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IT CORPORATION

Memorandum

101715

To: T. Daniels

Date: February 11, 1985

From: D. Catalano

Subject: EERU DIOXIN/FURAN REPORT

Attached please find a copy of the dioxin results for the two tar samples received January 22, 1985. Verbal results were given to you February 5, 1985. Please feel free to contact me regarding any questions.

jjh

Attachments

AR400018

ORIGINAL
(Red)

EERU REPORT

SUMMARY OF METHOD

Two tar samples (#2716 and #2722) were received 1/22/85 for the analysis of 2,3,7,8-TCDD and total dioxin cogener analysis (Cl_4-Cl_8). The samples and a blank were spiked prior to extraction with an internal standard/surrogate solution containing 50 ng ^{13}C-2,3,7,8-TCDD; 10 ng ^{37}Cl-2,3,7,8-TCDD; and 50 ng ^{13}C-OCDD. The samples were extracted and cleaned up using the EPA reference method described in "The Determination of 2,3,7,8-TCDD From Soil and Sediment," revised September 1983. Extracts were analyzed by GC/MS operating in the selected ion monitoring mode for enhanced sensitivity.

SAMPLE PREPARATION

1. Soil

   A one (1) gram aliquot of each tar and 10 g sodium sulfate (TBLANK190) were weighed into separate jars. The samples and blank were spiked with the internal standard/surrogate mixture and allowed to stand overnight for equilibration. The samples were dissolved in 10 ml benzene and subsequently subjected to cleanup techniques.

SAMPLE CLEANUP

To aid in the removal of chemical interferences, the samples and blank were first treated using separatory funnel techniques found in Option C of "The Determination of 2,3,7,8-TCDD in Soil and Sediment," September 1983 revision. Extracts were washed with 20% KOH and distilled water followed by three concentrated H_2SO_4 washes. Further cleanup consisted of two steps of column chromatography. The first step involved a neutral alumina column while the second was a dual column system utilizing acid-modified silica gel followed by neutral alumina. Final extracts were concentrated to near dryness and raised to 50 µl with isooctane.

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GC/MS ANALYSIS

(1) Isomer specific 2,3,7,8-TCDD

The sample extracts were analyzed using HRGC/LRMS scanning in the selected ion monitoring mode for enhanced sensitivity. The column used for this isomer specific analysis was a 60 m SP2330 fused silica column. Before acquisition of the samples, a seven isomer performance mixture containing the six most closely eluting TCDD isomers to 2,3,7,8-TCDD was run. In addition, a five point calibration plot was run in triplicate. The mean response factor was used for all subsequent calculations. The shift standard, analyzed on the same day as the samples, produced an acceptable response factor within 10% of the fifteen point. Table 1 lists the results of the isomer specific analysis. Detection limits based on 2.5 times noise are calculated whenever a non detected is reported. The results are in ppb for all samples.

(2) Total Dioxin and Furan

The analytical approach employed by ITAS for the determination of total dioxins is considered semi-quantitative due to the lack of availability of all dioxin isomer standards. The standard analyzed each shift consisted of:

2,3,7,8-TCDD
1,2,3,4-TCDD
1,2,3,4,7-Penta CDD
1,2,3,4,7,8-Hexa CDD
1,2,3,4,6,7,8-Hepta CDD
OCDD
^{13}C-2,3,7,8-TCDD
^{13}C-2,3,7,8-TCDF
^{37}Cl-2,3,7,8-TCDD

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Response factors were calculated for each compound in the standard, relative to ^{13}C-TCDD; the same response was assumed applicable to all isomers in each cogener group. ^{37}Cl-TCDD and ^{13}C-OCDD were used to calculate the accuracy of the method.

The extracts were analyzed using HRGC/LRMS scanning in the selected ion monitoring mode for enhanced senstivity. The column used for the analysis was a 30 M SE54 fused silica column.

The results, shown in Table 2, are reported in ppb with the total amount of each cogener calculated. When more than one isomer of a cogener of dioxin is found, all of the isomers are added together to produce a total cogener results. Detection limits are calculated from 2.5 times signal to noise when a "not detected" is reported. The detection limits are listed in parenthesis.

