

**GROUNDWATER ANALYTICAL RESULTS: METALS, BTEX, TPH, PAH, PESTICIDES
HELENA EAST REMEDIATION AND REDEVELOPMENT PER**

			Various										Metals								BTEX				TPHs				PAHs					OC/OP Pesticides			
			pH (no units)	Cyanide	Aluminum	Ammonia	Arsenic	Cadmium	Chromium	Copper	Manganese	Mercury	Nickel	Lead	Selenium	Zinc	Benzene	Toluene	Ethyl-Benzene	Xylenes	C ₉₋₉	C ₁₀₋₁₄	C ₁₅₋₂₈	C ₂₉₋₃₆	Naphthalene	2-methylnaphthalene	Fluorene	Phenanthrene	Benzofluorene	Total PAH	Aldrin	Dieldrin	DDT	Total Chlordane			
			WATER ASSESSMENT CRITERIA										mg/L								mg/L				µg/L					µg/L							
Drinking Water			6.5-8.5	0.08	0.2	NV	0.007	0.002	0.05	2	0.5	0.001	0.02	0.01	0.01	3	0.001	0.8	0.3	0.6	NV	NV	NV	NV	NV	NV	NV	NV	0.00001	NV	0.3	20	1				
Fresh Water			6.5-9.0	0.07	0.055	NV	0.013	0.0002	0.01	0.0014	1.9	0.00006	0.011	0.0034	0.005	0.008	0.95	0.3	NV	0.2	NV	NV	NV	NV	16	NV	NV	NV	NV	3	0.01	NV	0.006	0.03			
Sample ID	ARL#	Date	GROUNDWATER ANALYTICAL RESULTS										mg/L								mg/L				µg/L					µg/L							
ATA-1	20137	9/08/2005	7.6	-	0.06	0.001	0.001	<0.0002	0.001	0.002	-	<0.0002	<0.001	<0.001	0.001	0.003	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
ATA-2	20276	10/08/2005	7.0	-	-	0.001	<0.001	<0.0002	0.001	0.013	-	0.0003	0.017	<0.001	<0.001	0.62	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
ATA-3	22132	25/08/2005	6.7	-	-	0.001	0.001	<0.0002	0.003	0.001	0.002	<0.0001	0.004	<0.001	0.001	0.049	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
ATA-4	22133	25/08/2005	6.7	<0.01	-	0.004	0.001	<0.0002	<0.001	<0.001	0.92	0.006	<0.001	0.006	<0.001	0.10	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	0.3	1.1	<0.1	<0.2	<3.7	-	-	-	-			
ATA-5	20277	10/08/2005	6.8	-	-	0.001	<0.001	<0.002	0.003	0.004	-	<0.0001	0.013	<0.001	<0.001	0.29	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-				
ATA-6	20459	11/08/2005	6.2	-	-	<0.001	<0.001	<0.0002	<0.001	0.003	-	<0.0001	0.018	<0.001	<0.001	0.21	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
ATA-7	20460	11/08/2005	6.0	-	-	<0.001	<0.001	0.0005	<0.001	0.006	-	<0.0001	10.0	<0.001	<0.001	0.21	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
ATA-8	21173	18/08/2005	6.3	-	-	0.001	0.001	<0.0002	<0.001	0.009	-	0.0003	0.013	<0.001	<0.001	0.30	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
ATA-9	21174	18/08/2005	6.6	-	-	0.001	0.004	<0.0002	<0.001	0.003	-	<0.0001	0.007	<0.001	<0.001	0.10	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
ATA-10	20461	11/08/2005	7.0	-	-	<0.001	<0.001	<0.0002	<0.001	0.001	-	<0.0001	0.002	0.001	<0.001	0.016	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
ATA-11	21316	19/08/2005	6.6	-	-	<0.001	<0.001	0.0003	<0.001	0.003	-	<0.0001	0.014	0.002	<0.001	0.14	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	0.9	0.3	<0.1	<0.1	<0.2	<3.6	-	-	-	-	-			
ATA-12	21175	11/08/2005	7.0	<0.01	-	0.001	0.004	<0.0002	<0.001	0.001	-	<0.0001	0.010	<0.001	<0.001	0.096	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
ATA-15	21184	18/08/05 & ...	6.1	-	-	<0.001	<0.001	<0.0002	0.001	0.002	-	<0.0001	0.003	<0.001	<0.001	0.093	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
