

US EPA ARCHIVE DOCUMENT

March 14, 2013

To: Ralph Dollhopf, Federal On-Scene Coordinator (FOSC)
From: Thomas P. Graan, Ph.D., Scientific Support Coordinator (SSC)
Re: Update on Line 6B Oil Concentrations
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release

As part of the ongoing Submerged Oil Quantification Study, approximately 100 sediment cores were collected in July/August 2012 from locations along the stretch of the Kalamazoo River affected by the Line 6B oil discharge. U.S. EPA's oil chemist (Dr. Gregory S. Douglas, NewFields) has been examining and interpreting the oil fingerprinting analytical results provided by Alpha Analytical (Enbridge contractor) for the 400 samples extracted from the sediment cores. Attached is a table representing Dr. Douglas's interpretation of the concentrations of Line 6B oil found in those samples based on the analytical results provided by Alpha Analytical. Line 6B oil was positively detected in approximately 75% of the sediment samples. Sample results ranged from non-detectable levels near 10 mg/kg to positive detections of Line 6B oil above 8,000 mg/kg. The results reflect conditions in the Kalamazoo River in July/August 2012.

U.S. EPA is currently evaluating the pattern of submerged Line 6B oil distribution across the affected portions of the Kalamazoo River. Since the sediment cores were collected from areas with known depositional characteristics and oiling levels, U.S. EPA has examined the Line 6B oil with respect to these characteristics. Areas of the site that exhibit heavy/moderate poling results have higher submerged Line 6B oil concentrations than areas of the site that were characterized as light/none by poling. Areas of the site that accumulate large amounts of soft sediments (the impoundments at Ceresco, Mill Ponds, and Morrow Lake Delta) have higher submerged Line 6B oil concentrations than areas with less accumulation of soft sediments. The light/none areas of the site represent a large proportion of the spill site (approximately 32 miles) where Line 6B oil has been dispersed through a combination of natural turbulence/flow, flood events, and oil recovery activities.

Table 1
Line 6B Oil Concentrations in Oil Quantification Sediment Samples
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release

Client ID	Lab ID	TAS2/Hopane Line 6B Oil Conc. mg/kg Sed	TAS2/Hopane Line 6B Oil LOD mg/kg Sed	TAS1/T30 Line 6B Oil Conc. mg/kg Sed	TAS1/T30 Line 6B Oil LOD mg/kg Sed	Line 6B Oil Reported Value
SEKR0325C701S072512DX	1209019-18	ND	6	14	NA	14
SEKR0325C701S072512D002	1211038-07	ND	49	47	NA	47
SEKR0400C701S072512DX	1209019-19	ND	24	6	NA	6
SEKR0400C701S072512D003	1211038-08	391	NA	520	NA	455
SEKR0425C701S072512DX	1208009-14	667	NA	879	NA	773
SEKR0425C701S072512D007	1208009-15	303	NA	473	NA	388
SEKR0425C702S112812DX	1212031-11	ND	7	7	NA	7
SEKR0425C702S112812D005	1212031-12	ND	104	32	NA	32
