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Report No.: 8003-431
Rev. No.: 1

LCP CHEMICAL
LINDEN, UNION COUNTY, NEW JERSEY

SITE INSPECTION REPORT

PREPARED UNDER

WORK ASSIGNMENT NO. 019-2JZZ
CONTRACT NO. 68-W9-0051

JUNE 16, 1995
UPDATED: JULY 24, 1995

VOLUME 2 OF 4

REFERENCE NO. 7

MALCOLM PIRNIE, INC. **PROJECT NOTES**

To: File	**Date: May 10, 1995**
From: David Kahlenberg	**Project #: 8003-431**
Subject: Four-mile Radius Populations	**Site Name: LCP Chemicals**

Population estimation within four miles of the LCP Chemical site was accomplished using the Topologically Integrated Geographic Encoding and Referencing (TIGER) data base. The results of the data base analysis is shown in the table below.

Ring (miles)	Population
0 - ¼	13
¼ - ½	38
½ - 1	506
1 - 2	10,829
2 - 3	36,650
3 - 4	103,624
TOTAL POPULATION WITHIN 4 MILES:	151,660

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Sep 27, 1994

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Sub: LCP Chemicals Inc.
Linden, NJ

Job: 8003-431-201

Site Longitude: 74-12-37 74.210281
Site Latitude : 40-36-27 40.607498

The CENTRACTS report below identifies the population, households, and private water wells of each Block Group that lies within, or partially within, the 4, 3, 2, 1, .5, and .25, mile "rings" of the latitude and longitude coordinates above. CENTRACTS may have up to ten radii of any length. 1000 block groups, and 15000 block group sides.

CENTRACTS uses the 1990 Block Group population and Block Group house count data found in the Census Bureau's 1990 STF-1A files. The sources of water supply data are from the Bureau's 1990 STF-3A files. The boundary line coordinates of the Block Groups were extracted from the Census Bureau's 1990 TIGER/Line Files.

CENTRACTS reports are created with programs written by Frost Associates, P.O. Box 495, Essex, Conn. The code was written using Microsoft's Quick-Basic Ver. 4.5.

Latitude and Longitude coordinates identifying a site are entered in degrees and decimal degrees. One or more county files holding Block Group boundary lines are selected for use by CENTRACTS by determining whether the site coordinates fall within the minimum and maximum Lat\Lon coordinates of each county in the state.

Each Block Group line segment has Lat\Lon coordinates representing the "From" and "To" ends of that line. All coordinates from the selected county files are read and converted from degrees, decimal degrees to X\Y miles from the site location. Each line segment is then examined whether it lies within or partially within the maximum ring from the site.

The unique Block Group ID numbers of each line segment that lie within the maximum ring are retained. All Block Group boundary lines matching the Block Group numbers are then extracted from the respective county files to obtain all sides of the included Block Groups. Boundary records are then sorted in adjacent side order to determine the shape and area of each Block Group polygon.

A method to solve for the area of a polygon is to take one-half the sum of the products obtained by multiplying each X-coordinate by the difference between the adjacent Y-coordinates. For a polygon with coordinates at adjacent angles A, B, C, D, and

The formula can be expressed:

Area = 1/2{Xa(Ye-Yb)+ Xb(Ya-Yb)+ Xc(Yb-Yd)+ Xd(Yc-Ye)+ Xe(Yd-Ya)}

For each ring, the selected Block Groups will be inside, outside, or intersected by the ring. When a polygon is intersected, the partial Block Group area within that ring is calculated using the method described below.

When a ring intersects a Block Group, the intersect points are solved and plotted at the points where the ring enters and exits the shape. The chord line, a line within the circle connecting the intersect points is determined. This chord line is used to calculate the segment area, the half moon shape between the chord line and the ring, and the sub-polygon created by the chord line and the Block Group boundaries that lie outside the ring.

The segment area is subtracted from the sub-polygon area to determine the area of the sub-polygon outside the ring. The area outside the ring is then subtracted from the area of the entire polygon to arrive at the inside area. This inside area is then divided by the tract's total area to determine the percentage of area within the ring. This process is repeated for each block group that is intersected by one of the rings. The total area, partial area, and percentage of partial area of those block groups within, or partially within a ring, are held in memory for the report.

On occasion, the algorithm described above is unable to determine the area of the partial area. Within the report program is a "Paint" routine which allows an enclosed shape to be highlighted. Another routine calculates the percentage of highlighted screen pixels to the pixels within the polygon. A manual entry is allowed. Both the "paint" method and manual entry method over ride the calculated method.

CENTRACTS lists, starting on page 4, all Block Groups in State, County, Census Tract, and Block Group ID order that lie within, or partially within, the maximum ring. Each Block Group is identified by a City or Town name and by the Block Group's State, County, Tract and Block Group ID number. Following is the Block Group's 1990 populu tion and house count extracted from the Census Bureau's 1990 STF-1A files.

The next four columns display water source data from the 1990 STF-3A files. The first column is "Units with Public system or private company source of water", followed by "Units with individual well, Drilled, source of water"; "Units with individual well, Dug, source of water" and "Units with Other source of water".

For each ring, CENTRACTS then shows the Block Groups that are within that ring, the Block Group's total area in square miles, the partial area of the Block Group within that ring, and the partial percentage within the ring. The areas of the included Block Group and the partial areas are then totaled.

The last section tallies the demographic data within each ring. The percentage of area for each Block Group is multiplied times the census data for that Block Group and totaled for all Block Group's within the ring. Ring totals are then determined by subtracting the three mile data from the four mile, the two mile from the three mile, one from the two, etc... Population on private wells is calculated using the formula: ((Drilled + Dug Wells) / Households) * Population

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No.	City	Block Group ID	Blk Grp People	House Holds	Public Water	Drilled Wells	Dug Wells	Other
1	Bayonne	34017 0115 4	516	203	182	0	0	0
2	Carteret	34023 0035 1	1053	393	364	0	0	0
3	Carteret	34023 0035 2	1053	419	433	0	0	0
4	Carteret	34023 0035 3	838	297	312	0	0	0
5	Carteret	34023 0036 1	1949	723	734	0	0	0
6	Carteret	34023 0036 2	2151	918	937	0	0	0
7	Carteret	34023 0036 3	610	225	195	0	0	0
8	Carteret	34023 0036 9	0	0	0	0	0	0
9	Carteret	34023 0037 1	963	363	368	0	0	0
10	Carteret	34023 0037 2	1078	361	367	0	0	0
11	Carteret	34023 0037 3	844	334	311	0	0	0
12	Carteret	34023 0037 4	551	208	220	0	0	0
13	Carteret	34023 0038 1	1142	414	410	0	0	0
14	Carteret	34023 0038 2	1305	377	347	0	0	0
15	Carteret	34023 0038 3	1308	405	436	0	0	0
16	Carteret	34023 0038 4	643	205	208	0	0	0
17	Carteret	34023 0039 1	904	322	268	0	0	0
18	Carteret	34023 0039 2	2609	847	901	0	0	0
19	Woodbridge	34023 0027011	2149	975	1015	0	0	0
20	Woodbridge	34023 0027012	1703	645	658	0	0	0
21	Woodbridge	34023 0027031	620	206	190	0	0	0
22	Woodbridge	34023 0027034	1013	379	379	0	0	0
23	Woodbridge	34023 0027035	828	299	293	0	0	0
24	Woodbridge	34023 0027041	3261	0	0	0	0	0
25	Woodbridge	34023 0028011	21	10	13	0	0	0
26	Woodbridge	34023 0028012	512	171	152	0	0	0
27	Woodbridge	34023 0028013	1704	856	844	0	0	7
28	Woodbridge	34023 0028021	1556	562	569	0	0	0
29	Woodbridge	34023 0028031	1069	382	388	0	0	0
30	Woodbridge	34023 0028032	560	168	159	0	0	0
31	Woodbridge	34023 0028033	1232	406	422	0	0	0
32	Woodbridge	34023 0028034	208	79	71	0	0	0
33	Woodbridge	34023 0028035	843	294	300	0	0	0
34	Woodbridge	34023 0029011	569	214	198	0	0	0
35	Woodbridge	34023 0034011	312	107	87	0	0	0
36	Woodbridge	34023 0034012	1381	512	503	0	0	0
37	Woodbridge	34023 0034015	11	6	4	0	0	0
38	Carteret	34023 0036999	24	0	0	0	0	0
39	Elizabeth	34039 0301 1	0	0	0	0	0	0
40	Elizabeth	34039 0301 9	191	93	84	0	0	0
41	Elizabeth	34039 0302 1	152	45	27	0	0	0
42	Elizabeth	34039 0302 2	886	268	279	0	0	0
43	Elizabeth	34039 0302 3	2193	662	678	0	0	0
44	Elizabeth	34039 0303 1	1359	508	518	0	0	0
45	Elizabeth	34039 0303 2	1630	519	510	0	0	0
46	Elizabeth	34039 0303 3	245	88	87	0	0	0
47	Elizabeth	34039 0304 2	136	40	38	0	0	0
48	Elizabeth	34039 0304 3	1007	304	289	12	0	0
49	Elizabeth	34039 0304 4	845	267	262	0	0	0
50	Elizabeth	34039 0304 5	2703	870	841	19	0	0
51	Elizabeth	34039 0304 6	1217	359	379	0	0	0
52	Elizabeth	34039 0305 1	581	173	173	0	0	0
53	Elizabeth	34039 0305 2	1627	543	516	13	0	0
54	Elizabeth	34039 0305 3	798	315	330	0	0	0

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55	Elizabeth	34039	0305	4	1116	437	436	0	0	0
56	Elizabeth	34039	0306	1	553	222	224	0	0	0
57	Elizabeth	34039	0306	2	1885	766	753	0	0	0
58	Elizabeth	34039	0306	3	765	285	293	0	0	9
59	Elizabeth	34039	0306	4	83	51	45	0	0	0
60	Elizabeth	34039	0307	1	950	376	386	0	0	0
61	Elizabeth	34039	0307	2	1534	589	540	0	0	0
62	Elizabeth	34039	0307	3	986	395	421	5	0	0
63	Elizabeth	34039	0307	4	560	226	229	5	0	0
64	Elizabeth	34039	0307	5	1004	387	393	0	0	0
65	Elizabeth	34039	0307	6	1415	603	605	0	0	0
66	Elizabeth	34039	0307	7	1479	530	522	0	0	0
67	Elizabeth	34039	0309	1	1402	535	555	0	0	0
68	Elizabeth	34039	0309	2	1289	468	474	0	0	0
69	Elizabeth	34039	0309	3	1660	551	544	0	0	0
70	Elizabeth	34039	0309	4	478	173	154	0	0	0
71	Elizabeth	34039	0310	1	2201	669	663	0	0	0
72	Elizabeth	34039	0310	2	1365	449	455	0	0	0
73	Elizabeth	34039	0311	1	956	388	384	6	0	0
74	Elizabeth	34039	0311	2	1021	411	409	0	0	0
75	Elizabeth	34039	0311	3	758	275	265	0	0	0
76	Elizabeth	34039	0311	4	505	168	161	0	0	0
77	Elizabeth	34039	0311	5	1322	438	448	7	0	0
78	Elizabeth	34039	0312	1	938	287	282	0	0	0
79	Elizabeth	34039	0312	2	770	257	256	0	0	0
80	Elizabeth	34039	0312	3	1273	384	398	0	0	0
81	Elizabeth	34039	0312	4	528	179	177	0	0	0
82	Elizabeth	34039	0312	5	1863	703	697	0	0	0
83	Elizabeth	34039	0320	1	1511	611	573	9	0	0
84	Elizabeth	34039	0320	2	1422	683	711	0	0	0
85	Elizabeth	34039	0320	3	1419	605	580	0	0	0
86	Elizabeth	34039	0320	4	648	230	231	0	0	0
87	Elizabeth	34039	0320	5	920	370	383	0	0	0
88	Elizabeth	34039	0320	6	1194	382	371	0	0	0
89	Elizabeth	34039	0320	7	740	248	249	0	0	0
90	Elizabeth	34039	0320	8	727	323	345	0	0	0
91	Roselle	34039	0340	1	799	375	320	0	0	0
92	Roselle	34039	0341	1	1321	663	681	0	0	0
93	Roselle	34039	0341	2	675	235	217	0	0	0
94	Roselle	34039	0341	3	636	208	207	0	0	0
95	Roselle	34039	0341	4	842	276	277	0	0	0
96	Roselle	34039	0342	1	1475	569	616	0	0	0
97	Roselle	34039	0343	1	765	267	256	0	0	0
98	Roselle	34039	0343	2	1114	606	628	7	0	0
99	Roselle	34039	0344	1	759	256	249	0	0	0
100	Roselle	34039	0344	2	944	329	344	0	0	0
101	Roselle	34039	0344	3	909	264	288	0	0	0
102	Roselle	34039	0344	4	1036	325	290	0	0	0
103	Roselle	34039	0344	5	1012	350	353	0	0	0
104	Linden	34039	0345	1	586	236	226	0	0	0
105	Linden	34039	0345	2	313	144	142	0	0	0
106	Linden	34039	0345	3	304	119	122	0	0	0
107	Linden	34039	0345	4	382	132	129	0	0	0
108	Linden	34039	0345	5	368	115	128	0	0	0
109	Linden	34039	0345	6	1320	670	695	0	0	6
110	Linden	34039	0345	7	424	176	162	0	0	0
111	Linden	34039	0345	8	221	92	74	0	0	0
112	Linden	34039	0346	1	1279	404	369	0	0	0
113	Linden	34039	0346	2	606	205	225	5	0	0
114	Linden	34039	0346	3	1372	473	469	0	0	0

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115	Linden	34039	0346	4	1000	369	383	0	0	0
116	Linden	34039	0347	1	700	278	271	0	0	0
117	Linden	34039	0347	2	1189	535	550	0	0	0
118	Linden	34039	0347	3	735	321	325	0	0	0
119	Linden	34039	0347	4	769	313	301	0	0	0
120	Linden	34039	0348	2	789	325	320	0	0	0
121	Linden	34039	0348	3	593	245	249	0	0	0
122	Linden	34039	0348	4	534	206	204	0	0	0
123	Linden	34039	0349	1	590	224	237	0	0	0
124	Linden	34039	0349	2	664	258	241	0	0	0
125	Linden	34039	0349	3	601	234	210	0	0	0
126	Linden	34039	0349	4	1113	601	662	0	0	0
127	Linden	34039	0349	5	629	224	211	0	0	0
128	Linden	34039	0349	6	876	344	322	0	0	0
129	Linden	34039	0349	7	496	184	178	0	0	0
130	Linden	34039	0349	8	886	419	427	0	0	0
131	Linden	34039	0350	1	983	393	386	0	0	0
132	Linden	34039	0350	2	1009	402	386	0	0	0
133	Linden	34039	0350	3	288	109	104	0	0	0
134	Linden	34039	0351	1	514	158	165	0	0	0
135	Linden	34039	0351	2	571	221	215	0	0	0
136	Linden	34039	0351	3	2100	1071	1092	0	0	0
137	Linden	34039	0352	1	1431	547	564	0	0	0
138	Linden	34039	0352	2	666	244	233	0	0	0
139	Linden	34039	0353	1	542	266	276	0	0	0
140	Linden	34039	0353	2	909	311	311	0	0	0
141	Linden	34039	0353	3	746	278	277	0	0	0
142	Linden	34039	0353	4	1513	689	692	0	0	0
143	Linden	34039	0353	5	1226	436	427	0	0	0
144	Linden	34039	0354	1	651	291	294	0	0	0
145	Linden	34039	0354	2	809	309	324	0	0	0
146	Linden	34039	0354	3	678	272	246	0	0	0
147	Linden	34039	0354	9	370	143	148	0	0	0
148	Rahway	34039	0355	1	497	217	218	0	0	0
149	Rahway	34039	0355	2	1398	588	564	0	0	0
150	Rahway	34039	0355	3	744	283	284	0	0	0
151	Rahway	34039	0355	4	1002	477	500	0	0	0
152	Rahway	34039	0355	5	991	407	423	0	0	0
153	Rahway	34039	0355	6	467	186	189	0	0	0
154	Rahway	34039	0355	7	642	275	265	0	0	0
155	Rahway	34039	0355	8	609	254	248	0	0	0
156	Rahway	34039	0357	1	1094	468	474	0	0	0
157	Rahway	34039	0357	2	1449	552	514	0	0	0
158	Rahway	34039	0357	3	710	293	286	0	0	0
159	Rahway	34039	0358	1	988	316	309	0	0	0
160	Rahway	34039	0358	2	923	304	298	0	0	0
161	Rahway	34039	0358	3	1193	470	483	0	0	0
162	Rahway	34039	0359	1	1232	526	506	0	0	0
163	Rahway	34039	0359	2	417	192	216	0	0	0
164	Rahway	34039	0359	3	1099	373	369	0	0	0
165	Rahway	34039	0360	1	775	312	297	0	0	0
166	Rahway	34039	0360	2	616	214	164	0	0	0
167	Rahway	34039	0360	3	1702	655	691	0	0	0
168	Rahway	34039	0360	4	1223	515	546	0	0	0
169	Clark	34039	0362	1	726	268	270	0	0	0
170	Clark	34039	0362	8	579	212	205	0	0	0
171	Elizabeth	34039	0308011		559	233	209	0	0	0
172	Elizabeth	34039	0308012		256	94	69	9	0	3
173	Elizabeth	34039	0308022		309	96	82	0	0	0
174	Elizabeth	34039	0308023		824	314	303	0	0	0

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175	Elizabeth	34039	0308024	1165	454	516	0	0	0
176	Elizabeth	34039	0319012	960	5	0	0	0	0
177	Elizabeth	34039	0319022	442	328	332	0	0	0
178	Elizabeth	34039	0319023	2516	1140	1089	0	0	0
179	Elizabeth	34039	0319024	4407	2197	2259	0	0	0
180	Linden	34039	0354999	23	0	0	0	0	0
===	==========	==========		======	======	======	======	======	
	Totals:			173072	64920	64737	97	0	25

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City	Census Tract ID	Tract People	House Count	Public Water	Drilled Wells	Dug Wells	Other Wells
Bayonne	34017 0115 4	516	203	182	0	0	0
	Sub Totals:	516	203	182	0	0	0
Carteret	34023 0035 1	1053	393	364	0	0	0
Carteret	34023 0035 2	1053	419	433	0	0	0
Carteret	34023 0035 3	838	297	312	0	0	0
Carteret	34023 0036 1	1949	723	734	0	0	0
Carteret	34023 0036 2	2151	918	937	0	0	0
Carteret	34023 0036 3	610	225	195	0	0	0
Carteret	34023 0036 9	0	0	0	0	0	0
Carteret	34023 0037 1	963	363	368	0	0	0
Carteret	34023 0037 2	1078	361	367	0	0	0
Carteret	34023 0037 3	844	334	311	0	0	0
Carteret	34023 0037 4	551	208	220	0	0	0
Carteret	34023 0038 1	1142	414	410	0	0	0
Carteret	34023 0038 2	1305	377	347	0	0	0
Carteret	34023 0038 3	1308	405	436	0	0	0
Carteret	34023 0038 4	643	205	208	0	0	0
Carteret	34023 0039 1	904	322	268	0	0	0
Carteret	34023 0039 2	2609	847	901	0	0	0
Carteret	34023 0036999	24	0	0	0	0	0
	Sub Totals:	19025	6811	6811	0	0	0
Clark	34039 0362 8	579	212	205	0	0	0
Clark	34039 0362 1	726	268	270	0	0	0
	Sub Totals:	1305	480	475	0	0	0
Elizabeth	34039 0307 6	1415	603	605	0	0	0
Elizabeth	34039 0307 7	1479	530	522	0	0	0
Elizabeth	34039 0307 5	1004	387	393	0	0	0
Elizabeth	34039 0309 4	478	173	154	0	0	0
Elizabeth	34039 0310 1	2201	669	663	0	0	0
Elizabeth	34039 0309 1	1402	535	555	0	0	0
Elizabeth	34039 0311 1	956	388	384	6	0	0
Elizabeth	34039 0311 2	1021	411	409	0	0	0
Elizabeth	34039 0311 3	758	275	265	0	0	0
Elizabeth	34039 0311 4	505	168	161	0	0	0
Elizabeth	34039 0311 5	1322	438	448	7	0	0
Elizabeth	34039 0312 1	938	287	282	0	0	0
Elizabeth	34039 0309 2	1289	468	474	0	0	0
Elizabeth	34039 0309 3	1660	551	544	0	0	0
Elizabeth	34039 0312 4	528	179	177	0	0	0
Elizabeth	34039 0312 5	1863	703	697	0	0	0
Elizabeth	34039 0310 2	1365	449	455	0	0	0
Elizabeth	34039 0301 1	0	0	0	0	0	0
Elizabeth	34039 0301 9	191	93	84	0	0	0
Elizabeth	34039 0302 1	152	45	27	0	0	0
Elizabeth	34039 0302 2	886	268	279	0	0	0
Elizabeth	34039 0302 3	2193	662	678	0	0	0
Elizabeth	34039 0303 1	1359	508	518	0	0	0
Elizabeth	34039 0303 2	1630	519	510	0	0	0
Elizabeth	34039 0303 3	245	88	87	0	0	0

