4. Sediment Hydrocarbons

Hydrocarbon concentrations at each Chirag sample station were determined from 2 replicate sediment samples. Replicate values are given in Table 4.1. GC chromatograms are presented in appendix 4 and full PAH data is given in appendix 5.

Table 4.1 Replicate Hydrocarbon Concentrations; Chirag Survey 2010

Station Number	Rep	THC µg.g^{-1}	LAO µg.g^{-1}	THC less LAO µg.g^{-1}	UCM µg.g^{-1}	% UCM	Total 2-6 ring PAH ng.g^{-1}	NPD ng.g^{-1}	% NPD	Total USEPA 16 PAH ng.g^{-1}	Phenols µg.g^{-1}
1	1	15	ND	15	10	67	112	44	39	32	<0.03
	2	42	5	37	31	73	166	90	54	42	<0.03
2	1	47	6	41	33	70	247	177	72	45	<0.03
	2	62	8	54	44	72	200	128	64	47	<0.03
7	1	57	5	52	44	78	241	119	49	43	<0.03
	2	10	ND	10	7	69	106	55	52	19	<0.03
8	1	20	ND	20	14	71	343	103	30	162	<0.03
	2	15	ND	15	10	66	1133	241	21	686	<0.03
9	1	75	9	66	54	72	256	116	45	46	0.20
	2	41	ND	41	31	74	216	112	52	43	0.29
15	1	48	4	43	36	75	278	113	41	85	<0.03
	2	18	ND	18	14	80	80	41	51	16	<0.03
16	1	20	ND	20	14	70	134	64	48	34	<0.03
	2	12	ND	12	9	75	79	41	52	16	<0.03
25	1	7	ND	7	5	71	77	38	49	14	<0.03
	2	11	ND	11	8	75	80	38	47	25	<0.03
33	1	24	3	21	18	76	112	56	50	22	<0.03
	2	40	4	37	31	77	152	76	50	31	<0.03
34	1	410	70	340	307	75	873	633	72	253	4.84
	2	205	40	165	151	74	856	594	69	191	3.19
35	1	95	10	86	74	77	380	177	47	91	<0.03
	2	39	4	35	31	79	168	86	51	42	<0.03
36	1	30	3	27	24	78	161	70	43	29	1.97
	2	8	1	7	5	69	95	54	57	22	0.25
37	1	46	6	39	33	73	266	122	46	58	1.99
	2	61	8	54	47	77	320	156	49	89	2.51
38	1	65	13	53	50	77	261	134	51	63	1.87
	2	69	13	57	53	77	366	144	39	104	2.05
39	1	55	9	47	43	78	171	88	51	37	0.39
	2	79	12	67	57	72	275	163	59	48	3.41
40	1	3	ND	3	ND	ND	NA	NA	NA	NA	NA
	2	13	ND	13	10	77	NA	NA	NA	NA	NA

Table 4.1 (Continued) Replicate Hydrocarbon Concentrations; Chirag Survey 2010

Station Number	Rep	THC µg.g^{-1}	LAO µg.g^{-1}	THC less LAO µg.g^{-1}	UCM µg.g^{-1}	% UCM	Total 2-6 ring PAH ng.g^{-1}	NPD ng.g^{-1}	% NPD	Total USEPA 16 PAH ng.g^{-1}	Phenols µg.g^{-1}
41	1	13	ND	13	10	74	NA	NA	NA	NA	NA
	2	17	ND	17	13	77	NA	NA	NA	NA	NA
42	1	31	ND	31	23	74	NA	NA	NA	NA	NA
	2	15	ND	15	11	76	NA	NA	NA	NA	NA
43	1	5	ND	5	3	65	NA	NA	NA	NA	NA
	2	<2.5	ND	<2.5	ND	ND	NA	NA	NA	NA	NA
44	1	14	ND	14	10	72	NA	NA	NA	NA	NA
	2	<2.5	ND	<2.5	ND	ND	NA	NA	NA	NA	NA
45	1	15	ND	15	11	74	114	57	50	30	<0.03
	2	45	5	40	33	72	200	102	51	46	<0.03
46	1	54	7	47	43	80	188	128	68	55	<0.03
	2	111	23	88	80	72	488	246	50	141	<0.03
47	1	22	ND	22	17	79	134	56	41	30	<0.03
	2	36	ND	36	29	82	268	82	31	90	<0.03
48	1	21	ND	21	17	79	101	48	48	16	<0.03
	2	19	ND	19	14	74	141	69	49	19	<0.03
49	1	10	ND	10	7	75	57	23	41	13	<0.03
	2	18	ND	18	14	79	87	39	45	15	<0.03
50	1	4	ND	4	ND	ND	63	29	46	9	<0.03
	2	7	ND	7	5	71	92	46	50	15	<0.03
51	1	8	ND	8	6	73	NA	NA	NA	NA	NA
	2	5	ND	5	4	68	NA	NA	NA	NA	NA
52	1	24	ND	24	19	79	146	63	43	29	1.98
	2	4	ND	4	ND	ND	111	60	54	18	0.65
53	1	41	3	38	31	74	243	129	53	60	1.67
	2	4	ND	4	ND	ND	48	22	45	5	1.22
54	1	18	ND	18	14	77	106	50	47	19	1.21
	2	7	ND	7	5	70	52	23	45	7	1.46
55	1	26	ND	26	19	73	186	90	48	31	2.42
	2	46	ND	46	35	77	145	67	46	25	3.63
56	1	18	ND	18	13	75	184	87	47	33	<0.03
	2	<2.5	ND	2	ND	ND	77	42	55	11	<0.03
57	1	8	ND	8	6	69	139	71	51	24	<0.03
	2	15	ND	15	11	74	121	54	44	22	<0.03