SEKR0425C702D112812D005	1212031-13	ND	57	42	NA	42
SEKR0425C702S112812D009	1212031-14	ND	14	22	NA	22
SEKR0425C702S112812D019	1212052-03	ND	492	1167	NA	1167
SEKR0475C701S072612DX	1209020-06R	ND	29	ND	18	ND, LOD = 24
SEKR0475C701S072612D004	1211039-03	18	NA	ND	---	18
SEKR0475C701S072612D008	1211039-04	22	NA	ND	---	22
SEKR0475C701S072612D017	1212052-11	12	NA	ND	14	12
SEKR0475C702S072612DX	1209020-09R	ND	64	11	NA	11
SEKR0475C702S072612D005	1211039-09	ND	5	23	NA	23
SEKR0475C702S072612D009	1211039-10	ND	52	30	NA	30
SEKR0475C702S072612D013	1211039-11	ND	103	71	NA	71
SEKR0500C701S112912DX	1212034-03	ND	231	135	NA	135
SEKR0500C701D112912D006	1212034-05	ND	214	279	NA	279
SEKR0500C701S112912D006	1212034-04	ND	415	405	NA	405
SEKR0500C701S112912D012	1212034-06	ND	585	1313	NA	1313
SEKR0500C702S112812DX	1212031-02	ND	77	112	NA	112
SEKR0500C702S112812D007	1212031-03	14	NA	ND	507	14
SEKR0500C702S112812D013	1212031-04	ND	14	ND	368	ND, LOD = 193
SEKR0500C702D112812D013	1212031-05	ND	8	ND	368	ND, LOD = 193
SEKR0525C702S112812DX	1212032-02	1618	NA	1914	NA	1766
SEKR0525C702S112812D006	1212032-03	290	NA	633	NA	461
SEKR0525C702S112812D011	1212032-04	ND	2078	900	NA	2078
SEKR0525C702S112812D016	1212032-05	ND	8030	2223	NA	8030
SEKR0525C702S112812D020	1212032-06	ND	6873	3258	NA	6873
SEKR0525C702S112812D024	1212032-07	1165	NA	1800	NA	1483
SEKR0550C701S072612DX	1209020-02R	ND	177	218	NA	218
SEKR0550C701S072612DX	1212028-19	ND	151	415	NA	415
SEKR0550C701S072612D005	1211038-11	ND	26	502	NA	502
SEKR0550C701S072612D010	1211038-12	62	NA	ND	25	62
SEKR0550C702S112912DX	1212034-07	ND	194	585	NA	585
SEKR0550C702S112912D006	1212034-08	ND	301	647	NA	647
SEKR0550C702D112912D006	1212034-09	12	NA	1087	NA	549
SEKR0550C702S112912D011	1212034-10	ND	2621	426	NA	426
SEKR0550C702S112912D015	1212034-11	ND	10872	4216	NA	4216
SEKR0550C702S112912D019	1212034-12	ND	2113	857	NA	857
SEKR0550C703S112712DX	1212028-09	128	NA	582	NA	355
SEKR0550C703S112712D006	1212028-10	ND	768	182	NA	182
SEKR0550C703S112712D011	1212028-11	ND	1467	526	NA	526
SEKR0550C703S112712D016	1212028-12	ND	12954	2524	NA	2524
SEKR0550C703S112712D019	1212028-13	ND	5233	1225	NA	1225
SEKR0550C703S112712D022	1212028-14	ND	289	1512	NA	1512
SEKR0550C704S112812DX	1212031-06	366	NA	845	NA	605
SEKR0550C704S112812D006	1212031-07	ND	558	659	NA	659
SEKR0550C704S112812D011	1212031-08	ND	5194	1490	NA	1490
SEKR0550C704S112812D011	1212031-08D	ND	4823	1272	NA	1272
SEKR0550C704S112812D016	1212031-09	ND	12731	4314	NA	4314
SEKR0550C704S112812D020	1212031-10	ND	1700	1471	NA	1471
SEKR0550C705D112712D016	1212030-08	27	NA	ND	369	27
SEKR0550C705S112712DX	1212030-04	ND	214	55	NA	55
SEKR0550C705S112712D006	1212030-05	0	NA	128	NA	64
SEKR0550C705S112712D011	1212030-06	78	NA	80	NA	79
SEKR0550C705S112712D016	1212030-07	25	NA	ND	310	25
SEKR0550C705S112712D020	1212030-09	7	NA	ND	368	7
SEKR0550C705S112712D025	1212030-10	19	NA	ND	393	19
SEKR0550C705S112712D030	1212052-01	39	NA	ND	300	39

