New York State Department of Environmental Conservation
625 Broadway • Albany, NY 12233

WEST SIDE CORPORATION
OPERABLE UNIT No.2

Offsite Plume Delineation and Investigation Report Addendum #3

Work Assignment No. D00443-10.1

October 2009

Report Prepared By:

Malcolm Pirnie, Inc.

27-01 Queens Plaza North
Suite 800
Long Island City, NY 11101
718-446-0116

Contents

1. Introduction 1-1

1.1. INTRODUCTION 1-1

2. Water Level Measurements 2-1

2.1. Introduction 2-1

2.2. Results Summary 2-1

3. Water Quality Sampling Results 3-1

3.1. INTRODUCTION 3-1

3.2. RESULTS SUMMARY 3-1

3.2.1. DATA VALIDATION 3-1

3.3. PCE PLUME 3-1

List of Figures

Figure 2-1: Intermediate Well Groundwater Elevations 2-2

Figure 3-1: Shallow Well PCE Isoconcentration Contours 3-3

Figure 3-2: Intermediate Well PCE Isoconcentration Contours 3-4

Figure 3-3: Deep Well PCE Isoconcentration Contours 3-5

Figure 3-4: PCE Plume Cross-Section 3-5

List of Tables

Table 2-1: Depth-To-Water Measurements from Top-of-Casing 2-1

Table 3-1: Validated York Laboratory Results Summary: 4th Sampling Event 3-2

Appendices

A. Hydrographs - Groundwater Elevation in Intermediate Depth Monitoring Wells: 4th Monitoring Quarter

B. NOAA Quality Controlled Climatological Data: April to July 2009

C. Data Usability Summary Report (DUSR) Narrative – 4th Sampling Event

Data CD Contents

1) PDF: Offsite Plume Delineation and Investigation Report Addendum #3
2) Fully Validated Data Package – 4th Sampling Event
3) Raw Transducer Data – 4th Monitoring Quarter

1. Introduction

1.1. INTRODUCTION

This addendum summarizes the water quality data and water level measurements collected during the 4th quarterly sampling event at the West Side Corporation site, Operable Unit No.2 (OU-2) in Jamaica, Borough of Queens, New York. The purpose of this event was to continue monitoring the migration of PCE in the groundwater from the West Side site. Field investigation activities related to the perchloroethene (PCE) plume delineation are documented in the report titled Offsite Plume Delineation and Investigation Report: West Side Corporation Operable Unit No.2, Malcolm Pirnie Inc., dated February 2009.

The data collected during this sampling event was retrieved from monitoring wells located at Operable Unit No.1 (OU-1) and OU-2 and spans from April 7, 2009 to July 7, 2009. This work was performed under Work Assignment No. D00443-10.1 and follows the 3rd monitoring quarter, presented in the October 2009 Offsite Plume Delineation and Investigation Report Addendum #2.

2. Water Level Measurements

2.1. Introduction

Synoptic water level measurements taken from the surveyed top-of-casing, as well as Levelogger® pressure transducer data, were retrieved from existing permanent monitoring wells at OU-1 and OU-2. This data was converted into groundwater elevation to document water level trends and the direction of groundwater movement. Groundwater elevations measured hourly throughout the 4th monitoring quarter were plotted as hydrographs, found in Appendix A.

Depth-to-water measurements taken from the top of monitoring well casings are presented in Table 2-1.

2.2. Results Summary

Hydrographs showing continuous water level monitoring data indicate that groundwater elevation generally increased since the 3rd monitoring quarter. Meteorological information obtained from NOAA (Appendix B) reports that more precipitation occurred during the 4th monitoring quarter than the 3rd quarter, on account of vernal rains and increased aquifer recharge. Hydrographs display a decrease in water table elevation that in some well locations is as much as 9 inches.

A groundwater elevation map (Figure 2-1) based on water level data from transducers installed in intermediate depth monitoring wells indicates that the direction of regional flow is south to southwest. This observation is consistent with observations made during the 3rd monitoring quarter, suggesting that seasonal variation in precipitation during the period of April to July 2009 did not change the direction of regional flow in the aquifer.