Table 4.1 (Continued) Replicate Hydrocarbon Concentrations; Chirag Survey 2010

	THC µg.g^{-1}	LAO µg.g^{-1}	THC less LAO µg.g^{-1}	UCM µg.g^{-1}	% UCM	Total 2-6 ring PAH ng.g^{-1}	NPD ng.g^{-1}	% NPD	Total USEPA 16 PAH ng.g^{-1}	Phenols µg.g^{-1}
Min	<2.5	1*	<2.5	3	65	48	22	21	5	<0.03
Max	410	70*	340	307	82	1133	633	72	686	4.84
Median	20	7*	19	17	74	157	73	49	31	<0.03
Mean	38	11*	33	31	74	216	106	49	59	0.71
Std Dev	58	15*	47	44	4	205	112	9	99	1.25
%CV	150	134*	143	144	5	95	106	19	167	175

ND: Not detected
NA: No Analysis
*In samples where detected

4.1. LAO linear Alpha Olefins

The presence of linear alpha olefins (LAO) has been detected at stations 1, 2, 7, 9, 15, 33, 34, 35, 36, 37, 38, 39, 45, 46 and 53. Detection of these synthetic hydrocarbons can be used to indicate the spread of contamination over time from discharged LAO based drill cuttings. LAO drilling fluid is predominately comprised of the group of alkenes C_{14}, C_{16} and C_{18}.

The maximum LAO concentration was 70 and 40µg.g^{-1} recorded at station 34. The concentration at all other stations was very low and ranged from 1 to 23µg.g^{-1}.

The spatial distribution of average LAO concentrations is given in figure 4.1 below. Stations where LAO has been detected are indicated by a red position marker. The LAO contamination footprint extends 1250m NE, 500m N, 750m E, 1000m W and 250m S of the Chirag platform position.

4.2. Total Hydrocarbons

The concentration of THC less LAO ranged from below the detectable limit of 2.5µg.g^{-1} at stations 43R2 and 44R2 to a maximum of 340 and 165µg.g^{-1} at station 34. The next highest concentrations were 88µg.g^{-1} at station 46R2 and 86µg.g^{-1} at station 35R1. The median and mean concentrations were 19 and 33µg.g^{-1} respectively.

Other than the highest concentrations at station 34 and to a lesser extent stations 46 and 35 THC concentrations were low, with the majority of stations having a concentration lower than 40µg.g^{-1}.

Weathered hydrocarbons are often characterised by a 'hump' in the GC chromatogram (Appendix 4), representing a complex mixture of unresolved components (UCM). UCM represented a relatively constant proportion of THC and was indicative of weathered material being present throughout the survey area, ranging from 65-82% with a median and mean of 74%.

The spatial distribution of average THC (less LAO) concentrations is given in figure 4.1 below. As noted above the concentration at the majority of stations was very low. The highest concentration at station 34 is 250m directly to the northeast of the platform. The next highest concentrations are located at stations directly to the east and extending to the northeast of the platform. This was the area of greatest influence identified in previous Chirag surveys.

