

WASTEWATER TREATMENT STUDY OF LINEAR ALKYL BENZENE SULFONATE (LAS)

PART I ANALYTICAL TEST RESULTS

Client: The Soap and Detergent Association
475 Park Avenue South
New York, New York 10016



INDUSTRIAL
TESTING
LABORATORIES
inc.

2350 Seventh Blvd.



St. Louis, Missouri 63104



INDUSTRIAL TESTING LABORATORIES inc.

2350 Seventh Blvd.

• St. Louis, Missouri 63104

Chemists

Engineers

Metallurgists

314/771-7111

Report No. 84-5-360

May 24, 1984

Examination of fifty (50) water and sludge samples submitted.

The Soap and Detergent Association
475 Park Avenue South
New York, N.Y. 10016

Attn: Mr. Richard I. Sedlak
Assistant Technical Director

TEST REPORT

I. Methylene Blue Active Substance (MBAS)

Test Procedure: Standard Methods for the Examination of Water and Wastewater,
APHA, 15th ed., Section 512A, Washington, D.C. 1980.

<u>Location Number</u>	<u>Sample Description</u>	<u>I.T.L. Lab. No.</u>	<u>Results, mg/l</u>
1A-1	Raw Influent	50197	5.28, 5.32
1A-2	Raw Influent	50198	5.52, 5.38
1A-3	Raw Influent	50199	4.95, 5.04
1D	Raw Influent	50201	2.90, 2.99
1E	Raw Influent Spiked with 1.97 mg/l LAS	50202	5.10, 5.01
2A-1	S Plant Primary Effluent	50203	1.90, 1.98
2A-2	S Plant Primary Effluent	50204	1.20, 1.23
2A-3	S Plant Primary Effluent	50205	0.82, 0.86
3A-1	N Plant Primary Effluent	50207	1.90, 1.91
3A-2	N Plant Primary Effluent	50208	2.20, 2.13
3A-3	N Plant Primary Effluent	50209	2.22, 2.25
4A-1	S Plant Final Effluent	50211	0.14, 0.13
4A-2	S Plant Final Effluent	50212	0.15, 0.14
4A-3	S Plant Final Effluent	50213	0.30, 0.31



Report No. 84-5-360

Page 2

<u>Location Number</u>	<u>Sample Description</u>	<u>I.T.L. Lab. No.</u>	<u>Results, mg/l</u>
4D	S Plant Final Effluent	50215	0.19, 0.19
4E	S Plant Final Effluent Spiked with 0.52 mg/l LAS	50216	0.69, 0.70
5A-1	N Plant Final Effluent	50217	0.17, 0.17
5A-2	N Plant Final Effluent	50218	0.17, 0.18
5A-3	N Plant Final Effluent	50219	0.16, 0.16
14A-1	Primary Influent	50247	2.85, 2.92
14A-2	Primary Influent	50248	4.38, 4.15
14A-3	Primary Influent	50249	3.40, 3.44
15A	Distilled Water Blank	50250	*0.01, *0.01
15B	Distilled Water Blank Spiked with 0.52 mg/l LAS	50251	0.55, 0.54

* Less than

II. Interference Limited Methylene Blue Active Substance (IL-MBAS)

Test Procedure: "Proposed Methodology for the Measurement and Characterization of LAS in Sewage Wastes", Appendix I and Appendix II, Quentin Osburn, The Procter & Gamble Company, received November 10, 1981

<u>Location Number</u>	<u>Sample Description</u>	<u>Lab. No.</u>	<u>Results, mg/l</u>
1A-1	Raw Influent	50197	3.91, 4.08
1A-2	Raw Influent	50198	4.18, 4.52
1A-3	Raw Influent	50199	4.11, 4.22
1D	Raw Influent	50201	3.21, 3.09
1E	Raw Influent Spiked with 1.97 mg/l LAS	50202	5.27, 5.75
2A-1	S Plant Primary Effluent	50203	1.88, 1.94
2A-2	S Plant Primary Effluent	50204	1.61, 1.88
2A-3	S Plant Primary Effluent	50205	1.43, 1.22
3A-1	N Plant Primary Effluent	50207	3.18, 3.09
3A-2	N Plant Primary Effluent	50208	2.81, 2.52
3A-3	N Plant Primary Effluent	50209	2.58, 2.72



INDUSTRIAL
TESTING
LABORATORIES
inc.

Report No. 84-5-360

Page 3

<u>Location Number</u>	<u>Sample Description</u>	<u>I.T.L. Lab. No.</u>	<u>Results, mg/l</u>
4A-1	S Plant Final Effluent	50211	0.05, 0.04
4A-2	S Plant Final Effluent	50212	0.04, 0.04
4A-3	S Plant Final Effluent	50213	0.11, 0.09
4D	S Plant Final Effluent	50215	0.04, 0.04
4E	S Plant Final Effluent Spiked with 0.52 mg/l LAS	50216	0.53, 0.51
5A-1	N Plant Final Effluent	50217	0.03, 0.02
5A-2	N Plant Final Effluent	50218	0.03, 0.03
5A-3	N Plant Final Effluent	50219	0.03, 0.05
			<u>Results, μg/gm</u>
6A-1	S Plant Primary Sludge	50221	126, 132
6A-2	S Plant Primary Sludge	50222	96, 86
6A-3	S Plant Primary Sludge	50223	125, 112
6B-1a	S Plant Primary Sludge Spiked with 76 μ g/gm	50224	201
6B-1b	S Plant Primary Sludge Spiked with 77 μ g/gm	50224	196
6B-2a	S Plant Primary Sludge Spiked with 105 μ g/gm	50225	263
6B-2b	S Plant Primary Sludge Spiked with 101 μ g/gm	50225	240
6B-3a	S Plant Primary Sludge Spiked with 111 μ g/gm	50226	242
6B-3b	S Plant Primary Sludge Spiked with 111 μ g/gm	50226	268
7A-1	N Plant Primary Sludge	50227	84, 92
7A-2	N Plant Primary Sludge	50228	91, 93
7A-3	N Plant Primary Sludge	50229	223, 214
8A-1	S Plant Secondary Sludge	50230	1.63, 1.42
8A-2	S Plant Secondary Sludge	50231	1.12, 1.36
8A-3	S Plant Secondary Sludge	50232	10.14, 11.53



Report No. 84-5-360

Page 4

<u>Location Number</u>	<u>Sample Description</u>	<u>I.T.L. Lab. No.</u>	<u>Results, μg/gm</u>
8B-1a	S Plant Secondary Sludge Spiked with 0.49 μ g/gm LAS	50233	2.08
8B-1b	S Plant Secondary Sludge Spiked with 0.49 μ g/gm LAS	50233	1.92
8B-2a	S Plant Secondary Sludge Spiked with 0.49 μ g/gm LAS	50234	1.87
8B-2b	S Plant Secondary Sludge Spiked with 0.49 μ g/gm LAS	50234	1.98
8B-3a	S Plant Secondary Sludge Spiked with 3.9 μ g/gm LAS	50235	13.33
8B-3b	S Plant Secondary Sludge Spiked with 3.9 μ g/gm LAS	50235	14.67
9A-1	N Plant Secondary Sludge	50236	1.67, 1.74
9A-2	N Plant Secondary Sludge	50237	1.32, 1.24
9A-3	N Plant Secondary Sludge	50238	1.66, 1.83
10A	Anaerobically Digested Sludge from Digester	50239	127, 134
10Ba	Anaerobically Digested Sludge from Digester, Spiked with 88 μ g/gm LAS	50240	234
10Bb	Anaerobically Digested Sludge from Digester, Spiked with 99 μ g/gm LAS	50240	228
11A	Aerobically Digested Sludge from Digester	50241	91, 93
11Ba	Aerobically Digested Sludge from Digester, Spiked with 129 μ g/gm LAS	50242	227
11Bb	Aerobically Digested Sludge from Digester, Spiked with 121 μ g/gm LAS	50242	243
12A	Anaerobically Digested Sludge from Drying Bed	50243	121, 115
12Ba	Anaerobically Digested Sludge from Drying Bed, Spiked with 37.6 μ g/gm LAS	50244	163



Report No. 84-5-360

Page 5

<u>Location Number</u>	<u>Sample Description</u>	<u>I.T.L. Lab. No.</u>	<u>Results, μg/gm</u>
12Bb	Anaerobically Digested Sludge from Drying Bed, Spiked with 37.8 μ g/gm LAS	50244	169
13A	Aerobically Digested Sludge from Drying Bed	50245	63, 51
13Ba	Aerobically Digested Sludge from Drying Bed, Spiked with 115 μ g/gm LAS	50246	162
13Bb	Aerobically Digested Sludge from Drying Bed, Spiked with 114 μ g/gm LAS	50246	171
			<u>Results, mg/l</u>
14A-1	Primary Influent	50247	3.61, 3.72
14A-2	Primary Influent	50248	2.92, 2.88
14A-3	Primary Influent	50249	3.01, 2.92
15A	Distilled Water Blank	50250	*0.01, *0.01
15B	Distilled Water Blank Spiked with 0.52 mg/l LAS	50251	0.55, 0.54

* Less than.

