Environmental
Resources
Management

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December 3, 2012

Mr. Mark Riggle
Project Manager
Voluntary Cleanup Section
Texas Commission on Environmental Quality
Mail Code 221
12118 North IH 35, Building D
Austin, Texas 78753

Project No. 0159198

Subject: Third Quarter 2012 Monitoring Data Transmittal
Former Cameron Iron Works Facility, Houston, Texas
VCP No. 221; RN101474880; CN600374821

Dear Mr. Riggle:

On behalf of Cameron International Corporation (Cameron), Environmental Resources Management (ERM) is providing the Third Quarter 2012 ground water monitoring results for the Former Cameron Iron Works Facility (the facility) for your review and consideration. This quarterly ground water sampling event was completed in August 2012 in accordance with the Texas Commission on Environmental Quality's (TCEQ) July 25, 2012 comments on the *First Quarter 2012 Monitoring Data Transmittal* dated July 11, 2012.

All ground water analytical results collected during this sampling event were compared with the response action objectives outlined in the Response Action Plan (RAP), dated August 28, 2003. Table 1 lists the wells that require a response action and the proposed action for each well. The ground water analytical results are summarized in Table 2. Figure 1 posts the analytical data on the site map. A concentration versus time graph for each monitor well is also included in Attachment 2.

The laboratory reports and data usability summaries will be provided in the 2012 Annual Ground Water Monitoring Report and Field Activities Summary.

Evaluation of Plume Movement

Cameron has taken action to address elevated concentrations of constituents of concern (COCs) at selected well locations where upward trends were previously identified. The actions included expanding of treatment galleries in February and July 2011 followed by 60 sodium permanganate treatments across the site. A total of 20 more permanganate injections were completed in the Pinewood Estates area in March 2012. More data and information were developed regarding changes in ground water flow conditions associated with the I-610/I-10 Interchange dewatering system. This dewatering system was first described in the *First Half 2011 Monitoring Data Transmittal*, dated August 15, 2011. On August 17, 2012, ERM received permission from TxDOT and measured the flow from the dewatering system. The measured flow was slightly more than 120gallons per minute (gpm). This discharge is believed to be a significant factor in the on-site and off-site plume movement observed to date. ERM continues to evaluate the adequacy of the monitor well network to assess the full extent of affected ground water.

The following discussion provides details on the recent monitoring results for the ground water samples collected in August 2012.

Concentration Trends and Response Action Plan Activities

Following the completion of construction activities near MW-59, the damaged well casing and protective vault were repaired and the well was re-developed on March 14, 2012. MW-59 was sampled on March 29, 2012 as part of the First Half of 2011 sampling event and reported the site COCs below PCLs. In the Third Quarter of 2012 sampling event, MW-59 reported site COCs as *Not Detected*. MW-59 lies within the capture zone of the facility's ground water treatment system and will remain on the quarterly sampling schedule.

The reported concentrations of 1,1-DCE and vinyl chloride were above their PCLs at MW-74 during this sampling event. Both COCs appear to display increasing concentration trends. This monitor well is influenced by the dewatering system and will remain on the quarterly sampling schedule.

The increasing concentrations of COCs above their PCLs in MW-84 were reported since 2009 and prompted an expansion of the treatment system in this area. Following treatments in July 2011 and again in March 2012, COC concentrations in MW-84 continue to decrease. Cameron is monitoring this location for the presence of permanganate. This well will remain on the quarterly sampling schedule.

The concentration of trichloroethene (TCE) was reported below the PCL in MW-122 for the first time since October 2010. MW-122 will remain on the quarterly sampling schedule for one additional sampling event before recommending semi-annual sampling.

The concentrations of COCs in MW-125 have remained generally stable. Permanganate treatments have been conducted in both up and downgradient wells and this area is monitored for the presence of permanganate. MW-125 will remain on the quarterly sampling schedule.

The reported concentrations of 1,1-DCE in MW-134 have been generally stable to decreasing over the past seven sampling events at levels slightly above its PCL. The concentrations at MW-134 are influenced by the dewatering system and will remain on the quarterly sampling schedule.

The reported concentrations of 1,1-DCE in MW-145 exceeded the PCL in March 2012 at which time it was added to the trigger well list. This area received permanganate treatment just prior to the March 2012 sampling event. In August 2012, the ground water exhibited the deep purple color associated with permanganate during low flow purging of MW-145 and was not sampled. Cameron is monitoring this area for the presence of permanganate. The concentrations at MW-145 are influenced by the dewatering system and will remain on the quarterly sampling schedule.

The concentrations of 1,1-DCE at MW-146 have exceeded it PCL over the past two sampling events. This area is influenced by the dewatering system and MW-146 will remain on the quarterly sampling schedule.

The reported concentration of 1,1-DCE in MW-169 has decreased to a level below its PCL. The concentrations at MW-169 are believed to be influenced by the dewatering project and will remain on the quarterly sampling schedule.

The concentration of 1,1-DCE was first reported above the PCL in August 2011 at MW-174. Permanganate treatments were conducted upgradient of MW-174 in July 2011 and March 2012 and decreasing concentrations of 1,1-DCE have been reported over the past two events. This area is influenced by the dewatering system and will continue to be monitored for the presence of permanganate. MW-174 will remain on the quarterly sampling schedule.

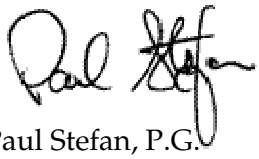
Conclusions

Ground water concentrations were monitored at select wells in the third quarter of 2012 to assess the effectiveness of the remedy at controlling affected ground water. Based on the available data, the dewatering system at the I-610/I-10 Interchange is influencing concentration trends in both on- and off-site areas. Cameron has worked to engage the various stakeholders to evaluate feasible remedial alternatives. A Revised Response Action Plan is underway, pending outcomes of discussions with the City of Houston and TxDot and property owners of the former facility. The next ground water monitoring event is scheduled to be completed in November 2012.

Please contact Mr. Ted Fasting of Cameron International Corporation at (713) 513-3325 or me at (281) 600-1023 with any questions or comments.