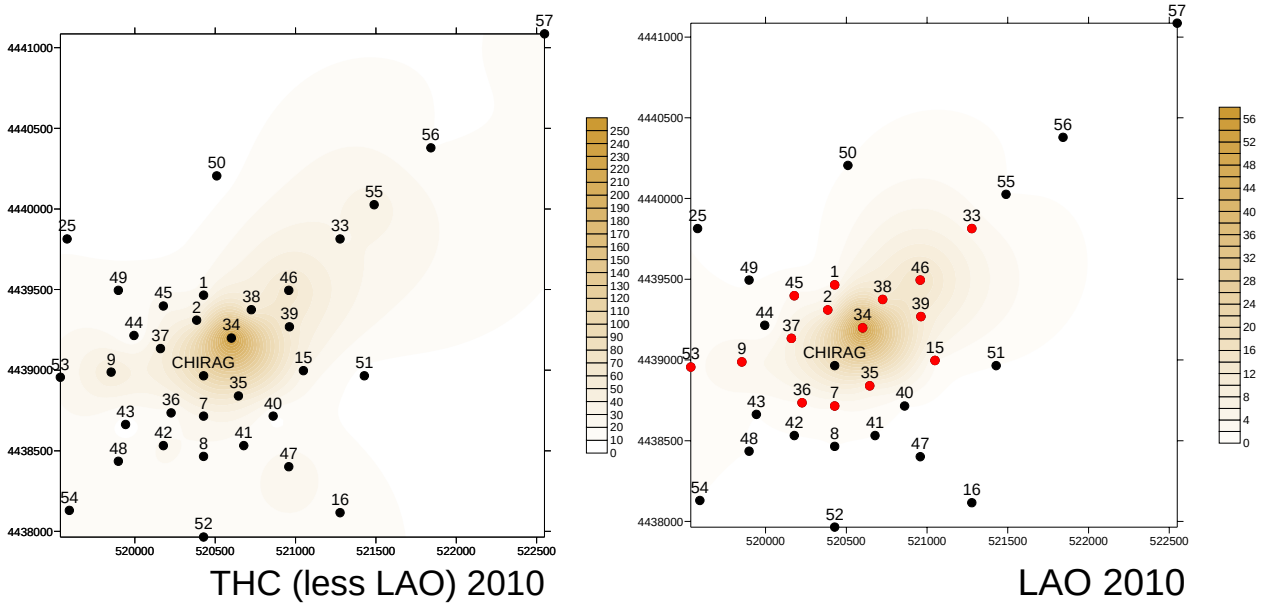

Figure 4.1 THC and LAO Distribution Plots

4.3. Polynuclear Aromatic Hydrocarbons

As with THC, the PAH concentration at the majority of stations was low or very low. The highest concentration was recorded in replicate 2 at station 8 with 1,133ng.g^{-1} and station 34 with 873 and 856ng.g^{-1}. The next highest concentration was 488ng.g^{-1} at station 46R2 and the median and mean concentrations were 157 and 216ng.g^{-1} respectively.

NPD as a proportion of total 2-6 ring PAH was generally low. The median and mean proportion was 49% and overall was typical of weathered material. The highest proportion was present in samples from station 34 with 72 and 69% and samples 2R1 and 46R1 with 72 and 68% respectively.

The higher 2-6 ring PAH concentrations at station 34 and to lesser extent station 46 correspond to the higher THC concentrations present in these samples. However, the highest 2-6 ring PAH concentration observed at station 8 corresponds to a low THC concentration of 15µg.g^{-1}.

USEPA 16 PAH was also generally low throughout. The highest concentration was observed in sample 8R2 with 686ng.g^{-1}. Higher concentrations were also observed at station 34 with 253 and 191ng.g^{-1}. The median and mean concentrations were 31 and 59ng.g^{-1} respectively.

The distribution plots for average 2-6 ring PAH and USEPA16 PAH are given in figure 4.2 below. Both PAH distribution plots are very similar. With the exception of the high PAH concentrations at station 8 the distribution plots exhibit strong similarities to the distribution of average THC concentrations with higher levels present at stations to the northeast of the platform.