III. Linear Alkyl Sulfonate (LAS) by Desulfonation - Gas Chromatography

Test Procedure: "Proposed Methodology for the Measurement and Characterization of LAS in Sewage Waste", Quentin W. Osburn, The Procter & Gamble Company, received November 10, 1981

- (a) Influent & Effluent Samples - Appendix I
- (b) Sludge Samples - Appendix II

Report No. 84-5-360

Page 6

III Continued

	<u>1A-1a Raw Influent</u>	<u>1A-1b Raw Influent</u>	<u>1A-2a Raw Influent</u>	<u>1A-2b Raw Influent</u>
LAS Concentration, mg/l	3.13	3.52	4.31	4.22
Isomer				
C10-5	2.6	2.3	2.6	2.6
C10-4	2.4	2.3	2.4	2.4
C10-3	4.5	4.8	3.5	3.8
C10-2	3.4	3.3	3.3	3.2
TOTAL	12.9	12.7	11.8	12.0
C11-6	2.6	2.3	2.6	2.5
C11-5	5.5	5.3	5.5	5.6
C11-4	4.6	4.4	4.5	4.6
C11-3	6.3	6.5	5.8	6.0
C11-2	5.7	5.5	5.7	5.6
TOTAL	24.7	24.0	23.9	24.3
C12-6	6.1	6.1	6.4	6.5
C12-5	5.8	5.6	6.0	6.1
C12-4	4.4	4.4	4.7	4.8
C12-3	6.2	6.5	5.9	6.1
C12-2	5.8	6.2	6.3	6.1
TOTAL	28.3	28.9	29.3	29.5
C13-7,6	6.8	6.7	7.3	7.4
C13-5	4.7	4.7	4.8	4.9
C13-4	3.3	3.2	3.5	3.4
C13-3	4.3	4.8	4.2	4.1
C13-2	3.3	3.2	3.4	3.2
TOTAL	22.3	22.7	23.2	23.0
C14-7	2.4	2.0	2.2	2.1
C14-6	2.4	2.3	2.3	2.2
C14-5	1.9	1.8	2.1	2.0
C14-4	2.0	2.1	1.8	1.8
C14-3	1.7	1.8	1.7	1.6
C14-2	1.5	1.6	1.6	1.5
TOTAL	11.8	11.7	11.8	11.2



Report No. 84-5-360

Page 7

III Continued

	<u>1A-3a</u> <u>Raw Influent</u>	<u>1A-3b</u> <u>Raw Influent</u>	<u>1D-a</u> <u>Raw Influent</u>	<u>1D-b</u> <u>Raw Influent</u>
LAS Concentration, mg/l	3.90	3.30	3.11	3.07
Isomer				
C10-5	2.6	2.7	2.6	2.6
C10-4	2.4	2.4	2.4	2.4
C10-3	2.8	3.2	3.6	3.6
C10-2	3.4	3.4	3.6	3.7
TOTAL	11.2	11.6	12.1	12.4
C11-6	2.6	2.5	2.6	2.6
C11-5	5.6	5.6	5.9	5.9
C11-4	4.5	4.5	4.9	4.9
C11-3	5.3	5.5	6.5	6.6
C11-2	5.8	5.7	6.5	6.5
TOTAL	23.9	23.8	26.5	26.5
C12-6	6.5	6.3	6.8	6.7
C12-5	6.2	5.9	6.4	6.3
C12-4	4.9	4.7	5.0	5.0
C12-3	5.6	5.7	6.5	6.5
C12-2	6.4	6.4	6.5	6.6
TOTAL	29.6	29.0	31.2	31.1
C13-7,6	7.5	7.4	6.6	6.4
C13-5	4.8	4.8	4.4	4.3
C13-4	3.6	3.6	3.1	3.0
C13-3	3.8	4.0	3.8	3.9
C13-2	3.6	3.5	2.9	2.9
TOTAL	23.3	23.3	20.7	20.5
C14-7	2.4	2.3	1.9	1.8
C14-6	2.3	2.4	1.8	1.9
C14-5	2.1	2.2	1.7	1.8
C14-4	1.8	1.9	1.5	1.6
C14-3	1.7	1.7	1.4	1.2
C14-2	1.7	1.7	1.2	1.2
TOTAL	12.0	12.3	9.5	9.5



Report No. 84-5-360

Page 8

III Continued

	1E-a Raw Influent Spiked With 1.97 mg/l LAS	1E-b Raw Influent Spiked with 1.97 mg/l LAS
LAS Concentration, mg/l	5.36	5.64
Isomer		
C10-5	2.6	2.5
C10-4	2.5	2.4
C10-3	3.7	3.6
C10-2	4.8	4.4
TOTAL	13.6	12.8
C11-6	3.1	3.1
C11-5	7.2	6.8
C11-4	6.1	5.9
C11-3	8.3	8.0
C11-2	9.4	9.3
TOTAL	34.1	33.1
C12-6	6.6	6.4
C12-5	6.2	6.2
C12-4	5.2	5.1
C12-3	7.1	7.0
C12-2	7.4	7.8
TOTAL	32.4	32.5
C13-7,6	4.4	4.6
C13-5	3.0	3.2
C13-4	2.1	2.2
C13-3	1.3	3.3
C13-2	3.1	2.2
TOTAL	13.9	15.5
C14-7	1.2	1.2
C14-6	1.2	1.2
C14-5	1.1	1.1
C14-4	0.9	0.9
C14-3	0.8	0.8
C14-2	0.7	0.8
TOTAL	6.0	6.1



III Continued

	2A-1a S Plant <u>Primary Effluent</u>	2A-1b S Plant <u>Primary Effluent</u>
LAS Concentration, mg/l	1.75	1.94
Isomer		
C10-5	4.9	4.7
C10-4	4.3	4.0
C10-3	5.3	4.8
C10-2	4.8	4.8
TOTAL	19.3	18.4
C11-6	3.7	3.6
C11-5	8.1	8.0
C11-4	6.0	6.0
C11-3	7.4	7.2
C11-2	5.6	5.9
TOTAL	30.8	30.7
C12-6	6.4	6.7
C12-5	5.7	6.0
C12-4	4.1	4.3
C12-3	5.4	5.3
C12-2	4.7	4.6
TOTAL	26.3	26.9
C13-7,6	5.2	5.4
C13-5	3.4	3.5
C13-4	2.3	2.4
C13-3	2.9	2.9
C13-2	2.1	2.1
TOTAL	16.0	16.3
C14-7	1.5	1.4
C14-6	1.4	1.5
C14-5	1.2	1.4
C14-4	1.2	1.2
C14-3	1.1	1.0
C14-2	1.3	1.1
TOTAL	7.6	7.7

Report No. 84-5-360

Page 10

III Continued

	2A-2a S Plant <u>Primary Effluent</u>	2A-2b S Plant <u>Primary Effluent</u>
LAS Concentration, mg/l	1.53	1.99
Isomer		
C10-5	5.8	4.7
C10-4	5.0	4.0
C10-3	5.9	4.8
C10-2	6.0	4.9
TOTAL	22.6	18.5
C11-6	4.2	3.8
C11-5	8.9	8.1
C11-4	6.8	6.2
C11-3	8.7	7.9
C11-2	5.9	5.8
TOTAL	34.4	31.8
C12-6	6.6	7.0
C12-5	5.8	6.2
C12-4	4.1	4.5
C12-3	5.3	5.7
C12-2	3.9	4.0
TOTAL	25.8	27.3
C13-7,6	4.3	5.3
C13-5	2.8	3.5
C13-4	1.8	2.3
C13-3	2.2	3.0
C13-2	1.4	1.8
TOTAL	12.6	15.9
C14-7	0.9	1.3
C14-6	0.9	1.3
C14-5	0.8	1.0
C14-4	0.7	1.2
C14-3	0.6	0.8
C14-2	0.7	0.7
TOTAL	4.6	6.5



Report No. 84-5-360

Page 11

III Continued

	2A-3a S Plant <u>Primary Effluent</u>	2A-3b S Plant <u>Primary Effluent</u>
LAS Concentration, mg/l	1.64	1.52
Isomer		
C10-5	5.1	5.5
C10-4	4.3	4.7
C10-3	4.8	5.0
C10-2	5.0	5.2
TOTAL	19.1	20.3
C11-6	4.1	4.1
C11-5	8.3	8.6
C11-4	6.2	6.5
C11-3	7.4	7.7
C11-2	5.7	5.7
TOTAL	31.6	32.7
C12-6	6.8	6.9
C12-5	6.0	6.1
C12-4	4.3	4.3
C12-3	5.2	5.3
C12-2	4.2	4.0
TOTAL	26.5	26.5
C13-7,6	5.3	5.0
C13-5	3.4	3.2
C13-4	2.3	2.1
C13-3	2.9	2.5
C13-2	1.9	1.6
TOTAL	15.9	14.5
C14-7	1.4	1.2
C14-6	1.4	1.2
C14-5	1.3	1.1
C14-4	1.1	1.0
C14-3	0.9	0.7
C14-2	0.8	0.8
TOTAL	6.9	6.0