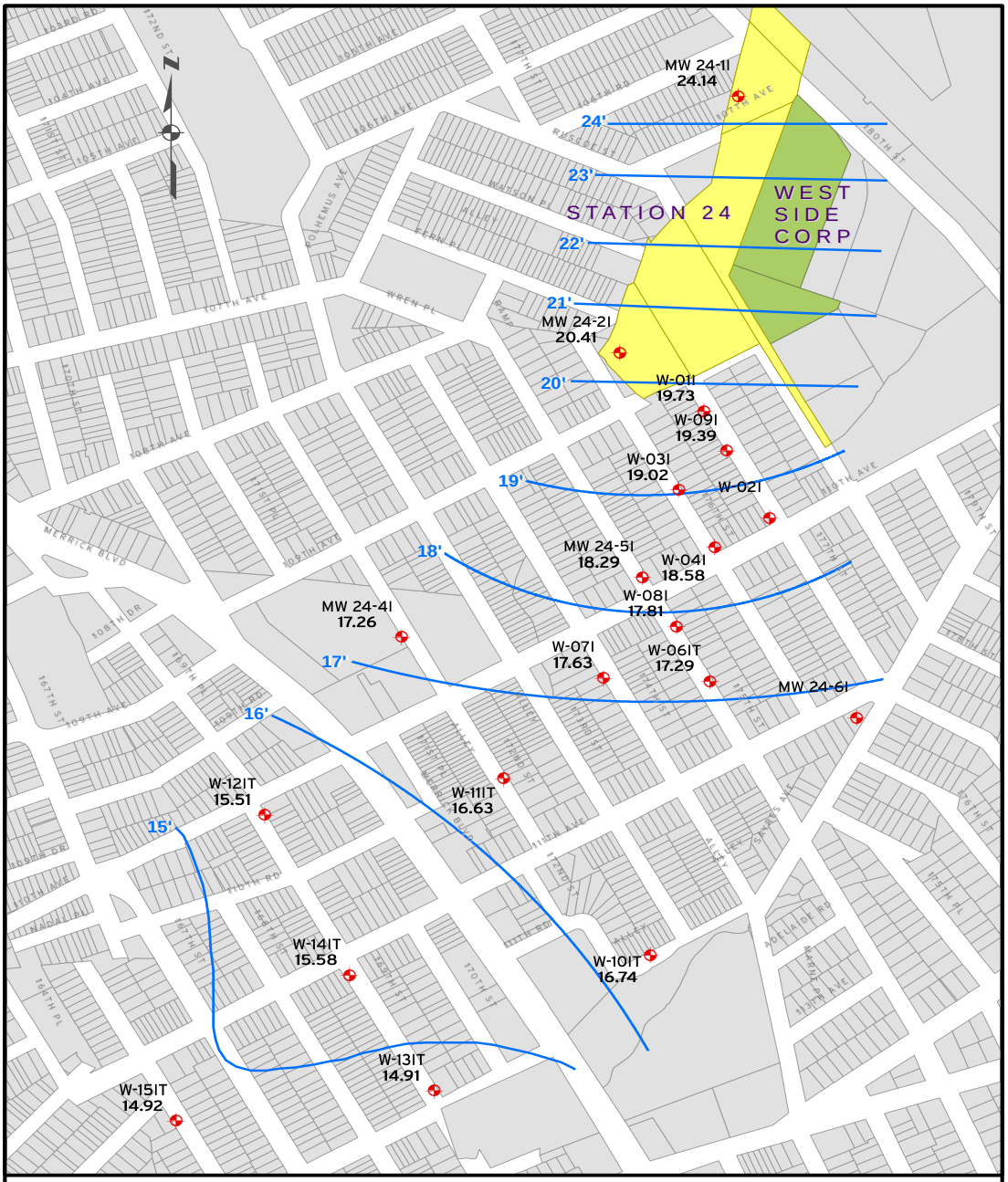
The groundwater elevation at MW 24-2 I was anomalously high during the 2nd monitoring possibly due to construction activities, including trenching and excavation, upgradient of the well location. Groundwater elevation has since returned to values consistent with previous monitoring quarters.

TABLE 2-1

WESTSIDE DTW READINGS - 4th SAMPLING EVENT

Well Designation	Levellogger Serial Number	Date	DTW (S)	DTW (I)	DTW (D)
MW 24-2	1033544	7/6/09	8.59	8.56	8.63
MW 24-1	1033548	7/6/09	8.90	8.83	8.86
MW 24-4	1033560	7/7/09	12.90	12.93	12.90
MW 24-6	1033576	7/6/09	8.61	8.63	8.65
MW 25-5	1033547	7/7/09	10.00	10.00	10.09
MW-6S	N/A	7/7/09	9.97	N/A	N/A
MW-6D	N/A	7/7/09	N/A	N/A	9.87
MW-7S	N/A	7/7/09	7.00	N/A	N/A
MW-7D	N/A	7/7/09	N/A	N/A	7.06
MW-22S	N/A	7/7/09	7.93	N/A	N/A
MW-55D	N/A	7/7/09	N/A	N/A	7.91
MW-3D	N/A	7/7/09	N/A	N/A	5.90
W-01	1033561	7/6/09	8.29	8.01	8.09
W-02	1033549	7/6/09	9.19	9.24	9.27
W-03	1033550	7/7/09	6.22	6.43	6.25
W-04	1033557	7/7/09	7.11	6.85	6.88
W-05	N/A	7/7/09	N/A	8.34	N/A
W-06	1033546	7/7/09	9.97	9.90	9.93
W-07 (DEP Yard)	N/A	7/6/09	N/A	8.20	N/A
W-07	1033567	7/8/09	9.68	9.73	9.30
W-08	1033555	7/7/09	10.08	10.10	10.11
W-09	1033557	7/6/09	9.54	9.64	9.47
W-10	1033538	7/6/09	8.88	9.37	9.90
W-11	1033629	7/8/09	12.76	11.74	11.40
W-12	1033573	7/8/09	19.58	19.35	19.32
W-13	1033537	7/8/09	6.81	6.97	6.81
W-14	1033575	7/8/09	13.57	13.60	13.60
W-15	1033579	7/8/09	6.50	6.63	6.68

