

**HELENA RIVER WATER ANALYTICAL RESULTS: METALS, TPH, PAH
HELENA EAST REMEDIATION AND REDEVELOPMENT PER**

	Heavy Metals								TPHs				Polycyclic Aromatic Hydrocarbons																						
	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc	C ₆₋₉	C ₁₀₋₁₄	C ₁₅₋₂₀	C ₂₁₋₃₆	Naphthalene	2-methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-c,d)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Benzo(e)pyrene	Total PAH				
WATER ASSESSMENT CRITERIA	mg/L								mg/L				µg/L																						
Drinking Water	0.007	0.002	0.05	2	0.001	0.02	0.01	3	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.01	NV	NV	NV	0.01	NV			
Fresh Waters	0.013	0.0002	0.01	0.0014	0.00006	0.011	0.0034	0.008	NV	NV	NV	NV	16	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	3		
WATER ANALYTICAL RESULTS	mg/L								mg/L				µg/L																						
Sample ID	ARL#																																		
HR-W-1	4523	0.001	<0.0001	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.005	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
HR-W-2	4524	0.001	<0.0001	<0.001	<0.001	<0.0001	<0.001	<0.001	<0.005	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
HR-W-3	4525	<0.001	<0.0001	<0.001	<0.001	<0.0001	0.001	<0.001	<0.005	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
HRW-4	4526	<0.001	<0.0001	0.007	<0.001	<0.0001	0.001	<0.001	<0.005	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
QUALITY CONTROL SAMPLE DATA	mg/L								mg/L				µg/L																						
HR-W-FIELD BLANK	4535	<0.001	<0.0002	<0.001	<0.001	<0.0002	<0.001	<0.001	<0.005	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
HR-W-DUP	4527	0.001	<0.0002	<0.001	<0.001	<0.0002	0.001	<0.001	<0.005	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
HRW-4	4526	<0.001	<0.0001	0.007	<0.001	<0.0001	0.001	<0.001	<0.005	<0.02	<0.02	<0.04	<0.04	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
RPD (%)		0%	-	150%	0%	-	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-		

HELENA RIVER WATER ANALYTICAL RESULTS: VOC
HELENA EAST REDEVELOPMENT AND REMEDIATION PER

	Monocyclic Aromatic Hydrocarbons													Halogenated Aliphatic Hydrocarbons																																
	Benzene	Toluene	Ethylbenzene	m & p-Xylenes	o-Xylene	Styrene	Isopropylbenzene	p-Propylbenzene	1,3,5-Trimethylbenzene	tert-Butylbenzene	1,2,4-Trimethylbenzene	sec-Butylbenzene	4-Isopropyltoluene	p-Butylbenzene	Chloromethane	Vinyl chloride	Bromomethane	Chloroethane	Trichlorofluoromethane	1,1-Dichloroethane	Dichloromethane	trans-1,2-Dichloroethene	1,1-Dichloroethene	2,2-Dichloropropane	cis-1,2-Dichloroethene	Bromochloromethane	1,1,1-Trichloroethane	Carbon tetrachloride	1,1-Dichloropropane	1,2-Dichloroethane	Trichloroethene	1,2-Dichloropropane	Dibromomethane	cis-1,3-Dichloropropene	trans-1,3-Dichloropropene	1,1,2-Trichloroethane	Tetrachloroethene	1,3-Dichloropropane	1,2-Dibromoethane	1,1,1,2-Tetrachloroethane	1,1,2,2-Tetrachloroethane	1,2,3-Trichloropropane	1,2-Dibromo-3-chloropropane	Hexachlorobutadiene		
	GROUNDWATER ASSESSMENT CRITERIA (µg/L)																																													
Drinking Water	1	800	300	600	30	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.3	NV	NV	NV	NV	4	NV	NV	NV	NV	NV	NV	NV	3	NV	3	70	NV	NV	NV	NV	NV	50	NV	NV	NV	NV	NV	0.7			
Fresh Waters	950	300	NV	200	350	NV	NV	NV	NV	NV	NV	NV	NV	NV	0.7	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	NV	500	NV	NV	NV	NV	NV	6500	40	NV	NV	NV	NV	NV	NV			
Sample ID	ARL#	GROUNDWATER ANALYTICAL RESULTS (µg/L)																																												
HR-W-1	4523	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		
HR-W-2	4524	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
HR-W-3	4525	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
HRW-4	4526	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
		QUALITY CONTROL SAMPLE DATA																																												
HR-W-DUP	4527	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
HR-W-TRIP BLANK	4537	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

Note: No halogenated aromatic hydrocarbons, trihalomethanes, PAHs, oxygenated compounds, or sulfonated compounds were detected in any sample.