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--- = Biomarker was not detected

Table 1

Line 6B Oil Concentrations in Oil Quantification Sediment Samples
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release

Client ID	Lab ID	TAS2/Hopane Line 6B Oil Conc. mg/kg Sed	TAS2/Hopane Line 6B Oil LOD mg/kg Sed	TAS1/T30 Line 6B Oil Conc. mg/kg Sed	TAS1/T30 Line 6B Oil LOD mg/kg Sed	Line 6B Oil Reported Value
SEKR0575C701S072612DX	1209020-04R	ND	443	625	NA	625
SEKR0575C701S072612D007	1211038-16	ND	843	1206	NA	1206
SEKR0575C701S072612D013	1211038-17	ND	2202	461	NA	461
SEKR0575C701S072612D019	1211038-18	ND	2315	976	NA	976
SEKR0575C702S112712DX	1212028-01	ND	350	404	NA	404
SEKR0575C702S112712D006	1212028-02	ND	537	412	NA	412
SEKR0575C702S112712D011	1212028-03	ND	265	515	NA	515
SEKR0575C702S112712D016	1212028-04	ND	1686	500	NA	500
SEKR0575C702S112712D016	1212028-04D	ND	2030	480	NA	480
SEKR0575C702S112712D020	1212028-05	ND	3819	1340	NA	1340
SEKR0900C701S112912DX	1212037-02	56	NA	305	NA	181
SEKR0900C701S112912D006	1212037-03	ND	8	13	NA	13
SEKR0900C701S112912D006	1212037-03X	ND	12	ND	13	ND, LOD = 13
SEKR0900C701S112912D011	1212037-04	ND	0	ND	---	ND, LOD = 0
SEKR0900C701S112912D016	1212037-05	1	NA	9	NA	5
SEKR0900C701S112912D016	1212037-05X	ND	1	ND	---	ND, LOD = 1
SEKR0900C702D112712D011	1212028-18	ND	1514	57	NA	57
SEKR0900C702S112712DX	1212028-15	1321	NA	1038	NA	1179
SEKR0900C702S112712D006	1212028-16	24	NA	495	NA	259
SEKR0900C702S112712D011	1212028-17	ND	1669	30	NA	30
SEKR0900C702S112712D014	1212029-01	ND	984	127	NA	127
SEKR0900C702S112712D017	1212029-02	ND	120	178	NA	178
SEKR1050C701S072512DX	1209019-14	ND	147	287	NA	287
SEKR1050C701S072512D003	1211038-02	43	NA	388	NA	215
SEKR1075C701S112812DX	1212030-18	ND	33	67	NA	67
SEKR1075C701S112812D005	1212030-19	270	NA	310	NA	290
SEKR1075C701S112812D009	1212031-01	7982	NA	8574	NA	8278
SEKR1075C701S112812D014	1212052-02	261	NA	313	NA	287
SEKR1075C702S113012DX	1212038-02	2100	NA	2390	NA	2245
SEKR1075C702S113012D006	1212038-03	2858	NA	2949	NA	2903
SEKR1100C701S112912DX	1212035-17	608	NA	536	NA	572
SEKR1100C701S112912D005	1212035-18	236	NA	373	NA	304
SEKR1200C701S072512DX	1209019-13	177	NA	525	NA	351
SEKR1200C701S072512D006	1211037-18	235	NA	707	NA	471
SEKR1200C701S072512D011	1211038-01	526	NA	621	NA	574
SEKR1425C701S113012DX	1212037-15	252	NA	359	NA	306
SEKR1425C701S113012D004	1212037-16	132	NA	129	NA	130
SEKR1475C701S072612DX	1209020-11R	260	NA	299	NA	279
SEKR1475C701S072612D006	1211039-13	823	NA	1060	NA	941
SEKR1475C701S072612D011	1211039-14	1142	NA	1470	NA	1306
SEKR1475C702S072612DX	1209020-14R	920	NA	696	NA	808
SEKR1475C702S072612D004	1211039-17	ND	985	37	NA	37
SEKR1475C702S072612D007	1211039-18	ND	701	181	NA	181
SEKR1500C701S072612DX	1209020-16R	467	NA	647	NA	557
SEKR1500C701S072612D003	1211040-02	410	NA	708	NA	559
SEKR1500C701S072612D006	1211040-03	1709	NA	2258	NA	1984
SEKR1500C701S072612D009	1211040-04	791	NA	909	NA	850
SEKR1500C701S072612D013	1211040-05	ND	51	52	NA	52
SEKR1500C701S072612D028	1212052-12	70	NA	41	NA	56
SEKR1550C701S112812DX	1212033-07	746	NA	1469	NA	1107
SEKR1550C701S112812D006	1212033-08	1915	NA	2570	NA	2242
SEKR1550C701S112812D011	1212033-09	224	NA	510	NA	367
SEKR1550C701S112812D016	1212033-10	ND	137	51	NA	51
SEKR1550C701S112812D021	1212033-11	150	NA	50	NA	100
SEKR1550C701S112812D026	1212033-12	199	NA	8	NA	103
SEKR1575C701S072612DX	1208010-05	609	NA	1002	NA	805
SEKR1575C701S072612D007	1208010-06	739	NA	1043	NA	891
SEKR1575C701S072612D013	1208010-07	ND	204	347	NA	347
SEKR1575C701S072612D019	1208010-08	ND	743	186	NA	186
SEKR1575C701S072612D019	1208010-08D	ND	690	133	NA	133
SEKR1575C702S072612DX	1208010-02	684	NA	1297	NA	990
SEKR1575C702S072612D005	1208010-03	803	NA	1007	NA	905
SEKR1575C702S072612D010	1208010-04	ND	351	103	NA	103