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Table 2. Total Dioxin Results (Cogener Analysis)

Cogener	Tank Sludge 2 2716 (J2187)	Tank Sludge 1 2722 (J2188)	RBLANK190
^{13}C-TCDD (% recovery)	42%	41%	22%
^{37}Cl-TCDD (% accuracy)	114%	110%	122%
^{13}C-OCDD (% accuracy)	60%	58%	NS
TCDD (ppb)	2.6[1]	ND(0.95)	ND(0.55)
PCDD (ppb)	ND(2.1)	ND(1.30)	ND(0.53)
HxCDD (ppb)	5.9	ND(1.0)	ND(0.47)
HpCDD (ppb)	461	246	ND(0.13)
OCDD (ppb)	2950	1870	[illegible](0.50)

NS = Not spiked with ^{13}C-OCDD ,

ND = Not detected detection limits in parenthesis

[1]Ratio 257/322 not correct, no more than stated amount found

Table 1. Isomer Specific 2,3,7,8-TCDD Analysis

Sample ID	Aliquot Wt (g)	PPB Measure	TCDD D.L.	Date	Time	Rel. Ion 320/322	Abundance 332/334	PPB Measure	Surrogate % Accuracy	% Recovery
2716 Tank Sludge 2	1.0 g	ND	2.1	2/4/85	15:08		0.82	217	108%	55%
2722 Tank Sludge 1	1.0 g	ND	2.1	2/4/85	17:31		0.77	244	122%	46%
RBLANK190(RB)	10.0 g	ND	0.80	2/4/85	15:57		0.77	260	130%	22%

ND = Not detected

RB = Reagent blank

AR400023

ORIGINAL (Red)

TABLE I. POLYNUCLEAR [illegible]MATIC HYDROCARBONS - WATER SAMPLES

ALL RESULTS REPORTED [illegible]

COMPOUND	DET. LMT. (ppb)	L.O.Q.[1] (ppb)	STA 2550	ST2 2551	BWF 2552	ST3 2553	L6 2554	WO1 2556	L2 2494	UST 2495
NAPHTHALENE	2.32	9.27	867	531	ND	413	3090	698	3046	ND
ACENAPHTHYLENE	2.32	18.5	ND	ND	ND	ND	ND	ND	ND	ND
ACENAPHTHENE	2.32	9.27	259	232	ND	132	534	415	645	ND
FLUORENE	.232	1.85	66.6	62.4	ND	12.9	208	115	272	ND
PHENANTHRENE	.116	.927	81.6	53.0	ND	13.1	277	137	669	ND
ANTHRACENE	.116	.927	2.57	21.2	ND	1.12	10.5	ND	82.5	ND
FLUORANTHENE	.463	1.85	2.24	17.6	ND	4.06	111	ND	289	ND
PYRENE	.232	.927	0.8	7.05	ND	2.31	51.5	ND	145	ND
BENZO(a) ANTHRACENE	.116	.927	.663[2]	ND	ND	.463	15.0	ND	41.4	ND
CHRYSENE	.116	.927	.369	ND	ND	.818	15.1	ND	41.9	ND
BENZO(b) FLUORANTHENE	.232	1.85	ND	ND	ND	ND	7.04	ND	20.5	ND
BENZO(k) FLUORANTHENE	.232	.927	ND	ND	ND	ND	6.53	ND	28.5	ND
BENZO(a) PYRENE	.232	.927	ND	ND	ND	ND	4.81	ND	14.7	ND
DIBENZO(a,h) ANTHRACENE	.463	1.85	ND	ND	ND	ND	.924	ND	ND	ND
BENZO(g,h,i) perylene	.463	1.85	ND	ND	ND	ND	1.51	ND	19.8	ND
INDENO(1,2,3 c,d) PYRENE	.232	.927	ND	ND	ND	ND	1.26	ND	8.31	ND

1. L.O.Q. is the LIMIT OF QUANTIFICATION.
2. Results reported between the detection limit and the limit of quantification are estimates

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ORIGINAL (Red)

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TABLE II. PHENOLS-WATER SAMPLES

All Results Reported IN PARTS per billion

COMPOUND	DET. LMT. (µg/L)	L.O.Q.[1] µg/L	ST1 2850	ST2 2851	BWF 2852	ST3 2853	L6 2854	W01 2856	L2 2494	VST 2495
PHENOL	2.38	11.9	1920	604	8.51	243	1920	487	1640	51.9
2-CHLOROPHENOL	2.32	11.6	ND	ND	12.3	ND	ND	ND	ND	ND
2,4-DIMETHYLPHENOL	2.31	11.5	1110	ND	ND	ND	1110	ND	888	ND
4-CHLORO-3-METHYLPHENOL	4.58	11.4	ND	274	ND	239	ND	ND	ND	ND
2,4-DICHLOROPHENOL	4.87	12.2	441	251	ND	350	370	ND	364	ND
2,4,6-TRICHLOROPHENOL	4.42	11.1	241	109	ND	ND	354	4.42	427	ND
Pentachlorophenol	5.10	12.8	242	660	5.10[2]	152	334	12.5	372	14.4

