

98-e01
part 1

DEPARTMENT OF ECOLOGY

March 6, 1998

TO: Craig Thompson, Toxics Cleanup Program
Bob Woolrich, WDOH Office of Shellfish Programs
Glen Patrick, WDOH Office of Toxic Substances

FROM: ^{al} Art Johnson, Environmental Investigations & Laboratory Services
Program

SUBJECT: Data Report on Jackson Park/Erlands Point Clam and Sediment Samples
(WA-15-0040)

The Toxic Cleanup Program (TCP) requested assistance from the Environmental Investigations & Laboratory Services Program (EILS) in determining if there is significant chemical contamination of the clams and sediments along a stretch of beach from the Jackson Park Housing Complex to Erlands Point, on Dyes Inlet, near Bremerton. The Washington State Department of Health (WDOH) has classified the commercial clam beds east of Erlands Point as "prohibited," due, in part, to possible contamination from toxic substances. Jackson Park Housing Complex is the site of a former Navy ordnance demilitarization facility and putative source of the contamination

Samples of manila clams and intertidal sediment were collected by WDOH and EILS personnel on December 11, 1997 at the sites shown in Figure 1. Gary Pasco of EA Engineering, a Navy contractor, and Steve Saepoff of the Navy's ESA Northwest observed and assisted with the sampling. WDOH also collected manila clams from a reference area, Twanoh State Park on Hood Canal, on December 10, 1997

Quality assurance project plans contain detailed information on how the sampling was conducted (Johnson, 1997; Patrick, 1997). Briefly, the sediment samples consisted of a composite of multiple cores of the top 10-cm surface layer, taken with either a stainless steel tube or stainless steel scoop. Each clam sample consisted of the entire soft parts from 50 individuals. The composites were homogenized and split into subsamples for chemical analyses. Portions of each homogenate were provided to Gary Pasco for an independent analysis requested by the Navy.

The Ecology/WDOH samples were analyzed by the Ecology/EPA Manchester Environmental Laboratory and contract laboratories selected by Manchester. Clam samples were analyzed for arsenic, vanadium, mercury, thallium, antimony, pentachlorophenol, bis(2-ethylhexyl)phthalate, and 3,3'-dichlorobenzidine. WDOH had determined that these were the chemicals of potential human health concern in Erlands Point clams. Sediment samples were analyzed for grain size, total organic

carbon, priority pollutant metals, vanadium, semivolatile organic compounds, polychlorinated biphenyls, and ordnance compounds. These analyses were selected to include the chemicals of concern in clams, allow a determination of compliance with Ecology sediment quality standards, and to increase the amount of data available on ordnance compounds.

The complete chemical data with quality assurance reviews by Manchester Laboratory staff are attached. Results of this study are summarized in the following tables:

- Table 1 Sample location information and size range of clams analyzed
- Table 2 Results on clam samples compared to WDOH health risk values
- Table 3 Grain size and total organic carbon in sediment samples
- Table 4 Results of metals analysis on sediment samples
- Table 5 Semivolatile compounds detected in sediment samples
- Table 6 Results of PCB analysis on sediment samples
- Table 7 Results of ordnance analysis on sediment samples
- Table 8 Sediment chemistry compared to Ecology sediment quality standards

Acknowledgements

The assistance of Cindy O'Hare, ESA Northwest, in arranging for permission to sample at Jackson Park is very much appreciated. The clam samples were collected by Michael Antee, Cathy Barker, Wayne Clifford, and Helen Seyferlich of WDOH and by Shawn Ultican, Bremerton/Kitsap County Health District. Manchester Laboratory staff who participated in analyzing the clam and sediment samples included Dickey Huntamer, Peggy Knight, Stewart Magoon, Karin Feddersen, Jim Ross, Randy Knox, Bob Carrell, Pam Covey, Bob Rieck, Catherine Bickle, and Debbie Lacroix.

References

- Johnson, A. 1997. Chemical Contaminants in Clams and Sediments from Jackson Park and Vicinity, Dyes Inlet. Quality Assurance Project Plan. Washington State Dept. Ecology, Olympia, WA.
- Patrick, G. 1997. ERLANDS Pt. Project: Shellfish Sample Collection and Handling Protocols. Washington State Dept. Health, Olympia, WA.