HELENA RIVER SEDIMENT ANALYTICAL RESULTS: METALS, TPH, PAH, VOC
HELENA EAST REMEDIATION AND REDEVELOPMENT PER

										TPHs				Polycyclic Aromatic Hydrocarbons																					
Asenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc	C ₆₋₉	C ₁₀₋₁₄	C ₁₅₋₂₈	C ₂₉₋₃₆	Naphthalene	2-methylnaphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo[a]anthracene	Chrysene	Benzo[b]fluoranthene	Benzo[k]fluoranthene	Benzo[a]pyrene	Indeno[1,2,3-c,d]pyrene	Dibenz[a,h]anthracene	Benzo[g,h,i]perylene	Benzo[e]pyrene	Low Mol. Wt. PAHs	High Mol. Wt. PAHs	Total PAH			
SEDIMENT ASSESSMENT CRITERIA										mg/kg				µg/kg																					
ISQG-Low	20	1.5	80	65	0.15	21	50	200	NV	NV	NV	NV	160	240	16	44	19	240	85	600	665	261	384	261	NV	430	NV	63	NV	NV	552	1700	4000		
ISQG-High	70	10	370	270	1	52	220	410	NV	NV	NV	NV	2100	1500	500	640	540	1500	1100	5100	2600	1600	2800	1600	NV	1600	NV	260	NV	NV	3160	9600	45000		
SEDIMENT ANALYTICAL RESULTS										mg/kg				µg/kg																					
Sample ID	ARL#	mg/kg								mg/kg				µg/kg																					
HR-S-1	4529	<5	<0.1	11	10	0.04	5	23	20	<0.2	<0.2	<0.4	<0.4	<100	<100	<100	<100	<100	<100	<100	<100	<100	<200	<200	<200	<200	<200	<200	<200	<200	<200	<600	<1000	<2500	
HR-S-2	4530	<5	<0.1	6	4	0.03	2	8	24	<0.2	<0.2	<0.4	<0.4	<100	<100	<100	<100	<100	<100	<100	<100	<100	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<600	<1000	<2500
HR-S-3	4531	<5	<0.1	24	27	0.08	12	63	56	<0.2	<0.2	<0.4	<0.4	<100	<100	<100	<100	<100	<100	<100	<100	<100	<200	<200	<200	<200	<200	<200	<200	<200	<200	<600	<1000	<2500	
HR-S-4	4532	5	0.1	25	31	0.10	12	54	120	<0.2	<0.2	<0.4	<0.4	<100	<100	<100	<100	<100	<100	<100	<100	<100	<200	<200	<200	<200	<200	<200	<200	<200	<200	<600	<1000	<2500	
HR-S-5	4533	9	<0.1	23	23	0.08	10	45	82	<0.2	<0.2	<0.4	<0.4	<100	<100	<100	<100	<100	<100	<100	<100	<100	<200	<200	<200	<200	<200	<200	<200	<200	<200	<600	<1000	<2500	
QUALITY CONTROL SAMPLE DATA										mg/L				µg/L																					
HR-S-FIELD BLANK	4536	<5	<0.1	<1	<1	<0.02	<1	<1	<1	<0.2	<0.2	<0.4	<0.4	<100	<100	<100	<100	<100	<100	<100	<100	<100	<200	<200	<200	<200	<200	<200	<200	<200	<200	<600	<1000	<2500	
HR-S-DUP	4534	<5	<0.1	29	24	0.07	10	45	130	<0.2	<0.2	<0.4	<0.4	<100	<100	<100	<100	<100	<100	<100	<100	<100	<200	<200	<200	<200	<200	<200	<200	<200	<200	<600	<1000	<2500	
HR-S-5	4533	9	<0.1	23	23	0.08	10	45	82	<0.2	<0.2	<0.4	<0.4	<100	<100	<100	<100	<100	<100	<100	<100	<100	<200	<200	<200	<200	<200	<200	<200	<200	<200	<600	<1000	<2500	
RPD (%)	-	57%	0%	23%	4%	13%	0%	0%	45%	0.0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-	-	-		

Note: No VOCs were detected in any sediment or blank sample.

HELENA RIVER WATER AND SEDIMENT LABORATORY SPIKE RECOVERIES
HELENA EAST REMEDIATION AND REDEVELOPMENT PER

ARL LAB #	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel	Lead	Zinc	TPH
4523-4538	91%	81%	91%	96%	89%	87%	93%	94%	86%