1. L.O.Q is the Limit of QUANTIFICATION

2. Results Reported between the detection limit and the limit of quantification are estimates

ORIGINAL (Red)

COMPOUND	Det Limit ppm	L.O.Q.[1] ppm	2489	2490	2491	2493	2494	2495	2499	2500	2707	2708	2709	2[2]
			B5	B8	B6	B9	L2	UST	B15	2002	L1	L2	L4	L
NAPHTHALENE	.252	1.01	1.69	15.7	ND	1670	894	ND	ND		196	17.9	7.87	6
ACENAPHTHYLENE	.252	2.02	ND	ND	ND	ND	ND	ND	ND	ND	66.6	ND	26.9	N
ACENAPHTHENE	.252	1.01	ND	12.9	48.7	1392	583	ND	2.27	1.97	198	107	43.5	6
FLUORENE	.0252	.202	.300	3.61	6.19	497	296	ND	1.21	1.54	87.6	42.3	21.4	27
PHENANTHRENE	.0126	.101	.41	5.53	10.9	1373	881	ND	4.06	5.71	271	163	73.6	78
ANTHRACENE	.0126	.101	.647	9.19	3.34	191	123	ND	1.13	4.33	45.2	23.3	11.6	12
FLUORANTHENE	.0505	.202	2.07	54.2	27.8	282	426	ND	2.42	7.53	158	123	42.2	49
PYRENE	.0252	.101	1.34	22.6	32.1	431	220	ND	1.28	3.87	83.5	54.9	22.7	26
Benzo(a) ANTHRACENE	.0126	.101	.501	8.54	5.40	152	86.7	ND	.453	1.31	29.6	19.9	8.52	96.
Chrysene	.0126	.101	.901	8.70	8.60	140	82.0	ND	.497	1.79	29.4	22.7	8.92	92.
Benzo(b) FLUORANTHENE	.0252	.202	.601	3.53	5.52	62.4	36.2	ND	.202	57.9	13.1	9.40	3.17	41.
Benzo(k) FLUORANTHENE	.0252	.101	.259	1.98	4.07	35.9	18.5	ND	.0512	3.04	8.44	5.10	.811	21.4
Benzo(a) PYRENE	.0252	.101	.320	5.81	3.03	54.2	27.7	ND	.119	43.4	10.7	6.79	2.61	29.7
Dibenzo(a,h) ANTHRACENE	.0505	.202	.134	6.50	8.45	10.9	37.0	ND	.193	4.17	5.15	1.97	4.87	8.26
Benzo(g,h,i) perylene	.0505	.202	.184	1.08	4.11	14.9	9.35	ND	ND	7.11	3.18	3.67	3.43	9.6
Indeno(1,2,3-cd) PYRENE	.0252	.101	.174	.915	1.60	12.1	7.72	ND	ND	11.7	2.33	2.03	.572	8.1

1. L.O.Q. = the limit of quantification
2. Usually reported between the detection limit and the limit of quantification are estimates

AR400000

ORIGINAL (Red)

Polynuclear Aromatic Hydrocarbon - Soil Samples (CONTINUED)