Sincerely,

Environmental Resources Management



Paul Stefan, P.G.
Principal Partner

PAS/hmh
Attachments

cc: Marsha Hill, Texas Commission on Environmental Quality, Region XII
Ted Fasting, Cameron International Corporation
Bruce Himmelreich, Cameron International Corporation (without attachments)
President, Stablewood Property Owners Association
Robin Morse, Crain, Caton, and James, P.C.
Larry Nettles, Vinson & Elkins

Tables

Attachment 1

December 3, 2012
Project No. 0159198

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
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TABLE 1

Summary of Response Action Plan Implementation
Third Quarter 2012 Monitoring Data Transmittal

Former Cameron Iron Works Facility
Houston, Texas

Well [1]	COCs elevated above MQL	COCs elevated above PCL	Need for Additional Notification (Yes or No)	In-situ Treatment (Yes or No)	Sampling Frequency
MW-59			no (a)	no (b)	Quarterly
MW-74	1,1-dichloroethane		no (a)	no	Quarterly
MW-74	1,1-dichloroethene	1,1-dichloroethene	no (a)	no	Quarterly
MW-74	vinyl chloride	vinyl chloride	no (a)	no	Quarterly
MW-84	1,1-dichloroethane		no (a)	yes (c)	Quarterly
MW-84	1,1-dichloroethene	1,1-dichloroethene	no (a)	yes (c)	Quarterly
MW-84	cis-1,2-dichloroethene		no (a)	yes (c)	Quarterly
MW-84	Vinyl chloride	Vinyl chloride	no (a)	yes (c)	Quarterly
MW-122	trichloroethene		no (a)	no	Quarterly
MW-125	Tetrachloroethene	Tetrachloroethene	no (a)	yes (c)	Quarterly
MW-134	1,1-dichloroethene	1,1-dichloroethene	no (a)	yes (c)	Quarterly
MW-145 [2] (d)			no (a)	yes (c)	Quarterly
MW-146 [2]	1,1-dichloroethane		no (a)	yes (c)	Quarterly
MW-146 [2]	1,1-dichloroethene	1,1-dichloroethene	no (a)	yes (c)	Quarterly
MW-146 [2]	cis-1,2-dichloroethene		no (a)	yes (c)	Quarterly
MW-169 [2]	1,1-dichloroethene		no (a)	no	Quarterly
MW-174	1,1-dichloroethane		no (a)	yes (c)	Quarterly
MW-174	1,1-dichloroethene	1,1-dichloroethene	no (a)	yes (c)	Quarterly
MW-174	cis-1,2-dichloroethene		no (a)	yes (c)	Quarterly

NOTES:

COCs = Chemicals of Concern
MQL = Method Quantitation Limit
PCL = Protective Concentration Level
[1] - Quarterly trigger well list as provided in TCEQ letter dated July 25, 2012.
[2] - Trigger well added following evaluation of First Half of 2012 data.
(a) Properties in the vicinity of the affected ground water have been previously notified.
(b) MW-59 is within the capture zone of EW-1.
(c) Injection wells located in this area were injected with sodium permanganate in March 2012. This area is being gauged regularly for the presence of permanganate. Additional permanganate will be injected as needed to reduce concentration levels to the PCL.
(d) Not Sampled due to the presence of permanganate in ground water during low flow purging.
(e) MW-169 lies within the capture zone of EW-1 on the Parraffin Partners Property.

TABLE 2

Summary of Ground Water Data for Trigger Wells
Third Quarter 2012 Monitoring Data Transmittal

Former Cameron Iron Works Facility
Houston, Texas

Constituent	MQL	Critical PCLs (a)	Location:	MW-59	MW-74	MW-84	MW-122	MW-125
			Depth: (b)	28'	29'	33'	29'	BAILED
			Date:	8/21/2012	8/21/2012	8/21/2012	8/21/2012	8/21/2012
1,1-Dichloroethane	0.0050	4.9		ND (0.00050)	**0.067**	**0.018**	ND (0.00050)	ND (0.00050)
1,1-Dichloroethene	0.0050	0.0070		ND (0.00060)	**0.021**	**0.12**	ND (0.00060)	ND (0.00060)
1,2-Dichloroethane	0.0050	0.0050		ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)
cis-1,2-Dichloroethene	0.0050	0.070		ND (0.0010)	ND (0.0010)	**0.0011 J**	ND (0.0010)	ND (0.0010)
Tetrachloroethene	0.0050	0.0050		ND (0.0010)	ND (0.0010)	ND (0.0010)	ND (0.0010)	**0.0093**
Trichloroethene	0.0050	0.0050		ND (0.0010)	ND (0.0010)	ND (0.0010)	**0.0014 J**	ND (0.0010)
Vinyl Chloride	0.0020	0.0020		ND (0.00050)	ND (0.00050)	**0.0024**	ND (0.00050)	ND (0.00050)

Constituent	MQL	Critical PCLs (a)	Location:	MW-134	MW-145	MW-146	MW-169	MW-174
			Depth: (b)	25'		30'	36'	34'
			Date:	8/21/2012	8/21/2012	8/21/2012	8/21/2012	8/21/2012
1,1-Dichloroethane	0.0050	4.9		ND (0.00050)	NS	**0.018**	ND (0.00050)	**0.022**
1,1-Dichloroethene	0.0050	0.0070		**0.0077**	NS	**0.020**	**0.0060**	**0.066**
1,2-Dichloroethane	0.0050	0.0050		ND (0.00050)	NS	ND (0.00050)	ND (0.00050)	ND (0.00050)
cis-1,2-Dichloroethene	0.0050	0.070		ND (0.0010)	NS	**0.0059**	ND (0.0010)	**0.0025 J**
Tetrachloroethene	0.0050	0.0050		ND (0.0010)	NS	ND (0.0010)	ND (0.0010)	ND (0.0010)
Trichloroethene	0.0050	0.0050		ND (0.0010)	NS	ND (0.0010)	ND (0.0010)	ND (0.0010)
Vinyl Chloride	0.0020	0.0020		ND (0.00050)	NS	ND (0.00050)	ND (0.00050)	ND (0.00050)

NOTES:

The reported concentrations are in mg/L.
0.023 = exceedance of TCEQ Texas Risk Reduction Program (TRRP) Tier 1 Residential Class 2 Ground Water critical PCLs.
Bold values exceed the MQL.
ND (0.00050) = *Not Detected* at the Sample Detection Limit (SDL) given in parentheses.
MQL = Method Quantitation Limit.
(a) TCEQ Texas Risk Reduction Program (TRRP) Tier 1 Residential Class 2 Ground Water PCLs, Table 3, table for TRRP Rule dated Apil 2008.
(b) The sample depths are reported in feet below top of casing elevations.
J = Estimated data, the reported sample concentration is approximated due to exceedance of QC requirements.
NS = Not Sampled due to the presence of permanganate during low flow purging.

