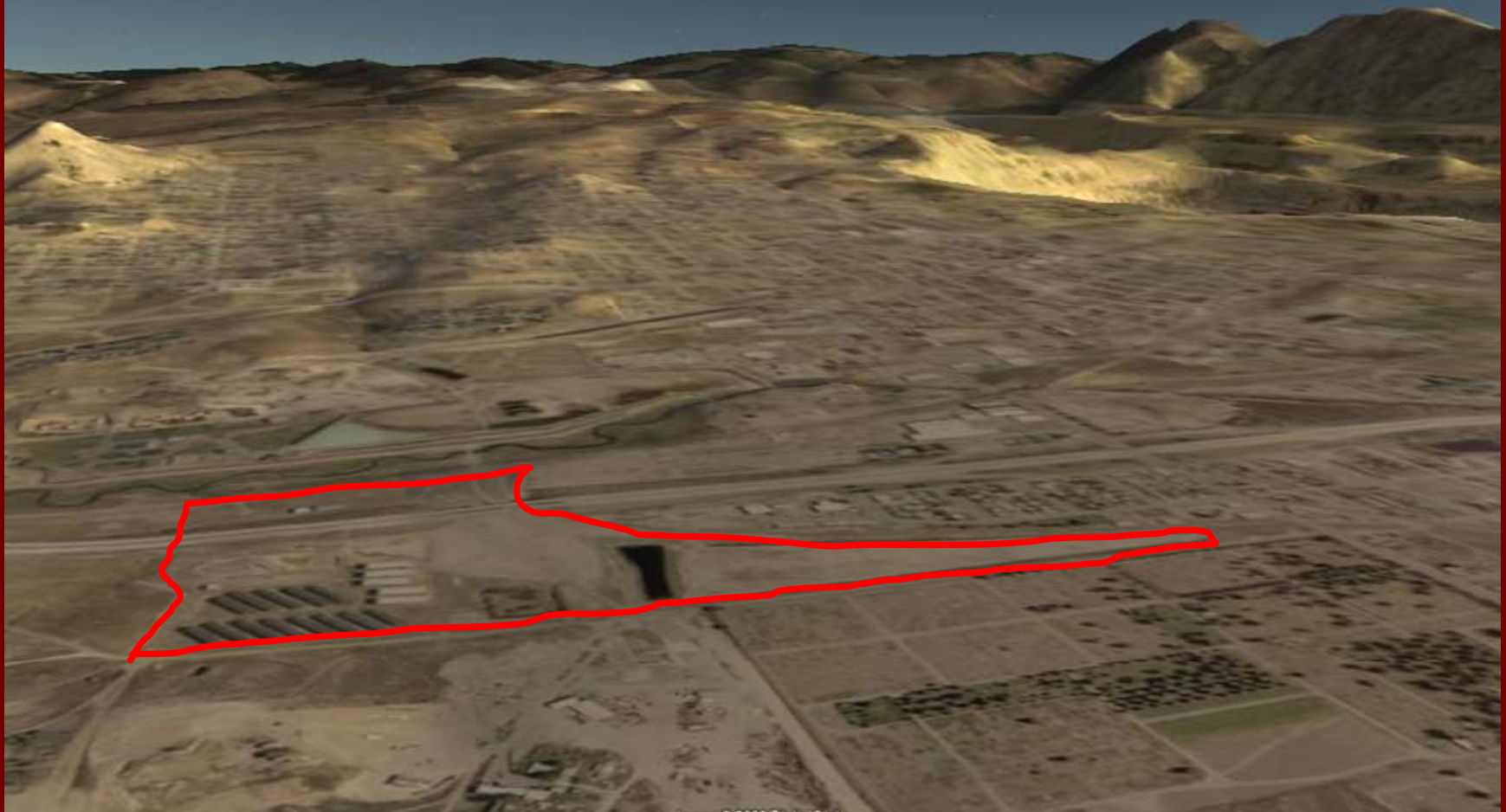


Montana Pole Water Treatment Plant





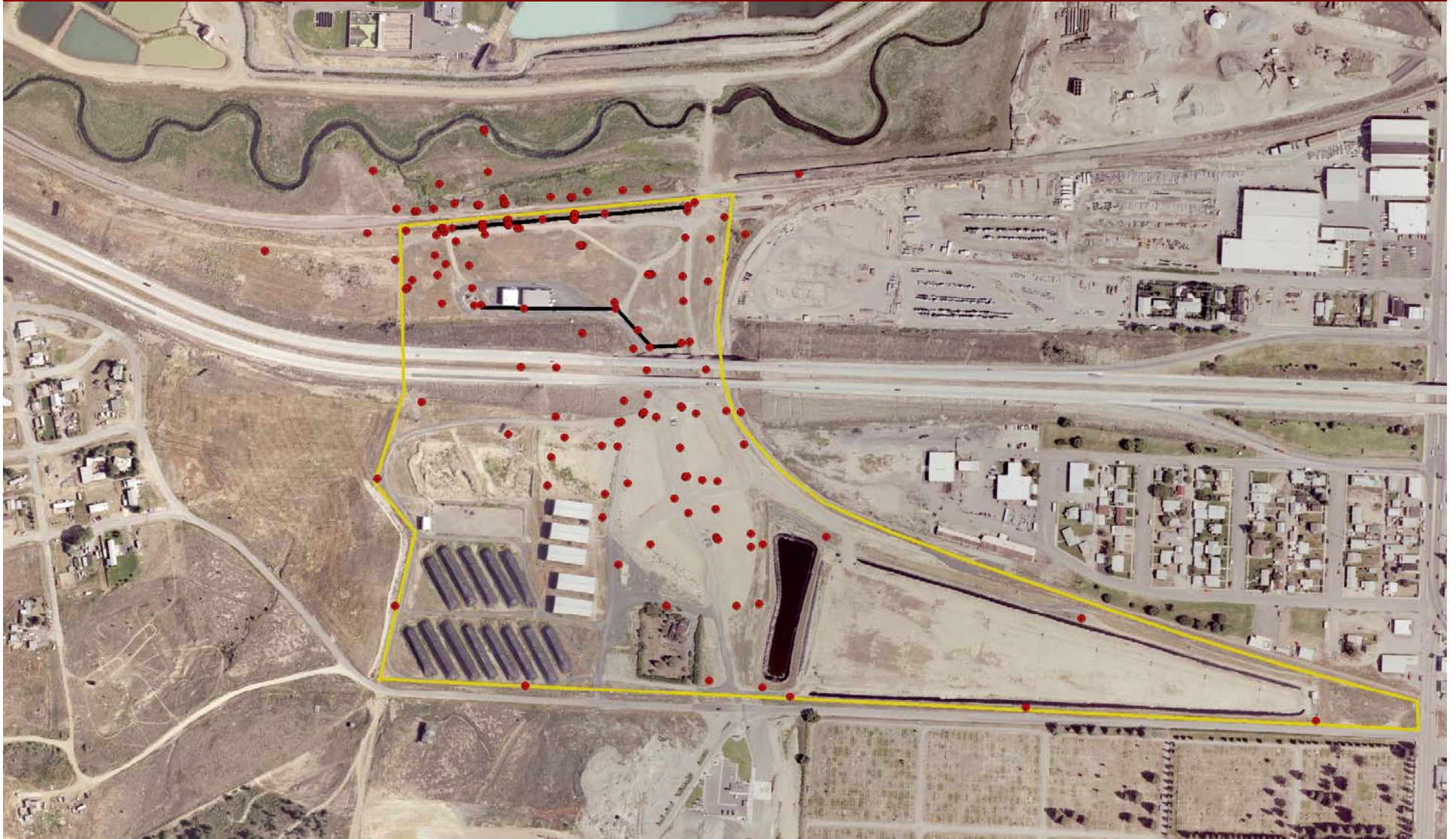
lat 45.991636° lon -112.547516°

elev 5464 ft

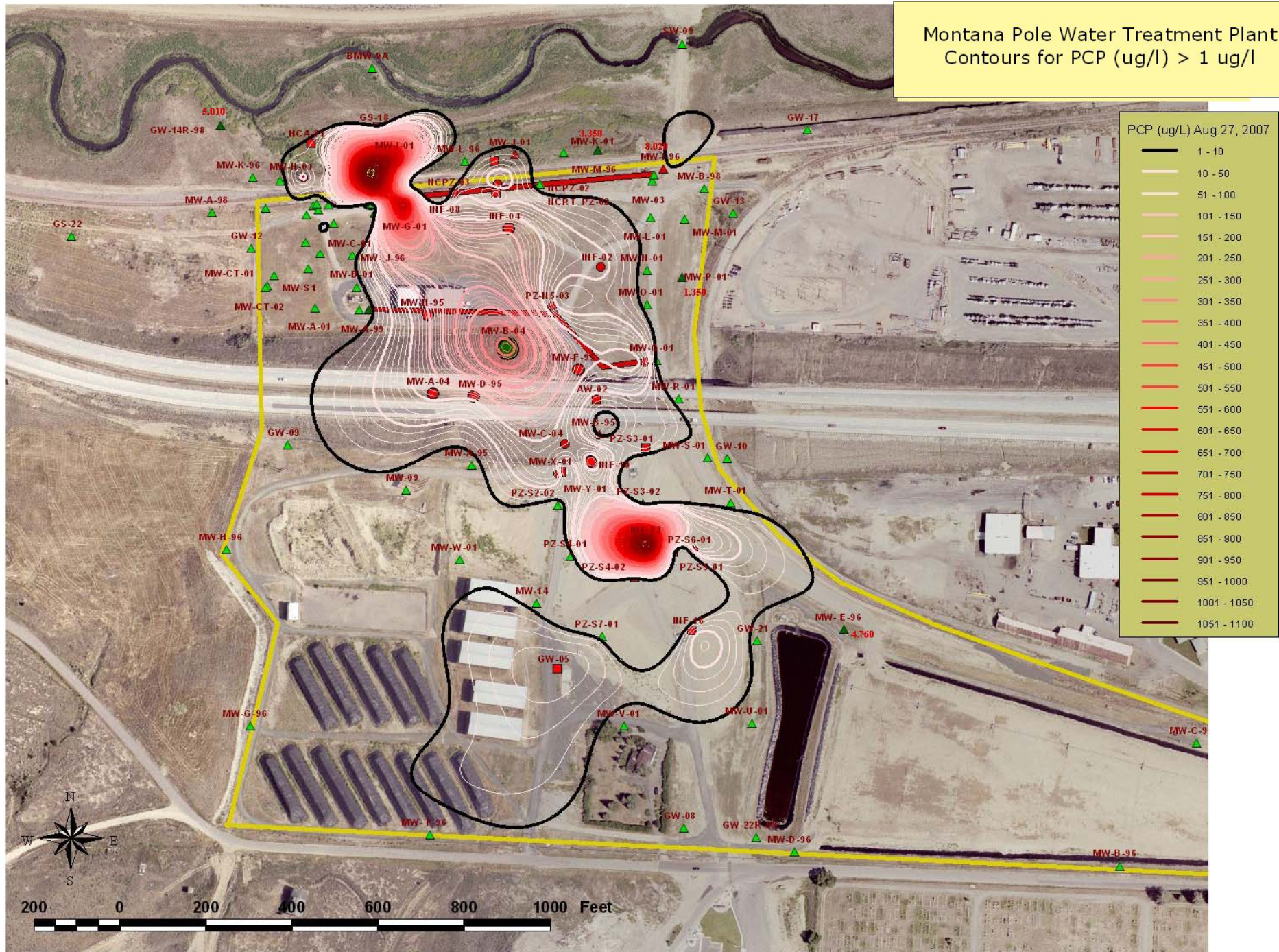
©2008 Google