Figure 2-1: Intermediate Well Groundwater Elevations



3. Water Quality Sampling Results

3.1. INTRODUCTION

Groundwater samples were collected using Passive Diffusion Bag samplers (PDBs) from 68 monitoring wells and analyzed by York Analytical Laboratories for VOCs by SW-846 EPA Method 8260.

3.2. RESULTS SUMMARY

PCE and other compound concentrations were consistent with the laboratory results obtained from the 3rd sampling event. Validated laboratory results for PCE, as well as other detected analytes, are summarized in Table 3-1.

3.2.1. DATA VALIDATION

Laboratory deliverable results were compiled in ASP-B format for data validation. The Data Usability Summary Report (DUSR) can be found in Appendix C. The fully validated data package is presented in the Data CD.

3.3. PCE PLUME

Plan-view PCE isoconcentration maps indicate variation in plume configuration with depth. Figure 3-1 indicates that shallow contamination remains between the OU-1 source area and the vicinity of 173rd Street. The highest concentrations were observed between 174th and 176th Street, where monitoring wells indicated significant shallow groundwater contamination from 180 ppb to 700 ppb. Several other shallow wells indicated PCE concentrations greater than 10 ppb between OU-1 and 173rd Street.

Intermediate depth monitoring wells indicate that the PCE contamination continues to occupy the intermediate zone, extending further south and west of shallow contamination from OU-1. PCE concentrations indicate that the leading edge of the plume in the intermediate zone is still located between 169th and 166th Streets. The highest concentrations in the intermediate zone (~ 40-50 ft bgs) were observed from 174th Street to 172nd Street, where PCE concentrations range from 1300 ppb to 1500 ppb (see Figure 3-2).

Analysis of groundwater samples from deep monitoring wells indicates that contamination is still present to the south-southwest in the deepest interval. This is evidenced by detection of PCE in W-15D at a concentration of 120 ppb (Figure 3-3). PCE was not detected between 166th street and 172nd street. The data indicates that deep

zone contamination remains bounded by 110th Avenue and Sayres Avenue to the northwest and southeast, respectively.

The direction of plume movement as shown in these figures remains consistent with the southwesterly regional flow direction. Groundwater samples from the monitoring wells were consistent in showing that PCE contamination extends deeper into the aquifer with increasing distance from OU-1, with the most widespread contamination in the intermediate zone. Figure 3-4 illustrates this trend, showing a cross-section through the plume. Water quality data obtained from monitoring wells along this cross-section continue to show that shallow and intermediate PCE contamination predominates to the north of 174th Street, while deeper contamination predominates southward to 166th Street.