Figures

Attachment 2

December 3, 2012
Project No. 0159198

Environmental Resources Management
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(281) 600-1000

MW-59	28'
	8/21/2012
1,1-Dichloroethane	ND (0.00050)
1,1-Dichloroethene	ND (0.00060)
1,2-Dichloroethane	ND (0.00050)
cis-1,2-Dichloroethene	ND (0.0010)
Tetrachloroethene	ND (0.0010)
Trichloroethene	ND (0.0010)
Vinyl Chloride	ND (0.00050)

MW-74	29'
	8/21/2012
1,1-Dichloroethane	0.067
1,1-Dichloroethene	**0.021**
1,2-Dichloroethane	ND (0.00050)
cis-1,2-Dichloroethene	ND (0.0010)
Tetrachloroethene	ND (0.0010)
Trichloroethene	ND (0.0010)
Vinyl Chloride	ND (0.00050)

MW-134	25'
	8/21/2012
1,1-Dichloroethane	ND (0.00050)
1,1-Dichloroethene	**0.0077**
1,2-Dichloroethane	ND (0.00050)
cis-1,2-Dichloroethene	ND (0.0010)
Tetrachloroethene	ND (0.0010)
Trichloroethene	ND (0.0010)
Vinyl Chloride	ND (0.00050)

MW-145	
	8/21/2012
1,1-Dichloroethane	NS
1,1-Dichloroethene	NS
1,2-Dichloroethane	NS
cis-1,2-Dichloroethene	NS
Tetrachloroethene	NS
Trichloroethene	NS
Vinyl Chloride	NS

MW-146	30'
	8/21/2012
1,1-Dichloroethane	0.018
1,1-Dichloroethene	**0.020**
1,2-Dichloroethane	ND (0.00050)
cis-1,2-Dichloroethene	0.0059
Tetrachloroethene	ND (0.0010)
Trichloroethene	ND (0.0010)
Vinyl Chloride	ND (0.00050)

MW-122	29'
	8/21/2012
1,1-Dichloroethane	ND (0.00050)
1,1-Dichloroethene	ND (0.00060)
1,2-Dichloroethane	ND (0.00050)
cis-1,2-Dichloroethene	ND (0.0010)
Tetrachloroethene	ND (0.0010)
Trichloroethene	0.0014 J
Vinyl Chloride	ND (0.00050)

MW-174	34'
	8/21/2012
1,1-Dichloroethane	0.022
1,1-Dichloroethene	**0.066**
1,2-Dichloroethane	ND (0.00050)
cis-1,2-Dichloroethene	0.0025 J
Tetrachloroethene	ND (0.0010)
Trichloroethene	ND (0.0010)
Vinyl Chloride	ND (0.00050)

MW-84	33'
	8/21/2012
1,1-Dichloroethane	0.018
1,1-Dichloroethene	**0.12**
1,2-Dichloroethane	ND (0.00050)
cis-1,2-Dichloroethene	0.0011 J
Tetrachloroethene	ND (0.0010)
Trichloroethene	ND (0.0010)
Vinyl Chloride	**0.0024**

MW-169	36'
	8/21/2012
1,1-Dichloroethane	ND (0.00050)
1,1-Dichloroethene	0.0060
1,2-Dichloroethane	ND (0.00050)
cis-1,2-Dichloroethene	ND (0.0010)
Tetrachloroethene	ND (0.0010)
Trichloroethene	ND (0.0010)
Vinyl Chloride	ND (0.00050)

MW-125	BAILED
	8/21/2012
1,1-Dichloroethane	ND (0.00050)
1,1-Dichloroethene	ND (0.00060)
1,2-Dichloroethane	ND (0.00050)
cis-1,2-Dichloroethene	ND (0.0010)
Tetrachloroethene	**0.0093**
Trichloroethene	ND (0.0010)
Vinyl Chloride	ND (0.00050)

LEGEND

- MW-35 ⊕ MONITOR/INJECTION WELL
- MW-34 ⊕ MONITOR WELL
- MW-01(S) ⊡ AWTY MONITOR WELL
- P-1 ⊗ PIEZOMETER
- SWD-11 ◭ SURFACE WATER SAMPLE LOCATION IN THE HARRIS COUNTY FLOOD CONTROL DISTRICT
- DP-135 ◭ DIRECT PUSH GROUND WATER SAMPLE LOCATION
- IW-24 ■ INJECTION WELL
- APPROXIMATE LOCATION OF HARRIS COUNTY FLOOD CONTROL DITCH / BUFFALO BAYOU
- I-10 RIGHT-OF-WAY EXPANSION
- PROPERTY LINE FOR FORMER CAMERON IRON WORKS
- AWTY SCHOOL PROPERTY LINE
- CURRENT BUILDINGS
- NS NOT SAMPLED

NOTES:

1. SITE FEATURES ARE BASED ON HARRIS COUNTY APPRAISAL DISTRICT MAPS.
2. THE LOCATIONS OF THE BUILDINGS FOR THE AWTY SCHOOL ARE APPROXIMATE.
3. THE DIRECT PUSH LOCATIONS ARE APPROXIMATE.

0 300 600
SCALE FEET

Environmental Resources Management

FIGURE 1
SITE FEATURE MAP
Third Quarter 2012
Former Cameron Iron Works Facility
Houston, Texas

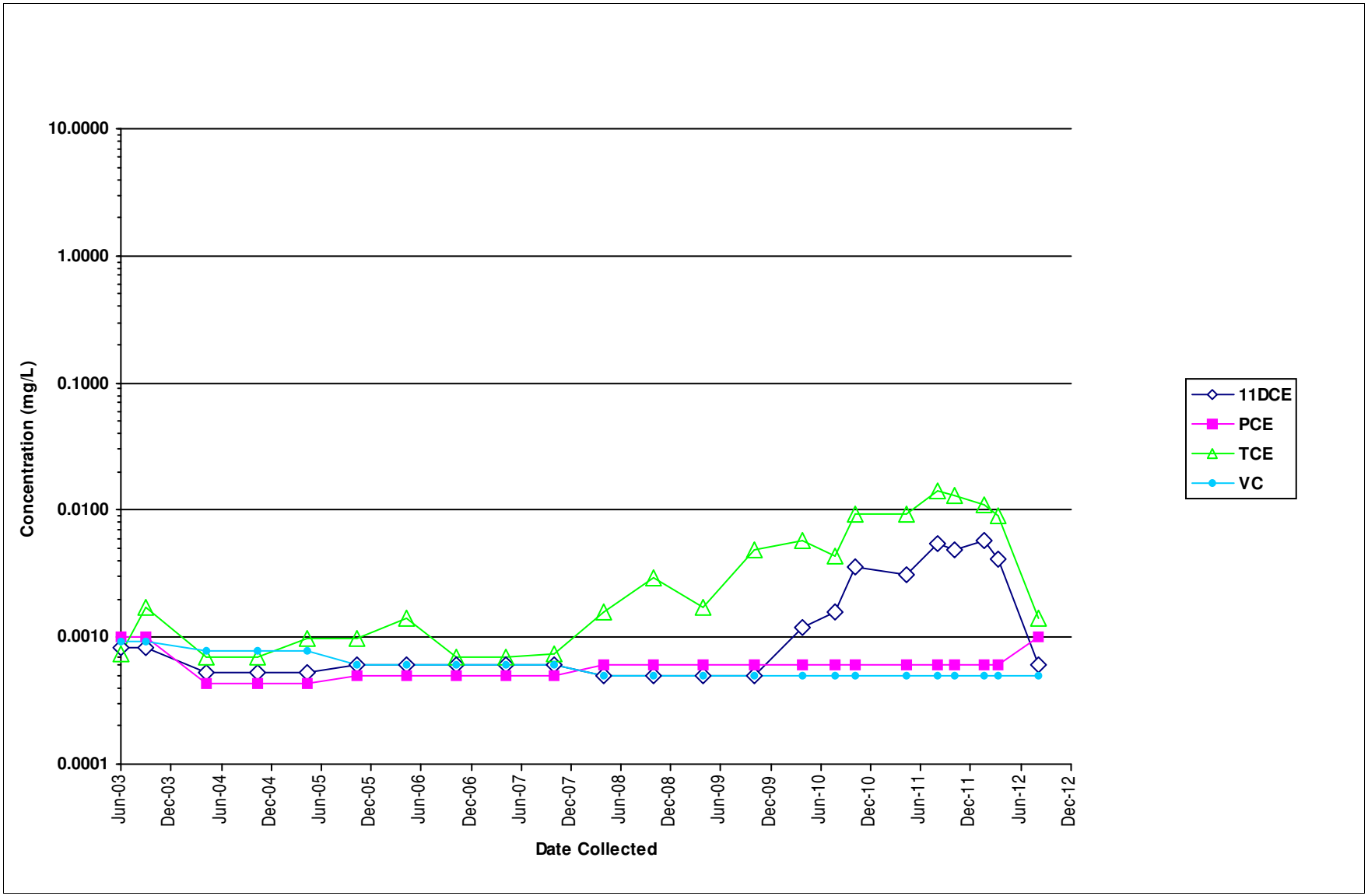
DESIGN: RJ	DRAWN: JMH	CHKD.: PAS	SHEET NO.
DATE: 9/25/2012	SCALE: AS SHOWN	REV.:	
W.O.NO.: H:\DWG\I12\0159198_3Q12.dwg, 9/25/2012 3:03:51 PM			of

