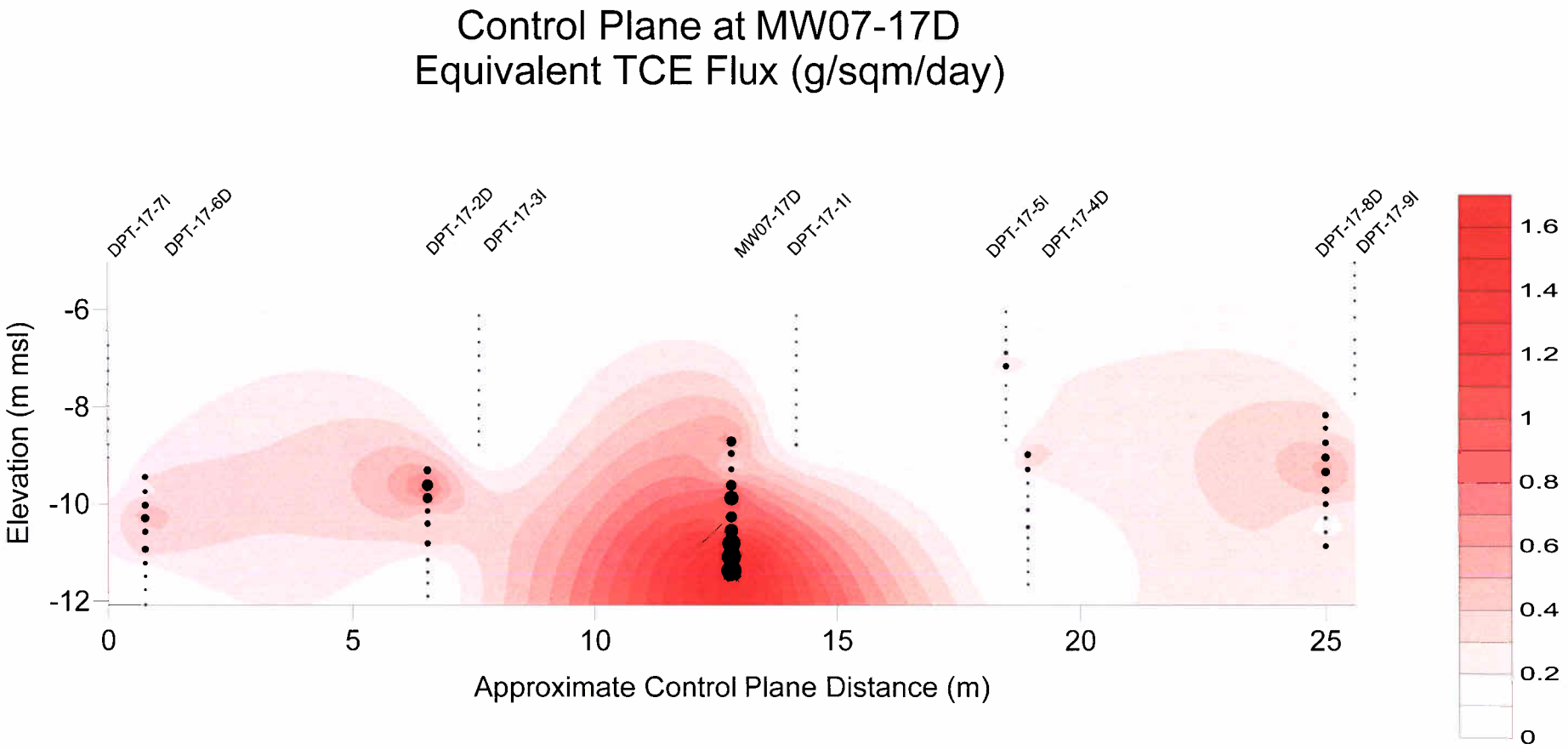
CPP - Third PFM Deployment

Control Plane based on MW07-15D

- Mass Discharge = 5.6 g/day
- Thiessen Polygon Approach
- Control plane based on LTM average groundwater elevations



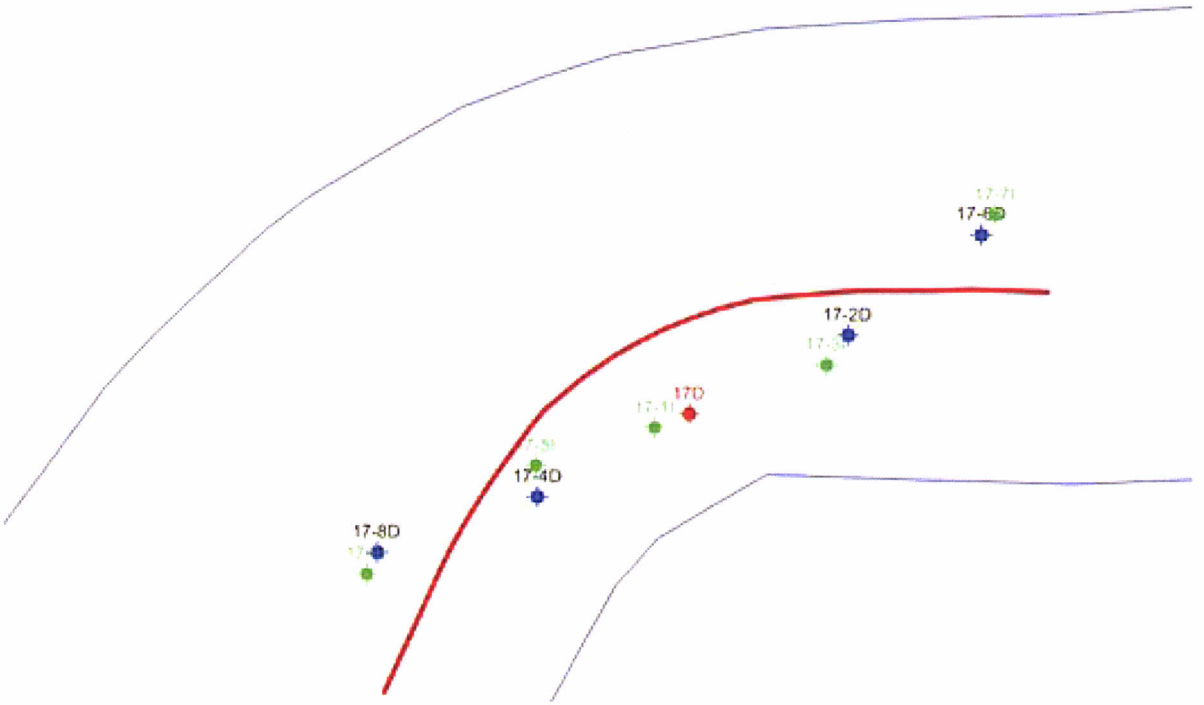
CPP - Third PFM Deployment



- Mass Discharge = 45 g/day
- Kriging Interpolation w/in Surfer Software
- Control plane based on average groundwater elevations during 3rd PFM deployment.

CPP - Third PFM Deployment

Control Plane based on MW07-17D



- Mass Discharge = 42 g/day.
- Thiessen Polygon Approach.
- Control plane based on LTM average groundwater elevations.

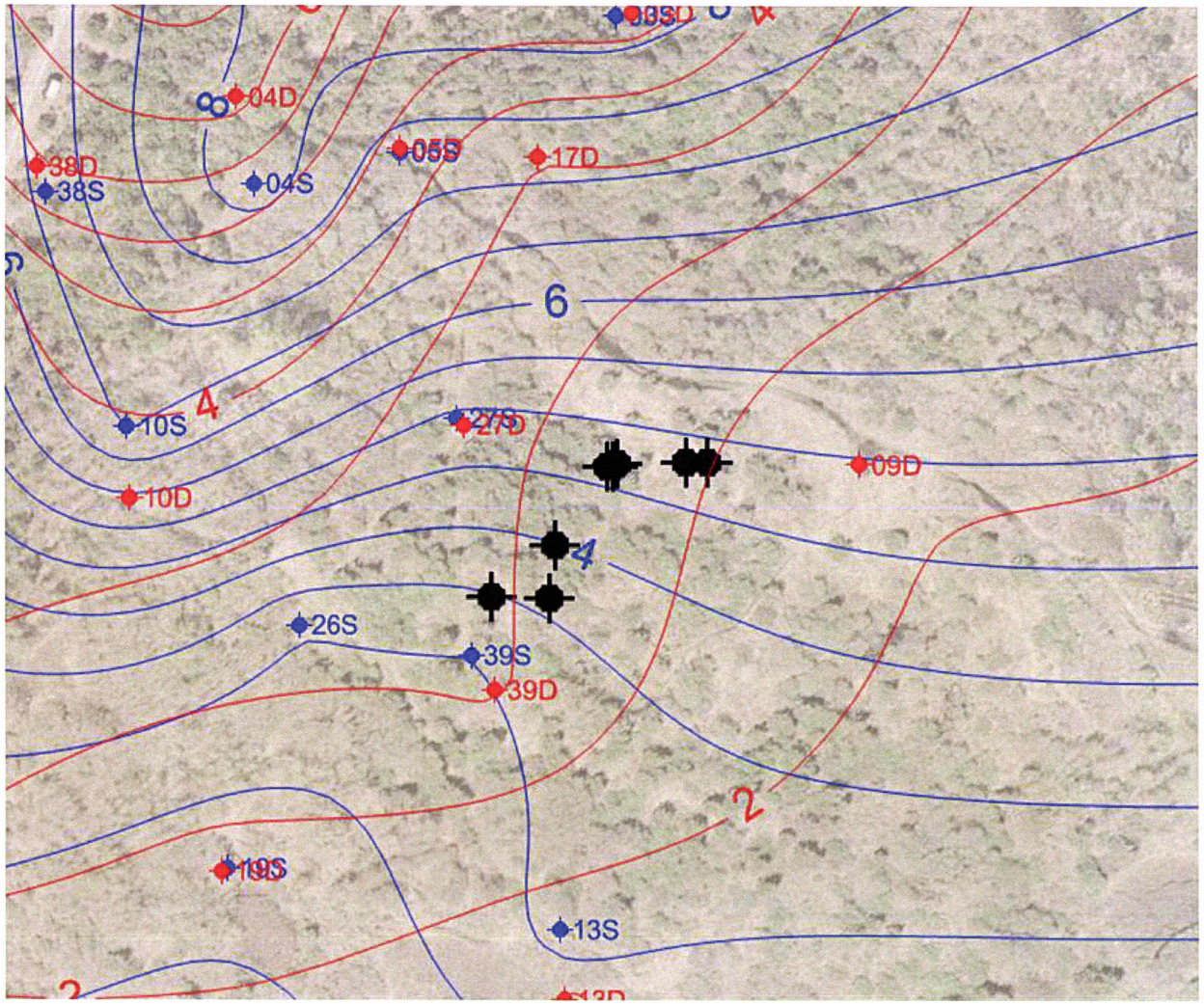
CPP - Third PFM Deployment

Shallow versus Deep groundwater elevations contours (average of LTM data)

