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Date of Hearing: 5-2-13

Case No. 12-1685-GA-AIR

PUCO Case Caption: In the Matter of the Application of Duke Energy Ohio

Volume IV

List of exhibits being filed:

DEO 29

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Reporter's Signature: Karen Sue Gibson

Date Submitted: 5-8-13

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Technician _____ Date Processed MAY 16 2013

BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO

- - -

In the Matter of the Application of Duke Energy Ohio, Inc., for an Increase in Gas Rates.	:	Case No 12-1685-GA-AIR
In the Matter of the Application of Duke Energy Ohio, Inc., for Tariff Approval.	:	Case No. 12-1686-GA-ATA
In the Matter of the Application of Duke Energy Ohio, Inc., for Approval of an Alternative Rate Plan for Gas Distribution Service.	:	Case No. 12-1687-GA-ATA
In the Matter of the Application of Duke Energy Ohio, Inc., for Approval to Change Accounting Methods.	:	Case No. 12-1688-GA-AAM

- - -

PROCEEDINGS

before Ms. Christine M. T. Pirik and Ms. Katie Stenman, Attorney Examiners, at the Public Utilities Commission of Ohio, 180 East Broad Street, Room 11-A, Columbus, Ohio, called at 9:00 a.m. on Thursday, May 2, 2013.

- - -

VOLUME IV

- - -

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- - -

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Free Product Considerations Under Ohio's Voluntary Action Program (VAP)

John T. Garvey, CP #118
Partners Environmental Consulting, Inc.

and

Mike McKim, CP #[illegible]
URS



2012 VAP Certified Professional (CP) Training

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PENGAD 800-631-6989
EXHIBIT
29
DEO

Presentation Overview

I. Overview of Free Product Occurrence

II. Overview of Characterization Techniques

III. Implications of Free Product under the VAP

IV. Case Studies

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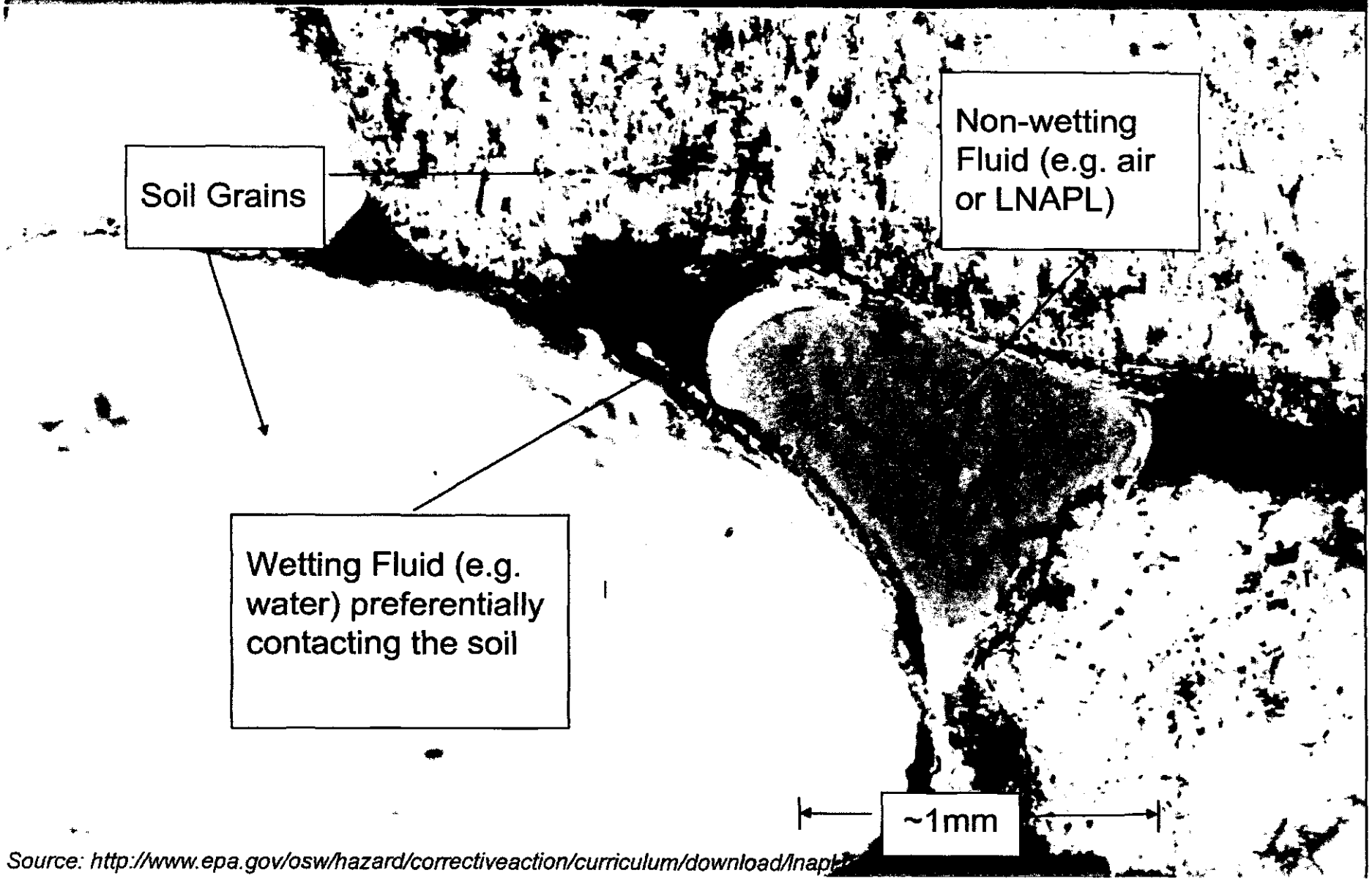
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Overview of Product Occurrence Definitions

- Non-Aqueous Phase Liquids (NAPL) = Contaminants (commonly petroleum or solvents) that remain undiluted, essentially as the original bulk liquid form in the subsurface.
- Free Product (VAP) = A separate liquid hydrocarbon phase that has a measurable thickness of greater than one one-hundredth of a foot.
- NAPL = Free Product potential if the concentration exceeds residual saturation values. *(Typically .1% to 10% in the vadose zone; and 3% to 7 % in the saturated zone)*

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Overview of Product Occurrence Phase Diagrams



Source: http://www.epa.gov/osw/hazard/correctiveaction/curriculum/download/lnapl

Overview of Product Occurrence
Phase Diagram – Wetting Phase Importance

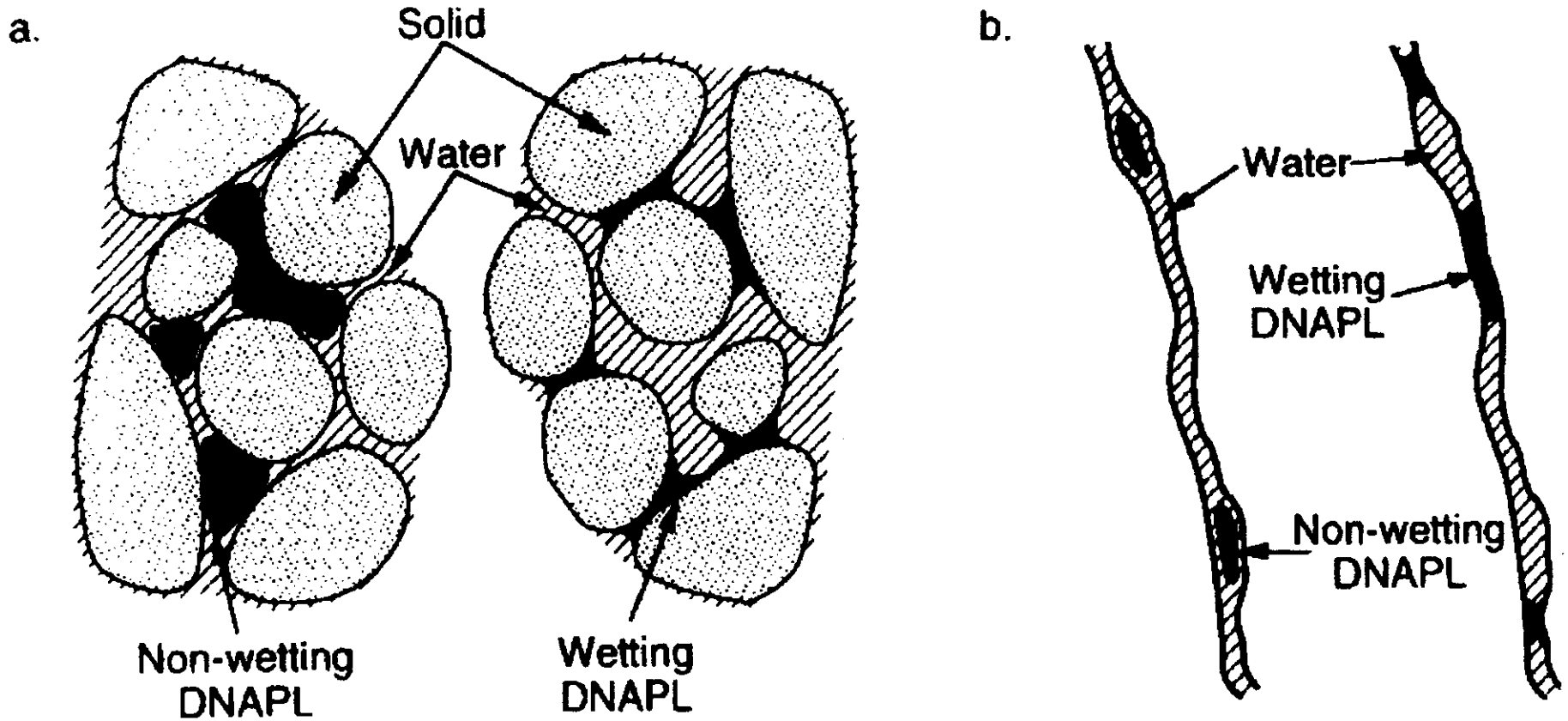
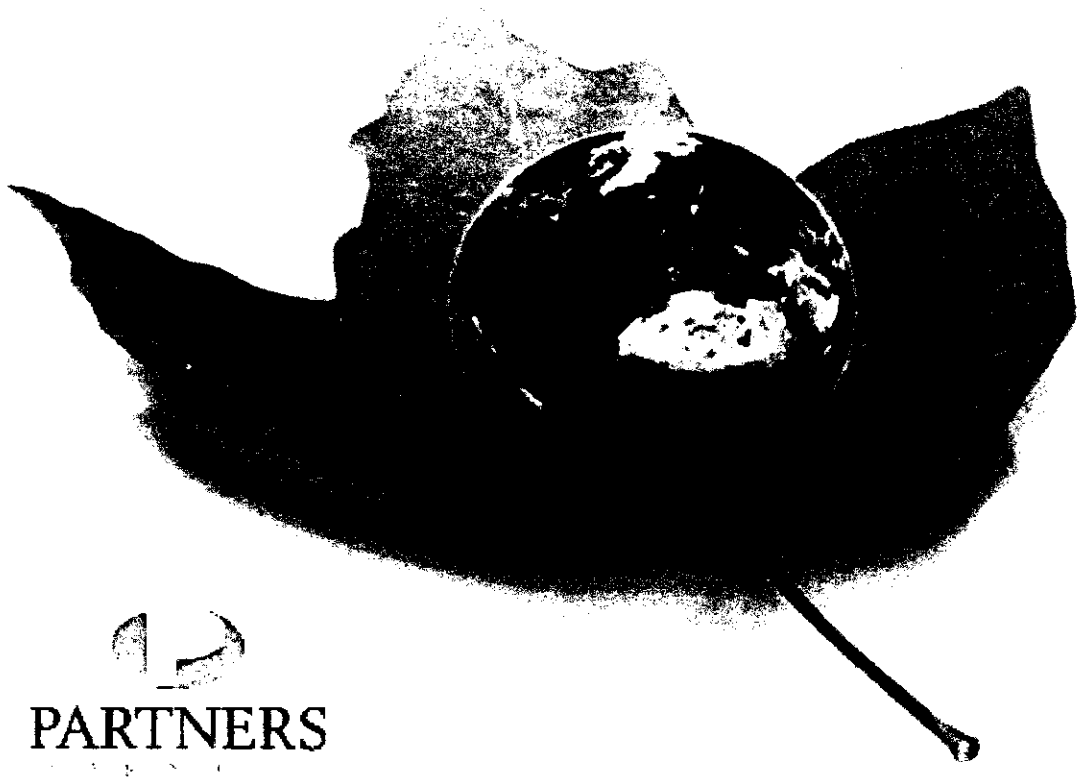


