Tables

TABLE 1
FOCUSED SITE INSPECTION SAMPLING RESULTS
SSI/RI Work Plan
SOCs 4 and 5
UMore Mining Area, Dakota County, Minnesota

Location	Tier 1 SRVs	Units	FGOW-AOC3-DA1-SS-GP1(0-6INCHES)	FGOW-AOC3-DA1-S-GP1(2-4FT)	FGOW-AOC3-DA1-SS-GP1(8-10FT)	FGOW-AOC3-DA1-S-SS1(0-6INCHES)	FGOW-AOC5-SS GP1 (0-6INCHES)	FGOW-AOC5-S-GP1(2-4FT)	FGOW-AOC5-SS-GP2(0-6INCHES)	FGOW-AOC5-S-GP2(2-4FT)	FGOW-AOC5-SS-GP3(0-6INCHES)	FGOW-AOC5-S-GP3(2-4FT)	FGOW-AOC5-SS-GP4(0-6INCHES)	FGOW-AOC5-S-GP4(2-4FT)	FGOW-AOC5-SS-GP5(0-6INCHES)	FGOW-AOC5-SS-GP5(2-4FT)	FGOW-AOC5-SS-GP6(0-6INCHES)	FGOW-AOC5-SS-GP6(0-6INCES) DUP
Date							9/6/2007	9/4/2007	9/6/2007	9/4/2007	9/6/2007	9/4/2007	9/6/2007	9/4/2007	9/6/2007	9/6/2007	9/6/2007	9/6/2007
Pesticides																		
4,4-DDD	56000	ug/kg	NA	NA	NA	NA												
4,4-DDE	40000	ug/kg	NA	NA	NA	NA							<SRV					
4,4-DDT	15000	ug/kg	NA	NA	NA	NA	<SRV		<SRV		<SRV		<SRV					
Aldrin	1000	ug/kg	NA	NA	NA	NA												
alpha-BHC	2000	ug/kg	NA	NA	NA	NA												
alpha-Chlordane (Chlordane,cis) - Chlordane	13000	ug/kg	NA	NA	NA	NA						<SRV						
beta-BHC	7000	ug/kg	NA	NA	NA	NA												
delta-BHC	NONE	ug/kg	NA	NA	NA	NA												
Dieldrin	800	ug/kg	NA	NA	NA	NA	**17000**	<SRV	<SRV		<SRV	<SRV						
Endosulfan I (Endosulfan)	120000	ug/kg	NA	NA	NA	NA												
Endosulfan II	NONE	ug/kg	NA	NA	NA	NA												
Endosulfan sulfate	NONE	ug/kg	NA	NA	NA	NA												
Endrin	8000	ug/kg	NA	NA	NA	NA	<SRV											
Endrin aldehyde	NONE	ug/kg	NA	NA	NA	NA							8.2 JJ					
Endrin ketone	NONE	ug/kg	NA	NA	NA	NA		1.4 J										
g-BHC (Lindane)	9000	ug/kg	NA	NA	NA	NA												
g-Chlordane - Chlordane	13000	ug/kg	NA	NA	NA	NA					<SRV	<SRV						
Heptachlor	2000	ug/kg	NA	NA	NA	NA												
Heptachlor epoxide	400	ug/kg	NA	NA	NA	NA												
Methoxychlor	11000	ug/kg	NA	NA	NA	NA		<SRV										
Toxaphene	13000	ug/kg	NA	NA	NA	NA												
TPH																		
Diesel Range Organics	NONE	mg/kg	NA	NA	NA	NA	39	1.7 J	100	2.3 J	11 J		510			4 J	2 Jj	15 j
Gasoline Range Organics	NONE	mg/kg	NA	NA	NA	NA	1.7 JB	2.4 JB	1.9 JB	1.9 JB	1.7 JB	1.2 JB	1.7 JB	2.1 JB	1.8 JB	1.5 JB	1.6 JB	1.4 JB
Explosives																		
2,4-Dinitrotoluene	50	mg/kg																
2,6-Dinitrotoluene	25	mg/kg																
Metals																		
Arsenic	9	mg/kg	NA	NA	NA	NA	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV
Barium	1100	mg/kg	NA	NA	NA	NA	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV
Cadmium	25	mg/kg	NA	NA	NA	NA	<SRV	<SRV	<SRV		<SRV		<SRV		<SRV		<SRV	<SRV
Chromium	87 CR	mg/kg	NA	NA	NA	NA	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV
Lead	300	mg/kg	NA	NA	NA	NA	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV	<SRV
Mercury	0.5	mg/kg	NA	NA	NA	NA	**0.55**		<SRV		<SRV		<SRV		<SRV			
Selenium	160	mg/kg	NA	NA	NA	NA												
Silver	160	mg/kg	NA	NA	NA	NA												
PAHs and Diphenylamine																		
2-Methylnaphthalene	100000	ug/kg	NA	NA	NA	NA							<SRV					
Acenaphthene	1200000	ug/kg	NA	NA	NA	NA	<SRV		<SRV				<SRV					
Acenaphthylene	NONE	ug/kg	NA	NA	NA	NA												
Anthracene	7880000	ug/kg	NA	NA	NA	NA	<SRV		<SRV				<SRV					
Benzo(a)anthracene	T	ug/kg	NA	NA	NA	NA												
Benzo(a)pyrene	T	ug/kg	NA	NA	NA	NA												
Benzo(b)fluoranthene	T	ug/kg	NA	NA	NA	NA												
Benzo(ghi)perylene	NONE	ug/kg	NA	NA	NA	NA	160 J		590				3200					
Benzo(k)fluoranthene	T	ug/kg	NA	NA	NA	NA												
Chrysene	T	ug/kg	NA	NA	NA	NA												
Dibenz(a,h)anthracene	T	ug/kg	NA	NA	NA	NA												
Diphenylamine	NONE	ug/kg																
Fluoranthene	1080000	ug/kg	NA	NA	NA	NA	<SRV		<SRV		<SRV		<SRV		<SRV			
Fluorene	850000	ug/kg	NA	NA	NA	NA	<SRV		<SRV				<SRV					
Indeno(1,2,3-cd)pyrene	T	ug/kg	NA	NA	NA	NA												
Naphthalene	10000	ug/kg	NA	NA	NA	NA							<SRV					
Phenanthrene	NONE	ug/kg	NA	NA	NA	NA	380		960				13000 E		42 J			
Pyrene	890000	ug/kg	NA	NA	NA	NA	<SRV		<SRV		<SRV		<SRV		<SRV			
BaP Equiv	2000 T	ug/kg	NA	NA	NA	NA	<SRV		<SRV		<SRV		**8900**		<SRV			
Other																		
Nitrocellulose	NONE	mg/kg	8.2	1.2		1	2.5 B	0.81 B	6.4	1.5 B	1.6 B	0.93 B	2.4 B		1.9 B			

Notes:
Tier I SRV - Soil Reference Value, Residential Setting
Shading and bold font indicate Tier I SRV exceedances
Blanks indicate non-detect
NA indicates not analyzed
J - estimated
B - detected in associated blank
T - used in calculation of Benzo-a-pyrene Equivalent (BaP Equiv) calculation

TABLE 1
FOCUSED SITE INSPECTION SAMPLING RESULTS
SSI/RI Work Plan
SOCs 4 and 5
UMore Mining Area, Dakota County, Minnesota

