

Technical Memorandum

To: File
From: Jim Eidem
Subject: Environmental Soil Data, Proposed Turbine Area, UMore Park
Date: October 1, 2010
Project: 23191060.00
c: Brian Kombrink (Ryan Co.), Janet Dagleish (UMN), Dan Mielke (UMN), Jeff Marr (UMN), John Wachtler (Barr)

Attached is a table summarizing the analytical data from the proposed wind turbine area and a map showing the locations of the test trenches. On May 19, 2010, a total of seventeen soil samples were collected from the original proposed turbine location, turbine laydown area, met tower location, and the area in the immediate vicinity of the met tower. Fourteen of the samples were collected at the ground surface (to evaluate soil disturbed during initial site clearing) and three samples were collected at depth in the proposed foundation areas (to evaluate soils encountered during construction). Each of the samples were analyzed for arsenic, lead, mercury, and carcinogenic polycyclic aromatic hydrocarbons (cPAHs).

Analytical results are summarized below:

- Arsenic and Lead: all detected concentrations below the Tier I Soil Reference Values (SRVs) established for residential settings,
- Mercury & cPAHs: not detected (with laboratory reporting limits below Tier I SRVs)

Based on the analytical data, the tested soils are considered unregulated soil by the MPCA and can be managed as such.

**Table 1
Soil Analytical Results
Proposed Turbine Area
Dakota County, Minnesota**

				Sys Loc Code	WT-TT1	WT-TT1	WT-TT10	WT-TT11	WT-TT12	WT-TT13	WT-TT14	WT-TT2	WT-TT2
				Sample Date	5/19/2010	5/19/2010	5/19/2010	5/19/2010	5/19/2010	5/19/2010	5/19/2010	5/19/2010	5/19/2010
				Depth Interval	0 - 0.5	3 - 6	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	3 - 6
				Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft	ft
				Sample Type Code	N	N	N	N	N	N	N	N	N
Chemical Name	MN Tier I SRV	MN Tier 2 Industrial SRV	MN Tier 2 Short Term Worker SRV										
Effective Date	06/22/2009	06/22/2009	06/22/2009										
Exceedance Key	No Exceed	No Exceed	No Exceed										
General Parameters													
Solids, percent				81%	96%	82%	83%	83%	80%	83%	82%	90%	
Metals													
Arsenic	9 mg/kg	20 mg/kg	70 mg/kg	6.4 mg/kg	1.5 mg/kg	6.5 mg/kg	6.8 mg/kg	6.7 mg/kg	7.0 mg/kg	6.4 mg/kg	6.7 mg/kg	2.0 mg/kg	
Lead	300 mg/kg	700 mg/kg	700 mg/kg	13 mg/kg	1.9 mg/kg	12 mg/kg	13 mg/kg	10 mg/kg	13 mg/kg	12 mg/kg	9.8 mg/kg	2.5 mg/kg	
Mercury	0.5 mg/kg	1.5 mg/kg	0.4 mg/kg	< 0.12 mg/kg	< 0.10 mg/kg	< 0.12 mg/kg	< 0.13 mg/kg	< 0.13 mg/kg	< 0.12 mg/kg	< 0.12 mg/kg	< 0.12 mg/kg	< 0.12 mg/kg	
SVOCs													
2-Chloronaphthalene				< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
2-Methylnaphthalene	100 mg/kg	369 mg/kg	NA	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Acenaphthene	1200 mg/kg	5260 mg/kg	19000 mg/kg	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Acenaphthylene				< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Anthracene	7880 mg/kg	45400 mg/kg	100000 mg/kg	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Benzo(a)anthracene	T	T	T	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Benzo(a)pyrene	T	T	T	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Benzo(b)fluoranthene	T	T	T	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Benzo(g,h,i)perylene				< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Benzo(k)fluoranthene	T	T	T	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Chrysene	T	T	T	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Dibenz(a,h)anthracene	T	T	T	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Fluoranthene	1080 mg/kg	6800 mg/kg	48600 mg/kg	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Fluorene	850 mg/kg	4120 mg/kg	17240 mg/kg	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Indeno(1,2,3-cd)pyrene	T	T	T	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Naphthalene	10 mg/kg	28 mg/kg	78 mg/kg	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Phenanthrene				< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
Pyrene	890 mg/kg	5800 mg/kg	43000 mg/kg	< 0.41 mg/kg	< 0.34 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.41 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.37 mg/kg	
BaP equivalent, non-detects at zero for the detection limit.¹	2 T mg/kg	3 T mg/kg	14 T mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg

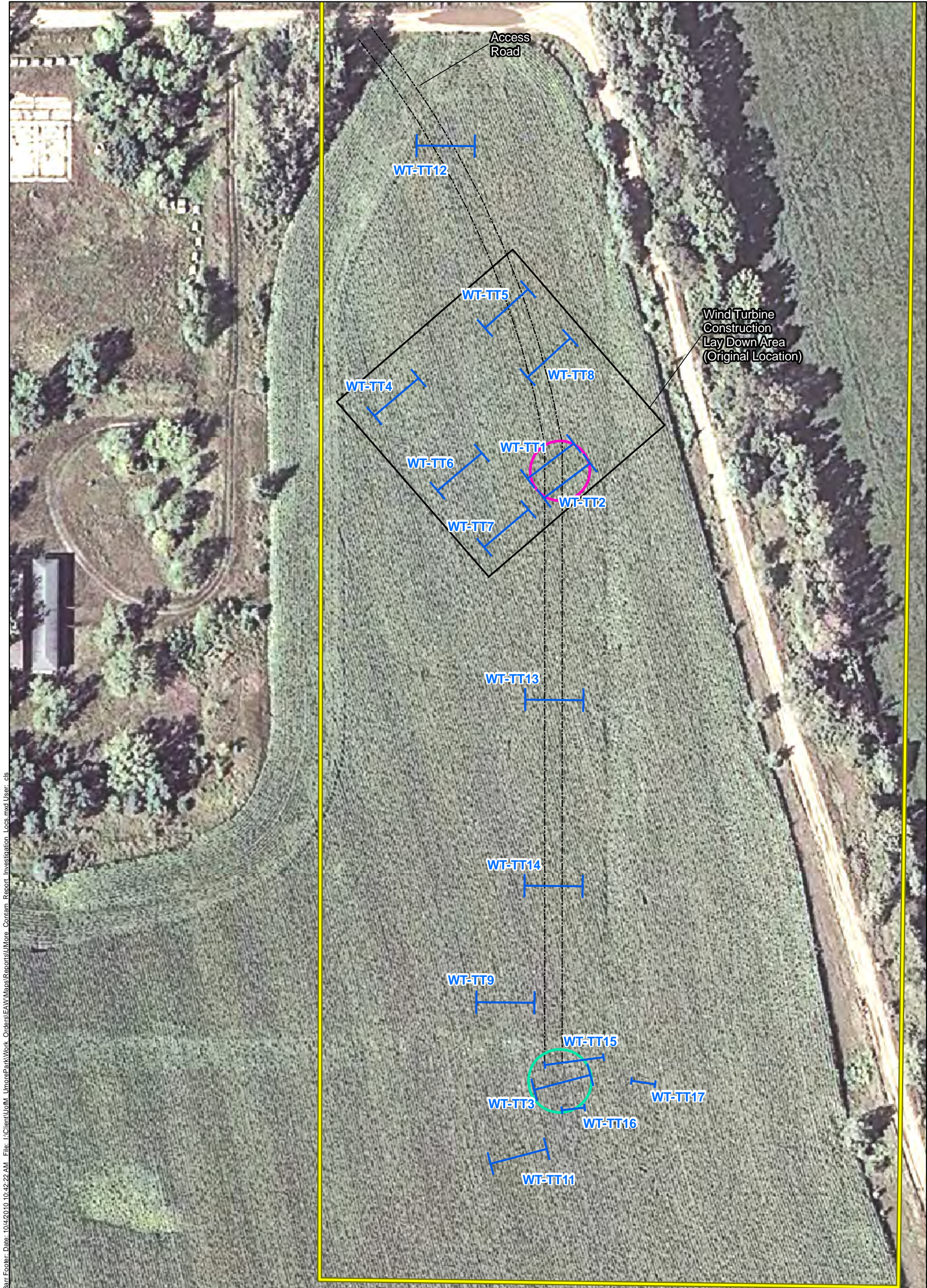
**Table 1
Soil Analytical Results
Proposed Turbine Area
Dakota County, Minnesota**