AJ:jl

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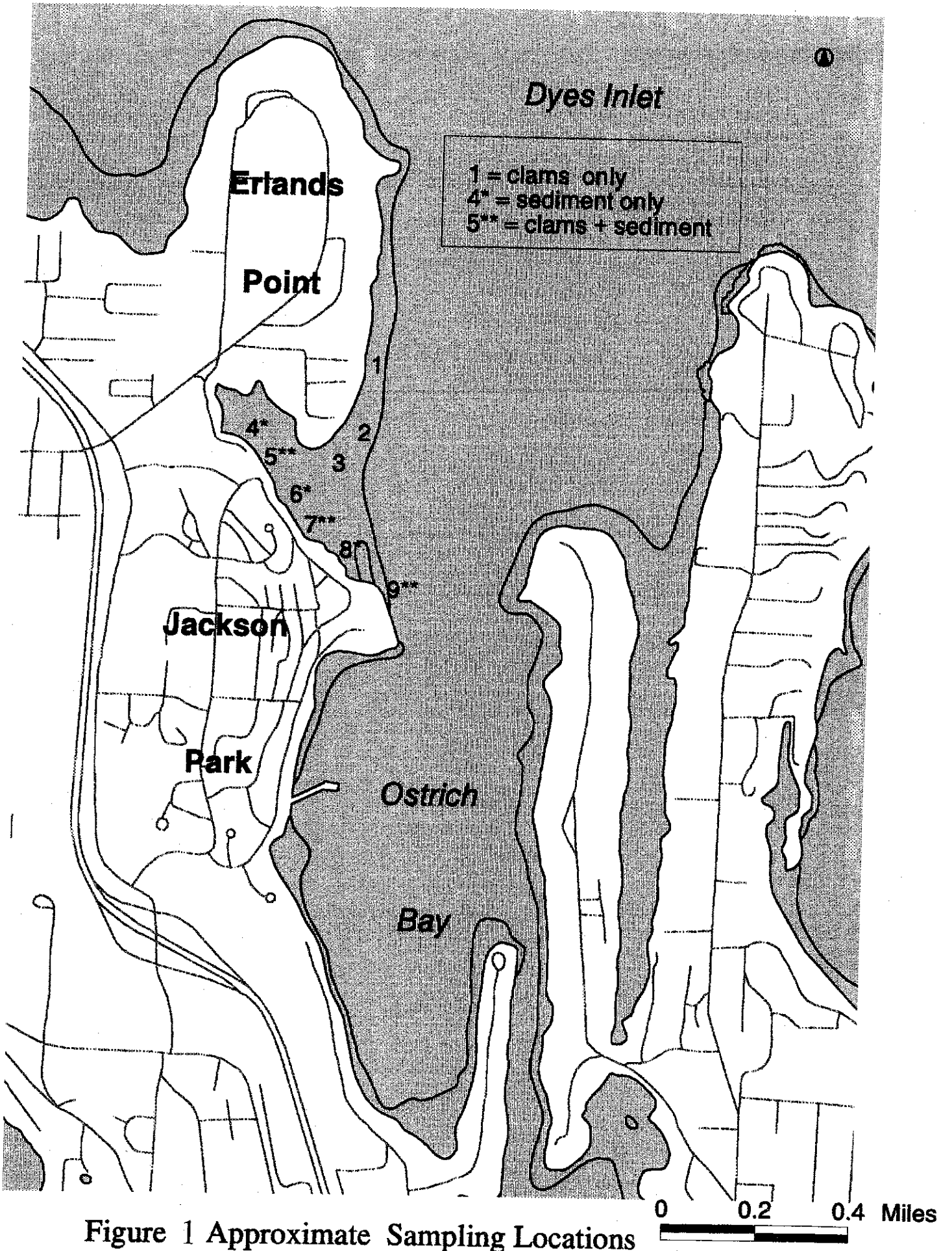


Figure 1 Approximate Sampling Locations

Table 1. Ecology/WDOH December 1997 Jackson Park/Erlands Point Samples

Location	Sample No	Latitude (N)	Longitude (W)	Date	Size Range (mm)
Clams					
Twanoh St. Pk. (Hood Canal)	508080	47 22 44	122 58 16	10 Dec. 97	33 - 55
"	508081	"	"	"	38 - 53
Erlands Pt. 1A	508082	47 35 57	122 41 11	11 Dec. 97	40 - 56
Erlands Pt. 1B	508083	"	"	"	42 - 60
Erlands Pt. 1C	508084	"	"	"	41 - 56
Erlands Pt. 2A	508085	47 35 52	122 41 14	"	33 - 54
Erlands Pt. 2B	508086	"	"	"	38 - 54
Erlands Pt. 2C	508087	"	"	"	39 - 53
Erlands Pt. 3A	508088	47 35 49	122 41 17	"	35 - 52
Erlands Pt. 3B	508089	"	"	"	34 - 54
Erlands Pt. 3C	508090	"	"	"	38 - 50
Jackson Pk. #5	508091	47 35 48	122 41 24	"	36 - 54
Jackson Pk. #7	508092	47 35 41	122 41 15	"	40 - 65
Jackson Pk. #9	508093	47 35 37	122 41 09	"	44 - 66
Sediment					
Jackson Pk. #4	508094	47 35 50	122 41 29	"	--
Jackson Pk. #5	508095	47 35 48	122 41 24	"	--
Jackson Pk. #6	508096	47 35 44	122 41 22	"	--
Jackson Pk. #7	508097	47 35 43	122 41 16	"	--
Jackson Pk. #8	508098	47 35 39	122 41 13	"	--
Jackson Pk. #9	508099	47 35 37	122 41 09	"	--

Table 2. Results on WDOH Target Chemicals in Clam Samples (ug/Kg, wet wt.)