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SEKR1575C703S112812DX	1212031-15	52	NA	68	NA	60
SEKR1575C703S112812D006	1212031-16	29	NA	27	NA	28
SEKR1575C703S112812D012	1212031-17	20	NA	28	NA	24
SEKR1575C703S112812D022	1212052-04	104	NA	ND	86	104
SEKR1850C701S072412DX	1209019-03	111	NA	51	NA	81
SEKR1850C701S072412D003	1211037-05	104	NA	52	NA	78
SEKR1875C701S072512DX	1209019-11	88	NA	21	NA	54
SEKR1875C701S072512D003	1211037-15	103	NA	44	NA	74
SEKR1900C701S072512DX	1208009-05	159	NA	49	NA	104
SEKR1900C701S072512D005	1208009-06	164	NA	69	NA	117
SEKR1900C701S072512D005	1208009-06D	115	NA	33	NA	74
SEKR1900C701S072512D009	1208009-07	ND	72	ND	21	ND, LOD = 47
SEKR1950C701S072412DX	1209019-04	ND	15	ND	550	ND, LOD = 283
SEKR1950C701S072412D006	1211037-06	ND	164	ND	180	ND, LOD = 172
SEKR2000C701S072412DX	1209019-02	37	NA	ND	152	37
SEKR2000C701S072412D005	1211037-02	ND	233	ND	479	ND, LOD = 356
SEKR2000C701S072412D010	1211037-03	ND	691	ND	877	ND, LOD = 818
SEKR2000C701S072412D010	1211037-03D	ND	908	ND	796	ND, LOD = 818
SEKR2000C701S072412D014	1211037-04	ND	551	ND	201	ND, LOD = 376
SEKR2000C701S072412D020	1212052-08	ND	1509	1623	NA	1623
SEKR2000C701S072412D023	1212052-09	ND	353	1856	NA	1856
SEKR2000C702S072512DX	1209019-09	85	NA	ND	791	85
SEKR2000C702S072512D002	1211037-13	21	NA	ND	267	21
SEKR2025C701S072412DX	1209019-01	290	NA	ND	67	290
SEKR2025C701S072412D007	1211037-01	45	NA	ND	586	45
SEKR2025C702S072412DX	1208009-01	1302	NA	382	NA	842
SEKR2025C702S072412D005	1208009-02	ND	125	ND	559	ND, LOD = 342
SEKR2025C703S072412DX	1209019-05	ND	25	ND	426	ND, LOD = 226
SEKR2025C703S072412D004	1211037-07	100	NA	ND	193	100
SEKR2125C701S072412DX	1209019-06	569	NA	583	NA	576
SEKR2125C701S072412D006	1211037-08	462	NA	565	NA	514
SEKR2150C701S072512DX	1209019-16	36	NA	ND	167	36
SEKR2150C701S072512D004	1211038-03	ND	210	ND	241	ND, LOD = 226
SEKR2150C701S072512D008	1211038-04	ND	182	38	NA	38
SEKR2150C702S072712DX	1209021-04	ND	1	ND	17	ND, LOD = 9
SEKR2150C702S072712D005	1211040-11	148	NA	57	NA	102
SEKR2150C702S072712D010	1211040-12	42	NA	16	NA	29
SEKR2150C702S072712D015	1211040-13	15	NA	3	NA	9
SEKR2150C703S072712DX	1209021-06	364	NA	47	NA	205
SEKR2150C703S072712D005	1211040-16	325	NA	31	NA	178
SEKR2150C704S072712DX	1209021-08	707	NA	187	NA	447
SEKR2150C704S072712D003	1211041-02	74	NA	53	NA	64
SEKR2150C704S072712D005	1211041-03	122	NA	345	NA	234
SEKR2150C704S072712D010	1211041-04	ND	101	245	NA	245
SEKR2150C705S112912DX	1212035-04	ND	148	407	NA	407
SEKR2150C705S112912D006	1212035-05	ND	71	607	NA	607
SEKR2150C705S112912D011	1212035-06	ND	204	21	NA	21
SEKR2175C701S072712DX	1209021-12	218	NA	131	NA	174
SEKR2175C701S072712D002	1211041-12	605	NA	417	NA	511
SEKR2175C701S072712D005	1211041-13	ND	6	ND	37	ND, LOD = 22
SEKR2175C701S072712D006	1211041-14X	ND	3	ND	25	ND, LOD = 14
SEKR2175C702S112912DX	1212036-06	ND	28	ND	35	ND, LOD = 23
SEKR2175C702S112912DX	1212036-06X	ND	4	ND	24	ND, LOD = 23
SEKR2175C702S112912D004	1212036-07	ND	48	ND	57	ND, LOD = 53
SEKR2175C702S112912D007	1212036-08	ND	154	ND	427	ND, LOD = 291
SEKR2200C701S072412DX	1209019-07	641	NA	271	NA	456
SEKR2200C701S072412D005	1211037-09	345	NA	349	NA	347
SEKR2200C701S072412D008	1211037-10	171	NA	194	NA	182
SEKR2275C701S072512DX	1209019-10	387	NA	311	NA	349
SEKR2275C701S072512D002	1211037-14	127	NA	77	NA	102
SEKR2300C701D113012D003	1212038-01	1203	NA	503	NA	853
SEKR2300C701S113012DX	1212037-17	1176	NA	843	NA	1009
SEKR2300C701S113012D003	1212037-18	1595	NA	1156	NA	1376