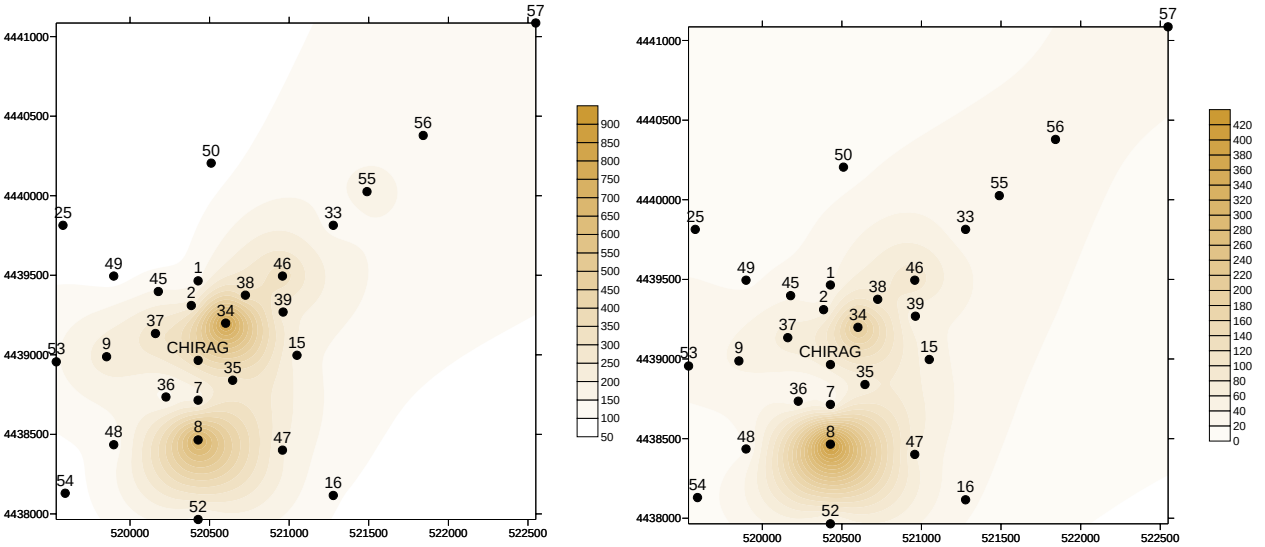

Figure 4.2 2-6 Ring PAH & USEPA16 PAH Distribution Plots

4.4. Phenols

Phenol concentrations were below the detectable limit of 0.03µg.g^{-1} at the majority of stations. Where detected, concentrations ranged from 0.20µg.g^{-1} at station 9R1 to 4.84 at station 34R1.

The distribution plot of average concentrations indicates that the highest concentrations were present at stations 34 and 37 directly to the northeast and northwest of the platform and station 55, 1500m northeast of the platform.

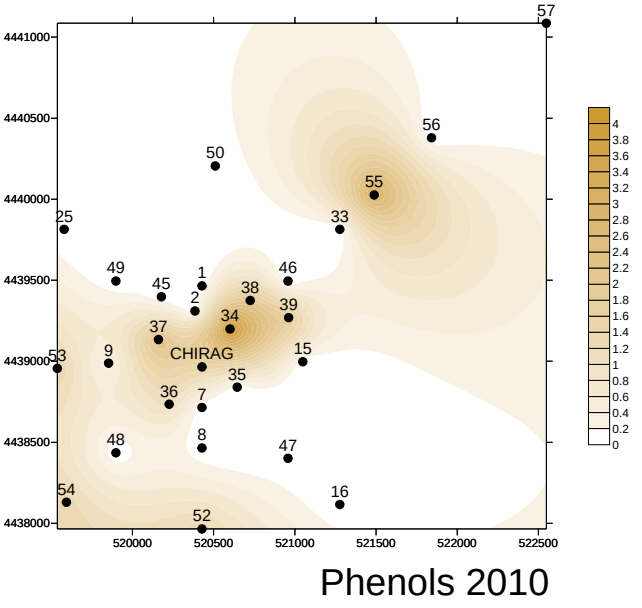

Figure 4.3 Phenol Distribution Plots

4.5. Relationship between Hydrocarbon Parameters

The relationship between measured parameters was tested by a Pearson's r correlation analysis of the replicate data. The results are presented in table 4.2 and paired variable scatterplots are given in figure 4.4.