ATA-16	21315	19/08/2005	6.3	<0.01	-	<0.001	<0.001	<0.0002	<0.001	<0.001	-	<0.0001	0.009	0.004	<0.001	0.18	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
ATA-72	5796	9/03/2006	-	-	-	0.001	<0.001	<0.0001	<0.001	<0.001	-	<0.0001	0.005	<0.001	-	0.008	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
ATA-73	5797	9/03/2006	-	-	-	0.003	<0.001	<0.0001	<0.001	<0.001	-	<0.0001	0.007	0.002	-	0.011	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
ATA-75	5798	9/03/2006	-	-	-	0.003	<0.001	<0.0001	<0.001	<0.001	-	<0.0001	0.028	0.001	-	0.36	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
ATA-76	5799	9/03/2006	-	-	-	0.004	<0.001	<0.0001	<0.001	<0.001	-	<0.0001	0.21	0.002	-	3.2	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
ATA-77	5800	9/03/2006	-	-	-	0.001	0.0005	<0.0001	<0.001	0.001	-	<0.0001	0.032	0.004	-	0.23	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
B3	24336	16/09/2005	6.3	<0.01	-	0.001	<0.001	0.0003	<0.001	0.003	0.15	<0.0001	0.17	<0.001	0.001	0.092	-	-	-	-	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	<0.001	<0.001	<0.001	<0.002			
HSB	24826	22/09/2005	6.7	<0.01	-	0.001	0.001	<0.0001	0.001	<0.001	0.04	<0.0001	0.017	<0.001	<0.001	0.032	<0.001	<0.001	0.015	0.0003	0.25	0.62	0.74	<0.04	-	-	-	-	-	-	-	-	-	-			
HSB	21913	23/08/2005	6.3	-	-	<0.001	0.001	<0.0002	0.001	0.003	-	<0.0001	0.006	<0.001	<0.001	0.14	0.004	0.005	0.013	0.005	0.03	0.02	0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
HE-1	24824	22/09/2005	5.8	<0.01	-	0.001	0.003	<0.0001	<0.001	0.002	0.03	<0.0001	0.004	<0.001	0.001	0.067	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
HE-2	24825	22/09/2005	5.8	<0.01	-	0.002	0.002	0.0002	<0.001	0.007	0.07	<0.0001	0.008	0.003	0.001	0.076	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
HE-3	21729	22/08/2005	6.3	-	-	<0.001	0.002	<0.0002	<0.001	0.001	-	<0.0001	0.003	<0.001	<0.001	0.28	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
HE-5	20145	8/08/2005	5.7	<0.01	-	0.003	0.002	<0.0002	0.002	0.027	-	<0.0001	0.092	0.002	<0.001	1.20	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-			
HE-6	20146	8/08/2005	5.6	-	-	0.002	0.001	<0.0002	<0.001	0.010	-	<0.0001	0.019	0.002	<0.001	0.65	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
HE-7	21317	19/08/2005	5.4	-	-	<0.001	<0.001	0.0004	<0.001	0.003	-	<0.0001	0.002	<0.001	0.22	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-	-			
HE-8	21912	23/08/2005	6.2	-	-	<0.001	0.001	<0.0002	<0.001	0.007	-	0.0004	0.003	<0.001	<0.001	0.71	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
HE-9	20136	9/08/2005	7.3	-	0.01	0.003	0.004	<0.0002	0.002	<0.001	-	<0.0002	0.003	<0.001	0.004	0.003	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-			
HE-11	21176	18/08/2005	6.5	-	-	<0.001	<0.001	<0.0002	<0.001	<0.001	-	<0.0001	0.031	<0.001	<0.001	0.19	-	-	-	-	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	<0.001	<0.001	<0.001	<0.002			
HE-14	24463	19/09/2005	6.0	<0.01	-	<0.001	<0.0																														