Location	Sample No	Arsenic	Vanadium	Mercury	Thallium	Antimony	Pentachlorophenol	Bis(2-ethyhexyl)phthalate	3,3'-dichlorobenzidine	Percent Lipid
Twanoh St. Pk. (Hood Canal)	508080	2640	230	5U	33	50U	50U	100U	45U	0.6
"	508081	2490	200	5U	10	50U	40U	90U	42U	0.3
"	508081-dup.1	na	na	na	na	na	40U	20U	na	na
"	508081-dup.2	na	na	na	na	na	35U	30U	na	na
Erlands Pt. 1A	508082	3550	140	38	26	50U	36U	63U	50U	0.5
Erlands Pt. 1B	508083	4050	150	43	22	50U	38U	58U	65U	0.6
Erlands Pt. 1C	508084	3860	170	50	23	50U	31U	10U	60U	0.5
Erlands Pt. 2A	508085	3970	140	52	32	50U	43U	60U	47U	0.4
Erlands Pt. 2B	508086	3500	130	48	21	50U	32U	56U	76U	0.5
Erlands Pt. 2C	508087	3770	130	50	10U	50U	38U	53U	60U	0.6
Erlands Pt. 3A	508088	4360	160	41	23	50U	25U	70U	50U	0.4
Erlands Pt. 3B	508089	3550	120	40	20	50U	40U	40U	42U	0.4
Erlands Pt. 3C	508090	3720	180	43	22	50U	40U	40U	43U	0.4
Jackson Pk. #5	508091	2920	120	43	20	50U	40U	40U	300U	0.5
Jackson Pk. #7	508092	1550	120	17	17	50U	24U	49U	66U	0.3
Jackson Pk. #9	508093	2690	87	26	10U	50U	36U	58U	43U	0.5
"	508093-dup.	2590	87	28	12	50U	na	na	na	0.3
WDOH Health Risk Values:		220	6600	74	59	290	61	530	16	--

Data Qualifiers:

Bold = analyte present in sample; visual aid to locating data of interest

U = not detected at or above reported value (quantitation limit)

Table 3. Grain Size and Total Organic Carbon in Jackson Park Sediment Samples

Location: Sample No.:	#4 508094	#5 508095	#6 508096	#7 508097	#8 508098	#9 508099
Gravel (%)	0.05	16.3	11.3	5.5	10.9	37
Sand (%)	61.3	65.2	74.4	82.1	79	58.4
Silt (%)	34.5	15.4	11.6	11	9.9	3.8
Clay (%)	3.7	3.1	2.7	1.4	0.2	0.7
IOC (% @70°C)	0.64	0.78	0.49	0.45	0.27	0.24
IOC (% @104°C)	0.68	0.79	0.49	0.45	0.28	0.25
Solids (%)	67.9	69.3	76.7	75.7	81.7	83.1

Table 4. Results of Metals Analysis on Jackson Park Sediment Samples (mg/Kg, dry wt.)

Location:	#4	#5	#6	#7	#8	#9
Sample No :	508094	508095	508096	508097	508098	508099
Zinc	45	36	30	31	32	31
Vanadium	38	27	24	26	25	26
Chromium	39 J	24 J	26 J	22 J	25 J	24 J
Nickel	31	20	21	22	24	25
Copper	16	9.5	8.7	8.2	8.7	7.9
Lead	9.0	7.8	6.1	5.8	9.2	5.8
Arsenic	3.2	2.7	2.7	2.1	1.6	1.7
Mercury	0.03	0.19	0.04	0.03	0.02	0.02
Selenium	0.53	0.49	0.4 U	0.45	0.4 U	0.4 U
Antimony	0.4 UJ	0.4 UJ	0.4 UJ	0.4 UJ	0.75 J	0.4 UJ
Silver	0.33 J	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ	0.2 UJ
Beryllium	0.23	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Cadmium	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Thallium	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

Data Qualifiers:

Bold = analyte present in sample; visual aid to locating data of interest

U = not detected at or above reported value (quantitation limit)

UJ = not detected at or above reported estimated value

J = positively identified; numerical value is an estimate

Table 5. Semivolatiles Detected in Jackson Park Sediment Samples (ug/Kg, dry wt.)