ERM-Southwest, Inc. TX PE Firm No. 2393

Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

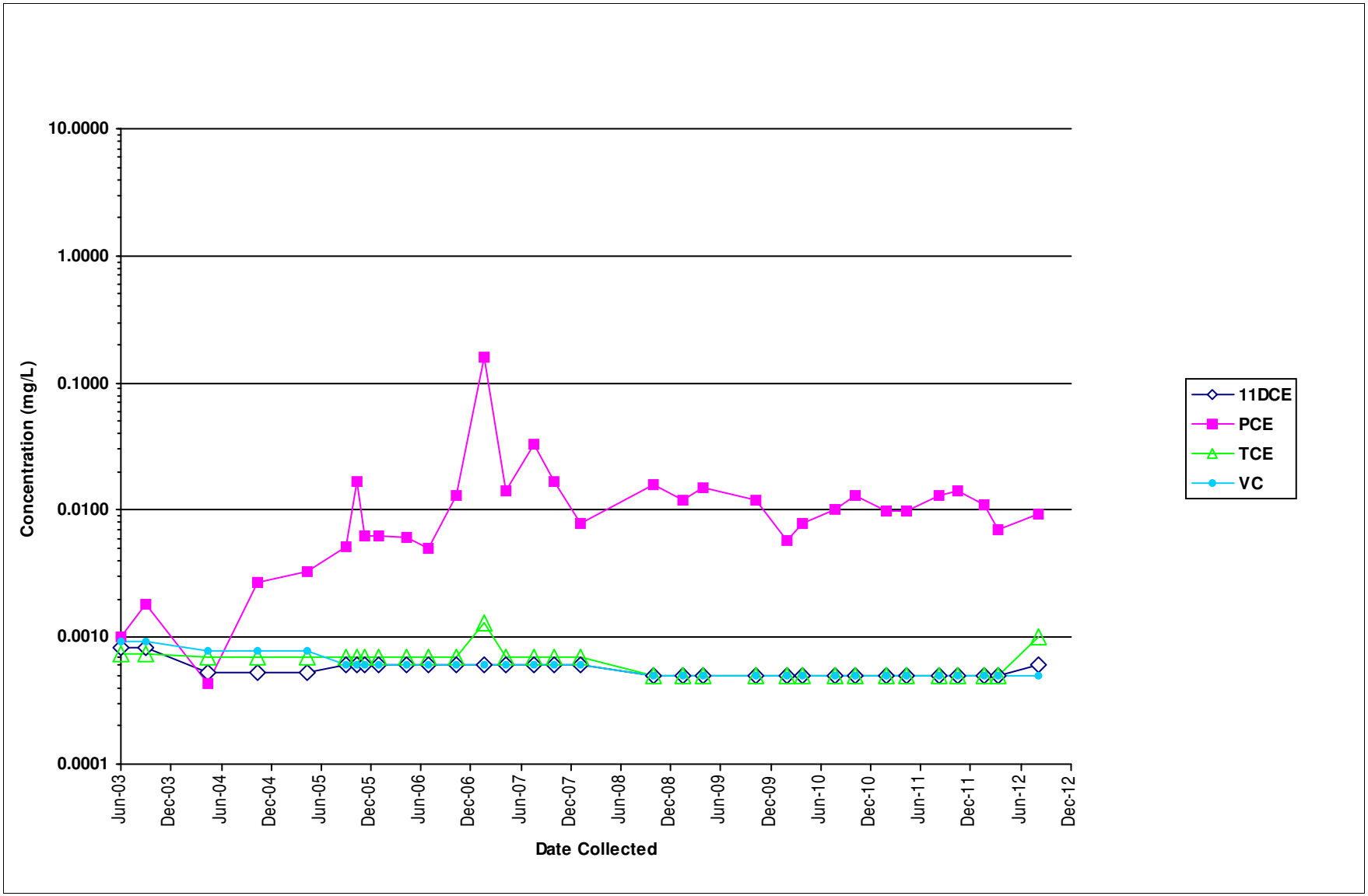
Client Sample ID: MW-122



Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

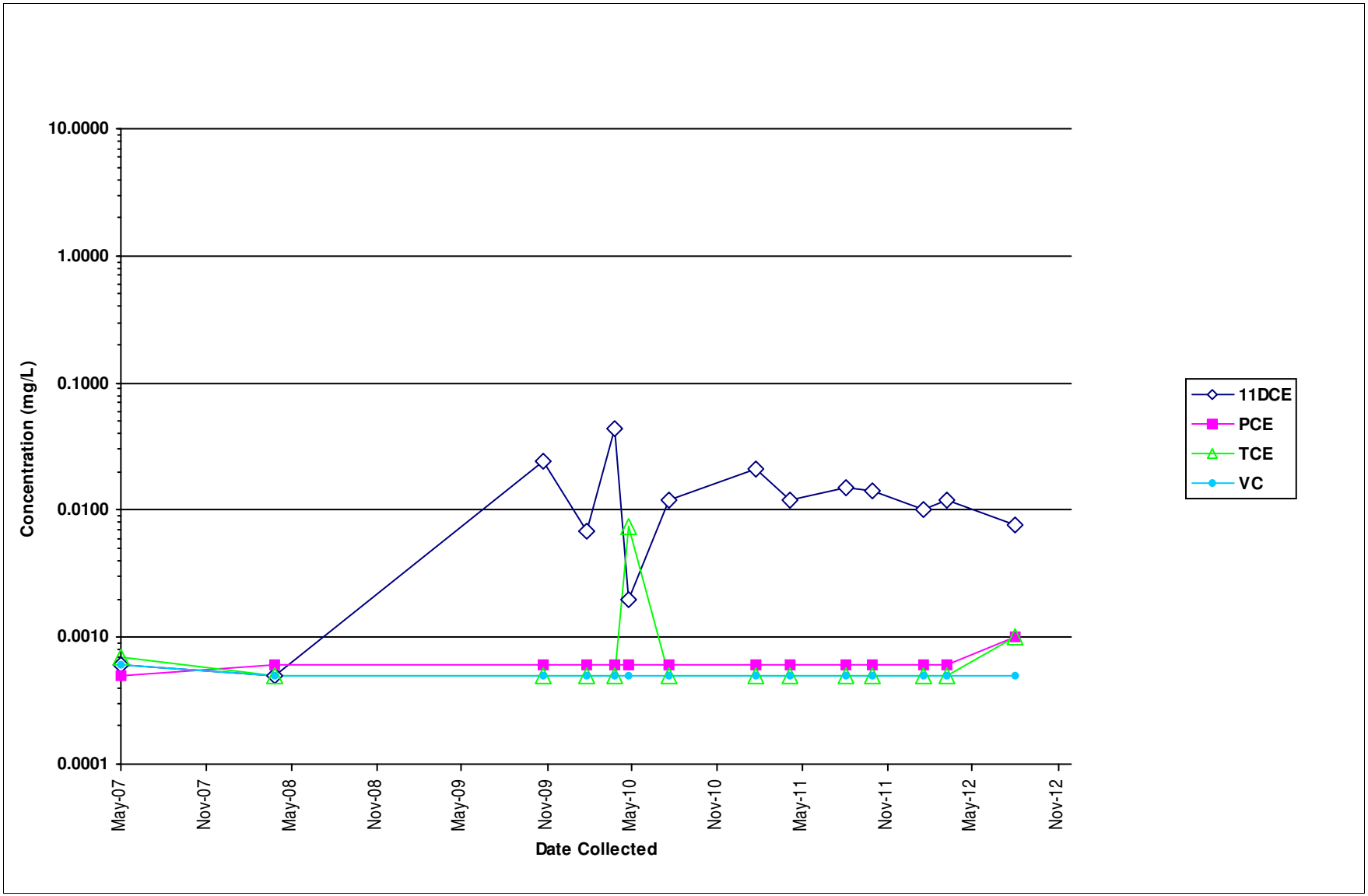