TABLE 3-1

WESTSIDE OU-1 OU-2: VALIDATED GROUNDWATER QUALITY DATA SUMMARY

4th Sampling Event: July 7-10, 2009

	PCE	TCE	MTBE	Vinyl Chloride	1-1-1 trichloro ethane	1-1 dichloro ethane	1-1 dichloro ethylene	cis 1-2 dichloro ethylene	trans 1-2 dichloro ethene
MW 24-1S	2 J	ND	ND	ND	ND	ND	ND	ND	ND
MW 24-1I	**6**	2 J	ND	ND	ND	ND	ND	ND	ND
MW 24-1D	**160**	4 J	ND	ND	4 J	7 J	5 J	3 J	ND
MW 24-2S	**24**	ND	ND	ND	ND	ND	ND	ND	ND
MW 24-2I	**27**	4 J	ND	ND	ND	1 J	ND	3 J	ND
MW 24-2D	3 J	ND	ND	ND	ND	**12**	4 J	ND	ND
MW 24-4S	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW 24-4I	**5**	ND	ND	ND	ND	ND	ND	ND	ND
MW 24-4D	ND	ND	**18**	ND	ND	**9**	ND	ND	ND
MW 24-5S	**13**	1 J	ND	ND	ND	ND	ND	ND	ND
MW 24-5I	**820 J**	**150 J**	ND	ND	ND	ND	ND	**80 J**	ND
MW 24-5D	**14**	**5**	ND	ND	ND	2 J	ND	**20**	ND
MW 24-6S	**10**	3 J	ND	ND	ND	ND	ND	**12**	ND
MW 24-6I	**42**	**12**	ND	ND	ND	ND	ND	**45**	ND
MW 24-6D	1 J	ND	ND	ND	ND	ND	ND	**6**	ND
W-01S	**180**	**37**	ND	ND	ND	2 J	ND	**28**	ND
W-01I	**19**	**5**	ND	ND	ND	ND	ND	ND	ND
W-01D	1 J	4 J	ND	ND	ND	ND	ND	**31**	ND
W-02S	**30**	2 J	ND	ND	ND	ND	ND	ND	ND
W-02I	**190**	**88**	ND	ND	ND	ND	ND	**260**	ND
W-02D	1 J	**6**	ND	ND	ND	ND	ND	**51**	ND
W-03S	**10**	ND	ND	ND	ND	ND	ND	ND	ND
W-03I	**22 J**	**34 J**	ND	ND	ND	ND	ND	**480**	ND
W-03D	ND	ND	ND	ND	ND	ND	ND	**19**	ND
W-04S	**420**	**18 J**	ND	ND	ND	ND	ND	**12 J**	ND
W-04I	**220**	**84**	ND	ND	ND	ND	ND	**52**	ND
W-04D	**380**	**46**	ND	ND	ND	ND	ND	**61**	ND
W-06S	**42**	ND	ND	ND	ND	ND	ND	ND	ND
W-06I	**170**	**13**	ND	ND	ND	ND	ND	**13**	ND
W-06D	**340**	ND	ND	ND	ND	ND	ND	ND	ND
W-07S	**89**	**6**	ND	ND	ND	ND	ND	3 J	ND
W-07I	**1300**	**24 J**	ND	ND	ND	ND	ND	**19**	ND
W-07D	**13**	**6**	2 J	ND	ND	ND	ND	**28**	ND
W-08S	**700**	**140**	ND	ND	ND	ND	ND	ND	ND
W-08I	**610**	**200**	ND	ND	ND	ND	ND	**160**	ND
W-08D	**330**	**120**	ND	ND	ND	ND	ND	**150**	ND
W-09S	**41**	**13**	ND	2 J	ND	ND	ND	**19**	ND
W-09I	**870**	**130**	ND	ND	ND	ND	ND	**57**	ND
W-09D	**76**	**30**	ND	ND	ND	1 J	**54**	ND	ND
W-10S	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-10I	**1500**	**160**	ND	ND	ND	ND	ND	**200**	ND
W-10D	**8**	2 J	ND	ND	ND	ND	ND	**92**	ND
W-11S	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-11I	**6**	ND	ND	ND	ND	ND	ND	**9**	ND
W-11D	**21 J**	ND	ND	ND	ND	ND	ND	**1200**	11 J

NOTES:
All values listed in parts-per-billion (PPB)
'ND' denotes 'Non-detect' for that parameter

QUALIFIERS:
J - Analyte positively identified, reported value is an approximate concentration