Figure 2.3 Pore-scale representation of non-wetting and wetting DNAPL residual in: a) water-saturated sand; and b) a fracture.

Source: http://www.epa.gov/osw/hazard/correctiveaction/curriculum/download/lnapl.pdf

II. Overview of Characterization Techniques

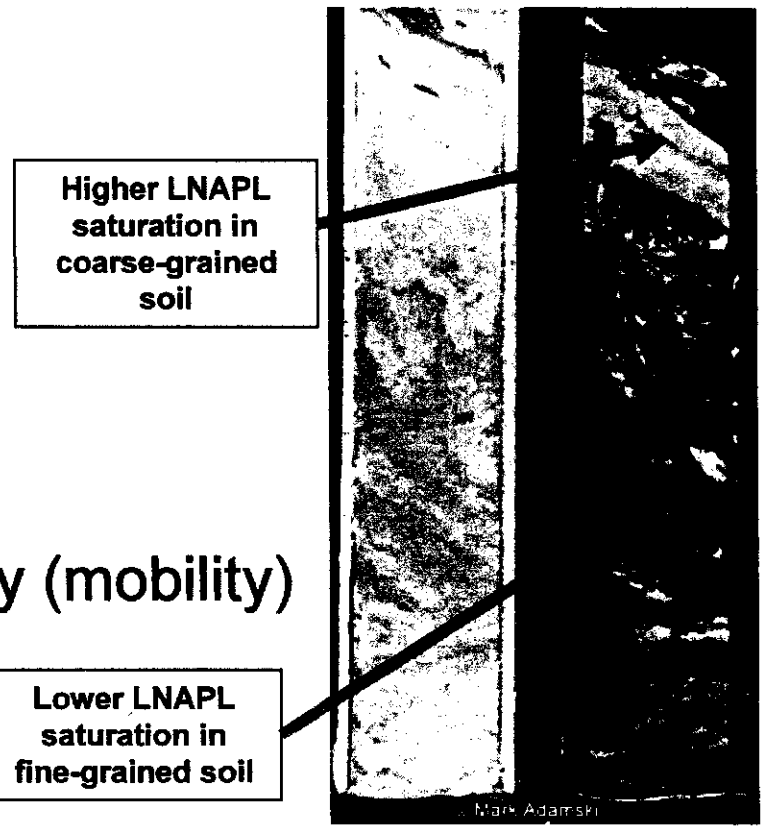


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Characterization Techniques

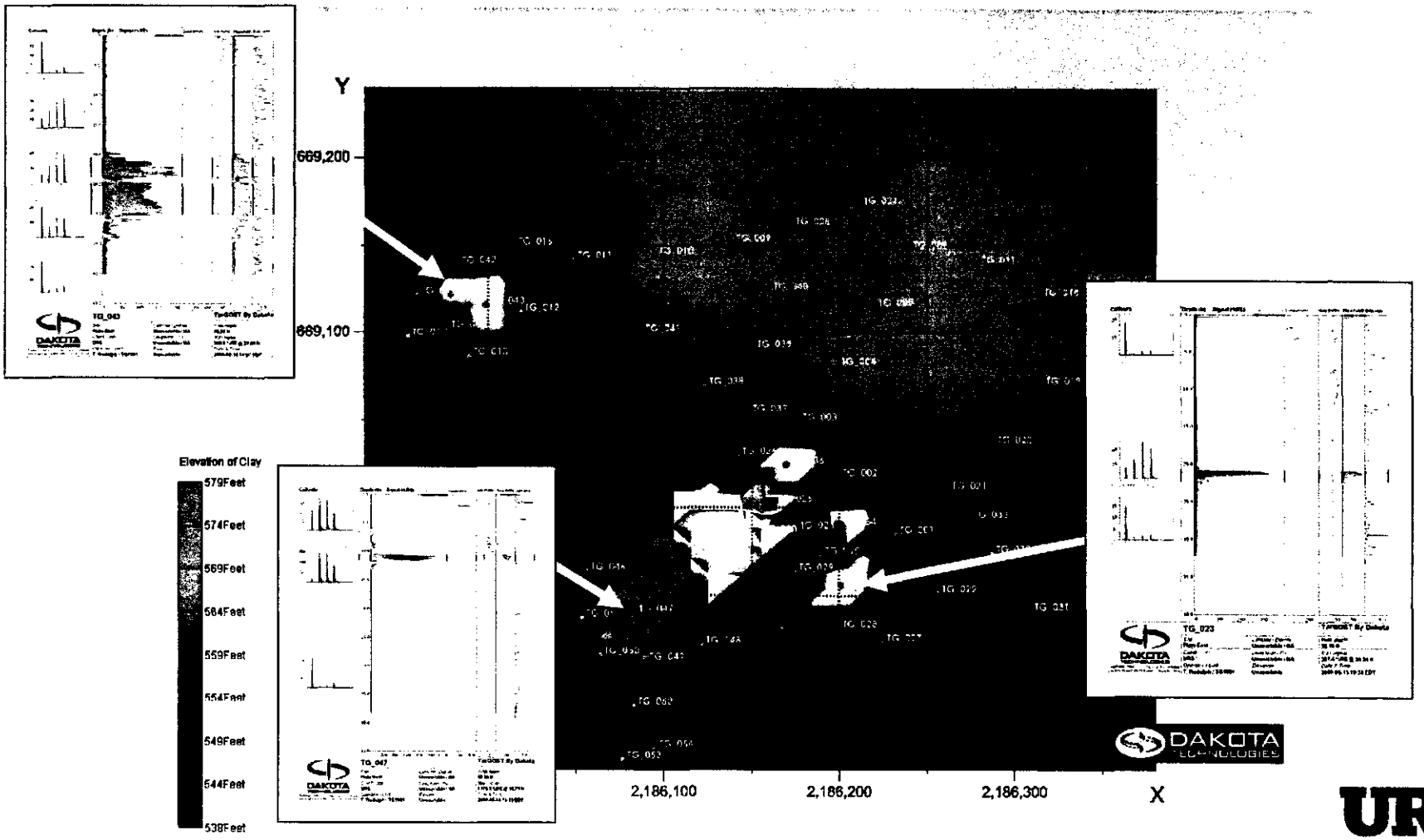
- Monitoring well gauging
  - Presence or absence
- Sample analyses
  - Soil type, density
  - Hydraulic conductivity
  - LNAPL saturation
  - Porosity & effective porosity (mobility)
  - Viscosity



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Characterization Techniques

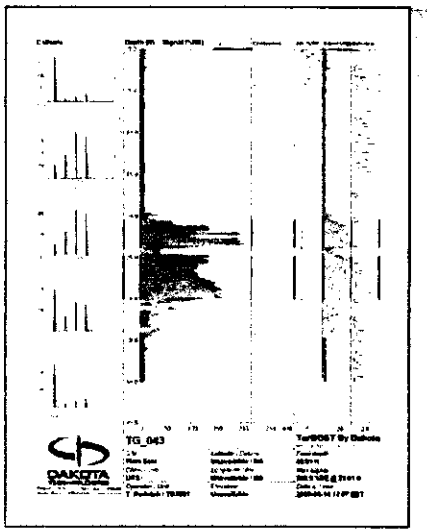
- Light-induced fluorescence (LIF) to estimate area

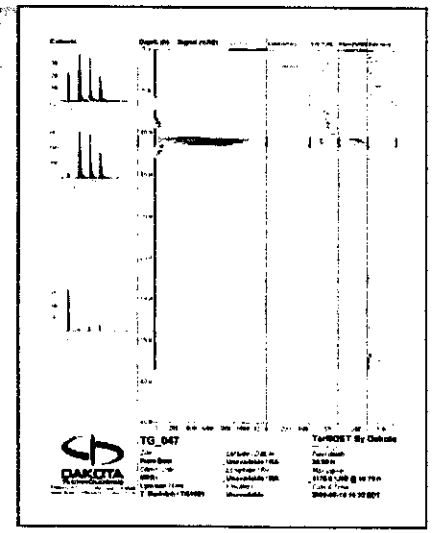


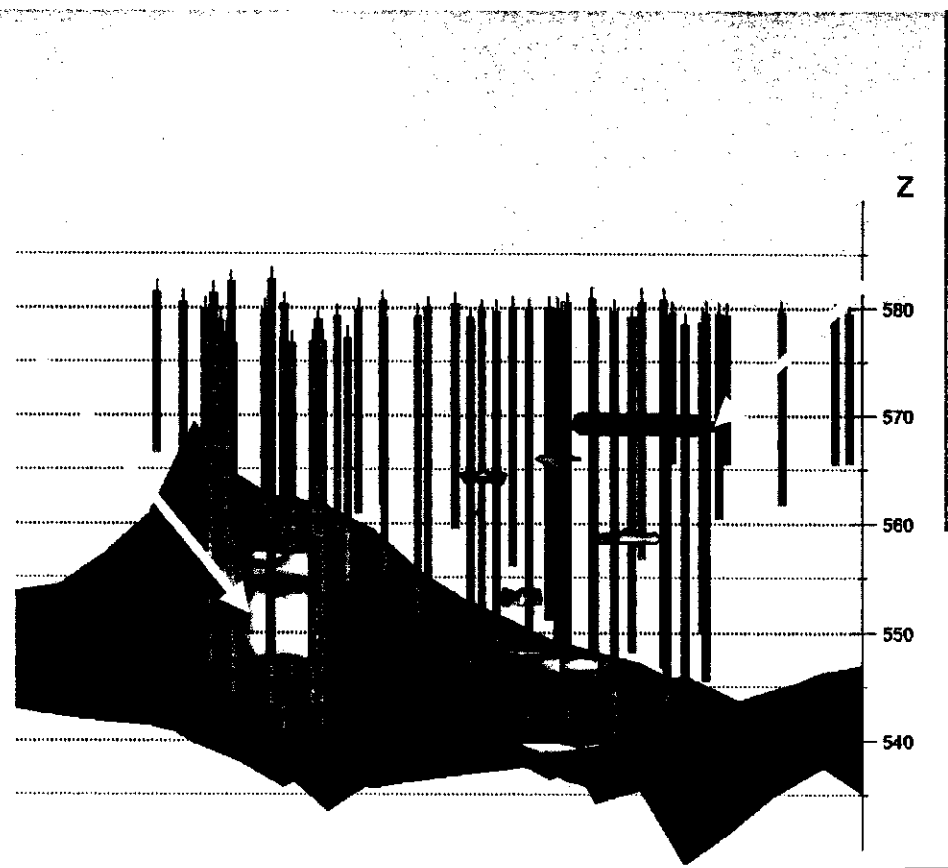
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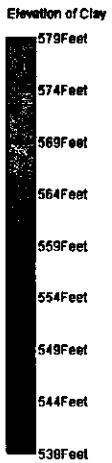
Characterization Techniques