Report No. 84-5-360

Page 12

III Continued

	3A-1a N Plant <u>Primary Effluent</u>	3A-1b N Plant <u>Primary Effluent</u>
LAS Concentration, mg/l	3.26	2.94
Isomer		
C10-5	2.9	3.1
C10-4	2.6	2.8
C10-3	3.4	3.6
C10-2	3.7	3.6
TOTAL	12.6	13.1
C11-6	2.7	2.8
C11-5	6.1	6.0
C11-4	4.9	4.9
C11-3	6.1	6.2
C11-2	5.7	5.8
TOTAL	25.4	25.6
C12-6	6.4	6.4
C12-5	6.0	5.9
C12-4	4.6	4.6
C12-3	5.6	5.7
C12-2	5.5	5.4
TOTAL	28.1	27.9
C13-7,6	7.0	7.0
C13-5	4.6	4.6
C13-4	3.4	3.4
C13-3	3.9	3.7
C13-2	3.2	3.2
TOTAL	22.0	22.0
C14-7	2.4	2.1
C14-6	2.3	2.3
C14-5	2.2	2.2
C14-4	1.8	1.8
C14-3	1.6	1.7
C14-2	1.5	1.4
TOTAL	11.9	11.4



Report No. 84-5-360

Page 13

III Continued

	3A-2a N Plant <u>Primary Effluent</u>	3A-2b N Plant <u>Primary Effluent</u>
LAS Concentration, mg/l	2.72	2.85
Isomer		
C10-5	3.6	3.2
C10-4	3.2	2.9
C10-3	3.8	3.5
C10-2	4.4	3.7
TOTAL	15.0	13.3
C11-6	3.2	2.8
C11-5	7.0	5.9
C11-4	5.5	4.8
C11-3	6.6	5.8
C11-2	6.2	5.5
TOTAL	28.6	24.8
C12-6	6.7	6.2
C12-5	6.2	5.8
C12-4	4.8	4.4
C12-3	5.4	5.4
C12-2	5.1	5.3
TOTAL	28.2	27.1
C13-7,6	6.4	7.2
C13-5	4.1	4.7
C13-4	3.0	3.4
C13-3	3.1	3.6
C13-2	2.7	3.6
TOTAL	19.3	22.5
C14-7	1.8	2.6
C14-6	1.8	2.4
C14-5	1.6	2.2
C14-4	1.4	1.9
C14-3	1.3	1.8
C14-2	1.0	1.5
TOTAL	8.9	12.3



III Continued

	3A-3a N Plant <u>Primary Effluent</u>	3A-3b N Plant <u>Primary Effluent</u>
LAS Concentration, mg/l	2.67	2.62
Isomer		
C10-5	3.4	3.5
C10-4	3.0	3.1
C10-3	3.7	3.7
C10-2	4.0	3.9
TOTAL	14.2	14.1
C11-6	3.2	3.0
C11-5	6.5	6.6
C11-4	5.3	5.2
C11-3	6.7	6.4
C11-2	5.9	5.9
TOTAL	27.4	27.1
C12-6	6.6	6.6
C12-5	6.1	6.1
C12-4	4.8	4.7
C12-3	5.7	5.6
C12-2	5.2	5.1
TOTAL	28.4	28.1
C13-7,6	6.6	6.7
C13-5	4.3	4.4
C13-4	3.1	3.2
C13-3	3.5	3.5
C13-2	3.2	2.8
TOTAL	20.7	20.6
C14-7	2.0	2.0
C14-6	2.1	2.0
C14-5	1.7	1.8
C14-4	1.3	1.7
C14-3	1.3	1.5
C14-2	1.0	1.2
TOTAL	9.3	10.1



Report No. 84-5-360

Page 15

III Continued

	4A-1a S Plant <u>Final Effluent</u>	4A-1b S Plant <u>Final Effluent</u>
LAS Concentration, mg/l	0.03	0.02
Isomer		
C10-5	2.7	2.2
C10-4	3.0	1.8
C10-3	7.4	8.5
C10-2	3.7	1.6
TOTAL	16.8	14.1
C11-6	3.4	1.9
C11-5	3.5	3.5
C11-4	7.0	4.4
C11-3	7.2	5.9
C11-2	3.5	3.6
TOTAL	24.5	19.4
C12-6	7.0	5.2
C12-5	4.2	4.4
C12-4	3.4	3.3
C12-3	6.7	7.8
C12-2	10.3	14.6
TOTAL	31.7	35.4
C13-7,6	5.5	6.0
C13-5	3.3	3.6
C13-4	2.4	2.5
C13-3	4.8	3.9
C13-2	1.8	2.6
TOTAL	17.7	18.5
C14-7	1.1	2.2
C14-6	1.0	1.9
C14-5	0.9	1.5
C14-4	0.8	0.7
C14-3	0.8	0.7
C14-2	4.6	5.7
TOTAL	9.3	12.6

III Continued

	4A-2a S Plant <u>Final Effluent</u>	4A-2b S Plant <u>Final Effluent</u>
LAS Concentration, mg/l	0.03	0.02
Isomer		
C10-5	2.6	2.0
C10-4	3.6	2.6
C10-3	10.9	8.8
C10-2	2.4	1.7
TOTAL	19.5	15.0
C11-6	2.4	1.4
C11-5	4.4	2.9
C11-4	6.9	4.8
C11-3	7.3	5.2
C11-2	2.9	4.3
TOTAL	23.8	18.6
C12-6	3.8	4.3
C12-5	3.1	3.7
C12-4	2.5	2.8
C12-3	4.9	6.3
C12-2	11.9	13.2
TOTAL	26.2	30.3
C13-7,6	4.3	5.9
C13-5	2.5	3.3
C13-4	2.1	2.3
C13-3	3.7	4.8
C13-2	1.8	2.6
TOTAL	14.4	18.8
C14-7	2.1	2.2
C14-6	1.4	2.2
C14-5	1.5	1.8
C14-4	1.7	0.8
C14-3	1.8	1.8
C14-2	7.5	8.6
TOTAL	16.1	17.3



Report No. 84-5-360

Page 17

III Continued

	4A-3a S Plant <u>Final Effluent</u>	4A-3b S Plant <u>Final Effluent</u>
LAS Concentration, mg/l	0.08	0.08
Isomer		
C10-5	10.3	10.4
C10-4	6.9	6.8
C10-3	7.0	6.9
C10-2	2.1	2.1
TOTAL	26.2	26.2
C11-6	6.0	6.0
C11-5	9.7	9.9
C11-4	6.6	6.6
C11-3	7.1	7.3
C11-2	1.7	1.8
TOTAL	31.1	31.7
C12-6	7.0	7.1
C12-5	4.8	4.9
C12-4	2.3	2.5
C12-3	5.0	5.0
C12-2	4.6	4.1
TOTAL	23.7	23.6
C13-7,6	4.0	3.7
C13-5	2.6	2.4
C13-4	1.0	1.2
C13-3	2.5	2.3
C13-2	0.8	0.8
TOTAL	11.0	10.3
C14-7	1.1	0.8
C14-6	1.3	1.3
C14-5	0.9	1.0
C14-4	0.7	0.8
C14-3	0.9	0.9
C14-2	3.2	3.3
TOTAL	8.0	8.2



Report No. 84-5-360

Page 18

III Continued

	4D-a S Plant <u>Final Effluent</u>	4D-b S Plant <u>Final Effluent</u>
LAS Concentration, mg/l	0.02	0.02
Isomer		
C10-5	4.6	6.0
C10-4	2.3	3.9
C10-3	10.5	12.4
C10-2	1.9	1.9
TOTAL	19.3	24.2
C11-6	3.0	3.2
C11-5	4.5	5.5
C11-4	8.9	10.5
C11-3	5.6	10.1
C11-2	3.9	3.6
TOTAL	25.9	32.9
C12-6	6.4	5.9
C12-5	4.8	4.5
C12-4	3.3	2.9
C12-3	7.6	7.8
C12-2	5.3	5.0
TOTAL	27.4	26.0
C13-7,6	5.9	4.4
C13-5	3.1	3.8
C13-4	1.8	1.9
C13-3	4.7	2.9
C13-2	1.1	4.0
TOTAL	16.7	16.9
C14-7	2.6	0
C14-6	2.6	0
C14-5	0.9	0
C14-4	2.9	0
C14-3	1.4	0
C14-2	0.3	0
TOTAL	10.7	0