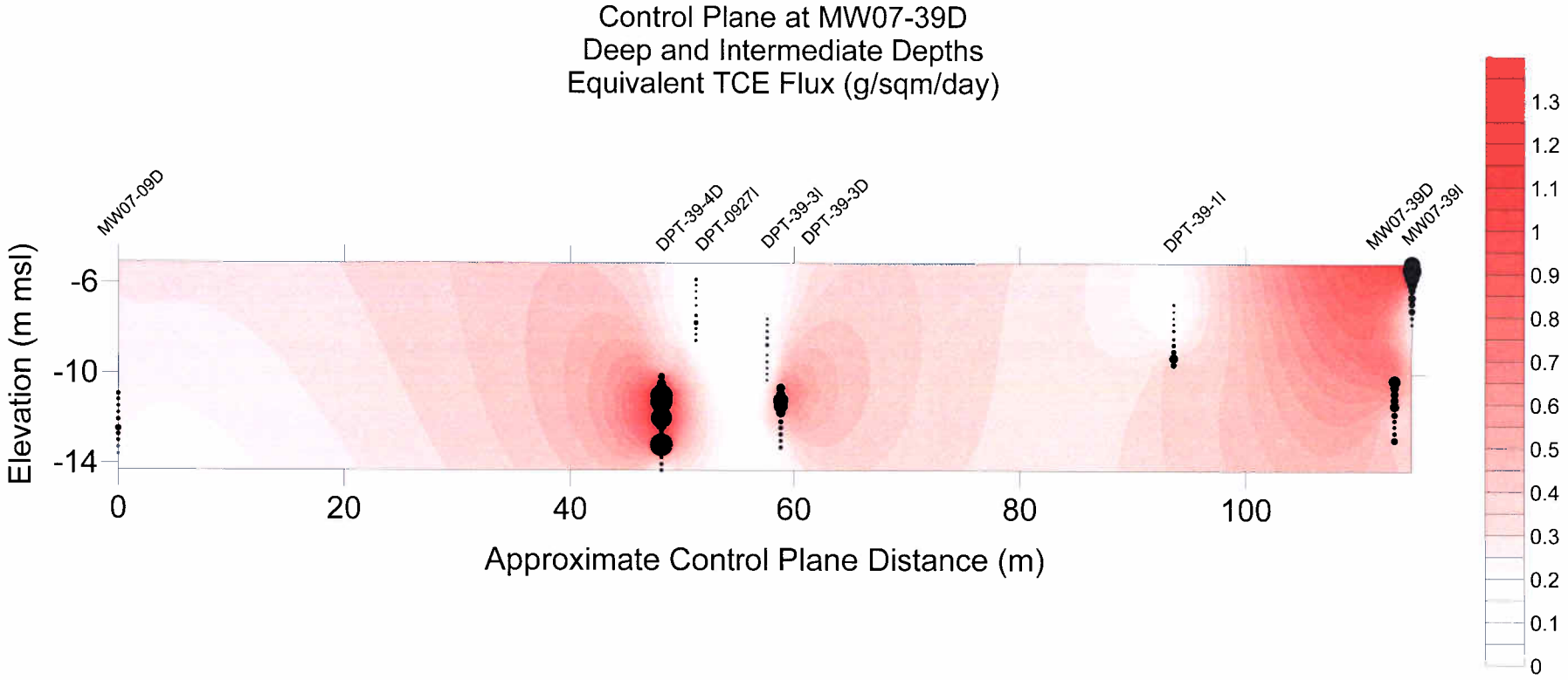
Shallow (blue)

Vs

Deep (red)

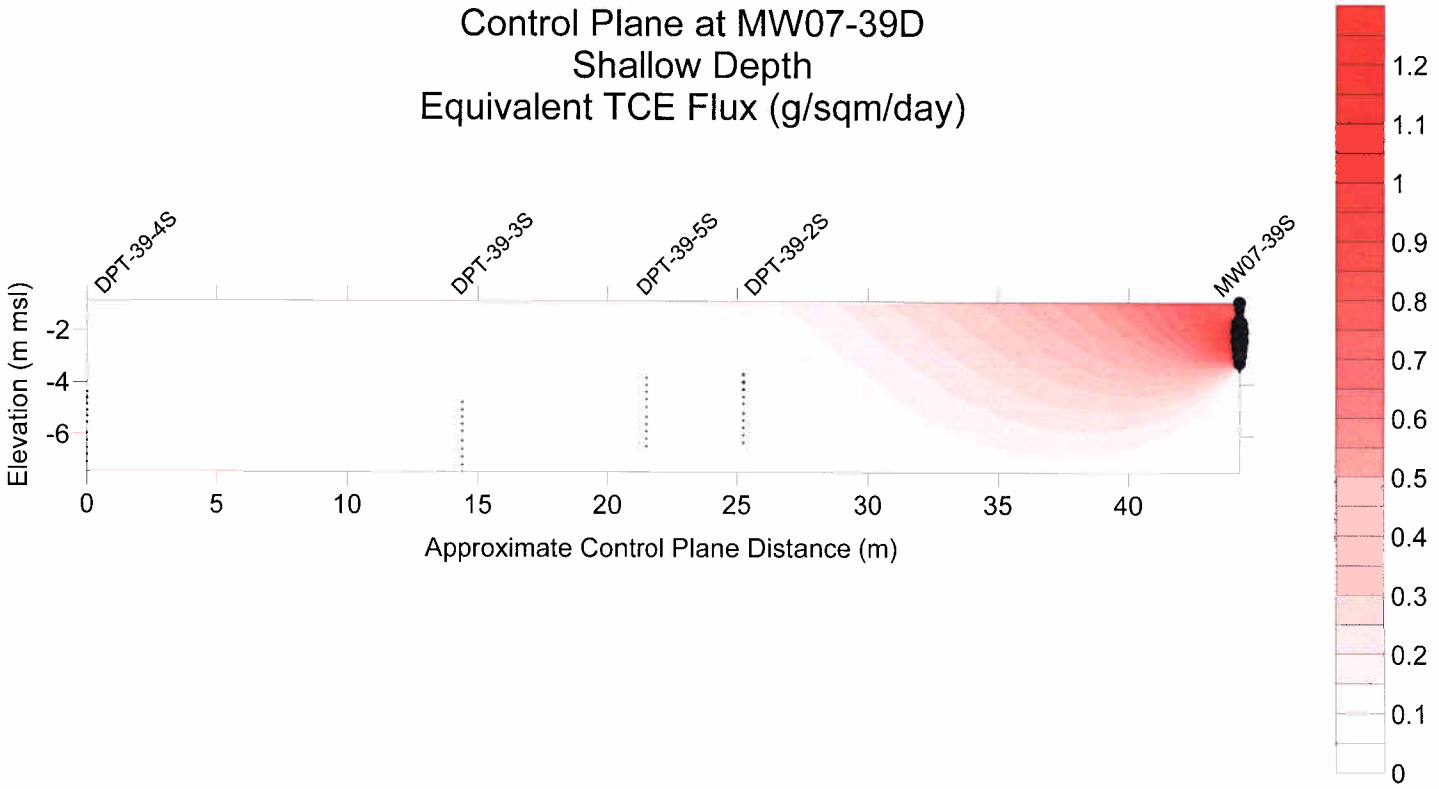


CPP - Third PFM Deployment



- Mass Discharge = 370 g/day
- Kriging Interpolation w/in Surfer Software
- Control Plane based on average water levels measured during 3rd PFM deployment

CPP - Third PFM Deployment



- Mass Discharge = 32 g/day
- Kriging Interpolation w/in Surfer Software
- Control Plane based on average LTM water elevations
- "Total" Mass Discharge = 402 g/day

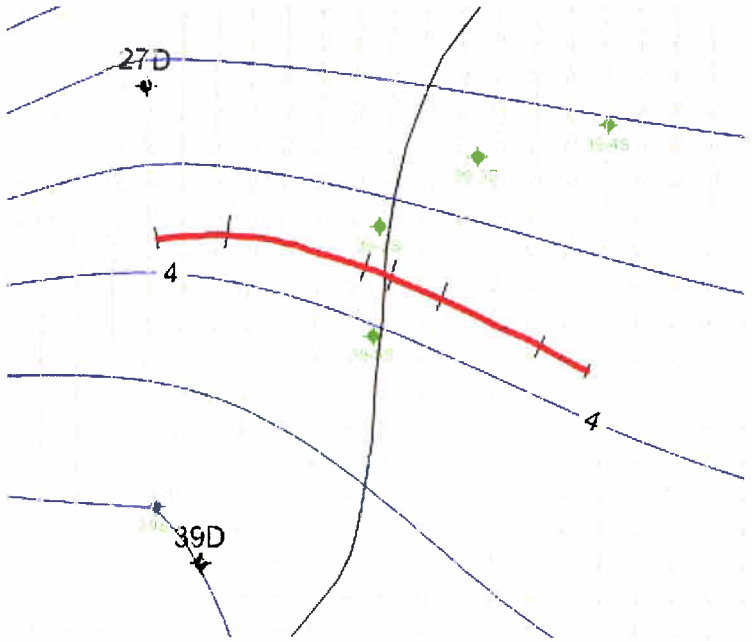
CPP - Third PFM Deployment

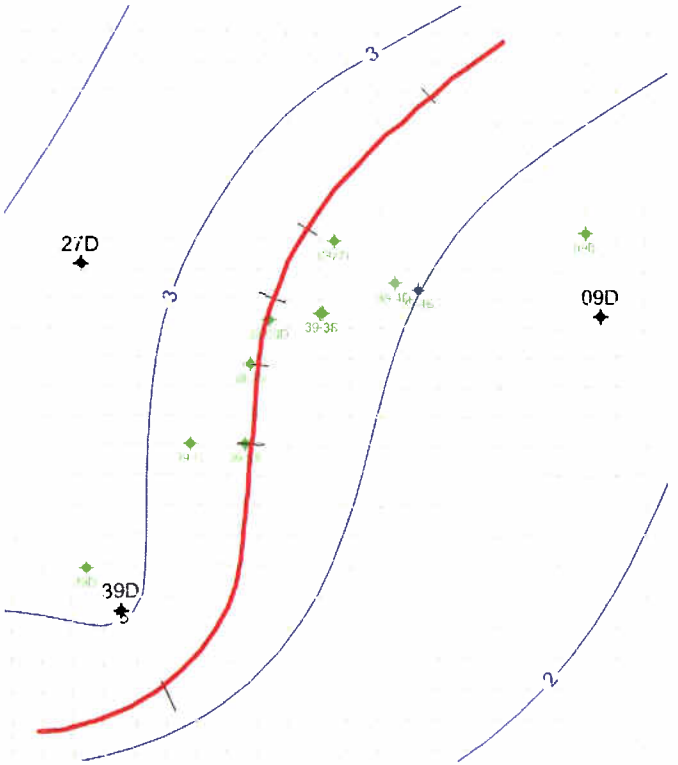
Control Plane based on MW07-39S/I/D

- Thiessen Polygon Approach
- Control Plane based on average LTM water elevations