- Light-induced fluorescence (LIF) to estimate volume







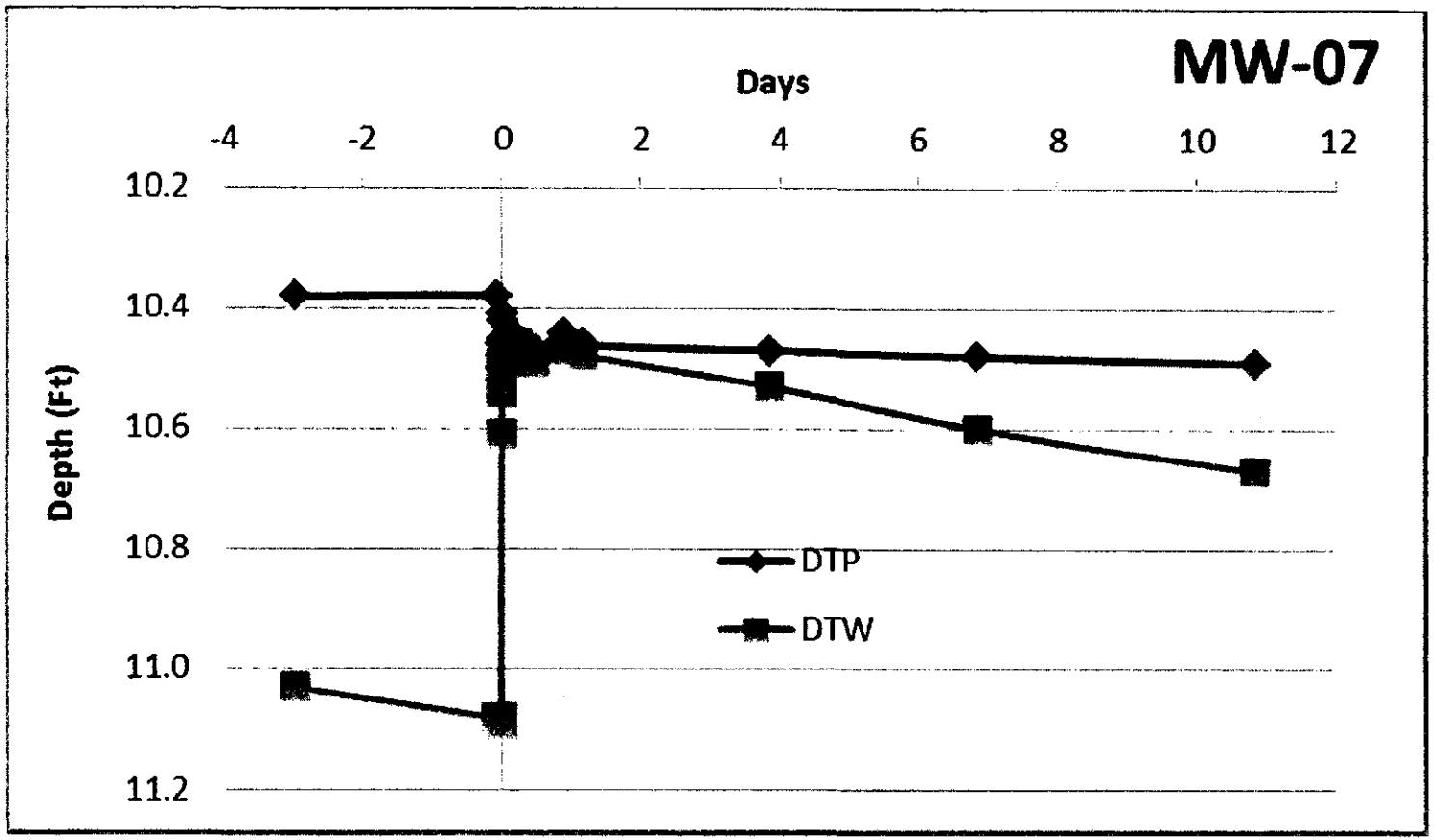


DAKOTA TECHNOLOGIES

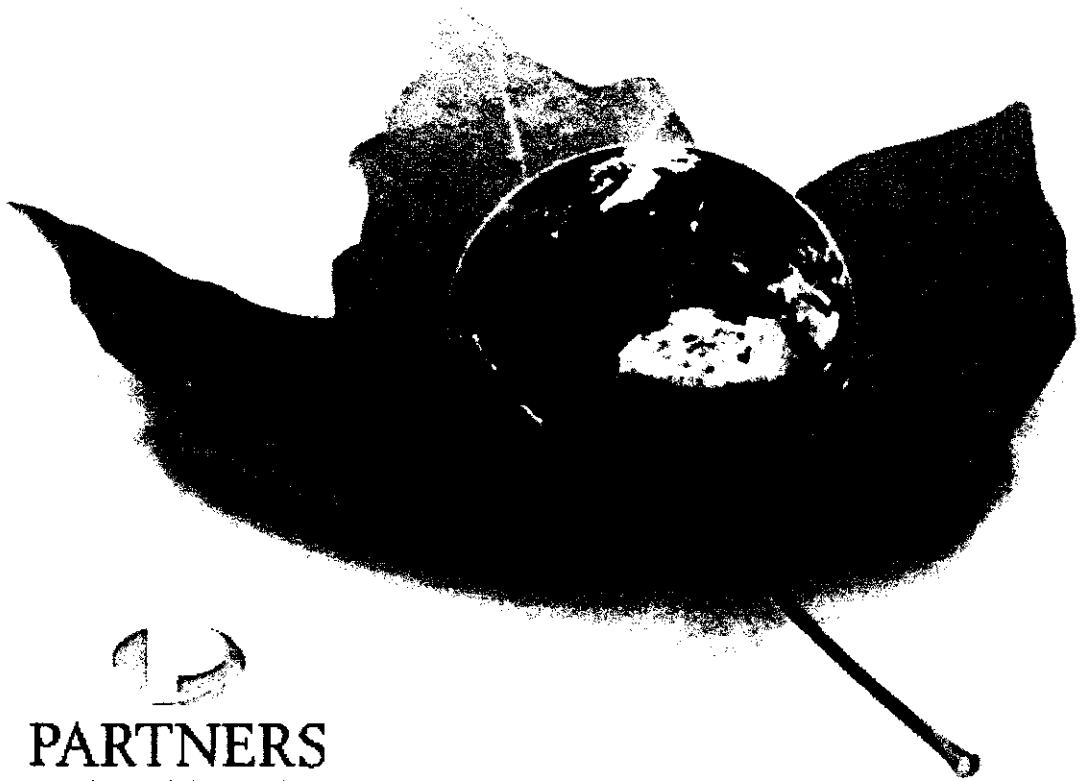
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Characterization Techniques

- Baildown testing – recoverability/mobility



III. Implications of Free Product Under the VAP



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Implications of Free Product

- Risk Considerations
  - Depth to product *(direct contact or not)*
  - Vapor migration potential
  - Chemical characteristics
    - Volatile Organic Compounds
    - Semivolatile Organic Compounds
    - Polychlorinated Biphenyls

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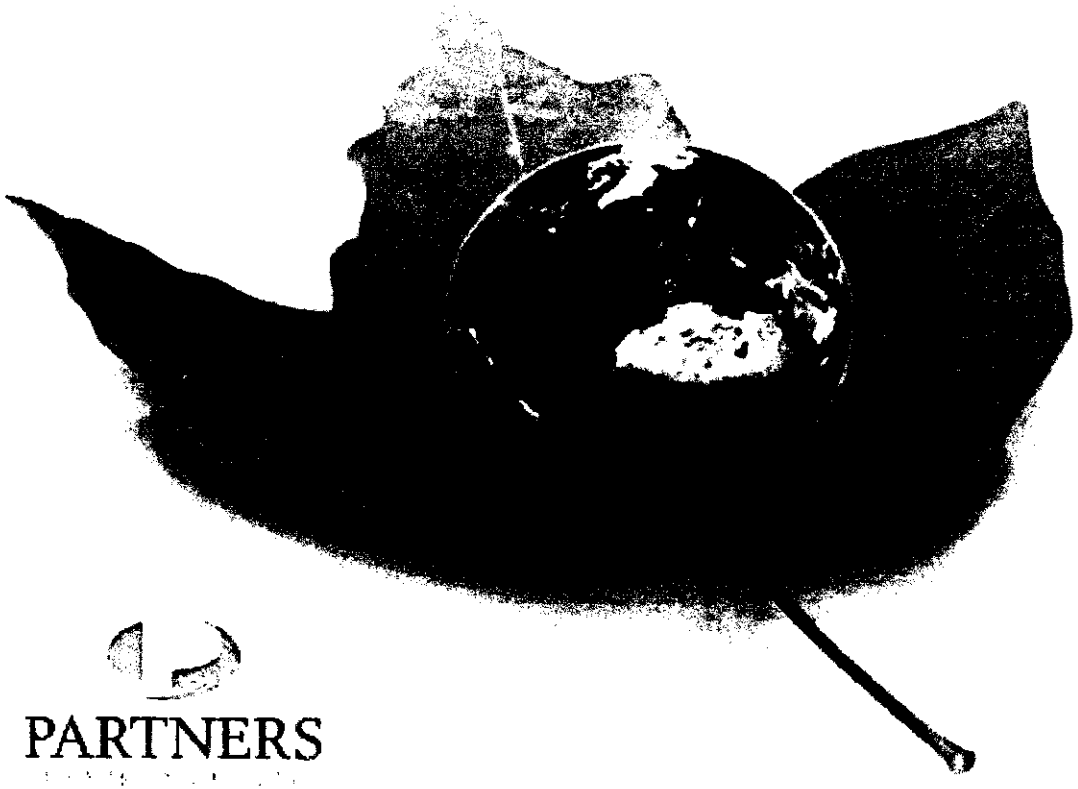
Implications of Free Product