Client Sample ID: MW-125



Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

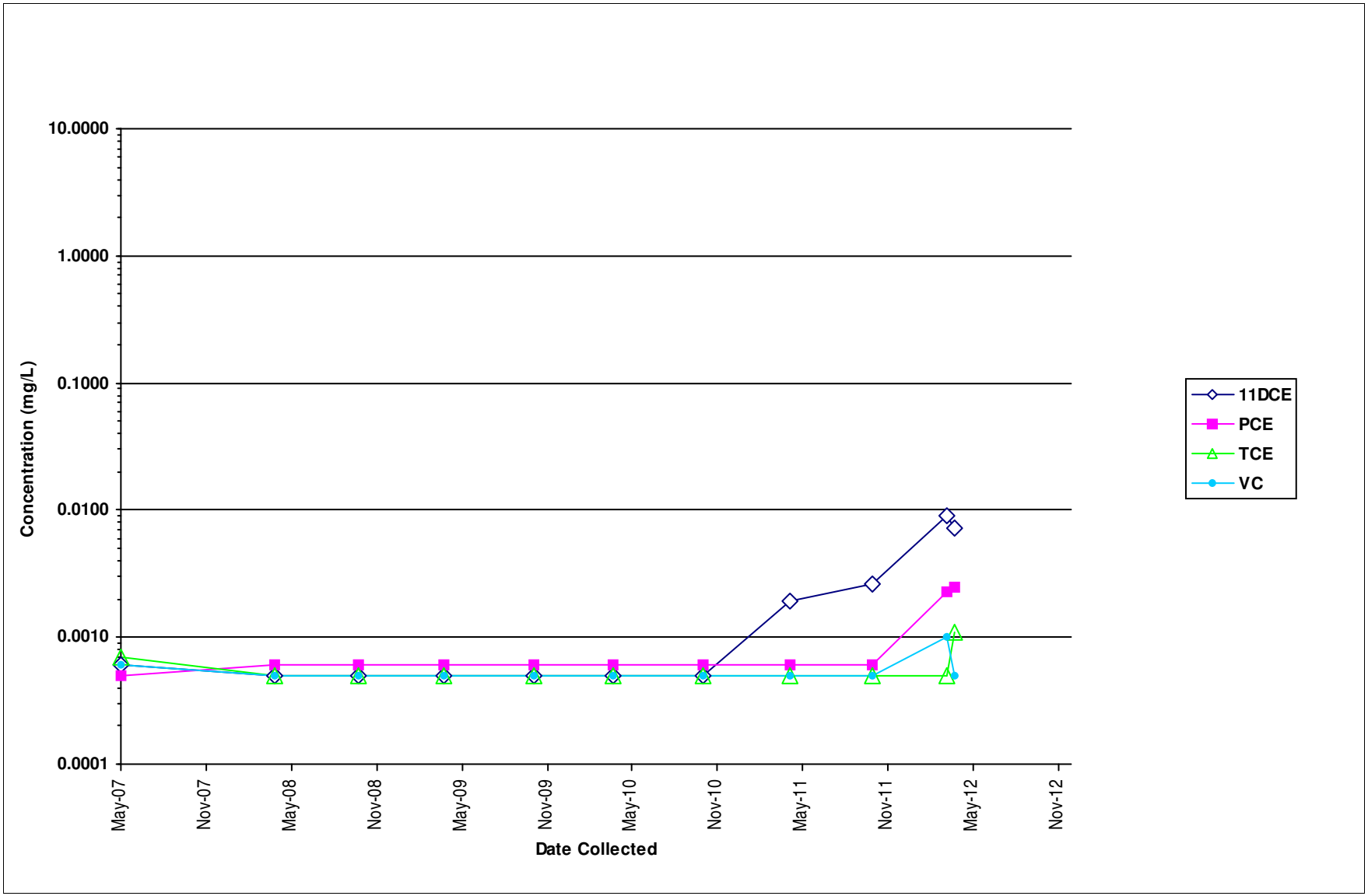
Client Sample ID: MW-134



Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

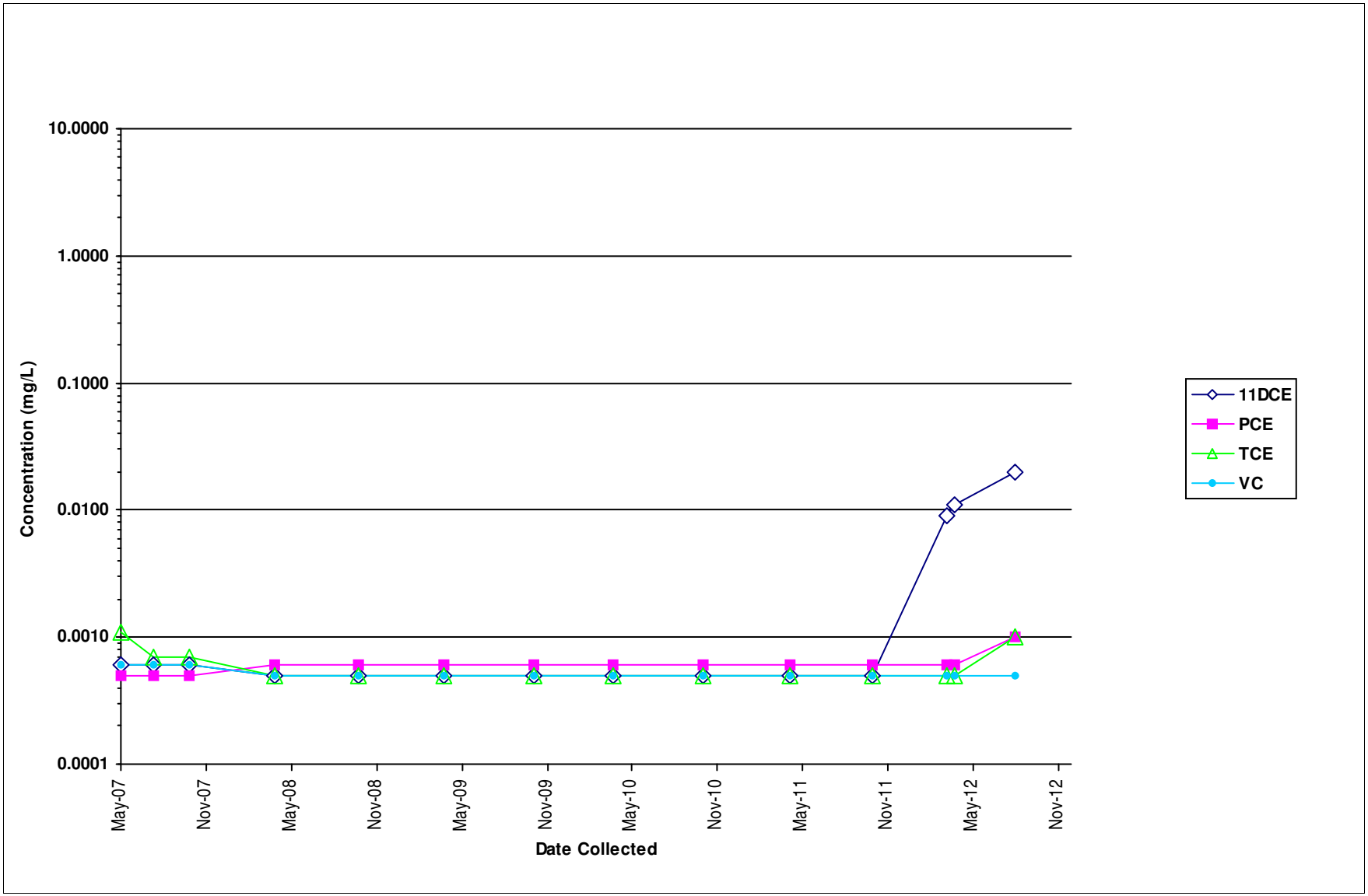