Location	Tier 1 SRVs	Units	FGOW-AOC5-S-GP6(2-4FT)		FGOW-AOC5-SS-GP7(0-6INCES)		FGOW-AOC5-SS-GP7(0-6INCHES)		FGOW-AOC5-S-GP7(2-4FT)		FGOW-AOC5-SS-GP8(0-6INCHES)		FGOW-AOC5-S-GP8(2-4FT)		FGOW-AOC5-S-GP9(0-6INCHES)		FGOW-AOC5-S-GP9(2-4FT)		FGOW-AOC5-S-GP10(0-6INCHES)		FGOW-AOC5-S-GP10(2-4FT)		FGOW-AOC5-S-GP11(0-6INCHES)		FGOW-AOC5-S-GP11(2-4FT)		FGOW-AOC5-S-GP12(0-6INCHES)		FGOW-AOC5-S-GP12(0-6INCHES)DUP		FGOW-AOC5-S-GP12(2-4FT)	
Date			9/4/2007		9/6/2007		9/6/2007		9/5/2007		9/6/2007		9/5/2007		9/6/2007		9/5/2007		9/6/2007		9/5/2007		9/6/2007		9/4/2007		9/6/2007		9/6/2007		9/4/2007	
Pesticides																																
4,4-DDD	56000	ug/kg																														
4,4-DDE	40000	ug/kg			<SRV				<SRV		<SRV				<SRV												<SRV		<SRV		<SRV	
4,4-DDT	15000	ug/kg			<SRV				<SRV		<SRV				<SRV				<SRV				<SRV				<SRV		<SRV		<SRV	
Aldrin	1000	ug/kg			<SRV						<SRV																					
alpha-BHC	2000	ug/kg																														
alpha-Chlordane (Chlordane,cis) - Chlordane	13000	ug/kg					<SRV		<SRV						<SRV																	
beta-BHC	7000	ug/kg																														
delta-BHC	NONE	ug/kg																														
Dieldrin	800	ug/kg			<SRV		<SRV		<SRV		<SRV				<SRV																	
Endosulfan I (Endosulfan)	120000	ug/kg							<SRV																							
Endosulfan II	NONE	ug/kg					23	J							7.1																	
Endosulfan sulfate	NONE	ug/kg																														
Endrin	8000	ug/kg																														
Endrin aldehyde	NONE	ug/kg																														
Endrin ketone	NONE	ug/kg																														
g-BHC (Lindane)	9000	ug/kg																														
g-Chlordane - Chlordane	13000	ug/kg			<SRV		<SRV		<SRV						<SRV																	
Heptachlor	2000	ug/kg			<SRV																											
Heptachlor epoxide	400	ug/kg			<SRV				<SRV																							
Methoxychlor	11000	ug/kg																														
Toxaphene	13000	ug/kg																														
TPH																																
Diesel Range Organics	NONE	mg/kg			56		NA		1.4	J	190		29		420				310				170		4	J	3.5	J	4.8	J		
Gasoline Range Organics	NONE	mg/kg	1.9	JB	1.9	JB	NA				2.1	JB	1.7	JB	1.7	JB	1.6	JB	1.6	JB	1.2	JB	1.7	JB	2.2	JB	1.7	JB	1.5	JB	1.8	JB
Explosives																																
2,4-Dinitrotoluene	50	mg/kg					NA								<SRV																	
2,6-Dinitrotoluene	25	mg/kg					NA																									
Metals																																
Arsenic	9	mg/kg	<SRV		<SRV		NA		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV	
Barium	1100	mg/kg	<SRV		<SRV		NA		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV	
Cadmium	25	mg/kg			<SRV		NA				<SRV				<SRV				<SRV				<SRV				<SRV		<SRV			
Chromium	87 CR	mg/kg	<SRV		<SRV		NA		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV	
Lead	300	mg/kg	<SRV		<SRV		NA		<SRV		<SRV		<SRV		**330**		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV		<SRV	
Mercury	0.5	mg/kg			<SRV		NA		<SRV		**0.67**				<SRV				<SRV				<SRV		<SRV		<SRV		<SRV		<SRV	
Selenium	160	mg/kg					NA																									
Silver	160	mg/kg					NA																									
PAHs and Diphenylamine																																
2-Methylnaphthalene	100000	ug/kg					NA				<SRV								<SRV				<SRV									
Acenaphthene	1200000	ug/kg					NA				<SRV				<SRV				<SRV				<SRV									
Acenaphthylene	NONE	ug/kg					NA																									
Anthracene	7880000	ug/kg					NA				<SRV								<SRV		<SRV		<SRV									
Benzo(a)anthracene	T	ug/kg					NA																									
Benzo(a)pyrene	T	ug/kg					NA																									
Benzo(b)fluoranthene	T	ug/kg					NA																									
Benzo(ghi)perylene	NONE	ug/kg			180	J	NA				1600				560				2600		85	J	1300									
Benzo(k)fluoranthene	T	ug/kg					NA																									
Chrysene	T	ug/kg					NA																									
Dibenz(a,h)anthracene	T	ug/kg					NA																									
Diphenylamine	NONE	ug/kg					NA																									
Fluoranthene	1080000	ug/kg			<SRV		NA				<SRV		<SRV		<SRV				<SRV		<SRV		<SRV									
Fluorene	850000	ug/kg					NA				<SRV				<SRV				<SRV				<SRV									
Indeno(1,2,3-cd)pyrene	T	ug/kg					NA				<SRV																					
Naphthalene	10000	ug/kg					NA				<SRV				<SRV				<SRV				<SRV									
Phenanthrene	NONE	ug/kg			220	J	NA				7500		87	J	1700				5200		120		6000									
Pyrene	890000	ug/kg			<SRV		NA				<SRV		<SRV		<SRV				<SRV		<SRV		<SRV									
BaP Equiv	2000 T	ug/kg			<SRV						**4500**		<SRV		<SRV				**6700**		<SRV		**3400**									
Other																																
Nitrocellulose	NONE	mg/kg			3.9	B			1.1	B	3.2		0.82	B	5	B			2.2	B			2.6	B			2.2	B	2.3	B		

Notes:
Tier I SRV - Soil Reference Value, Residential Setting
Shading and bold font indicate Tier I SRV exceedances
Blanks indicate non-detect
NA indicates not analyzed
J - estimated
B - detected in associated blank
T - used in calculation of Benzo-a-pyrene Equivalent (BaP Equiv) calculation

TABLE 2
CONCEPTUAL RELEASE MODEL, ROUTES OF MIGRATION, AND POTENTIAL EXPOSURE PATHWAYS
SSI/RI Work Plan
SOCs 4 and 5
UMore Mining Area
Dakota County, Minnesota

Site of Concern and Operable Unit (Preliminary)		Potential Constituents of Concern	Potential Affected Media			Likely Routes of Migration					Potential Exposure Pathways			
			Debris (if present)	Soil	Groundwater	Release to Soil	Surface Water Transport	Infiltration to Groundwater	Contained in Buried Debris	Leachate from Waste	Inhalation[2]	Ingestion[2]	Groundwater Consumption*	Dermal
SOC 4	OU1-Frm. DNT Platform and Ditch	DNT		X	X	X	X	X			X	X	X	X
		NC, DPA, DBP		X	X	X	X	X			X	X	X	X
		Perchorate[1]			X								X	
	OU2-Settling Basin and Ditch	DNT		X	X	X	X	X			X	X	X	X
		NC, DPA, DBP		X	X	X	X	X			X	X	X	X
		Perchorate[1]			X								X	
		VOCs	X	X	X		X	X			X	X	X	X
		Pesticides	X	X	X		X	X			X	X	X	X
		PCBs		X			X					X		X
	OU3-Surficial Debris Area	Asbestos	X						X		X	X		
		Metals	X	X	X	X			X	X	X	X	X	X
SOC 5	OU1-DNT Storage Bunkers	DNT		X	X	X	X	X			X	X	X	X
		NC, DPA, DBP		X	X	X	X	X			X	X	X	X
		Perchorate[1]			X								X	
		VOCs		X	X	X	X	X			X	X	X	X
		Pesticides		X	X	X	X	X			X	X	X	X
		Metals		X	X	X					X	X	X	X
		SVOCs		X	X	X					X	X	X	X
	OU2-Pesticide Release Area	Pesticides		X	X	X	X	X			X	X	X	X
	OU3-Petroleum Release Area	Metals		X	X	X					X	X	X	X
		Pesticides		X	X	X	X	X			X	X	X	X
		VOCs		X	X	X	X	X			X	X	X	X
	Others													
	Dirt Roads	PCBs		X		X					X	X		X
	Green Space	Metals		X	X	X	X				X	X	X	X
		SVOCs		X	X	X	X				X	X	X	X
	Water Supply Wells	DNT			X			X					X	
		NC, DPA, DBP			X			X					X	
		Perchorate[1]			X			X					X	
		VOCs			X			X					X	
		Pesticides			X			X					X	
		Metals			X			X					X	
		SVOCs			X			X					X	

Notes:

* - Groundwater in the uppermost saturated, permeable geologic unit (outwash) is not considered a consumptive use aquifer. Pathway included assuming that groundwater recharges into deeper aquifer units downgradient of the site.

[1]No indication of presence at GOW. Included due to presence at other FUD sites.

[2]Includes exposure to dust.

DNT - 2,4-dinitrotoluene and 2,6-dinitrotoluene,
DPA - diphenylamine, and Di-n-butyl phthalate
DBP - Di-n-butyl phthalate
NC - Nitrocellulose
VOCs - Volatile organic compounds
SVOCs - Semi-volatile organic compounds
X - Present or likely present

TABLE 3
POTENTIALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO-BE-CONSIDERED CRITERIA
SSI/RI Work Plan
SOCs 4 and 5
UMore Mining Area
Dakota County, Minnesota

Standard	Classification		Description
	ARAR	TBC	
Soil			
Soil Reference Values (SRVs)		X	No ARARs exist for soil. SRVs are risk based guidance for the soil-human pathway published by the MPCA. Based on planned site use including export of sand and gravel and possible future residential use, Tier I SRVs for residential use apply.
Soil Leaching Values (SLVs)		X	No ARARs exist for soil. SLVs are risk based guidance for the soil-groundwater pathway published by the MPCA. Groundwater quality characterization will be used to determine the applicability of the SLVs.
Groundwater			
Health Risk Limits (HRLs)	X		HRLs are health based criteria assuming the ingestion of groundwater developed by the MDH. HRLs are applicable to drinking water aquifers (ie., Prairie du Chein and Jordan Sandstone) and not to the water table aquifer.
Health Based Values (HBVs)		X	HRLs are developed as interim guidance for groundwater and are used until the MDH develops a HRL. HBVs are applicable to drinking water aquifers (ie., Prairie du Chein and Jordan Sandstone) and not to the water table aquifer.
Maximum Contaminant Levels (MCLs)	X		MCLs are enforceable standards that apply to public water systems which provide water for human consumption. MCLs are developed by the EPA.