- Institutional Controls:
  - No groundwater use
  - Risk Mitigation Plan

- Remedial options to address:
  - Developer or owner considerations
  - Other regulatory requirements

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IV. Case Studies



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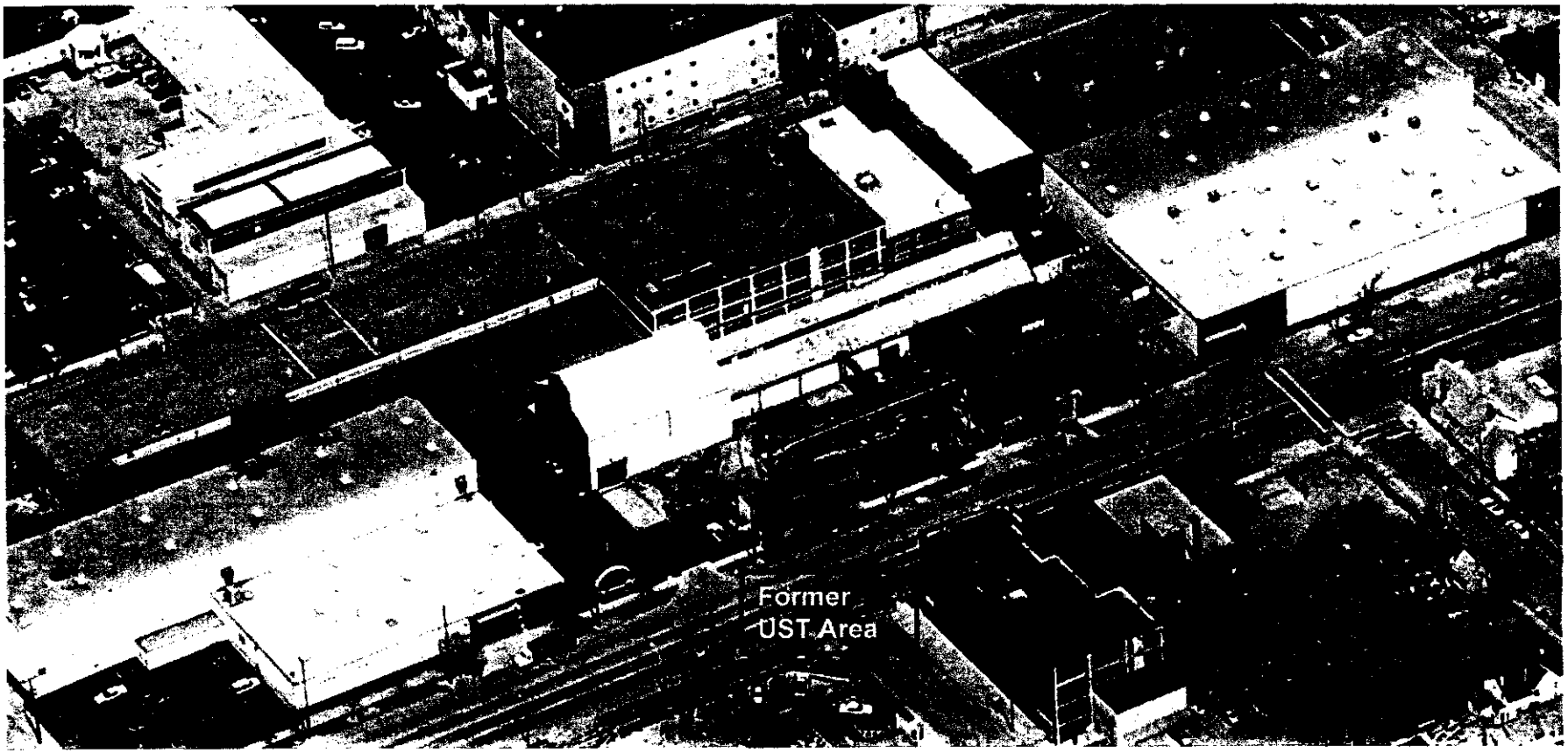
Gear Manufacturing Facility

Two Product Areas

- Former UST Area – BUSTR
  - Remedy needed for NFA determination
- Interior Building Area
  - Mobility evaluation
  - Remedy involved operational changes to eliminate potential ongoing source

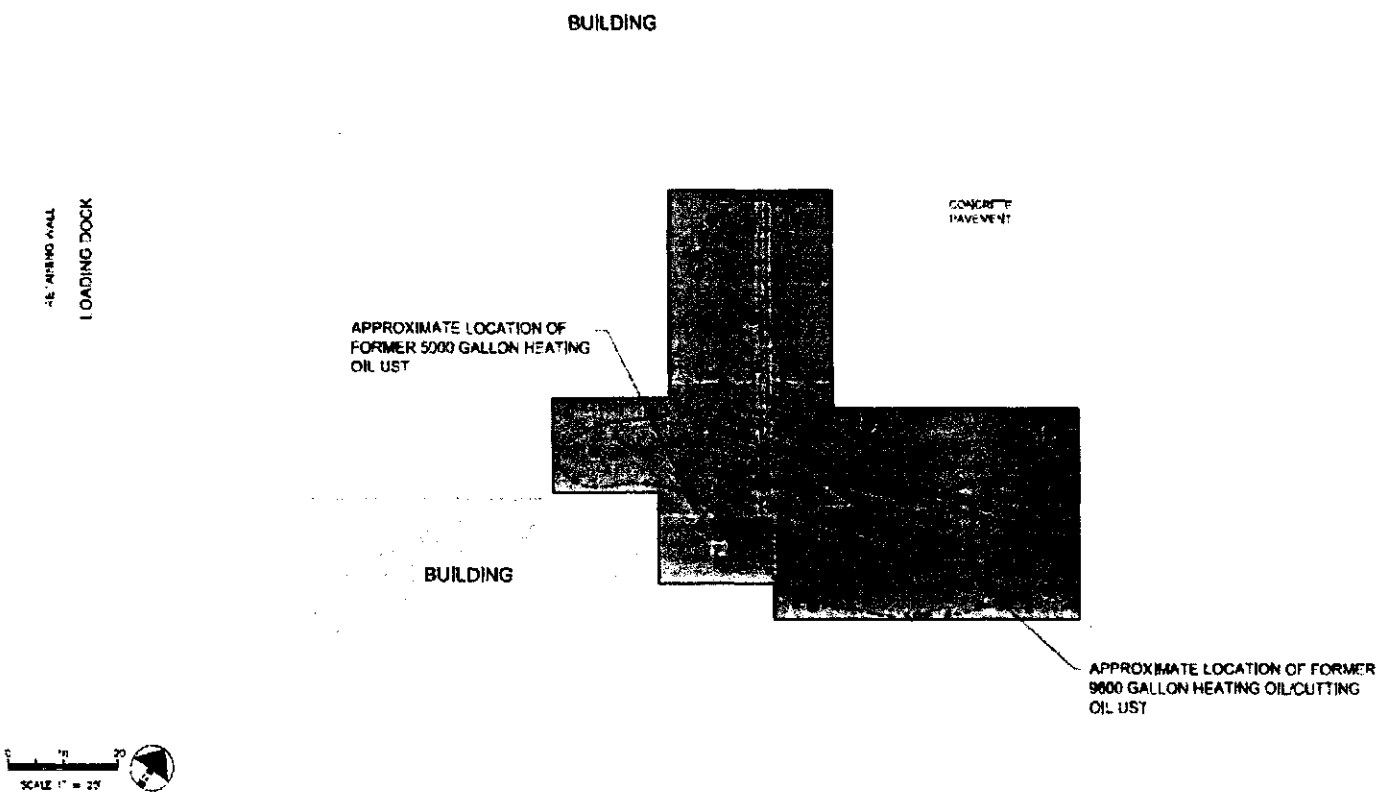
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Gear Manufacturing Facility



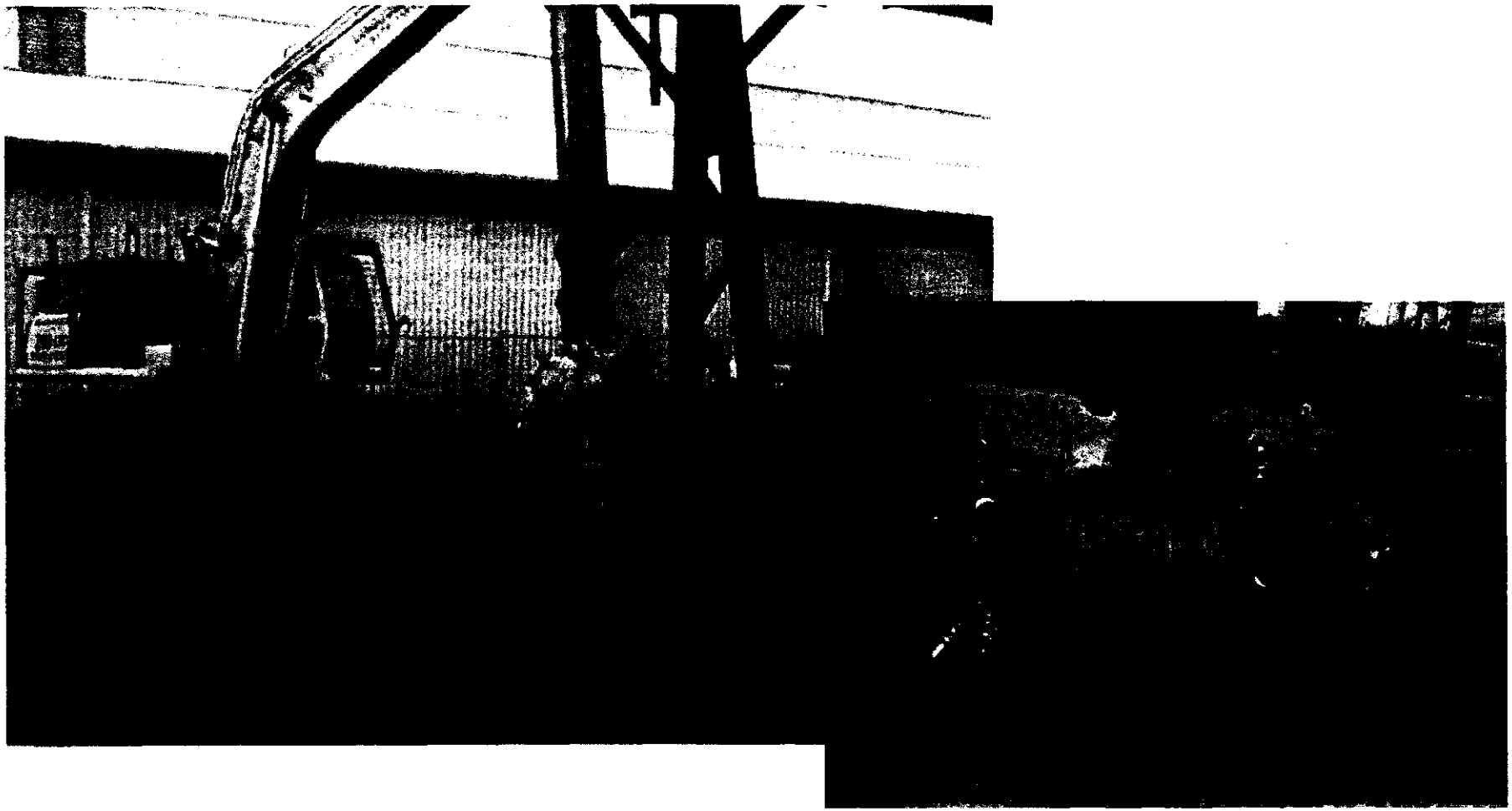
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Former UST Area