TABLE 3-1

WESTSIDE OU-1 OU-2: VALIDATED GROUNDWATER QUALITY DATA SUMMARY

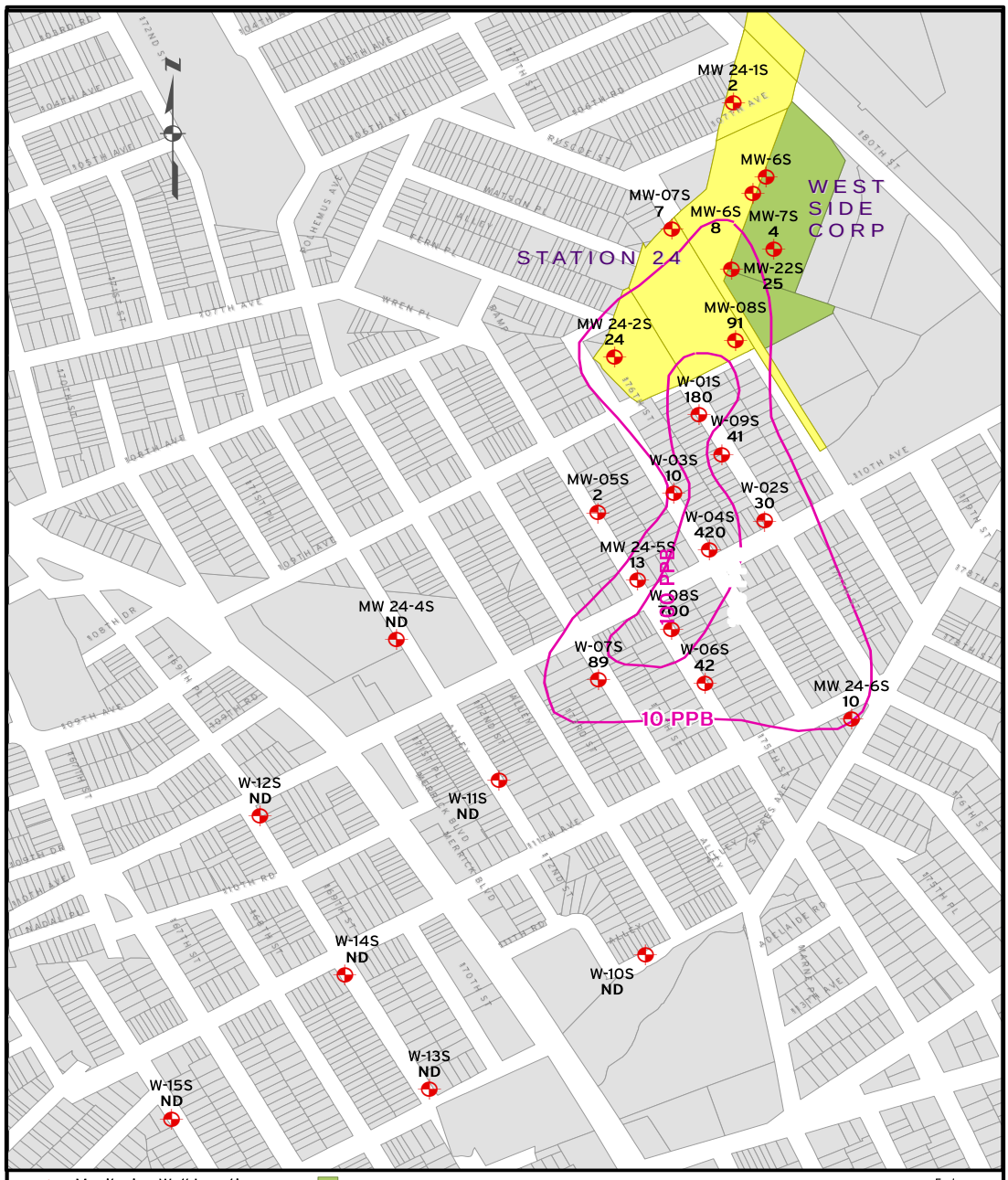
4th Sampling Event: July 7-10, 2009

WELL NO.	PCE	TCE	MTBE	Vinyl Chloride	1-1-1 trichloro ethane	1-1 dichloro ethane	1-1 dichloro ethylene	cis 1-2 dichloro ethylene	trans 1-2 dichloro ethylene
W-12S	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-12I	2 J	ND	ND	ND	ND	ND	ND	ND	ND
W-12D	ND	ND	2 J	ND	ND	ND	ND	4 J	ND
W-13S	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-13I	ND	ND	3 J	ND	ND	ND	ND	**9**	ND
W-13D	ND	ND	ND	ND	ND	ND	ND	2 J	ND
W-14S	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-14I	**640**	**11 J**	ND	ND	ND	ND	ND	**19 J**	ND
W-14D	ND	ND	2 J	ND	ND	ND	ND	**43**	ND
W-15S	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-15I	ND	ND	**170**	ND	ND	ND	ND	ND	ND
W-15D	**120**	**13**	ND	ND	ND	ND	ND	**12**	ND
MW-05	2 J	ND	ND	ND	ND	ND	ND	ND	ND
MW 22S	**25**	3 J	ND	ND	ND	ND	ND	**6**	ND
MW 3D	**38**	**11**	ND	ND	ND	ND	ND	2 J	ND
MW 55D	**27**	**6**	ND	ND	3 J	2 J	2 J	ND	ND
MW 6S	**8**	ND	ND	ND	ND	ND	ND	ND	ND
MW 6D	ND	ND	ND	ND	ND	ND	ND	**280**	ND
MW 7S	4 J	3 J	ND	ND	ND	ND	ND	4 J	ND
MW 77D	**330**	**81**	ND	ND	ND	ND	ND	**150**	ND
MW-07	**7**	ND	ND	ND	ND	ND	ND	ND	ND
MW-08	**91**	**9**	ND	ND	ND	ND	ND	**15**	ND

NOTES:
All values listed in parts-per-billion (PPB)
'ND' denotes 'Non-detect' for that parameter