Report No. 84-5-360

Page 19

III Continued

LAS Concentration, mg/l	4E-a	4E-b
	<u>S Plant Final Effluent</u> <u>Spiked with 0.52 mg/l LAS</u>	<u>S Plant Final Effluent</u> <u>Spiked with 0.52 Mg/l LAS</u>
	0.50	0.50
Isomer		
C10-5	3.0	3.3
C10-4	2.9	3.2
C10-3	4.3	5.0
C10-2	5.6	6.2
TOTAL	15.8	17.6
C11-6	3.7	3.8
C11-5	8.2	8.5
C11-4	7.6	7.8
C11-3	10.6	10.8
C11-2	12.8	13.0
TOTAL	42.9	44.0
C12-6	6.1	5.6
C12-5	5.8	5.4
C12-4	5.3	4.7
C12-3	8.0	7.8
C12-2	9.2	8.6
TOTAL	34.3	32.1
C13-7,6	1.6	1.4
C13-5	1.5	1.4
C13-4	1.0	0.8
C13-3	1.7	1.4
C13-2	1.2	1.3
TOTAL	7.0	6.3
C14-7	0	0
C14-6	0	0
C14-5	0	0
C14-4	0	0
C14-3	0	0
C14-2	0	0
TOTAL	0	0



Report No. 84-5-360

Page 20

III Continued

	5A-1a N Plant <u>Final Effluent</u>	5A-1b N Plant <u>Final Effluent</u>
LAS Concentration, mg/l	0.01	0.01
Isomer		
C10-5	1.7	2.3
C10-4	2.5	5.4
C10-3	11.6	18.1
C10-2	1.5	4.8
TOTAL	17.3	30.5
C11-6	1.9	3.4
C11-5	3.9	3.4
C11-4	6.3	5.5
C11-3	8.0	18.9
C11-2	3.0	2.5
TOTAL	23.1	33.7
C12-6	4.0	6.2
C12-5	3.1	2.9
C12-4	2.8	2.5
C12-3	6.7	5.7
C12-2	14.3	5.2
TOTAL	30.9	22.5
C13-7,6	5.3	4.1
C13-5	3.2	1.9
C13-4	1.8	1.2
C13-3	3.8	4.9
C13-2	2.0	1.2
TOTAL	16.1	13.3
C14-7	1.5	0
C14-6	1.5	0
C14-5	1.5	0
C14-4	0.6	0
C14-3	0.5	0
C14-2	7.1	0
TOTAL	12.6	0



Report No. 84-5-360

Page 21

III Continued

	5A-2a N Plant <u>Final Effluent</u>	5A-2b N Plant <u>Final Effluent</u>
LAS Concentration, mg/l	0.02	0.02
Isomer		
C10-5	3.0	3.2
C10-4	4.7	4.0
C10-3	9.8	13.7
C10-2	2.3	1.7
TOTAL	19.8	22.6
C11-6	2.7	1.7
C11-5	4.5	3.2
C11-4	6.0	5.0
C11-3	5.0	4.9
C11-2	2.8	2.6
TOTAL	21.0	17.4
C12-6	4.5	4.2
C12-5	3.6	3.2
C12-4	2.9	2.4
C12-3	5.9	5.7
C12-2	10.6	11.8
TOTAL	27.5	27.3
C13-7,6	6.2	6.1
C13-5	3.8	3.7
C13-4	2.6	2.3
C13-3	4.0	4.5
C13-2	2.4	2.1
TOTAL	18.9	18.6
C14-7	2.1	2.1
C14-6	2.0	2.1
C14-5	1.7	1.5
C14-4	1.4	1.1
C14-3	0.8	0.9
C14-2	4.8	6.4
TOTAL	12.8	14.1

Report No. 84-5-360

Page 22

III Continued

	5A-3a N Plant <u>Final Effluent</u>	5A-3b N Plant <u>Final Effluent</u>
LAS Concentration, mg/l	0.03	0.03
Isomer		
C10-5	1.4	1.9
C10-4	2.5	3.2
C10-3	8.2	7.1
C10-2	4.4	4.7
TOTAL	16.6	16.9
C11-6	3.2	3.4
C11-5	3.2	3.4
C11-4	6.5	6.6
C11-3	6.9	7.3
C11-2	4.8	4.2
TOTAL	24.7	24.9
C12-6	5.6	5.6
C12-5	4.5	4.2
C12-4	4.0	3.5
C12-3	7.4	6.5
C12-2	6.5	6.5
TOTAL	28.0	26.3
C13-7,6	5.5	5.4
C13-5	4.2	4.3
C13-4	2.5	2.7
C13-3	4.7	4.6
C13-2	2.5	2.3
TOTAL	19.4	19.3
C14-7	2.9	3.2
C14-6	1.8	2.2
C14-5	1.7	2.0
C14-4	2.4	2.5
C14-3	1.5	1.6
C14-2	1.0	1.0
TOTAL	11.3	12.6



INDUSTRIAL
TESTING
LABORATORIES
inc.

Report No. 84-5-360

Page 23

III Continued

	6A-1a S Plant <u>Primary Sludge</u>	6A-1b S Plant <u>Primary Sludge</u>
LAS Concentration, $\mu\text{g/gm}$	141.17	118.04
Isomer		
C10-5	0.5	0.5
C10-4	0.5	0.6
C10-3	0.9	1.7
C10-2	1.2	1.3
TOTAL	3.1	4.1
C11-6	1.1	1.2
C11-5	2.6	2.8
C11-4	2.2	2.4
C11-3	2.9	3.5
C11-2	4.6	4.8
TOTAL	13.5	14.7
C12-6	5.6	5.8
C12-5	5.4	5.5
C12-4	4.5	4.6
C12-3	5.4	5.9
C12-2	7.5	7.4
TOTAL	28.5	29.2
C13-7,6	10.1	9.6
C13-5	6.7	6.4
C13-4	5.3	4.9
C13-3	5.5	5.8
C13-2	5.8	5.1
TOTAL	33.4	31.8
C14-7	4.4	3.8
C14-6	4.0	3.7
C14-5	4.1	3.7
C14-4	3.1	3.2
C14-3	2.9	2.9
C14-2	2.9	2.8
TOTAL	21.5	20.2



Report No. 84-5-360

Page 24

III Continued

	6A-2a S Plant <u>Primary Sludge</u>	6A-2b S Plant <u>Primary Sludge</u>
LAS Concentration, $\mu\text{g/gm}$	117.35	118.93
Isomer		
C10-5	0.5	0.5
C10-4	0.5	0.5
C10-3	1.2	1.9
C10-2	1.4	1.3
TOTAL	3.5	4.2
C11-6	1.0	0.9
C11-5	2.7	2.7
C11-4	2.3	2.3
C11-3	3.1	3.3
C11-2	4.9	4.7
TOTAL	14.0	13.9
C12-6	5.6	5.5
C12-5	5.4	5.2
C12-4	4.6	4.5
C12-3	5.6	5.9
C12-2	8.6	7.9
TOTAL	29.7	29.0
C13-7,6	9.7	9.4
C13-5	6.5	6.4
C13-4	5.1	4.9
C13-3	5.4	5.8
C13-2	5.6	5.2
TOTAL	32.4	31.6
C14-7	4.2	3.9
C14-6	3.8	4.0
C14-5	3.8	3.9
C14-4	2.9	3.4
C14-3	2.8	3.1
C14-2	3.0	3.1
TOTAL	20.4	21.3

III Continued

	6A-3a S Plant <u>Primary Sludge</u>	6A-3b S Plant <u>Primary Sludge</u>
LAS Concentration, $\mu\text{g/gm}$	138.02	135.19
Isomer		
C10-5	0.6	0.6
C10-4	0.6	0.6
C10-3	1.4	1.8
C10-2	1.4	1.5
TOTAL	4.1	4.5
C11-6	1.3	1.3
C11-5	3.0	3.0
C11-4	2.7	2.7
C11-3	3.7	3.8
C11-2	5.1	5.1
TOTAL	15.8	16.0
C12-6	6.3	6.2
C12-5	6.1	6.0
C12-4	5.1	5.2
C12-3	6.4	6.2
C12-2	7.3	7.2
TOTAL	31.2	30.7
C13-7,6	9.9	9.8
C13-5	6.4	6.4
C13-4	4.9	4.9
C13-3	5.5	5.7
C13-2	4.8	4.8
TOTAL	31.6	31.7
C14-7	3.5	3.5
C14-6	3.6	3.8
C14-5	3.1	3.2
C14-4	2.4	2.4
C14-3	2.4	2.4
C14-2	2.3	1.9
TOTAL	17.3	17.1