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[illegible]zabeth	34039 0304	2	136	40	38	0	0	0
[illegible]zabeth	34039 0304	3	1007	304	289	12	0	0
Elizabeth	34039 0304	4	845	267	262	0	0	0
Elizabeth	34039 0304	5	2703	870	841	19	0	0
Elizabeth	34039 0304	6	1217	359	379	0	0	0
Elizabeth	34039 0305	1	581	173	173	0	0	0
Elizabeth	34039 0305	2	1627	543	516	13	0	0
Elizabeth	34039 0305	3	798	315	330	0	0	0
Elizabeth	34039 0305	4	1116	437	436	0	0	0
Elizabeth	34039 0306	1	553	222	224	0	0	0
Elizabeth	34039 0306	2	1885	766	753	0	0	0
Elizabeth	34039 0306	3	765	285	293	0	0	9
Elizabeth	34039 0306	4	83	51	45	0	0	0
Elizabeth	34039 0307	1	950	376	386	0	0	0
Elizabeth	34039 0307	2	1534	589	540	0	0	0
Elizabeth	34039 0307	3	986	395	421	5	0	0
Elizabeth	34039 0307	4	560	226	229	5	0	0
Elizabeth	34039 0320	4	648	230	231	0	0	0
Elizabeth	34039 0320	5	920	370	383	0	0	0
Elizabeth	34039 0320	6	1194	382	371	0	0	0
Elizabeth	34039 0320	7	740	248	249	0	0	0
Elizabeth	34039 0320	8	727	323	345	0	0	0
Elizabeth	34039 0312	3	1273	384	398	0	0	0
Elizabeth	34039 0308011		559	233	209	0	0	0
Elizabeth	34039 0308012		256	94	69	9	0	3
Elizabeth	34039 0320	1	1511	611	573	9	0	0
Elizabeth	34039 0320	2	1422	683	711	0	0	0
Elizabeth	34039 0320	3	1419	605	580	0	0	0
[illegible]zabeth	34039 0308024		1165	454	516	0	0	0
[illegible]zabeth	34039 0319012		960	5	0	0	0	0
Elizabeth	34039 0319022		442	328	332	0	0	0
Elizabeth	34039 0319023		2516	1140	1089	0	0	0
Elizabeth	34039 0312	2	770	257	256	0	0	0
Elizabeth	34039 0308023		824	314	303	0	0	0
Elizabeth	34039 0319024		4407	2197	2259	0	0	0
Elizabeth	34039 0308022		309	96	82	0	0	0
	Sub Totals:		66248	24569	24482	85	0	12
Linden	34039 0346	4	1000	369	383	0	0	0
Linden	34039 0347	1	700	278	271	0	0	0
Linden	34039 0347	2	1189	535	550	0	0	0
Linden	34039 0348	2	789	325	320	0	0	0
Linden	34039 0348	3	593	245	249	0	0	0
Linden	34039 0348	4	534	206	204	0	0	0
Linden	34039 0349	1	590	224	237	0	0	0
Linden	34039 0346	3	1372	473	469	0	0	0
Linden	34039 0351	3	2100	1071	1092	0	0	0
Linden	34039 0352	1	1431	547	564	0	0	0
Linden	34039 0352	2	666	244	233	0	0	0
Linden	34039 0353	1	542	266	276	0	0	0
Linden	34039 0347	3	735	321	325	0	0	0
Linden	34039 0347	4	769	313	301	0	0	0
Linden	34039 0353	4	1513	689	692	0	0	0
Linden	34039 0353	5	1226	436	427	0	0	0
Linden	34039 0354	1	651	291	294	0	0	0
[illegible]den	34039 0354	2	809	309	324	0	0	0
[illegible]den	34039 0354	3	678	272	246	0	0	0
Linden	34039 0354	9	370	143	148	0	0	0
Linden	34039 0349	3	601	234	210	0	0	0

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[illegible]den	34039 0345	1	586	236	226	0	0	0
[illegible]nden	34039 0345	2	313	144	142	0	0	0
inden	34039 0353	2	909	311	311	0	0	0
Linden	34039 0353	3	746	278	277	0	0	0
Linden	34039 0345	6	1320	670	695	0	0	6
inden	34039 0345	7	424	176	162	0	0	0
inden	34039 0345	8	221	92	74	0	0	0
Linden	34039 0346	1	1279	404	369	0	0	0
Linden	34039 0346	2	606	205	225	5	0	0
inden	34039 0351	2	571	221	215	0	0	0
inden	34039 0354999		23	0	0	0	0	0
Linden	34039 0349	4	1113	601	662	0	0	0
Linden	34039 0349	5	629	224	211	0	0	0
inden	34039 0345	3	304	119	122	0	0	0
inden	34039 0345	4	382	132	129	0	0	0
Linden	34039 0345	5	368	115	128	0	0	0
inden	34039 0349	8	886	419	427	0	0	0
inden	34039 0350	1	983	393	386	0	0	0
Linden	34039 0350	2	1009	402	386	0	0	0
Linden	34039 0350	3	288	109	104	0	0	0
inden	34039 0349	2	664	258	241	0	0	0
inden	34039 0349	7	496	184	178	0	0	0
Linden	34039 0351	1	514	158	165	0	0	0
Linden	34039 0349	6	876	344	322	0	0	0
	Sub Totals:		34368	13986	13972	5	0	6
Rahway	34039 0358	2	923	304	298	0	0	0
[illegible]way	34039 0358	3	1193	470	483	0	0	0
[illegible]way	34039 0359	1	1232	526	506	0	0	0
Rahway	34039 0360	1	775	312	297	0	0	0
ahway	34039 0360	2	616	214	164	0	0	0
ahway	34039 0360	3	1702	655	691	0	0	0
Rahway	34039 0360	4	1223	515	546	0	0	0
Rahway	34039 0355	1	497	217	218	0	0	0
ahway	34039 0358	1	988	316	309	0	0	0
ahway	34039 0355	7	642	275	265	0	0	0
Rahway	34039 0355	2	1398	588	564	0	0	0
Rahway	34039 0355	3	744	283	284	0	0	0
ahway	34039 0359	2	417	192	216	0	0	0
ahway	34039 0359	3	1099	373	369	0	0	0
Rahway	34039 0355	5	991	407	423	0	0	0
Rahway	34039 0355	8	609	254	248	0	0	0
ahway	34039 0357	1	1094	468	474	0	0	0
ahway	34039 0357	2	1449	552	514	0	0	0
Rahway	34039 0357	3	710	293	286	0	0	0
ahway	34039 0355	4	1002	477	500	0	0	0
ahway	34039 0355	6	467	186	189	0	0	0
	Sub Totals:		19771	7877	7844	0	0	0
oselle	34039 0341	1	1321	663	681	0	0	0
Roselle	34039 0341	3	636	208	207	0	0	0
Roselle	34039 0341	2	675	235	217	0	0	0
oselle	34039 0344	4	1036	325	290	0	0	0
oselle	34039 0344	5	1012	350	353	0	0	0
[illegible]elle	34039 0343	2	1114	606	628	7	0	0
[illegible]elle	34039 0344	1	759	256	249	0	0	0
oselle	34039 0344	2	944	329	344	0	0	0
Roselle	34039 0344	3	909	264	288	0	0	0

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Roselle	34039	0340	1	799	375	320	0	0	0
Roselle	34039	0343	1	765	267	256	0	0	0
Roselle	34039	0341	4	842	276	277	0	0	0
Roselle	34039	0342	1	1475	569	616	0	0	0
	Sub Totals:			12287	4723	4726	7	0	0
Woodbridge	34023	0028011		21	10	13	0	0	0
Woodbridge	34023	0028012		512	171	152	0	0	0
Woodbridge	34023	0027041		3261	0	0	0	0	0
Woodbridge	34023	0028032		560	168	159	0	0	0
Woodbridge	34023	0028033		1232	406	422	0	0	0
Woodbridge	34023	0028034		208	79	71	0	0	0
Woodbridge	34023	0028035		843	294	300	0	0	0
Woodbridge	34023	0029011		569	214	198	0	0	0
Woodbridge	34023	0034011		312	107	87	0	0	0
Woodbridge	34023	0034012		1381	512	503	0	0	0
Woodbridge	34023	0034015		11	6	4	0	0	0
Woodbridge	34023	0028013		1704	856	844	0	0	7
Woodbridge	34023	0028021		1556	562	569	0	0	0
Woodbridge	34023	0028031		1069	382	388	0	0	0
Woodbridge	34023	0027011		2149	975	1015	0	0	0
Woodbridge	34023	0027012		1703	645	658	0	0	0
Woodbridge	34023	0027031		620	206	190	0	0	0
Woodbridge	34023	0027034		1013	379	379	0	0	0
Woodbridge	34023	0027035		828	299	293	0	0	0
	Sub Totals:			19552	6271	6245	0	0	7

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For Radius of 4 Mi., Circle Area = 50.265482

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
1	Bayonne	34017 1154	0.800110	0.163910	20.49
2	Carteret	34023 351	0.240205	0.240205	100.00
3	Carteret	34023 352	0.171103	0.171103	100.00
4	Carteret	34023 353	0.653666	0.653666	100.00
5	Carteret	34023 361	0.339609	0.339609	100.00
6	Carteret	34023 362	0.208102	0.208102	100.00
7	Carteret	34023 363	0.046229	0.046229	100.00
8	Carteret	34023 369	0.825569	0.825569	100.00
9	Carteret	34023 371	0.121400	0.121400	100.00
10	Carteret	34023 372	0.181518	0.181518	100.00
11	Carteret	34023 373	0.093079	0.093079	100.00
12	Carteret	34023 374	0.101343	0.101343	100.00
13	Carteret	34023 381	0.170832	0.170832	100.00
14	Carteret	34023 382	0.110213	0.110213	100.00
15	Carteret	34023 383	0.102889	0.102889	100.00
16	Carteret	34023 384	0.052778	0.052778	100.00
17	Carteret	34023 391	0.165729	0.165729	100.00
18	Carteret	34023 392	0.860196	0.860196	100.00
19	Woodbridge	34023 27011	0.279914	0.195741	69.93
20	Woodbridge	34023 27012	0.250822	0.003756	1.50
21	Woodbridge	34023 27031	0.153167	0.057594	37.60
22	Woodbridge	34023 27034	0.157397	0.147860	93.94
23	Woodbridge	34023 27035	0.104249	0.033401	32.04
24	Woodbridge	34023 27041	0.440851	0.440851	100.00
25	Woodbridge	34023 28011	0.846441	0.846441	100.00
26	Woodbridge	34023 28012	0.173746	0.173746	100.00
27	Woodbridge	34023 28013	0.696039	0.695613	99.94
28	Woodbridge	34023 28021	0.329203	0.015990	4.86
29	Woodbridge	34023 28031	0.606630	0.606630	100.00
30	Woodbridge	34023 28032	0.066413	0.066413	100.00
31	Woodbridge	34023 28033	0.153317	0.153317	100.00
32	Woodbridge	34023 28034	0.235489	0.235489	100.00
33	Woodbridge	34023 28035	0.310057	0.195005	62.89
34	Woodbridge	34023 29011	0.168269	0.000001	0.00
35	Woodbridge	34023 34011	0.114087	0.089938	78.83
36	Woodbridge	34023 34012	0.275517	0.006283	2.28
37	Woodbridge	34023 34015	1.203843	0.618569	51.38
39	Elizabeth	34039 3011	2.666728	0.191023	7.16
40	Elizabeth	34039 3019	2.764693	0.229243	8.29
41	Elizabeth	34039 3021	0.031820	0.031820	100.00
42	Elizabeth	34039 3022	0.063518	0.063518	100.00
43	Elizabeth	34039 3023	0.060668	0.060668	100.00
44	Elizabeth	34039 3031	0.908904	0.785669	86.44
45	Elizabeth	34039 3032	0.048137	0.048137	100.00
46	Elizabeth	34039 3033	0.046578	0.046578	100.00
47	Elizabeth	34039 3042	0.003960	0.003960	100.00
48	Elizabeth	34039 3043	0.032778	0.032778	100.00
49	Elizabeth	34039 3044	0.051660	0.051660	100.00
50	Elizabeth	34039 3045	0.062493	0.062493	100.00
51	Elizabeth	34039 3046	0.121323	0.121323	100.00
52	Elizabeth	34039 3051	0.029504	0.029504	100.00
53	Elizabeth	34039 3052	0.113219	0.113219	100.00

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[illegible]4	Elizabeth	34039 3053	0.171061	0.171061	100.00
[illegible]5	Elizabeth	34039 3054	0.054623	0.054623	100.00
56	Elizabeth	34039 3061	0.087651	0.087651	100.00
57	Elizabeth	34039 3062	0.060374	0.060374	100.00
58	Elizabeth	34039 3063	0.226943	0.226943	100.00
59	Elizabeth	34039 3064	0.394502	0.394502	100.00
60	Elizabeth	34039 3071	0.049056	0.049056	100.00
61	Elizabeth	34039 3072	0.082451	0.082451	100.00
62	Elizabeth	34039 3073	0.062644	0.062644	100.00
63	Elizabeth	34039 3074	0.033560	0.033560	100.00
64	Elizabeth	34039 3075	0.046338	0.046338	100.00
65	Elizabeth	34039 3076	0.057481	0.057481	100.00
66	Elizabeth	34039 3077	0.087245	0.087245	100.00
67	Elizabeth	34039 3091	0.064574	0.064574	100.00
68	Elizabeth	34039 3092	0.046310	0.046310	100.00
69	Elizabeth	34039 3093	0.066901	0.066901	100.00
70	Elizabeth	34039 3094	0.085731	0.085731	100.00
71	Elizabeth	34039 3101	0.049429	0.049429	100.00
72	Elizabeth	34039 3102	0.057111	0.057111	100.00
73	Elizabeth	34039 3111	0.034380	0.034380	100.00
74	Elizabeth	34039 3112	0.043755	0.043755	100.00
75	Elizabeth	34039 3113	0.053276	0.053276	100.00
76	Elizabeth	34039 3114	0.037289	0.037289	100.00
77	Elizabeth	34039 3115	0.065655	0.065655	100.00
78	Elizabeth	34039 3121	0.031401	0.031401	100.00
79	Elizabeth	34039 3122	0.057738	0.057738	100.00
80	Elizabeth	34039 3123	0.065805	0.065805	100.00
81	Elizabeth	34039 3124	0.098606	0.039745	40.31
[illegible]2	Elizabeth	34039 3125	0.073773	0.069692	94.47
[illegible]3	Elizabeth	34039 3201	0.082501	0.014885	18.04
84	Elizabeth	34039 3202	0.063055	0.057033	90.45
85	Elizabeth	34039 3203	0.060967	0.060967	100.00
86	Elizabeth	34039 3204	0.033195	0.033195	100.00
87	Elizabeth	34039 3205	0.061605	0.061605	100.00
88	Elizabeth	34039 3206	0.055597	0.055597	100.00
89	Elizabeth	34039 3207	0.048550	0.048550	100.00
90	Elizabeth	34039 3208	0.034295	0.034295	100.00
91	Roselle	34039 3401	0.090103	0.003525	3.91
92	Roselle	34039 3411	0.399451	0.389319	97.46
93	Roselle	34039 3412	0.049956	0.034055	68.17
94	Roselle	34039 3413	0.067058	0.039414	58.78
95	Roselle	34039 3414	0.088979	0.006759	7.60
96	Roselle	34039 3421	0.164211	0.023468	14.29
97	Roselle	34039 3431	0.147938	0.132270	89.41
98	Roselle	34039 3432	0.198943	0.149989	75.39
99	Roselle	34039 3441	0.067069	0.067069	100.00
100	Roselle	34039 3442	0.065261	0.065261	100.00
101	Roselle	34039 3443	0.058254	0.058254	100.00
102	Roselle	34039 3444	0.153217	0.153217	100.00
103	Roselle	34039 3445	0.108619	0.098666	90.84
104	Linden	34039 3451	0.049641	0.049641	100.00
105	Linden	34039 3452	0.049977	0.049977	100.00
106	Linden	34039 3453	0.044636	0.044636	100.00
107	Linden	34039 3454	0.064081	0.064081	100.00
108	Linden	34039 3455	0.027473	0.027473	100.00
109	Linden	34039 3456	0.068257	0.068257	100.00
[illegible]0	Linden	34039 3457	0.043033	0.043033	100.00
[illegible]1	Linden	34039 3458	0.024531	0.024531	100.00
112	Linden	34039 3461	0.074766	0.074766	100.00
113	Linden	34039 3462	0.057037	0.057037	100.00