Intermediate MD = 129 g/day
Deep MD = 251 g/day
Sum MD = 380 g/day

Shallow Mass Discharge = 47 g/day

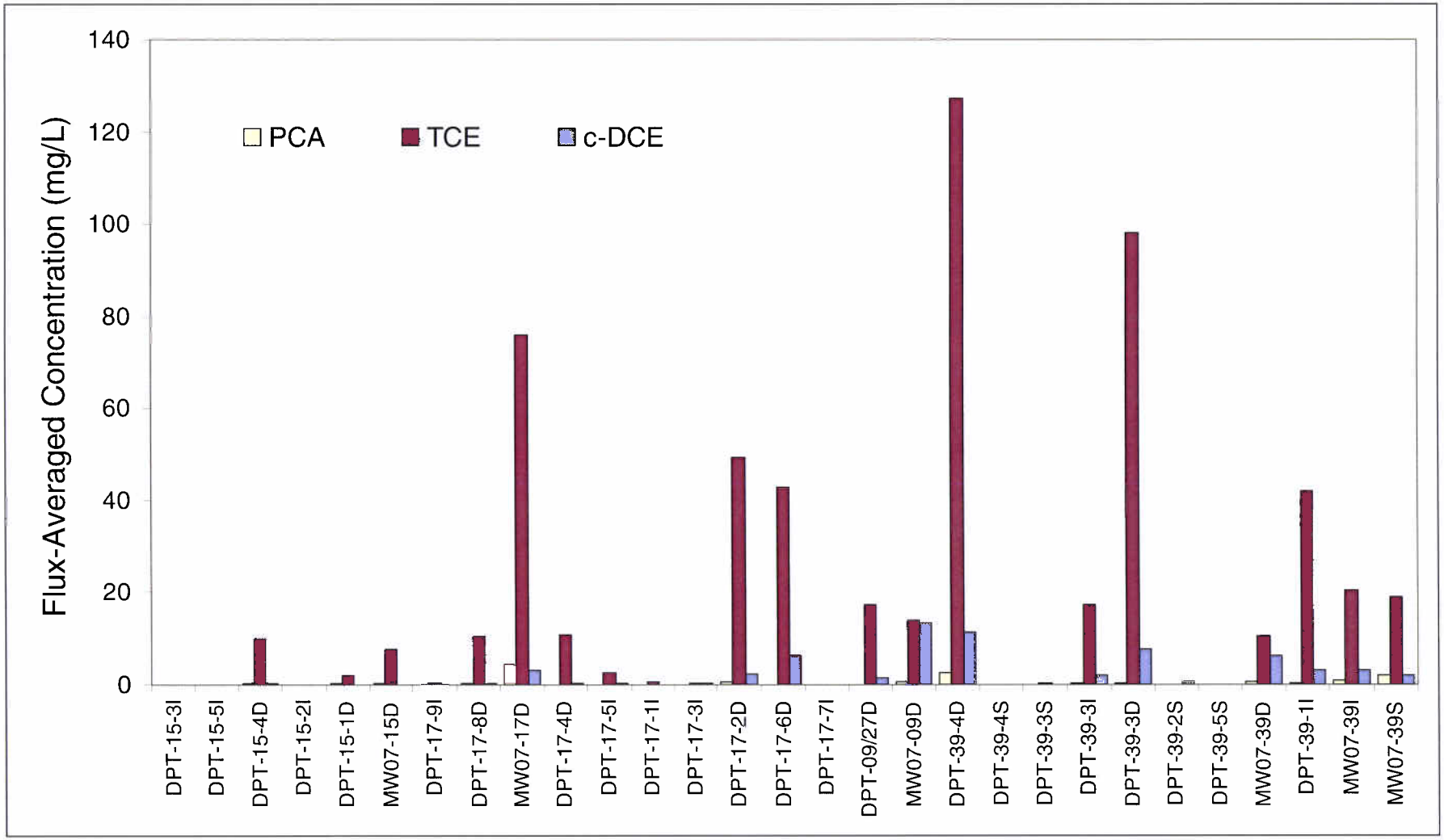




"Total" Mass Discharge = 427 g/day

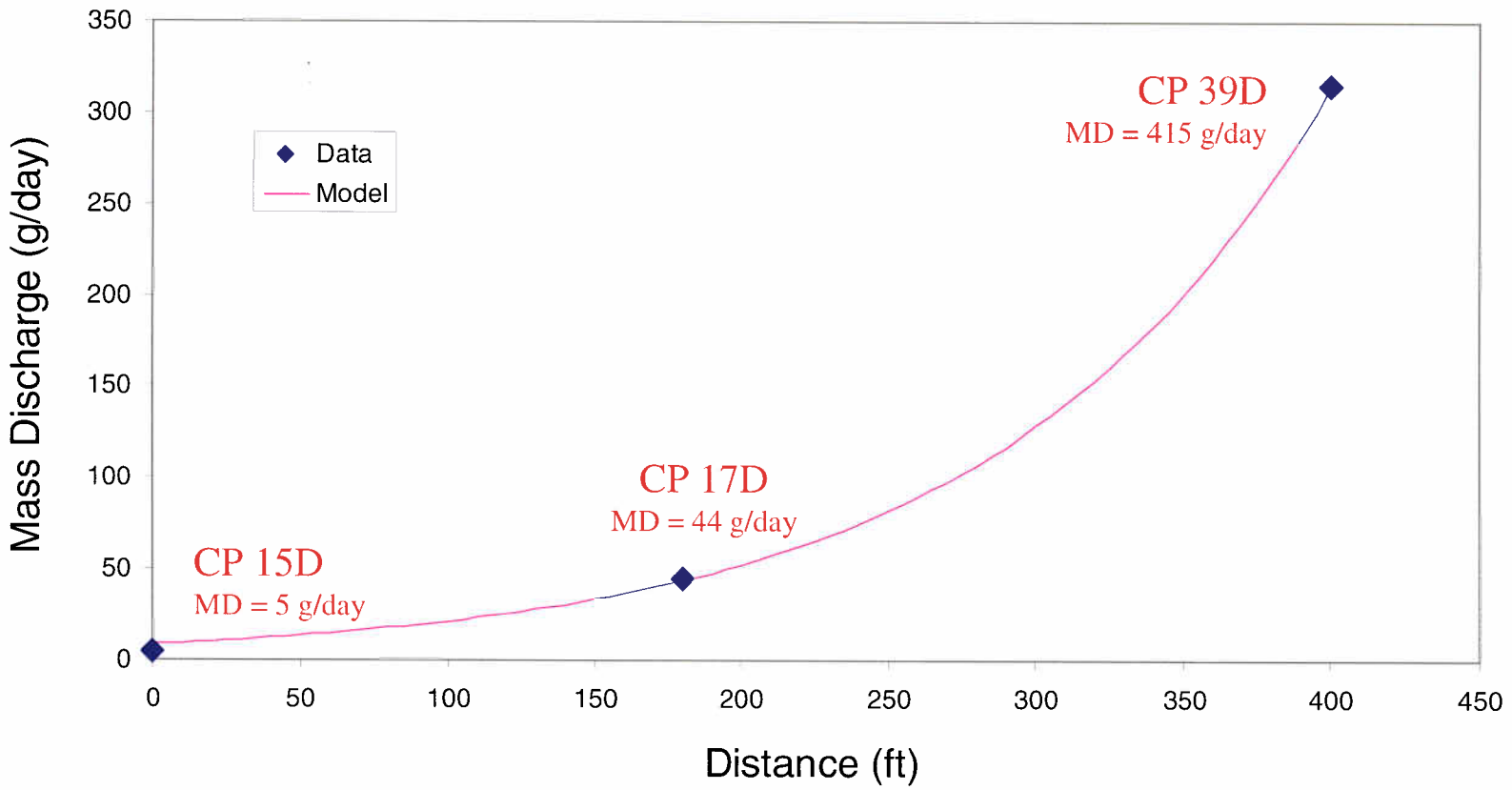
CPP - Third PFM Deployment

Well Averaged, Flux-Averaged Concentrations



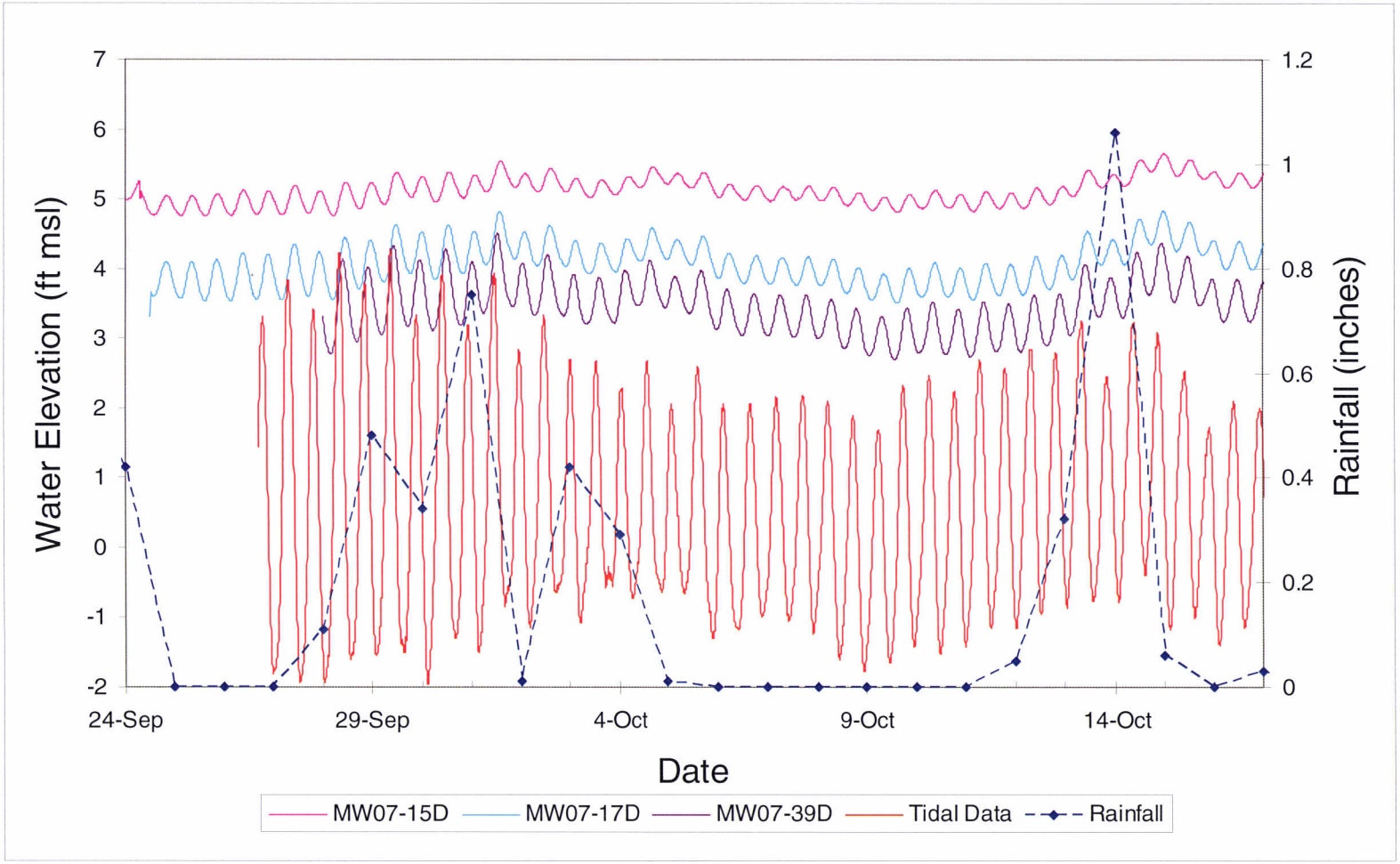
CPP Source Strength Functions

Based on Spatial Information



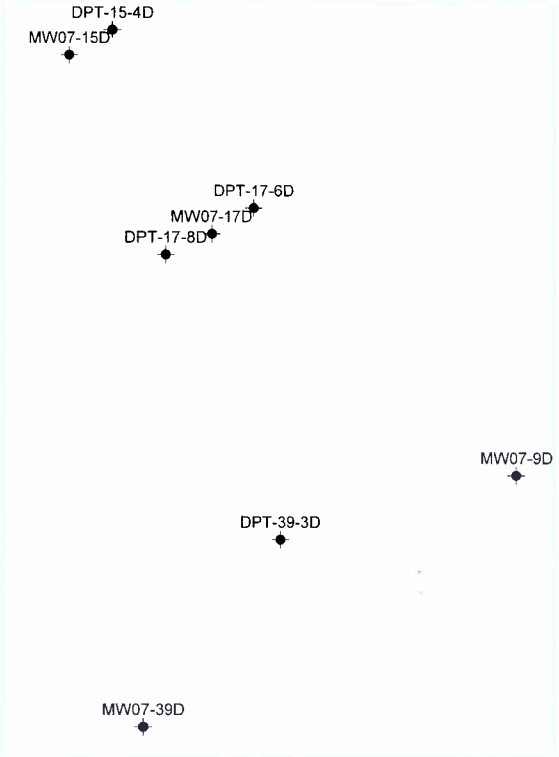
CPP - Third PFM Deployment

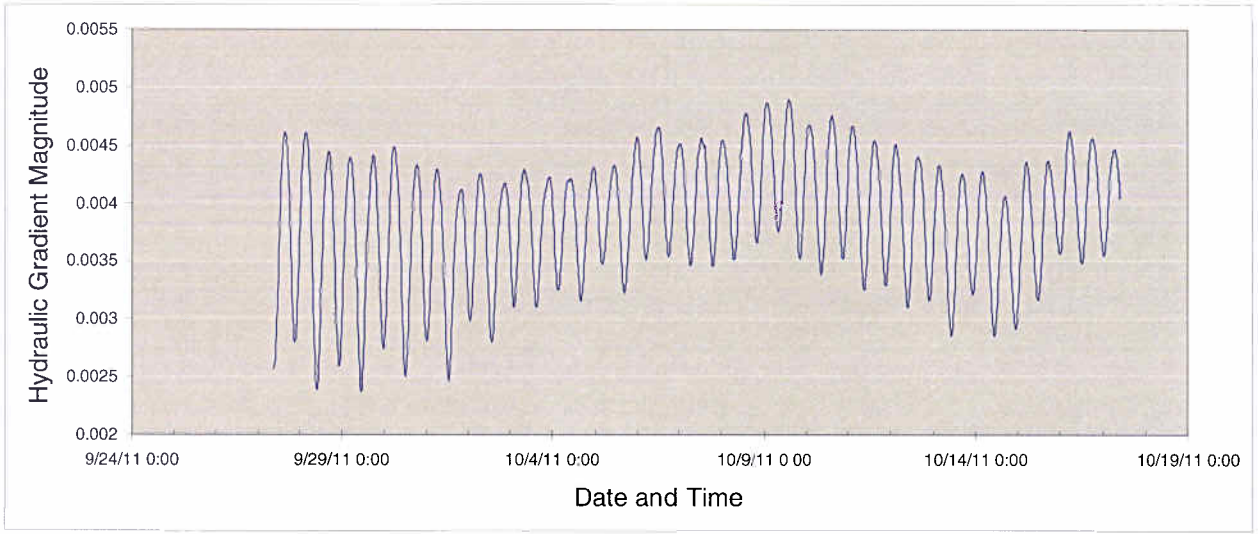
Pressure Transducer Data during 3rd PFM Deployment