Report No. 84-5-360

Page 26

III Continued

	6B-1a S Plant Primary Sludge Spiked with 76 $\mu\text{g/gm}$	6B-1b S Plant Primary Sludge Spiked with 77 $\mu\text{g/gm}$
LAS Concentration, $\mu\text{g/gm}$	219.16	194.80
Isomer		
C10-5	1.4	1.5
C10-4	1.4	1.6
C10-3	2.4	2.6
C10-2	2.9	3.1
TOTAL	8.0	8.8
C11-6	2.2	2.2
C11-5	4.7	5.1
C11-4	4.3	4.5
C11-3	5.9	6.2
C11-2	7.7	8.0
TOTAL	24.8	26.0
C12-6	5.7	5.8
C12-5	5.5	5.7
C12-4	4.7	4.9
C12-3	6.7	6.6
C12-2	8.4	8.2
TOTAL	31.0	31.1
C13-7,6	6.8	6.7
C13-5	4.6	4.4
C13-4	3.5	3.3
C13-3	4.3	4.1
C13-2	3.8	3.5
TOTAL	22.9	22.0
C14-7	2.5	2.3
C14-6	2.6	2.3
C14-5	2.4	2.2
C14-4	2.0	1.8
C14-3	1.8	1.7
C14-2	1.9	1.7
TOTAL	13.3	12.1



Report No. 84-5-360

Page 27

III Continued

	6B-2a S Plant Primary Sludge Spiked with 105 $\mu\text{g/gm}$	6B-2b S Plant Primary Sludge Spiked with 101 $\mu\text{g/gm}$
LAS Concentration, $\mu\text{g/gm}$	235.92	243.54
Isomer		
C10-5	1.7	1.5
C10-4	1.7	1.6
C10-3	2.6	2.7
C10-2	3.5	3.4
TOTAL	9.4	9.1
C11-6	2.3	2.2
C11-5	5.4	5.3
C11-4	4.8	4.7
C11-3	6.4	6.7
C11-2	8.6	8.6
TOTAL	27.4	27.5
C12-6	5.7	5.8
C12-5	5.6	5.6
C12-4	4.8	4.9
C12-3	6.4	6.9
C12-2	8.6	9.5
TOTAL	31.1	32.7
C13-7,6	6.2	5.7
C13-5	4.1	3.9
C13-4	3.1	3.0
C13-3	3.8	3.9
C13-2	3.5	3.3
TOTAL	20.7	19.8
C14-7	2.2	2.0
C14-6	2.1	2.0
C14-5	2.0	2.0
C14-4	1.7	1.6
C14-3	1.6	1.5
C14-2	1.7	1.7
TOTAL	11.4	10.9



Report No. 84-5-360

Page 28

III Continued

	6B-3a S Plant Primary Sludge Spiked with 111 48 g/gm	6B-3b S Plant Primary Sludge Spiked with 111 48 g/gm
LAS Concentration, 41 g/gm	279.82	290.05
Isomer		
C10-5	1.4	1.4
C10-4	1.5	1.5
C10-3	2.4	2.4
C10-2	3.3	3.1
TOTAL	8.6	8.4
C11-6	2.2	2.1
C11-5	4.8	4.7
C11-4	4.4	4.3
C11-3	6.2	6.0
C11-2	8.8	8.1
TOTAL	26.4	25.3
C12-6	5.6	5.6
C12-5	5.4	5.5
C12-4	4.8	4.8
C12-3	6.6	6.5
C12-2	9.7	8.7
TOTAL	32.0	31.2
C13-7,6	5.9	6.5
C13-5	4.0	4.4
C13-4	3.2	3.3
C13-3	4.0	4.3
C13-2	3.8	3.8
TOTAL	20.9	22.2
C14-7	2.3	2.4
C14-6	2.2	2.4
C14-5	2.2	2.3
C14-4	1.7	1.9
C14-3	1.6	1.8
C14-2	2.1	2.1
TOTAL	12.1	12.9



Report No. 84-5-360

Page 29

III Continued

	7A-1a N Plant <u>Primary Sludge</u>	7A-1b N Plant <u>Primary Sludge</u>
LAS Concentration, $\mu\text{g/gm}$	101.32	112.57
Isomer		
C10-5	0.6	0.6
C10-4	0.7	0.6
C10-3	1.5	1.0
C10-2	1.6	1.5
TOTAL	4.4	3.7
C11-6	1.4	1.3
C11-5	3.2	3.0
C11-4	2.9	2.7
C11-3	3.7	3.4
C11-2	5.4	5.1
TOTAL	16.6	15.5
C12-6	6.1	6.1
C12-5	6.0	5.9
C12-4	5.0	5.1
C12-3	6.1	5.8
C12-2	7.4	7.5
TOTAL	30.6	30.4
C13-7,6	9.6	10.0
C13-5	6.6	6.4
C13-4	4.9	5.2
C13-3	5.1	5.2
C13-2	4.8	5.1
TOTAL	31.1	31.9
C14-7	3.5	3.7
C14-6	3.4	3.6
C14-5	3.3	3.5
C14-4	2.7	2.7
C14-3	2.4	2.6
C14-2	2.0	2.4
TOTAL	17.3	18.5



Report No. 84-5-360

Page 30

III Continued

	7A-2a N Plant <u>Primary Sludge</u>	7A-2b N Plant <u>Primary Sludge</u>
LAS Concentration, μ g/gm	83.24	90.56
Isomer		
C10-5	0.6	0.5
C10-4	0.6	0.5
C10-3	0.9	1.4
C10-2	1.4	1.3
TOTAL	3.5	3.7
C11-6	1.2	1.1
C11-5	2.9	2.7
C11-4	2.6	2.4
C11-3	3.3	3.3
C11-2	5.2	4.9
TOTAL	15.3	14.4
C12-6	6.0	5.6
C12-5	5.9	5.5
C12-4	5.0	4.7
C12-3	5.9	5.9
C12-2	7.6	7.7
TOTAL	30.4	29.4
C13-7,6	10.0	9.9
C13-5	6.7	6.5
C13-4	5.3	5.0
C13-3	5.3	5.6
C13-2	5.3	5.4
TOTAL	32.5	32.4
C14-7	3.7	3.7
C14-6	3.6	4.0
C14-5	3.4	3.8
C14-4	2.7	3.1
C14-3	2.6	2.9
C14-2	2.3	2.7
TOTAL	18.3	20.1



Report No. 84-5-360

Page 31

III Continued

	7A-3a N Plant <u>Primary Sludge</u>	7A-3b N Plant <u>Primary Sludge</u>
LAS Concentration, $\mu\text{g/gm}$	201.01	237.40
Isomer		
C10-5	0.6	0.4
C10-4	0.6	0.5
C10-3	1.2	1.2
C10-2	1.4	1.1
TOTAL	3.8	3.3
C11-6	1.3	0.9
C11-5	3.0	2.5
C11-4	2.7	2.3
C11-3	3.6	3.2
C11-2	5.2	4.5
TOTAL	15.8	13.4
C12-6	6.2	5.6
C12-5	6.1	5.4
C12-4	5.0	4.6
C12-3	6.1	5.9
C12-2	7.5	7.3
TOTAL	30.8	28.8
C13-7,6	10.0	9.9
C13-5	6.5	6.6
C13-4	5.3	5.1
C13-3	5.3	6.0
C13-2	5.0	5.6
TOTAL	32.1	33.2
C14-7	3.4	3.8
C14-6	3.5	4.2
C14-5	3.3	4.0
C14-4	2.7	3.4
C14-3	2.5	3.1
C14-2	2.1	2.8
TOTAL	17.5	21.3



Report No. 84-5-360

Page 32

III Continued

	8A-1a S Plant <u>Secondary Sludge</u>	8A-1b S Plant <u>Secondary Sludge</u>
LAS Concentration, $\mu\text{g/gm}$	0.92	0.63
Isomer		
C10-5	0.4	0.4
C10-4	0.4	0.4
C10-3	3.2	3.9
C10-2	1.5	1.4
TOTAL	5.4	6.1
C11-6	1.1	1.1
C11-5	2.5	2.6
C11-4	2.0	2.0
C11-3	4.5	3.5
C11-2	4.3	4.3
TOTAL	14.3	13.4
C12-6	5.4	5.4
C12-5	4.9	5.0
C12-4	4.1	4.1
C12-3	5.2	5.2
C12-2	7.7	7.1
TOTAL	27.2	26.8
C13-7,6	10.1	10.3
C13-5	5.8	5.9
C13-4	4.7	4.7
C13-3	4.6	4.9
C13-2	4.3	4.7
TOTAL	29.6	30.4
C14-7	5.7	5.8
C14-6	4.7	4.6
C14-5	4.2	4.1
C14-4	3.7	3.7
C14-3	2.6	2.8
C14-2	2.5	2.3
TOTAL	23.5	23.3



