

TABLE D-15

## ANIONS AND CATIONS IN GROUND WATER

Remedial Investigation/Feasibility Study  
Astoria Area-Wide Petroleum Site  
Astoria, Oregon

Locator ID	Sample ID	Sample Date	Alkalinity, Total MgCaCO <sub>3</sub> /L	Calcium ug/L	Chemical Oxygen Demand ug/L	Chloride ug/L	Formaldehyde ug/L	Iron ug/L	Magnesium ug/L
MW-1(F)	MW-1(F)	10/22/2003	490	119000		17500		46600	46800
MW-2(M)	MW-2(M)	6/19/2003			26100			28100	
MW-2(M)	MW-2 (M)	10/15/2003	116	23400		16800		39300	11100
MW-6(M)	MW-6(M)	6/19/2003			15800			11800	
MW-6(M)	MW-6 (M)	1/12/2004	130	15700		16500		29000	11100
MW-7(M)	BM-7(M)	6/19/2003			16400			12200	
MW-7(M)	MW-7(M)	6/19/2003			14800			13000	
MW-7(M)	MW-7(M)	10/13/2003	208	41800		13200		19600	19500
MW-10(M)	MW-10(M)	6/19/2003			30600			47000	
MW-10(M)	MW-10 (M)	10/15/2003	225	46500		9610		68300	32600
MW-11(M)	MW-11(M)	6/19/2003			9510			25700	
MW-11(M)	MW-11 (M)	10/15/2003	115	13800		20800		27800	17600
MW-12(A)	MW-12(A)	10/22/2003						870	
MW-12(A)	MW-12 (A)	1/15/2004	136	131000		13900		133 J	18300
MW-13(A)	MW-13(A)	10/22/2003	497	136000		14800		1270	20500
MW-14(A)	MW-14(A)	10/21/2003	132	110000		12900		348	18300
MW-15(A)	MW-15(A)	10/20/2003						7810	
MW-16(A)	MW-16(A)	10/20/2003						13300	
MW-16(A)	MW-16(A)	1/19/2004	300	92200		15800		12000	22000
MW-17(A)	MW-17 (A)	10/17/2003	240	102000		13400		18400	22400
MW-18(A)	MW-18(A)	10/21/2003						20000	
MW-18(A)	MW-18(A)	1/19/2004	332	67000		13200		28600	28100
MW-19(A)	BM-19(A)	10/20/2003						12800	
MW-19(A)	MW-19(A)	10/20/2003						12700	
MW-19(A)	MW-19 (A)	1/13/2004	92.7	19700		12600		3010	10400
MW-20(A)	MW-20(A)	10/20/2003	71.2	17800		7240		15700	15000
MW-21(A)	MW-21(A)	10/20/2003						25000	
MW-21(A)	BM-21 (A)	1/13/2004	109	20800		7850		15300	9320
MW-21(A)	MW-21 (A)	1/13/2004	107	20400		7860		14100	9330
MW-22(A)	MW-22 (A)	10/16/2003						18600	

TABLE D-15

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MW-22(A)	MW-22(A)	1/19/2004	85	26600		10200		14300	10000
MW-23(A)	MW-23(A)	10/20/2003	90.3	37800		11500		6210	11200
MW-24(A)	MW-24(A)	10/21/2003	206	12100		54500		1200	7620
MW-26(A)	MW-26 (A)	10/17/2003						13900	
MW-26(A)	MW-26 (A)	1/15/2004	127	21000		12300		34600	7660
MW-27(A)	MW-27(A)	10/21/2003						996	
MW-27(A)	MW-27 (A)	1/14/2004	34.4	12500		10200		33300	5720
MW-28(A)	MW-28 (A)	10/17/2003						58500	
MW-28(A)	MW-28(A)	1/19/2004	138	46900		10700		48300	14500
MW-29(A)	MW-29(A)	10/21/2003						37600	
MW-29(A)	MW-29(A)	1/19/2004	173	26400		10100		41400	13100
MW-30(A)	MW-30 (A)	10/16/2003	162	28000		8510		38200	16600
MW-31(A)	BM-31 (A)	10/16/2003	200	33900		10800		29500	23300
MW-31(A)	MW-31 (A)	10/16/2003	202	33500		10700		29100	23500
MW-32(A)	MW-32(A)	10/14/2003	153	12400		26700		3240	24400
MW-33(A)	MW-33(A)	10/14/2003	186	24100		16600		16700	14100
MW-34(A)	MW-34(A)	10/14/2003	179	31600		19100		5500	26000
MW-35(A)	MW-35 (A)	10/16/2003	45.7	9060		16600		5930	6620
MW-36(A)	MW-36(A)	10/21/2003						15000	
MW-36(A)	MW-36 (A)	1/14/2004	84	17900		6750		410	5450
MW-37(A)	MW-37 (A)	10/17/2003						27100	
MW-38(A)	MW-38(A)	10/21/2003	150	32400		17200		1480	13000
MW-39(A)	MW-39 (A)	10/16/2003						6090	
MW-39(A)	MW-39 (A)	1/16/2004	63.7	11800		9700		12800	5050
MW-40(A)	MW-40 (A)	10/17/2003	190	28400		10400		42500	24900
MW-41(A)	MW-41(A)	10/14/2003	185	40600		9230		35000	13600
MW-42(A)	MW-42 (A)	10/15/2003	218	48300		7640		48200	18100