THC has been correlated with 2-6 ring PAH (0.67) and NPD (0.91). A lower coefficient of 0.35 has been given between THC and USEPA 16 PAH. The paired variable scatter plot for THC and USEPA 16 PAH indicates a linear relationship up to a THC concentration of 30µg.g^{-1} with a wider scatter being present in samples where the THC concentration exceeds 30µg.g^{-1}. Strong correlations >0.85 have been given between all PAH parameters.

A moderate correlation of 0.60 has been given between THC and phenols. When the paired variable plot is examined a wide scatter is evident with the correlation being influenced by a small number of samples, indicating that phenols present within sediments are independent of all other hydrocarbon parameters.

The high correlation coefficient given for LAO and THC is the result of the higher concentrations present in samples from station 34.

Table 4.2 Pearson's r Correlation between Replicate Hydrocarbon Concentrations; Chirag Survey 2010

	THC	*LAO*	*THC less LAO*	*UCM*	*% UCM*	*Total 2-6 ring PAH*	*NPD*	*% NPD*	*Total USEPA 16 PAH*	*Phenols*
THC	1.00									
LAO	0.99	1.00								
THC less LAO	1.00	0.98	1.00							
UCM	1.00	0.98	1.00	1.00						
% UCM	0.11	-0.07	0.12	0.13	1.00					
Total 2-6 ring PAH	0.67	0.92	0.67	0.65	-0.21	1.00				
NPD	0.92	0.95	0.91	0.91	-0.09	0.85	1.00			
% NPD	0.49	0.52	0.48	0.50	0.00	0.01	0.44	1.00		
Total USEPA 16 PAH	0.35	0.93	0.35	0.33	-0.30	0.90	0.56	-0.27	1.00	
Phenols	0.60	0.69	0.60	0.60	0.09	0.39	0.56	0.27	0.15	1.00

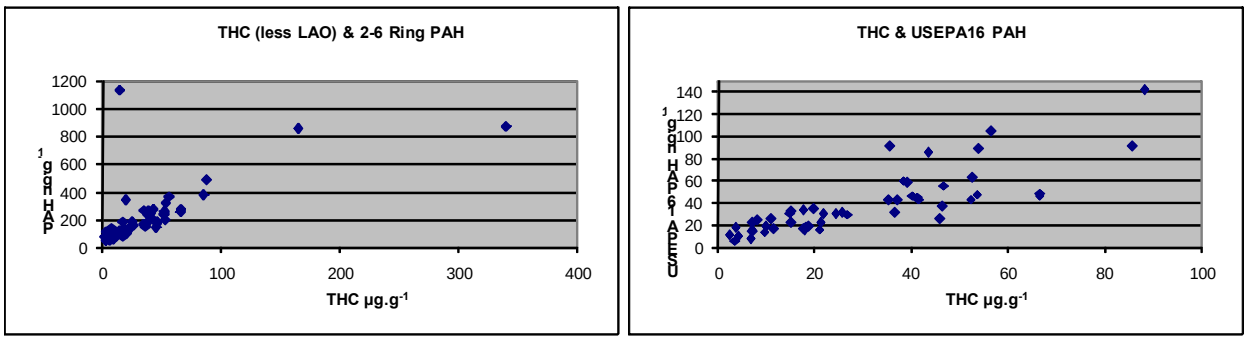

Figure 4.4 Paired variable Scatter plots

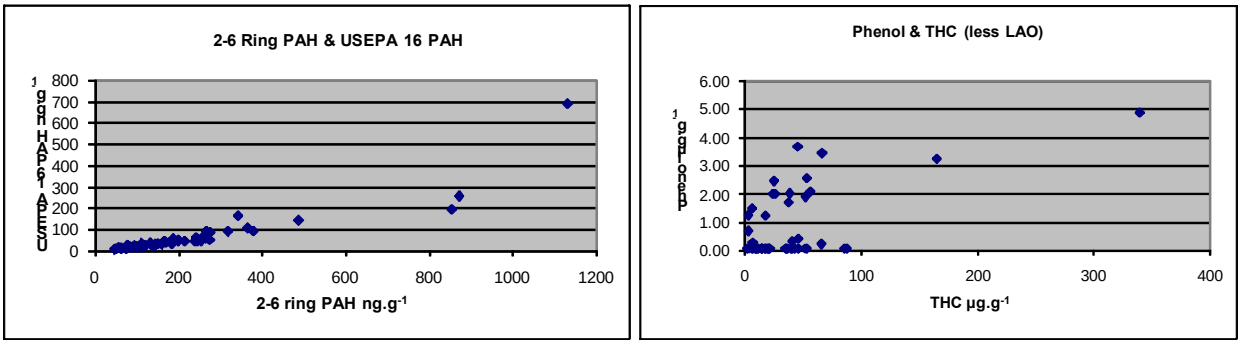

Figure 4.4 (continued) Paired variable Scatter plots

4.6. Comparison to Chirag 1998, 2000, 2004, 2006 & 2008 Data

The comparable average hydrocarbon data for surveys carried out at the Chirag location is given in table 4.3 below.