Notes:
ARAR - Applicable or Relevant and Appropriate Requirement
TBC - To-be-considered criteria
MPCA - Minnesota Pollution Control Agency
MDH - Minnesota Department of Health

TABLE 4
SOIL AND GROUNDWATER SAMPLING PLAN
SSI/RI Work Plan
SOCs 4 and 5
UMore Mining Area
Dakota County, Minnesota

Site of Concern and OU (Preliminary)	Sampling Location ID	Target Depth[1] (feet bgs)	Soil Sampling Plan[3]									Groundwater Sampling Plan[3]									Comment
			Sample Interval[2] (feet bgs)	Parameters (Number of samples)								Depth[7] (feet bgs)	Parameters (Number of samples)								
				VOCs[4]	SVOCs	PPL Metals	Nitrocellulose	List 1&2 - Pest[5]	OC-Pest[6]	Asbestos	PCBs		VOCs[4]	SVOCs	PPL Metals	Nitrocellulose	List 1&2 - Pest[5]	OC-Pest[6]	Nitrogen[8]	Perchlorate	
SOC#4 DNT Loading Platform and Drainage Ditch (Includes AOC3A-D1)																					
OU1 - Frm. DNT Loading Platform and Ditch	TT1	6								*											
	TT2	6								*											
	TT3	6								*											
	TT4	6								*											
	TT5	6								*											
	TT6	6	0-0.5		1		1			*											
	TT7	6								*											
	TT8	6								*											
OU2 - Settling Basing and Ditch	TT9	6								*											
	TT10	6								*											
	TT11	6	0-0.5	1	1	1	1	1	1	*	1										
	TT12	6								*											
OU3 - Surficial Debris Area	TT13	6								*											
	TT14	6								*											
	TT15	6								*											
OU1 - Frm. DNT Loading Platform and Ditch	GP1	55	0-0.5		1	1	1					50		1	1	1			1	1	Continuous soil sample to groundwater
	GP2	20	0-0.5		1		1														
	GP3	20	0-0.5		1		1														
OU2 - Settling Basing and Ditch	GP4	55	0-0.5	1	1	1	1	1	1			50		1	1	1			1		Continuous soil sample to groundwater
	GP5	20	0-0.5		1	1	1					50		1	1	1			1		Soil sample to 20'; blind advance to WT
	GP6	20	0-0.5		1	1	1														
	GP7	20	0-0.5		1		1														
SOC#5 Central Services Station and Offices																					
OU1 (260-E)	TT1	6	3-4	1	1	1	1	1	1	*											A minimum of one sample will be collected from test trenches; default location is below sump on NW building corner if no impacts are observed
	TT2	6																			
OU1 (260-A)	TT3	6	3-4	1	1	1	1	1	1	*											A minimum of one sample will be collected from test trenches; default location is below sump on NW building corner if no impacts are observed
	TT4	6																			
	TT5	6																			
	TT6	6																			
OU1 (260-F)	TT7	6	3-4	1	1	1	1	1	1	*											A minimum of one sample will be collected from test trenches; default location is below sump on NW building corner if no impacts are observed
	TT8	6																			
OU1 (260-B)	TT9	6	3-4	1	1	1	1	1	1	*											A minimum of one sample will be collected from test trenches; default location is below sump on NW building corner if no impacts are observed
	TT10	6																			
	TT11	6																			
	TT12	6																			
OU1 (260-G)	TT13	6	3-4	1	1	1	1	1	1	*											A minimum of one sample will be collected from test trenches; default location is below sump on NW building corner if no impacts are observed
	TT14	6																			
	TT15	6																			
OU1 (260-C)	TT16	6	3-4	1	1	1	1	1	1	*											A minimum of one sample will be collected from test trenches; default location is below sump on NW building corner if no impacts are observed
	TT17	6																			
	TT18	6																			
	TT19	6																			
OU1 (260-H)	TT20	6	3-4	1	1	1	1	1	1	*											A minimum of one sample will be collected from test trenches; default location is below sump on NW building corner if no impacts are observed
	TT21	6																			
	TT22	6																			
OU1 (260-D)	TT23	6	3-4	1	1	1	1	1	1	*											A minimum of one sample will be collected from test trenches; default location is below sump on NW building corner if no impacts are observed
	TT24	6																			
	TT25	6																			
OU2-Pest. Release Area	TT26	12	3-4			1		1	1	*											A minimum of one sample will be collected from test trenches; default location is below sump on NW building corner if no impacts are observed
	TT27	12																			
	TT28	12																			
	TT29	12																			
OU1,2&3 - Groundwater	GP1	20	0-0.5		1	1						45	1	1	1	1	1	1	1	1	Continuous soil sample to groundwater
	GP2	50	0-0.5		1	1						45	1	1	1	1	1	1	1		Soil sample to 20'; blind advance to WT
	GP3	50	0-0.5		1	1						45	1	1	1	1	1	1	1		Continuous soil sample to groundwater
	GP4	20	0-0.5		1	1						45	1	1	1	1	1	1	1		Soil sample to 20'; blind advance to WT
OU3 - Petroleum Release Area	GP5	20	0-0.5	1	1	1	1														
			2-4	1	1	1	1														Hold
	GP6	20	0-0.5	1	1	1	1														
			2-4	1	1	1	1														Hold
	GP7	20	0-0.5	1	1	1	1														
			2-4	1	1	1	1														Hold
	GP8	20	0-0.5	1	1	1	1														
			2-4	1	1	1	1														Hold

TABLE 4
SOIL AND GROUNDWATER SAMPLING PLAN
SSI/RI Work Plan
SOCs 4 and 5
UMore Mining Area
Dakota County, Minnesota

Site of Concern and OU (Preliminary)	Sampling Location ID	Target Depth[1] (feet bgs)	Soil Sampling Plan[3]									Groundwater Sampling Plan[3]									Comment
			Sample Interval[2] (feet bgs)	Parameters (Number of samples)								Depth[7] (feet bgs)	Parameters (Number of samples)								
				VOCs[4]	SVOCs	PPL Metals	Nitrocellulose	List 1&2 - Pest[5]	OC-Pest[6]	Asbestos	PCBs		VOCs[4]	SVOCs	PPL Metals	Nitrocellulose	List 1&2 - Pest[5]	OC-Pest[6]	Nitrogen[8]	Perchlorate	
OU1 - Groundwater	GP9	50	0-0.5									45	1	1	1	1	1	1	1		Soil sample to 20'; blind advance to WT
	GP10	50	0-0.5									45	1	1	1	1	1	1	1	1	Continuous soil sample to groundwater
	GP11	50	0-0.5									45	1	1	1	1	1	1	1		Continuous soil sample to groundwater
OU2 - Pesticide Release Area (bld 608)	GP12 (A-D)	12	0-0.5					1	1												Sample Per MDA Guidance: A, B, C, D subsamples- Hold 0-0.5' (composite) and 4.5-5' (discrete); analyze 2-2.5' (composite)
			2-2.5					1	1												
			5					1	1												
	GP13 (A-D)	12	0-0.5					1	1												Sample Per MDA Guidance: A, B, C, D subsamples- Hold 0-0.5' (composite) and 4.5-5' (discrete); analyze 2-2.5' (composite)
			2-2.5					1	1												
			5					1	1												
	GP14 (A-D)	12	0-0.5					1	1												Sample Per MDA Guidance: A, B, C, D subsamples- Hold 0-0.5' (composite) and 4.5-5' (discrete); analyze 2-2.5' (composite)
			2-2.5					1	1												
			5					1	1												
OU1 - DNT-Storage Bunkers exterior walls	GP15	4	0-4		1																Characterize berm soils
	GP16	4	0-4		1																
	GP17	4	0-4		1																
	GP18	4	0-4		1																
	GP19	4	0-4		1																
	GP20	4	0-4		1																
	GP21	4	0-4		1																
	GP22	4	0-4		1																
	GP23	4	0-4		1																
	GP24	4	0-4		1																
	GP25	4	0-4		1																
	GP26	4	0-4		1																
OU2- Pesticide Release Area (bld 608)	GP27 (A-D)	12	0-0.5					1	1												Sample Per MDA Guidance: A, B, C, D subsamples- Hold 0-0.5' (composite) and 4.5-5' (discrete); analyze 2-2.5' (composite)
			2-2.5					1	1												
			5					1	1												
Other - Green Space	SS1	0.5	0-0.5		1	1	1	1	1												Characterize site soils not in vicinity of bunkers or suspected releases
	SS2	0.5	0-0.5		1	1	1	1	1												
	SS3	0.5	0-0.5		1	1	1	1	1												
	SS4	0.5	0-0.5		1	1	1	1	1												
	SS5	0.5	0-0.5		1	1	1	1	1												
	SS6	0.5	0-0.5		1	1	1	1	1												
	SS7	0.5	0-0.5		1	1	1	1	1												
	SS8	0.5	0-0.5		1	1	1	1	1												
	SS9	0.5	0-0.5		1	1	1	1	1												
	SS10	0.5	0-0.5		1	1	1	1	1												
	SS11	0.5	0-0.5		1	1	1	1	1												
OU1- DNT Storage Bunker exterior walls	SS12	0.5	0-0.5		1																
	SS13	0.5	0-0.5		1																Hold
	SS14	0.5	0-0.5		1																
	SS15	0.5	0-0.5		1																Hold
	SS16	0.5	0-0.5		1																
	SS17	0.5	0-0.5		1																Hold
	SS18	0.5	0-0.5		1																
	SS19	0.5	0-0.5		1																Hold
	SS20	0.5	0-0.5		1																
	SS21	0.5	0-0.5		1																Hold
	SS22	0.5	0-0.5		1																
	SS23	0.5	0-0.5		1																Hold
	SS24	0.5	0-0.5		1																
	SS25	0.5	0-0.5		1																Hold
	SS26	0.5	0-0.5		1																
	SS27	0.5	0-0.5		1																Hold
	SS28	0.5	0-0.5		1																
	SS29	0.5	0-0.5		1																Hold
	SS30	0.5	0-0.5		1																
	SS31	0.5	0-0.5		1																Hold
	SS32	0.5	0-0.5		1																
	SS33	0.5	0-0.5		1																Hold
	SS34	0.5	0-0.5		1																Hold
	SS35	0.5	0-0.5		1																Hold
	SS36	0.5	0-0.5		1																Hold
	SS37	0.5	0-0.5		1																Hold
	SS38	0.5	0-0.5		1																Hold
	SS39	0.5	0-0.5		1																Hold
	SS40	0.5	0-0.5		1																Hold
	SS41	0.5	0-0.5		1																Hold