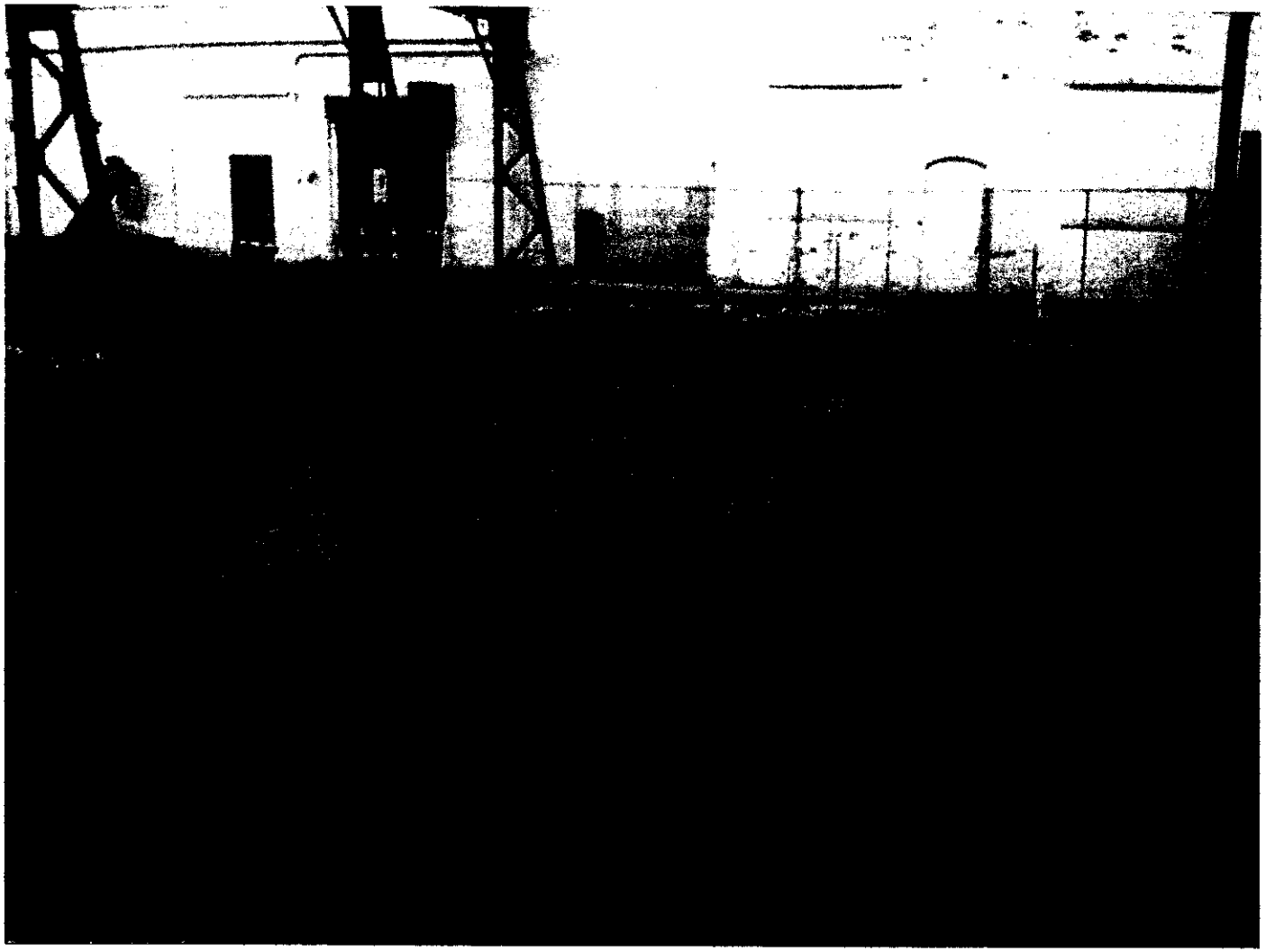
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Former UST Area



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Former UST Area



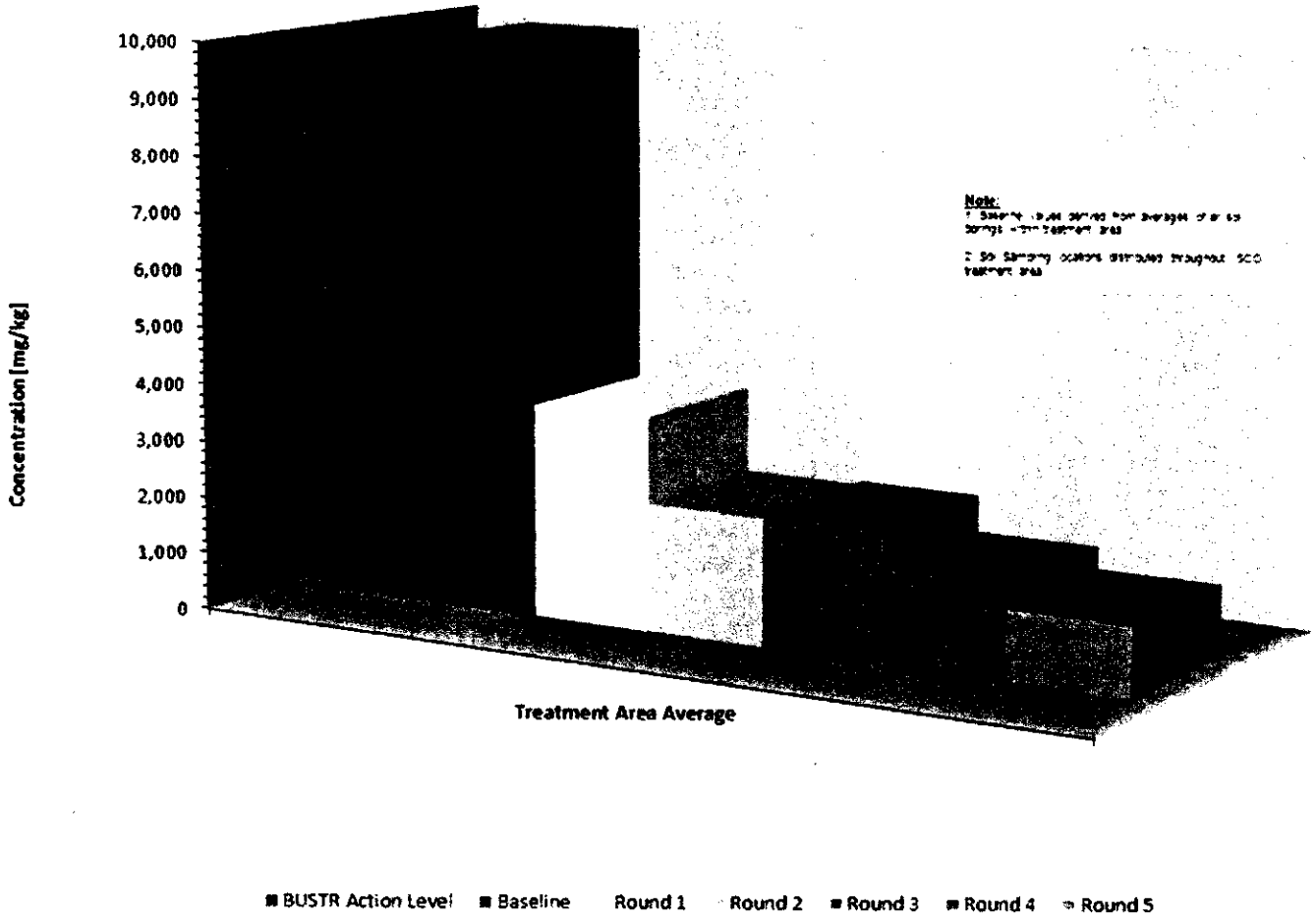
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Former UST Area



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Former UST Area



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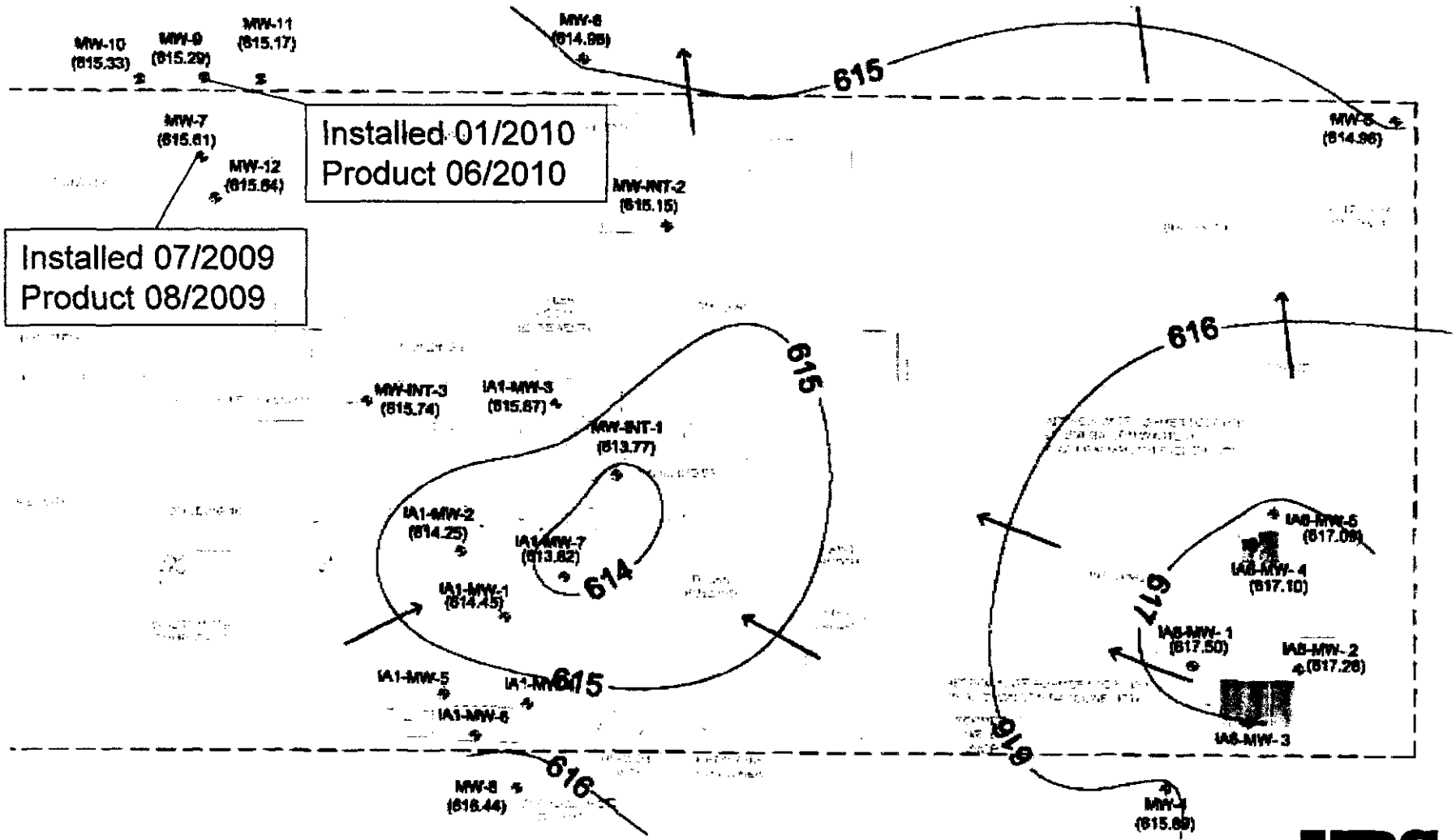
Former UST Area