Location: Sample No.:	#4	#5	#6	#7	#8	#9
	508094	508095	508096	508097	508098	508099
WDOH Target Chemicals						
Pentachlorophenol	87 J	80 J	128 U	130 U	124 U	118 U
Bis(2-ethylhexyl)phthalate	138 U	131 U	128 U	130 U	124 U	118 U
3,3'-Dichlorobenzidine	110 U	105 U	103 U	104 U	100 U	95 U
Polyaromatic Hydrocarbons						
Acenaphthene	28 U	26 U	26 U	26 U	6.6 J	24 U
Phenanthrene	5.7 J	5.1 J	5 J	26 U	59	24 U
Anthracene	28 U	26 U	26 U	26 U	16 J	24 U
Fluoranthene	12 J	13 J	9.2 J	26 U	191	24 U
Pyrene	28 U	26 U	9.3 J	26 U	169	24 U
Benzo[a]anthracene	28 U	26 U	14 J	26 U	118	24 U
Chrysene	28 U	7.9 J	26 U	26 U	145	24 U
Benzo(b)fluoranthene	29 J	30 J	26 J	26 J	197	24 J
Benzo(k)fluoranthene	24 J	22 J	22 J	21 J	90	20 J
Benzo[a]pyrene	29 J	29 J	28 J	28 J	172	25 J
Indeno[1,2,3-c,d]pyrene	37 J	36 J	35 J	34 J	140	31 J
Dibenzo[a,h]anthracene	138 U	131 U	128 U	130 U	55 J	118 U
Benzo[g,h,i]perylene	31 J	31 J	28 J	28 J	112	25 J
Miscellaneous Compounds						
Phenol	78 U	178	705	737	1040	1160
4-Methylphenol	28 U	26 U	15 J	26 U	25 U	24 U
Retene	15 J	26 U	14 J	26 U	25 U	24 U
Benzoic acid	519 J	463 J	420 J	438 J	563	398 J

Data Qualifiers:

BOLD = analyte present in samples; visual aid to locating data of interest

U = not detected at or above reported value (quantitation limit)

J = positively identified; numerical value is an estimate

Table 6. Results of PCB Analysis on Jackson Park Sediment Samples (ug/Kg, dry wt.)

Location: Sample No :	#4 508094	#5 508095	#6 508096	#7 508097	#8 508098	#9 508099
PCB-1016	28 U	26 U	26 U	26 U	25 U	24 U
PCB-1221	28 U	26 U	26 U	26 U	25 U	24 U
PCB-1232	28 U	26 U	26 U	26 U	25 U	24 U
PCB-1242	28 U	26 U	26 U	26 U	25 U	24 U
PCB-1248	28 U	26 U	26 U	26 U	25 U	24 U
PCB-1254	28 U	26 U	26 U	26 U	25 U	24 U
PCB-1260	28 U	26 U	26 U	26 U	25 U	24 U

Data Qualifiers:

U = not detected at or above reported value (quantitation limit)

Table 7. Results of Ordnance Analysis on Jackson Park Sediment Samples (ug/Kg, dry wt.)

Location: Sample No.:	#4 508094	#5 508095	#6 508096	#7 508097	#8 508098	#9 508099
HMX	37 U	39 U	36 U	39 U	38 U	37 U
RDX	37 U	39 U	36 U	39 U	38 U	37 U
Tetryl	37 U	39 U	36 U	39 U	38 U	37 U
1,3,5-Trinitrobenzene	37 U	39 U	36 U	39 U	38 U	37 U
1,3-Dinitrobenzene	28 U	29 U	27 U	30 U	29 U	28 U
Nitrobenzene	37 U	39 U	36 U	39 U	38 U	37 U
2,4,6-Trinitrotoluene	28 U	29 U	27 U	30 U	29 U	28 U
2-Aminodinitrotoluene	37 U	39 U	36 U	39 U	38 U	37 U
4-Aminodinitrotoluene	37 U	39 U	36 U	39 U	38 U	37 U
2,4-dinitrotoluene	28 U	29 U	27 U	30 U	29 U	28 U
2,6-dinitrotoluene	37 U	39 U	36 U	39 U	38 U	37 U
2-Nitrotoluene	47 U	49 U	45 U	49 U	48 U	46 U
3-Nitrotoluene	47 U	49 U	45 U	49 U	48 U	46 U
4-Nitrotoluene	47 U	49 U	45 U	49 U	48 U	46 U
Picric acid	94 U	97 U	91 U	99 U	96 U	92 U
Picramic acid	380 J	240 J	91 U	91 J	96 U	92 U

Data Qualifiers:

Bold = analyte present in sample; visual aid to locating data of interest

U = not detected at or above reported value (quantitation limit)

J = positively identified; numerical value is an estimate

Table 8. Jackson Park Sediment Chemistry Compared to Sediment Management Standards