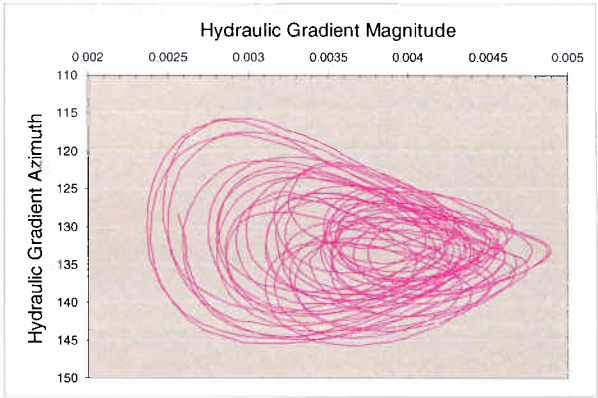


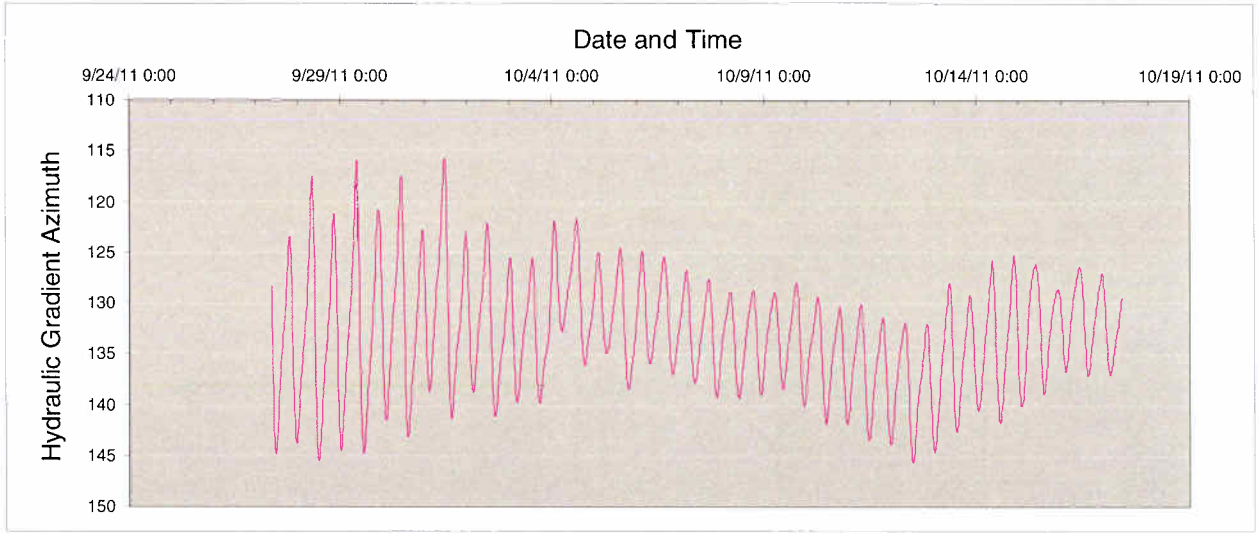
CPP - Third PFM Deployment

Pressure Transducer Data / Fit Plane by Multiple Linear Regression





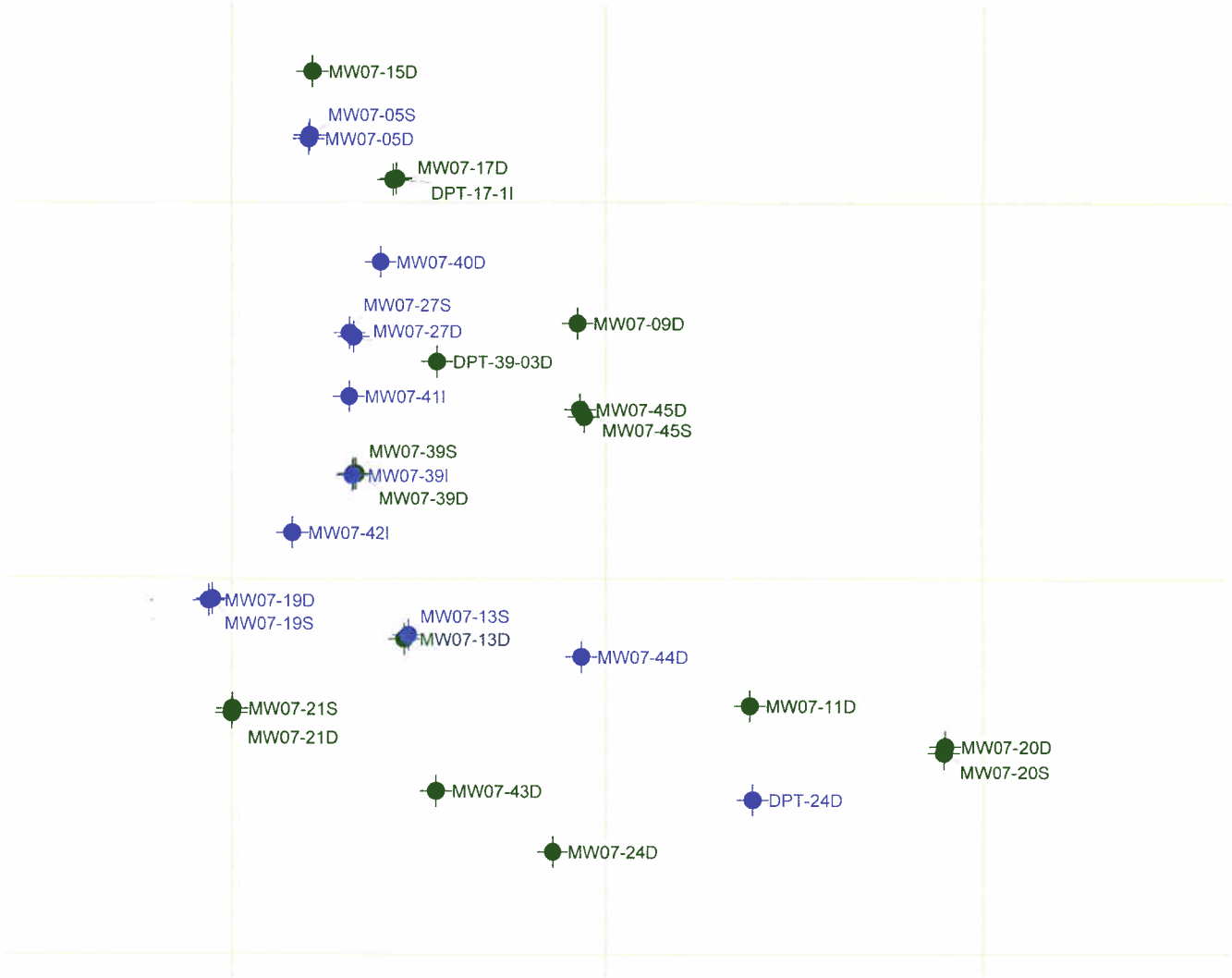




Hyd. Grad.: Ave Az. = 133 degrees, Ave Mag. = 0.0039

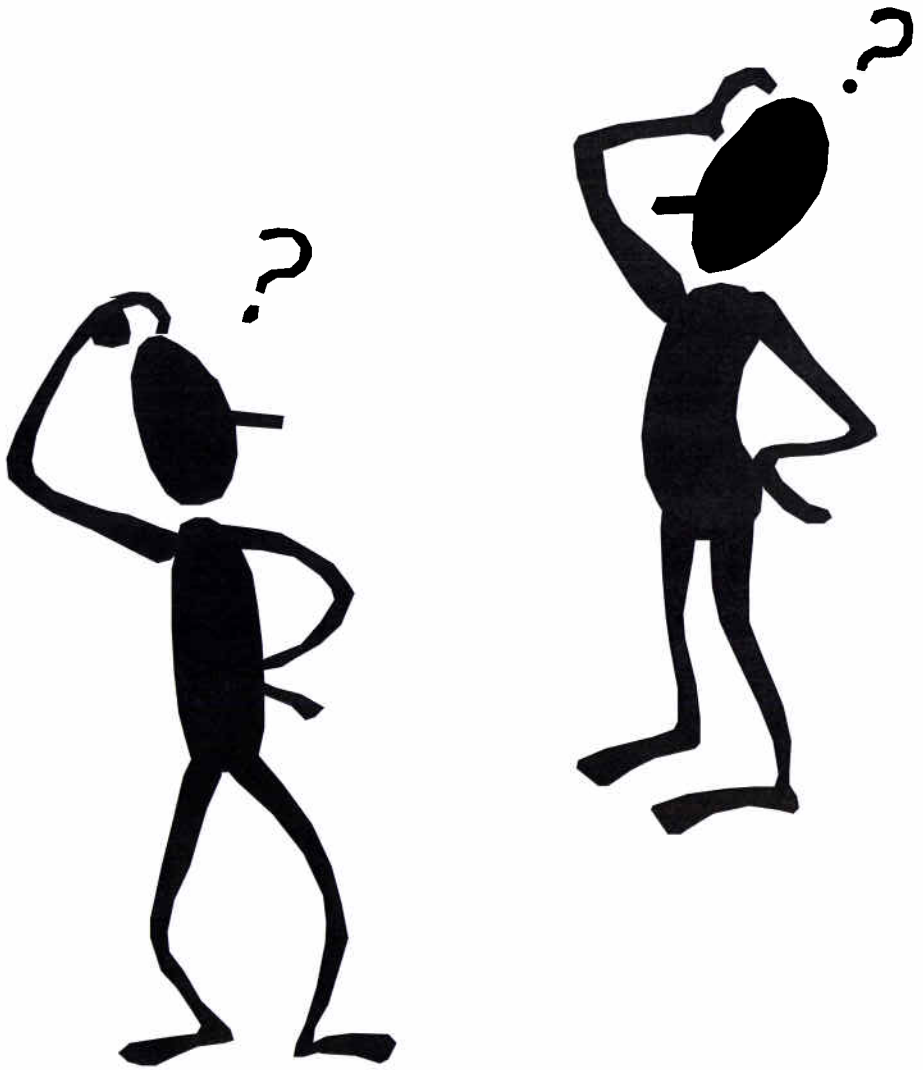
CPP – Tidal Analysis

Pressure Transducer Deployment



CPP - Ongoing and Future Work

- Complete well installation/3rd PFM deployment summary memorandum.
  - Assess PFM groundwater flux distribution
- Complete PSA QA review/summary memorandum.
- Complete tidal influence assessment.
- Continue with historic data analysis.