Report No. 84-5-360

Page 33

III Continued

	8A-2a S Plant <u>Secondary Sludge</u>	8A-2b S Plant <u>Secondary Sludge</u>
LAS Concentration, <i>4</i> g/gm	0.75	0.76
Isomer		
C10-5	0.4	0.4
C10-4	0.5	0.4
C10-3	2.3	2.3
C10-2	1.1	1.0
TOTAL	4.2	4.2
C11-6	1.1	1.2
C11-5	2.9	2.9
C11-4	2.0	2.0
C11-3	2.9	3.0
C11-2	4.1	4.1
TOTAL	13.0	13.1
C12-6	5.2	5.2
C12-5	4.8	4.9
C12-4	4.1	4.1
C12-3	5.2	4.8
C12-2	7.2	7.2
TOTAL	26.5	26.2
C13-7,6	10.2	10.3
C13-5	6.1	6.0
C13-4	4.8	4.9
C13-3	5.2	5.3
C13-2	5.3	5.3
TOTAL	31.7	31.6
C14-7	6.0	6.0
C14-6	4.7	4.8
C14-5	4.2	4.3
C14-4	3.8	3.9
C14-3	3.0	3.0
C14-2	2.8	2.8
TOTAL	24.6	24.9



Report No. 84-5-360

Page 34

III Continued

	8A-3a S Plant <u>Secondary Sludge</u>	8A-3b S Plant <u>Secondary Sludge</u>
LAS Concentration, $\mu\text{g/gm}$	8.21	14.36
Isomer		
C10-5	1.1	0.6
C10-4	1.1	0.6
C10-3	2.4	1.1
C10-2	2.8	1.6
TOTAL	7.4	3.9
C11-6	2.5	1.4
C11-5	3.4	3.0
C11-4	3.2	2.4
C11-3	4.4	3.3
C11-2	5.4	4.6
TOTAL	18.9	14.8
C12-6	7.6	6.4
C12-5	5.6	6.1
C12-4	5.2	4.7
C12-3	5.8	5.3
C12-2	6.2	6.9
TOTAL	30.4	29.4
C13-7,6	9.9	10.8
C13-5	5.6	6.5
C13-4	4.2	5.1
C13-3	4.5	4.9
C13-2	3.7	5.0
TOTAL	27.8	32.3
C14-7	3.9	4.6
C14-6	2.8	4.1
C14-5	2.8	3.7
C14-4	2.5	2.9
C14-3	1.9	2.4
C14-2	1.5	2.0
TOTAL	15.5	19.6



Report No. 84-5-360

Page 35

III Continued

	8B-1a S. Plant Secondary Sludge Spiked with 0.49 μ g/gm LAS	8B-1b S Plant Secondary Sludge Spiked with 0.49 μ g/gm LAS
LAS Concentration, μ g/gm	1.28	1.33
Isomer		
C10-5	1.6	1.2
C10-4	2.1	1.2
C10-3	10.1	10.6
C10-2	3.8	2.9
TOTAL	17.5	16.0
C11-6	2.1	2.1
C11-5	4.8	4.9
C11-4	4.3	4.3
C11-3	7.5	7.6
C11-2	7.5	7.4
TOTAL	26.3	26.3
C12-6	5.8	5.3
C12-5	4.8	4.9
C12-4	4.2	3.9
C12-3	7.1	7.2
C12-2	6.5	6.7
TOTAL	28.3	28.0
C13-7,6	5.0	5.6
C13-5	3.4	3.6
C13-4	2.2	2.4
C13-3	4.2	4.5
C13-2	2.4	2.6
TOTAL	17.3	18.7
C14-7	2.6	2.9
C14-6	1.9	2.3
C14-5	1.8	1.9
C14-4	2.0	2.3
C14-3	1.3	1.0
C14-2	1.0	0.7
TOTAL	10.6	11.0



Report No. 84-5-360

Page 36

III Continued

	8B-2a S Plant Secondary Sludge Spiked with 0.49 μ g/gm LAS	8B-2b S Plant Secondary Sludge Spiked with 0.49 μ g/gm LAS
LAS Concentration, μ g/gm	1.22	1.09
Isomer		
C10-5	1.4	1.5
C10-4	1.4	1.6
C10-3	3.6	5.3
C10-2	4.2	4.3
TOTAL	10.6	12.7
C11-6	2.1	2.3
C11-5	4.9	5.4
C11-4	4.3	4.9
C11-3	6.8	7.9
C11-2	8.2	8.7
TOTAL	26.3	29.3
C12-6	5.7	5.4
C12-5	5.4	5.1
C12-4	4.8	4.7
C12-3	6.4	6.7
C12-2	8.2	8.2
TOTAL	30.5	30.0
C13-7,6	6.1	4.9
C13-5	3.8	3.0
C13-4	3.1	2.3
C13-3	3.9	4.1
C13-2	3.3	3.1
TOTAL	20.1	17.4
C14-7	3.0	2.7
C14-6	2.4	1.9
C14-5	1.7	1.8
C14-4	2.1	1.7
C14-3	1.6	1.3
C14-2	1.7	1.2
TOTAL	12.5	10.6



Report No. 84-5-360

Page 37

III Continued

	8B-3a S Plant Secondary Sludge Spiked with 3.9 μ g/gm LAS	8B-3b S Plant Secondary Sludge Spiked with 3.9 μ g/gm LAS
LAS Concentration, μ g/gm	16.80	15.61
Isomer		
C10-5	1.2	1.2
C10-4	1.2	1.2
C10-3	2.7	2.9
C10-2	2.7	2.7
TOTAL	7.9	7.9
C11-6	2.1	1.9
C11-5	4.4	4.2
C11-4	3.8	3.6
C11-3	5.6	5.5
C11-2	6.8	6.5
TOTAL	22.7	21.8
C12-6	6.3	6.1
C12-5	5.8	5.5
C12-4	4.9	4.6
C12-3	6.5	6.3
C12-2	7.4	7.5
TOTAL	30.9	29.9
C13-7,6	8.0	8.1
C13-5	5.1	5.1
C13-4	3.8	3.8
C13-3	4.2	4.4
C13-2	3.8	4.0
TOTAL	24.9	25.4
C14-7	3.1	3.6
C14-6	3.1	3.2
C14-5	2.5	2.7
C14-4	1.9	2.1
C14-3	1.7	1.8
C14-2	1.3	1.5
TOTAL	13.6	15.0



Report No. 84-5-360

Page 38

III Continued

	9A-1a N Plant <u>Secondary Sludge</u>	9A-1b N Plant <u>Secondary Sludge</u>
LAS Concentration, $\mu\text{g/gm}$	1.25	1.78
Isomer		
C10-5	0.3	0.3
C10-4	0.3	0.6
C10-3	3.0	1.0
C10-2	1.8	2.1
TOTAL	5.4	3.9
C11-6	0.9	0.7
C11-5	2.0	1.4
C11-4	1.6	1.2
C11-3	2.9	2.0
C11-2	2.3	2.3
TOTAL	9.7	7.6
C12-6	4.1	4.2
C12-5	3.7	4.0
C12-4	3.0	3.1
C12-3	3.7	3.5
C12-2	5.1	5.6
TOTAL	19.7	20.3
C13-7,6	10.0	10.3
C13-5	6.0	6.4
C13-4	4.9	6.0
C13-3	5.7	4.8
C13-2	4.9	5.7
TOTAL	31.6	33.4
C14-7	7.7	8.2
C14-6	6.5	6.6
C14-5	6.1	6.5
C14-4	5.1	5.4
C14-3	4.4	3.8
C14-2	3.8	4.3
TOTAL	33.6	34.8



Report No. 84-5-360

Page 39

III Continued

	9A-2a N Plant <u>Secondary Sludge</u>	9A-2b N Plant <u>Secondary Sludge</u>
LAS Concentration, $\mu\text{g/gm}$	0.82	1.02
Isomer		
C10-5	0.3	0.3
C10-4	0.3	0.2
C10-3	6.8	1.0
C10-2	1.5	0.5
TOTAL	8.8	2.0
C11-6	0.9	0.8
C11-5	2.3	1.8
C11-4	1.5	1.3
C11-3	3.6	2.1
C11-2	2.3	2.3
TOTAL	10.6	8.3
C12-6	4.5	4.3
C12-5	4.5	4.2
C12-4	3.2	3.4
C12-3	4.0	4.6
C12-2	5.1	6.5
TOTAL	21.2	23.0
C13-7,6	10.0	10.9
C13-5	5.9	6.5
C13-4	4.7	5.5
C13-3	5.3	4.8
C13-2	4.5	5.0
TOTAL	30.4	32.9
C14-7	6.9	7.5
C14-6	6.2	6.9
C14-5	5.0	6.1
C14-4	4.5	5.3
C14-3	3.4	3.7
C14-2	3.0	4.4
TOTAL	29.0	33.8



Report No. 84-5-360

Page 40

III Continued

	9A-3a N Plant <u>Secondary Sludge</u>	9A-3b N Plant <u>Secondary Sludge</u>
LAS Concentration, μ g/gm	1.21	1.37
Isomer		
C10-5	0.4	0.3
C10-4	0.6	0.3
C10-3	7.5	1.7
C10-2	1.3	1.3
TOTAL	9.8	3.6
C11-6	0.7	0.7
C11-5	1.9	1.7
C11-4	1.5	1.4
C11-3	2.8	2.4
C11-2	2.9	2.7
TOTAL	9.9	9.1
C12-6	4.2	4.5
C12-5	3.8	4.8
C12-4	3.3	3.5
C12-3	4.3	4.3
C12-2	6.0	6.0
TOTAL	21.6	23.0
C13-7,6	9.6	10.5
C13-5	5.9	6.4
C13-4	5.0	5.6
C13-3	5.1	6.0
C13-2	4.5	4.6
TOTAL	30.1	33.2
C14-7	6.4	7.2
C14-6	5.8	6.1
C14-5	5.2	5.7
C14-4	4.2	4.9
C14-3	3.3	3.5
C14-2	3.7	3.7
TOTAL	28.6	31.1



INDUSTRIAL
TESTING
LABORATORIES
inc.