Location: Sample No.:	#4 508094	#5 508095	#6 508096	#7 508097	#8 508098	#9 508099	SQS	CSL
Metals (mg/Kg, dry weight; ppm)								
Arsenic	3.2	2.7	2.7	2.1	1.6	1.7	57	93
Cadmium	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	5.1	6.7
Chromium	39	24	26	22	25	24	260	270
Copper	16	9.5	8.7	8.2	8.7	7.9	390	390
Lead	9.0	7.8	6.1	5.8	9.2	5.8	450	530
Mercury	0.03	0.19	0.04	0.03	0.02	0.02	0.41	0.59
Silver	0.33	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	6.1	6.1
Zinc	45	36	30	31	32	31	410	960
Nonionizable Organic Compounds (mg/Kg IOC; ppm)								
Polyaromatic Hydrocarbons								
Total LPAH ^a	0.8	0.6	1.0	nd	29	nd	370	780
Naphthalene	< 4	< 3	< 5	< 6	< 9	< 10	99	170
Acenaphthylene	< 4	< 3	< 5	< 6	< 9	< 10	66	66
Acenaphthene	< 4	< 3	< 5	< 6	2.4	< 10	16	57
Fluorene	< 4	< 3	< 5	< 6	< 9	< 10	23	79
Phenanthrene	0.8	0.6	1.0	< 6	21	< 10	100	480
Anthracene	< 4	< 3	< 5	< 6	5.7	< 10	220	1200
2-Methylnaphthalene	< 4	< 3	< 5	< 6	< 9	< 10	38	64
Total HPAH ^b	24	21	35	30	496	50	960	5300
Fluoranthene	1.8	1.6	1.9	< 6	68	< 10	160	1200
Pyrene	< 4	< 3	1.9	< 6	60	< 10	1,000	1400
Benzo[a]anthracene	< 4	< 3	2.9	< 6	42	< 10	110	270
Chrysene	< 4	1.0	< 5	< 6	52	< 10	110	460
Tot. Benzofluoranthenes	7.8	6.6	9.8	10	103	18	230	450
Benzo[a]pyrene	4.3	3.7	5.7	6.2	61	10	99	210
Indeno[1,2,3-c,d]pyrene	5.4	4.6	7.1	7.6	50	12	34	88
Dibenzo[a,h]anthracene	< 20	< 17	< 26	< 29	20	47	12	33
Benzo[g,h,i]perylene	4.6	3.9	5.7	6.2	40	10	31	78
Chlorinated Benzenes								
1,2-Dichlorobenzene	< 4	< 3	< 5	< 6	< 9	< 10	2.3	2.3
1,4-Dichlorobenzene	< 4	< 3	< 5	< 6	< 9	< 10	3.1	9
1,2,4-Dichlorobenzene	< 4	< 3	< 5	< 6	< 9	< 10	0.81	1.8
Hexachlorobenzene	< 4	< 3	< 5	< 6	< 9	< 10	0.38	2.3

Table 8 (cont.). Jackson Park Sediment Chemistry Compared to Sediment Management Standards

Location: Sample No.:	#4	#5	#6	#7	#8	#9	SQS	CSL
Nonionizable Organic Compounds (mg/Kg TOC; ppm)								
Phthalate Esters								
Dimethyl phthalate	< 4	< 3	< 5	< 6	< 9	< 10	53	53
Diethyl phthalate	< 4	< 3	< 5	< 6	< 9	< 10	61	110
Di-N-butyl phthalate	< 20	< 53	< 43	< 55	< 56	< 234	220	1700
Butylbenzyl phthalate	< 20	< 17	< 26	< 29	< 44	< 47	4.9	64
Bis(2-ethylhexyl)phthalate	< 20	< 17	< 26	< 29	< 44	< 47	47	78
Di-N-Octyl phthalate	< 8	< 7	< 10	< 12	< 18	< 19	58	4500
Miscellaneous								
Dibenzofuran	< 4	< 3	< 5	< 6	< 9	< 10	15	58
Hexachlorobutadiene	< 4	< 3	< 5	< 6	< 9	< 10	3.9	6.2
N-Nitrosodiphenylamine	< 4	< 3	< 5	< 6	< 9	< 10	11	11
Total PCBs	< 4	< 3	< 5	< 6	< 9	< 10	12	65
Ionizable Organic Compounds (ug/Kg, dry weight; ppb)								
Phenol	< 78	178	705	737	1040	1160	420	1200
2-Methylphenol	< 28	< 26	< 26	< 26	< 25	< 24	63	63
4-Methylphenol	< 28	< 26	15	< 26	< 25	< 24	670	670
2,4-Dimethylphenol	< 28	< 26	< 26	< 26	< 25	< 24	29	29
Pentachlorophenol	87	80	< 128	< 1130	< 124	< 118	360	690
Benzyl alcohol	< 28	< 26	< 26	< 26	< 25	< 24	57	73
Benzoic acid	519	463	420	438	563	398	650	650

Note: Underlined values exceed sediment quality standards (SQS); CSL = cleanup screening level

Data Qualifiers:

BOLD = analyte present in samples; visual aid to locating data of interest

^anaphthalene+acenaphthylene+acenaphthene+fluorene+phenanthrene+anthracene

^bfluoranthene+pyrene+benzo[a]anthracene+chrysene+total benzofluoranthenes+benzo[a]pyrene
indeno[1,2,3-c,d]pyrene+dibenzo[a,h]anthracene+benzo[g,h,i]perylene

98-e01
part 2

DEPARTMENT OF ECOLOGY

March 23, 1998

TO: Craig Thompson, Toxics Cleanup Program
Bob Woolrich, WDOH Office of Shellfish Programs
Glen Patrick, WDOH Office of Environmental Health Assessment Services

FROM: ^{AJ} Art Johnson, Environmental Investigations and Laboratory Services

SUBJECT: Correction to Dichlorobenzidine Data Reported on Jackson Park/
Erlands Pt. Clam Samples

Manchester Laboratory has informed me there are errors in the data they reported on 3,3'-dichlorobenzidine in clam samples from the Jackson Park and Erlands Point project. Their calculations were based on 50% of the extract being analyzed, when the actual value was 25%. This translates into a doubling of surrogate recoveries and lowering of detection limits for this compound by approximately a factor of 2.