  - Use spatial information to estimate SSF.
  - Compare spatial and temporal SSF estimates
  - Assess how uncertainty has changed with additional data.
- Complete well development of DPT-39-4S
- Fourth PFM deployment? (assuming funding is available).
- Augment control planes with additional wells? (depending on funding).



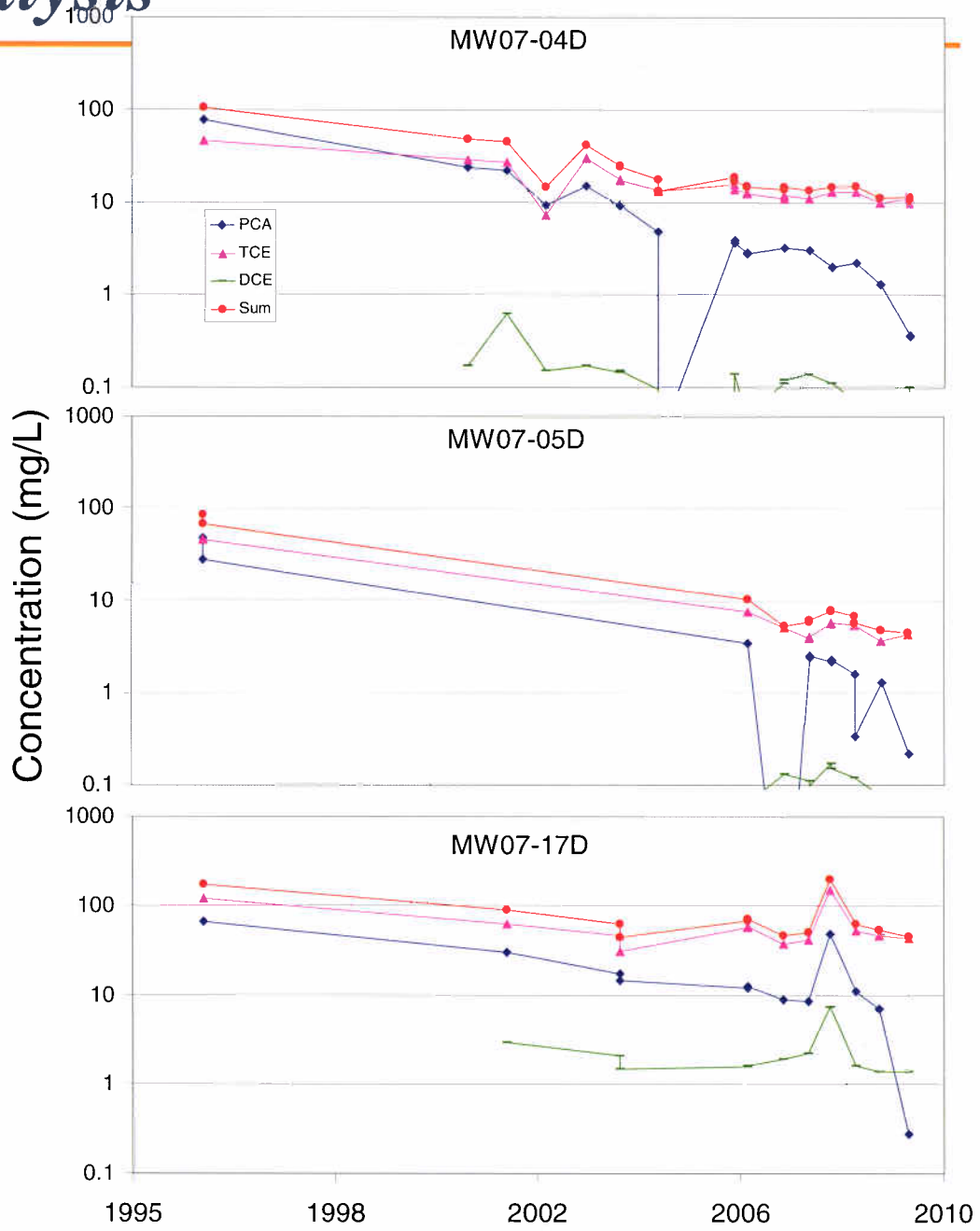
Questions?

CPP - Historic Data Analysis

STEP 2) Source-Zone Control Plane Mass Discharge:

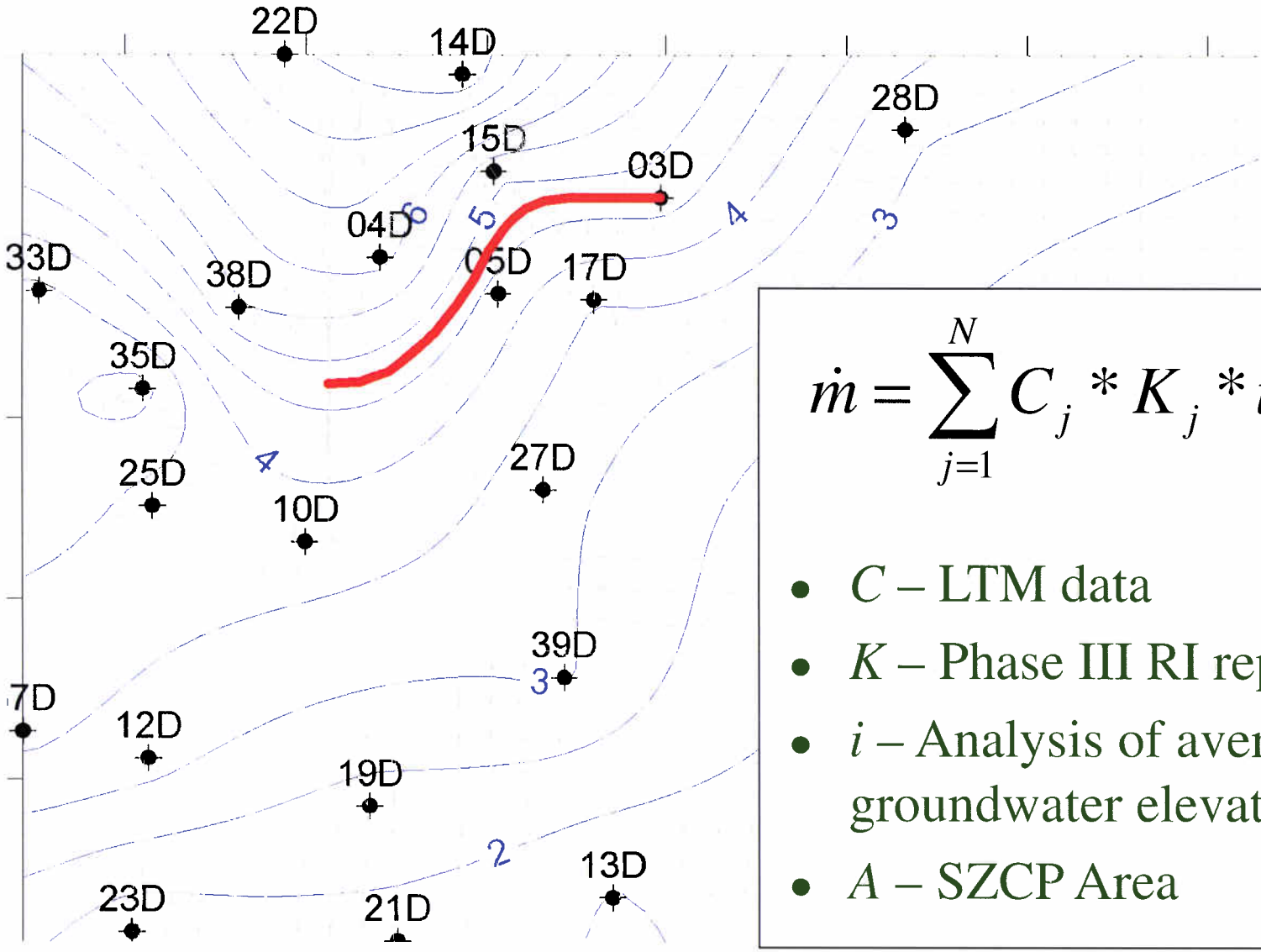
$$\dot{m} = \sum_{j=1}^{N} C_j * K_j * i_j * A_j$$

- *C* – LTM data
- *K* – Phase III RI report
- *i* – Analysis of average groundwater elevation
- *A* – SZCP Area