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114	Linden	34039 3463	0.086394	0.086394	100.00
115	Linden	34039 3464	0.081715	0.081715	100.00
116	Linden	34039 3471	0.050346	0.050346	100.00
117	Linden	34039 3472	0.105402	0.105402	100.00
118	Linden	34039 3473	0.085026	0.085026	100.00
119	Linden	34039 3474	0.058531	0.058531	100.00
120	Linden	34039 3482	0.094839	0.005868	6.19
121	Linden	34039 3483	0.071189	0.071189	100.00
122	Linden	34039 3484	0.097730	0.089374	91.45
123	Linden	34039 3491	0.088662	0.088662	100.00
124	Linden	34039 3492	0.080917	0.080917	100.00
125	Linden	34039 3493	0.060538	0.060538	100.00
126	Linden	34039 3494	0.073913	0.073913	100.00
127	Linden	34039 3495	0.084446	0.084446	100.00
128	Linden	34039 3496	0.118963	0.075686	63.62
129	Linden	34039 3497	0.056543	0.016124	28.52
130	Linden	34039 3498	0.066867	0.066160	98.94
131	Linden	34039 3501	0.083416	0.083416	100.00
132	Linden	34039 3502	0.077366	0.077366	100.00
133	Linden	34039 3503	0.350396	0.350396	100.00
134	Linden	34039 3511	0.070138	0.070138	100.00
135	Linden	34039 3512	0.060843	0.060843	100.00
136	Linden	34039 3513	0.184399	0.184399	100.00
137	Linden	34039 3521	0.170746	0.170746	100.00
138	Linden	34039 3522	0.529567	0.529567	100.00
139	Linden	34039 3531	0.055104	0.055104	100.00
140	Linden	34039 3532	0.059872	0.059872	100.00
141	Linden	34039 3533	0.057938	0.057938	100.00
142	Linden	34039 3534	0.145441	0.145441	100.00
143	Linden	34039 3535	0.096886	0.096886	100.00
144	Linden	34039 3541	0.410977	0.410977	100.00
145	Linden	34039 3542	0.915320	0.915320	100.00
146	Linden	34039 3543	0.136758	0.136758	100.00
148	Rahway	34039 3551	0.047975	0.047975	100.00
149	Rahway	34039 3552	0.124180	0.124180	100.00
150	Rahway	34039 3553	0.068381	0.068381	100.00
151	Rahway	34039 3554	0.114201	0.114201	100.00
152	Rahway	34039 3555	0.101790	0.101790	100.00
153	Rahway	34039 3556	0.041996	0.041996	100.00
154	Rahway	34039 3557	0.096952	0.096952	100.00
155	Rahway	34039 3558	0.227511	0.081649	35.89
156	Rahway	34039 3571	0.097973	0.072512	74.01
157	Rahway	34039 3572	0.196347	0.093158	47.45
158	Rahway	34039 3573	0.113180	0.020796	18.37
159	Rahway	34039 3581	0.280788	0.280788	100.00
160	Rahway	34039 3582	0.343691	0.234149	68.13
161	Rahway	34039 3583	0.142542	0.071001	49.81
162	Rahway	34039 3591	0.114909	0.114909	100.00
163	Rahway	34039 3592	0.069629	0.069629	100.00
164	Rahway	34039 3593	0.105863	0.105862	100.00
165	Rahway	34039 3601	0.294947	0.294947	100.00
166	Rahway	34039 3602	0.132558	0.132558	100.00
167	Rahway	34039 3603	0.253918	0.253918	100.00
168	Rahway	34039 3604	0.123285	0.123285	100.00
169	Clark	34039 3621	0.449922	0.024643	5.48
170	Clark	34039 3628	0.143986	0.047531	33.01
171	Elizabeth	34039 308011	0.100358	0.046829	46.66
172	Elizabeth	34039 308012	0.025964	0.025964	100.00
173	Elizabeth	34039 308022	0.069984	0.069984	100.00
174	Elizabeth	34039 308023	0.060879	0.060879	100.00

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175	Elizabeth	34039 308024	0.102291	0.102291	100.00
176	Elizabeth	34039 319012	0.063080	0.057365	90.94
177	Elizabeth	34039 319022	0.033529	0.030574	91.19
178	Elizabeth	34039 319023	0.125870	0.125870	100.00
179	Elizabeth	34039 319024	0.148800	0.079886	53.69
180	Linden	34039 3549	5.761127	5.761127	100.00
	Totals:		38.709511	28.999186	

For Radius of 3 Mi., Circle Area = 28.274334

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
2	Carteret	34023 351	0.240205	0.240205	100.00
3	Carteret	34023 352	0.171103	0.171103	100.00
4	Carteret	34023 353	0.653666	0.653661	100.00
5	Carteret	34023 361	0.339609	0.339609	100.00
6	Carteret	34023 362	0.208102	0.208102	100.00
7	Carteret	34023 363	0.046229	0.046229	100.00
8	Carteret	34023 369	0.825569	0.825569	100.00
9	Carteret	34023 371	0.121400	0.121400	100.00
10	Carteret	34023 372	0.181518	0.181518	100.00
11	Carteret	34023 373	0.093079	0.093079	100.00
12	Carteret	34023 374	0.101343	0.101343	100.00
13	Carteret	34023 381	0.170832	0.170832	100.00
14	Carteret	34023 382	0.110213	0.110213	100.00
15	Carteret	34023 383	0.102889	0.102889	100.00
16	Carteret	34023 384	0.052778	0.052778	100.00
17	Carteret	34023 391	0.165729	0.165729	100.00
18	Carteret	34023 392	0.860196	0.598171	69.54
25	Woodbridge	34023 28011	0.846441	0.627117	74.09
26	Woodbridge	34023 28012	0.173746	0.000808	0.46
27	Woodbridge	34023 28013	0.696039	0.091077	13.08
29	Woodbridge	34023 28031	0.606630	0.212022	34.95
30	Woodbridge	34023 28032	0.066413	0.066413	100.00
31	Woodbridge	34023 28033	0.153317	0.080053	52.21
32	Woodbridge	34023 28034	0.235489	0.063293	26.88
50	Elizabeth	34039 3045	0.062493	0.000786	1.26
51	Elizabeth	34039 3046	0.121323	0.021462	17.69
52	Elizabeth	34039 3051	0.029504	0.000091	0.31
53	Elizabeth	34039 3052	0.113219	0.087959	77.69
54	Elizabeth	34039 3053	0.171061	0.171061	100.00
55	Elizabeth	34039 3054	0.054623	0.048488	88.77
56	Elizabeth	34039 3061	0.087651	0.087651	100.00
57	Elizabeth	34039 3062	0.060374	0.060374	100.00
58	Elizabeth	34039 3063	0.226943	0.226943	100.00
59	Elizabeth	34039 3064	0.394502	0.394502	100.00
61	Elizabeth	34039 3072	0.082451	0.009447	11.46
62	Elizabeth	34039 3073	0.062644	0.061983	98.95
63	Elizabeth	34039 3074	0.033560	0.032684	97.39
64	Elizabeth	34039 3075	0.046338	0.008658	18.69
67	Elizabeth	34039 3091	0.064574	0.008763	13.57
69	Elizabeth	34039 3093	0.066901	0.029422	43.98
70	Elizabeth	34039 3094	0.085731	0.078815	91.93
106	Linden	34039 3453	0.044636	0.015204	34.06
107	Linden	34039 3454	0.064081	0.027248	42.52
108	Linden	34039 3455	0.027473	0.001106	4.03

LCP Chemicals Inc.
Linden, NJ

2	Linden	34039 3461	0.074766	0.005023	6.72
113	Linden	34039 3462	0.057037	0.016305	28.59
115	Linden	34039 3464	0.081715	0.035056	42.90
116	Linden	34039 3471	0.050346	0.021355	42.42
117	Linden	34039 3472	0.105402	0.047194	44.78
131	Linden	34039 3501	0.083416	0.047838	57.35
132	Linden	34039 3502	0.077366	0.038645	49.95
133	Linden	34039 3503	0.350396	0.122633	35.00
134	Linden	34039 3511	0.070138	0.069832	99.56
135	Linden	34039 3512	0.060843	0.060843	100.00
136	Linden	34039 3513	0.184399	0.184399	100.00
137	Linden	34039 3521	0.170746	0.141836	83.07
138	Linden	34039 3522	0.529567	0.527541	99.62
139	Linden	34039 3531	0.055104	0.055104	100.00
140	Linden	34039 3532	0.059872	0.059872	100.00
141	Linden	34039 3533	0.057938	0.057938	100.00
142	Linden	34039 3534	0.145441	0.145441	100.00
143	Linden	34039 3535	0.096886	0.096886	100.00
144	Linden	34039 3541	0.410977	0.410977	100.00
145	Linden	34039 3542	0.915320	0.915320	100.00
146	Linden	34039 3543	0.136758	0.136758	100.00
159	Rahway	34039 3581	0.280788	0.140898	50.18
165	Rahway	34039 3601	0.294947	0.199995	67.81
166	Rahway	34039 3602	0.132558	0.132558	100.00
167	Rahway	34039 3603	0.253918	0.077700	30.60
168	Rahway	34039 3604	0.123285	0.015531	12.60
175	Elizabeth	34039 308024	0.102291	0.031924	31.21
180	Linden	34039 3549	5.761127	5.761127	100.00
=	==========	==========	==========	==========	======
	Totals:		19.845966	16.252388	

For Radius of 2 Mi., Circle Area = 12.566371

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
---	----------	----------	---------	--------	--------
2	Carteret	34023 351	0.240205	0.240205	100.00
3	Carteret	34023 352	0.171103	0.065339	38.19
4	Carteret	34023 353	0.653666	0.068790	10.52
5	Carteret	34023 361	0.339609	0.339609	100.00
6	Carteret	34023 362	0.208102	0.192500	92.50
7	Carteret	34023 363	0.046229	0.003658	7.91
8	Carteret	34023 369	0.825569	0.816709	98.93
9	Carteret	34023 371	0.121400	0.121400	100.00
10	Carteret	34023 372	0.181518	0.164098	90.40
11	Carteret	34023 373	0.093079	0.030065	32.30
12	Carteret	34023 374	0.101343	0.004192	4.14
17	Carteret	34023 391	0.165729	0.011370	6.86
18	Carteret	34023 392	0.860196	0.000118	0.01
59	Elizabeth	34039 3064	0.394502	0.046649	11.82
140	Linden	34039 3532	0.059872	0.050203	83.85
141	Linden	34039 3533	0.057938	0.057938	100.00
142	Linden	34039 3534	0.145441	0.032713	22.49
145	Linden	34039 3542	0.915320	0.854828	93.39
146	Linden	34039 3543	0.136758	0.136758	100.00
180	Linden	34039 3549	5.761127	4.169000	72.36
===	==========	==========	==========	==========	======
	Totals:		11.478705	7.406142	

100201

LCP Chemicals Inc.
Linden, NJ

For Radius of 1 Mi., Circle Area = 3.141593

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
8	Carteret	34023 369	0.825569	0.147148	17.82
145	Linden	34039 3542	0.915320	0.086177	9.41
146	Linden	34039 3543	0.136758	0.059911	43.81
180	Linden	34039 3549	5.761127	2.848357	49.44
	Totals:		7.638774	3.141593	

or Radius of .5 Mi., Circle Area = 0.785398

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
180	Linden	34039 3549	5.761127	0.785398	13.63
	Totals:		5.761127	0.785398	

Radius of .25 Mi., Circle Area = 0.196350

No.	City	Block Group ID	Total Area	Partial Area	% Within Radius
180	Linden	34039 3549	5.761127	0.196350	3.41
	Totals:		5.761127	0.196350	

LCP Chemicals Inc.
Linden, NJ

========== Site Data ==========

Population:	151659.20
Households:	56438.78
Drilled Wells:	87.90
Dug Wells:	0.00
Other Water Sources:	25.00

========== Partial (RING) data ==========

---- Within Ring: 4 Mile(s) and 3 Mile(s) ----

Population:	103623.95
Households:	38182.38
Drilled Wells:	66.32
Dug Wells:	0.00
Other Wells:	15.08

** Population On Private Wells: 179.98

---- Within Ring: 3 Mile(s) and 2 Mile(s) ----

Population:	36650.00
Households:	13890.28
Drilled Wells:	21.58
Dug Wells:	0.00
Other Wells:	9.92

** Population On Private Wells: 56.95

---- Within Ring: 2 Mile(s) and 1 Mile(s) ----

Population:	10829.13
Households:	4147.18
Drilled Wells:	0.00
Dug Wells:	0.00
Other Wells:	0.00

** Population On Private Wells: 0.00

---- Within Ring: 1 Mile(s) and .5 Mile(s) ----

Population:	505.68
Households:	199.46
Drilled Wells:	0.00
Dug Wells:	0.00
Other Wells:	0.00

** Population On Private Wells: 0.00

LCP Chemicals Inc.
Linden, NJ

---- Within Ring: .5 Mile(s) and .25 Mile(s) ----

Population:	37.83
Households:	14.62
Drilled Wells:	0.00
Dug Wells:	0.00
Other Wells:	0.00

** Population On Private Wells: 0.00

---- Within Ring: .25 Mile(s) and 0 Mile(s) ----

Population:	12.61
Households:	4.87
Drilled Wells:	0.00
Dug Wells:	0.00
Other Wells:	0.00

** Population On Private Wells: 0.00

** Total Population On Private Wells: 236.93

REFERENCE NO. 8

MALCOLM PIRNIE, INC. **PROJECT NOTES**

To: File	**Date:** December 21, 1994
From: Jin Ho Jang	**Project #:** 8003-431
Subject: 4-mile Wetlands Acreage	**Site Name:** LCP Chemical

Wetlands acreage estimation within four miles of the LCP Chemical Site was accomplished using US Department of Interior National Wetlands Inventory Maps (Ref. No. 3). The calculated results is shown in the table below.

Ring (miles)	Wetland Acres
0 - ¼	5
¼ - ½	1
½ - 1	217
1 - 2	462
2 - 3	506
3 - 4	351
TOTAL WETLAND ACREAGE WITHIN 4 MILES:	1,542

REFERENCE NO. 9

federal register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
Hazard Ranking System; Final Rule

TABLE 3-6.—HYDRAULIC CONDUCTIVITY OF GEOLOGIC MATERIALS

Type of material	Assigned hydraulic conductivity [a] (cm/sec)
Clay: low permeability till (compact unfractured till); shale: unfractured metamorphic and igneous rocks	10^{-8}
Silt: loesses: silty clays; sediments that are predominantly silts; moderately permeable till (fine-grained, unconsolidated till, or compact till with some fractures); low permeability limestones and dolomites (no karst); low permeability sandstone; low permeability fractured igneous and metamorphic rocks	10^{-6}
Sands: sandy silts; sediments that are predominantly sand; highly permeable till (coarse-grained, unconsolidated or compact and highly fractured); peat; moderately permeable limestones and dolomites (no karst); moderately permeable sandstone; moderately permeable fractured igneous and metamorphic rocks	10^{-4}
Gravel: clean sand; highly permeable fractured igneous and metamorphic rocks; permeable basalt; karst limestones and dolomites	10^{-2}

[a] Do not round to nearest integer.

TABLE 3-7.—TRAVEL TIME FACTOR VALUES [a]

Hydraulic conductivity (cm/sec)	Thickness of lowest hydraulic conductivity layer(s)[b] (feet)			
	Greater than 3 to 5	Greater than 5 to 100	Greater than 100 to 500	Greater than 500
Greater than or equal to 10^{-3}	35	35	35	25
Less than 10^{-3} to 10^{-5}	35	25	15	15
Less than 10^{-5} to 10^{-7}	15	15	5	5
Less than 10^{-7}	5	5	1	1

[a] If depth to aquifer is 10 feet or less or if, for the interval being evaluated, all layers that underlie a portion of the sources at the site are karst, assign a value of 35.

[b] Consider only layers at least 3 feet thick. Do not consider layers or portions of layers within the first 10 feet of the depth to the aquifer.

Determine travel time only at locations within 2 miles of the sources at the site, except: if observed ground water contamination attributable to sources at the site extends more than 2 miles beyond these sources, use any location within the limits of this observed ground water contamination when evaluating the travel time factor for any aquifer that does not have an observed release. If the necessary subsurface geologic information is available at multiple locations, evaluate the travel time factor at each location. Use the location having the highest travel time factor value to assign the factor value for the aquifer. Enter this value in Table 3-1.

3.1.2.5 *Calculation of potential to release factor value.* Sum the factor values for net precipitation, depth to aquifer, and travel time, and multiply this sum by the factor value for containment. Assign this product as the potential to release factor value for the aquifer. Enter this value in Table 3-1.

3.1.3 *Calculation of likelihood of release factor category value.* If an observed release is established for an aquifer, assign the observed release factor value of 550 as the likelihood of release factor category value for that aquifer. Otherwise, assign the potential to release factor value for that aquifer as the likelihood of release value. Enter the value assigned in Table 3-1.

3.2 *Waste characteristics.* Evaluate the waste characteristics factor category for an aquifer based on two factors: toxicity/mobility and hazardous waste quantity. Evaluate only those hazardous substances available to migrate from the sources at the site to ground water. Such hazardous substances include:

- Hazardous substances that meet the criteria for an observed release to ground water.
- All hazardous substances associated with a source that has a ground water containment factor value greater than 0 (see sections 2.2.2, 2.2.3, and 3.1.2.1).

3.2.1 *Toxicity/mobility.* For each hazardous substance, assign a toxicity factor value, a mobility factor value, and a combined toxicity/mobility factor value as specified in the following sections. Select the toxicity/mobility factor value for the aquifer being evaluated as specified in section 3.2.1.3.

3.2.1.1 *Toxicity.* Assign a toxicity factor value to each hazardous substance as specified in Section 2.4.1.1.

3.2.1.2 *Mobility.* Assign a mobility factor value to each hazardous substance for the aquifer being evaluated as follows:

- For any hazardous substance that meets the criteria for an observed release by chemical analysis to one or more aquifers underlying the sources at the site, regardless of the aquifer being evaluated, assign a mobility factor value of 1.
- For any hazardous substance that does not meet the criteria for an observed release by chemical analysis to at least one of the aquifers, assign that hazardous substance a mobility factor value from Table 3-8 for the aquifer being evaluated, based on its water solubility and distribution coefficient (K_d).
- If the hazardous substance cannot be assigned a mobility factor value because data on its water solubility or distribution coefficient are not available, use other hazardous substances for which information is available in evaluating the pathway.

TABLE 3-8.—GROUND WATER MOBILITY FACTOR VALUES [a]

Water solubility (mg/l)	Distribution coefficient (K_d) (ml/g)			
	Karst [c]	≤ 10	> 10 to 1,000	> 1,000
Present as liquid [b]	1	1	0.01	0.0001
Greater than 100	1	1	0.01	0.0001
Greater than 1 to 100	0.2	0.2	0.002	2×10^{-6}
Greater than 0.01 to 1	0.002	0.002	2×10^{-6}	2×10^{-7}
Less than or equal to 0.01	2×10^{-6}	2×10^{-6}	2×10^{-7}	2×10^{-9}

[a] Do not round to nearest integer.
[b] Use if the hazardous substance is present or deposited as a liquid.
[c] Use if the entire interval from the source to the aquifer being evaluated is karst.

REFERENCE NO. 10

100211

(C SI)

DEP-081
6/89

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

910701

CASE TRANSFER REPORT

The following case is being considered for possible reassignment of lead. See Instructions on back.

ORIGINATING PROGRAM REPORT

1. Bureau/Division: Division of Water Resources / Bureau of Ground Water Pollution Abatement — Name of Person Reporting: David Van Eck — Tele # 609-292-8427

2. SITE INFORMATION

A. Name of Site: LCP Chemicals

Operator: ____ Owner: ____

AKA(s): ____ EPA ID #: NJD 079303020

Address: Foot of South Wood Avenue — Case ID #: ____

Municipality: Linden — Lot: ____ Block: ____ County: Union

Type of Business or Operation: ____ SIC Code: ____ Approx. Acreage: 26

B. Environmental Concerns (Check as many as apply, include number of units)

Asbestos		Dumpster		Surface Spill	✓	UST (Reg.)	
AGST	✓	Floor Drain		Roof Drain		UST (Nonreg.)	
Bldg. Decont.		Lagoon	✓ (2)	Tank Farm		Waste Pile	
Discharge		Seepage Pit		Transformer		Unknown	
Drum Storage	✓	Septic System		MVA			
Monitoring Well(s)	✓	Potable Well(s)		Other (specify)			

If "B" is checked, complete and attach Form DEP-081A on contaminants or to detail other comments.

3. Case Level Determination: C-3 (A-D) A. Provide Priority Score (if available) 31.2 Ranking System Used: SIN

B. Was an RP Search Done? No (Yes/No) C. Project Activity Code Used ____

4. Other NJDEP Programs Involved in this Case are: Metro Bureau of Regional Enforcement, Haz. Waste Engineering

5. Were Local Officials notified? ☒ Yes ☐ No Date ____ Organization: Health office

ORIGINATING PROGRAM APPROVALS

David Van Eck 6/26/91 — Inspector/Date

Tracy Wagner 6/27/91 — Section Chief/Date

[illegible] 6/27/91 — Bureau Chief/Date

SITE ASSESSMENT GROUP REVIEW

1. Case Received: (Date) 7/1/91 Project Activity Code: ____

Assigned to: A. Cyr (Date) 7/16/91

2. Reviewer's Evaluation

A. Case Level Determination D (A-D) Public ____ Private ✓ Transfer Sequence # 2

Reason for Determination: Groundwater + Soil Contamination Known/multiple sources.