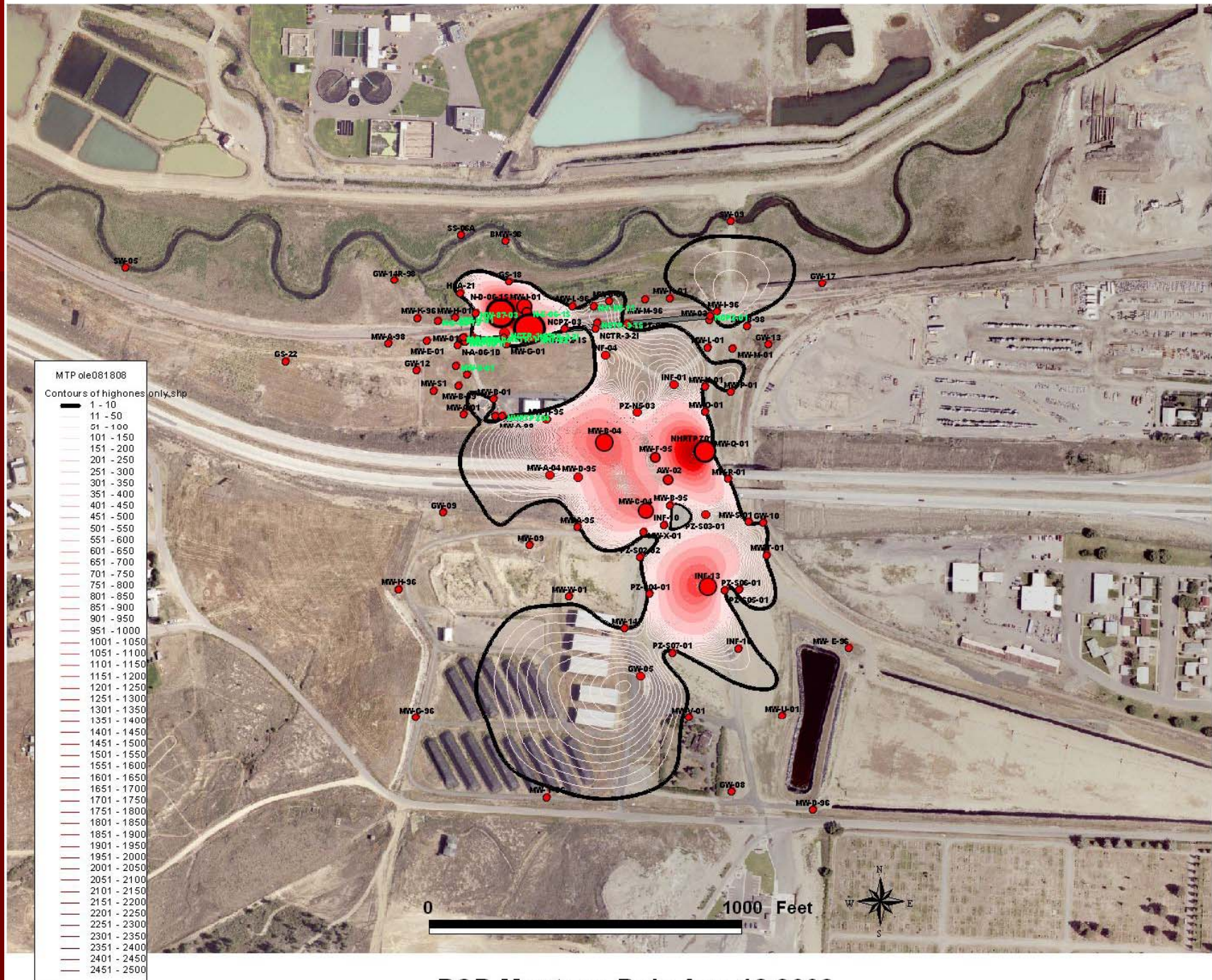
Eye alt 7917 ft

Montana Pole Water Treatment Plant

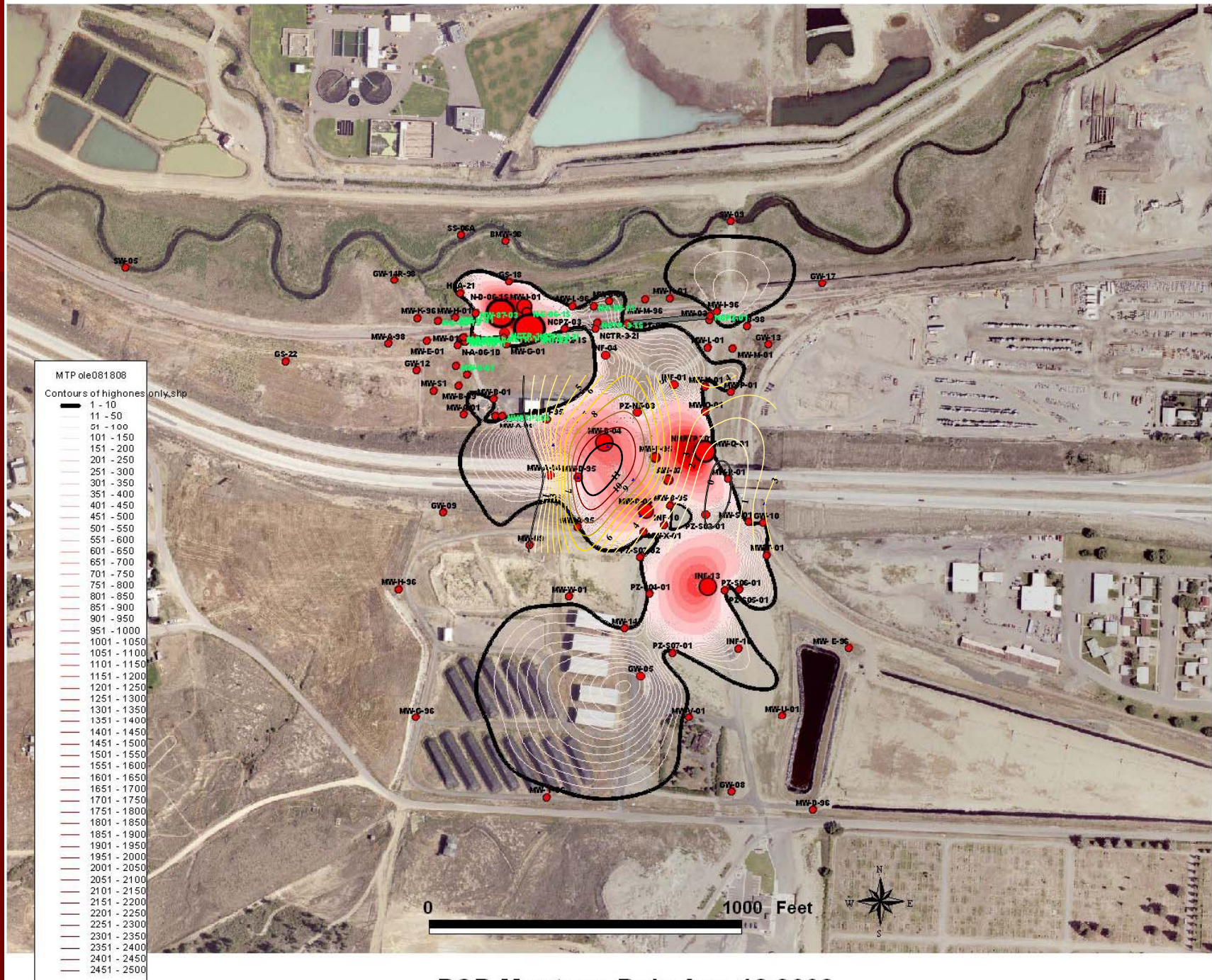


Montana Pole Water Treatment Plant
Contours for PCP (ug/l) > 1 ug/l

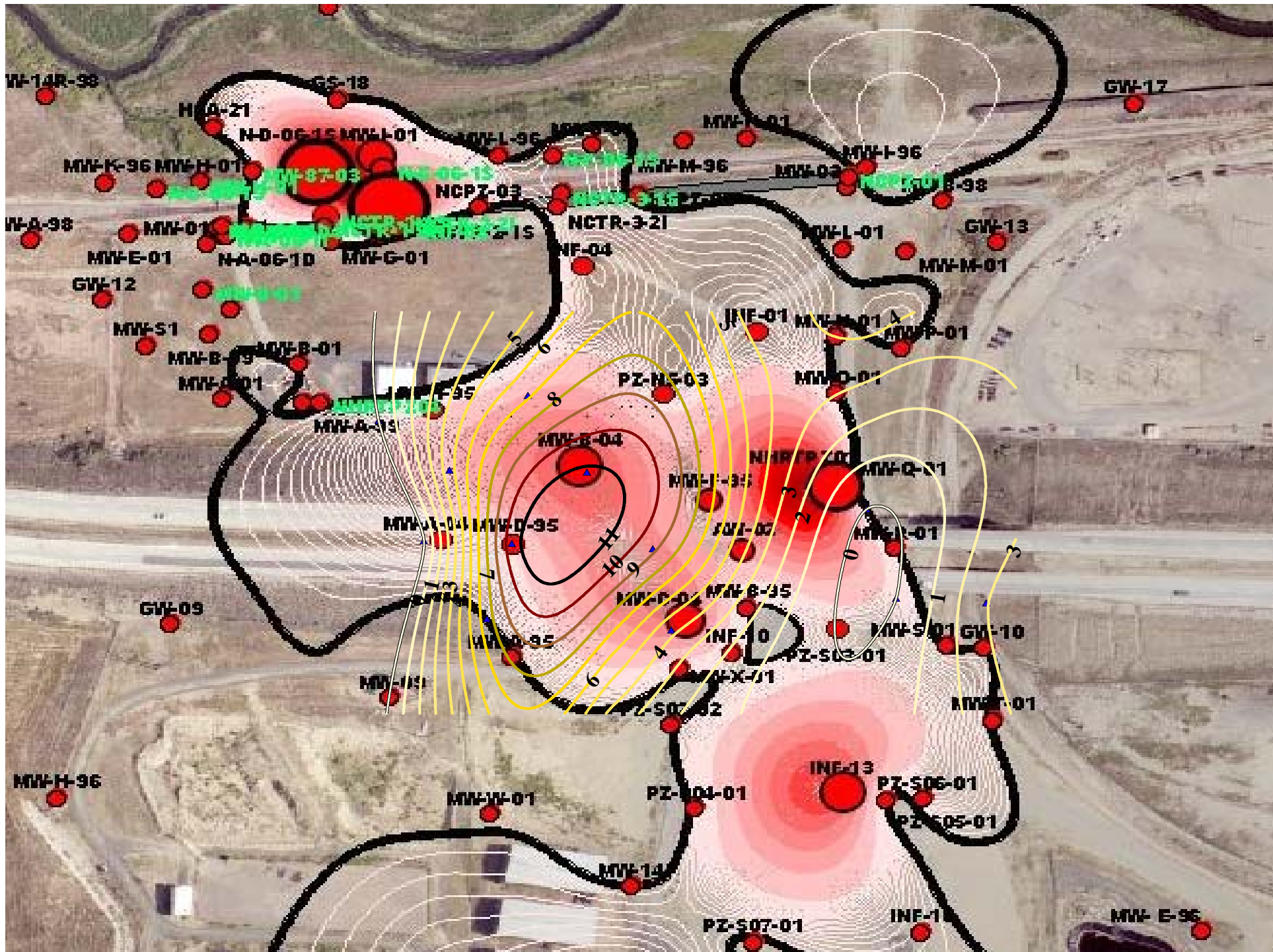