CPP - Historic Data Analysis

Source-Zone Control Plane

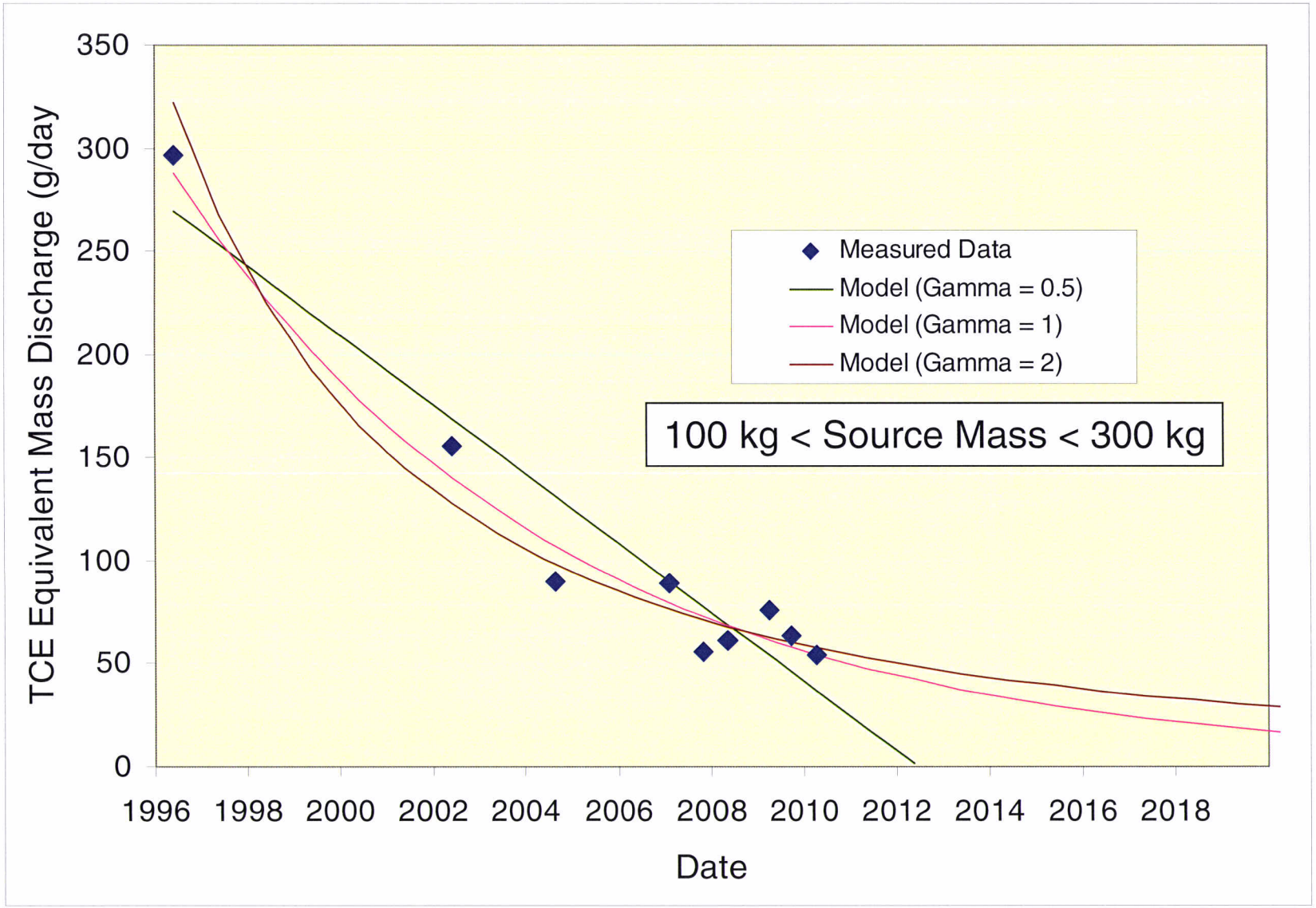


$$\dot{m} = \sum_{j=1}^{N} C_j * K_j * i_j * A_j$$

- C – LTM data
- K – Phase III RI report
- i – Analysis of average groundwater elevation
- A – SZCP Area

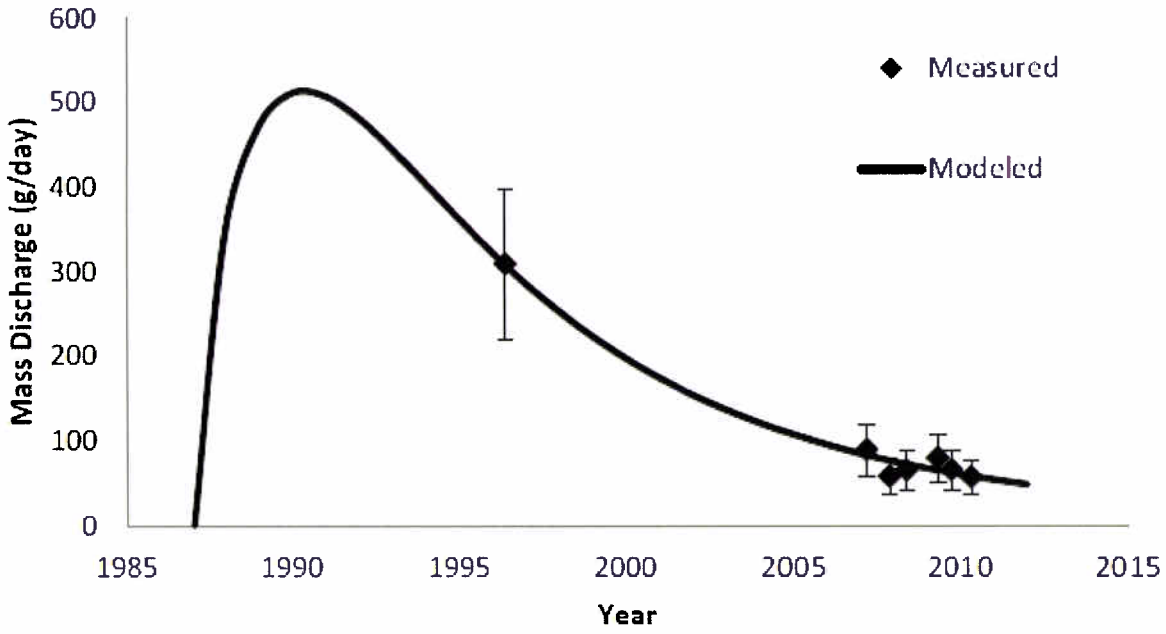
CPP - Historic Data Analysis

Source Strength Function

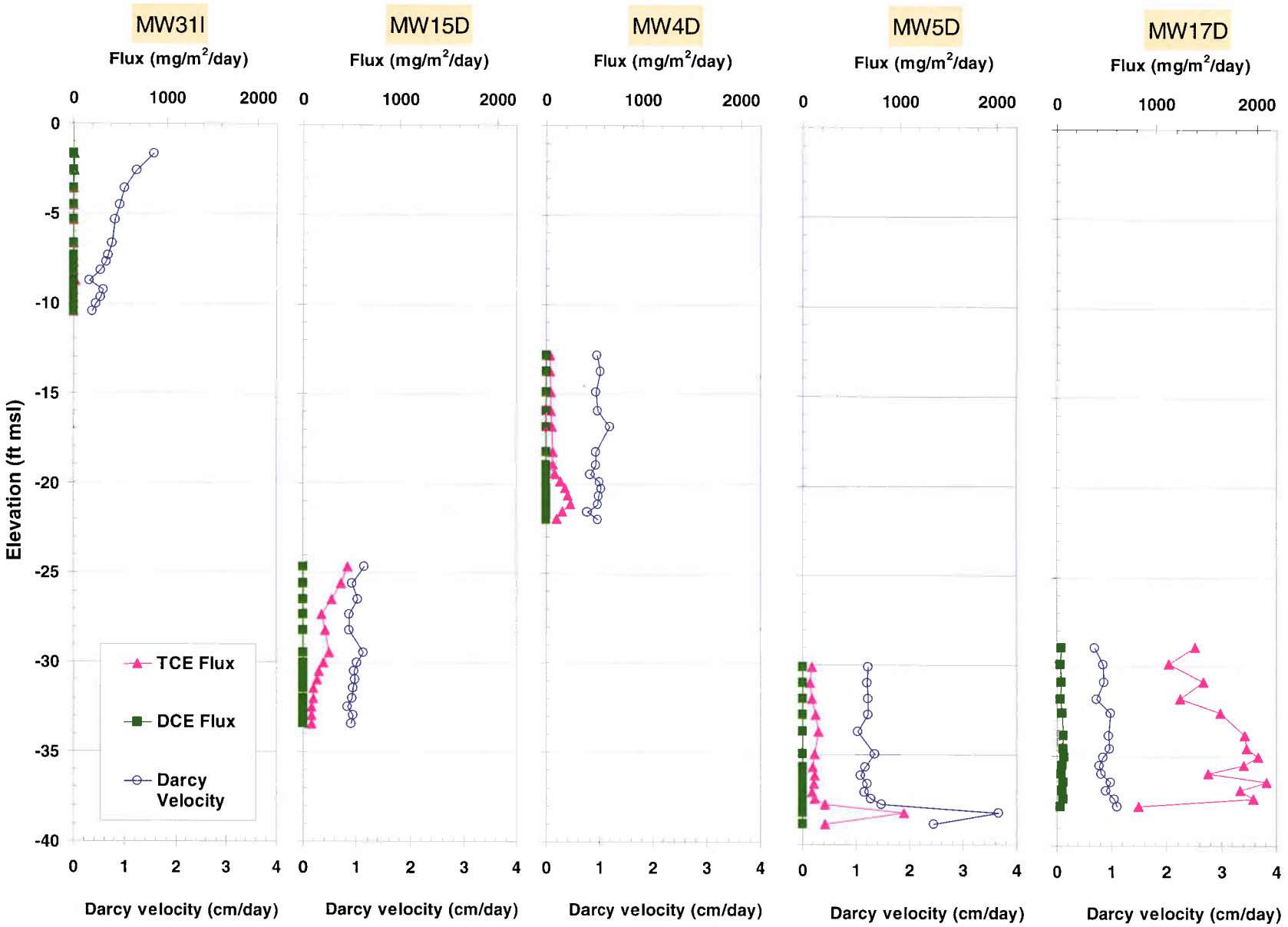


SSF Modeling
University of Florida

SSF	EST Model	PL Model
$\mu_{\ln\tau}$	1.6	N/A
$\sigma_{\ln\tau}$	0.8	N/A
Γ	N/A	0.4
f.c.	4.5	18
M_o (kg)	N/A	16000
Source Length (m)	71	N/A
α_x (m)	70	130
v_D (m/day)	0.14	0.07
X_o (m)	-30	-30
t_o (year)	1987	1945
COE	0.99	0.99
$t_{1g/day}$ (years)	51	491
$t_{5\mu g/L}$ (years)	284	491