Client Sample ID: MW-145



Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

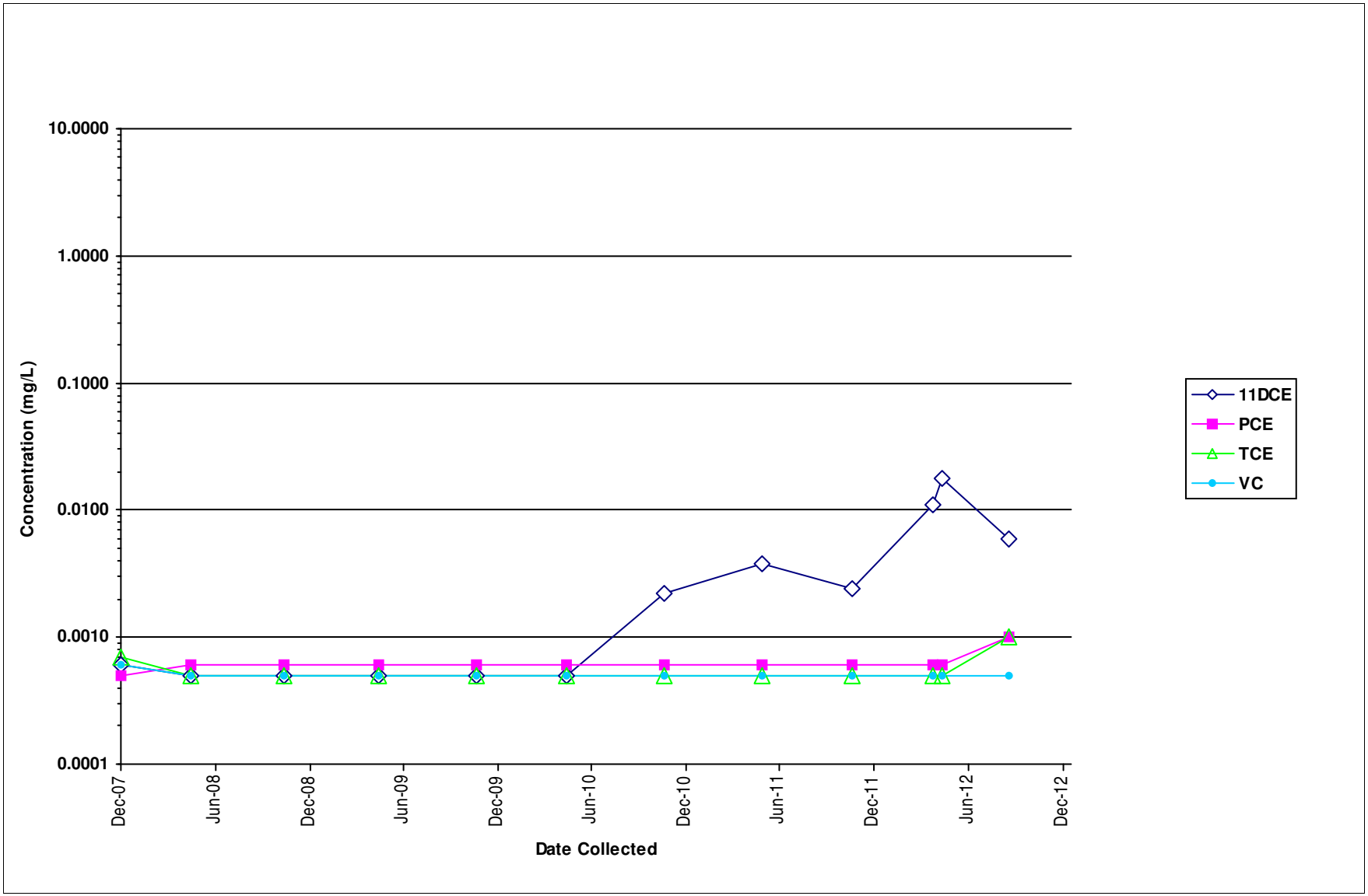
Client Sample ID: MW-146



Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

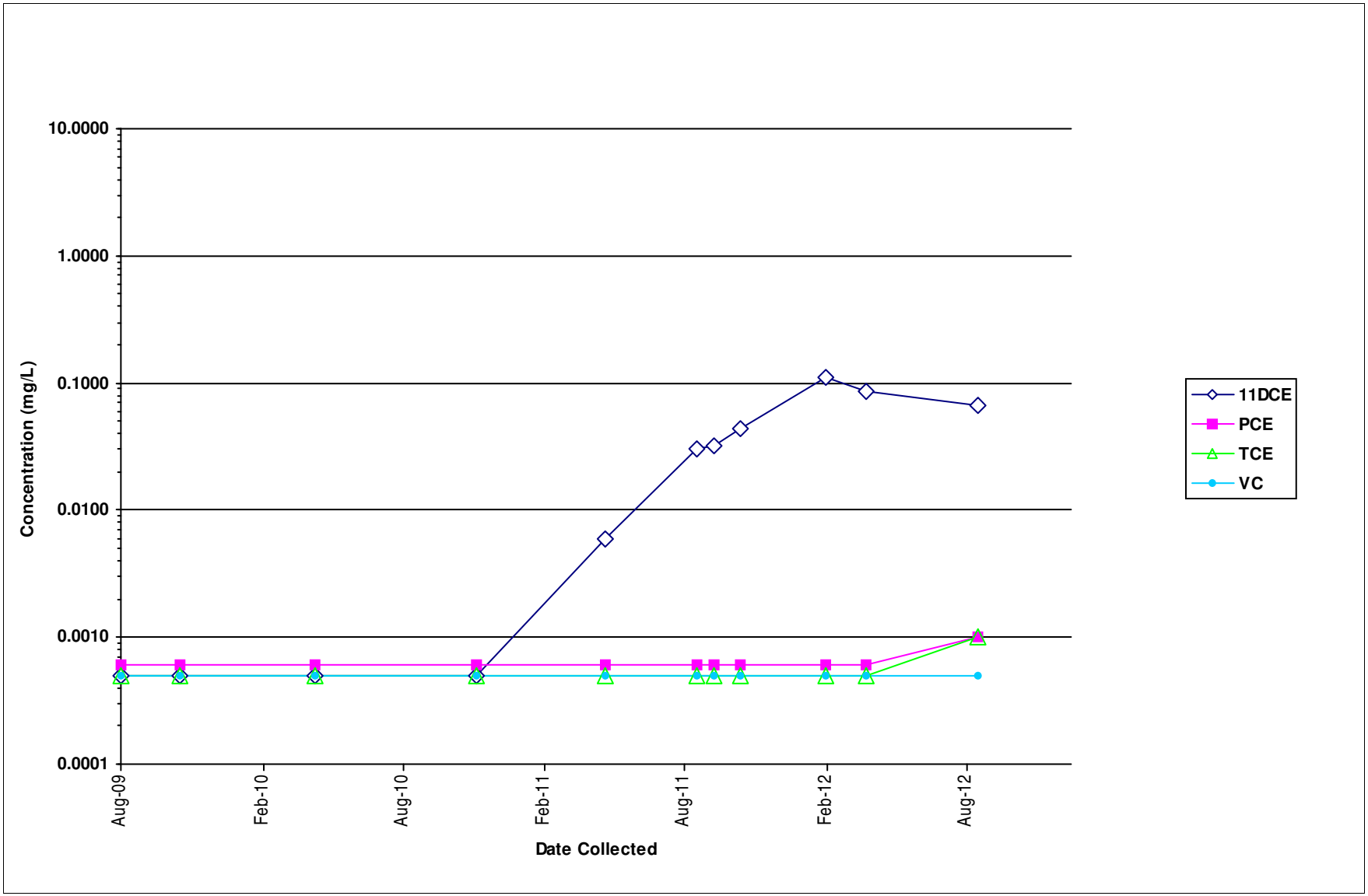