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Client ID	Lab ID	TAS2/Hopane Line 6B Oil Conc. mg/kg Sed	TAS2/Hopane Line 6B Oil LOD mg/kg Sed	TAS1/T30 Line 6B Oil Conc. mg/kg Sed	TAS1/T30 Line 6B Oil LOD mg/kg Sed	Line 6B Oil Reported Value
SEKR2400C701S072512DX	1209019-15	104	NA	ND	2	104
SEKR2475C701S072512DX	1209019-17	271	NA	ND	327	271
SEKR2475C701S072512D004	1211038-05	559	NA	422	NA	491
SEKR2475C701S072512D007	1211038-06	20	NA	ND	235	20
SEKR2525C701D112912D006	1212036-11	ND	305	ND	361	ND, LOD = 333
SEKR2525C701S112912DX	1212036-09	123	NA	ND	119	123
SEKR2525C701S112912DX	1212036-09X	119	NA	ND	238	119
SEKR2525C701S112912D006	1212036-10	ND	29	ND	76	ND, LOD = 53
SEKR2525C701S112912D012	1212036-12	ND	462	ND	86	ND, LOD = 274
SEKR2625C701S112912DX	1212035-01	357	NA	ND	69	357
SEKR2625C701S112912D006	1212035-02	621	NA	ND	17	621
SEKR2625C701S112912D011	1212035-03	ND	876	583	NA	583
SEKR2625C702S112912DX	1212036-13	713	NA	231	NA	472
SEKR2625C702S112912D005	1212036-14	802	NA	ND	476	802
SEKR2625C702S112912D010	1212036-15	ND	574	219	NA	219
SEKR2725C701S072712DX	1209021-13	ND	7	120921-13	10	ND, LOD = 9
SEKR2725C701S072712D007	1211041-15X	14	NA	34	NA	24
SEKR2725C701S072712D007	1211041-15XD	58	NA	43	NA	50
SEKR2750C701S112912DX	1212036-16	ND	22	ND	553	ND, LOD = 288
SEKR2750C701S112912D006	1212036-17	ND	75	ND	571	ND, LOD = 323
SEKR2750C701S112912D011	1212036-18	ND	2	ND	157	ND, LOD = 9
SEKR2750C701S112912D011	1212036-18D	9	NA	ND	95	9
SEKR2750C701S112912D016	1212037-01	136	NA	ND	---	136
SEKR2750C702S113012DX	1212037-09	ND	23	ND	919	ND, LOD = 471
SEKR2750C702S113012D005	1212037-10	3	NA	ND	77	3
SEKR2800C701S072412DX	1209019-08	1020	NA	ND	167	1020
SEKR2800C701S072412D007	1211037-11	106	NA	41	NA	73
SEKR2800C701S072412D012	1211037-12	ND	81	ND	67	ND, LOD = 74
SEKR2850C701S072412DX	1208009-03	ND	1	ND	42	ND, LOD = 22
SEKR2850C701S072412D003	1208009-04	39	NA	ND	79	39
SEKR2875C701D112812D004	1212033-05	ND	883	ND	585	ND, LOD = 734
SEKR2875C701S112812DX	1212033-03	ND	644	ND	611	ND, LOD = 628
SEKR2875C701S112812D004	1212033-04	ND	1069	ND	683	ND, LOD = 805
SEKR2875C701S112812D008	1212033-06	ND	36	ND	88	ND, LOD = 628
SEKR2875C701S112812D016	1212052-06	16	NA	ND	---	16
SEKR3075C701S072712DX	1209021-02	ND	342	ND	470	ND, LOD = 406
SEKR3075C701S072712D005	1211040-07	ND	63	191	NA	191
SEKR3075C701S072712D012	1212052-13	9	NA	170	NA	90
SEKR3075C702D112712D020	1212029-13	6	NA	5	NA	6
SEKR3075C702D112712D020	1212029-13D	ND	13	2	NA	2
SEKR3075C702S112712DX	1212029-08	7	NA	2	NA	5
SEKR3075C702S112712D006	1212029-09	8	NA	4	NA	6
SEKR3075C702S112712D011	1212029-10	38	NA	17	NA	28
SEKR3075C702S112712D016	1212029-11	17	NA	ND	29	17
SEKR3075C702S112712D020	1212029-12	32	NA	44	NA	38
SEKR3075C702S112712D025	1212029-14	ND	11	ND	2	ND, LOD = 7
SEKR3250C701S112912DX	1212033-18	9	NA	9	NA	9
SEKR3250C701S112912D006	1212033-19	2	NA	ND	0	2
SEKR3250C701S112912D010	1212034-01	11	NA	ND	---	11
SEKR3250C701S112912D014	1212034-02	7	NA	ND	---	7
SEKR3250C701S112912D014	1212034-02D	9	NA	ND	---	9
SEKR3650C701S072512DX	1208009-08	ND	131	ND	507	ND, LOD = 319
SEKR3650C701S072512D006	1208009-09	ND	267	ND	704	ND, LOD = 486
SEKR3650C701S072512D010	1208009-10	ND	212	ND	642	ND, LOD = 427
SEKR3650C701S072512D019	1212052-10	11	NA	ND	---	11
SEKR3675C701D112712D006	1212028-08	ND	1354	946	NA	946
SEKR3675C701S112712DX	1212028-06	ND	787	ND	242	ND, LOD = 515
SEKR3675C701S112712D006	1212028-07	ND	1133	212	NA	212
SEKR3700C701S112712DX	1212030-15	1032	NA	466	NA	749
SEKR3700C701S112712D005	1212030-16	94	NA	ND	55	94
SEKR3700C701S112712D008	1212030-17	ND	4	ND	140	ND, LOD = 72
SEKR3725C701S072512DX	1209019-12	ND	35	ND	203	ND, LOD = 119
SEKR3725C701S072512D007	1211037-16	48	NA	166	NA	107