COMPOUND	BF2 2843	F3 2844	F6 2845	F13 2846	F14 2847	F15 2848	F16 2849	ST1 2850	ST3 2853	L6 2854	L5 2855
Naphthalene	ND	3054	ND	.980	354	1.86	ND	ND	87.2	253	12.9
Acenaphthylene	ND	ND	ND	ND	72.8	ND	ND	ND	35.2	ND	17.0
Acenaphthene	ND	3519	ND	ND	184	26.5	ND	ND	117	679	14.2
Fluorene	ND	1452	ND	.456	74.2	15.6	ND	.329	57.3	337	2.48
Phenanthrene	.0495	3548	1.01	.705	196	49.5	.0537	1.51	183	1360	9.42
Anthracene	ND	1144	3.00	.128	22.9	14.1	.0158	.349	25.2	63.7	.895
Fluoranthene	ND	1984	9.19	.106	105	30.3	ND	1.05	104	933	9.07
Pyrene	ND	1061	7.57	ND	57.5	16.3	ND	.504	55.5	504	4.39
Benzo(a) anthracene	ND	465	1.36	.0164	23.1	6.40	ND	.136	21.2	187	1.02
Chrysene	ND	378	2.72	.0154	6.63	7.35	ND	.173	21.5	192	1.20
Benzo(b) fluoranthene	ND	197	1.32	ND	11.0	2.93	ND	ND	9.60	66.9	1.16
Benzo(k) fluoranthene	ND	104	.946	ND	5.44	1.02	ND	ND	5.21	28.9	.703
Benzo(a) pyrene	ND	136	.735	ND	7.69	4.82	ND	ND	7.09	51.7	.781
Dibenzo(a,h) anthracene	ND	74.4	ND	ND	1.77	4.03	ND	ND	1.88	71.5	.123
Benzo(g,h,i) perylene	ND	44.9	.294	ND	3.76	3.08	ND	ND	2.63	52.9	.242
Indeno(1,2,3-cd) pyrene	ND	37.3	.368	ND	2.31	1.31	ND	ND	1.91	14.5	.198

AR400027

ORIGINAL (Red)

ALL ~~SAMPLE~~ RESULTS REPORTED IN [illegible]/Kg (ppm)

AR 400028

COMPOUND	Det Lmt ppm	[illegible] ppm	B5 2489	B8 2490	B6 2491	B9 2493	L2 2494	UST 2495	B15 2494	B7 2500	L1 2707	2708	L4 2709
PHENOL	.259	1.30	2.34	.859	.733	2.57	4.90	.792	1.10	15.9	11.5	4.63	1.62
2-chlorophenol	.252	1.26	ND	ND	ND	ND	5.11	ND	ND	ND	ND	ND	ND
2,4-DIMETHYLPHENOL	.252	1.26	ND	ND	ND	ND	ND	ND	ND	ND	.287	1.83	1.11
4-chloro-3-methylphenol	.499	1.25	ND	ND	ND	ND	2.17	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	.530	1.33	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-TRICHLOROPHENOL	.481	1.21	ND	ND	ND	ND	ND	ND	ND	50.0	ND	ND	ND
Pentachlorophenol	.555	1.39	1.4	23.5	190	192	147	.845	3.07	286	24.5	14.2	19.3

COMPOUND	2711	2843	2844	2845	2846	2847	2848	2849	2850	2853	2854	2855	2851
Phenol	.661	.820	20.9	ND	1.27	ND	[illegible]	1.04	.812	1.09	ND	1.87	ND
2-chlorophenol	ND	ND	60.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-chloro-3 methylphenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4-Dichlorophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,4,6-TRICHLOROPHENOL	ND	ND	169	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	40.1	7.91	794	ND	3.13	ND	ND	43.9	5.28	10.4	20.3	ND	ND

1. LOQ is the limit of quantification
2. Results reported between the detection limit and the limit of quantification are estimates

ORIGINAL

R400029

SOIL GAS AIR TUBE RESULTS

SAMPLE	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES	NAPHTHALENE	OTHERS
B71	ND	ND	ND	ND	7	
B1	ND	ND	ND	ND	9	Terpenes present
B6	30	85	10	35	90	small amount terpenes present
B11	4500	3000	2000	2600	3500	Indene - 1600
B4	35	140	15	60	150	Indene - 7; others - Tr.
B8	15	40	25	45	ND	Indene - 8
B14	45	70	15	40	180	Indene - 20; Me Naphth - 30
F4	150	600	480	750	1300	Indene 40; Me Naphth - 20
F7	BMDL	BMDL	BMDL	BMDL	130	Indene - 15; Me Naphth - 8
F10	BMDL	BMDL	BMDL	BMDL	60	
F12	Tr(~10)	Tr(~7)	Tr(~2)	Tr(~4)	20	Me Naphth - 25
F16	BMDL	BMDL	BMDL	BMDL	15	
751	NQ	~.5	BMDL	~.3	BMDL	BMDL
753	0.4	~.4	BMDL	~.25	4	Me Naphth ~.45
753(Dup)	0.6	1.0	.16	.67	2.4	Me Naphth ~.15