Client Sample ID: MW-169



Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

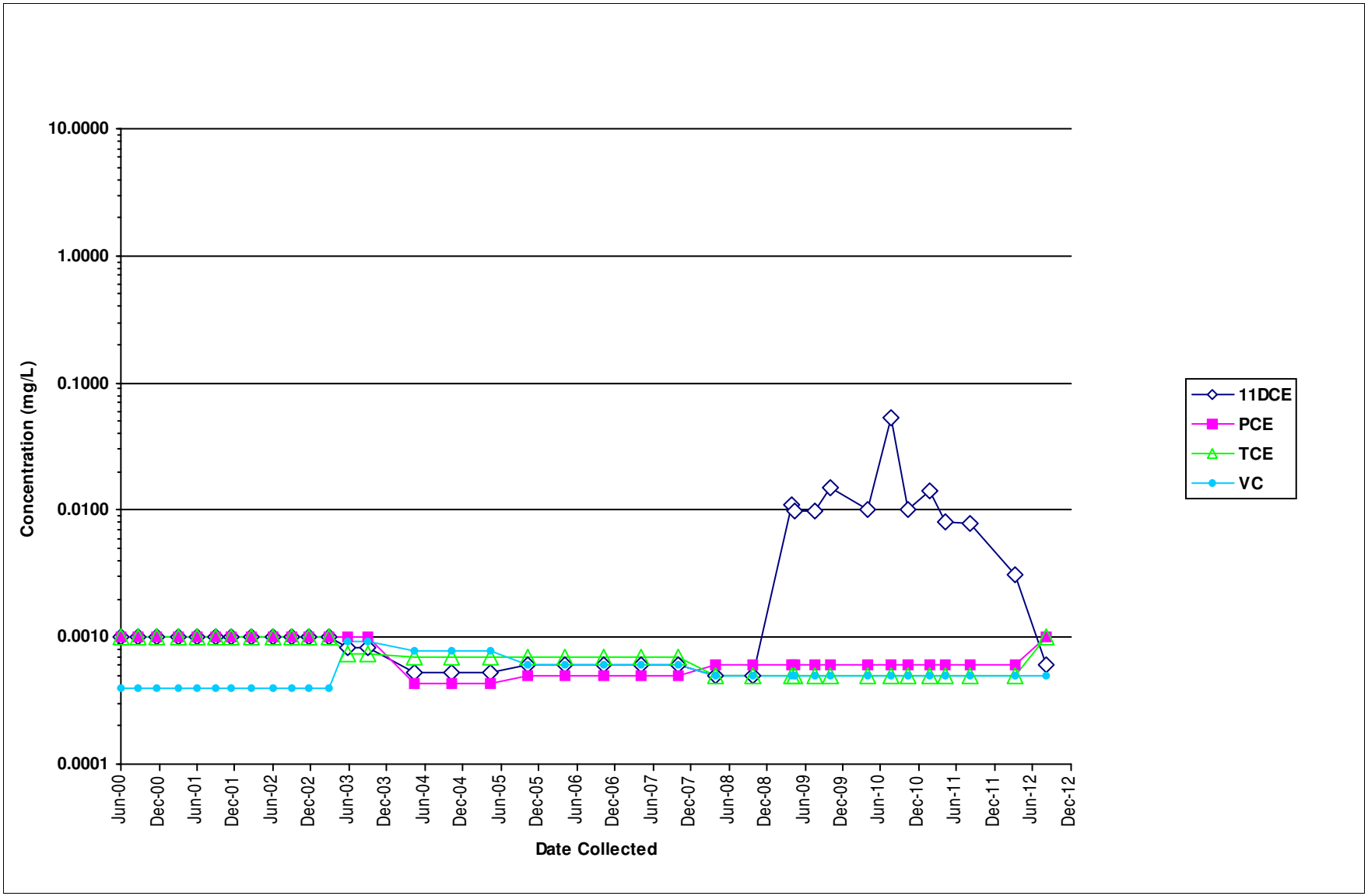
Client Sample ID: MW-174



Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