Therefore, in my report to you of March 6, 1998 ("Data Report on Jackson Park/Erlands Point Clam and Sediment Samples"), please replace Table 2, the Case Summary for Select Base/Neutral/Acids Analytes in Clams, and the individual data reports for re-extracted samples (Re-extract/only - REX1) with the attached corrected information.

Please note that, in the corrected version of Table 2, the detection limit for clam sample number 508091 is from the original analysis (120 ug/Kg, analyzed 02/06/98), since the re-analysis of this sample did not improve detection limits (150 ug/Kg, analyzed 02/25/98).

AJ:jl

cc: Ali Raad, TCP
Michael Antee, WDOH
Larry Goldstein, EILS
Dale Norton, EILS

Table 2. Results on WDOH Target Chemicals in Clam Samples (ug/Kg, wet wt.)

Location	Sample No	Arsenic	Vanadium	Mercury	Thallium	Antimony	Pentachlorophenol	Bis(2-ethylhexyl)phthalate	3,3'-dichlorobenzidine	Percent Lipid
Twanoh St. Pk. (Hood Canal)	508080	2640	230	5U	33	50U	50U	100U	23U	0.6
"	508081	2490	200	5U	10	50U	40U	90U	21U	0.3
"	508081-dup.1	na	na	na	na	na	40U	20U	na	na
"	508081-dup.2	na	na	na	na	na	35U	30U	na	na
Erlands Pt. 1A	508082	3550	140	38	26	50U	36U	63U	25U	0.5
Erlands Pt. 1B	508083	4050	150	43	22	50U	38U	58U	33U	0.6
Erlands Pt. 1C	508084	3860	170	50	23	50U	31U	10U	32U	0.5
Erlands Pt. 2A	508085	3970	140	52	32	50U	43U	60U	24U	0.4
Erlands Pt. 2B	508086	3500	130	48	21	50U	32U	56U	39U	0.5
Erlands Pt. 2C	508087	3770	130	50	10U	50U	38U	53U	31U	0.6
Erlands Pt. 3A	508088	4360	160	41	23	50U	25U	70U	25U	0.4
Erlands Pt. 3B	508089	3550	120	40	20	50U	40U	40U	22U	0.4
Erlands Pt. 3C	508090	3720	180	43	22	50U	40U	40U	22U	0.4
Jackson Pk. #5	508091	2920	120	43	20	50U	40U	40U	120U	0.5
Jackson Pk. #7	508092	1550	120	17	17	50U	24U	49U	34U	0.3
Jackson Pk. #9	508093	2690	87	26	10U	50U	36U	58U	22U	0.5
"	508093-dup.	2590	87	28	12	50U	na	na	na	0.3
WDOH Health Risk Values:		220	6600	74	59	290	61	530	16	--


Data Qualifiers:

Bold = analyte present in sample; visual aid to locating data of interest

U = not detected at or above reported value (quantitation limit)

State of Washington Department of Ecology
Manchester Environmental Laboratory
7411 Beach Dr East Port Orchard WA 98366

Clam BNA Data Review
February 11, 1998
Amended March 5, 1998 and March 20, 1998

Project: **Jackson Park**
Samples: 97508080 - 97508093
By: Stuart Magoon 

Case Summary for Select Base/Neutral/Acids Analytes in Clams

Data from these analyses were reviewed for qualitative and quantitative accuracy, validity, and usefulness. These samples were prepared and analyzed according to EPA methods 1625/1653 modified; isotopic dilution. The target list was amended to only include Pentachlorophenol, 3,3'-Dichlorobenzidine, Bis(2ethylhexyl)phthalate and corresponding isotopes

The original analysis of sample extracts were not cleaned by Gel permeation chromatography (GPC) as per standard operating procedure for tissue extracts, because the GPC unit was not functioning properly; consequently detection limits have likely suffered.

In order to provide better detection levels for 3,3'-Dichlorobenzidine a second aliquot of the original clam tissue extracts were processed through GPC clean-up, washed with a basic solution of 37% potassium hydroxide, and re-analyzed for 3,3'-Dichlorobenzidine. These samples are designated with the suffix "Re-extract/only - REX1". The matrix spikes were re-analyzed and designated as LMX3 (re-analysis of LMX1) and LMX4 (a re-analysis of LMX2). The method blank OBT8020A2R is a re-analysis of OBT8020A2. Note that the analysis date for all these samples and the blanks was February 25, 1998. The REX reports were amended on 3/19/98 to reflect that the results were based on 25% of the original extract not 50% as previously reported.