LOD = Limit of Detectability
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--- = Biomarker was not detected

Table 1

Line 6B Oil Concentrations in Oil Quantification Sediment Samples
Enbridge Line 6B MP 608 Marshall, MI Pipeline Release

Client ID	Lab ID	TAS2/Hopane Line 6B Oil Conc. mg/kg Sed	TAS2/Hopane Line 6B Oil LOD mg/kg Sed	TAS1/T30 Line 6B Oil Conc. mg/kg Sed	TAS1/T30 Line 6B Oil LOD mg/kg Sed	Line 6B Oil Reported Value
SEKR3725C701S072512D013	1211037-17	71	NA	ND	254	71
SEKR3725C702S072712DX	1209021-11	407	NA	69	NA	238
SEKR3725C702S072712D004	1211041-09	542	NA	134	NA	338
SEKR3725C702S072712D010	1211041-10	10	NA	ND	149	10
SEKR3725C702S072712D015	1211041-11	27	NA	ND	31	27
SEKR3725C704S112812DX	1212032-18	42	NA	29	NA	36
SEKR3725C704S112812D006	1212032-19	32	NA	ND	63	32
SEKR3725C704S112812D011	1212033-01	42	NA	19	NA	30
SEKR3725C704S112812D017	1212033-02	19	NA	3	NA	11
SEKR3725C705D112812D006	1212033-15	ND	49	ND	15	ND, LOD = 32
SEKR3725C705S112812DX	1212033-13	ND	94	62	NA	62
SEKR3725C705S112812D006	1212033-14	ND	58	39	NA	39
SEKR3725C705S112812D006	1212033-14D	21	NA	28	NA	25
SEKR3725C705S112812D010	1212033-16	ND	195	ND	35	ND, LOD = 115
SEKR3725C705S112812D013	1212033-17	ND	398	209	NA	209
SEKR3725C706S112912DX	1212034-13	ND	6	7	NA	7
SEKR3725C706S112912D002	1212034-14	3	NA	13	NA	8
SEKR3725C706S112912D004	1212034-15	633	NA	571	NA	602
SEKR3725C706S112912D005	1212034-16	75	NA	63	NA	69
SEKR3725C706S112912D010	1212034-17	ND	476	ND	270	ND, LOD = 373
SEKR3725C706S112912D013	1212034-18	ND	4227	8081	NA	8081
SEKR3725C706S112912D015	1212052-07	162	NA	225	NA	193
SEKR3725C707S112712DX	1212029-15	2	NA	ND	11	2
SEKR3725C707S112712D006	1212029-16	32	NA	14	NA	23
SEKR3725C707S112712D010	1212029-17	66	NA	22	NA	44
SEKR3725C707S112712D013	1212029-18	58	NA	22	NA	40
SEKR3725C708D112912D005	1212035-09	27	NA	17	NA	22
SEKR3725C708S112912DX	1212035-07	ND	48	ND	26	ND, LOD = 37
SEKR3725C708S112912D005	1212035-08	38	NA	ND	77	38
SEKR3725C709D113012D008	1212037-14	ND	35	ND	7	ND, LOD = 21
SEKR3725C709S113012DX	1212037-11	ND	74	ND	170	ND, LOD = 122
SEKR3725C709S113012D005	1212037-12	18	NA	38	NA	28
SEKR3725C709S113012D008	1212037-13	667	NA	643	NA	655
SEKR3725C709S113012D008	1212037-13D	678	NA	584	NA	631
SEKR3750C701S072512DX	1208009-11	321	NA	ND	379	321
SEKR3750C701S072512D006	1208009-12	ND	92	ND	349	ND, LOD = 221
SEKR3750C701S072512D010	1208009-13	ND	391	ND	453	ND, LOD = 422
SEKR3750C703S112812DX	1212031-18	ND	777	ND	2827	ND, LOD = 1802
SEKR3750C703S112812D007	1212031-19	ND	35	ND	22	ND, LOD = 29
SEKR3750C703S112812D012	1212038-18	12	NA	2	NA	7
SEKR3750C703D112812D012	1212032-01	0	NA	2	NA	1
SEKR3750C703S112812D022	1212052-05	5	NA	ND	---	5
SEKR3750C703S112812D022	1212052-05D	5	NA	ND	---	5
SEKR3750C704S112712DX	1212029-03	1058	NA	480	NA	769
SEKR3750C704S112712D006	1212029-04	259	NA	33	NA	146
SEKR3750C705S112812DX	1212032-13	437	NA	504	NA	471
SEKR3750C705S112812D006	1212032-14	ND	611	2955	NA	2955
SEKR3750C705D112812D006	1212032-15	ND	572	3125	NA	3125
SEKR3750C705S112812D011	1212032-16	ND	579	5000	NA	5000
SEKR3750C705S112812D016	1212032-17	ND	55	1632	NA	1632
SEKR3750C706D112912D009	1212036-04	260	NA	135	NA	198
SEKR3750C706S112912DX	1212036-01	ND	259	ND	251	ND, LOD = 255
SEKR3750C706S112912D006	1212036-02	ND	101	ND	279	ND, LOD = 190
SEKR3750C706S112912D009	1212036-03	ND	296	ND	365	ND, LOD = 331
SEKR3750C706S112912D012	1212036-05	ND	360	2246	NA	2246
SEKR3750C707D112812D006	1212030-13	153	NA	ND	40	153
SEKR3750C707S112812DX	1212030-11	175	NA	98	NA	137
SEKR3750C707S112812D006	1212030-12	221	NA	79	NA	150
SEKR3750C707S112812D010	1212030-14	ND	995	ND	315	ND, LOD = 655
SEKR3750C708D112912D011	1212035-13	ND	13	ND	5	ND, LOD = 9
SEKR3750C708S112912DX	1212035-10	355	NA	138	NA	247
SEKR3750C708S112912D006	1212035-11	57	NA	ND	35	57
SEKR3750C708S112912D011	1212035-12	ND	8	ND	30	ND, LOD = 20