The concentration of LAO was relatively unchanged at the majority of stations. The greatest change was observed a station 34 with the average concentration reducing from 187µg.g^{-1} in 2008 to 55µg.g^{-1} in 2010. The distribution was similar to that observed in 2008.

THC (less LAO) concentrations were generally comparable to those recorded in 2008. Slightly higher concentrations were observed at stations 35, 38 and 46. However, these were within the concentration range recorded at these positions on previous surveys.

The highest THC (less LAO) concentration has generally been observed at station 34. Examination of the time series data at this position indicates that the concentration reduced between 2004 and 2006 and has remained relatively similar on subsequent surveys.

The proportion of UCM in samples has remained high, indicating the presence of weathered material throughout.

As with THC the concentrations of 2-6 ring PAH were generally comparable to those observed in 2008. Slightly higher concentrations have been observed at stations 2, 7, 8, 38 and 46. The greatest difference observed was the increase in concentration at station 8, which has increased from 255ng.g^{-1} in 2008 to 738ng.g^{-1} in 2010.

The highest 2-6 ring PAH concentrations have generally been observed at station 34. Examination of the time series data at this position indicates a reduction in average concentration on each consecutive survey from 2004.

The NPD proportion was similar to that observed in 2008. The higher PAH concentration observed at station 8 is associated with a slight reduction in the proportion of NPD from 33 to 26%. As the proportion of PAH compounds present at station 8 are similar to those present at this position on previous years, it is likely that the higher concentration is the result of variation through sampling a patchy environment rather than an impact from the platform. Particularly as station 8 is located 1000m to the south and the direction of greatest influence extends to the northeast.

Phenol concentrations were found to be higher and lower at stations throughout the survey area, with no pattern in variation being observed. The greatest increase was recorded at stations 34 and 55 where the highest concentrations were observed.

4.7. Hydrocarbon Summary

The LAO contamination footprint has remained relatively similar to that present in 2008. LAO concentrations at the majority of stations were low or very low, with the highest concentration being observed at station 34 directly to the northeast of the platform. The concentration present at this station has reduced on each consecutive survey from 939µg.g^{-1} in 2004 to 55µg.g^{-1} in 2010.

THC and PAH concentrations were generally low throughout, with the highest concentrations being present at stations directly to the northeast of the platform.

In general the hydrocarbon concentrations were similar to those recorded in 2008, with no fresh inputs being identified.

It was noted in previous surveys that the direction of greatest impact was to the northeast of the Chirag platform. Data from the 2008 and 2010 surveys indicate that although stations directly to the northeast have the highest levels of contamination, the extent of contamination is not increasing, with hydrocarbon concentrations at the majority of stations reducing from 2004 and 2006 levels.

Table 4.3 Average Hydrocarbon Concentrations, Chirag Survey; 1998, 2000, 2004, 2006, 2008 & 2010.