Report No. 84-5-360

Page 41

III Continued

	10Aa Anaerobically Digested Sludge from Digester	10Ab Anaerobically Digested Sludge from Digester
LAS Concentration, $\mu\text{g/gm}$	134.23	119.77
Isomer		
C10-5	0.5	0.6
C10-4	0.6	0.6
C10-3	1.7	1.7
C10-2	1.5	1.6
TOTAL	4.3	4.5
C11-6	1.3	1.4
C11-5	2.9	3.3
C11-4	2.6	2.8
C11-3	3.5	3.8
C11-2	5.1	5.4
TOTAL	15.5	16.7
C12-6	5.7	6.2
C12-5	5.7	6.0
C12-4	4.8	5.0
C12-3	5.8	6.1
C12-2	7.2	7.3
TOTAL	29.2	30.5
C13-7,6	9.8	9.5
C13-5	6.4	6.2
C13-4	5.0	4.8
C13-3	5.4	5.4
C13-2	5.2	4.9
TOTAL	31.7	30.9
C14-7	3.9	3.4
C14-6	3.7	3.4
C14-5	3.7	3.3
C14-4	2.9	2.7
C14-3	2.7	2.5
C14-2	2.4	2.0
TOTAL	19.3	17.4



Report No. 84-5-360

Page 42

III Continued

	10Ba Anaerobically Digested Sludge from Digester, Spiked with 88 4 g/gm LAS	10Bb Anaerobically Digested Sludge from Digester, Spiked with 99 4 g/gm LAS
LAS Concentration, 4 g/gm	216.28	236.79
Isomer		
C10-5	1.6	1.6
C10-4	1.6	1.5
C10-3	3.1	3.8
C10-2	3.2	3.0
TOTAL	9.5	9.9
C11-6	2.5	2.3
C11-5	5.1	5.2
C11-4	4.8	4.8
C11-3	6.7	7.6
C11-2	8.3	7.9
TOTAL	27.4	27.8
C12-6	6.0	6.0
C12-5	5.7	5.6
C12-4	4.9	4.9
C12-3	7.0	7.6
C12-2	7.8	7.4
TOTAL	31.4	31.5
C13-7,6	6.4	6.1
C13-5	4.3	4.4
C13-4	3.2	3.3
C13-3	3.9	4.1
C13-2	3.4	3.0
TOTAL	21.2	20.8
C14-7	2.2	2.1
C14-6	2.2	2.2
C14-5	1.9	1.8
C14-4	1.5	1.4
C14-3	1.6	1.5
C14-2	1.2	1.0
TOTAL	10.5	10.0



Report No. 84-5-360

Page 43

III Continued

	11Aa <u>Aerobically Digested Sludge from Digester</u>	11Ab <u>Aerobically Digested Sludge from Digester</u>
LAS Concentration, μ g/gm	96.61	108.01
Isomer		
C10-5	0.8	0.7
C10-4	0.8	0.7
C10-3	1.8	2.3
C10-2	2.0	1.8
TOTAL	5.4	5.6
C11-6	1.7	1.6
C11-5	3.8	3.6
C11-4	3.3	3.1
C11-3	4.3	4.2
C11-2	6.0	5.6
TOTAL	19.1	18.0
C12-6	6.5	6.2
C12-5	6.3	6.0
C12-4	5.2	4.9
C12-3	6.1	6.1
C12-2	7.1	7.0
TOTAL	31.1	30.3
C13-7,6	9.3	9.3
C13-5	6.0	6.0
C13-4	4.6	4.6
C13-3	4.9	5.1
C13-2	4.5	4.5
TOTAL	29.2	29.5
C14-7	3.2	3.3
C14-6	3.1	3.2
C14-5	2.9	3.1
C14-4	2.3	2.6
C14-3	2.1	2.4
C14-2	1.7	2.0
TOTAL	15.2	16.6

INDUSTRIAL
TESTING
LABORATORIES
inc.

Report No. 84-5-360

Page 44

III Continued

	11Ba Aerobically Digested Sludge from Digester, <u>Spiked with 129.4 μg/gm LAS</u>	11Bb Aerobically Digested Sludge from Digester, <u>Spiked with 121.4 μg/gm LAS</u>
LAS Concentration, μ g/gm	233.59	257.86
Isomer		
C10-5	1.9	1.7
C10-4	1.9	1.7
C10-3	3.9	3.3
C10-2	3.8	3.6
TOTAL	11.5	10.3
C11-6	2.7	2.6
C11-5	5.9	5.8
C11-4	5.4	5.2
C11-3	7.9	7.3
C11-2	8.8	8.6
TOTAL	30.7	29.5
C12-6	6.0	6.2
C12-5	5.7	6.0
C12-4	4.9	5.2
C12-3	7.3	7.0
C12-2	7.5	7.6
TOTAL	31.4	31.9
C13-7,6	5.5	5.9
C13-5	3.9	4.0
C13-4	2.8	3.0
C13-3	3.3	3.5
C13-2	2.7	2.9
TOTAL	18.1	19.2
C14-7	1.9	2.0
C14-6	1.9	2.0
C14-5	1.5	1.7
C14-4	1.1	1.2
C14-3	1.2	1.3
C14-2	0.7	0.9
TOTAL	8.3	9.1



Report No. 84-5-360

Page 45

III Continued

	12Aa Anaerobically Digested Sludge from Drying Bed	12Ab Anaerobically Digested Sludge from Drying Bed
LAS Concentration, μ g/gm	112.58	110.40
Isomer		
C10-5	0.2	0.2
C10-4	0.1	0.1
C10-3	0.1	0.1
C10-2	0.3	0.2
TOTAL	0.7	0.7
C11-6	0.9	0.8
C11-5	1.6	1.6
C11-4	0.9	1.0
C11-3	1.1	1.7
C11-2	1.9	1.9
TOTAL	6.4	7.0
C12-6	6.4	6.4
C12-5	4.7	4.6
C12-4	3.3	3.3
C12-3	3.3	3.2
C12-2	5.1	5.0
TOTAL	22.8	22.4
C13-7,6	15.4	15.3
C13-5	8.0	8.0
C13-4	6.1	6.2
C13-3	4.1	4.2
C13-2	4.1	4.0
TOTAL	37.6	37.7
C14-7	8.9	8.7
C14-6	7.5	7.6
C14-5	6.4	6.3
C14-4	4.4	4.4
C14-3	3.0	2.9
C14-2	2.3	2.3
TOTAL	32.5	32.2



Report No. 84-5-360

Page 46

III Continued

	12Ba Anaerobically Digested Sludge from Drying Bed, <u>Spiked with 37.6 μg/gm LAS</u>	12Bb Anaerobically Digested Sludge from Drying Bed, <u>Spiked with 37.8 μg/gm LAS</u>
LAS Concentration, μ g/gm	160.18	167.99
Isomer		
C10-5	0.8	0.7
C10-4	0.8	0.7
C10-3	1.1	1.0
C10-2	1.7	1.5
TOTAL	4.5	4.0
C11-6	1.7	1.5
C11-5	3.4	2.9
C11-4	2.6	2.4
C11-3	3.7	3.3
C11-2	4.6	4.3
TOTAL	16.0	14.4
C12-6	6.9	6.4
C12-5	5.2	4.9
C12-4	4.0	3.8
C12-3	4.3	4.2
C12-2	5.6	5.5
TOTAL	25.9	24.9
C13-7,6	12.3	12.1
C13-5	6.4	6.4
C13-4	4.6	4.7
C13-3	3.6	3.8
C13-2	3.7	3.8
TOTAL	30.6	30.9
C14-7	6.5	7.0
C14-6	5.4	5.9
C14-5	4.6	5.1
C14-4	3.0	3.5
C14-3	2.1	2.3
C14-2	1.5	1.9
TOTAL	23.0	25.8