Results have been reported in micrograms per kilogram (ug/Kg); parts per billion wet weight

BNA Analysis

Holding times:

Sample no.	Collect date	Extraction date	Analysis date	Re-anlaysis date
97508080	12/11/97	1/20/98	2/5/98	2/25/98
97508081	12/11/97	1/21/98	2/5/98	2/25/98
97508082	12/11/97	1/20/98	2/5/98	2/25/98
97508083	12/11/97	1/20/98	2/5/98	2/25/98
97508084	12/11/97	1/20/98	2/4/98	2/25/98
97508085	12/11/97	1/20/98	2/4/98	2/25/98
97508086	12/11/97	1/20/98	2/4/98	2/25/98
97508087	12/11/97	1/20/98	2/5/98	2/25/98
97508088	12/11/97	1/20/98	2/6/98	2/25/98
97508089	12/11/97	1/20/98	2/6/98	2/25/98
97508090	12/11/97	1/20/98	2/6/98	2/25/98
97508091	12/11/97	1/20/98	2/6/98	2/25/98
97508092	12/11/97	1/20/98	2/4/98	2/25/98
97508093	12/11/97	1/20/98	2/4/98	2/25/98

All samples were frozen upon receipt. Extractions were performed well within the one year recommended holding time. All sample extracts were analyzed within forty (40) days of extraction. Sample 97508081 was analyzed in triplicate. The original sample extract for sample 97508081 was lost during extraction; the first duplicate (LDP1) was not affected. Sample 97508081 and another duplicate (LDP2) were extracted the following day (1/21/98); hence triplicate results for sample 97508081 have been provided.

Method Blanks:

Bis(2-ethylhexyl)phthalate was detected in all four method blanks; results based on a 10 gram sample size ranged from 5.5 to 46 ug/Kg. Bis(2-ethylhexyl)phthalate was detected in four (4) of the fourteen samples (97508080, 81, 84, 88) and both duplicates at levels similar to the blanks. The Bis(2-ethylhexyl)phthalate detected in these samples was considered most likely due to contamination and not native to the clam tissue. Therefore, these results have been reported as not detected at a level above the contamination detected.

Calibration:

Calibration data was with specifications.

Surrogate Recoveries:

Surrogate (labeled compound) recoveries for ¹³C₆-Pentachlorophenol and D₄-Bis (2-ethylhexyl) phthalate, were within acceptance limits. There are no specified limits for D₆-3,3'-Dichlorobenzidine. The limits for this compound are described as the range that can be measured reliably. Recoveries in the samples ranged from 2.8 – 19% for the original analyses and 3.3 – 35% for the re-analyses. Sample reporting limits are based on the lowest calibration standard (about the lowest reliable level of detection) and adjusted for sample amount and labeled compound recoveries. Hence the lowest associated labeled recoveries correspond to the highest reporting limits.

Matrix Spikes:

Sample 97508081 was chosen for matrix spike/spike duplicate analysis. Recoveries were reasonable and acceptable, ranging from 38- 93%, within established QC limits.

Analyte	LMX1 %recovery	LMX2 %recovery	RPD	%Recovery QC limits	
Pentachlorophenol	93	90	3.3	17 -109	
3,3'-Dichlorobenzidine	38	39	2.6	25 -125	
Bis (2-ethylhexyl)phthalate	87	87	0	50 -150	

Analyte	LMX3 %recovery	LMX4 %recovery	RPD	%Recovery QC limits	
3,3'-Dichlorobenzidine	70.5	73	3.5	25 -125	

Summary:

This data is acceptable for use. Note that the re-analysis of sample 97508091 for 3,3'-Dichlorobenzidine gave rise to higher detection levels than the original analysis.

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508080 (Re-extract/analy - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: HOODCANAL

Date Prepared: 01/20/98

Matrix: Tissue

Project Officer: Art Johnson

Date Analyzed: 02/05/98

Units: ug/Kg

25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	23	U
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	44	%
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Authorized By: 

Release Date: 3/19/98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508081 (Re-extract/analy - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: HOODCANAL

Date Prepared: 01/21/98

Matrix: Tissue

Project Officer: Art Johnson

Date Analyzed: 02/05/98

Units: ug/Kg

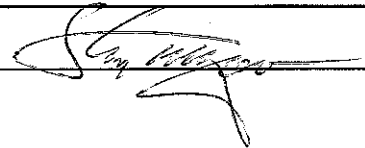
25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	21	U
------------------------	----	---

Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	48	%
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Authorized By: 

Release Date: 3/19/98

Page:

2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508081 (Matrix Spike - LMX3)