	THC µg.g^{-1}						LAO µg.g^{-1}			
station	1998	2000	2004	2006	2008	2010	2004	2006	2008	2010
1	152	205	58	78	57	29	14	20	8	2
2	928	271	206	183	28	55	44	80	7	7
7	75	NA	17	41	3	33	ND	5	ND	2
8	30	NA	33	13	20	18	ND	1	ND	ND
9	25	86	112	29	47	58	48	12	7	4
15	226	170	61	54	16	33	13	7	ND	2
16	4	34	28	10	13	16	ND	ND	ND	ND
25	11	18	34	9	11	9	ND	1	ND	ND
33	NA	62	73	24	44	32	20	5	8	3
34	NA	NA	1898	613	531	308	939	353	187	55
35	NA	NA	71	44	51	67	11	6	7	7
36	NA	NA	84	25	6	19	21	14	1	2
37	NA	NA	387	286	70	53	205	131	20	7
38	NA	NA	225	107	44	67	79	52	11	13
39	NA	NA	196	3430	55	67	58	2336	11	10
40	NA	NA	36	17	17	8	4	1	ND	ND
41	NA	NA	37	6	15	15	ND	1	ND	ND
42	NA	NA	19	8	9	23	ND	2	ND	ND
43	NA	NA	82	46	<2.5	4	11	5	ND	ND
44	NA	NA	99	24	13	8	35	4	ND	ND
45	NA	NA	60	68	10	30	12	25	ND	3
46	NA	NA	504	42	56	82	224	11	11	15
47	NA	NA	52	12	34	29	ND	1	ND	ND
48	NA	NA	29	16	34	20	ND	2	ND	ND
49	NA	NA	38	44	3	14	ND	7	ND	ND
50	NA	NA	45	24	10	6	ND	2	ND	ND
51	NA	NA	27	14	5	6	ND	2	ND	ND
52	NA	NA	8	7	7	14	ND	ND	ND	ND
53	NA	NA	8	16	4	22	ND	3	ND	2
54	NA	NA	31	39	6	12	ND	ND	ND	ND
55	NA	NA	NA	24	15	36	NA	8	ND	ND
56	NA	NA	NA	5	4	10	NA	ND	ND	ND
57	NA	NA	NA	10	8	12	NA	ND	ND	ND

ND: Not detected
NA: No Analysis

Table 4.3 (Continued) Average Hydrocarbon Concentrations, Chirag Survey; 1998, 2000, 2004, 2006, 2008 & 2010.

	THC - LAO µg.g^{-1}						% UCM				
station	1998	2000	2004	2006	2008	2010	2000	2004	2006	2008	2010
1	152	205	44	58	49	26	74	65	62	87	70
2	928	271	161	103	21	47	62	69	47	87	71
7	75	NA	17	37	3	31	NA	67	72	ND	73
8	30	NA	33	12	20	18	NA	76	70	73	68
9	25	86	64	17	39	54	52	49	40	83	73
15	226	170	48	47	16	31	65	67	74	72	77
16	4	34	28	10	13	16	71	70	68	71	73
25	11	18	34	9	11	9	67	70	64	72	73
33	NA	62	53	19	37	29	65	65	61	88	77
34	NA	NA	958	256	344	253	NA	42	31	92	74
35	NA	NA	60	38	44	61	NA	71	72	86	78
36	NA	NA	63	12	5	17	NA	42	30	68	74
37	NA	NA	182	159	49	47	NA	35	46	88	75
38	NA	NA	146	56	33	55	NA	46	40	90	77
39	NA	NA	138	1168	44	57	NA	60	25	79	75
40	NA	NA	32	16	17	8	NA	70	70	73	68
41	NA	NA	37	6	15	15	NA	74	38	73	75
42	NA	NA	19	7	9	23	NA	38	44	37	75
43	NA	NA	72	42	<2.5	4	NA	70	72	ND	ND
44	NA	NA	65	20	13	8	NA	61	65	72	51
45	NA	NA	49	43	10	28	NA	71	52	71	73
46	NA	NA	280	31	46	67	NA	48	59	89	76
47	NA	NA	52	11	34	29	NA	78	62	79	81
48	NA	NA	29	14	34	20	NA	73	61	76	77
49	NA	NA	38	37	3	14	NA	69	66	0	77
50	NA	NA	45	22	10	6	NA	74	70	71	68
51	NA	NA	27	12	5	6	NA	73	63	35	71
52	NA	NA	8	7	7	14	NA	66	51	73	69
53	NA	NA	8	13	4	21	NA	52	44	ND	65
54	NA	NA	31	39	6	12	NA	75	70	70	74
55	NA	NA	NA	17	15	36	NA	NA	54	72	75
56	NA	NA	NA	5	4	10	NA	NA	32	ND	69
57	NA	NA	NA	10	8	12	NA	NA	66	72	72

ND: Not detected
NA: No Analysis

Table 4.3 (Continued) Average Hydrocarbon Concentrations, Chirag Survey; 1998, 2000, 2004, 2006, 2008 & 2010.