TABLE D-15

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MW-43(A)	MW-43(A)	10/13/2003	91	25900		9310		6250	5580
MW-44(A)	MW-44 (A)	10/17/2003	90.8	17100		14600		36800	5100
MW-45(A)	MW-45 (A)	10/16/2003						10400	
MW-45(A)	MW-45 (A)	1/16/2004	71.6	24100		12100		798	7530
MW-46(A)	MW-46(A)	10/14/2003	54	10100		7640		15400	6320
MW-47(A)	MW-47(A)	10/13/2003	36.1	7890		11600		490	8340
MW-48(A)	MW-48(A)	10/14/2003	83.3	18000		11600		25700	10400
TW-704(P)	TW-704(P)	8/21/2002					220 U		
TW-705(P)	TW-705(P)	8/20/2002					77 U		

TABLE D-15

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Astoria Area-Wide Petroleum Site  
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Locator ID	Sample ID	Sample Date	Manganese	Nitrogen, Nitrate (as N)	Nitrogen, Nitrate- Nitrite	Potassium	Sodium	Sulfate	Total Dissolved Solids	Total Organic Carbon (TOC)
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-1(F)	MW-1(F)	10/22/2003	10500		1000 U	8540	96300	168000		
MW-2(M)	MW-2(M)	6/19/2003		100 U					138000	4610
MW-2(M)	MW-2 (M)	10/15/2003	1690		2000 U B	6030	12600	1000 U B		
MW-6(M)	MW-6(M)	6/19/2003		100 U					163000	4070
MW-6(M)	MW-6 (M)	1/12/2004	2320		500 U	4000	21900	1430		
MW-7(M)	BM-7(M)	6/19/2003		100 U					244000	3960
MW-7(M)	MW-7(M)	6/19/2003		100 U					248000	3900
MW-7(M)	MW-7(M)	10/13/2003	1060		149	6690	14300	5760		
MW-10(M)	MW-10(M)	6/19/2003		100 U					330000	7590
MW-10(M)	MW-10 (M)	10/15/2003	1320		2000 U B	11300	11600	770 U B		
MW-11(M)	MW-11(M)	6/19/2003		100 U					182000	1920
MW-11(M)	MW-11 (M)	10/15/2003	473		2000 U	8130	8560	2360		
MW-12(A)	MW-12(A)	10/22/2003								
MW-12(A)	MW-12 (A)	1/15/2004	12.7		2010	7110	64000	371000		
MW-13(A)	MW-13(A)	10/22/2003	131		20 U	7710	62600	52600		
MW-14(A)	MW-14(A)	10/21/2003	245		47.2	7410	51400	353000		
MW-15(A)	MW-15(A)	10/20/2003								
MW-16(A)	MW-16(A)	10/20/2003								
MW-16(A)	MW-16(A)	1/19/2004	458		107 J+,B	7990	43500	133000		
MW-17(A)	MW-17 (A)	10/17/2003	991		2000 U	11800	56400	204000		
MW-18(A)	MW-18(A)	10/21/2003								
MW-18(A)	MW-18(A)	1/19/2004	1530		50 U	11100	45400	24200		
MW-19(A)	BM-19(A)	10/20/2003								
MW-19(A)	MW-19(A)	10/20/2003								
MW-19(A)	MW-19 (A)	1/13/2004	162		512	5050	24500	25000		
MW-20(A)	MW-20(A)	10/20/2003	581		1000 U	7170	18000	90500		
MW-21(A)	MW-21(A)	10/20/2003								
MW-21(A)	BM-21 (A)	1/13/2004	576		500 U	5520	13900	8340		
MW-21(A)	MW-21 (A)	1/13/2004	581		500 U	5210	14100	7940		
MW-22(A)	MW-22 (A)	10/16/2003								