**GROUNDWATER ANALYTICAL RESULTS: METALS, BTEX, TPH, PAH, PESTICIDES
HELENA EAST REMEDIATION AND REDEVELOPMENT PER**

	Various		Metals												BTEX				TPHs				PAHs					OC/OP Pesticides					
	pH (no units)	Cyanide	Aluminium	Antimony	Arsenic	Cadmium	Chromium	Copper	Manganese	Mercury	Nickel	Lead	Selenium	Zinc	Benzene	Toluene	Ethyl-Benzene	Xylenes	C ₆₋₉	C ₁₀₋₁₄	C ₁₅₋₂₈	C ₂₉₋₃₆	Naphthalene	2-methylnaphthalene	Fluorene	Phenanthrene	Benzo[a]pyrene	Total PAH	Aldrin	Dieldrin	DDT	Total Chlordane	
	WATER ASSESSMENT CRITERIA																																
Drinking Water	6.5-8.5	0.08	0.2	NV	0.007	0.002	0.05	2	0.5	0.001	0.02	0.01	0.01	3	0.001	0.8	0.3	0.6	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.00001	NV	0.3	20	1	
Fresh Water	6.5-9.0	0.07	0.055	NV	0.013	0.0002	0.01	0.0014	1.9	0.00006	0.011	0.0034	0.005	0.008	0.95	0.3	NV	0.2	NV	NV	NV	NV	16	NV	NV	NV	NV	3	0.01	NV	0.006	0.03	
Sample ID	ARL#	Date	GROUNDWATER ANALYTICAL RESULTS																														
			mg/L												mg/L				mg/L					µg/L									
TB 18/8/05	21179	18/08/2005	-	<0.01	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-	
TB 19/8/05	21320	18/08/2005	-	<0.01	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-	
TB 22/8/05	21731	18/08/2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	
TB 23/9/05	21916	23/08/2005	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.003	-	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-	
TB 25/8/05	22137	25/08/2005	-	-	-	-	-	-	-	-	-	-	-	-	<0.001	<0.001	<0.001	<0.003	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	-	-	-	-	
TB 8/8/05	20147	8/08/2005	6.0	<0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	
TB 9/8/05	20138	9/08/2005	7.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	
TB 19/9/05	24465	19/09/2005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	
TB 16/9/05	24337	16/09/2005	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	<0.04	<0.04	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.2	<2.5	<0.001	<0.001	<0.001	<0.002	
TRIP BLANK	24828	22/09/2005	-	-	-	-	-	-	-	-	-	-	-	-	<0.02	<0.02	<0.04	<0.04	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	
DUP1	21177	18/08/2005	7.2	<0.01	-	<0.001	0.002	<0.0002	0.001	0.001	-	<0.0001	<0.001	<0.001	0.066	-	-	-	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-	-	-
DUP2	22135	25/08/2005	5.8	-	-	<0.001	0.001	<0.0002	<0.001	<0.001	0.038	0.0004	0.013	<0.001	0.003	0.40	0.008	0.063	0.16	0.93	6.0	6.6	0.47	<0.04	130	68	0.8	1.2	<0.2	202.1	-	-	-
DUP1 09/03/06	5801	9/03/2006	-	-	-	-	0.002	<0.001	<0.001	<0.001	-	<0.0001	0.012	0.005	0.02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
DUP2 09/03/06	5802	9/03/2006	-	-	-	-	<0.001	<0.001	<0.001	<0.001	-	<0.0001	0.007	0.009	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Notes:
Insufficient water: HE-13, HE-14
Bores destroyed: HE-4, HE-10, HE-12, HE-13

GROUNDWATER LABORATORY SPIKE RECOVERIES
HELENA EAST REMEDIATION AND REDEVELOPMENT PER

ARL LAB #	Antimony	Arsenic	Cadmium	Chromium	Copper	Manganese	Mercury	Nickel	Lead	Selenium	Zinc	TPH		BTEX		PAH		OC/OP Pesticides	
20145-20148	-	-	97%	110%	91%	-	-	95%	95%	-	-	93%	-	84%	-	89%	104%	-	-
20136-20139	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20276-20279	-	-	113%	113%	92%	-	-	97%	94%	-	-	82%	-	-	-	-	-	-	-
20459-20463	98%	-	113%	113%	92%	-	-	97%	94%	-	-	-	-	84%	-	-	-	-	-
21173-21179	-	-	103%	103%	101%	-	-	98%	94%	-	92%	89%	104%	107%	-	-	-	-	-
21184	-	-	-	-	-	-	-	-	-	-	-	90%	102%	-	-	-	-	-	-
21315-21320	-	-	-	-	-	-	-	-	-	-	-	82%	-	107%	-	89%	104%	-	-
21728-21731	-	85%	105%	102%	92%	-	87%	105%	95%	103%	96%	-	-	82%	-	-	-	-	-
21912-21916	-	-	-	-	-	-	-	-	-	-	-	85%	-	106%	-	91%	72%	-	-
22132-22137	87%	92%	95%	96%	82%	91%	87%	103%	95%	103%	98%	94%	-	79%	-	112%	113%	99%	103%
24463-24466	-	86%	103%	108%	107%	104%	84%	101%	99%	-	100%	102%	-	-	-	86%	90%	119%	89%
24336-24338	-	83%	102%	108%	107%	104%	-	101%	99%	-	100%	102%	-	-	-	86%	90%	100%	105%
24824-24828	-	-	103%	108%	107%	104%	93%	101%	99%	86%	100%	102%	-	-	-	-	-	-	-
5796-5803	-	-	94%	84%	84%	-	80%	99%	113%	-	-	86%	-	87%	102%	80%	83%	-	-