	Total 2-6 ring PAH ng.g^{-1}					% NPD				
station	2000	2004	2006	2008	2010	2000	2004	2006	2008	2010
1	676	188	263	190	139	45	51	50	55	47
2	750	472	602	77	223	72	58	61	51	68
7	NA	141	192	82	173	NA	45	52	50	51
8	NA	307	189	255	738	NA	31	37	33	26
9	862	231	113	170	236	32	51	55	45	48
15	1122	234	229	107	179	33	37	42	45	46
16	337	NA	56	82	106	34	NA	50	48	50
25	224	NA	76	87	78	33	NA	41	45	48
33	692	171	104	192	132	33	47	58	47	50
34	NA	6664	2211	1508	864	NA	55	81	68	71
35	NA	204	249	217	274	NA	49	51	48	49
36	NA	231	214	59	128	NA	50	60	51	50
37	NA	660	457	212	293	NA	71	62	56	47
38	NA	NA	257	230	313	NA	NA	62	46	45
39	NA	NA	5391	185	223	NA	NA	74	48	55
40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
44	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
45	NA	NA	NA	NA	157	NA	NA	NA	NA	50
46	NA	220	134	205	338	NA	56	53	59	59
47	NA	208	54	239	201	NA	43	48	38	36
48	NA	105	65	162	121	NA	44	54	46	49
49	NA	161	165	42	72	NA	53	53	50	43
50	NA	NA	120	87	78	NA	NA	48	47	48
51	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
52	NA	NA	270	54	128	NA	NA	59	51	48
53	NA	NA	98	38	145	NA	NA	37	47	49
54	NA	118	156	43	79	NA	43	46	47	46
55	NA	NA	106	101	165	NA	NA	62	48	47
56	NA	NA	112	66	130	NA	NA	59	50	51
57	NA	NA	67	86	130	NA	NA	53	50	48

ND: Not detected
NA: No Analysis

Table 4.3 (Continued) Average Hydrocarbon Concentrations, Chirag Survey; 1998, 2000, 2004, 2006, 2008 & 2010.

	USEPA 16 PAH ng.g-1					Phenols µg.g^{-1}			
station	2000	2004	2006	2008	2010	2004	2006	2008	2010
1	88	31	78	47	37	0.85	2.40	0.78	<0.03
2	123	78	166	15	46	1.10	2.30	<0.03	<0.03
7	NA	14	49	18	31	1.20	0.70	0.25	<0.03
8	NA	146	105	109	424	1.25	1.20	<0.03	<0.03
9	65	35	24	39	44	0.90	1.40	0.38	0.25
15	245	75	88	25	50	0.70	1.10	0.48	<0.03
16	34	NA	18	17	25	NA	NA	0.44	<0.03
25	28	NA	33	23	19	NA	NA	0.63	<0.03
33	176	22	17	55	26	1.25	1.20	0.60	<0.03
34	NA	2281	365	249	222	1.30	0.70	2.15	4.02
35	NA	31	80	60	66	1.30	0.90	0.86	<0.03
36	NA	30	40	11	26	<0.03	0.10	0.71	1.11
37	NA	94	159	57	73	1.50	2.20	1.19	2.25
38	NA	NA	46	73	84	NA	1.90	0.60	1.96
39	NA	NA	466	39	43	NA	5.30	1.83	1.90
40	NA	NA	NA	NA	NA	NA	NA	NA	NA
41	NA	NA	NA	NA	NA	NA	NA	NA	NA
42	NA	NA	NA	NA	NA	NA	NA	NA	NA
43	NA	NA	NA	NA	NA	NA	NA	NA	NA
44	NA	NA	NA	NA	NA	NA	NA	NA	NA
45	NA	NA	NA	NA	38	NA	NA	NA	NA
46	NA	27	26	59	98	<0.03	0.60	0.30	<0.03
47	NA	42	12	88	60	3.00	0.90	0.42	<0.03
48	NA	17	10	31	17	<0.03	0.80	<0.03	<0.03
49	NA	22	34	4	14	1.10	0.90	<0.03	<0.03
50	NA	NA	25	18	12	NA	NA	0.24	<0.03
51	NA	NA	NA	NA	NA	NA	NA	NA	NA
52	NA	NA	84	8	24	NA	NA	0.25	1.32
53	NA	NA	43	5	32	NA	NA	0.19	1.44
54	NA	16	29	6	13	<0.03	<0.03	<0.03	1.33
55	NA	NA	18	26	28	NA	1.40	0.21	3.02
56	NA	NA	21	11	22	NA	0.50	<0.03	<0.03
57	NA	NA	13	16	23	NA	0.90	0.22	<0.03

ND: Not detected
NA: No Analysis