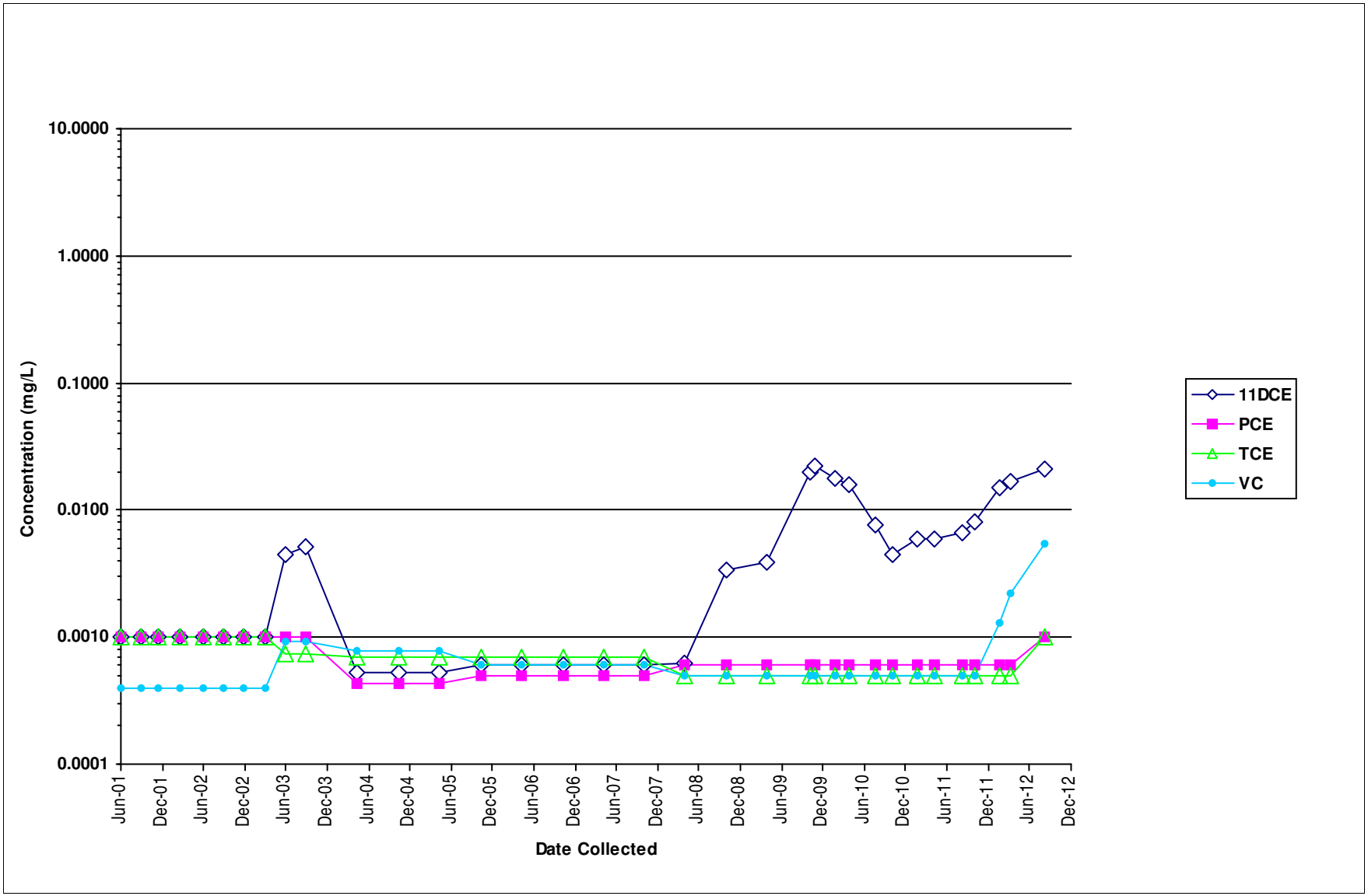
Client Sample ID: MW-59



Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

Client Sample ID: MW-74



Ground Water Concentration Trend Graph

Former Cameron Iron Works Facility
Houston, Texas

Client Sample ID: MW-84