QUALIFIERS:
J - Analyte positively identified, reported value is an approximate concentration

Figure 3-1: Shallow Well PCE Isoconcentration Contours

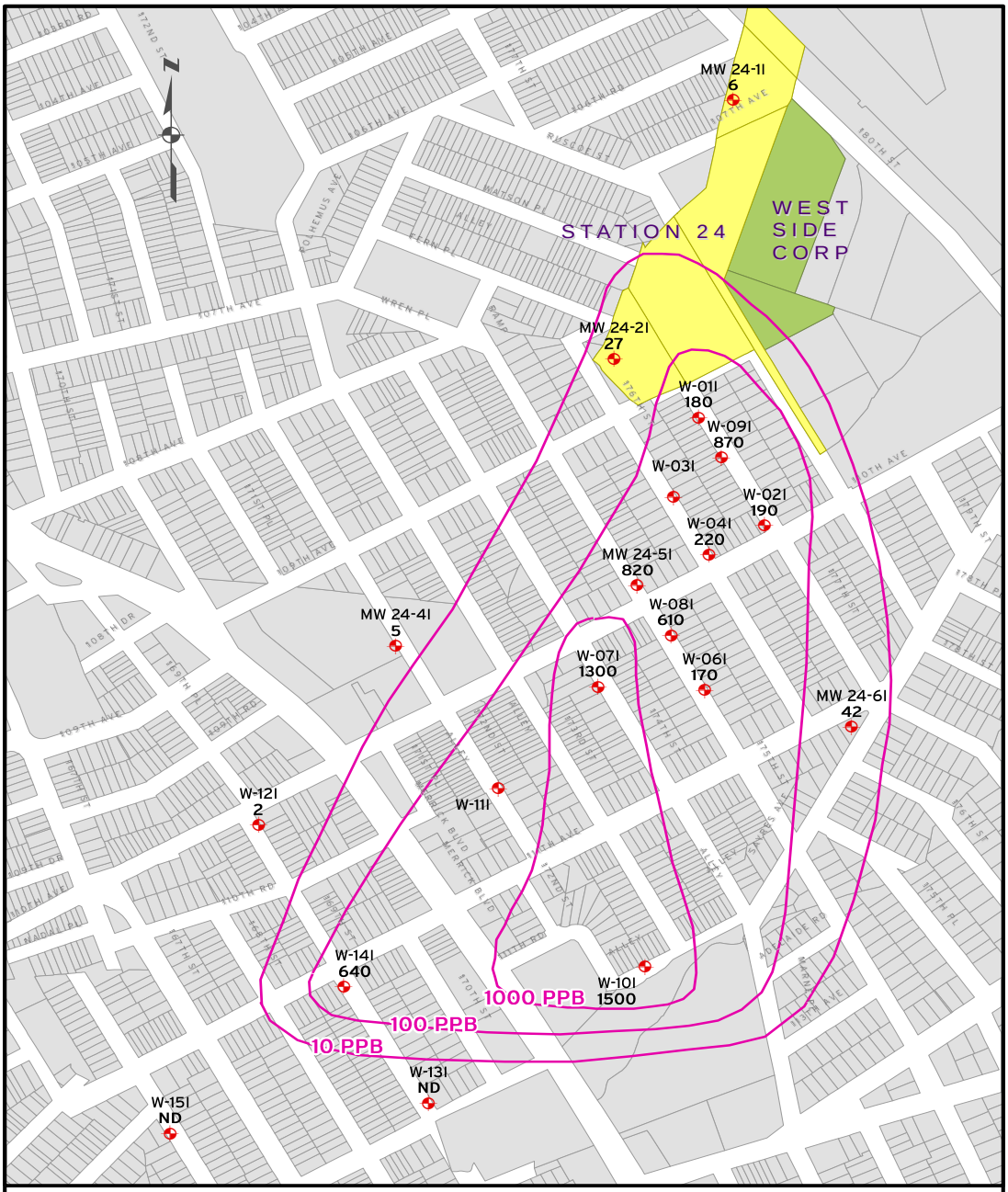


SHALLOW WELL PCE ISOCONCENTRATION CONTOURS
from PDBs: 4th SAMPLING EVENT July 7-10, 2009

WEST SIDE CORPORATION
OPERABLE UNIT No. 2

Figure 3-1

Figure 3-2: Intermediate Well PCE Isoconcentration Contours



Monitoring Well Locations with PDBs Installed
47 = PCE in Parts per Billion (ppb)
ND= PCE Not Detected

West Side Corp
Station 24 (based on 2006 PLUTO)