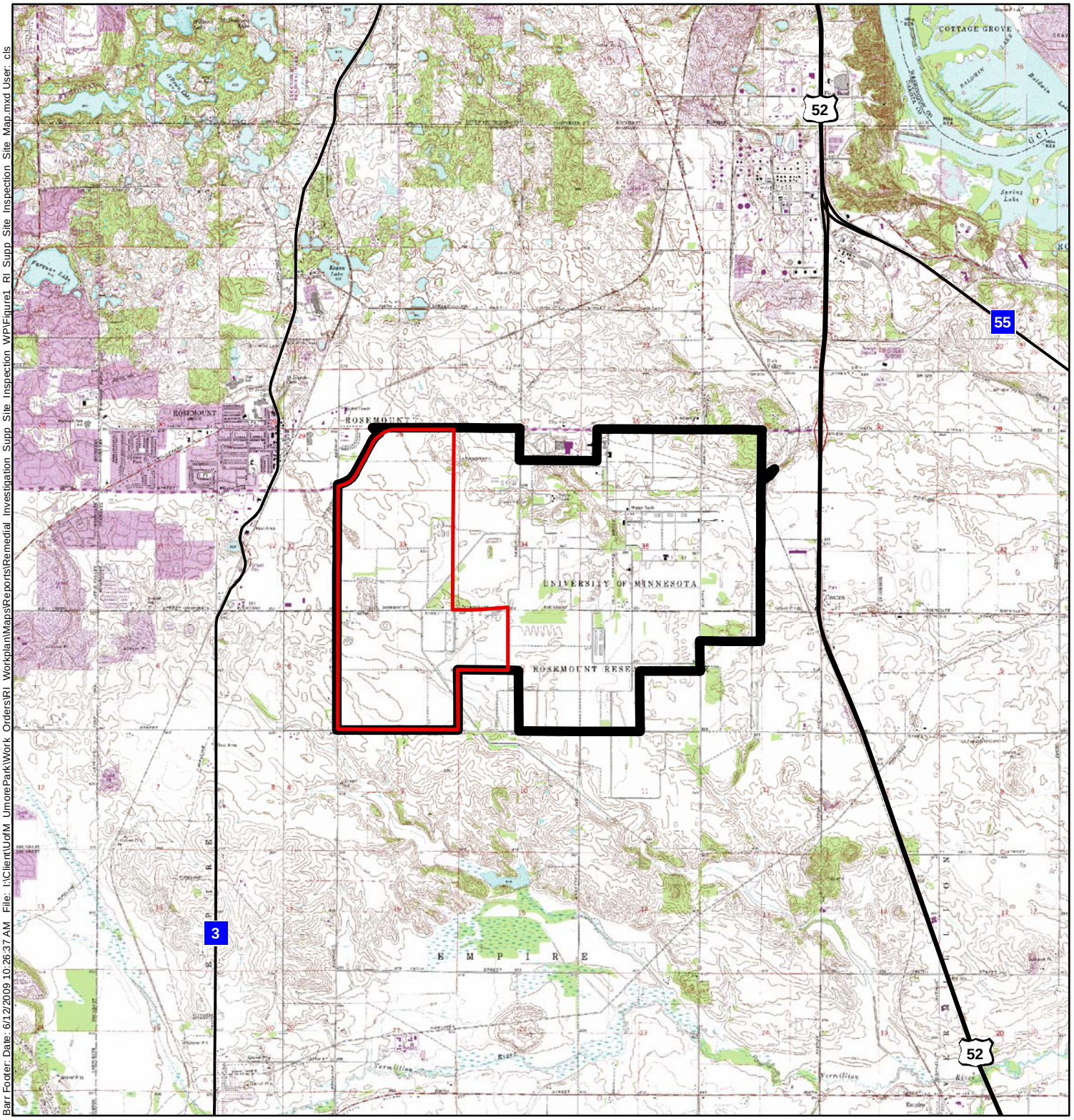
TABLE 4
SOIL AND GROUNDWATER SAMPLING PLAN
SSI/RI Work Plan
SOCs 4 and 5
UMore Mining Area
Dakota County, Minnesota

Site of Concern and OU (Preliminary)	Sampling Location ID	Target Depth[1] (feet bgs)	Soil Sampling Plan[3]									Groundwater Sampling Plan[3]									Comment
			Sample Interval[2] (feet bgs)	Parameters (Number of samples)								Depth[7] (feet bgs)	Parameters (Number of samples)								
				VOCs[4]	SVOCs	PPL Metals	Nitrocellulose	List 1&2 - Pest[5]	OC-Pest[6]	Asbestos	PCBs		VOCs[4]	SVOCs	PPL Metals	Nitrocellulose	List 1&2 - Pest[5]	OC-Pest[6]	Nitrogen[8]	Perchlorate	
OU1- DNT Storage Bunker exterior walls	SS42	0.5	0-0.5		1																Hold
	SS43	0.5	0-0.5		1																Hold
	SS44	0.5	0-0.5		1																Hold
	SS45	0.5	0-0.5		1																Hold
Other - Access Road Materials	SS46	0.5	0-0.5								1										
	SS47	0.5	0-0.5								1										
	SS48	0.5	0-0.5								1										
	SS49	0.5	0-0.5								1										
Groundwater Quality	WSW-207607												1	1	1	1	1	1	1	1	
	WSW-208402												1	1	1	1	1	1	1	1	
	WSW-208405												1	1	1	1	1	1	1	1	
	WSW-207605												1	1	1	1	1	1	1	1	Use data from SOC investigation; sample remaining params

Notes:

1- Continuous soil sampling conducted in borings to target depth for soil description and screening purposes. Test trenches to extend 2 feet into unimpacted geologic deposit below modern soil or filled material, if possible.
2- Default soil sample collection depths for chemical analysis. If impacted soils are encountered aat a different interval the sample interval will be adjusted in the field to target impacted soils.
3 - Individual compounds and analytical methods for each parameter list are included in the Sampling and Analysis Plan (SAP)
4 - VOC samples will be collected where soil exhibits evidence that VOCs are present. For example, elevated headspace, staining and strong odor.
5 - List1&2-Pest - includes Minnesota Department of Agriculture Pesticides List 1 (neutral) and List 2 (acid) pesticides
6 - OC-Pest - includes organochlorine pesticides listed in EPA method # 8081A
7 - Approximate depth to groundwater. Actual depth to be determined in the field.
8 - Nitrogen analysis include Nitrate+Nitrite (As N) and Total Kjeldahl Nitrogen (TKN)
VOCs - Volatile organic compounds
SVOCs - Semi-volatile organic compounds
PPL Metals - Priority Pollutant List metals
WT - Water table
Hold - Sample will be collected at geoprobe locations and held at the laboratory and analysis to be conducted pending results from other sample locations. Surface samples to be held will be collected after analytical results from intial samples are recieved.
* indicates that a sample will be collected if potential Asbestos Containing Material is observed during test trenching

Figures



UMore Mining Area (UMA)

UMore Park Boundary

Figure 1

SITE LOCATION

SSI/RI Work Plan
Sites of Concern 4 and 5
UMore Mining Area
Dakota County, MN

N

Feet
6,000 0 6,000

Source: MnDOT, MN DNR, Dakota County, Barr, SEH, HKGi.
USGS topographic map background downloaded from the U.S. Department of Agriculture, Natural Resources Conservation Service.

BARR

UMP005524

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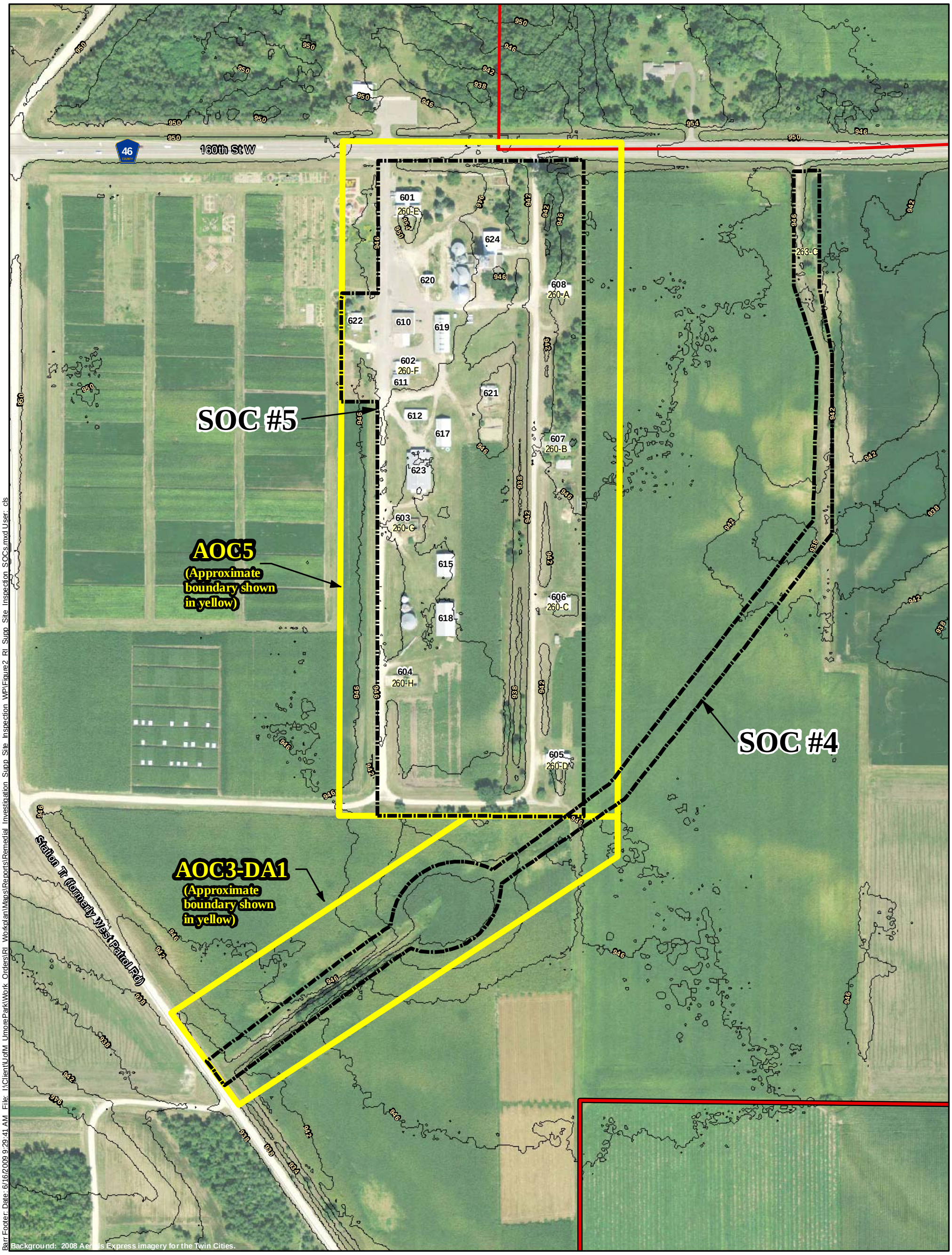