RECEIVING PROGRAM DESIGNATIONS

RCRA SITE

Per the Case Management Strategy, this case is being:

(1) Transferred to: DHWM - Bureau of Federal Case Management as the Lead Program

Contact: ~~Bruce Venner~~ Collen Hart Tele # 609-633-1455

(2) Referred to:

Bureau ____ Name ____ Action Required ____

Bureau ____ Name ____ Action Required ____

Bureau ____ Name ____ Action Required ____

SITE ASSESSMENT APPROVALS

[illegible] 7/23/91 — Reviewer/Date

[illegible] 7/24/91 — Section Chief/Date

[illegible] 7/26/91 — Bureau Chief/Date

COPIES: White - Receiving Program Green - Originating Program Yellow - Tracking

DEP-081 A
6/89

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

SUPPLEMENTAL CASE TRANSFER REPORT

KNOWN OR POTENTIAL SOURCES OF RELEASE

LOCATION OF CONCERN AND MEDIA AFFECTED SWMU	POLLUTANTS		ACTIONS TAKEN
~~GROUND WATER~~ Brine sludge and Chem Fix lagoons	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: See Attached RFA NEXT STEP:
~~SURFACE WATER~~ Waste 0.1 Drum Storage Area	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: See Attached RFA NEXT STEP:
~~SOILS~~ Areas Between Bldg 231 and Railroad	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: See Attached RFA NEXT STEP:
~~AIR~~ 500 K Tank and surrounding Areas	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: See Attached RFA NEXT STEP:
~~OTHER~~ South Branch Creek	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: See Attached RFA NEXT STEP:

100212

DEP-081 A
6/89

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

SUPPLEMENTAL CASE TRANSFER REPORT

KNOWN OR POTENTIAL SOURCES OF RELEASE

LOCATION OF CONCERN AND MEDIA AFFECTED SWMU	POLLUTANTS		ACTIONS TAKEN
~~GROUND WATER~~ Billet Tanks	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: See Attached RFA NEXT STEP:
~~SURFACE WATER~~ Salt Silo 4	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: See Attached RFA NEXT STEP:
~~SOILS~~ Cracks in floor of Bldgs 230 and 240	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: See Attached RFA NEXT STEP:
~~AIR~~ Additional Areas noted during inspection on 7-19-90 VSI with David Van Ech (DWR) Mike Soinano (EPA)	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: NEXT STEP:
OTHER	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: NEXT STEP:

100213

INSTRUCTIONS:

Fill out this form following the example below:

LOCATION OF CONCERN AND MEDIA AFFECTED	POLLUTANTS		ACTIONS TAKEN
GROUND WATER Leaking underground storge tanks at Northeast corner of property	SAMPLING FINDINGS Fuel Oil	CONCENTRATION 200ppm ACTION LEVEL 100ppm	ACTIONS TAKEN: Tank removed by RP (9/88) Soils removed OUTCOME: NEXT STEP: Additional Ground-Water sampling needed
SURFACE WATER	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: NEXT STEP:
SOILS Leaking underground storage tanks at Northeast corner of property	SAMPLING FINDINGS Fuel Oil	CONCENTRATION 50 ppm ACTION LEVEL 100 ppm	ACTIONS TAKEN: Tank removed/stained soils excavated OUTCOME: Residual soils below action level NEXT STEP: None for soils
AIR	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: NEXT STEP:
OTHER Monitoring wells at septic system in southwest area of property	SAMPLING FINDINGS benzene toluene	CONCENTRATION 3ppb/gw 10ppb/gw ACTION LEVEL	ACTIONS TAKEN: Wells installed under NJPDES program (10/87) OUTCOME: Ongoing monitoring NEXT STEP: Continue monitoring

List source, location on property by media affected in the appropriate box. under the Pollutants heading list the contaminants or major category of contaminants (i.e. volatile organics) per the sampling findings in the left box and their concentration in the top box on the right. List the action level for the contaminant in the media affected. Describe actions taken AND INCLUDE THE ACTION DATE IN PARENTHESES in the column on the right as it pertains to the source identified. If no actions taken, please state same. If specific areas of concern are known, specify as well (ie: soils and groundwater require sampling). Any concerns involving potable wells or imminent health hazards should be documented on this form as well. If these exist write "IEC" in Red at the top of the form.

INSTRUCTIONS:

Fill out this form following the example below:

LOCATION OF CONCERN AND MEDIA AFFECTED	POLLUTANTS		ACTIONS TAKEN
GROUND WATER Leaking underground storge tanks at Northeast corner of property	SAMPLING FINDINGS Fuel Oil	CONCENTRATION 200ppm ACTION LEVEL 100ppm	ACTIONS TAKEN: Tank removed by RP (9/88) Soils removed OUTCOME: NEXT STEP: Additional Ground-Water sampling needed
SURFACE WATER	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: NEXT STEP:
SOILS Leaking underground storage tanks at Northeast corner of property	SAMPLING FINDINGS Fuel Oil	CONCENTRATION 50 ppm ACTION LEVEL 100 ppm	ACTIONS TAKEN: Tank removed/stained soils excavated OUTCOME: Residual soils below action level NEXT STEP: None for soils
AIR	SAMPLING FINDINGS	CONCENTRATION ACTION LEVEL	ACTIONS TAKEN: OUTCOME: NEXT STEP:
OTHER Monitoring wells at septic system in southwest area of property	SAMPLING FINDINGS benzene toluene	CONCENTRATION 3ppb/qw 10ppb/gw ACTION LEVEL	ACTIONS TAKEN: Wells installed under NJPDES program (10/87) OUTCOME: Ongoing monitoring NEXT STEP: Continue monitoring

List source, location on property by media affected in the appropriate box. under the Pollutants heading list the contaminants or major category of contaminants (i.e. volatile organics) per the sampling findings in the left box and their concentration in the top box on the right. List the action level for the contaminant in the media affected. Describe actions taken AND INCLUDE THE ACTION DATE IN PARENTHESES in the column on the right as it pertains to the source identified. If no actions taken, please state same. If specific areas of concern are known, specify as well (ie: soils and groundwater require sampling). Any concerns involving potable wells or imminent health hazards should be documented on this form as well. If these exist write "IEC" in Red at the top of the form.

Use of this Form:
Originating programs which desire to transfer a case that is no longer within their program's scope should use this form. To determine if a case requires transfer, refer to the Case Management Strategy, Remedial Process Component, available through the Bureau of Planning and Assessment or your program supervisor.

Refer to the Case Transfer SOP for transfer and handling procedures.

Instructions:
Press firmly with a ballpoint pen to ensure that all copies are legible.

2A. AKA(s)= "also known as": list alternate names of site if applicable. ID #: this should be the EPA ID number Case number: list the program case number if applicable.

2B: Check all items that apply and specify number of units
For example = "AGST3"

AGST	= above ground storage tank.
MVA	= motor vehicle accident.
UST (reg.)	= underground storage tanks regulated under N.J.A.C.7:14B-1 et.seg.
UST (non reg.)	= underground storage tanks not regulated by above citation
Bldg. Decont	= building decontamination.

If any items are checked, complete and attach the Supplemental Case Transfer Report (HWM-OIOA).

3. Assign remedial level (A-D) given site conditions (for detailed remedial level description refer to the Remedial Process Component of the Case Management Strategy).

3B: To answer yes, the RP (responsible party) search must conform to the Bureau of Compliance and Technical Services S.O.P. and be documented in the case file.

4: List all other NJDEP programs currently involved in the case, ie. NJPDES or RCRA permits, air permits, etc.

Originating Program Approvals: Signature of the inspector and the date is required. Section and bureau chiefs may initial signifying their approval for transfer. After the bureau chief has approved, the originating program sends the completed form to the Bureau of Planning and Assessment, Division of Hazardous Waste Management, 401 East State St, 5th floor. This should also be logged out by your program.

LCP CHEMICALS
FOOT OF SOUTH WOOD AVENUE
LINDEN, UNION COUNTY, NJ
EPA ID# NJD079303020

I. FACILITY OWNERSHIP/BACKGROUND INFORMATION

OWNERSHIP:
LCP Chemicals purchased the 26 acre chlorine production facility in 1972 from General Aniline and Film Corp. (GAF) who owned the facility since 1942. E.I. Dupont owned the land, which according to aerial photographs was coastal marshland, prior to GAF.

LCP leases two sections of their property. The Western section near the guard house, is leased by Union Carbide. They have been leasing the building and property since 1959 when the property was owned by GAF. The other leased section is Building 231. This building is leased by Microcell Technologies, Inc. They have leased the building since 1987. LCP also leased to Kuehne Chemical from 1974 to 1981, who operated in the area that is adjacent to Building 220 (presently a parking lot).

FACILITY OPERATIONS:
GAF began producing chlorine in 1961 by utilizing a "mercury cell electrolysis process". The process involved the electrolysis of a sodium chloride (brine) solution in the presence of metalic mercury. The residual mercury-sodium solution is then used to hydrolize water, forming sodium hydroxide and hydrogen gas. The metalic mercury was partially recovered and recycled in a brine purification process. The remaining mercury tainted sludge was placed into the Brine Sludge Lagoon. When LCP purchased the property they continued to process chlorine using the same process method with a few minor modifications. In 1975, LCP modified the electrolysis process by switching from a graphite anode to a dimensionally stable anode. The components of this anode would allow the leaching of the mercury so that the brine sludge could be recycled. Other products produced at LCP are caustic soda, hydrogen chloride and bleach. (Preliminary Report on Brine Sludge Lagoon).

In 1976, LCP investigated ways to clean the Brine Sludge Lagoon and remove mercury from the wastes that were being produced. They contracted Chem-fix of Pittsburgh to set up a temporary lab and to construct the Chem-fix Lagoon to receive non-contaminated wastes. They operated the lagoon for six days and determined that this was not a practicle means of clean-up and the lagoon was abandoned. LCP investigated the possibility of mercury recovery from the brine sludge via a roasting system in 1978. The roaster was designed and built to vaporize mercury from steam dried sludge. This would allow the solid waste to be shipped off site to a sanitary landfill. An Administrative Consent Order (ACO), issued September 1, 1981, required LCP to submit an application for a hazardous waste facility permit to operate the roaster unit. On June 30, 1982 the Bureau of Hazardous Waste Engineering denied the permit and LCP subsequently abandoned the process. Since the permit was not approved, LCP was also required to close the Brine Sludge Lagoon under the September 1, 1981 ACO.

Closure Plans for the two lagoons were submitted by February 1983 and approved on November 7, 1983. During the Closure of the lagoons, LCP closed down the production facilities in order to eliminate employee exposure to mercury. The closure of the lagoons was completed in 1984.

In June of 1984, LCP submitted a facility closure plan to NJDEP. This included the complete closure of all production areas due to economic reasons. The closure was completed in 1985. Since the closure of the production areas, LCP has operated as a storage and transfer station for methylene chloride, potassium hydroxide, sodium hydroxide and hydrochloric acid that is produced by other LCP facilities. The caustics and methylene chloride are stored in above ground tanks (five tanks, maximum volume 122,800 gallons). Hydrochloric Acid is pumped directly from tank cars to tank trucks.

Operations conducted by Union Carbide include the bottling, storing and transferring of hydrogen. They compress liquid hydrogen to hydrogen gas, bottle it and ship it to their clients. Occasionally they produce gas mixtures of hydrogen with either argon or nitrogen.

Union Carbide has had two environmental releases. One was an air release, which occurred on September 15, 1988 when a safety valve blew off a truck causing a release of hydrogen gas (60,000 cubic feet). The other was a series of oil releases that occurred over a period of several years. The soil contamination was reported by Union Carbide on October 14, 1987 to NJDEP's Division of Hazardous Waste, Metro Bureau of Enforcement. Union Carbide was issued a Notice of Violation (NOV) on December 1, 1987 for the discharge of a hazardous substance. They responded to the violation by contracting IT Corp to excavate the oil contaminated soil near their past waste oil storage area. The soil was excavated and backfilled to conform to the sites topography in May 1988.

Also in 1988, Union Carbide underwent a plant upgrading that was overseen by IT Corp. This included the dismantling of a hydrogen tank, cleaning and replacing of compressor parts and pipelines. A small amount of mercury was recovered from the area of the hydrogen tank by IT Corp.

Microcell Technologies Inc. is a pilot plant that produces small, hollow glass spheres that are used as a strengthener in steel. Microcell does not store, treat or process any hazardous substances. They have a completely closed cooling system so there is no requirement for a discharge permit. There is no evidence of environmental releases at this site.

Kuehne Chemical Company was contracted by LCP to handle the loading of LCP's products. Kuehne also manufactured sodium hypochlorite and chlorine gas. On January 8, 1981 an NJDEP inspector visited Kuehne and had noted a violation in their NPDES #NJ0027707 discharge to surface water permit. Kuehne's discharge had both high and low pH levels and elevated levels of free chlorine. On October 7, 1981 NJDEP Division of Water Resources issued an Administrative Penalty Assessment against Kuehne for $17,500.00. Kuehne ceased operations at the site on January 27, 1981.

LOCAL DEMOGRAPHICS:
LCP is located on 26 acres of filled marshland in the city of Linden, Union County, New Jersey. The property is located in an industrial area along the Arthur Kill. The site is bordered by the Kill (to the east), GAF Corp. (to the west and north) and Linden Roselle Sewage Authority and Northville Industries Corp. (to the south). Densely populated residential areas are located approximately 1.5 miles to the west with the nearest residential home being approximately 0.5 miles west on S. Wood Avenue. The estimated populations living within a one mile and a three mile radius of the site are 7 and 62,000 people, respectively.

TOPOGRAPHY/HYDROGEOLOGY:
According to aerial photographs there are three major topographic changes at the LCP site. Originally S. Branch Creek flowed through the LCP property to the Arthur Kill. Between 1974 and 1977 the creek was damned on both sides of the production area. This resulted in two small ponds on GAF's property. The creek presently flows from LCP's storage tanks to the Kill. The other two changes regard the Chem-fix Lagoon and the Brine Sludge Lagoon.

The Chem-fix Lagoon was constructed and operated in 1976. The Brine Sludge Lagoon was constructed by erecting earthen dikes to contain the sludge in the early 1960's. In 1984, the Chem-fix Lagoon was dewatered, excavated and back filled to conform with the site's topography and the Brine Sludge Lagoon was dewatered and capped closed. The 20 plus years of filling has caused the Brine Sludge Lagoon to be elevated approximately 40 feet above sea level.

LCP is underlain by the Brunswick Formation which consists mostly of organic clays, silt, sand, gravel and a shale bedrock. The first 10 to 15 feet below the surface of LCP is unconsolidated fill composed of silts, sands, gravel, crushed stone and brick. Beneath the fill is a dark gray organic clay layer that extends to the bedrock. Throughout the clay layer there are lenses of sand and gravel. Also between the fill and clay layers there are occasionally peat mats. The red-brown shale bedrock is encountered between 40 and 50 feet below the surface.

The groundwater in this area is not used as a potable water source due to the salt intrusion from nearby coastal waters. There are two public supply well fields within a four mile radius of LCP. One belongs to the Elizabethtown Water Company and is located approximately 3.5 miles northwest of LCP. The other well field is owned by the City of Rahway and located approximately 3.5 miles west of LCP. The wells range from 50 to 350 feet in depth and are all screened in the Brunswick Formation.

LCP monitors its groundwater under NJPDES permit (NJ0003778). The six monitoring wells currently maintained by LCP were installed along the perimeter of the Brine Sludge Lagoon in 1981. The following table lists the well numbers, total depth and screened interval.

WELL NO.	TOTAL DEPTH (feet)	SCREENED INTERVAL (feet)
MW1	38.50	18.00-38.50
MW1A	10.00	5.00-10.00
MW2	39.48	18.00-28.00
MW3	31.77	15.00-30.00
MW4	39.18	18.00-38.00
MW5	38.00	8.00-38.00

LCP currently monitors five of the six wells (not MW1A) to determine the impact of the Brine Sludge Lagoon on the groundwater. Past monitoring reports have indicated that groundwater quality criteria had been exceeded for iron, manganese, total organic halogens (TOX), arsenic, cadmium, chromium, lead, mercury, selenium, silver and radium. During RCRA Facility Assessment visual site inspections (VSI) conducted by NJDEP Bureau of Planning and Assessment on December 20, 1987 and April 13, 1989, the presence of volatile organic (VO) vapors were detected in headspace of Monitoring Wells 1, 2, 3, and 4. The wells are sampled quarterly for total organic carbon (TOC), TOX, phenols, dissolved metals and a few other inorganics.

LCP was required to install four new monitoring wells under their final NJPDES permit issued on October 30, 1987. LCP wished to contest the well installation and requested an adjudicator hearing on February 25, 1988. On March 28, 1988, Donald DeNoon and Karl DeVoe of LCP, Michael McEachern of Geraghty and Miller, LCP's hydrogeologic consultant, and representatives of the Division of Water Resources (DWR) met to discuss the installation of new wells and the adequacy of the present monitoring system.

The DWR had three concerns with the present monitoring system. They were:

- The well screens are not all the same length and the wells are not all the same depth.

- A release from the facility might be diluted to a concentration below the detection limits.

- A leak from the lagoon might be moving above the main groundwater system as "perched water" because of the natural glacial deposits beneath the lagoon are low in permeability (G & M proposal 5/10/88).

To address these concerns Geraghty and Miller proposed that the wells be monitored with the use of a temporary "packer" or plug that would isolate the top five feet of screen that is below the water table. The DWR agreed that the study should be conducted.

In July and August 1988 Geraghty and Miller collected groundwater samples and analyzed them for antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, thallium and pH. The samples collected on July 27, and August 30 were conduted with the use of a temporary packer and the August 29 sampling was conducted without the use of the temporary packer. MW1 and MW1A did

not utilize a packer during the July 27 and August 30 sampling. This is because MW1A is a shallow well and MW1 was filled with sediment isolating only the top four feet of screen below the water level. The analysis indicated that MW1A exceeded the New Jersey Groundwater Quality Standard of 50 ppb, for arsenic, with levels of 73 ppb, 76 ppb, and 96 ppb. All other parameters monitored were below New Jersey Groundwater Quality Standards (NJGWQS) for all samples from all wells.

A comparison of the analytical results for wells sampled with a packer (July 27) and without a packer (August 29 & 30) revealed no significant differences, except in MW2, which exhibited an increase in barium when the packer was utilized. The concentration without the packer was 390 ppb while the concentrations with the packer were 750 ppb and 670 ppb. All concentrations were below the NJGWQS limit of 1,000 ppb. Mercury was detected only in MW1A. The concentrations for all three sampling dates were nearly identical; 0.58 ppb, 0.57 ppb, and 0.58 ppb. Again all of the concentrations were below the NJGWQS limit of 2 ppb. Also, a trace amount (8 ppb) of lead was detected in MW3 on the July 27 sampling round. Lead was not detected in any of the other wells or during either of the August sampling episodes. The lead concentration was below the NJGWQS limit of 50 ppb.

These analyses lead Geraghty and Miller to conclude that since there was no significant differences, except for barium in MW2, that there is no dilution occurring in the deep wells. Also, based on data provided by LCP, it has been determined that LCP has never used arsenic, therefore, the presence of arsenic is due to an outside source of contamination. The relatively invariant contaminant concentrations and the proximity of the well to the Arthur Kill suggest that the mercury and arsenic detected in the well represent background conditions in the Arthur Kill rather than contamination resulting from the LCP facility. (G & M January 89 Sam Report).

As of April 1989, the DWR had not yet reached a decision as to whether LCP would be required to install the additional monitoring wells. They also are considering amending the permit to include an analysis of volatile organics based on the findings of the December 22, 1987 VSI.