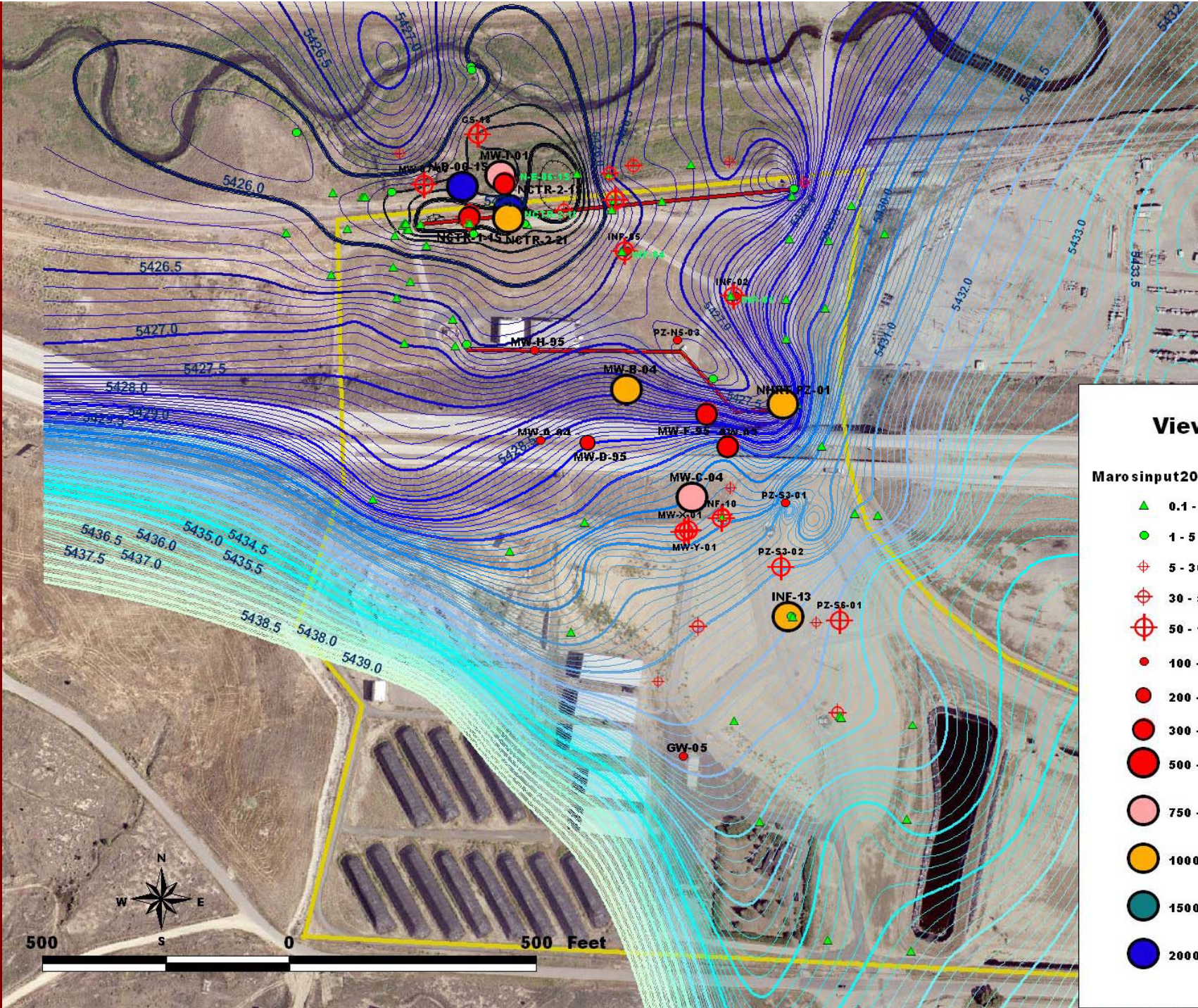


PCP Montana Pole Aug 18,2008



PCP Montana Pole Aug 18,2008

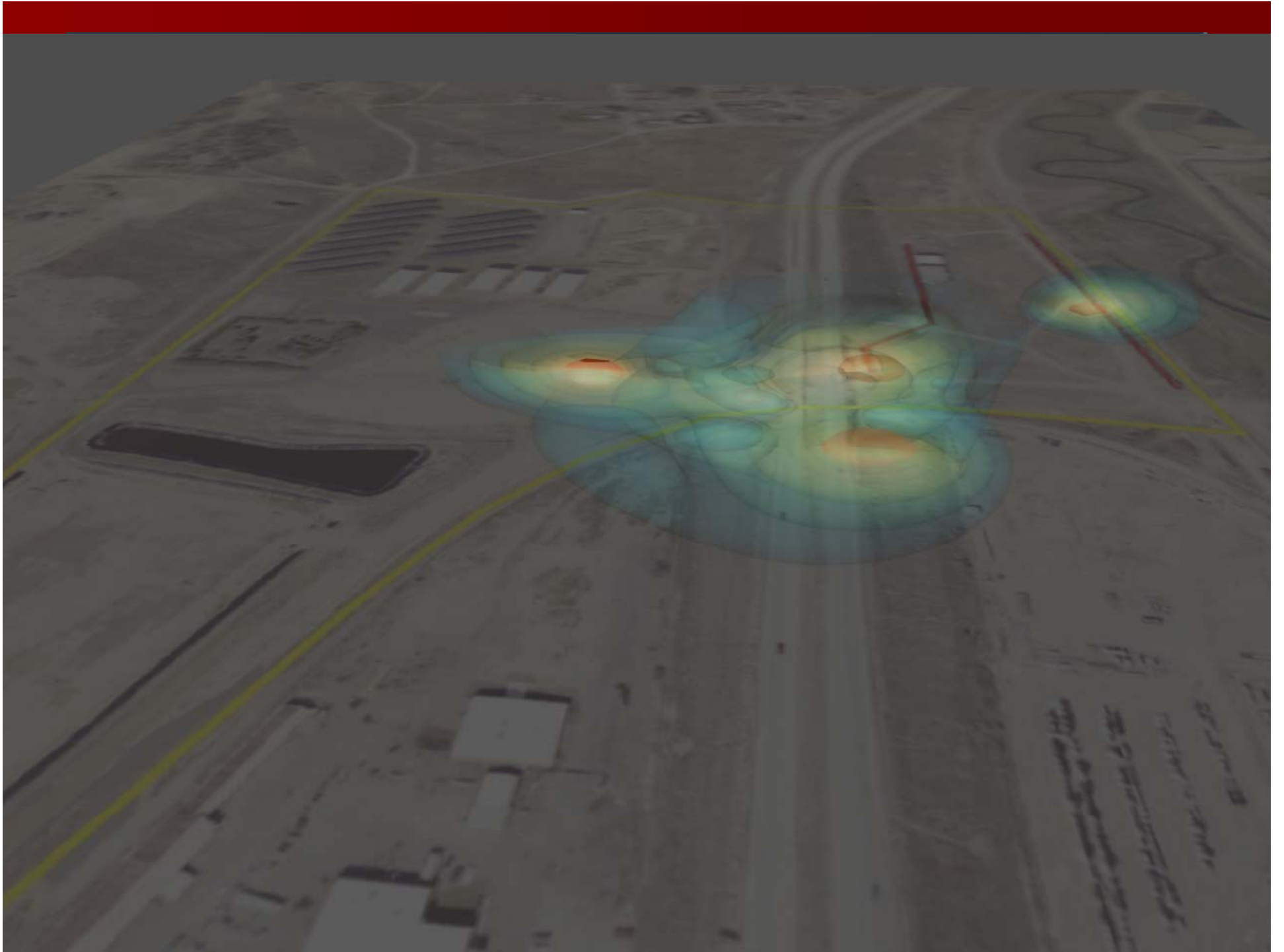


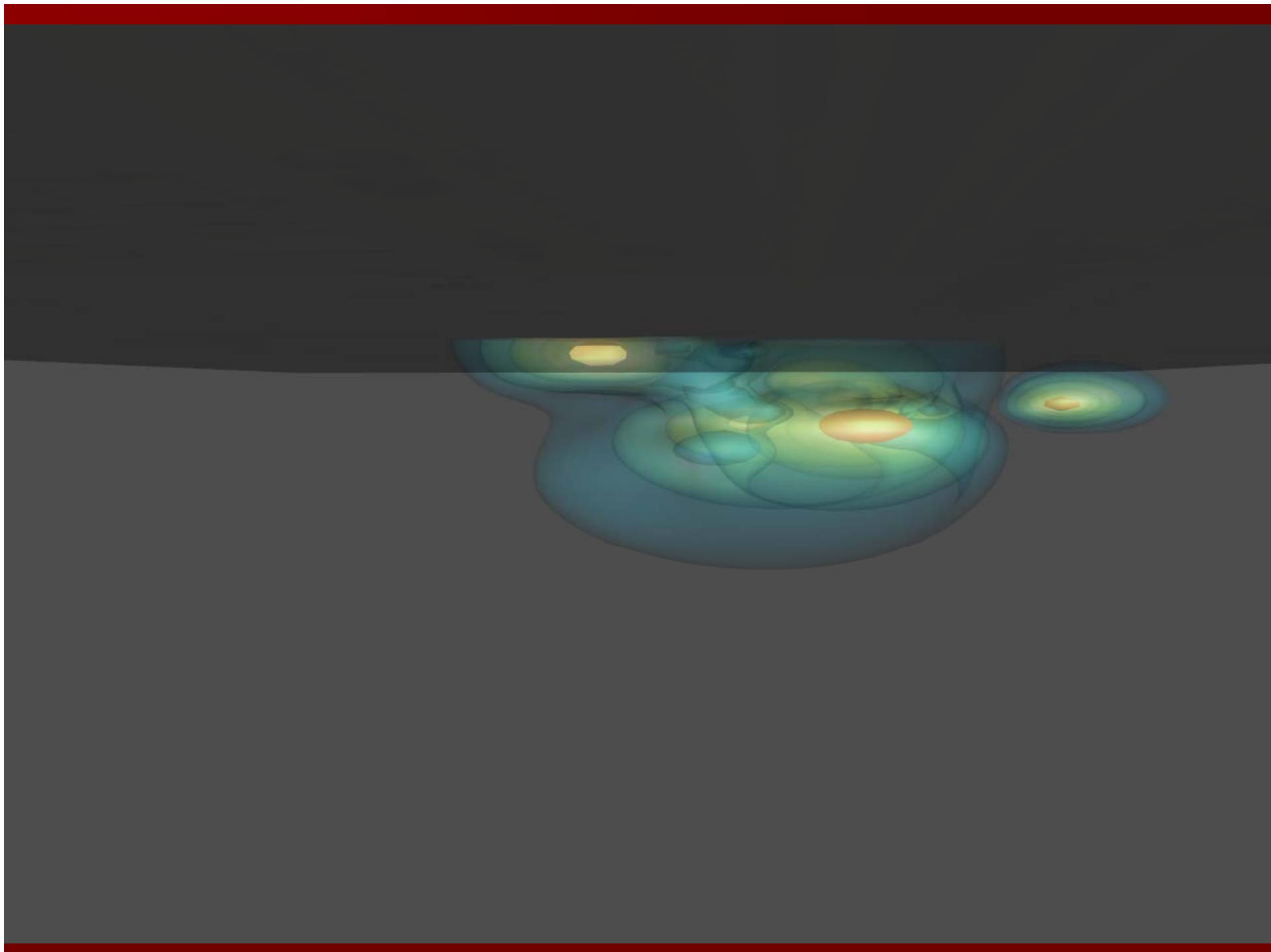


View1

Marosinput2008_allwell

- ▲ 0.1 - 1
- 1 - 5
- ◆ 5 - 30
- ⊕ 30 - 50
- ⊕ 50 - 100
- 100 - 200
- 200 - 300
- 300 - 500
- 500 - 750
- 750 - 1000
- 1000 - 1500
- 1500 - 2000
- 2000 - 2500





Recent Activities at the Montana Pole Plant

- Plant upgrades
- Reduction in well monitoring
- Treatability study focused on injection of oxidizing compounds into PCP hotspots, primarily under highway
(persulphate, CoolOx)
- Groundwater modeling

Upgrades

- Evaluation, repair, and updating of wiring diagrams between main control panel in office and remote panels at the trenches through logic testing and wire tracing
- Replacement of several flowmeters, level sensors, and pressure gauges/switches with devices that are properly ranged and/or work better in cold weather