Observations & Conclusions

- Innovative Soil Mixing/ISCO
- 5 days to treat 7,500 ft^2 from 3-18 feet (4,200 yd^3)
- No mobilization of chemicals from soil to groundwater
- 2 small areas retreated
- 9 months to attain standards
- Average 90% concentration reduction
- Cost savings of $450K over excavation

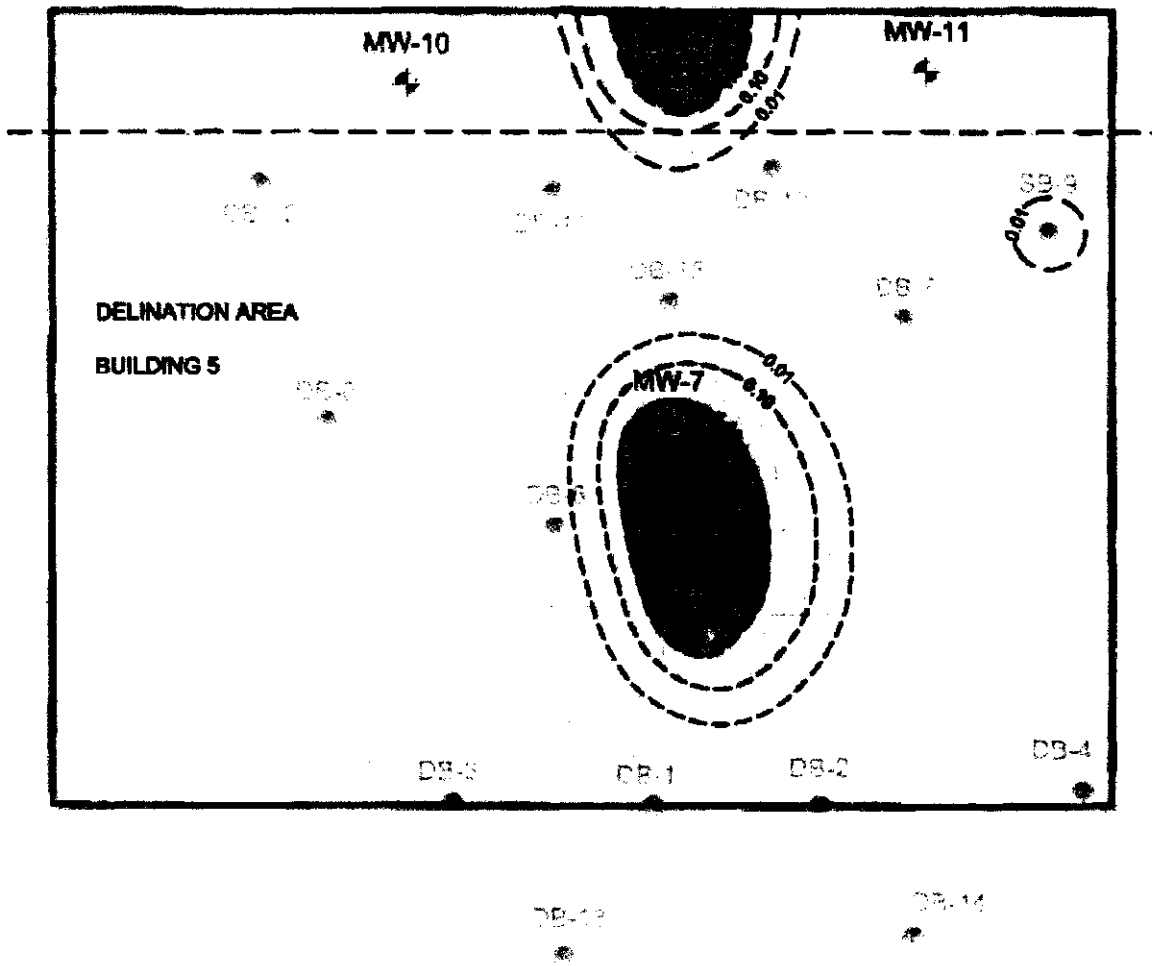
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Property-Wide Groundwater



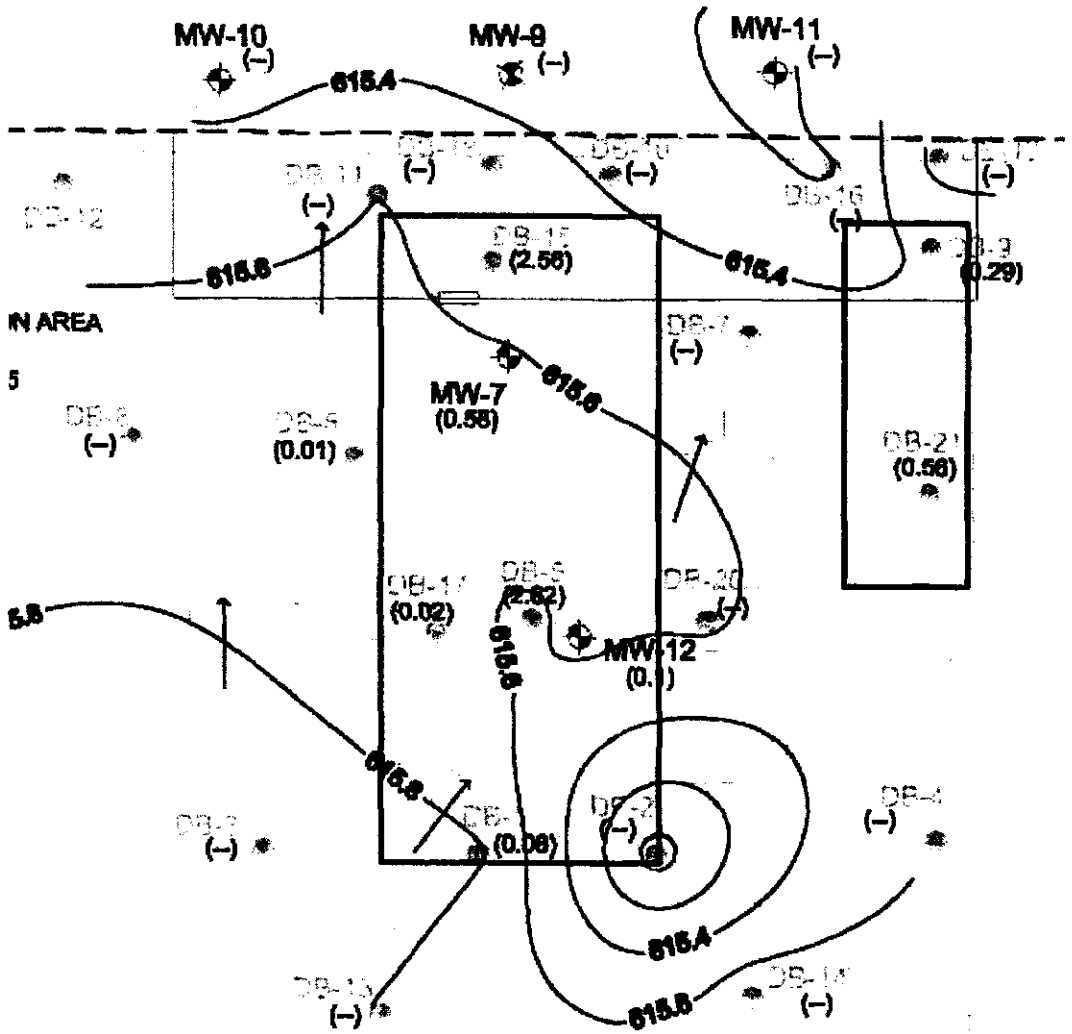
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Building Interior Pre-Remedy



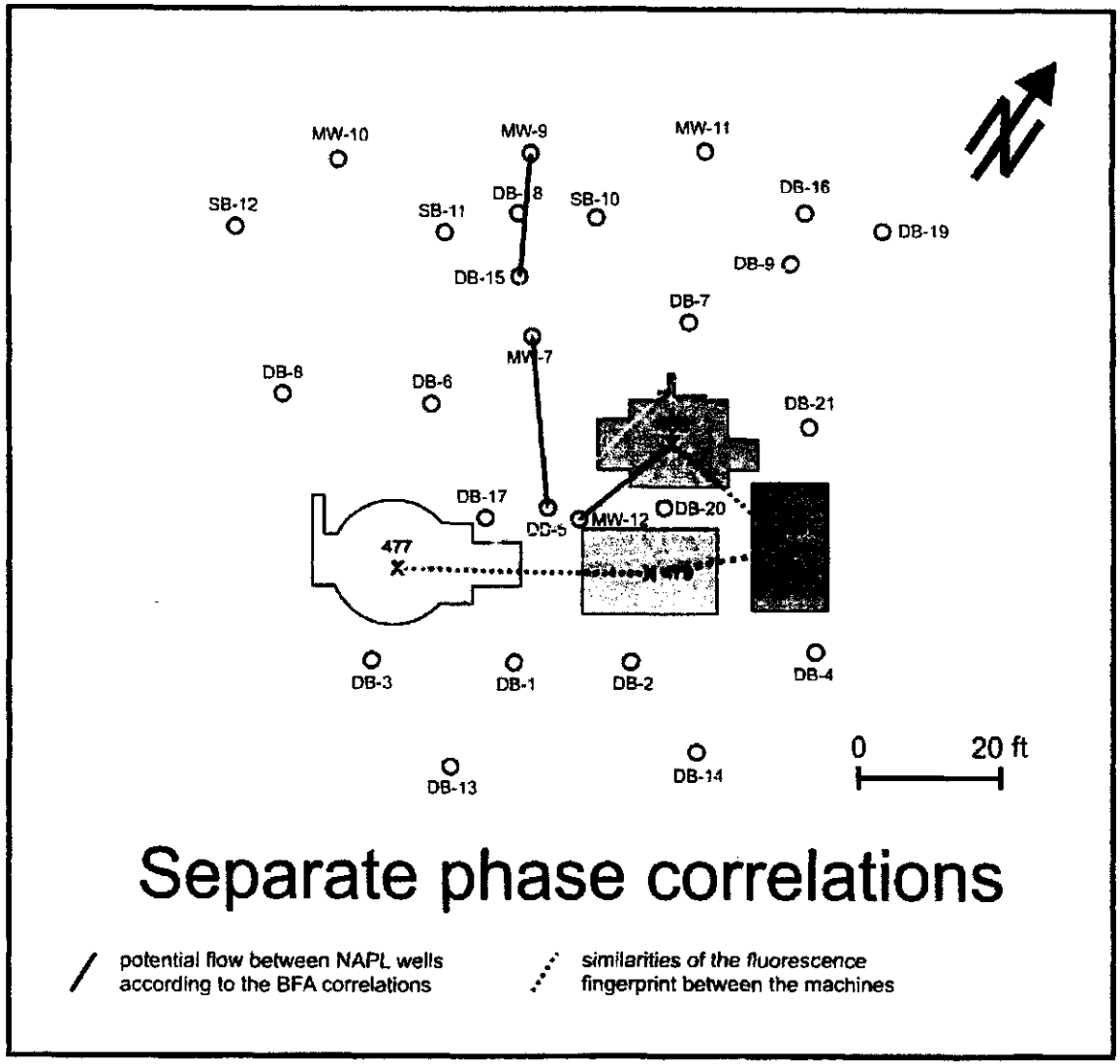
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Building Interior – Post Remedy