SURFACE WATER:

The surface waters of concern are the Arthur Kill, which borders the site on the east, and South Branch Creek, which flows through a section of the site and is a tributary to the Arthur Kill. The Arthur Kill is classified as "Saline Estuarine Waters: SE2" by the DWR and is used for recreational boating. The Peregrine Falcon, an endangered species, is known to hunt in the salt marshes near the Kill.

LCP operates a waste water treatment plant. When the plant was in full operation the waste waters from the electrolysis and sludge roaster as well as the plant's surface water run-off were treated and discharge to South Branch Creek under NJPDES permit NJ0003778. However, since the shut down of the plant's processing units, only surface run-off is treated. After treatment, the water is stored in an above ground tank. Due to the small amount of treated water, LCP discharges about two times a year.

From May 23 to May 26, 1988, Cosper Environmental Services Inc. performed a bioassay on LCP's effluent. The effluent samples collected were clear with no noticeable odor. There was a small amount of sediment present. The test organism for the bioassay was the sheeps-head minnow. There was no detection of the disease in the brood stock. For this bioassay, there was a 5.0% mortality at 100% effluent. The results were satisfactory with a LC50 of >100% effluent.

II. PERMITS:

1. NJPDES: LCP was issued a surface water discharge permit NJ0003778 on August 10, 1987, which expires April 30, 1991. The permit allows LCP to discharge treated surface run-off and spill wash-down to South Branch Creek (classified SE-3).

   LCP was issued a groundwater discharge permit NJ0003778 on October 30, 1987, which expires November 29, 1992. The permit requires LCP to continue to monitor the wells surrounding the closed Brine Sludge Lagoon in order to determine the impact of the lagoon on the groundwater.

2. Air: Currently LCP has a grandfathered air pollution control permit #076565, which is for the vents on their methylene chloride storage tanks. Previously LCP had eight air permits for hydrogen chloride tanks and several chlorine process apparatus. Due to the closure of the production areas at LCP, these permits have been deleted.

3. LCP submitted their Part A RCRA application on August 13, 1980. Since the only RCRA regulated unit was certified closed in September 1985, a Part B application was considered unnecessary in lieu of a post closure permit.

III. SOLID WASTE MANAGEMENT UNITS:

Twelve solid waste management units were identified at the LCP facility. The units are: The Brine Sludge Lagoon, the Chem-fix Lagoon, the 500K Tank, the Waste Oil Drum Storage Area, Area Between Building 231 and Railroad Tracks, South Branch Creek, the Bullet Tanks, Sludge Roaster, Salt Silo 4, past GAF Waste Water Treatment Area, the cracks in Building 230 and 240, and the Effluent Treatment Building. The only RCRA regulated unit is the Brine Sludge Lagoon.

UNITS SUMMARY:

1. Brine Sludge Lagoon: The lagoon is an unlined earthen surface impoundment, which is surrounded by earth dikes that extend about seven feet higher than the facility's average ground level. The lagoon is trapezium in shape, approximately 275 feet by 200 feet by 220 feet by 80 feet. The total waste volume is estimated to be 30,900 cubic yards, which was accumulated for over 20 years before the lagoon was closed in 1984.

   Under an Administrative Consent Order dated September 1, 1981, LCP agreed to submit a closure plan to the NJDEP for the lagoon. LCP submitted the plan on July 16, 1982. The plan was amended on February 28, 1983 and approved by the NJDEP on November 7, 1983. The lagoon

received the excavated waste from the Chem-fix Lagoon, which was dewatered, compressed and covered with a two foot clay cap. The cap was then covered with a foot of soil and seeded. The closure was completed in November 1984. During the closure of the lagoon, NJDEP and USEPA required LCP to suspend chlorine productions to eliminate worker exposure to mercury.

In 1981, LCP installed six monitoring wells to determine if there was any impact on the groundwater from the lagoon. These wells are sampled quarterly for TOC, TOX, phenols, dissolved metals and a few other inorganics. On several occasions between 1982 and 1987 quarterly reports indicate that concentrations of lead, chromium, cadmium, mercury, selenium and silver have exceeded the NJPDES permitted level.

Under the July 31, 1981 NJDEP Administrative Consent Order, LCP was required to implement a monitoring program to evaluate the release of mercury and other metals to the ambient environment. The program includes air, groundwater and soils obtained from land borings and creek sediments. Geraghty and Miller were retained to conduct all sampling except air. Recon Systems was contracted to perform air sampling. (Attachment B).

Recon collected two sets of sampling data on June 4, 1981. The first set of samples was collected three feet above the surface of the waste pile. Concentrations of mercury ranged from 1000 to 5000 nanogram/cubic meter (ng/m^3) to 12,600 ng/m^3 of mercury with an average concentration of 6400 ng/m^3. Based on the mercury contamination levels, crosswind speed and the lagoons dimensions an approximately 113 g/day of mercury is emitted by the lagoon.

Groundwater samples were taken on October 6, 1981 and October 15, 1981 and analyzed by LCP's lab for dissolved mercury. All samples were below the USEPA Primary Interim Drinking Water Standard of 0.002 ppm. The water samples were also sent to Princeton Testing Labs to be analyzed for calcium, barium, iron and mercury. Again all wells had levels below 0.002 ppm for mercury. However, the levels of barium ranged from 2.0 ppm to 7.0 ppm which exceed the NJDEP Action/Cleanup Level of 1 ppm.

Soil samples were taken from the monitoring well borings for MW1, MW2, MW3, MW4, MW5. The samples were analyzed by LCP for desorbable mercury with samples taken every 6 inches from the surface to the total depth of each well. Levels of mercury ranged from 0.26 ppm to 772 ppm, with the concentrations decreasing with depth. Surface soil samples were also taken near the sludge roaster and across Avenue B near the railroad tracks. The samples were analyzed in the same manner as the previous samples and had recorded levels of mercury ranging from 27.45 ppm to 1,580 ppm. Also, one creek-bed sediment sample was taken and analyzed by LCP for mercury. The sample contained 46.42 ppm of mercury. All of the surface samples exceeded the NJDEP Action/Cleanup Level of 1 ppm for mercury.

On April 13, 1989 the Bureau of Planning and Assessment (BPA) conducted a RCRA Visual Site Inspection (VSI) of the LCP facility. The closed lagoon appeared secure. During the investigation of the

monitoring wells, volatile organics were detected in the headspace of the wells by both the OVA and Hnu meter with readings ranging from 2 ppm to 350 ppm. Also, on a previous VSI conducted by the BPA on December 22, 1987, organic vapors were detected in MW1 and MW2 with the Hnu meter. Due to the presence of organic vapors in the headspace of the wells, it is recommended that the NJPDES 30 year post closure monitoring program be expanded to include an initial scan for priority pollutants and volatile organics. Due to the presence of mercury contamination, a RFI is recommended for this unit to determine the extent of the contamination. The RFI should consist of soil sampling around the perimeter of the lagoon to determine if any hazardous materials have leached from the lagoon. The sample analysis should include, but not be limited to, total mercury, total barium, volatile organics and priority pollutants. If this sampling indicates significant levels of contamination exist, a more detailed RFI is recommended.

2. The Chem-fix Lagoon: The Chem-fix Lagoon was an earthen surface impoundment which was in operation for a few months in 1976. The lagoon dikes were constructed to a height of eight feet with an earthen core and crushed stone cover. Two 0.20 mil thick visquene plastic liners were installed in the lagoon which was also equipped with a perforated under drain system for leachate collection. Any leachate collected was pumped to the effluent treatment plant. The lagoon received approximately 460 cubic yards of treated brine sludge.

   The Chem-fix Lagoon was closed in 1983. The contents of lagoon were excavated and placed into the Brine Sludge Lagoon. It was then back filled, graded and seeded. The proximity of the Chem-fix Lagoon to the Brine Sludge Lagoon allows the NJPDES permitted wells to monitor any leachate releases to the groundwater from either lagoon. During the VSI an April 13, 1989, the lagoon appeared secure and there is no evidence of releases. Due to the proximity of this lagoon to the Brine Sludge Lagoon and the potential to have received mercury waste; a limited RFI is recommended. The RFI should consist of soil sampling to determine if hazardous wastes have leached from the lagoon. The sample analysis should be identical to the analysis of the Brine Sludge Lagoon.

3. The Waste Oil Drum Storage Area: The Container Storage Area is a 300 square foot concrete pad, one foot thick, with a six inch curb. During full plant operations up to 40 (55 gallon) drums of waste lubricating oils, transformer oils, degreasing solvents, and dewatered brine sludges could be stored there. These wastes were shipped off-site for proper disposal within 90 days.

   During the December 22, 1987 VSI, there were no drummed waste being stored, however the pad was covered with an absorbant material and oily residues were noted on the gravel in the surrounding area. During the April 13, 1989 VSI, stained soils were also noted. Using air monitoring equipment (Hnu and OVA), organic vapors were detected in the soil (10 ppm on the OVA and 6 ppm on the Hnu). It is recommended that a RFI be conducted on this unit to determine the extent of the release. The RFI should consist of soil sampling and the analysis should include, but not be limited to, petroleum hydrocarbons, volatile organics, total mercury and priority

pollutants. Based on the results of the soil sampling it may be required that the groundwater be monitored.

4. Area Between Building 231 and Railroad Track: In August 1980, NJDEP was contacted by a LCP employee. The employee stated that one day in 1973 or 1974, LCP used a steam shovel to take some of the brine sludge from the lagoon and spread it on the ground behind the compressor building (#231). In 1981, during the Geraghty and Miller sampling episode, two surface soil samples (S-3, S-4) were taken near this area. The samples were analyzed for desorbed mercury. The results were: S-3, 1070 ppm and S-4, 1580 ppm of mercury. These levels of mercury are the highest detected in any sampling conducted on the LCP site. These concentrations are 300 ppm greater than the soil samples near the Brine Sludge Lagoon. Due to the presence of mercury contamination, a RFI is recommended for this unit to determine the extent of the contamination. The RFI should consist of soil sampling which includes, but not be limited to, total mercury and priority pollutants. If the results of the soil sampling indicate significant contamination, further investigation will be necessary to determine the extent.

5. 500K Tank and Surrounding Areas: The 500,000 gallon tank is located between Avenue C and Avenue B. The tank has served two purposes. Originally the tank was used to store sodium hydroxide and later became incorporated with the effluent treatment system and was used as a storage tank for wastewater. Presently the tank is not used. The area surrounding the tank was paved in 1982.

   From 1980 to 1982, a series of NJDEP Hazardous Waste Enforcement inspections revealed several releases in the area of the 500K Tank. The releases in this area are:

9/17/80	Brine Sludge was observed on the gravel near the 500K "collection tank."
1/21/81	During the inspection a liquid was observed spewing from a cracked PVC pipe near the 500K Tank and pump pit.
10/22/81	A brine sludge slurry release from a transfer line was evidenced by a 1 by 15 foot spill area located on Avenue B between the pump pit and the Brine Sludge Lagoon. There was also a hydrochloric acid spill approximately 15 feet northwest of the 500K Tank.
4/13/82	Sodium sulfide crystals were evident on the gravel surface in the pump pit area.

   Due to documented releases, a limited RFI is recommended for this unit. The RFI should consist of soil sampling and the analysis should include, but not be limited to, total mercury, hydrochloric acid, sodium hydroxide, sodium sulfide, and priority pollutants. A more in-depth RFA may be required based on the results of the soil sampling.

6. South Branch Creek: South Branch Creek is a tidal arm of the Arthur Kill that flows along the eastern border of the LCP property. Since

1974, LCP has had three discharges to the creek. On or about October 30, 1972 and February 7, 1974, there was an overflow of supernatant in contact with brine muds from LCP's Brine Sludge Lagoon into South Branch Creek. LCP pled guilty to violation 3 USC 1311 (a) for both occurrences on September 25, 1975. A fine of $5,000 was levied for each occurrence. The third incident occurred on August 15, 1979. Due to a sodium chloride block in LCP's east saturator an excess of mercury tainted brine overflowed the saturator. The surge of flow exceeded the surge capacity of the wastewater system. This caused an estimate of 10,000 to 20,000 gallons of brine to flow into South Branch Creek. LCP notified NJDEP and the EPA samples taken by the Coast Guard revealed the mercury contamination of the spill was 8.6 ppm.

In 1981, a sediment sample was taken from the creek. The sample was analyzed by LCP's Labs for mercury. The mercury concentration was 46 ppm, which exceeds NJDEP action/clean-up level of 1 ppm. Due to past releases to the South Branch Creek a limited RFI is recommended for this unit. The RFI should consist of sediment sampling and surface water sampling both upstream and downstream of LCP's discharge (DSN 001). The sample analysis should include, but not be limited to, total mercury, barium and priority pollutants.

7. Bullet Tanks: These tanks have been abandoned since about 1983. The Bullet Tanks were used to store brine sludge. A series of NJDEP Hazardous Waste Enforcement inspections have revealed that there were continual problems with brine containment in the area under the tanks. From September 17, 1980 until April 13, 1982 the inspections stated that the containment area had brine residues. On October 9, 1980 and January 22, 1981 the area was full with the potential to overflow.

   Due to the potential for a release to exposed soils a limited RFI is recommended for this unit. The RFI should consist of soil samples around the bermed area of the abandoned Bullet Tanks. The sample analysis should include, but not be limited to, total mercury, acid-base extractables and priority pollutants. Based on the results of the soil sampling it may be required that an additional investigation be conducted.

8. The Sludge Roaster: The Sludge Roaster was constructed in 1978 to vaporize mercury from steam dried brine sludge. The roaster was built on a 16 x 40 foot concrete pad, one foot thick, with drain channnels, that connect to the effluent treatment plant, and a cinder block curb around the pad.

   Under an Administrative Order issued on September 1, 1981, LCP was required to submit an application for a Hazardous Waste Facility permit to operate the roaster unit. The permit was denied on June 30, 1982 by the Bureau of Hazardous Waste Engineering (BHWE) and LCP subsequently abandoned the process.

   An enforcement inspection by the Division of Environmental Quality, Air Pollution Control Program on November 5, 1981 disclosed a hole in a muffler plate on the sludge roaster. This allowed an excessive quantity of mercury vapors to be released to the atmosphere.

In 1985, the sludge roaster was dismantled and most of its components were shipped to other LCP facilities. No further action is necessary for the roaster unit, at this time.

9. Salt Silo 4: This silo was used to store the brine sludge prior to disposal in the lagoon. During the October 9, 1980 inspection brine sludge was observed on the ground around the silo. The silos were removed in 1985. A limited RFI is recommended on this unit due to the potential of releases to the soil. Soil sampling should be conducted and the analysis should include, but not be limited to, total mercury and priority pollutants. An additional investigation may be required based on the soil results.

10. The Effluent Building : This building was originally used as a brine filtering facility. LCP began wastewater treatment in this building around the time of the lagoon closures. The October 9, 1980 inspection indicates that there was brine caked on the floor near the filters. This was washed to the sump next to the 500K Tank and eventually treated. Because there are no documents of a hazardous release from this area, no further investigations are warranted at this time.

11. Past GAF Waste Water Treatment Area: From past GAF and LCP site maps it appears that the waste water treatment plant that was operated by GAF was located on the western side of building 220. It is believed that the plant was used primarily for pH neutralization from the 1950's to the early 1970's. The site presently is paved over and supporting a transformer substation. No further investigation is warranted at this time.

12. Cracks in the Floor of Building 230 and 240: The employee complaint also stated that because of Occupational Safety and Health Administrative visits LCP re-cemented the floors of Buildings 230 and 240 to cover cracks. According to the employee these cracks may have exposed soils that could have been contaminated with mercury. The employee felt that this was not investigated by LCP.

In 1976, OSHA inspected the buildings and did report openings in the floor and wall of these rooms. However, there was no indication of possible soil contamination with mercury.

OSHA also conducted a health survey in April 1985. This survey concluded that any workers in Buildings 230 and 240 are exposed to mercury and mercury vapors above the OSHA 8 hr-time weighted average permissible exposure limit. According to the Plant Manager, John Canonton, LCP still monitors for mercury vapors and worker exposure even though they no longer produce chlorine.

Due to the potential of soil exposure to mercury, a limited RFI is recommended for this unit. Soil sampling should be conducted and the analyses should include, but not be limited to, total mercury and priority pollutants.

ADDITIIONAL CONCERN:

The 1982 Waste Lagoon-Ground Water Monitoring Report submitted by Geraghty and Miller stated that a possible source for the mercury

contamination at LCP was due to contaminated fill. There are three conditions which suggest that this is not the case. The data presented in the report indicate that soil samples below the fill layer have levels of mercury exceeding 1 ppm, the NJDEP action level. Based on the history of the site, the soils at GAF and LCP should have a similar composition. However, soil sampling conducted at GAF by NJDEP Bureau of Planning and Assessment, in December 1988 (data not reviewed for QA/QC), indicated lower mercury levels than LCP. GAF had levels of mercury ranging from <0.1 ppm to 347.8 ppm (Ave 29.1 ppm) and the levels of mercury for LCP ranged from <0.1 ppm to 1,580 ppm (Ave. 102.4 ppm). The highest levels of mercury 1,070 ppm and 1,580 ppm are in the area of alledged surface dumping, it is likely that this is a probable cause of mercury contamination. It is suggested that if the recommended soil sampling yields mercury levels similar to those of 1982, LCP should submit a remedial plan to address the contaminated soil.

IV. RECOMMENDATIONS:

A. The following have been determined to have no further action:

1. Sludge Roaster
2. The Effluent Building
3. The Past GAF Waste Water Treatment Plant

B. Units requiring a limited RFI based on known or strongly suspected release of contaminants to the environment.

1. The Chem-fix Lagoon
2. The 500 K Tank
3. South Branch Creek
4. The Bullet Tanks
5. Salt Silo 4
6. Cracks in Building 230 and 240

C. Due to the presence of mercury contamination, a RFI is recommended for the following units.

1. Brine Sludge Lagoon
2. The Area Between Building 231 and the Railroad Tracks
3. The Waste Oil & Drum Storage

All actions taken by the USEPA should be integrated with previous and ongoing actions by NJDEP.

Submitted by:

Linda Goldsworthy, HSMS Trainee
NJDEP/DHWM/BPA

RFA HOURS: 230

NUS CORPORATION
A Halliburton Company

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
EXECUTIVE SUMMARY

LCP Chemicals	D079303020
Site Name	EPA Site ID Number
Linden, New Jersey	02-8403-54A
Address	TDD Number

SITE DESCRIPTION

LCP Chemicals, a division of LCP Chemicals and Plastics, Inc., operates a chlorine gas production facility at the foot of S. Wood Avenue in Linden, New Jersey. Chlorine gas is produced by the electrolysis of a sodium chloride brine. The process involved the use of a mercury cell for a period of several years during the 1970's. Sodium hydroxide (caustic soda) sludge, a biproduct of this process, was subsequently contaminated with mercury. The sludge was stored in a lagoon which was located between the production plant and S. Branch Creek to the east. LCP attempted to recover some of the mercury in an experimental chem-fix lagoon which was constructed at the edge of the main lagoon. The project was abandoned, and LCP changed their production procedures to eliminate the hazardous mercury component from the process.

In 1982 the US EPA ordered the LCP plant closed until the lagoon was secured and the hazard to plant workers was eliminated. LCP proposed to excavate the experimental lagoon and place the excavated material along with all mercury contaminated waste into the brine-sludge lagoon. The lagoon would subsequently be capped with an impermeable layer of clay. The proposal was accepted and closure procedures were completed during the fall of 1984.

The landfill covers an area of 62,500 square feet and rises to a point approximately 15 feet above S. Branch Creek, a tributary to the Arthur Kill River. LCP has installed five groundwater monitoring wells around the landfill. LCP samples these wells semi-annually and analyzes the samples for a list of 14 substances.