Barr Footer: Date: 6/16/2009 9:29:41 AM File: I:\Client\UofM_UmorePark\Work Orders\RI Workplan\Maps\Reports\Remedial Investigation Supp Site Inspection WP\Figure2 RI Supp Site Inspection SOCs.mxd User: cls

UMore Mining Area Boundary (UMA)

UMore Park Boundary

Site of Concern (SOC) Boundary

USACE AOC Boundaries (based on Baywest 2008)

Ground Surface Contour (4-foot interval) ft, msl

260-H GOW-Era Building Number

604 University Building Number

N

Feet

250 0 250

Source: Dakota County, Barr, SEH, HKGi, Bay West (2008).

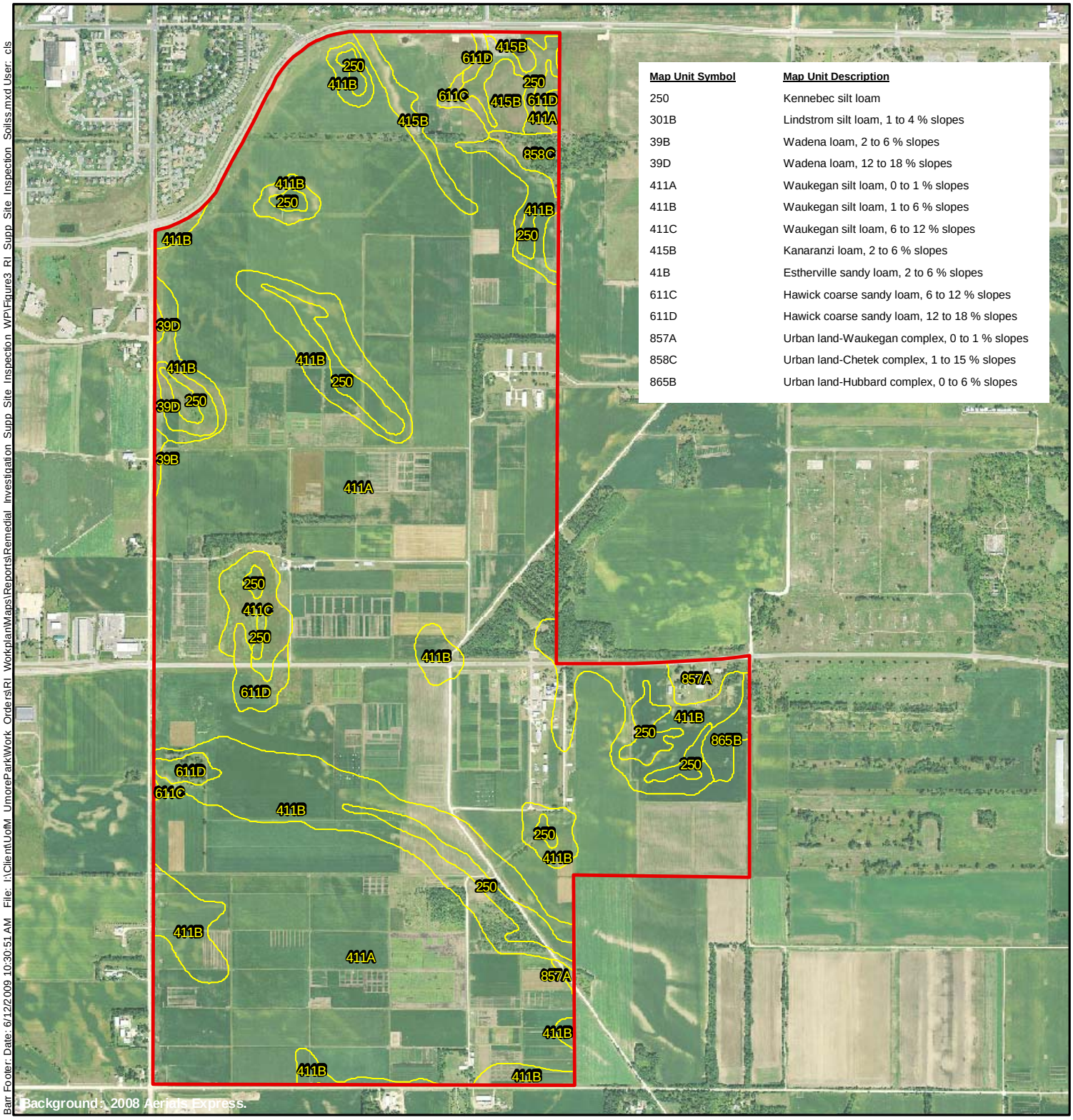
Figure 2

SOC #4 AND SOC #5

SSI/RI Work Plan
Sites of Concern 4 and 5
UMore Mining Area
Dakota County, MN

BARR

UMP005525



Map Unit Symbol	Map Unit Description
250	Kennebec silt loam
301B	Lindstrom silt loam, 1 to 4 % slopes
39B	Wadena loam, 2 to 6 % slopes
39D	Wadena loam, 12 to 18 % slopes
411A	Waukegan silt loam, 0 to 1 % slopes
411B	Waukegan silt loam, 1 to 6 % slopes
411C	Waukegan silt loam, 6 to 12 % slopes
415B	Kanaranzi loam, 2 to 6 % slopes
41B	Estherville sandy loam, 2 to 6 % slopes
611C	Hawick coarse sandy loam, 6 to 12 % slopes
611D	Hawick coarse sandy loam, 12 to 18 % slopes
857A	Urban land-Waukegan complex, 0 to 1 % slopes
858C	Urban land-Chetek complex, 1 to 15 % slopes
865B	Urban land-Hubbard complex, 0 to 6 % slopes

UMore Mining Area Boundary (UMA)

Soil Series

Figure 3

UMA SURFACE SOILS

SSI/RI Work Plan
Sites of Concern 4 and 5
UMore Mining Area
Dakota County, MN

N

Feet

1,000 0 1,000 2,000

Source: MnDOT, MN DNR, Dakota County, USGS, Barr, SEH.
Soil data is Soil Survey Geographic (SSURGO) database for Dakota County from the U.S. Department of Agriculture, Natural Resources Conservation Service.

BARR

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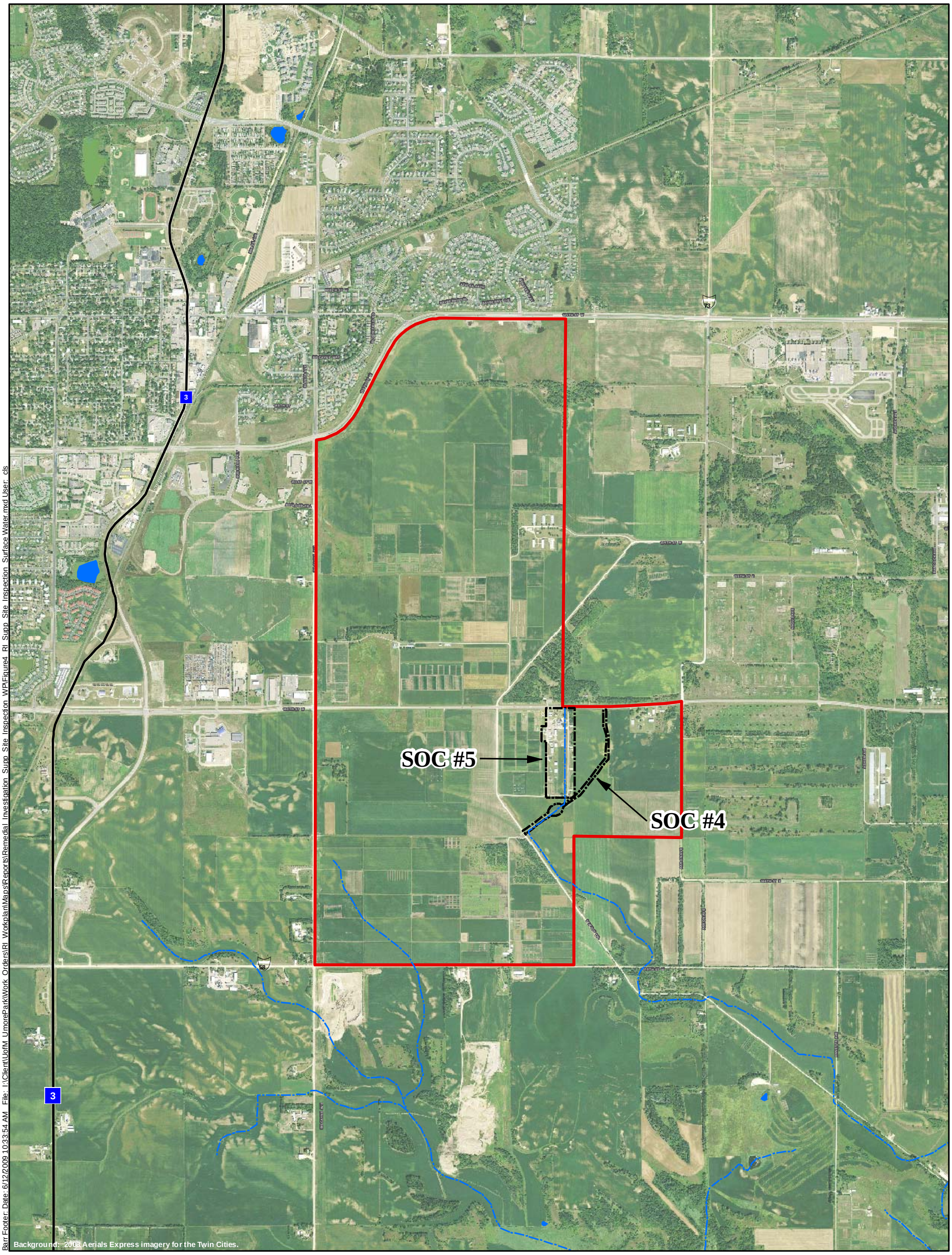