10, 100, 1000 PPB PCE Isocontour

0 250 500 1,000 Feet

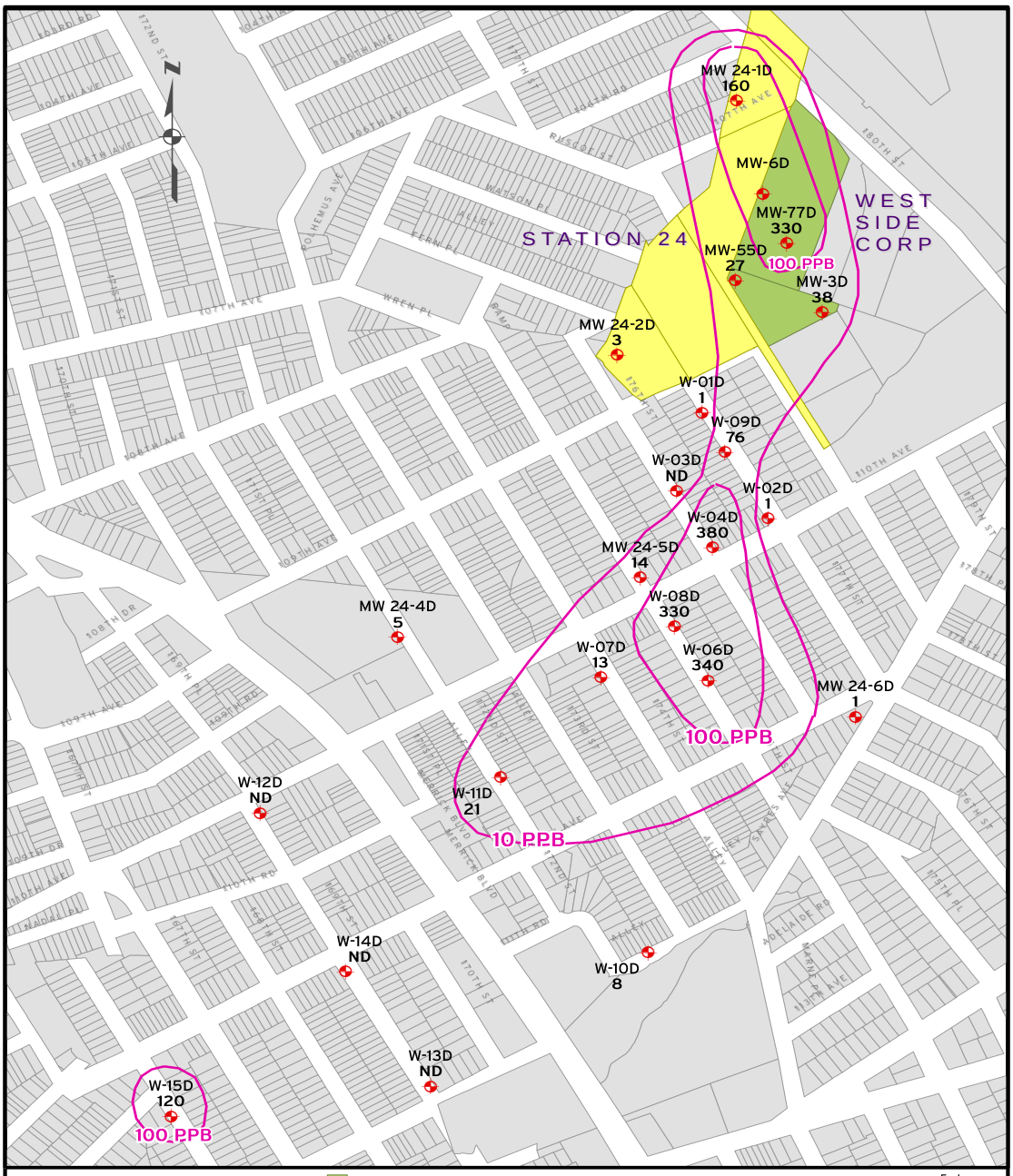
Note: Wells W-03 I and W-11 I were omited due to anomalous data.