HAZARD RANKING SCORE: S_M - 13.1 S_{FE} - 18.89 S_{DC} - 20.83

Prepared by: J. S. Cattafe of NUS Corporation Date: 5/21/85

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
LCP Chemicals, Inc.	Foot of S. Wood Avenue

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Linden	NJ	07036	Union	039	15

09 COORDINATES — LATITUDE: 40°36'03"N — LONGITUDE: 074°12'32"W

10 TYPE OF OWNERSHIP (Check one): ☒ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION: 9 / 27 / 84 (MONTH DAY YEAR)

02 SITE STATUS: ☒ ACTIVE ☐ INACTIVE

03 YEARS OF OPERATION: 1900 (BEGINNING YEAR) | 1984 (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply): ☐ A. EPA ☒ B. EPA CONTRACTOR NUS Corp. (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ___ (Name of firm) ☐ E. STATE ☐ F. STATE CONTRACTOR ___ (Name of firm) ☐ G. OTHER ___ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
J.S. Cattafe	Hydrogeologist	NUS Corp.	(201) 225-6160

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
D. Farley	Hydrogeologist	NUS Corp.	(201) 225-6160
M. Nicholas	Hydrogeologist	NUS Corp.	(201) 225-6160
G. Burchette	Hydrogeologist	NUS Corp.	(201) 225-6160
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO.
Mark E. McLaughlin	Technical Supervisor	P.O. Box 484	(201) 862-1666
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	1000-1640 HRS.	Partly Cloudy, 70° - 75°F, Windy

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Mark Haulenbeek	U.S. EPA Region II	(201) 321-6685

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
J.S. Cattafe		NUS CORP.	201-225-6160	12 / 10 / 84 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [X] A. SOLID
- [ ] B. POWDER, FINES
- [X] C. SLUDGE
- [ ] D. OTHER _____ (Specify)
- [ ] E. SLURRY
- [ ] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____
CUBIC YARDS 30,900
NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- [X] A. TOXIC
- [X] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [X] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [ ] G. FLAMMABLE
- [ ] H. IGNITABLE
- [ ] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [X] K. REACTIVE
- [X] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	Unknown		Brine sludge
OLW	OILY WASTE			
SOL	SOLVENTS	Unknown		Possible spent degreasers
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS	Unknown		Unknown
BAS	BASES	Unknown		Caustics are a biproduct of the
MES	HEAVY METALS			process

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
BAS	Sodium hydroxide	1310-73-2	landfill	unknown	NA

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	Mercury	7439-97-6	FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Waste Quantity - NUS Files, LCP Chemicals-PA, Background & History

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EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER
NJ | D07930320

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 200,000
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The potential for groundwater contamination exists as the closed Brine Sludge Lagoon is not lined.

01 ☒ B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: Unknown
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists if the Brine Sludge Lagoon has not been properly closed, and leachate runs into S. Branch Creek. The creek flows into the Arthur Kill which is used for recreational purposes.

01 ☒ C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED: Unknown
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists via airborn dust, if the Chem-Fix lagoon was not completely excavated.

01 ☐ D. FIRE EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED: None
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No potential exists for fire or explosion caused by the closed Brine Sludge Lagoon.

01 ☒ E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED: 100
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The potential exist for worker exposure if the Brine Sludge Lagoon was not properly closed, or if the contents of the "Chem-Fix" lagoon were not completely removed. A fence surrounds the site with a security guard house to prevent the general public from entering onto the property.

01 ☒ F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: 1.5 Acres (Acres)
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists for soil contamination for the same reasons listed in section E Direct contact.

01 ☐ G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: None
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No potential exists for drinking water contamination. Linden receives its drinking water from reservoirs in CLinton, N.J. approximately 30 miles away.

01 ☒ H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED: <100
02 ☐ OBSERVED (DATE _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The closed Brine Sludge Lagoon is not within LCP's main compound, and approximately 100 feet from the main plant.

01 ☐ I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED: None
02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No potential exists for exposure to the general public. Site security includes a fence on three sides, S. Branch Creek on the fourth and a guard house at the front gate.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D79303020

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE. _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists for contamination of estuarine flora.

01 ☒ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE. _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

The potential exists for contamination of estuarine fauna.

01 ☒ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE. _____) — ☒ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists via surface water contamination.

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: _____) — ☐ POTENTIAL — ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: None — 04 NARRATIVE DESCRIPTION

No problems were observed on the Site Inspection 9/27/84. The facility appeared to be properly capped and graded. Rainwater runoff features and vegetation were being installed on that date.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE. _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No potential exists.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE. _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No potential exits.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE. _____) — ☐ POTENTIAL — ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The excavation of the "Chem-Fix lagoon and the closure of the Brine Sludge lagoon were both permitted and inspected by the NJDEPand the U.S. EPA.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

An oily leachate was observed near S. Branch Creek which appeared to be coming from a series of large tanks on the property just south of LCP chemicals.

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files. LCP Chemicals - Site Inspection and Preliminary Assessment
NJDEP Files.

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EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☒ A. SURFACE IMPOUNDMENT	30,900	Cubic Yards
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER (Specify)		

04 TREATMENT (Check all that apply)
- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER
- ☒ A. BUILDINGS ON SITE

06 AREA OF SITE
_____ (Acres)

07 COMMENTS

Contents of an experimental "Chem-Fix" lagoon were excavated and placed into the Brine-Sludge Lagoon and the lagoon was closed. A clay cap, drainage management features and vegetative cover were installed between 1982 and 1984.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☒ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC

Closure procedures for the 62,500 sq. ft. Brine Sludge Lagoon consisted of compaction and dewatering of all waste, a 2 ft. cap of compacted clay, and final cover of soil and vegetation. A rip-rap berm was installed to manage site drainage and inhibit erosion. The facility is approximately 12 ft. above the 100-year flood stage of the Arthur Kill River.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☐ YES ☒ NO

02 COMMENTS

Waste is securely closed in the Brine-Sludge Lagoon.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

NUS Reigon II Fit Files - LCP Chemicals, Site Inspection and Preliminary Assessment.
NJDEP Files.

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)	SURFACE	WELL	02 STATUS ENDANGERED	AFFECTED	MONITORED	03 DISTANCE TO SITE
COMMUNITY	A. ☒	B. ☐	A. ☐	B. ☐	C. ☒	A. 30 (mi)
NON-COMMUNITY	C. ☐	D. ☐	D. ☐	E. ☐	F. ☐	B. ____ (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☒ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 0

03 DISTANCE TO NEAREST DRINKING WATER WELL N/A (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
6 (ft)	To Arthur Kill	40-50 (ft)	626,400 (gpd)	☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including usage, depth, and location relative to population and buildings)

Five monitoring wells have been installed around the closed lagoon. Three wells are situated along So. Branch Creek to the east, one well lies northwest of the lagoon The wells are constructed of two-inch PVC riser pipe and steel outer casings with locking caps.

10 RECHARGE AREA		11 DISCHARGE AREA	
☐ YES ☒ NO	COMMENTS S. Branch Creek exhibits a 2-foot tidal influence which affects the local groundwater gradient during periods of high and low tide.	☒ YES ☐ NO	COMMENTS S. Branch Creek is a tidal creek and changes the local groundwater gradient at high and low tide stages.

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☒ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Arthur Kill River	☐	.1 (mi)
S. Branch Creek	☐	0 (mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 7 NO OF PERSONS	B. 20,011 NO OF PERSONS	C. 62,527 NO OF PERSONS

02 DISTANCE TO NEAREST POPULATION 1.5 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE 7178

04 DISTANCE TO NEAREST OFF-SITE BUILDING .2 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

The area surrounding the site within a 1.5 mile radius is completely industrialized. Chemical and Oil companies maintain plants or storage facilities over much of the area. The remaining land is undeveloped marsh on the flood plain adjacent to the Arthur Kill River. The New Jersey State Turnpike runs within 3/4 mile of the site. Immediately outside the 1.5 mile radius are residential and densely populated urban areas of West Carteret, Linden and Elizabeth.

EPA FORM 2070-13 (7-81)

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D09303020

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☒ B. $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☐ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☒ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
40-50 (ft)	Unknown (ft)	7

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLO
12 (in)	2.5 (in)	25 %	Flat-lying	0

09 FLOOD POTENTIAL

SITE IS IN 100 YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE	OTHER
A. 0 (mi)	B. 0 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

0 (mi)

ENDANGERED SPECIES: Peregrin Falcon

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AGRICULTURAL LANDS: AG LAND
A. 0 (mi)	B. 1.5 (mi)	C. >10 (mi)	D. >10 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The closed Brine Sludge Lagoon is situated east of the main plant. So. Branch Creek borders the landfill on the northern and eastern sides. An access road circles the landfill approximately seven feet above the high tide level of S. Branch Creek. The closed lagoon covers an area of 62,900 sq. feet and rises 12 to 15 feet above the creek. Five monitoring wells are located around the landfill. Three wells are situated along So. Branch Creek, a fourth is northwest of the landfill, and the fifth is southwest and across the access road. The surrounding topography is flat-lying and the Landfill rises at an angle of repose to a point approximately twelve feet above grade.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection, Preliminary Assessment.

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	3	organic - Rockwell Int, inorganic - JTC	
SURFACE WATER	2	organic - Rockwell Int, inorganic - JTC	
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL	2	organic and inorganic - JTC	
VEGETATION			
OTHER Sediment	2	organic and inorganic - JTC	

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
Mercury Detector	No levels above background were recorded (NUS Detector inoperable)
	LCP supplied identical model in working condition.
HCL Draeger Tube	The apparatus indicated that there was no HCl in the ambient
	air at the site on 9/27/84.

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☒ GROUND ☐ AERIAL

02 IN CUSTODY OF EPA - photo log attached to Site Inspection Report (Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS A sketch map was compiled at the Site Inspection and is attached to the Site Inspection Report.

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

A field logbook, including sampling team members, weather conditions, samples collected and a chronological list of events which took place during the site inspection. Field Notebook #1017 TDD #02-8403-54A

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection.

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POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
LCP Chemicals, Inc		LCP Chemicals and Plastics	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE
P.O. Box 484	2812		

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE
Linden	NJ	07036			

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER
GAF	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER
Dupont	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

IV. REALTY OWNER(S) (If applicable, list most recent first)

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sampling analysis, reports)

NUS Region II FIT Files - Site Inspection, Preliminary Assessment
Telephone conversation with Linden City Clerk's Office.

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II. CURRENT OPERATOR (Provide if different from owner) / **OPERATOR'S PARENT COMPANY** (If applicable)

01 NAME: LCP Chemicals	02 D+B NUMBER:	10 NAME: LCP Chemicals and Plastics	11 D+B NUMBER:
03 STREET ADDRESS (P.O. Box, RFD #, etc.): P.O. Box 484	04 SIC CODE: 2812	12 STREET ADDRESS (P.O. Box, RFD #, etc.):	13 SIC CODE:
05 CITY: Linden	06 STATE: NJ / 07 ZIP CODE: 07036	14 CITY:	15 STATE: / 16 ZIP CODE:
08 YEARS OF OPERATION: 1970- Present	09 NAME OF OWNER: LCP Chemicals		

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner) / **PREVIOUS OPERATORS' PARENT COMPANIES** (If applicable)

01 NAME: GAF	02 D+B NUMBER:	10 NAME:	11 D+B NUMBER:
03 STREET ADDRESS (P.O. Box, RFD #, etc.): Foot of S. Wood Avenue	04 SIC CODE:	12 STREET ADDRESS (P.O. Box, RFD #, etc.):	13 SIC CODE:
05 CITY: Linden	06 STATE: NJ / 07 ZIP CODE: 07036	14 CITY:	15 STATE: / 16 ZIP CODE:
08 YEARS OF OPERATION: 1942 - 1970	09 NAME OF OWNER DURING THIS PERIOD: GAF		
01 NAME: Dupont	02 D+B NUMBER:	10 NAME:	11 D+B NUMBER:
03 STREET ADDRESS (P.O. Box, RFD #, etc.):	04 SIC CODE:	12 STREET ADDRESS (P.O. Box, RFD #, etc.):	13 SIC CODE:
05 CITY:	06 STATE: / 07 ZIP CODE:	14 CITY:	15 STATE: / 16 ZIP CODE:
08 YEARS OF OPERATION: 1900 - 1942	09 NAME OF OWNER DURING THIS PERIOD: Dupont		
01 NAME:	02 D+B NUMBER:	10 NAME:	11 D+B NUMBER:
03 STREET ADDRESS (P.O. Box, RFD #, etc.):	04 SIC CODE:	12 STREET ADDRESS (P.O. Box, RFD #, etc.):	13 SIC CODE:
05 CITY:	06 STATE: / 07 ZIP CODE:	14 CITY:	15 STATE: / 16 ZIP CODE:
08 YEARS OF OPERATION:	09 NAME OF OWNER DURING THIS PERIOD:		

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection, Preliminary Assessment
Telephone conversation with Linden City Clerk's Office.

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EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
LCP Chemicals	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
P.O. Box 484	2812

05 CITY	06 STATE	07 ZIP CODE
Linden	NJ	07036

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection, Preliminary Assessment
Telephone conversation with Linden City Clerks Office.

100240

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☒ E. CONTAMINATED SOIL REMOVED — 02 DATE 9/9/83 — 03 AGENCY EPA, NJDEP
04 DESCRIPTION
The contents of an experimental "Chem-Fix" Lagoon were excavated and placed in the Brine Sludge Lagoon.

01 ☐ F. WASTE REPACKAGED — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☒ H. ON SITE BURIAL — 02 DATE 8/84 — 03 AGENCY ____
04 DESCRIPTION
The Brine Sludge Lagoon was dewatered, compacted and capped. Operations proceeded with EPA and DEP approval.

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☒ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE 1983 — 03 AGENCY NJDEP
04 DESCRIPTION
The DEP directed that the HCl tanks be diked.

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE ____ — 03 AGENCY ____
04 DESCRIPTION

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☒ S. CAPPING/COVERING — 02 DATE 10/84 — 03 AGENCY EPA NJDEP
04 DESCRIPTION
A 2 foot compacted clay cap with vegetative cover and drainage features was installed.

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☒ 1. ACCESS TO SITE RESTRICTED — 02 DATE 1982 - 1984 — 03 AGENCY EPA NJDEP
04 DESCRIPTION
Plant operations were shut down during closure of the Brine Sludge and Chem-Fix Lagoon.

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE 1982-1983 — 03 AGENCY _____
04 DESCRIPTION

Five monitoring wells were installed around the Brine Sludge and Chem-Fix Lagoons.

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection and Preliminary Assessment.
NJDEP Files

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY ENFORCEMENT ACTION ☒ YES ☐ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY ENFORCEMENT ACTION

Following shut down of plant activities in 1982, LCP has carried out all DEP and EPA directives including diking, and closure of the Chem-Fix and Brine Sludge Lagoons. LCP presently conducts a semi-annual sampling program and analyzes for an abbreviated list of substances. A xerox copy of this list is attached.

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Preliminary Assessment.
NJDEP Files.

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EPA FORM 2070-13 (7-81)

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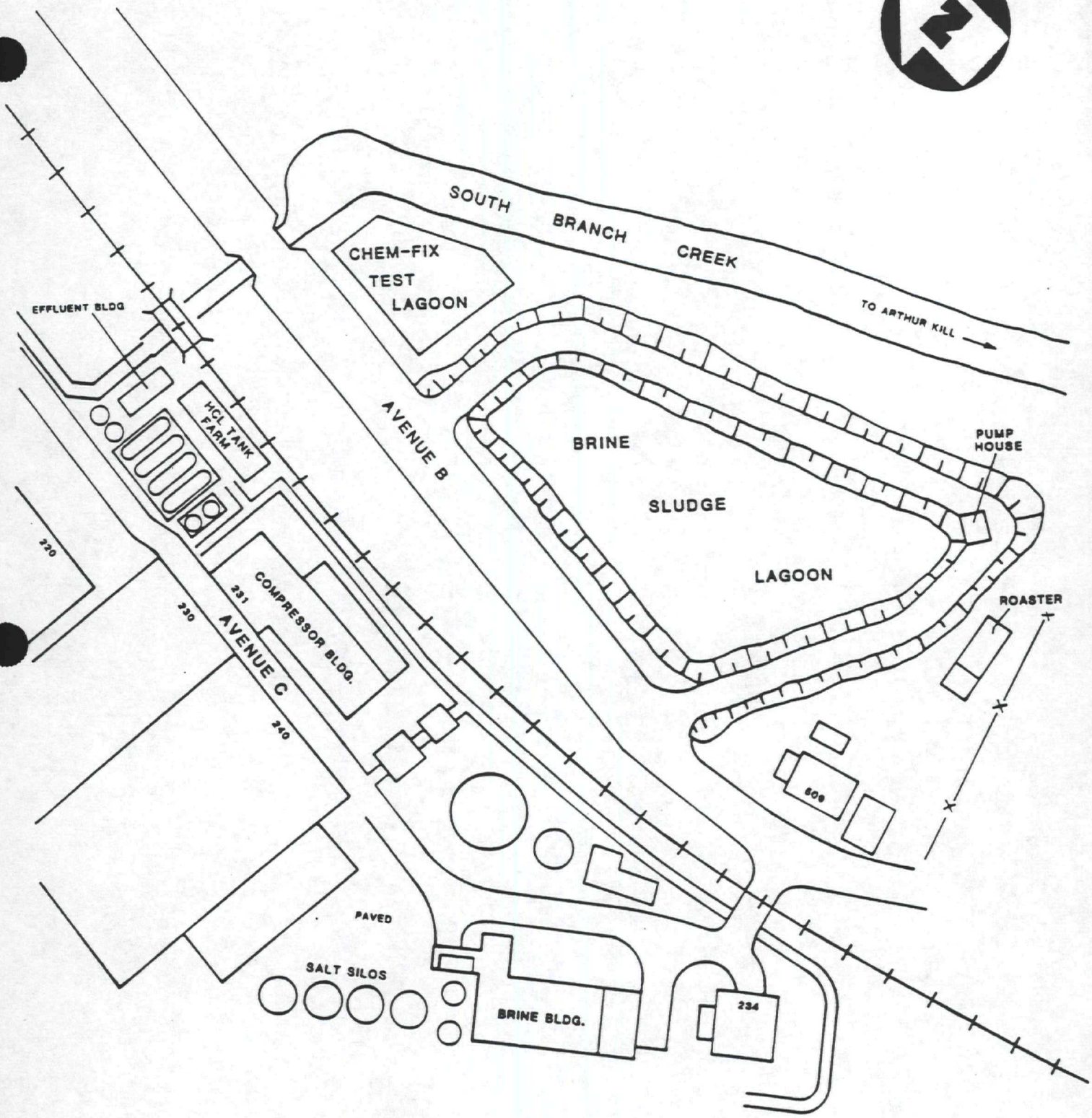


FIGURE A-2

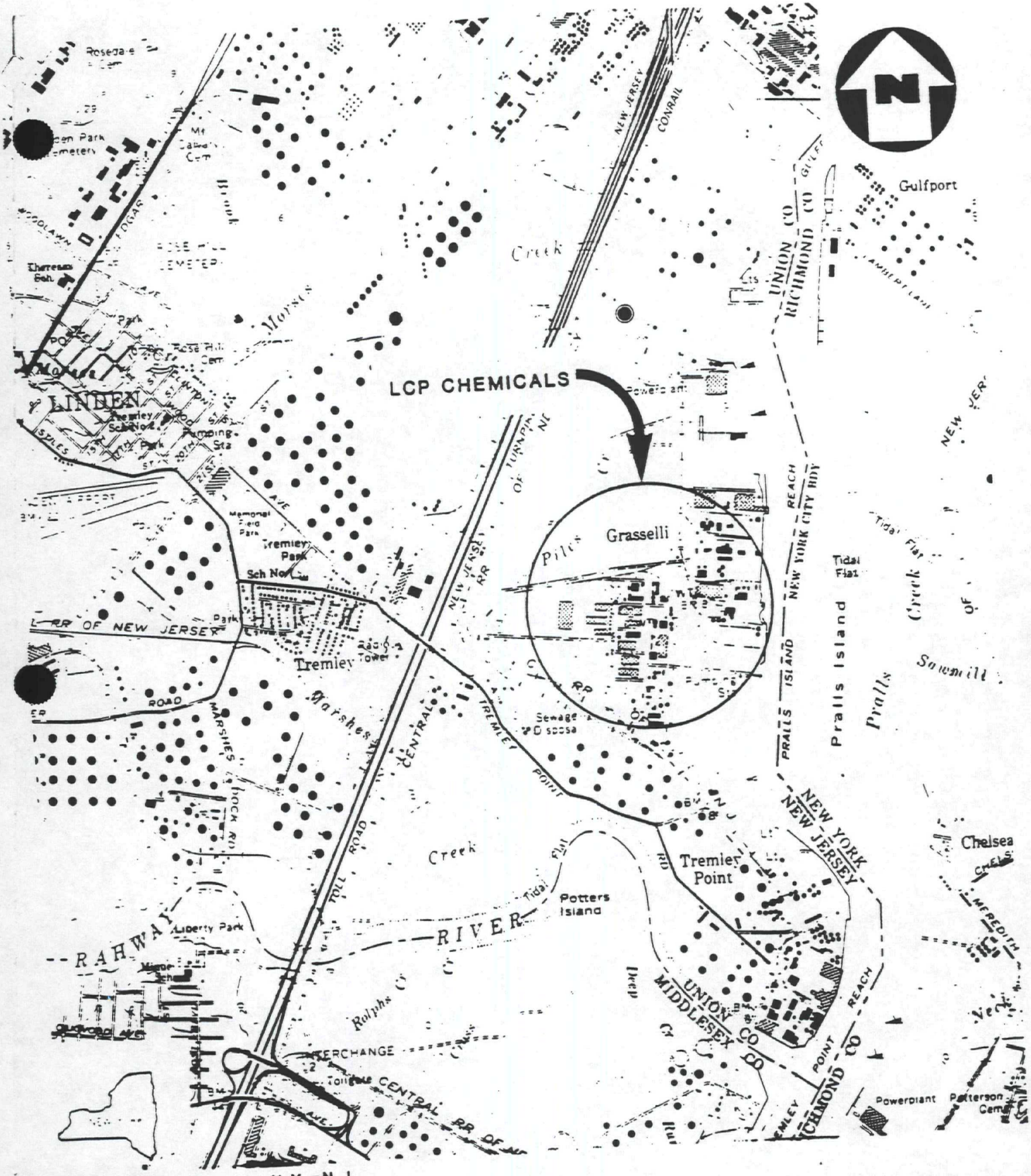
SITE MAP

LCP CHEMICALS SITE, LINDEN, N.J.