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UMore Mining Area Boundary (UMA)

Site of Concern (SOC) Boundary

Intermittent Stream

Waterbody

Note: Field data indicate that the intermittent streams shown do not flow out of the UMA.

Source: Dakota County, Barr, SEH, HKGi, MN DNR. Waterbodies and Streams within 1-mile of the UMA boundary are shown and were downloaded from the MN DNR Data Deli.

N

Feet

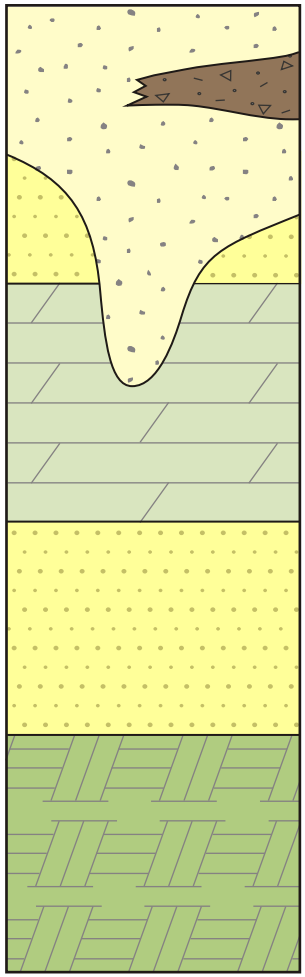
1,000 0 1,000 2,000

Figure 4

SURFACE WATER

SSI/RI Work Plan
Sites of Concern 4 and 5
UMore Mining Area
Dakota County, MN

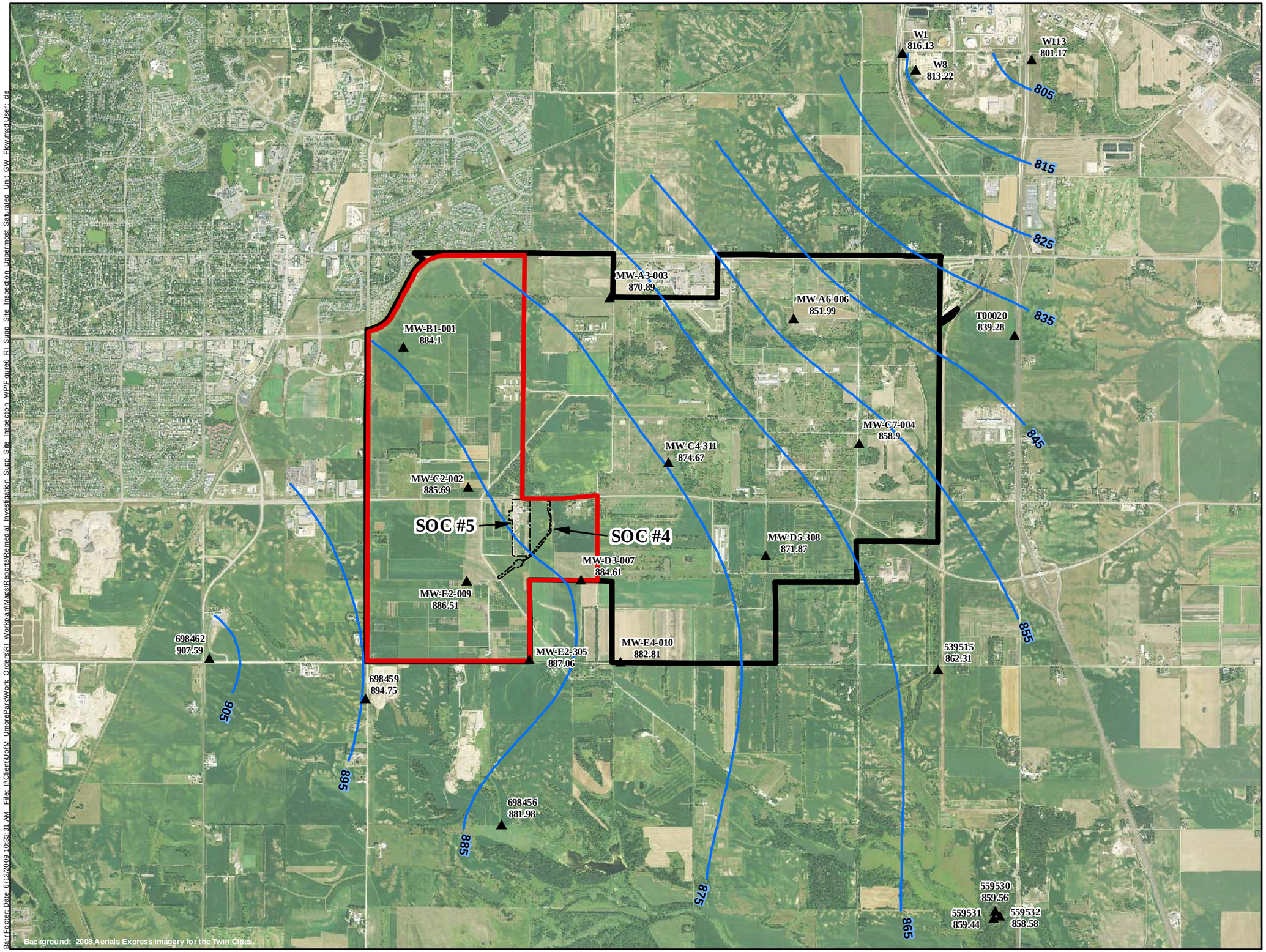
BARR



Formation Name and Graphic	Description	Site Nomenclature	Hydrogeologic Role
Unconsolidated Glacial Deposits	Unconsolidated sand and gravel	Outwash (sand & gravel deposit)	Surficial Aquifer
	containing fine grained diamicton	Diamiciton or Till	Leaky Confining Unit
	and lacustrine deposits.	Lacustrine - Lake bed silts & clays	Leaky Confining Unit
St. Peter	Fine to medium grained sandstone	St. Peter Formation Sandstone	Aquifer (where saturated)
Shakopee and Oneota	Thin to medium-bedded crystalline dolomite	Prairie Du Chien Group	Aquifer
Jordan	Fine to coarse sandstone	Jordan Formation Sandstone	Aquifer
St. Lawrence	Dolomitic shale and siltstone	St. Lawrence Formation	Regional Confining Unit

Figure 5

GENERALIZED STRATIGRAPHIC COLUMN
SSI/RI WORK PLAN
UMore Mining Area
Dakota County, MN



874.67 Groundwater Elevation ft, msl
April 3, 2009

▲ Monitoring Well

Groundwater Elevation Contour ft, msl

UMore Park Boundary

UMore Mining Area Boundary (UMA)

Site of Concern (SOC) Boundary

Source: Metropolitan Council, MnDOT, Dakota County, Barr, ProSource, SEH, HKGi.

Water levels used for this map are from wells completed in the uppermost saturated unit and within 25 feet of the water table. Most of the wells used are completed in Quaternary deposits or the St Peter formation, except W1, which is completed in the Prairie du Chien formation, and T00020, which is completed across Quaternary deposits and the Prairie du Chien formation. Well MW-C4-311 completed in St. Peter Sandstone confirmed by diamicton.