LOD = Limit of Detectability

ND = Nondetect

NA = Not applicable

--- = Biomarker was not detected

Table 1

Line 6B Oil Concentrations in Oil Quantification Sediment Samples
 Enbridge Line 6B MP 608 Marshall, MI Pipeline Release

Client ID	Lab ID	TAS2/Hopane Line 6B Oil Conc. mg/kg Sed	TAS2/Hopane Line 6B Oil LOD mg/kg Sed	TAS1/T30 Line 6B Oil Conc. mg/kg Sed	TAS1/T30 Line 6B Oil LOD mg/kg Sed	Line 6B Oil Reported Value
SEKR3750C708S112912D011	1212035-12D	ND	7	ND	35	ND, LOD = 20
SEKR3750C708S112912D016	1212035-14	16	NA	ND	---	16
SEKR3750C708S112912D021	1212035-15	16	NA	ND	6	16
SEKR3750C708S112912D026	1212035-16	20	NA	ND	41	20
SEKR3750C709D112712D006	1212030-02	318	NA	398	NA	358
SEKR3750C709S112712DX	1212029-19	ND	88	ND	38	ND, LOD = 63
SEKR3750C709S112712D006	1212030-01	259	NA	166	NA	213
SEKR3750C709D112712D006	1212030-02D	308	NA	528	NA	418
SEKR3750C709S112712D011	1212030-03	49	NA	22	NA	36
SEKR3750C710S112812DX	1212037-06	165	NA	32	NA	98
SEKR3750C710S112812D005	1212037-07	250	NA	262	NA	256
SEKR3750C710S112812D008	1212037-08	584	NA	452	NA	518
SEKR3775C701S072712DX	1209021-14	ND	263	159	NA	159
SEKR3775C701S072712D006	1211041-16	527	NA	561	NA	544
SEKR3775C701S072712D007	1211041-17	ND	597	ND	305	ND, LOD = 451
SEKR3775C702S072712DX	1208010-16	151	NA	219	NA	185
SEKR3775C702S072712D005	1208010-17	608	NA	362	NA	485
SEKR3775C702S072712D009	1208010-18	ND	158	ND	311	ND, LOD = 235
SEKR3775C703D112812D006	1212032-10	261	NA	ND	384	261
SEKR3775C703D112812D006	1212032-10D	79	NA	ND	193	79
SEKR3775C703S112812DX	1212032-08	ND	13	ND	195	ND, LOD = 104
SEKR3775C703S112812D006	1212032-09	ND	47	ND	391	ND, LOD = 219
SEKR3775C703S112812D011	1212032-11	ND	960	ND	34	ND, LOD = 497
SEKR3775C703S112812D015	1212032-12	ND	332	135	NA	135
SEKR3775C704S112712DX	1212029-05	954	NA	890	NA	922
SEKR3775C704S112712D007	1212029-06	10	NA	ND	53	10
SEKR3775C704S112712D012	1212029-07	17	NA	ND	37	17
SEKR3800C701S072612DX	1209020-10R	41	NA	265	NA	153
SEKR3800C701S072612D003	1211039-12	ND	93	320	NA	320
SEKR3800C702D072612DX	1209020-13R	3963	NA	2615	NA	3289
SEKR3800C702S072612DX	1209020-12R	5611	NA	2689	NA	4150
SEKR3800C702S072612D005	1211039-15	ND	59	ND	608	ND, LOD = 334
SEKR3800C702S072612D009	1211039-16	ND	432	ND	588	ND, LOD = 510
SEKR3800C703S072612DX	1209020-15R	76	NA	569	NA	323
SEKR3800C703S072612D007	1211040-01	ND	432	444	NA	444
SEKR3800C704S072712DX	1209021-01	ND	531	89	NA	89
SEKR3800C704S072712D006	1211040-06	ND	654	ND	247	ND, LOD = 451
SEKR3800C705S072712DX	1209021-05	449	NA	459	NA	454
SEKR3800C705S072712D002	1211040-14	105	NA	103	NA	104
SEKR3800C705S072712D004	1211040-15	ND	46	ND	21	ND, LOD = 34
SEKR3800C706S072712DX	1209021-09	37	NA	79	NA	58
SEKR3800C706S072712D004	1211041-05	51	NA	31	NA	41
SEKR3800C707S072712DX	1208010-09	258	NA	113	NA	186
SEKR3800C707S072712D004	1208010-10	ND	95	53	NA	53
SEKR3800C707S072712D009	1208010-11	ND	606	ND	218	ND, LOD = 412
SEKR3800C707S072712D014	1208010-12	ND	956	2545	NA	2545
SEKR3800C708S072712DX	1209021-10	ND	1614	624	NA	624
SEKR3800C708S072712D005	1211041-06	ND	1482	625	NA	625
SEKR3800C708S072712D005	1211041-06D	ND	1526	312	NA	312
SEKR3800C708S072712D010	1211041-07	ND	2096	821	NA	821
SEKR3800C708S072712D014	1211041-08	ND	1960	691	NA	691
SEKR3800C709S072712DX	1208010-13	ND	169	ND	237	ND, LOD = 203
SEKR3800C709S072712D006	1208010-14	ND	265	ND	203	ND, LOD = 234
SEKR3800C709S072712D011	1208010-15	ND	671	ND	151	ND, LOD = 411
SEKR3825C701S072712DX	1209021-07	ND	348	ND	7	ND, LOD = 178
SEKR3825C701S072712D003	1211040-17	ND	701	ND	222	ND, LOD = 462
SEKR3825C701S072712D009	1211040-18	ND	1068	ND	384	ND, LOD = 726
SEKR3825C701S072712D015	1211041-01	ND	3451	1867	NA	1867
SEKR3850C701S072612DX	1209020-01R	ND	976	ND	389	ND, LOD = 683
SEKR3850C701S072612D007	1211038-09	ND	1562	ND	693	ND, LOD = 1128
SEKR3850C701S072612D013	1211038-10	ND	4450	1793	NA	1793
SEKR3850C702S072612DX	1209020-05R	ND	382	ND	359	ND, LOD = 371
SEKR3850C702S072612D006	1211039-01	ND	875	ND	656	ND, LOD = 766