Report No. 84-5-360

Page 47

III Continued

	13Aa Aerobically Digested <u>Sludge from Drying Bed</u>	13Ab Aerobically Digested <u>Sludge from Drying Bed</u>
LAS Concentration, μ g/gm	40.71	33.73
Isomer		
C10-5	0.4	0.5
C10-4	0.8	0.8
C10-3	0.9	1.2
C10-2	0.6	1.1
TOTAL	2.6	3.6
C11-6	1.3	1.4
C11-5	2.3	2.6
C11-4	1.3	1.6
C11-3	2.8	3.7
C11-2	1.8	3.4
TOTAL	9.6	12.7
C12-6	6.3	6.8
C12-5	4.7	5.4
C12-4	3.6	4.2
C12-3	3.4	3.9
C12-2	6.0	7.1
TOTAL	24.0	27.4
C13-7,6	13.6	13.0
C13-5	7.5	7.0
C13-4	5.5	5.9
C13-3	3.9	3.9
C13-2	4.7	3.9
TOTAL	35.2	33.8
C14-7	7.9	5.7
C14-6	6.3	5.3
C14-5	5.3	5.0
C14-4	4.5	3.1
C14-3	2.4	2.0
C14-2	2.1	1.4
TOTAL	28.6	22.5



Report No. 84-5-360

Page 48

III Continued

	13Ba Aerobically Digested Sludge from Drying Bed, Spiked with 115 μ g/gm LAS	13Bb Aerobically Digested Sludge from Drying Bed, Spiked with 114 μ g/gm LAS
LAS Concentration, μ g/gm	162.06	180.23
Isomer		
C10-5	2.2	2.0
C10-4	2.2	2.1
C10-3	3.0	4.0
C10-2	4.5	4.6
TOTAL	11.9	12.8
C11-6	3.1	3.3
C11-5	6.8	6.0
C11-4	6.1	5.8
C11-3	7.7	8.6
C11-2	11.0	10.8
TOTAL	34.8	34.5
C12-6	6.0	6.3
C12-5	5.8	5.3
C12-4	5.1	4.9
C12-3	6.3	7.0
C12-2	8.8	8.8
TOTAL	32.0	32.3
C13-7,6	4.6	4.5
C13-5	2.8	3.0
C13-4	2.1	2.5
C13-3	2.2	2.4
C13-2	2.2	1.9
TOTAL	13.9	14.2
C14-7	1.9	1.6
C14-6	1.7	1.4
C14-5	1.5	1.2
C14-4	1.1	1.1
C14-3	0.7	0.6
C14-2	0.5	0.4
TOTAL	7.4	6.2



Report No. 84-5-360

Page 49

III Continued

	<u>14A-1a</u> <u>Primary Influent</u>	<u>14A-1b</u> <u>Primary Influent</u>
LAS Concentration, mg/l	3.46	3.40
Isomer		
C10-5	2.1	2.4
C10-4	1.9	2.1
C10-3	2.4	2.7
C10-2	3.1	3.1
TOTAL	9.5	10.4
C11-6	2.2	2.3
C11-5	5.0	5.2
C11-4	4.1	4.2
C11-3	5.2	5.1
C11-2	5.6	5.7
TOTAL	22.0	22.5
C12-6	6.2	6.2
C12-5	5.9	5.9
C12-4	4.7	4.6
C12-3	5.7	5.5
C12-2	6.3	6.3
TOTAL	28.7	28.5
C13-7,6	7.9	7.7
C13-5	5.1	5.0
C13-4	3.9	3.8
C13-3	4.4	4.1
C13-2	4.0	3.9
TOTAL	25.3	24.5
C14-7	2.7	2.7
C14-6	2.9	2.7
C14-5	2.7	2.6
C14-4	2.2	2.1
C14-3	2.1	2.0
C14-2	2.0	2.0
TOTAL	14.5	14.1



Report No. 84-5-360

Page 50

III Continued

	14A-2a <u>Primary Influent</u>	14A-2b <u>Primary Influent</u>
LAS Concentration, mg/l	2.55	2.61
Isomer		
C10-5	2.6	3.4
C10-4	2.4	3.1
C10-3	4.3	5.1
C10-2	3.2	3.9
TOTAL	12.5	15.5
C11-6	2.4	3.0
C11-5	5.4	6.3
C11-4	4.5	5.2
C11-3	6.0	6.8
C11-2	5.3	5.8
TOTAL	23.5	27.1
C12-6	6.1	6.2
C12-5	5.7	5.8
C12-4	4.5	4.4
C12-3	6.0	6.0
C12-2	5.9	5.6
TOTAL	28.1	28.0
C13-7,6	6.9	6.3
C13-5	4.7	4.3
C13-4	3.4	3.0
C13-3	4.5	3.6
C13-2	3.3	2.7
TOTAL	22.8	19.9
C14-7	2.4	1.9
C14-6	2.5	1.9
C14-5	2.4	1.7
C14-4	2.2	1.6
C14-3	2.0	1.3
C14-2	1.7	1.2
TOTAL	13.1	9.5



INDUSTRIAL
TESTING
LABORATORIES
inc.

Report No. 84-5-360

Page 51

III Continued

	<u>14A-3a</u> <u>Primary Influent</u>	<u>14A-3b</u> <u>Primary Influent</u>
LAS Concentration, mg/l	2.35	3.45
Isomer		
C10-5	3.2	2.5
C10-4	2.9	2.3
C10-3	4.9	3.7
C10-2	3.9	3.1
TOTAL	14.9	11.6
C11-6	2.8	2.5
C11-5	6.2	5.4
C11-4	5.0	4.4
C11-3	6.8	6.1
C11-2	5.6	5.3
TOTAL	26.5	23.7
C12-6	6.4	6.4
C12-5	5.9	5.8
C12-4	4.5	4.6
C12-3	5.8	6.1
C12-2	5.4	5.8
TOTAL	28.0	28.7
C13-7,6	6.4	7.2
C13-5	4.3	4.8
C13-4	3.0	3.4
C13-3	3.7	4.5
C13-2	2.8	3.3
TOTAL	20.2	23.2
C14-7	2.0	2.4
C14-6	2.0	2.4
C14-5	1.9	2.4
C14-4	1.7	2.1
C14-3	1.5	1.9
C14-2	1.3	1.6
TOTAL	10.4	12.8



Report No. 84-5-360

Page 52

III Continued

	15Aa <u>Distilled Water Blank</u>	15Ab <u>Distilled Water Blank</u>
LAS Concentration, mg/l	0.00	0.00
Isomer		
C10-5	0	0
C10-4	0	0
C10-3	44.5	42.9
C10-2	0	2.6
TOTAL	44.5	45.4
C11-6	0	5.1
C11-5	5.0	1.7
C11-4	1.6	0
C11-3	11.1	10.6
C11-2	2.1	2.1
TOTAL	19.8	19.5
C12-6	0	0
C12-5	0	0
C12-4	2.4	4.4
C12-3	5.5	6.6
C12-2	6.8	6.6
TOTAL	14.7	17.6
C13-7,6	0	0
C13-5	0	0
C13-4	0	0
C13-3	11.8	10.8
C13-2	0	0
TOTAL	11.8	10.8
C14-7	9.2	6.7
C14-6	0	0
C14-5	0	0
C14-4	0	0
C14-3	0	0
C14-2	0	0
TOTAL	9.2	6.7



Report No. 84-5-360

Page 53

III Continued

	15Ba Distilled Water Blank <u>Spiked with 0.52 mg/l LAS</u>	15Bb Distilled Water Blank <u>Spiked with 0.52 mg/l LAS</u>
LAS Concentration, mg/l	0.53	0.55
Isomer		
C10-5	2.9	2.8
C10-4	2.9	2.8
C10-3	4.1	4.1
C10-2	5.9	5.9
TOTAL	15.8	15.7
C11-6	3.6	3.5
C11-5	8.3	8.5
C11-4	7.4	7.5
C11-3	10.0	10.3
C11-2	13.9	13.6
TOTAL	43.1	43.3
C12-6	5.9	5.8
C12-5	5.8	5.8
C12-4	5.2	5.2
C12-3	7.7	7.7
C12-2	10.0	9.8
TOTAL	34.6	34.3
C13-7,6	1.5	1.5
C13-5	1.3	1.3
C13-4	0.9	0.9
C13-3	1.4	1.5
C13-2	1.5	1.5
TOTAL	6.5	6.7
C14-7	0	0
C14-6	0	0
C14-5	0	0
C14-4	0	0
C14-3	0	0
C14-2	0	0
TOTAL	0	0



INDUSTRIAL
TESTING
LABORATORIES
inc.

Report No. 84-5-360

Page 54

Source: Enid Oklahoma Wastewater
Treatment Plant

Analysts: William A. Rorie
William J. Lowry
Jeffrey W. Siria

Respectfully submitted,

INDUSTRIAL TESTING LABORATORIES, INC.

Allan M. Siegel, P.E.
Director

AMS/ps/hj