GROUNDWATER RPD CALCULATIONS
HELENA EAST REMEDIATION AND REDEVELOPMENT PER

	Various	Metals (mg/L)											TPH (mg/L)				BTEX (mg/L)				PAHs (µg/L)					
		pH	Antimony	Arsenic	Cadmium	Chromium	Copper	Manganese	Mercury	Nickel	Lead	Selenium	Zinc	C ₆₋₉	C ₁₀₋₁₄	C ₁₅₋₂₈	C ₂₉₋₃₆	Benzene	Toluene	Ethyl-Benzene	Xylenes	Naphthalene	2-methylnaphthalene	Fluorene	Phenanthrene	Total PAH
WATER ASSESSMENT CRITERIA																										
Drinking Water	6.5-8.5	NV	0.007	0.002	0.05	2	0.5	0.001	0.02	0.01	0.01	3	NV	NV	NV	NV	0.001	0.8	0.3	0.6	NV	NV	NV	NV	NV	
Fresh Waters	6.5-9.0	NV	0.013	0.0002	0.01	0.0014	1.9	0.00006	0.011	0.0034	0.005	0.008	NV	NV	NV	NV	0.95	0.3	NV	0.2	16	NV	NV	NV	3	
Sample ID	Date	RELATIVE PERCENT DIFFERENCE (RPD) CALCULATIONS																								
ATA-15	18/08/2005	6.1	<0.001	<0.001	<0.0002	0.001	0.002	-	<0.0001	0.003	<0.001	<0.001	0.093	<0.02	<0.02	<0.04	<0.04	<0.001	<0.001	<0.001	<0.003	<0.1	<0.1	<0.1	<0.1	<2.5
Dup1	18/08/2005	7.2	<0.001	0.002	<0.0002	0.001	0.001	-	<0.0001	<0.001	<0.001	<0.001	0.066	<0.02	<0.02	<0.04	<0.04	-	-	-	-	-	-	-	-	-
RPD (%)	-	17%	0%	67%	0%	0%	67%	-	0%	55%	0%	0%	34%	0%	0%	0%	0%	-	-	-	-	-	-	-	-	
HE-17	25/08/2005	5.8	0.001	0.001	<0.0002	<0.001	<0.001	0.039	0.0004	0.013	<0.001	<0.001	0.39	7.1	6.2	0.34	<0.04	0.009	0.073	0.18	1.1	120	59	0.8	0.7	183
Dup2	25/08/2005	5.8	<0.001	0.001	<0.0002	<0.001	<0.001	0.038	0.0004	0.013	<0.001	0.003	0.40	6.0	6.6	0.47	<0.04	0.008	0.063	0.16	0.93	130	68	0.8	1.2	202
RPD (%)	-	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	3%	0%	0%	0%	0%	12%	15%	12%	17%	8%	14%	0%	53%	10%
ATA-73	9/03/2006	-	-	0.003	<0.0001	<0.001	<0.001	-	<0.0001	0.007	0.002	-	0.011	<0.02	<0.02	<0.04	<0.04	<0.001	<0.001	<0.001	<0.003	<0.1	<0.1	<0.1	<0.1	<2.5
DUP1 9/3/06	9/03/2006	-	-	0.002	<0.001	<0.001	<0.001	-	<0.0001	0.012	0.005	-	0.024	-	-	-	-	-	-	-	-	-	-	-	-	-
RPD (%)	-	-	-	67%	0%	0%	0%	-	0%	53%	133%	-	74%	-	-	-	-	-	-	-	-	-	-	-	-	

Notes:

"-" denotes not analysed/calculated.

Where one or more values are below detection limit. RPD has been calculated using detection limit.