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--- = Biomarker was not detected

Table 1

Line 6B Oil Concentrations in Oil Quantification Sediment Samples
 Enbridge Line 6B MP 608 Marshall, MI Pipeline Release

Client ID	Lab ID	TAS2/Hopane Line 6B Oil Conc. mg/kg Sed	TAS2/Hopane Line 6B Oil LOD mg/kg Sed	TAS1/T30 Line 6B Oil Conc. mg/kg Sed	TAS1/T30 Line 6B Oil LOD mg/kg Sed	Line 6B Oil Reported Value
SEKR3850C702S072612D010	1211039-02	ND	262	116	NA	116
SEKR3850C702S072612D010	1211039-02D	ND	275	77	NA	77
SEKR3850C703S072712DX	1209021-03	ND	943	ND	382	ND, LOD = 663
SEKR3850C703S072712D002	1211040-08	ND	1046	ND	480	ND, LOD = 763
SEKR3850C703S072712D005	1211040-09	ND	1020	ND	687	ND, LOD = 911
SEKR3850C703S072712D005	1211040-09D	ND	1230	ND	730	ND, LOD = 911
SEKR3850C703S072712D009	1211040-10	ND	1344	ND	555	ND, LOD = 950
SEKR3850C703S072712D015	1212052-14	ND	313	ND	691	ND, LOD = 502
SEKR3875C701S072612DX	1209020-03R	ND	1128	ND	516	ND, LOD = 822
SEKR3875C701S072612D006	1211038-13	ND	2193	ND	922	ND, LOD = 1583
SEKR3875C701S072612D006	1211038-13D	ND	2439	ND	776	ND, LOD = 1583
SEKR3875C701S072612D012	1211038-14	ND	4028	347	NA	347
SEKR3875C701S072612D017	1211038-15	ND	2081	2169	NA	2169
SEKR3925C701S072612DX	1209020-08R	ND	955	ND	575	ND, LOD = 765
SEKR3925C701S072612D006	1211039-08	ND	826	ND	371	ND, LOD = 599
SEKR3950C701S072612DX	1208009-16	ND	1344	ND	1264	ND, LOD = 1304
SEKR3950C701S072612D007	1208009-17	ND	2402	ND	1443	ND, LOD = 1923
SEKR3950C701S072612D013	1208010-01	ND	4578	776	NA	776
SEKR3975C701S072612D005	1211039-05	ND	1224	ND	645	ND, LOD = 935
SEKR3975C701S072612D010	1211039-06	ND	2052	ND	679	ND, LOD = 1366
SEKR3975C701S072612D015	1211039-07	ND	4879	820	NA	820

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