TABLE D-15

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Locator ID	Sample ID	Sample Date	Manganese	Nitrogen, Nitrate (as N)	Nitrogen, Nitrate- Nitrite	Potassium	Sodium	Sulfate	Total Dissolved Solids	Total Organic Carbon (TOC)
			ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-22(A)	MW-22(A)	1/19/2004	337		415 J+,B	5280	12000	38100		
MW-23(A)	MW-23(A)	10/20/2003	293		1000 U B	4710	20900	104000		
MW-24(A)	MW-24(A)	10/21/2003	225		1000 U B	7900	92400	17600		
MW-26(A)	MW-26 (A)	10/17/2003								
MW-26(A)	MW-26 (A)	1/15/2004	1390		500 U	3980	9580	12800		
MW-27(A)	MW-27(A)	10/21/2003								
MW-27(A)	MW-27 (A)	1/14/2004	294		760	3070	14400	43900		
MW-28(A)	MW-28 (A)	10/17/2003								
MW-28(A)	MW-28(A)	1/19/2004	1610		50 U	4230	16800	128000		
MW-29(A)	MW-29(A)	10/21/2003								
MW-29(A)	MW-29(A)	1/19/2004	1780		53.1 J+,B	5530	7110	4950		
MW-30(A)	MW-30 (A)	10/16/2003	1470		2000 U	7180	7490	1000 U U		
MW-31(A)	BM-31 (A)	10/16/2003	1750		2000 U B	9030	11400	3280		
MW-31(A)	MW-31 (A)	10/16/2003	1700		2000 U	8920	11600	1200 J+,B		
MW-32(A)	MW-32(A)	10/14/2003	110		52 J	12000	48200	64500		
MW-33(A)	MW-33(A)	10/14/2003	575		94 J	9210	39600	13800		
MW-34(A)	MW-34(A)	10/14/2003	324		39 J	12400	14800	16400		
MW-35(A)	MW-35 (A)	10/16/2003	206		2000 U	4940	8040	8640		
MW-36(A)	MW-36(A)	10/21/2003								
MW-36(A)	MW-36 (A)	1/14/2004	59		852	3860	19000	9990		
MW-37(A)	MW-37 (A)	10/17/2003								
MW-38(A)	MW-38(A)	10/21/2003	209		1000 U	6600	29400	38900		
MW-39(A)	MW-39 (A)	10/16/2003								
MW-39(A)	MW-39 (A)	1/16/2004	146		500 U	2820	10200	3450		
MW-40(A)	MW-40 (A)	10/17/2003	1440		2000 U	12400	10000	1130		
MW-41(A)	MW-41(A)	10/14/2003	2290		200 U	5330	8680	5910		
MW-42(A)	MW-42 (A)	10/15/2003	2620		2000 U	6490	9190	5800		

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MW-43(A)	MW-43(A)	10/13/2003	598		70 J	4320	6420	7610		
MW-44(A)	MW-44 (A)	10/17/2003	540		2000 U	3420	10300	8530		
MW-45(A)	MW-45 (A)	10/16/2003								
MW-45(A)	MW-45 (A)	1/16/2004	57.7		1180	4380	13200	22700		
MW-46(A)	MW-46(A)	10/14/2003	722		112 J	5740	5770	1240 J+,B		
MW-47(A)	MW-47(A)	10/13/2003	47.6		1030 D	7260	8790	25200		
MW-48(A)	MW-48(A)	10/14/2003	872		200 U	8760	10600	45600		
TW-704(P)	TW-704(P)	8/21/2002								
TW-705(P)	TW-705(P)	8/20/2002								