Upgrades

- Newly built control panels at the trenches
- Better user interface

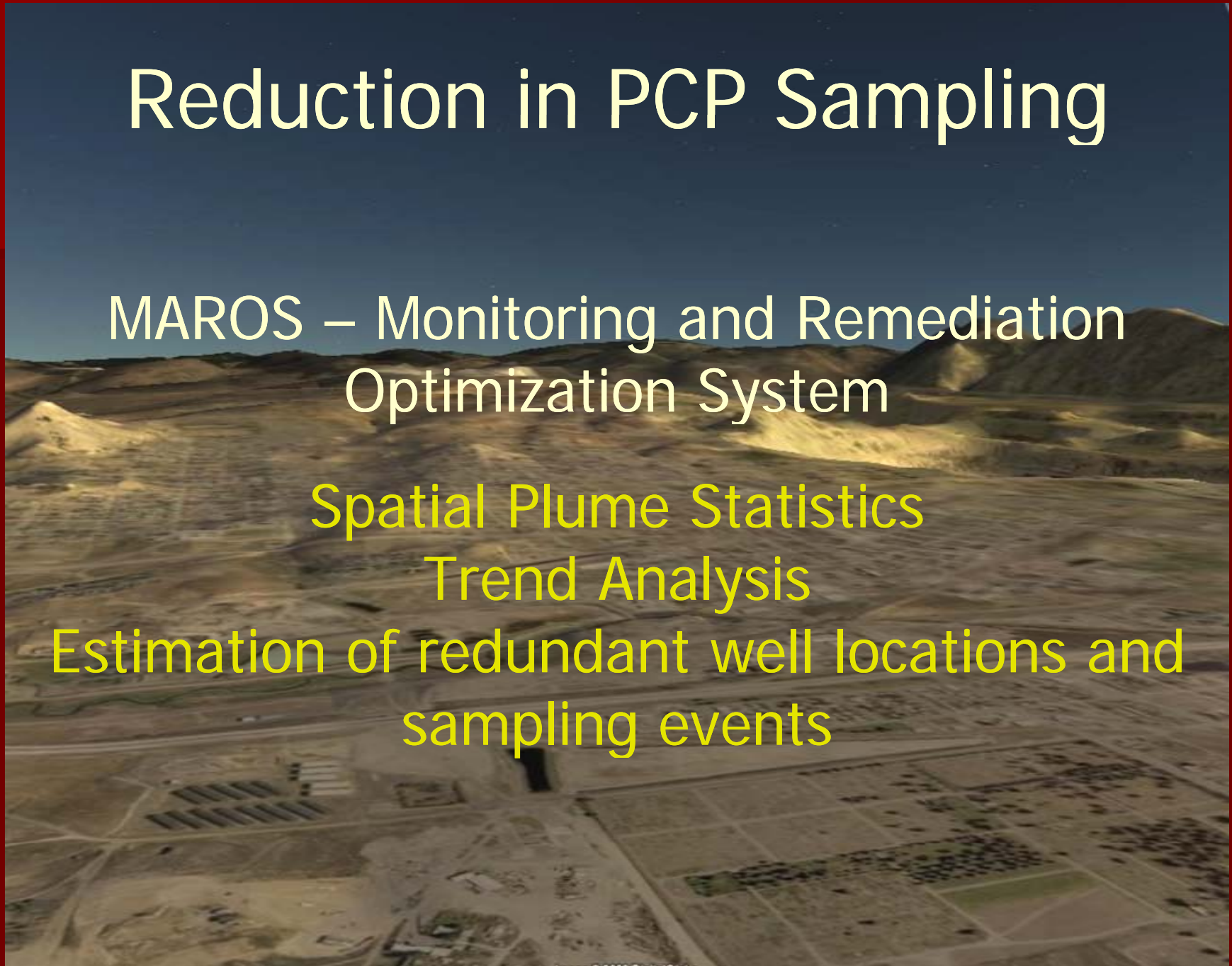
Reduction in PCP Sampling

MAROS – Monitoring and Remediation
Optimization System

Spatial Plume Statistics

Trend Analysis

Estimation of redundant well locations and
sampling events



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Entire List	Toms elim list	MAROS Elimination		GTS elimination list			Sampling Freq		Trend Results - GTS input			Trend Results - MAROS input										
2	WellName	WellName	GTSinput	MAROSinput	cutoff = 4	cutoff = 7	cutoff = 9	MAROS	GTS	MannKend	Linear Reg	LOEResult	MannKend	Conf in Tre	Linear Regr	LOEResult							
3	AW-02			TRUE				Q		NT	PI	PI	NT	75.8%	NT	NT							
4	BMW-9A	BMW-9A						A		I	I	I	I	97.5%	I	I							
5	GW-05							Q		I	I	I	I	95.8%	I	I							
6	GW-09	GW-09						A		I	NT	PI	NT	67.5%	NT	NT							
7	GW-14R-98				TRUE	TRUE	TRUE	A	A	NT	NT	NT	NT	40.8%	NT	NT							
8	GW-21							B	A	NT	NT	NT	NT	88.3%	PI	PI							
9	HCA-21		TRUE	TRUE	TRUE	TRUE	TRUE	A		D	D	D	D	95.8%	D	D							
10	INF-01	INF-01		TRUE				Q	A	NT	NT	NT	NT	75.8%	NT	NT							
11	INF-02				TRUE	TRUE	TRUE	Q	B	NT	PI	PI	NT	82.1%	NT	NT							
12	INF-03	INF-03						A	A	I	PI	PI	NT	88.3%	NT	NT							
13	INF-04		TRUE	TRUE				Q	A	PI	I	PI	NT	75.8%	I	PI							
14	INF-05	INF-05	TRUE	TRUE		TRUE	TRUE	Q	B	PI	I	PI	NT	75.8%	NT	NT							
15	INF-07							A	A	S	S	S	NT	59.2%	NT	NT							
16	INF-08							A	A	D	D	D	D	95.8%	D	D							
17	INF-10		TRUE	TRUE				Q	B	NT	NT	NT	NT	75.8%	NT	NT							
18	INF-11	INF-11	TRUE	TRUE				Q	B	D	D	D	NT	59.2%	NT	NT							
19	INF-13							Q	B	S	S	S	NT	75.8%	NT	NT							
20	INF-14	INF-14						A	A	NT	S	S	S	40.8%	S	S							
21	INF-16				TRUE	TRUE	TRUE	A	A	D	PD	D	S	88.3%	D	PD							
22	INF-17	INF-17						A	B	D	D	D	D	95.8%	PD	D							
23	MP-04	MP-04						A		I	I	I	PI	92.1%	I	PI							
24	MW-03	MW-03			TRUE	TRUE	TRUE	A		PI	I	PI	I	95.8%	I	I							