ALL CONCENTRATIONS IN PPB

BMDL: Below Method Detection Limit

Tr: Trace ND: Not Detected

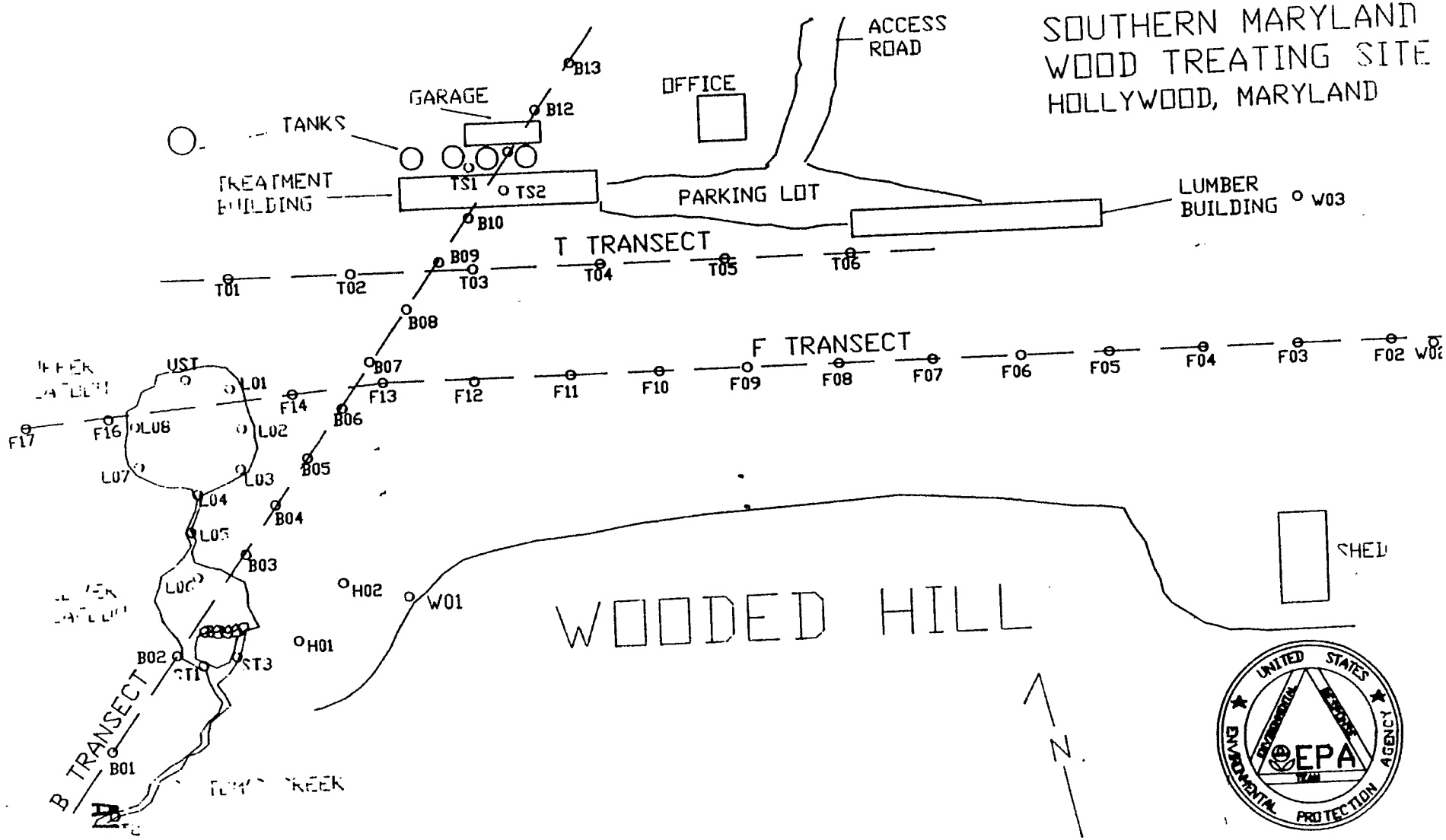
NQ: Not Quantitated

Me Naphth: Methyl Naphthalene

Dup: Duplicate

#751 and #753 are upwind Blanks

Analysis by Klinger & Bu


SOUTHERN MARYLAND
WOOD TREATING SITE
HOLLYWOOD, MARYLAND
ACCESS ROAD
OFFICE
GARAGE
TANKS
TREATMENT BUILDING
TS1
TS2
PARKING LOT
LUMBER BUILDING
W03
B13
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