SCALE: 1" = APPROX. 100'

NUS CORPORATION

A Halliburton Company



(QUAD) ARTHUR KILL. N.Y.-N.J.

FIGURE A-1

SITE LOCATION MAP

LCP CHEMICALS SITE, LINDEN, N.J.

SCALE: 1" = 2000'

NUS CORPORATION

A Halliburton Company

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REFERENCE NO. 11

EVALUATION AND SITE INSPECTION OF
LCP CHEMICALS-NJ, INC.
LINDEN, NEW JERSEY

Prepared for:

U.S. Environmental Protection Agency
Region II
New York, New York

EPA Contract Number 68-01-6515

Work Assignment R02-002

Prepared by:

Ertec Atlantic, Inc.
15 Campus Drive, Suite 100
Somerset, New Jersey 08873

May 1982

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ATTACHMENT N

1.0 INTRODUCTION

This report provides the results of Ertec's evaluation of the ground-water monitoring program at LCP Chemicals-NJ, Inc., of Linden, New Jersey. The objective of the technical review and site inspection is to assess the facility's ground-water monitoring program for compliance with the requirements of Subpart F - Ground-Water Monitoring (40 CFR 265.90-265.94) - of the Resource Conservation and Recovery Act (RCRA).

The evaluation included a review of available ground-water and geologic information, pertinent site documents, data collected by consultants and facility personnel, analytical determinations and regulatory requirements. A site inspection was conducted in order to confirm certain aspects of the information accumulated and submitted to the U.S. Environmental Protection Agency (EPA) by LCP Chemicals-NJ, Inc., and to provide better insight into the hydrogeologic setting of the facility.

2.0 SUMMARY OF REVIEW COMMENTS

2.1 REGULATORY DEFICIENCIES

The monitoring system, sampling and analysis plan, and data supplied by LCP Chemicals, Inc. have been reviewed by Ertec for compliance with 40 CFR 265.90-265.94. The deficiencies in the ground-water monitoring program established at the site are summarized below.

- 265.92 — A sampling and analysis plan has not been developed to conform to RCRA requirements.
- 265.92(a) — Chain-of-custody control procedures are not included.
- 265.92(b) — Required parameters (listed on Table 1) have not been analyzed on a quarterly basis.
- 265.92(e) — Ground-water elevations are not measured prior to sample collection.
- 265.94(a)(1) — Records of ground-water surface elevations and analysis results are not kept due to non-compliance with 265.92(b) and 265.92(e).
- 265.94(a)(2) — Plans to submit an annual report to the Regiona Administrator have not been formulated.

2.2 TECHNICAL DEFICIENCIES

- The lateral extent of the clay layers beneath the waste management area has not been determined.

3.0 WORK ASSIGNMENT REVIEW

Review of the data submitted to the EPA and additional data compiled by LCP Chemicals-NJ, Inc., has found the facility to be in non-compliance with RCRA regulations, as promulgated in 40 CFR, Subpart F, 265.90-265.94.

3.1 COMPLIANCE WITH 40 CFR 265.90-265.94

The primary regulatory requirements under 40 CFR 265.90-265.94 call for establishment of a ground-water monitoring system (265.91), the development of a sampling and analysis plan (265.92) and proper record keeping and reporting procedures (265.94).

3.1.1 Ground-Water Monitoring System

A ground-water monitoring system, in accordance with 265.91(c), has been established. Well sites, selected following completion of a hydrogeologic study by Geraghty & Miller, are found at the limit of the waste-management area. The ground-water monitoring system is composed of two wells hydraulically upgradient, and four wells hydraulically down-gradient, from the waste-management area.

Well construction data furnished in the Geraghty & Miller report and well logs reflect compliance with 265.91(c). The well casing and screens are made of PVC pipe. The screens are sand-packed and have 0.020-inch slots, capable of preventing significant infilling of the well. Bentonite was used to seal the bore hole above and below the screened interval. Well development was performed by bailing.

3.1.2 Sampling and Analysis Plan

A sampling and analysis plan, as required by 265.92, has not been developed. The company's ground-water sampling and analysis plan, included in a report compiled in accordance with the New Jersey Department

of Environmental Protection's (NJDEP) requirement for a NJPDES permit, includes sample collection, preservation and analysis procedures, as required by 265.92(a)(1-3).

As of the site inspection, 11 February 1982, the last ground-water samples were taken in December 1981. Analysis of the ground water was completed for four parameters: calcium, barium, iron and mercury. Samples will be taken on a quarterly basis.

Prior to sample collection, each well is bailed dry and allowed to recover sufficiently to yield the required sample volume. Samples are obtained with a peristaltic pump. All tubing on the peristaltic pump is replaced between samplings to prevent cross-contamination. Ground-water samples are adequately handled and stored prior to analysis by Princeton Testing Laboratories.

3.1.3 Record Keeping and Reporting

Record keeping and reporting requirements, as outlined in 265.94, have not been adhered to. Records are kept of the ground-water analyses.

3.2 GROUND-WATER MONITORING DEFICIENCIES

Review of the available information has found deficiencies in ground-water monitoring, which reflect non-compliance with 40 CFR 265.92 and 265.94.

3.2.1 Sampling and Analysis Plan

A sampling and analysis plan, as required under 265.92, has not been developed. Non-compliance with RCRA regulations results from the following deficiencies:

- Chain-of-custody control procedures, as required under 265.92(a), are not included in the sampling and analysis plan.

- Failure to determine the parameters listed in Table 1 on a quarterly basis in accordance with 265.92(b).

- Failure to measure ground-water surface elevations at each monitoring well prior to sampling [265.92(e)].

3.2.2 Record Keeping and Reporting

The following deficiencies were found in record keeping and reporting procedures, as promulgated in 265.94:

- Since ground-water surface elevations were not determined, this data could not be recorded, nor evaluated, and submitted as part of the annual report.

- Since analysis for parameters affecting the suitability of ground water for drinking was not undertaken, with the exception of barium and mercury, such information was not submitted to the EPA.

- Plans to submit an annual report, including a listing of parameters indicative of ground-water contamination, to the EPA have not been made.

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TABLE 1

DEFICIENT PARAMETERS

EPA Interim Drinking Water Standards

As	F	2, 4, D
Cd	Pb	2, 4, 5-TP Silvex
Lindane	Nitrate (as N)	Radium
Methoxychlor	Se	Gross alpha
Toxaphene	Ag	Coliform bacteria
Cr	Endrin	

Parameters Establishing Ground-Water Quality

Chloride	Phenols	Sulfate
Mn	Na	

Parameters Used as Indicators of Ground-Water Contamination

pH	TOC
Specific conductance	TOX

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4.0 TECHNICAL REVIEW

A ground-water monitoring system, in compliance with 265.91(a), has been established at the facility. Hydrogeologic and geologic studies conducted in the site area provide a sufficient amount of information to enable proper characterization of the site hydrology and proper implacement of the monitoring wells. Interpretation of the hydrology is compounded by tidal influence and the high clay content of the sediment.

Study of the geology by Geraghty & Miller shows that the surficial deposits are Holocene and Pleistocene glacial deposits, ranging in thickness from 42.3 to 48.5 feet, primarily composed of clay and silt with localized lenses of sand and gravel. The Brunswick Formation, composed of interbedded shales and siltstones with local beds of fine-grained sandstone, underlies the glacial mantle.

The surficial deposits have been subdivided into four units, A-D. A generalized description of these units is as follows:

A - Miscellaneous fill

B - Dark gray, organic clay

C - Well-sorted sands, intercolated with poorly-sorted gravelly sands

D - Red-brown, silty clay, clay and gravelly clay

The ground-water flow regime in the site area is governed by South Branch Creek, located approximately 100 feet to the northwest. Water from the Creek is conducted in response to the tidal fluctuations of the Arthur Kill, into which it empties.

The sediment's high clay content and probable inherent low permeability may be conducive to a slow rate of contaminant migration, should materials migrate from the lagoons. The permeability of these materials is presented in the consultant's report in a somewhat confusing manner, which detracts from the value of this information. Sorption of

contaminants by the clays may also diminish the potential hazard of leakage.

The waste-management area contains two components: a sludge pit in part surrounded by a brine lagoon, and a chemfix process lagoon. The sludge pile, which has accumulated for 20 to 25 years, mainly consists of salt which has been processed with mercury to remove calcium. LCP staff are not certain if the piles are built upon impervious material. Runoff is collected and processed in accordance with NJPDES regulations. Technology is now being developed to remove mercury constituents from the waste; while use of a less contaminated salt has reduced the magnitude of waste produced, from tons per day to pounds per day.

The chemfix process lagoon is double-lined with vinyl, and contains a low-mercury waste.

Six ground-water monitoring wells have been installed in the vicinity of the waste-management area. The well depths and screened interval depths ensure the early detection of any ground-water contamination.

Compilation of ground-water surface elevations (Table 2) collected in October 1981 and upon site inspection (February 1982) and well log data confirm a ground-water flow direction to the northeast (toward South Branch Creek). Because the nature of ground-water flow is compounded by tidal influx, measurements were taken by Geraghty & Miller at both high and low tide.

Wells 1, 1a, 2 and 3 serve as the downgradient wells. Wells 4 and 5 serve as upgradient wells, sources of background information.

Well 4, although generally upgradient from most of the area, is actually downgradient from the chemfix process lagoon, in relation to water levels found in Wells 3 and 4. This may possibly be caused by the lined pond which disrupts ground-water flow, or by the high clay content of the sediment through which Well 4 has been bored. The hydraulic

TABLE 2

STATIC WATER LEVEL MEASUREMENTS

Well Number	Elevation (Top of Casing, in feet)	October 6, 1981		October 15, 1981		February 11, 1982	
		Depth to Water (Low Tide)	Ground-Water Surface Elevation	Depth to Water (High Tide)	Ground-Water Surface Elevation	Depth to Water (1:30 PM)*	Ground-Water Surface Elevation
1	9.01	4.78	4.23	4.01	5.00	4.54	4.47
1a	10.82	5.42	5.40	4.54	6.28	5.08	5.74
2	8.25	5.29	2.96	3.68	4.57	3.70	4.55
3	13.85	7.83	6.02	7.72	6.13	8.30	5.55
4	12.31	6.64	5.67	6.30	6.01	6.85	5.46
5	12.49	5.99	6.50	6.99	5.50	7.38	5.11

* Last High Tide 10:22 a.m.
Low Tide 4:58 p.m.

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gradients between Wells 3 and 4 during low and high tide are 0.0007 and 0.0021, respectively. Such low gradients may at times be negligible; but in cases such as this (i.e., dealing with hazardous waste), true background readings are of utmost importance.

Well construction and completion methods outlined in the consultant's report and well logs reflect the wells' capability to yield representative ground-water samples.

The environmental engineer at LCP indicated that PVC casings may have been joined with adhesives. Adhesives can affect the ground-water quality by releasing certain chemicals, such as tetrahydrofuran. Management should contact the driller, H.P. Drilling of National Park, New Jersey, as to the method of pipe jointing. If adhesives were used, analysis for such chemicals may be advisable.

5.0 ADDITIONAL COMMENTS AND TECHNICAL RECOMMENDATIONS

Some additional comments and recommendations are as follows:

- Determination of the lateral extent of the clay layers which underly the waste-management area would help define the clay's affect on contaminant migration.

- It would be helpful to determine the sorptive properties of the clays and to consider periodic sampling and analysis of these clays for contaminants.

- Well 4, although generally upgradient from most of the area, is actually downgradient from the chemfix lagoon. It is recommended that Well 4 be used as an auxiliary source of background information and also as a potential monitoring well for the chemfix lagoon.

- A standard chain-of-custody form should be developed that describes the sampling procedure in brief and has places for each handler of the samples to fill in (name, date, time), from the time the samples are taken to when they are analyzed.

APPENDIX A-1

FACILITY INSPECTION FORM FOR COMPLIANCE WITH INTERIM STATUS STANDARDS COVERING GROUND-WATER MONITORING

Company Name: LCP Chemicals-NJ, Inc.; EPA I.D. Number: _____

Company Address: South Wood Ave ; Inspector's Name: Joe Torluccio Jr.

Linden, NJ 07036

Company Contact/Official: B. Fledderman ; Branch/Organization: Ertec Atlantic

Title: Plant Manager ; Date of Inspection: Feb. 11, 1982

	Yes	No	Unknown	Waived
Type of facility: (check appropriately)				
a) surface impoundment	✓			
b) landfill				
c) land treatment facility				
d) disposal waste pile*	✓			
Ground-Water Monitoring Program				
1. Was the ground-water monitoring program reviewed prior to site visit? If "No",		✓		
a) Was the ground-water program reviewed at the facility prior to site inspection?	✓			
2. Has a ground-water monitoring program (capable of determining the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility) been implemented? 265.90(a)	✓			

*Listed separate from landfill for convenience of identification.

	Yes	No	Unknown	Waived
3. Has at least one monitoring well been installed in the uppermost aquifer hydraulically upgradient from the limit of the waste management area? 265.91(a)(1)	✓			
a) Are ground-water samples from the uppermost aquifer, representative of background ground-water quality and not affected by the facility (as ensured by proper well number, locations and depths?)	✓			
4. Have at least three monitoring wells been installed hydraulically downgradient at the limit of the waste handling or management area? 265.91(a)(2)	✓			
a) Do well number, locations and depths ensure prompt detection of any statistically significant amounts of HW or HW constituents that migrate from the waste management area to the uppermost aquifer?	✓			
5. Have the locations of the waste management areas been verified to conform with information in the ground-water program?	✓			
a) If the facility contains multiple waste management components, is each component adequately monitored?		✓		
6. Do the numbers, locations, and depths of the ground-water monitoring wells agree with the data in the ground-water monitoring system program? If "No", explain discrepancies.	✓			
7. Well completion details. 265.91(c)				
a) Are wells properly cased?	✓			
b) Are wells screened (perforated) and packed where necessary to enable sampling at appropriate depths?	✓			
c) Are annular spaces properly sealed to prevent contamination of ground-water?	✓			

	Yes	No	Unknown
8. Has a ground-water sampling and analysis plan been developed? 265.92(a)	✓	~~for the~~	committed's region
a) Has it been followed?	✓		
b) Is the plan kept at the facility?	✓		
c) Does the plan include procedures and techniques for:			
1) Sample collection?	✓		
2) Sample preservation?	✓		
3) Sample shipment?	✓		
4) Analytical procedures?	✓		
5) Chain of custody control?		✓	
9. Are the required parameters in ground-water samples being tested quarterly for the first year? 265.92(b) and 265.92 (c)(1)		✓	
a) Are the ground-water samples analyzed for the following:			
1) Parameters characterizing the suitability of the ground-water as a drinking water supply? 265.92(b)(1)		✓	
2) Parameters establishing ground-water quality? 265.92(b)(2)		✓	
3) Parameters used as indicators of ground-water contamination? 265.92(b)(3)		✓	
(i) For each indicator parameter are at least four replicate measurements obtained at each upgradient well for each sample obtained during the first year of monitoring? 265.92(c)(2)		✓	
(ii) Are provisions made to calculate the initial background arithmetic mean and variance of the respective parameter concentrations or values obtained from the upgradient well(s) during the first year? 265.92(c)(2)		✓	
b) For facilities which have completed first year ground-water sampling and analysis requirements:			
1) Have samples been obtained and analyzed for the ground-water quality parameters at least annually? 265.92(d)(1)			
2) Have samples been obtained and analyzed for the indicators of ground-water contamination at least semi-annually? 265.92(d)(2)			

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	Yes	No	Unknown
c) Were ground-water surface elevations determined at each monitoring well each time a sample was taken? 265.92(e)		✓	
d) Were the ground-water surface elevations evaluated annually to determine whether the monitoring wells are properly placed? 265.93(f)		✓	
e) If it was determined that modification of the number, location or depth of monitoring wells was necessary, was the system brought into compliance with 265.91(a)? 265.93(f)			
10. Has an outline of a ground-water quality assessment program been prepared? 265.93(a)*		✓	
a) Does it describe a program capable of determining:			
1) Whether hazardous waste or hazardous waste constituents have entered the ground water?			
2) The rate and extent of migration of hazardous waste or hazardous waste constituents in ground water?			
3) Concentrations of hazardous waste or hazardous waste constituents in ground water?			
b) After the first year of monitoring, have at least four replicate measurements of each indicator parameter been obtained for samples taken for each well? 265.93(b)			
1) Were the results compared with the initial background means from the upgradient well(s) determined during the first year?			
(i) Was each well considered individually?			
(ii) Was the Student's t-test used (at the 0.01 level of significance)?			
2) Was a significant increase (or pH decrease as well) found in the:			
(i) Upgradient wells			
(ii) Downgradient wells			
If "Yes", Compliance Checklist A-2 must also be completed.			

