

THE UNIVERSITY OF TRINIDAD AND TOBAGO

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University of Trinidad and Tobago (UTT) Report on Fish sampled from La Brea and Toco and Tar Sand sampled from La Brea

BACKGROUND:

The exercise in this report centers on estimating the levels of contaminating Persistent Organic Pollutants (POPs) in fish from the Gulf of Paria, washing up on beaches along the South West Coast of Trinidad for the last several weeks. It was carried out at the request of Mr Gary Aboud, Fishermen and Friends of The Sea (FFOS). The report itself is prepared for and will be turned over to Mr Aboud. It should be noted that UTT has performed this service below cost (see invoice attached), essentially as a public service.

SAMPLING METHODOLOGY:

Fish Samples

Several samples of fish (catfish) were collected on each of three (3) separate days from a La Brea Beach (Point Sable Beach). The original intention was to collect different types of fish but during collection only on two occasions were other types of fish, one mullet fish and one crapaud fish, both badly deteriorated, on two different days. A daily combined sample was made from all fish collected on any one day and macerated together before being separated into triplicate sub-samples for POP analysis on the gas chromatograph double mass spectrometer (GC/MS/MS). At the same time, as a control, we purchased samples of red fish from vendors at the Fishing Facility in Toco. All replicate samples were analysed for twenty-four (24) different POP compounds. The data is statistically analysed as a nested ANOVA to estimate significant differences in the POPs levels between the two sites, the potentially contaminated La Brea and the control site at Toco.

Sand Samples

Several samples of oil soaked sand from La Brea only were collected for analysis of the same twenty-four (24) compounds. Results are quoted for means of triplicates of two separate combined samples.

RESULTS

Results are given for the levels of 23 POPs in Table 1. Dibenz(a,h)anthracene was not present in any of the fish or sand samples and so is not included in the table. Benz(a)anthracene was not present in any fish sample but was present in the sand so this is included in the table.

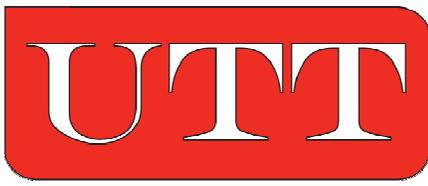


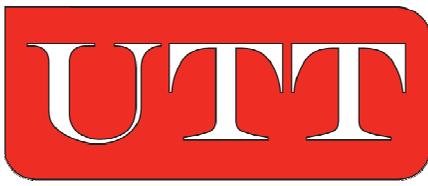
Table 1- Concentrations (ppb or µg of material/kg of sample) of POP contaminants

SITE	MEAN-FISH TISSUE		P value	MEAN- SAND SAMPLE		
	LA BREA	TOCO		Sample 1	Sample 2	Average
Naphthalene	26.15	8.69	.000	2349.97	1630.48	1990.23
2-methylnaphthalene	293.86	10.08	.002	330.12	494.20	412.16
1-methylnaphthalene	4.32	0.90	.010	0.00	196.04	98.02
2,6-dimethylnaphthalene	7.29	2.18	.000	393.14	669.13	531.14
Acenaphthylene	2.31	0.53	.000	119.45	307.25	213.35
Acenepthene	3.33	0.34	.000	320.20	312.42	316.31
2,3,5-methylnaphthalene	4.09	0.35	.000	601.71	1266.14	933.92
Fluorene	15.48	2.33	.024	2009.53	984.93	1497.23
Dibenzothiophene	0.79	0.27	.159¹	190.91	1322.08	756.50
Phenanthrene	42.02	6.35	.000	9209.29	19542.56	14375.93
Anthracene	35.72	0.48	.000	2331.52	8414.88	5373.20
1-methylphenanthrene	9.44	0.84	.001	5998.01	29112.22	17555.11
Fluoranthene	13.62	0.00	.000	4546.18	9414.40	6980.28
Pyrene	12.32	2.39	.000	19219.54	8121.26	13670.40
Benz(a)anthracene	0.00	0.00	-	3532.00	14683.38	9107.69
Chrysene	1.36	0.36	.129¹	31131.54	38924.20	35027.87
Benzo(b)fluoranthrene	0.75	0.30	.021	7862.62	3907.97	5885.29
Benzo(k)fluoranthrene	1.02	0.50	.054²	4894.43	1951.55	3422.99
Benzo(e)pyrene	1.12	0.58	.026	13071.14	5534.11	9302.62
Benzo(a)pyrene	0.63	0.33	.034	13445.78	1500.63	7473.205
Perylene	1.16	0.42	.036	6267.09	11302.08	8784.59
Indeno(1,2,3,-cd)pyrene	3.12	0.00	.009	1257.35	0.00	628.67
Benzo(ghi)perylene	1.00	0.08	.004	4305.06	1549.90	2927.48
Total POP (µg/kg) dry weight	482.05	38.32	.001	133419.91	161141.79	147280.85

1. Not significant 2. Significant at the 10% critical level

Note the following:

- Of the remaining 22 components, 19 of them were found to be significantly higher (p value < 0.05) in the fish from La Brea than in the samples from Toco.
- In the fish from Toco, only 6 of the 24 pollutants had levels higher than 1ppb and only 2-methylnaphthalene (**10.08**), Naphthalene (**8.69**), and phenanthrene (**6.35**) had levels higher than 2.5ppb.



- The sand samples had quite different levels of POPs from each other so averages of the replicates for each, as well as a joint average of both, are quoted in Table 1. These sand levels range from 100 to 35,000 times the values of the same pollutants in the fish samples in the area.

CONCLUSIONS

- It is clear that the Gulf is significantly contaminated with a variety of Persistent Organic Pollutants (PAHs and PCBs).
- It is clear too that these pollutants have worked their way into the fish in the area.
- This analysis cannot conclude that this contamination is the source of the Fish Kill.
- What can be said, however, is that these pollutants are present in larger amounts than they should be since ideally their levels should be zero. POPs are bio-accumulated in the lipid (fat) layers of organisms. Even if they are not the source of fish death, their presence in the marine ecosystem will eventually lead to higher and higher levels in fish and, when consumed by people, to high levels in humans, thereby posing a significant threat to human health.

Dr. Natasha Ramroop Singh

2016-09-22

Date

Professor Valerie Stoute

2016-09-22

Date