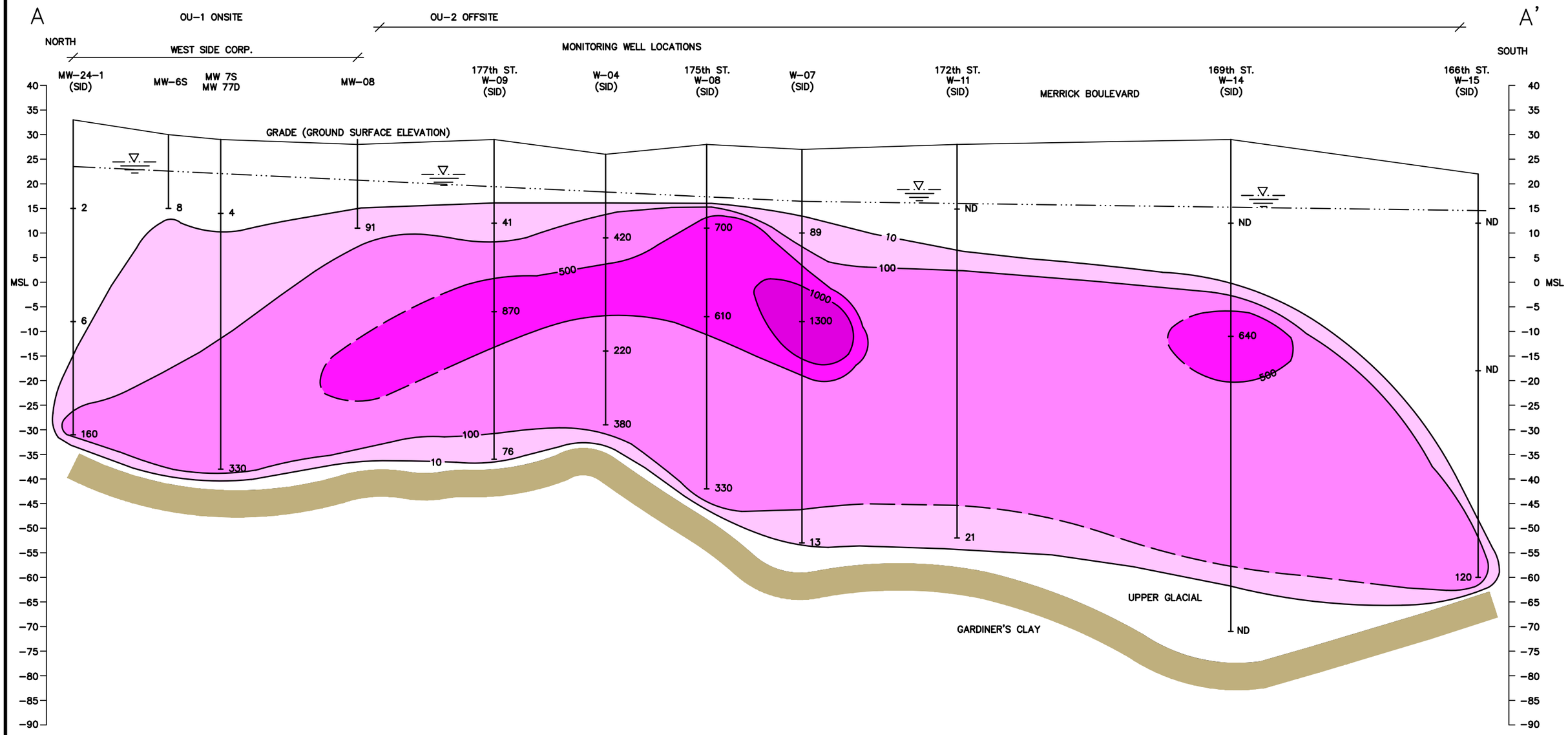
INTERMEDIATE WELL PCE ISOCONCENTRATION CONTOURS
from PDBs: 4th SAMPLING EVENT July 7-10, 2009

WEST SIDE CORPORATION
OPERABLE UNIT No. 2

Figure 3-2

Figure 3-3: Deep Well PCE Isoconcentration Contours





LEGEND

B-41 BOREHOLE

256 PCE IN ug/L (ppb)

10 DASHED LINE INDICATES PROJECTED ISOCONTOUR ISOCONCENTRATION CONTOUR

NOTE: DEPTHS OF PDBs AND (PCE) ARE AT WELL SCREEN MIDPOINT.

≥10 ug/L
≥100 ug/L
≥500 ug/L
≥1000 ug/L

HORIZONTAL SCALE: 1" = 320'

MALCOLM PIRNIE

NYSDEC
WESTSIDE CORP. OU-2, JAMAICA, QUEENS
PASSIVE DIFFUSION BAG SAMPLING DATE 7.10.09
PERCHLOROETHENE (PCE) IN GROUNDWATER
CROSS SECTION LOOKING EAST INTO PLUME FROM CENTERLINE A-A'

MALCOLM PIRNIE, INC.

FIGURE 3-4

User: MCKENNA Spec: PIRNIE STANDARD File: I:\0266375\SECTION A-A-4.DWG Scale: 1:1 Date: 10/26/2009 Time: 13:15 Layout: Layout1
XREFS: IMAGES: J:\0266375\plume3.cal K:\Symbols2000\Pirnie Standard\Gen\MPI Title Blocks\MPLOGOBK_NoBleed.jpg