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Building Interior



Source: Environmental Resources Management (March 2012)

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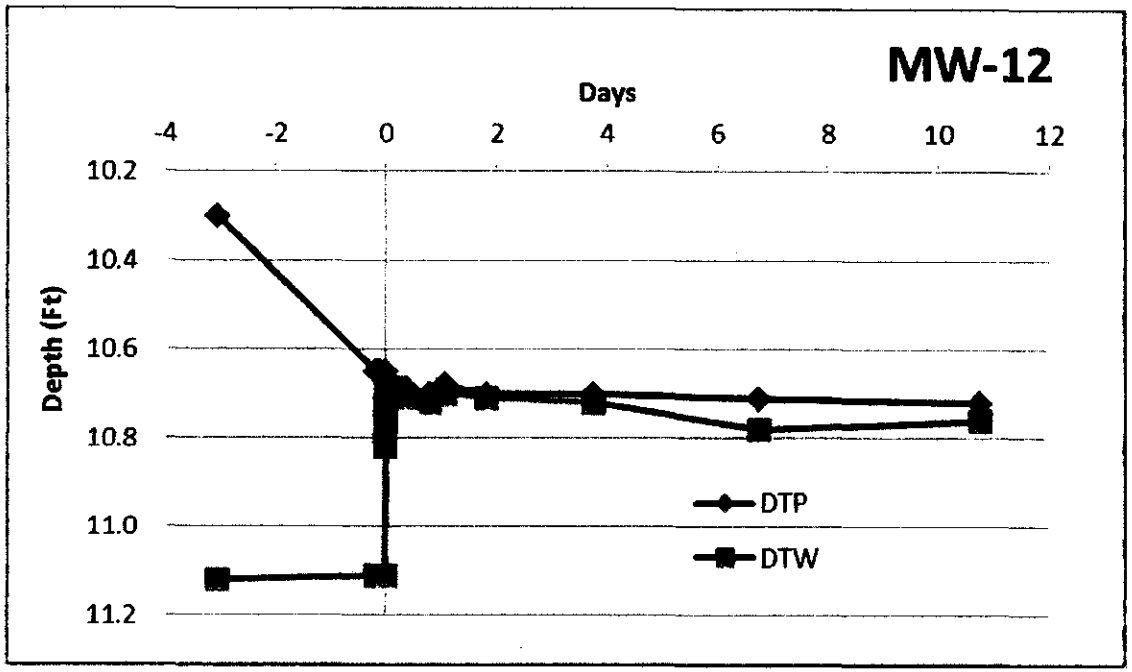
Building Interior



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Building Interior - Status

- Up to 3 feet remains in some wells
- Viscosity 300 times greater than water
- Baildown tests – not mobile



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Potential VAP Response

- Weight of evidence demonstrates immobility
  - Thickness monitoring
  - Field & lab test results
- Risk Mitigation Plan
- No Groundwater Use – Urban Setting Designation

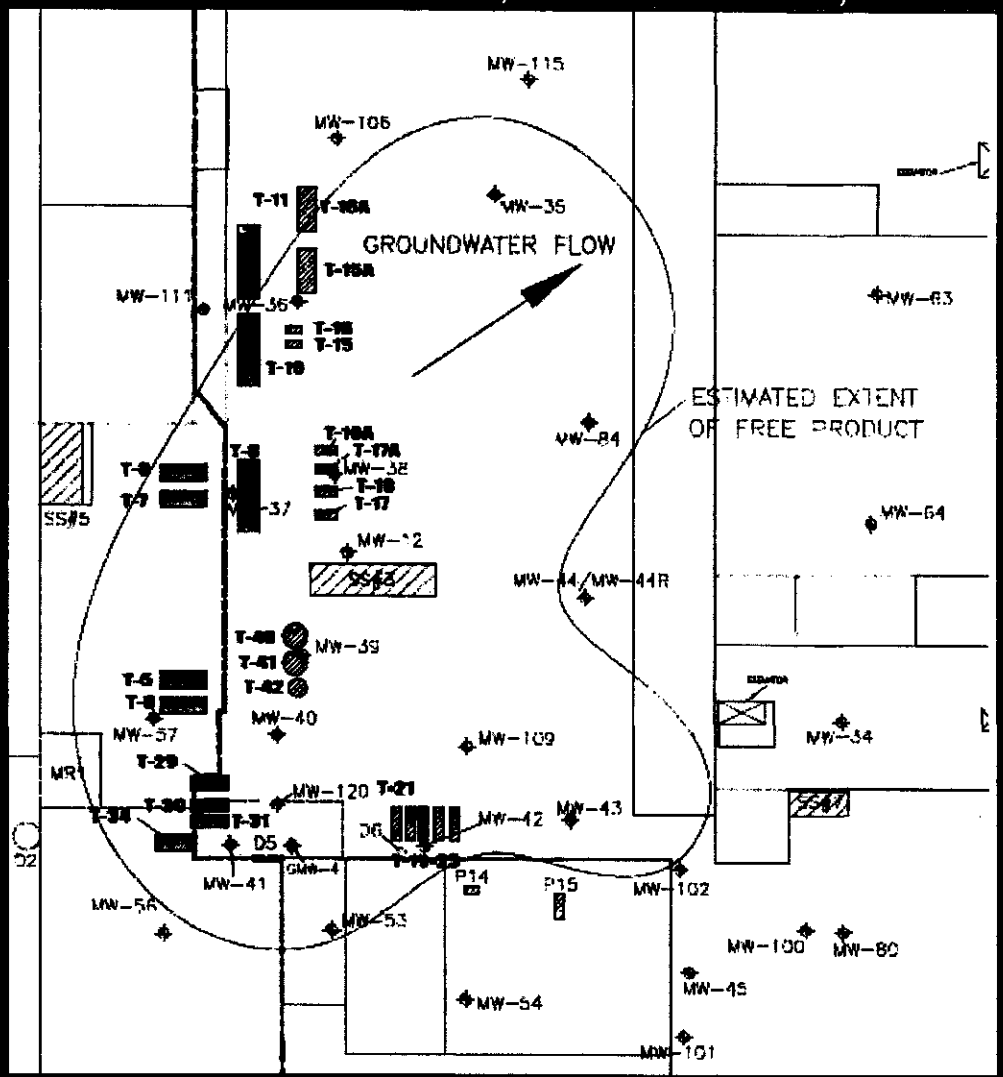
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Monitoring Well Free Product Gauging Information

Well ID	Date	Depth to Product (ft)	Depth to Groundwater (ft)	*Product Thickness (ft)*
GMW-4	4/4/2001	12.35	12.42	*0.07*
	4/5/2001	12.35	12.42	*0.07*
	10/1/2009	11.96	12.41	*0.45*
	10/21/2009	12.02	12.53	*0.51*
MW-35	10/5/2004	14.04	15.04	*1.00*
	11/11/2004	14.30	15.36	*1.06*
	6/21/2005	13.65	14.23	*0.58*
	10/20/2009	13.56	14.32	*0.76*
	10/21/2009	13.59	14.40	*0.81*
MW-36	10/5/2004	12.41	12.96	*0.55*
	11/11/2004	12.65	13.48	*0.83*
	6/21/2005	11.97	12.63	*0.66*
	10/1/2009	11.93	12.47	*0.54*
	10/21/2009	12.00	12.50	*0.50*
	11/11/2009	12.16	12.59	*0.43*
	2/1/2010	12.51	13.03	*0.52*
MW-38	10/6/2004	NA	12.14	-
	10/27/2004	NA	12.29	-
	1/11/2004	NA	12.40	-
	6/21/2005	NA	11.72	-
	10/1/2009	NA	12.07	-
	10/21/2009	11.65	11.67	*0.02*
MW-39	10/6/2004	12.92	13.40	*0.48*
	11/11/2004	12.92	13.56	*0.64*
	11/11/2009	12.77	12.92	*0.15*
MW-40	10/6/2004	NA	12.15	-
	10/27/2004	NA	12.31	-
	11/11/2004	NA	12.39	-
	6/17/2005	11.94	12.02	*0.08*
	10/1/2009	11.76	12.37	*0.61*
	10/21/2009	11.87	12.58	*0.71*
MW-41	10/7/2004	NA	11.82	-
	10/27/2004	NA	11.81	-
	11/11/2004	NA	11.94	-
	6/17/2005	11.52	11.60	*0.08*
	10/1/2009	11.43	11.62	*0.19*
	10/21/2009	11.46	11.78	*0.32*
MW-43	10/5/2004	NA	13.23	-
	10/27/2005	NA	13.39	-
	11/11/2004	NA	13.42	-
	6/17/2005	12.96	13.35	*0.39*
	10/1/2009	12.87	13.33	*0.46*
	10/21/2009	12.85	13.45	*0.60*
MW-57	11/3/2004	15.02	16.65	*1.63*
	11/11/2004	15.03	16.71	*1.68*
	6/17/2005	13.62	15.89	*2.27*
	2/19/2010	15.02	16.51	*1.49*
MW-84	6/16/2005	NA	14.02	-
	6/22/2005	NA	14.00	*product observed, not measurable*
	10/1/2009	13.77	14.02	*0.25*
	10/21/2009	13.79	14.10	*0.31*