CPP - First PFM Deployment

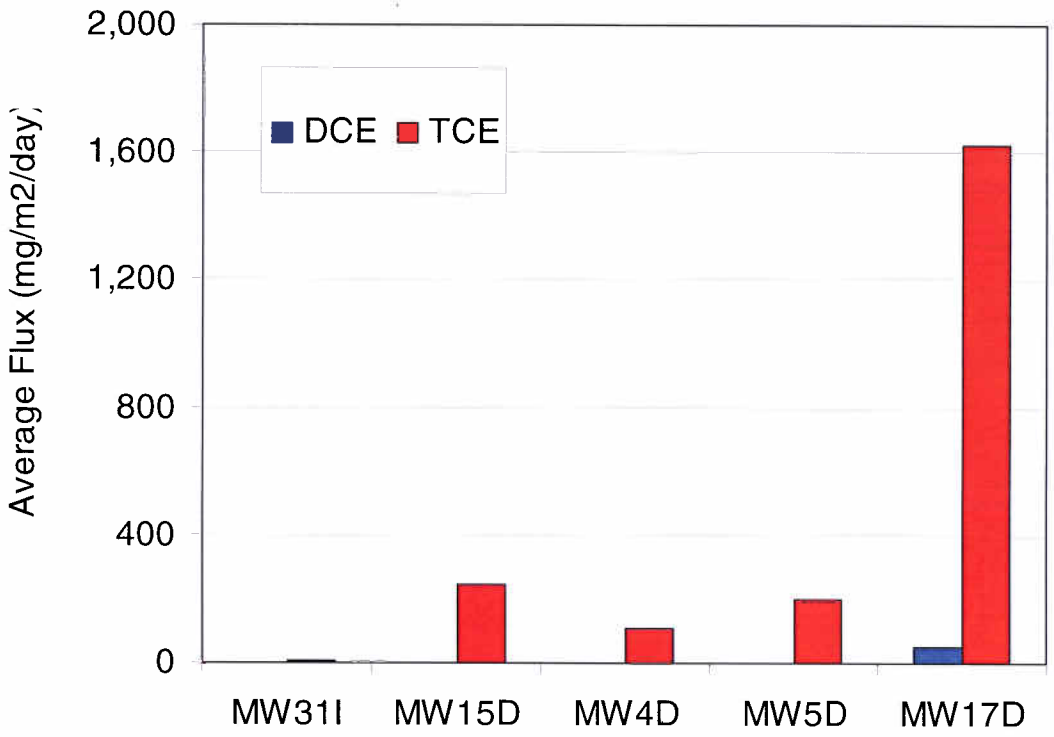


CPP - First and Second PFM Deployments

First PFM Deployment (yellow)
22-Sept-2010
through
7-Oct-2010

Second PFM Deployment (blue)
23-Mar-2011
Through
7-April-2011

CPP - First PFM Deployment



$$\dot{m} = \sum_{i=1}^{N} J_i A_i$$

Well	TCE Flux (g/day)
MW4D	8
MW5D	17
MW17D	164
Sum	188

TCE Flux = 50 g/day based on historical data analysis

Versus

TCE Flux = 188 g/day based on first PFM deployment

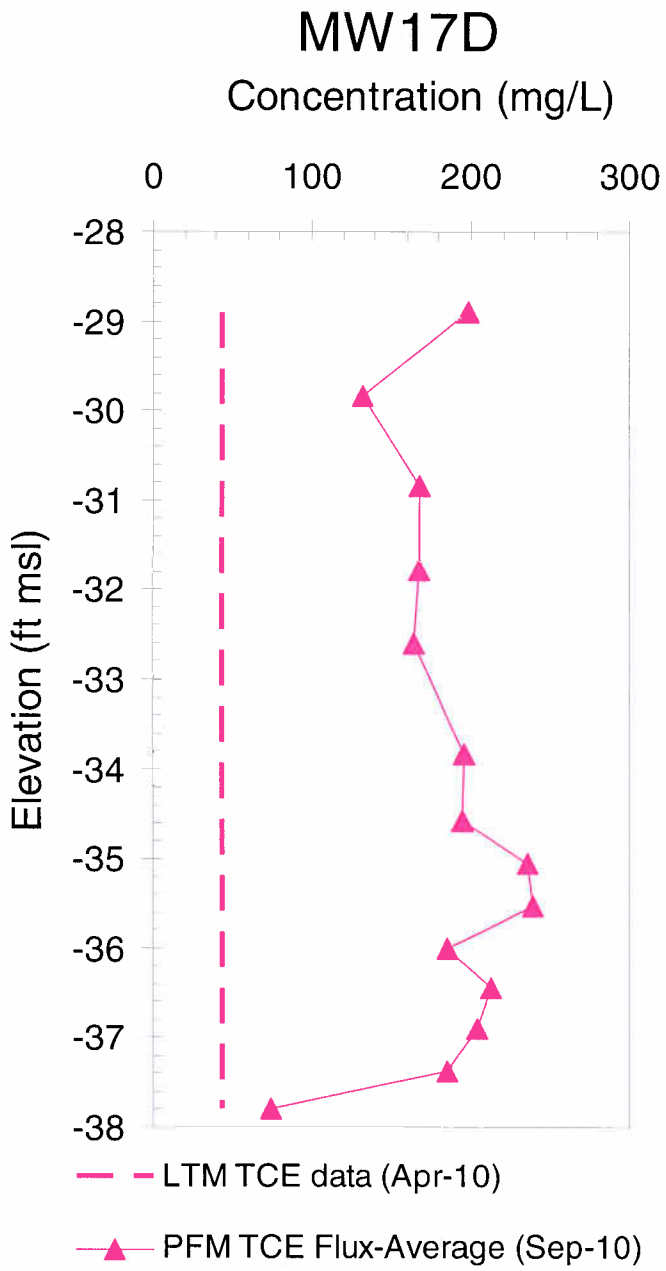
CPP - First PFM Deployment

50 g/day versus 188 g/day?

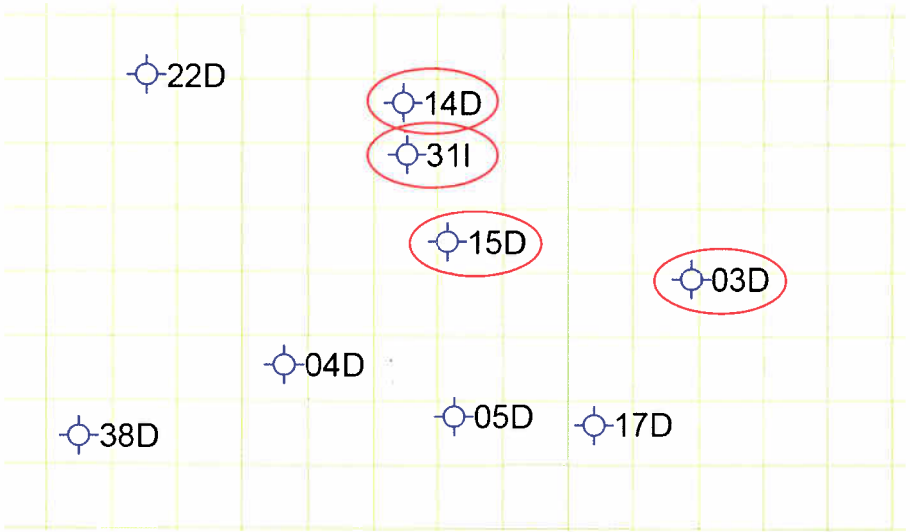
Compare fluxed-averaged concentration from PFM measurements to LTM concentration measurement

Flux-averaged concentration: $C_f = J / q$

LTM Concentration plotted over entire screen interval



CPP - Well Sampling

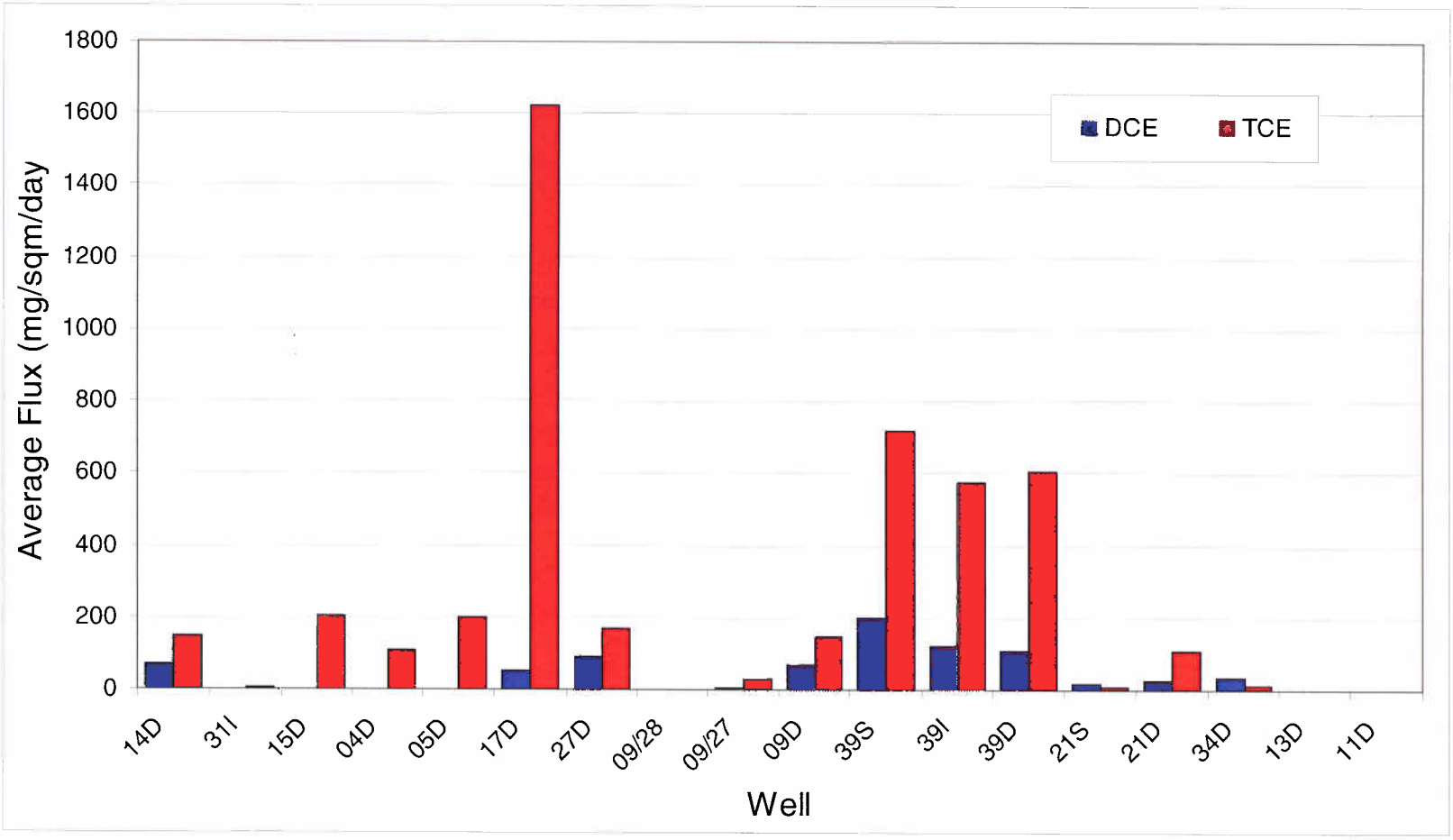


- Samples collected on 22-Sep-2010
- Samples collected with a SS bailer.
- No evidence of DNAPL, but water was very turbid.