N

Feet
3,000 0 3,000

Figure 6

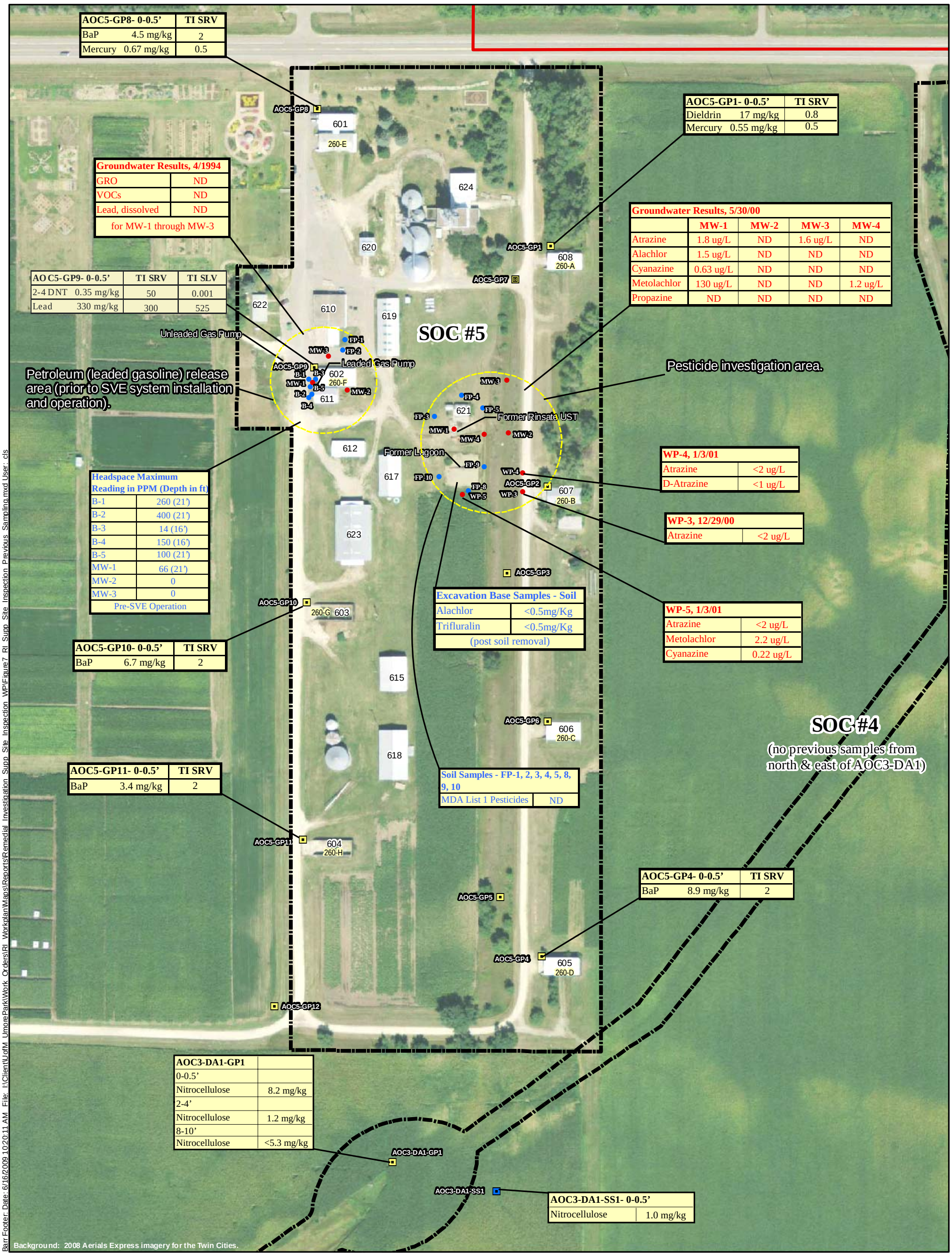
GROUNDWATER FLOW MAP
(UPPERMOST SATURATED UNIT)

SSI/RI Work Plan
Sites of Concern 4 and 5
UMore Mining Area
Dakota County, MN

BARR

UMP005529

Barr Footer: Date: 6/12/2009 10:33:31 AM File: I:\Client\UofM UmorePark\Work Orders\RI Workplan\Maps\Reports\Remedial Investigation Supp Site Inspection WP\Figure6 RI Supp Site Inspection Uppermost Saturated Unit GW Flow.mxd User: ds



UMore Mining Area (UMA)
Site of Concern (SOC) Boundary
USACE Geoprobe (Approximate Location from Bay West, 2009)
USACE Soil & Water Geoprobe (Approximate Location from Bay West, 2009)
USACE Surface Soil Sample (Approximate Location from Bay West, 2009)

Historical Sample Location
- Groundwater
- Soil

Figure 7

GENERAL SUMMARY OF PREVIOUS SAMPLING RESULTS

SSI/RI Work Plan
Sites of Concern 4 and 5
UMore Mining Area
Dakota County, MN

Notes:
1. Sample locations are approximate.
2. Not all data from previous investigations are shown.
   a. USACE data only nitrocellulose detections and other parameter detections above Tier I SRVs or SLVs are shown .
   b. Other data (STS, 1991; Peer 1994 and 2001) includes subset of data to demonstrate results of past investigations after corrective actions were implemented (unless noted otherwise).

Source: Dakota County, Barr, SEH, HKGi, Bay West (2008).

N
Feet
150 0 150

BARR

UMP005530

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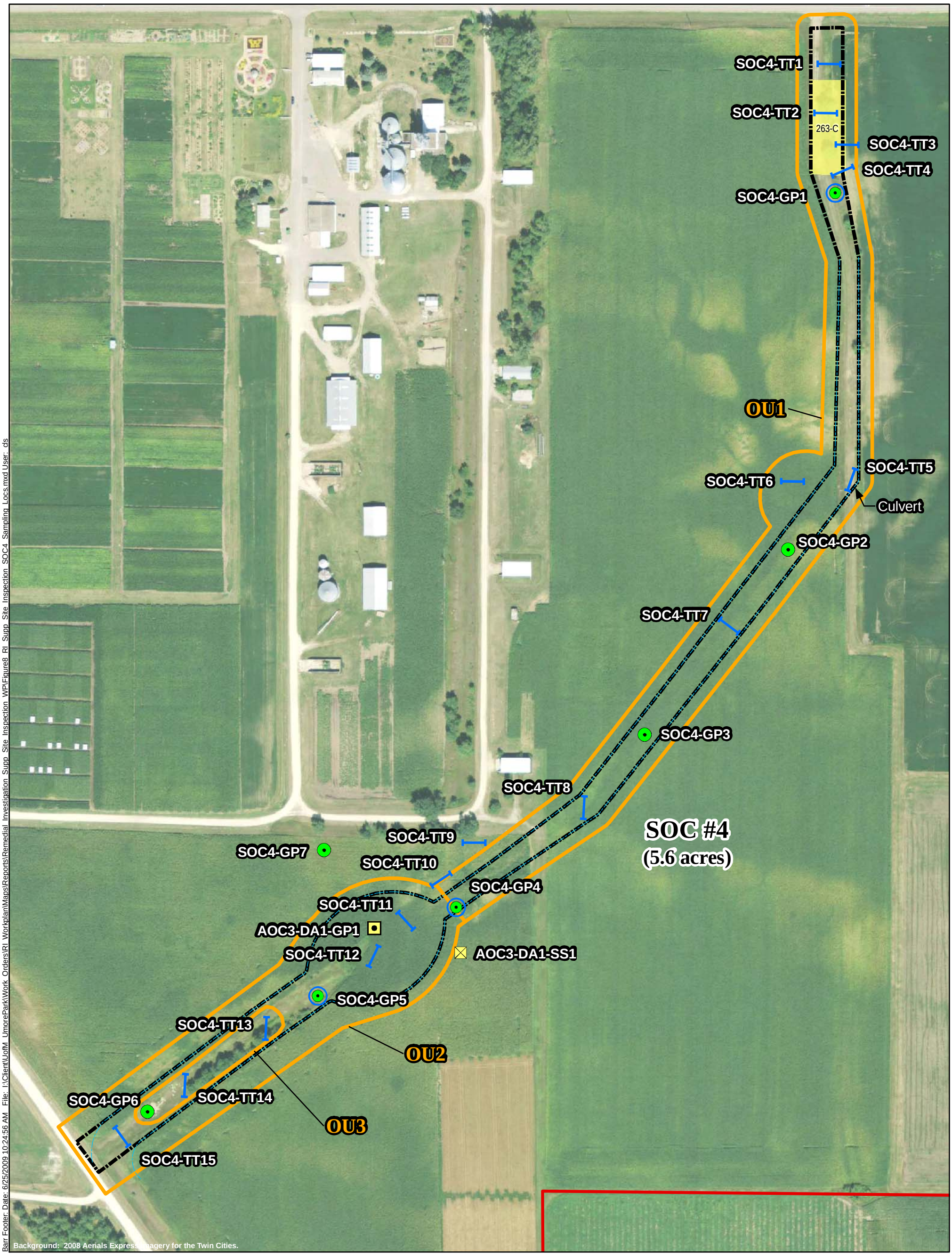


Barr Footer: Date: 6/25/2009 10:24:56 AM File: I:\Client\UofM_UmorePark\Work Orders\RI Workplan\Maps\Reports\Remedial Investigation Supp Site Inspection WP\Figure8 RI Supp Site Inspection SOC4 Sampling Locs.mxd User: cls

- UMore Mining Area Boundary (UMA)
- Site of Concern (SOC) Boundary
- Operational Unit
- Former GOW Building (location from Dakota Co.)
- Direct Push Boring for Soil Sampling
- Direct Push Boring for Soil and Groundwater Sampling
- Test Trench
- USACE Geoprobe (Approximate Location from Bay West, 2009)
- USACE Surface Soil Sample (Approximate Location from Bay West, 2009)
- Trace of Former Ditch Alignment (Approximate)

Notes:
1. Based on field observation, test trenches may consist of discontinuous test pits excavated throughout the planned trench limits.
2. Sample locations are approximate and may vary depending on site conditions.
3. Operational Unit boundaries are offset from SOC boundaries for the purpose of graphical presentation.

Source: Dakota County, Barr, SEH, HKGi.