25	MW-09	MW-09						B	A	I	I	I	PI	92.1%	I	PI							
26	MW-14							Q	A	NT	PI	PI	NT	75.8%	PI	PI							
27	MW-87-03				TRUE	TRUE	TRUE	Q	A	NT	NT	NT	NT	88.3%	NT	NT							
28	MW-A-01	MW-A-01						A	A	I	I	I	I	97.5%	I	I							
29	MW-A-04	MW-A-04			TRUE	TRUE	TRUE	A		S	S	S	S	59.2%	S	S							
30	MW-A-95							A	B	PD	D	D	NT	59.2%	NT	NT							
31	MW-A-98	MW-A-98				TRUE	TRUE	A	A	I	I	I	I	95.8%	PI	PI							

Mann-Kendall Trend Summary

PCP Trend	# of wells in class
I	17
PI	8
S	16
NT	48
PD	0
D	3

Well Monitoring Network

152 wells



Monitoring Network After 34 Wells Removed

118 wells



difference as a percentage of the reference or true value

EffectiveDate	Mass	SigmaXX	SigmaYY	SourceDistance
2/2/2004	-0.9%	-1.4%	-1.4%	-1.3%
8/2/2004	-35.1%	46.7%	52.1%	-1.3%
2/7/2005	-7.7%	12.7%	6.7%	-2.3%
8/1/2005	-31.5%	35.2%	47.8%	0.6%
2/6/2006	7.4%	1.5%	-3.3%	3.9%
8/14/2006	7.7%	19.6%	5.3%	-0.5%
2/5/2007	1.8%	-0.6%	-1.7%	-0.5%
8/27/2007	-16.4%	39.0%	22.3%	-0.4%
2/4/2008	9.7%	-0.1%	-5.8%	-2.8%
8/18/2008	-18.1%	27.9%	27.0%	-5.1%
	MomentType	COV	Conf in Trend	
	ZeroMoment	-18.8%	19.2%	
	FirstMomentX	-8.3%	50.1%	
	FirstMomentY	10.0%	0.0%	
	SecondMomentX	-14.9%	-12.1%	
	SecondMomentY	-16.5%	-12.1%	
	FirstMomentDist	3.3%	-12.1%	

Treatability of PCP Hotspots



Conventional Fenton Process- Oxidation by Liquid Hydrogen Peroxide

- Chemical oxidation with Fenton reactions involves the catalyzed decomposition of H_2O_2 by Fe^{2+} to form the hydroxyl radical $^*\text{OH}$, a strong oxidant.



Ferric iron is added as ferric sulphate

Modified Fenton - CoolOx

- the CoolOx process generates hydrogen peroxide from CaO_2 powder-based solid peroxygens that are injected into the soil or groundwater as a slurry
- Uses soil mineral sources for Fe^{3+}
- Produces a surfactant foam with the consistency of shaving cream – gone after 2 days

Questions? Comments?