Well ID	cis-1,2DCE (mg/L)	TCE (mg/L)	PCA (mg/L)
3D	ND	ND	ND
14D	ND	17.4	4.6
15D	ND	6.0	2.7
31I	ND	ND	ND

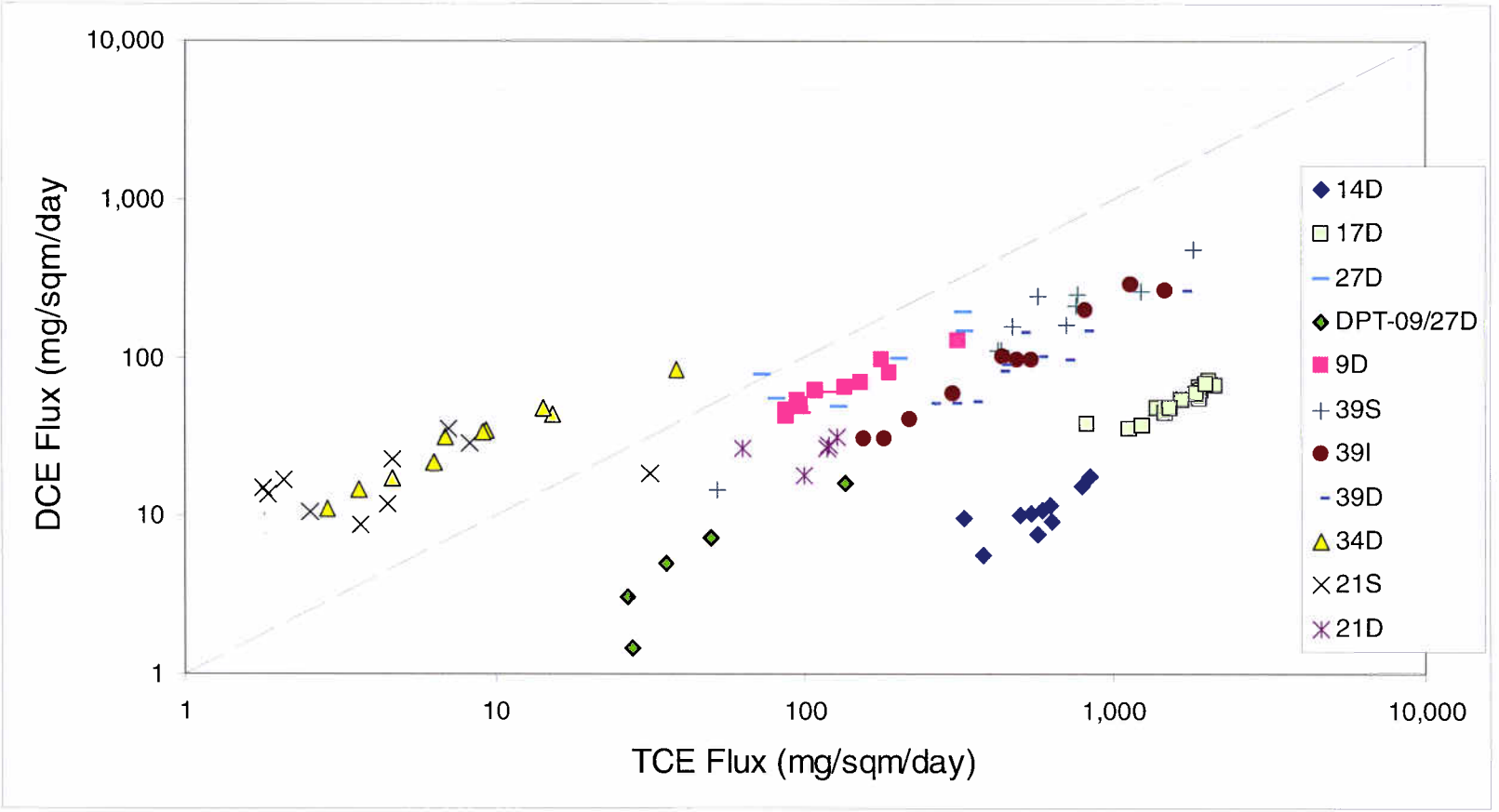
CPP - PFM Results

First and Second PFM Deployments



CPP - PFM Results

DCE vs TCE Flux from First and Second PFM Deployments

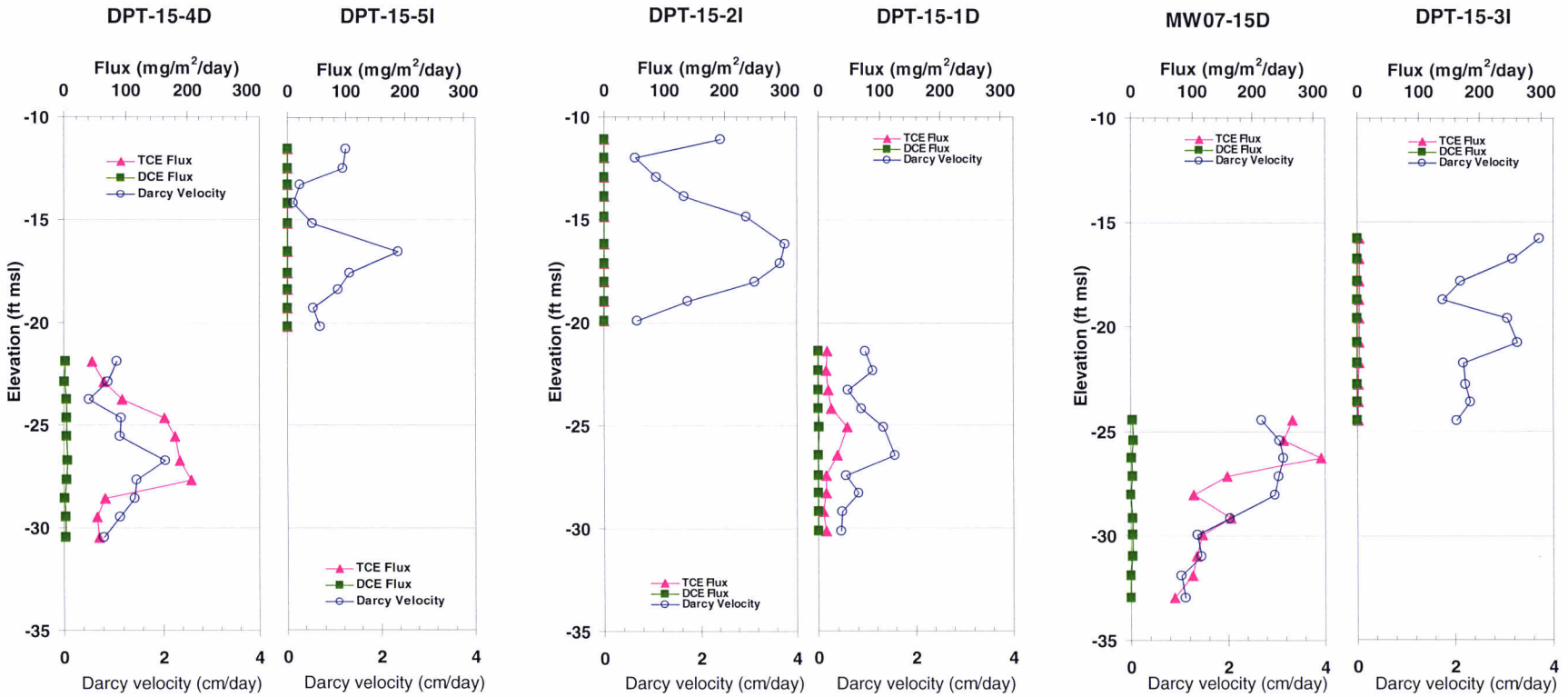


DCE not detected in MW07-5D, -4D, -11D, -13D, -15D, and 31I; nor in DPT-0928D.

WELL INSTALLATION SUMMARY TABLE

Well ID	Installation Date	Location		TOC Elevation	Well Depth	Screen Interval		Screen Interval		Comments
		Easting	Northing			Top	Bottom	Top	Bottom	
		(ft)	(ft)	(ft msl)	(ft from TOC)	(ft from TOC)	(ft from TOC)	(ft msl)	(ft msl)	
Control Plane at MW07-15D										
DPT-15-1D	6-Aug-11	524,623.0	197,685.6	11.37	42.1	31.7	41.9	-20.3	-30.5	Refusal depth confirmed with SSA
DPT-15-2I	8-Aug-11	524,625.3	197,685.7	11.31	31.8	21.4	31.6	-10.1	-20.3	
DPT-15-3I	8-Aug-11	524,604.1	197,673.8	11.79	36.9	26.5	36.7	-14.7	-24.9	
DPT-15-4D	8-Aug-11	524,640.0	197,695.0	11.39	42.5	32.1	42.3	-20.7	-30.9	
DPT-15-5I	8-Aug-11	524,639.5	197,692.7	11.41	32.2	21.8	32.0	-10.4	-20.6	
Control Plane at MW07-17D										
DPT-17-1I	2-Aug-11	524,715	197,530	8.46	37.9	27.5	37.7	-19.0	-29.2	
DPT-17-2D	2-Aug-11	524,738	197,541	9.23	48.9	38.5	48.7	-29.3	-39.5	
DPT-17-3I	3-Aug-11	524,735	197,537	9.06	38.5	28.1	38.3	-19.0	-29.2	
DPT-17-4D	3-Aug-11	524,702	197,522	9.08	47.9	37.5	47.7	-28.4	-38.6	
DPT-17-5I	3-Aug-11	524,701	197,525	8.92	38.0	27.6	37.8	-18.7	-28.9	
DPT-17-6D	3-Aug-11	524,753	197,552	9.51	49.8	39.4	49.6	-29.9	-40.1	
DPT-17-7I	5-Aug-11	524,755	197,555	9.66	40.0	29.6	39.8	-20.0	-30.2	
DPT-17-8D	4-Aug-11	524,683	197,515	8.68	44.9	34.5	44.7	-25.8	-36.0	Refusal depth confirmed with SSA
DPT-17-9I	5-Aug-11	524,682	197,513	8.64	34.6	24.2	34.4	-15.5	-25.7	
Control Plane at MW07-39D										
DPT-39-1I	10-Aug-11	524,684	197,186	7.24	39.3	28.9	39.1	-21.7	-31.9	
DPT-39-2S	10-Aug-11	524,733	197,226	6.58	27.8	17.4	27.6	-10.9	-21.1	
DPT-39-3S	11-Aug-11	524,801	197,271	7.04	31.8	21.4	31.6	-14.4	-24.6	
DPT-39-3I	11-Aug-11	524,798	197,269	6.96	41.3	30.9	41.1	-23.9	-34.1	
DPT-39-3D	10-Aug-11	524,794	197,268	7.05	51.2	40.8	51.0	-33.8	-44.0	
DPT-39-4S	9-Aug-11	524,853	197,292	7.28	31.0	20.6	30.8	-13.3	-23.5	
DPT-39-4D	9-Aug-11	524,837	197,291	7.08	54.6	39.0	54.4	-31.9	-47.3	~2 feet from soil boring SB07-106
DPT-39-5S	11-Aug-11	524,729	197,185	7.20	28.9	18.5	28.7	-11.3	-21.5	~5 feet from soil boring SB07-223

All well casings and screens are 1.5 inch diameter. Pre-packed well screens were used: screen size is 10 slot and filter is 20/40 silica sand.


DPT-15-4D
DPT-15-5I
DPT-15-2I
DPT-15-1D
MW07-15D
DPT-15-3I
Flux (mg/m²/day)
0
100
200
300
-10
-15
-20
-25
-30
-35
Elevation (ft msl)
TCE Flux
DCE Flux
Darcy Velocity
0
2
4
Darcy velocity (cm/day)

CPP Spatial Source Functions

Assume PLM with $\Gamma = 1$

$$\frac{\dot{m}}{\dot{m}_0} = e^{-\frac{\dot{m}_0}{M_0}t}$$

$$\frac{qR}{\eta}t = \ell$$

$$\frac{\dot{m}}{\dot{m}_0} = e^{-\frac{\dot{m}_0}{M_0}\left(\frac{R(L-\ell)}{q/\eta}\right)}$$