Date Received: 12/17/97

Method: EPA1625

Field ID: HOODCANAL

Date Prepared: 01/21/98

Matrix: Tissue

Project Officer: Art Johnson

Date Analyzed: 02/05/98

Units: % Recovery

25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	70.5	
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	60	%
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Authorized By: 

Release Date: 3/19/98

Page: 3

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508081 (Matrix Spike - LMX4)

Date Received: 12/17/97

Method: EPA1625

Field ID: HOODCANAL

Date Prepared: 01/21/98

Matrix: Tissue

Project Officer: Art Johnson

Date Analyzed: 02/05/98

Units: % Recovery

25 GJ

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	73	
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	70	%
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Authorized By: 

Release Date: 3/19/98

Page: 4

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Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508082 (Re-extract/analy - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: ERLNDPT1A Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/05/98 Units: ug/Kg

25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	25	U
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	40	%
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Authorized By: 

Release Date: 3-19-98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508083 (Re-extract/analy - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: ERLNDPT1B Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/05/98 Units: ug/Kg


25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	33	U
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	30	%
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Authorized By: 

Release Date: 3-19-98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508084 (Re-extract/only - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: ERLNDPT1C Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/04/98 Units: ug/Kg

25 g.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	32	U
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	32	%
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Authorized By: 

Release Date: 3/19/98

Page: 2

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Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508085 (Re-extract/only - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: ERLNDPT2A Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/04/98 Units: ug/Kg

25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	24	U
------------------------	----	---

Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	42	%
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Authorized By: 

Release Date: 3-19-98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508086 (Re-extract/only - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: ERLNDPT2B Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/04/98 Units: ug/Kg

25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	39	U
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	26	%
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Authorized By: 

Release Date: 3/19/98

Page:

2

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Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508087 (Re-extract/only - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: ERLNDPT2C Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/05/98 Units: ug/Kg

25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	31	U
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	32	%
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Authorized By: 

Release Date: 3/19/98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508088 (Re-extract/analy - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: ERLNDPT3A

Date Prepared: 01/20/98

Matrix: Tissue

Project Officer: Art Johnson

Date Analyzed: 02/06/98

Units: ug/Kg

25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	25	U
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	40	%
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Authorized By: 

Release Date: 3/19/98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508089 (Re-extract/analy - REXI) Date Received: 12/17/97 Method: EPA1625

Field ID: ERLNDPT3B Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/06/98 Units: ug/Kg

25 a.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	22	U
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	46	%
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Authorized By: 

Release Date: 3/19/98

Page: 2

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Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508090 (Re-extract/only - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: ERLNDPT3C

Date Prepared: 01/20/98

Matrix: Tissue

Project Officer: Art Johnson

Date Analyzed: 02/06/98

Units: ug/Kg

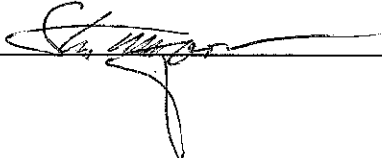
25 g.g.

Analyte	Result	Qualifier
---------	--------	-----------

3,3'-Dichlorobenzidine	22	U
------------------------	----	---

Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	46	%
---------------------------	----	---

Authorized By: 

Release Date: 3/19/98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508091 (Re-extract/analy - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: JACKSON-5 Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/06/98 Units: ug/Kg


25 g.g.

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	150	U
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Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	6.6	%
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Authorized By: 

Release Date: 3/19/98

Page: 2

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Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508092 (Re-extract/only - REXI) Date Received: 12/17/97 Method: EPA1625

Field ID: JACKSON-7 Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/04/98 Units: ug/Kg


25 G.J.

Analyte	Result	Qualifier
---------	--------	-----------

3,3'-Dichlorobenzidine	34	U
------------------------	----	---

Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	30	%
---------------------------	----	---

Authorized By: 

Release Date: 3/19/98

Page:

2

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Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: 97508093 (Re-extract/only - REX1) Date Received: 12/17/97 Method: EPA1625

Field ID: JACKSON-9 Date Prepared: 01/20/98 Matrix: Tissue

Project Officer: Art Johnson Date Analyzed: 02/04/98 Units: ug/Kg

25 a.g.

Analyte	Result	Qualifier
---------	--------	-----------

3,3'-Dichlorobenzidine	22	U
------------------------	----	---

Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	46	%
---------------------------	----	---

Authorized By: 

Release Date: 3/19/98

Page: 2

Manchester Environmental Laboratory

Department of Ecology

Analysis Report for

Base/Neutral/Acids

Project Name: Jackson Park

LIMS Project ID: 1725-97

Sample: **BLN80581**

Method: EPA1625

Blank ID: OBT8020A2R

Date Prepared: 01/20/98

Matrix: Tissue

Project Officer: Art Johnson

Date Analyzed: 02/25/98


Units: ug/Kg

Analyte	Result	Qualifier
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3,3'-Dichlorobenzidine	20	U
------------------------	----	---

Surrogate Recoveries

D6 3,3'-Dichlorobenzidine	50	%
---------------------------	----	---

Authorized By: 

Release Date: 3/19/98

Page:

1