N

Feet
200 0 200

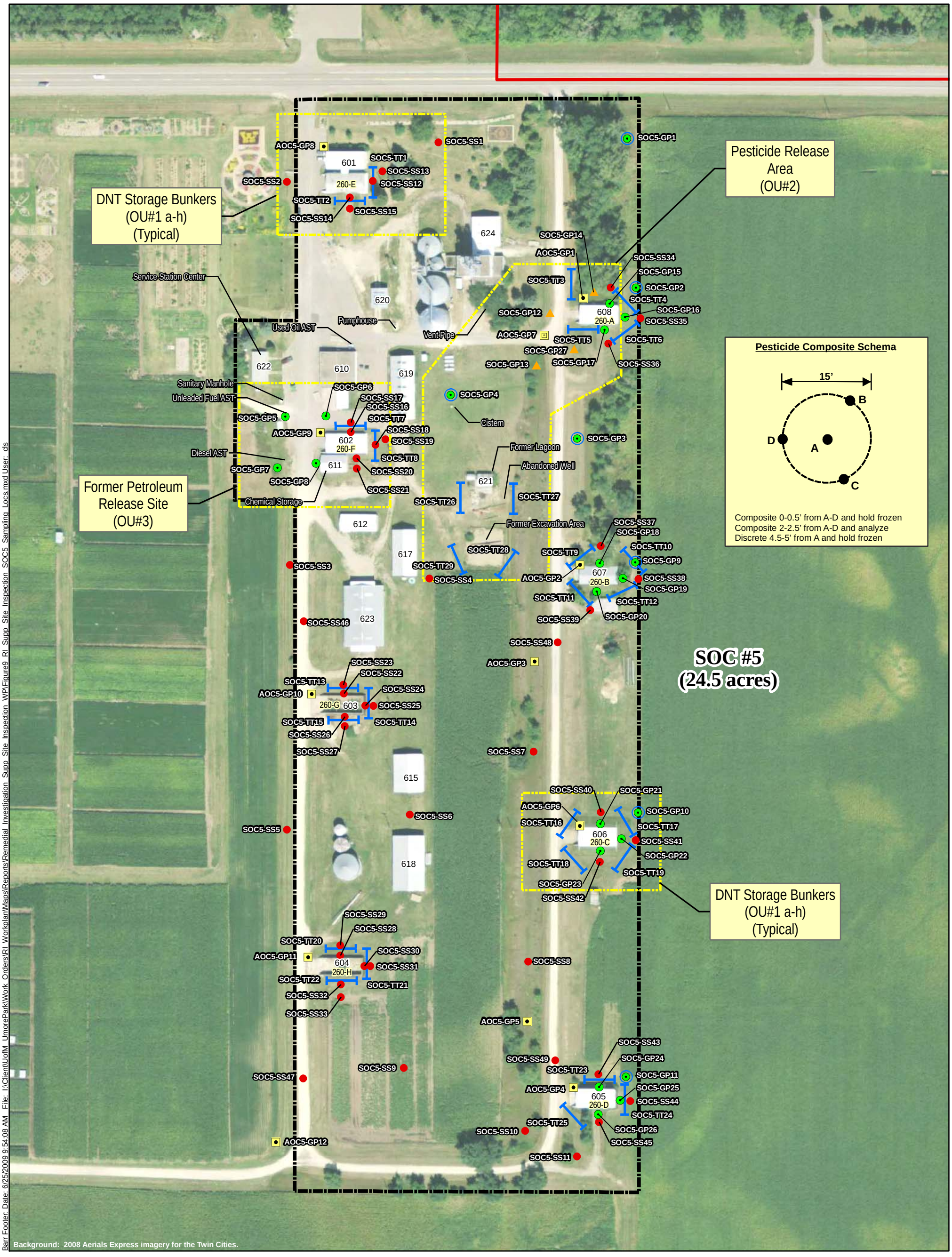
Figure 8

FORMER DNT LOADING PLATFORM AND DRAINAGE DITCH (SOC #4) SAMPLING LOCATIONS

SSI/RI Work Plan
Sites of Concern 4 and 5
UMore Mining Area
Dakota County, MN

BARR

UMP005531



UMore Mining Area Boundary (UMA)
Site of Concern (SOC) Boundary
Direct Push Boring for Ag. Chem. Soil Sampling
Direct Push Boring for Soil Sampling
Direct Push Boring for Soil and/or Groundwater Sampling
Test Trench
Surface Soil Sampling
USACE Geoprobe (Approximate Location from Bay West, 2009)
USACE Soil & Water Geoprobe (Approximate Location from Bay West, 2009)

Notes:
1. Based on field observation, test trenches may consist of discontinuous test pits excavated throughout the planned trench limits.
2. Sample locations are approximate and may vary depending on site conditions.
Source: Dakota County, Barr, SEH, HKGi, Bay West (2008).

N
Feet
150 0 150

Figure 9

CENTRAL SERVICES STATION /FORMER DNT BUNKERS (SOC #5) SAMPLING LOCATIONS

SSI/RI Work Plan
Sites of Concern 4 and 5
UMore Mining Area
Dakota County, MN

BARR

UMP005532

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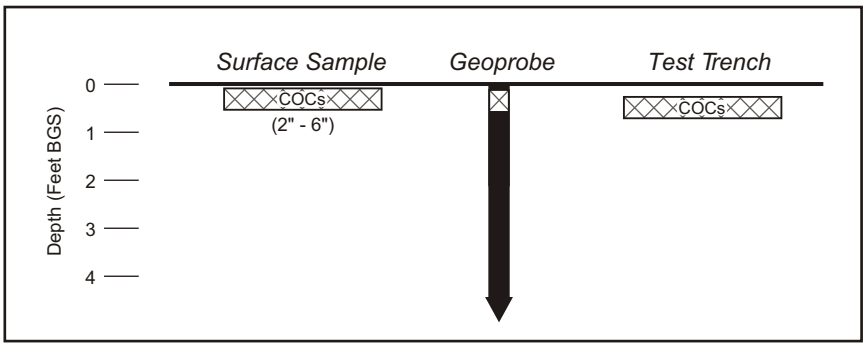
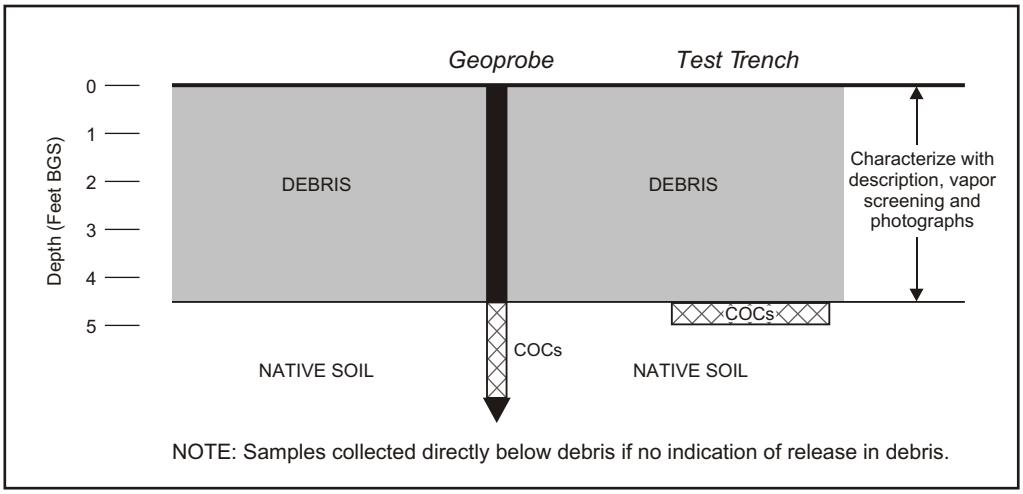


Comments:

1. Sample locations adjusted in field to ground surface depressions or where indication of a release is detected. (i.e., staining, stressed vegetation, etc.)
2. Geoprobe: If additional sample volume is needed, additional geoprobe borings will be advanced within 12" of the initial borehole.
3. Samples collected between vegetation rooting zone, typically 2 to 6 inches.

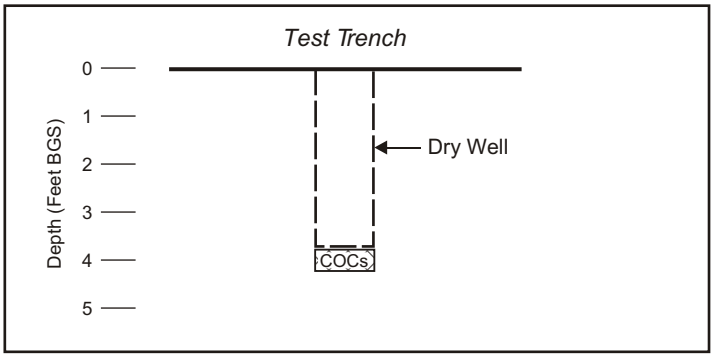
1. Conceptual Release Model: Surface Spill and Overland Transport



Comments:

1. Sample debris if indication of a release is detected. (i.e., staining, elevated headspace readings, etc.)
2. Samples collected directly below debris if no indication of release in debris.

2. Conceptual Release Model: Surface Debris



Comments:

1. Sample soil immediately beneath suspected source or where indication of a release is detected. (i.e., staining, elevated headspace readings, etc.)

3. Conceptual Release Model: Point Source Release to Subsurface Soil

SAMPLE EXPLANATION

COCs SOC Specific Constituents of Concern Sampling Interval

Figure 10

SOIL SAMPLING APPROACHES
SSI/RI WORK PLAN
UMore Mining Area
Dakota County, Minnesota

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UMore Mining Area Boundary (UMA)

Water Supply Well Sampling Location

Figure 11

WATER SUPPLY WELL SAMPLING LOCATIONS

SSI/RI Work Plan
Sites of Concern 4 and 5
UMore Mining Area
Dakota County, MN

N

Feet

400 0 400

Source: MnDOT, MN DNR, Dakota County, Barr, SEH.

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