				Sys Loc Code	WT-TT3	WT-TT3	WT-TT4	WT-TT5	WT-TT6	WT-TT7	WT-TT8	WT-TT9
				Sample Date	5/19/2010	5/19/2010	5/19/2010	5/19/2010	5/19/2010	5/19/2010	5/19/2010	5/19/2010
				Depth Interval	0 - 0.5	3 - 6	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5	0 - 0.5
				Depth Unit	ft	ft	ft	ft	ft	ft	ft	ft
				Sample Type Code	N	N	N	N	N	N	N	N
Chemical Name	MN Tier I SRV	MN Tier 2 Industrial SRV	MN Tier 2 Short Term Worker SRV									
Effective Date	06/22/2009	06/22/2009	06/22/2009									
Exceedance Key	No Exceed	No Exceed	No Exceed									
General Parameters												
Solids, percent				84%	96%	85%	82%	83%	82%	82%	82%	83%
Metals												
Arsenic	9 mg/kg	20 mg/kg	70 mg/kg	6.1 mg/kg	2.0 mg/kg	6.7 mg/kg	7.1 mg/kg	7.0 mg/kg	6.7 mg/kg	6.9 mg/kg	6.3 mg/kg	6.3 mg/kg
Lead	300 mg/kg	700 mg/kg	700 mg/kg	12 mg/kg	2.2 mg/kg	11 mg/kg	13 mg/kg	13 mg/kg	12 mg/kg	13 mg/kg	12 mg/kg	12 mg/kg
Mercury	0.5 mg/kg	1.5 mg/kg	0.4 mg/kg	< 0.12 mg/kg	< 0.11 mg/kg	< 0.10 mg/kg	< 0.12 mg/kg	< 0.12 mg/kg	< 0.13 mg/kg	< 0.11 mg/kg	< 0.13 mg/kg	< 0.13 mg/kg
SVOCs												
2-Chloronaphthalene				< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
2-Methylnaphthalene	100 mg/kg	369 mg/kg	NA	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Acenaphthene	1200 mg/kg	5260 mg/kg	19000 mg/kg	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Acenaphthylene				< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Anthracene	7880 mg/kg	45400 mg/kg	100000 mg/kg	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Benzo(a)anthracene	T	T	T	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Benzo(a)pyrene	T	T	T	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Benzo(b)fluoranthene	T	T	T	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Benzo(g,h,i)perylene				< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Benzo(k)fluoranthene	T	T	T	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Chrysene	T	T	T	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Dibenz(a,h)anthracene	T	T	T	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Fluoranthene	1080 mg/kg	6800 mg/kg	48600 mg/kg	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Fluorene	850 mg/kg	4120 mg/kg	17240 mg/kg	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Indeno(1,2,3-cd)pyrene	T	T	T	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Naphthalene	10 mg/kg	28 mg/kg	78 mg/kg	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Phenanthrene				< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
Pyrene	890 mg/kg	5800 mg/kg	43000 mg/kg	< 0.39 mg/kg	< 0.34 mg/kg	< 0.39 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg	< 0.40 mg/kg
BaP equivalent, non-detects at zero for the detection limit.¹	2 T mg/kg	3 T mg/kg	14 T mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg	ND mg/kg

Data Qualifiers/Footnotes - Soil	
Qualifier	Definition
--	Not analyzed/not available.
a	Estimated value, calculated using some or all values that are estimates.
b	Potential false positive value based on blank data validation procedures.
c	Coeluting compound.
e	Estimated value, exceeded the instrument calibration range.
h	EPA recommended sample preservation, extraction or analysis holding time was exceeded.
l	Indeterminate value based on failure of blind duplicate data to meet quality assurance criteria.
j	Reported value is less than the stated laboratory quantitation limit and is considered an estimated value.
p	Relative percent difference is >40% (25% CLP pesticides) between primary and confirmation GC columns.
r	The presence of the compound is suspect based on the ID criteria of the retention time and relative retention time obtained from the examination of the chromatograms.
*	Estimated value, QA/QC criteria not met.
**	Unusable value, QA/QC criteria not met.
ND	Not detected.
RPD	Relative percent difference.

Action Level Qualifiers/Footnotes

	Qualifier	Definition
	CR	Value represents the criteria for Chromium, hexavalent.
MN Tier 1 SRV/	DI	Value represents a criteria for 2,3,7,8-TCDD or 2,3,7,8-TCDD equivalents.
MN Tier 2 Industrial SRV/	M	Value represents the criteria for mixed Xylenes.
MN Tier 2 Short Term Worker SRV	T	Value represents a criteria for the total carcinogenic PAHs as BaP. Total carcinogenic PAHs are: Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenz(a,h)anthracene, Chrysene and Indeno(1,2.3-cd)pyrene.



Barr Footer Date: 10/4/2010 10:42:22 AM File: I:\Client\UoM_UmcorePark\Work_Orders\EAW\Maps\Reports\UMore Contam_Report_Investigation_Locs.mxd User: cjs

- ┌──┐ Test Trench Locations
- Proposed Meteorologic Tower (Original Location)
- Proposed Turbine (Original Location)

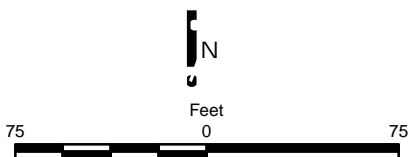


Figure 1

INVESTIGATION LOCATIONS

Proposed Turbine Area Investigation
Dakota County, Minnesota