NOTES
NM = not measured

Monitoring Well Location Map
Commerce Park, Cleveland, Ohio

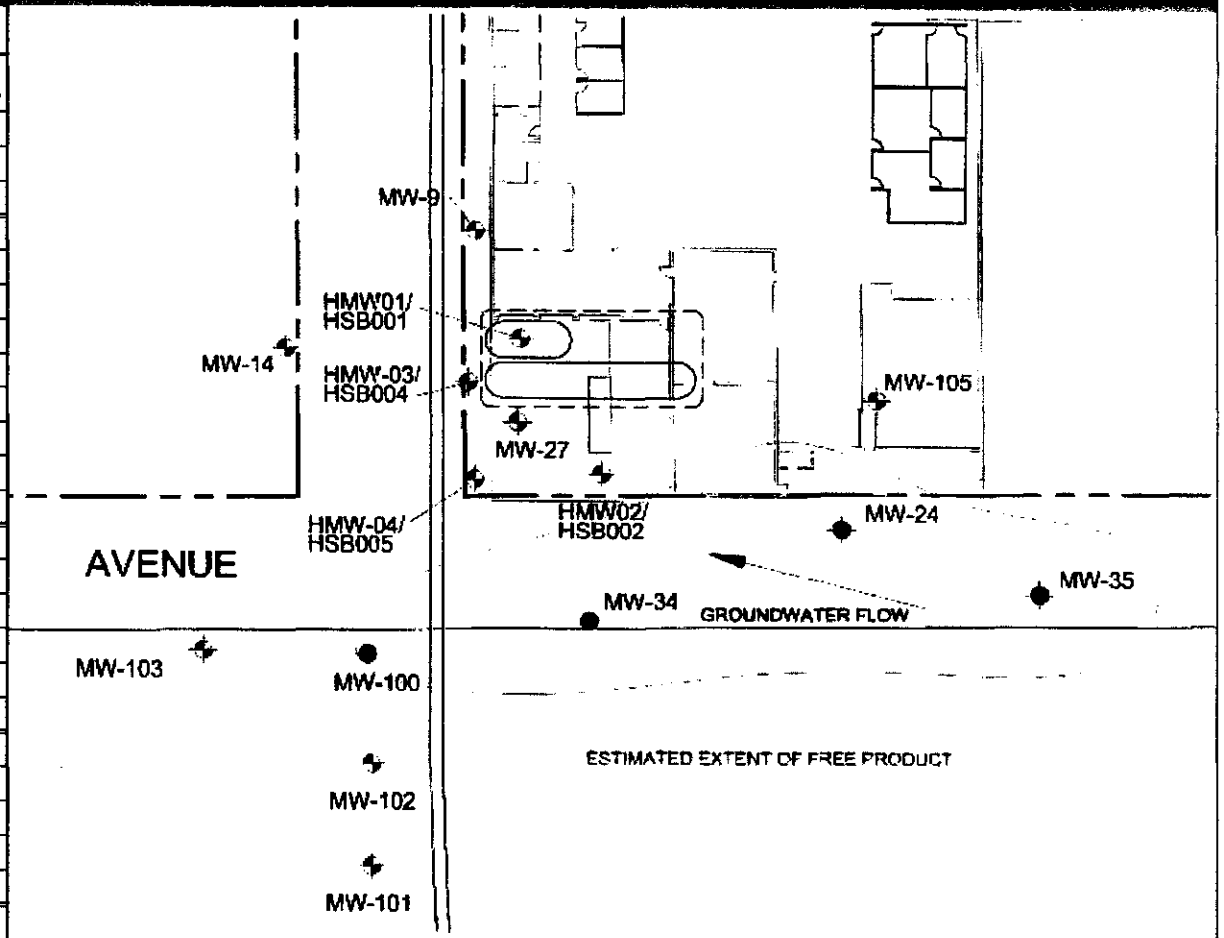


Groundwater Monitoring Well Location Map
Industrial Facility, Cleveland, Ohio

Monitoring Well Free Product Gauging Information

Well ID	Date	Depth to Product (ft)	Depth to Water (ft)	*Product Thickness (ft)*
MW-24	10/6/1994	7.83	7.86	*0.03*
	7/21/1997	NMI	9.20	*NMI*
	4/15/1998	6.94	7.30	*0.36*
MW-27	10/6/1994	NMI	5.04	*NMI*
	7/21/1997	NMI	4.48	*NMI*
	4/15/1998	3.84	3.86	*0.02*
	3/6/2007	NMI	7.95	*NMI*
	7/10/2008	NMI	4.91	*NMI*
	9/20/2011	NMI	4.69	*NMI*
	9/27/2011	NMI	4.76	*NMI*
	2/27/2012	NMI	4.41	*NMI*
	3/7/2012	NMI	4.65	*NMI*
MW-34	4/15/1998	2.36	2.38	*0.02*
	4/3/2007	2.85	5.26	*2.41*
	7/10/2008	2.71	11.39	*8.68*
	12/10/2008	2.79	11.74	*8.95*
	9/27/2011	2.57	12.72	*10.15*
	2/27/2012	3.04	12.70	*9.66*
MW-35	4/15/1998	10.65	11.05	*0.40*
	7/10/2008	8.32	13.15	*4.83*
	12/10/2008	11.11	11.88	*0.77*
	9/27/2011	10.62	11.62	*1.00*
	2/27/2012	10.72	11.74	*1.02*
MW-100	4/29/2011	4.65	4.66	*0.01*
	5/5/2011	NMI	3.43	*NMI*
	5/18/2011	NMI	3.47	*NMI*
	9/22/2011	NMI	3.55	*NMI*
	9/27/2011	NMI	2.19	*NMI*
	2/27/2012	NMI	4.47	*NMI*

Notes:
NMI - No measureable Interface

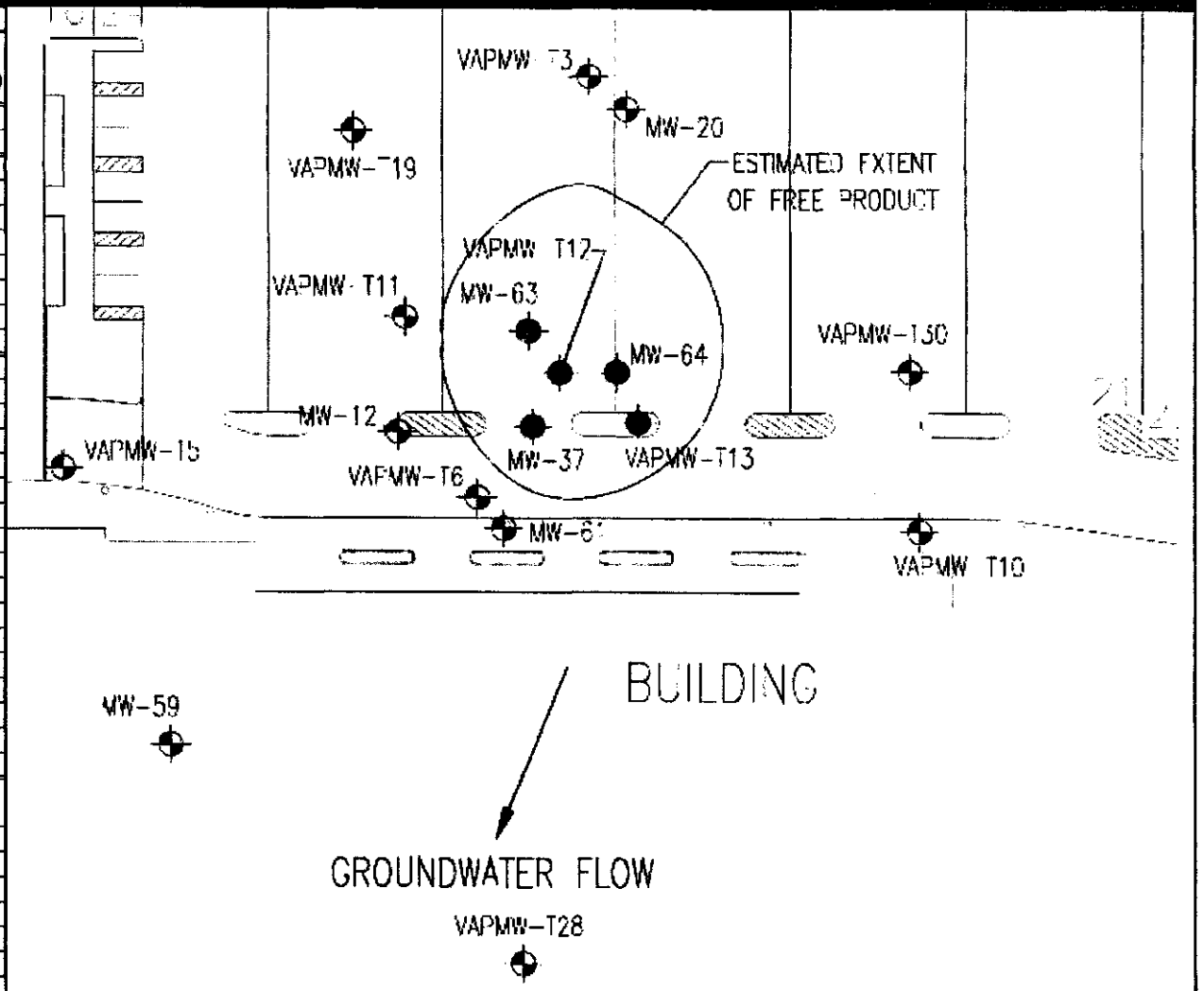


Monitoring Well Location Map
Commercial Facility, Cleveland, Ohio

Monitoring Well Free Product Gauging Information

Well ID	Date	Depth to Product (ft)	Depth to Groundwater (ft)	Product Thickness (ft)
MW-37	10/12/2004	12.27	15.69	3.42
	7/5/2005	11.15	15.20	4.05
MW-63	11/15/2004	11.8	12.65	0.85
	11/18/2004	N/A	13.81	N/A
	7/5/2005	11.14	11.80	0.66
	10/11/2006	5.52	5.53	0.01
	12/29/2006	6.83	6.90	0.07
	1/15/2007	6.07	6.08	0.01
	4/2/2007	N/A	6.66	N/A
	4/13/2007	N/A	6.55	N/A
VAPMW-T12	1/4/2006	9.86	10.05	0.19
	4/7/2006	11.46	14.41	2.95
	4/17/2006	10.79	11.90	1.11
	5/17/2006	11.85	17.27	5.42
	5/19/2006	11.87	11.94	0.07
	5/23/2006	12	12.09	0.09
	10/11/2006	5.81	6.15	0.34
	12/29/2006	7.21	8.62	1.41
	1/15/2007	6.32	7.91	1.59
	4/2/2007	7.11	9.91	2.80
	3/26/2010	7.38	11.14	3.76
	6/16/2010	7.37	10.08	2.71
	9/29/2010	7.8	12.05	4.25
	11/22/2010	7.55	11.05	3.50
	4/29/2011	6.52	11.35	4.83
	10/31/2011	6.28	7.71	1.43
	4/24/2012	6.88	8.44	1.56
VAPMW-T13	1/4/2006	9.12	9.78	0.66
VAPMW-T13R	4/3/2006	11.35	11.71	0.36
	4/7/2006	11.41	11.47	0.06
	4/17/2006	10.8	10.89	0.09
	5/17/2006	12.13	12.27	0.14
	5/19/2006	12.26	12.47	0.21
	5/23/2006	12.3	12.37	0.07
	10/11/2006	6.2	6.50	0.30
	12/29/2006	N/A	N/A	N/A

NOTES
N/A = No Information Available



PARTNERS
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EXHIBIT
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