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*See note Page 2-10

	Yes	No	Unknown
11. Have records been kept of analyses ~~for parameters in 265.92(c) and (d)? 265.94(a)(1)~~	✓		
12. Have records been kept of ground-water surface elevations taken at the time of sampling for each well? 265.94(a)(1)		✓ are not measured	
13. Have records been kept of required elevations in 265.93(b)? 265.94(a)(1)			
14. Have the following been submitted to the Regional Administrator 265.94(a)(2) :*			
a) Initial background concentrations of parameters listed in 265.92(b) within 15 days after completing each quarterly analysis required during the first year?			
b) For each well, have any parameters whose concentrations or values have exceeded the maximum contaminant levels allowed in drinking water supplies been separately identified?			
c) Annual reports including:			
1) Concentrations or values of parameters used as indicators of ground-water contamination for each well along with required evaluations under 265.93(b)?			
2) Any significant differences from initial background values in up-gradient wells separately identified?			
3) Results of the evaluation of ground-water surface elevations?			

*EPA will be proposing (Spring 1982) to replace this reporting requirement with an exception reporting system where reports will be submitted only where maximum contaminant levels or significant changes in the contamination indicators or other parameters are observed. EPA has delayed compliance stage for 14 a) above until August 1, 1982 (Federal Register, February 23, 1982, p.7841-7842) to be coupled with exception reporting in the interim.

ATTACHMENT N

APPENDIX B

GROUND-WATER MONITORING AND ALTERNATE SYSTEM
TECHNICAL INFORMATION FORM

1.0 Background Data:

Company Name: LCP Chemicals NJ, Inc.; EPA I.D.#: _____

Company Address: South Wood Ave
Linden NJ
07036

Inspector's Name: Joe Terlucci, Jr.; Date: February 11, 1982

1.1 Type of facility (check appropriately):

1.1.1 surface impoundment ✓
1.1.2 landfill ___
1.1.3 land treatment facility ___
1.1.4 disposal waste pile ✓

1.2 Has a ground-water monitoring system been established? (Y/N) Y

1.2.1 Is a ground-water quality assessment program outlined or proposed? (Y/N) N

If Yes,

1.2.2 Was it reviewed prior to the site visit? (Y/N) ___

1.3 Has a ground-water quality assessment program been implemented or proposed at the site? (Y/N) N

If yes, Appendix C, Ground-Water Quality Assessment Program Technical Information Form must be utilized also.

2.0 Regional/Facility Map(s)

2.1 Is a regional map of the area, with the facility delineated, included? (Y/N) Y

If yes,

2.1.1 What is the origin and scale of the map? Drawn by Bernard R. Berson & Assoc, Fords NJ 1"=60'

2.1.2 Is the surficial geology adequately illustrated? (Y/N) Y

2.1.3 Are there any significant topographic or surficial features evident? (Y/N) N

If yes, describe _____

2.1.4 Are there any streams, rivers, lakes, or wet lands near the facility? (Y/N) Y

If yes, indicate approximate distances from the facility South Branch Creek 100' NW of brine lagoon (creek empties into Arthur Kill)

2.1.5 Are there any discharging or recharging wells near the facility? (Y/N) Y

If yes, indicate approximate distances from the facility. Not given

2.2 Is a regional hydrogeologic map of the area included? (This information may be shown on 2.1) (Y/N) N

If yes:

2.2.1 Are major areas of recharge/dishcarge shown? (Y/N) Y

If yes, describe. South Branch Creek

2.2.2 Is the regional ground-water flow direction indicated? Toward creek (Y/N) Y

2.2.3 Are the potentiometric contours logical? (Y/N) ___
If not, explain. _____

2.3 Is a facility plot plan included? (Y/N) Y

2.3.1 Are facility components (landfill areas, impoundments, etc.) shown? (Y/N) Y

2.3.2 Are any seeps, springs, streams, ponds, or wetlands indicated? (Y/N) Y

2.3.3 Are the locations of any monitoring wells, soil borings, or test pits shown? (Y/N) Y

2.3.4 Is the facility a multi-component facility? (Y/N) Y

If yes:

2.3.4.1 Are individual components adequately monitored? (Y/N) N

2.3.4.2 Is a Waste Management Area delineated? (Y/N) Y

2.4 Is a site water table (potentiometric) contour map included? (Y/N) N

If yes,

2.4.1 Do the potentiometric contours appear logical based on topography and presented data? (Consult water level data) (Y/N) ____

2.4.2 Are groundwater flowlines indicated? (Y/N) ____

2.4.3 Are static water levels shown? (Y/N) ____

2.2.4 May hydraulic gradients be estimated? (Y/N) ____

2.4.5 Is at least one monitoring well located hydraulically upgradient of the waste management area(s)? (Y/N) Y

2.4.6 Are at least three monitoring wells located hydraulically downgradient of the waste management area(s)? (Y/N) Y

2.4.7 By their location, do the upgradient wells appear capable of providing representative ambient groundwater quality data? (Y/N) Y

If no, explain. ____

ATTACHMENT N

3.0 Soil Boring/Test Pit Details

3.1 Were soil borings/test pits made under the supervision of a qualified professional? (Y/N) Y

If yes,

3.1.1 Indicate the individual(s) and affiliation(s): Geraghty & Miller, Inc

3.1.2 Indicate the drilling/excavating contractor, if known
H.P. Drilling, National Park NJ

3.2 If soil borings/test pits were made, indicate the method(s) of drilling/excavating:

- Auger (hollow or solid stem) ✓
- Mud rotary
- Air rotary
- Reverse rotary
- Cable tool
- Jetting
- Other, including excavation (explain)

Cased borings + hollow stem auger

Drive Boring Rig

3.3 List the number of soil borings/test pits made at the site

3.3.1 Pre-existing

3.3.2 For RCRA compliance 6

3.4 Indicate borehole diameters and depths (if different diameters and depths use TABLE B-1).

3.4.1 Diameter: 2 1/2"

3.4.2 Depth: See well information

3.5 Were lithologic samples collected during drilling? (Y/N) Y

If yes,

3.5.1 How were samples obtained? (Check method(s))

- Split spoon
- Shelby tube, or similar
- Rock coring
- Ditch sampling
- Other (explain)

ATTACHMENT N

INFORMATION TABLE B-2

	WELL NO.	1	1a	2	3	4	5
	GROUND ELEVATION	7.51	7.7	6.5	12.1	10.3	12.5
	TOTAL DEPTH	38.5	10.0	28.0	30.0	38.0	38.0
WELL CASING	TYPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC
	DIAMETER (inches)	1.5	1.5	1.5	1.5	1.5	1.5
	LENGTH	20.0	8.0	20.0	17.0	20.0	8.0
	STICK-UP	1.5	3.0	2.0	2.0	2.0	—
	TOP ELEVATION	9.01	10.82	8.25	13.85	12.31	12.49
	BOTTOM ELEVATION	-11.01	2.82	-12.25	-2.85	-8.31	4.49
WELL SCREEN	DEPTH TOP/BOTTOM	18.5 / 38.5	5.0 / 10.0	18.0 / 28.0	15.0 / 30.0	18.0 / 38.0	/ 38.0
	TYPE MATERIAL	PVC	PVC	PVC	PVC	PVC	PVC
	DIAMETER (inches)	1.5	1.5	1.5	1.5	1.5	1.5
	LENGTH	20.0	5.0	10.0	15.0	20.0	30.0
	SLOT SIZE	20	20	20	20	20	20
	TOP ELEVATION	-11.01	2.82	-12.25	-2.85	-8.31	4.49
	BOTTOM ELEVATION	-31.01	-3.82	-22.25	-17.85	-28.31	-26.49
OPEN HOLE OR SAND/GRAVEL PACK	DEPTH TOP/BOTTOM						
	DIAMETER						
	LENGTH						
	TOP ELEVATION						
	BOTTOM ELEVATION						

ATTACHMENT A

3.5.2 At what interval were samples collected? _____

_____

3.5.3 Were the deposits or rock units penetrated described? (boring logs, etc.) (Y/N) ____

3.6 If test pits were excavated at the site, describe procedures. _____

_____

_____

4.0 Well Completion Detail

4.1 Were the wells installed under the supervision of a qualified professional? (Y/N) Y

If yes:

4.1.1 Indicate the individual and affiliation, if known _____

Geraghty & Miller

_____

4.1.2 Indicate the well construction contractor, if known _____

H.P. Drilling

_____

4.2 List the number of wells at the site

4.2.1 Pre-existing 6

4.2.2 For RCRA Compliance ____

4.3 Well construction information (fill out INFORMATION TABLE B-2)

4.3.1 If PVC well screen or casing is used, are joints (couplings):

Method of jointing is unknown

- Glued on ____
- Screwed on ____

4.3.2 Are well screens sand/gravel packed? (Y/N) Y

ATTACHMENT N

4.3.3 Are annular spaces sealed? (Y/N) Y

If yes, describe:

- bentonite slurry ✓
- Cement grout ____
- Other (explain) ____

- Thicknesses of seals not indicated

4.3.4 If "open hole" wells, are the cased portions sealed in place? (Y/N) ____

If yes, describe how: ____

4.3.5 Are there cement surface seals? (Y/N) N

If yes,

- How thick? ____

4.3.6 Are the wells capped? (Y/N) Y, vented

If yes,

- Do they lock? (Y/N) ____

4.3.7 Are protective standpipes cemented in place? (Y/N) N

4.3.8 Were wells developed? (Y/N) Y

If yes, check appropriate method(s):

- Air lift pumping ____
- Pumping and surging ____
- Jetting ____
- Bailing ✓
- Other (explain) ____

5.0 Aquifer Characterization

5.1 Has the extent of the uppermost saturated zone (aquifer) in the facility area been defined? (Y/N) Y

If yes,

5.1.1 Are soil boring/test pit logs included? (Y/N) Y

5.1.2 Are geologic cross-sections included? (Y/N) N

ATTACHMENT A

5.2 Is there evidence of confining (low permeability) layers beneath the site? (Y/N) Y

If yes,

5.2.1 Is the areal extent and continuity indicated? (Y/N) N

5.2.2 Is there any potential for saturated conditions (perched water) to occur above the uppermost aquifer? (Y/N) Y

If yes, give details: Sediment has a high clay content, high water table and ~~[illegible]~~ tidal influence add to the possibility of a perched water table.

a) Should or is this perched zone being monitored? (Y/N) Y

Explain Some of the intake areas are gen. to the potentially saturated levels

5.2.3 What is the lithology and texture of the uppermost saturated zone (aquifer)? Clays, silts, some sand + gravel - glacial deposits, stratigraphy varies

5.2.4 What is the saturated thickness, if indicated? —

5.3 Were static water levels measured? (Y/N) Y on well logs

If yes,

5.3.1 How were the water levels measured (check method(s)).

- Electric water sounder
- Wetted tape ✓
- Air line
- Other (explain)

5.3.2 Do fluctuations in static water levels occur? (Y/N) Y

If yes,

5.3.2.1 Are they accounted for (e.g. seasonal, tidal, etc.)? (Y/N) Y

If yes, describe: Tidal; may also be a seasonal variation but not as pronounced as tidal variation

5.3.2.2 Do the water level fluctuations alter the general ground-water gradients and flow directions? (Y/N) N

If yes,

5.3.2.3 Will the effectiveness of the wells to detect contaminants be reduced? (Y/N) N

Explain Although well 4 (used as an upgradient well) is actually slightly downgradient from the chemfix lagoon)

5.3.2.4 Based on water level data, do any head differentials occur that may indicate a vertical flow component in the saturated zone? (Y/N) —

If yes, explain

5.4 Have aquifer hydraulic properties been determined? (Y/N) Y

If yes,

5.4.1 Indicate method(s):

- Pumping tests → Low yields
- Falling/constant head tests
- Laboratory tests (explain)

5.4.2 If determined, what are the values for:

- Transmissivity
- Storage coefficient
- Leakage
- Permeability ✓
- Porosity
- Specific capacity

Permeability has been determined but is presented in a confusing manner

5.4.3 In cases where several tests were undertaken, were discrepancies in the results evident? (Y/N) —

If yes, explain

5.4.4 Were horizontal ground-water flow velocities determined? (Y/N) —

If yes, indicate rate of movement

ATTACHMENT A+

6.0 Well Performance

6.1 Are the monitoring wells screened in the uppermost aquifer? (Y/N) ✓

6.1.1 Is the full saturated thickness screened? (Y/N) ____
Extent of sat. thickness is not mentioned

6.1.2 For single completions, are the intake areas in the: (check appropriate levels)

- Upper portion of the aquifer ✓
- Middle of the aquifer ✓
- Lower portion of the aquifer ____

6.1.3 For well clusters, are the intake areas open to different portions of the aquifer? (Y/N) ____

6.1.4 Do the intake levels of the monitoring wells appear to be justified due to possible contaminant density and groundwater flow velocity? (Y/N) ____

7.0 Ground-Water Quality Sampling

7.1 Is a sampling (groundwater quality) program and schedule included? (Y/N) ✓
In consultant's report

7.2 Are sample collection field procedures clearly outlined? (Y/N) ✓

7.2.1 How are samples obtained: (check method(s))

- Air lift pump ____
- Submersible pump ____
- Positive displacement pump ____
- Centrifugal pump ____
- Peristaltic or other suction-lift pump ✓
- Bailer ____
- Other (describe) ____

7.2.2 Are all wells sampled with the same equipment and procedures? (Y/N) ✓

If no, explain ____

7.2.3 Are adequate provisions included to clean equipment after sampling to prevent cross-contamination between wells? (Y/N) ✓
All tubing on the peristaltic pump is changed between samplings

ATTACHMENT N

7.2.4 Are organic constituents to be sampled? (Y/N) N

If yes,

7.2.4.1 Are samples collected with equipment to minimize absorption and volatilization? (Y/N) ____

If yes,

Describe equipment _____

_____

_____

8.0 Sample Preservation and Handling

8.1 Have appropriate sample preservation and preparation procedures been followed (filtration and preservation where appropriate)? (Y/N) Y

8.2 Are samples refrigerated? (Y/N) Y

8.3 Are EPA recommended sample holding period requirements adhered to? (Y/N) Y

8.4 Are suitable container types used? (Y/N) Y

8.5 Are provisions made to store and ship samples under cold conditions (ice packs, etc.)? (Y/N) ____

8.6 Is a chain of custody control procedure clearly defined? (Y/N) N

8.7 Is a specific chain of custody form illustrated? (Y/N) N

If yes,

8.7.1 Will this form provide an accurate record of sample possession from the moment the sample is taken until the time it is analyzed? (Y/N) ____

9.0 Sample Analysis and Record Keeping

9.1 Is sample analysis performed by a qualified laboratory? (Y/N) Y

Indicate lab Princeton Testing Laboratory

9.2 Are analytical methods described in the records? (Y/N) Y

9.2.1 Are analytical methods acceptable to EPA? (Y/N) Y

9.3 Are the required drinking water suitability parametters tested for? (only Ba + Hg) (Y/N) N

9.4 Are the required groundwater quality parameters tested for? (Y/N) N
(only Fe)

ATTACHMENT N

9.5 Are the required groundwater contamination indicator parameters tested for? (Y/N) N

9.6 Are any analytical parameters determined in the field? (Y/N) N

Identify:

- pH ____
- Temperature ____
- Specific conductance ____
- Other (describe) _____

_____

9.7 Is a plan included to record information about each sample collected during the groundwater monitoring program? (Y/N) Y

9.7.1 Are field activity logs included? (Y/N) Y

9.7.2 Are laboratory results included? (Y/N) N

9.7.3 Are field procedures recorded? (Y/N) N

9.7.4 Are field parameter determinations included? (Y/N) N

9.7.5 Are the names and affiliation of the field personnel included? (Y/N) Y

they are [illegible] but not part of a [illegible]

9.8 Are statistical analyses planned or shown for all water quality results where necessary? (Y/N) N

9.8.1 Is an analysis program set-up which adheres to EPA guidelines? (Y/N) ____

9.8.2 Is Student's t-test utilized? (Y/N) ____
If other evaluation procedure used, identify _____

_____

9.8.3 Are provisions made for submitting analysis reports to the Regional Administrator? (Y/N) N

10.0 Site Verification

10.1 Plot Plan indicating the locations of various facility components, ground-water monitoring wells, and surface waters? (Y/N) ____

10.1.1 Is the plot plan used for the inspection the same as in the monitoring program plan documentation? (Y/N) Y

If not, explain _____

_____

10.1.2 Are all of the components of the facility identified during the inspection addressed in the monitoring program documentation? (Y/N) Y

If not, explain _____

10.1.3 Are there any streams, lakes or wetlands on or adjacent to the site? (Y/N) Y

If yes, indicate distances from waste management areas _____

South Branch Creek 100' NW of lagoon

10.1.4 Are there any signs of water quality degradation evident in the surface water bodies? (Y/N) N

If yes, explain _____

10.1.5 Is there any indication of distressed or dead vegetation on or adjacent to the site? (Y/N) N

If yes, explain _____

10.1.6 Are there any significant topographic or surficial features on or near the site (e.g., recharge or discharge areas)? (Y/N) N

If yes, explain _____

10.1.7 Are the monitor well locations and numbers in agreement with the monitoring program documentation? (Y/N) Y

If no, explain _____

10.1.7.1 Were locations and elevations of the monitor wells surveyed into some known datum? (Y/N) Y

If not, explain _____

ATTACHMENT N

10.1.7.2 Were the wells sounded to determine total depth below the surface? (Y/N) N

If not, explain _____

10.1.7.3 Were discrepancies in total depth greater than two feet apparent in any well? (Y/N) ____

If yes, explain _____

10.1.8 Was ground water encountered in all monitoring wells? (Y/N) Y

If not, indicate which well(s) were dry _____

10.1.9 Were water level elevations measured during the site visit? (Y/N) Y

If yes, indicate well number and water level elevation _____

If not, explain _____

(Feb. 11, 1982)

Well #	Depth to water	Ground-water Surface Elevation
1	4.54	4.47
1a	5.08	5.74
2	3.70	4.55
3	8.30	5.55
4	6.85	5.46
5	7.38	5.11

ATTACHMENT N

REFERENCE NO. 12

WASTE LAGOON GROUND-WATER MONITORING

LCP CHEMICALS, NEW JERSEY, INC.
LINDEN, NEW JERSEY

February 1982

GERAGHTY
& MILLER, INC.

Consulting Ground-Water Geologists and Hydrologists

NORTH SHORE ATRIUM
6800 JERICHO TURNPIKE
SYOSSET, NEW YORK 11791

1 of 52

100279

WASTE LAGOON

GROUND-WATER MONITORING

LCP CHEMICALS, NEW JERSEY, INC.

LINDEN, NEW JERSEY

February 1982

Geraghty & Miller, Inc.
Consulting Ground-Water Geologists and Hydrologists
North Shore Atrium
6800 Jericho Turnpike
Syosset, New York 11791

100280

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APPENDICES

A. Monitoring Well Boring Logs and Construction Data

B. Analytical Protocol for Mercury in Water and Soils

C. Administrative Consent Order of August 31, 1981 by State of New Jersey Department of Environmental Protection to Linden Chemicals & Plastics, Inc.

FIGURE

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TABLES

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2. Units in Which Wells are Screened	10
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WASTE LAGOON

GROUND-WATER MONITORING

LCP CHEMICALS, NEW JERSEY, INC.

LINDEN, NEW JERSEY

INTRODUCTION

LCP Chemicals, New Jersey, Inc. (LCP) retained Geraghty & Miller, Inc. to conduct ground-water monitoring at a waste disposal site at their Linden, New Jersey, plant. The plant produces chlorine by the electrolytic decomposition of brine using metallic mercury as an electrode. Mercury concentrations in the process wastes are high enough so that the wastes are hazardous as defined in the Resource Conservation and Recovery Act (RCRA) of 1976.

In order to comply with both the RCRA monitoring well requirements and a consent agreement with the State of New Jersey, LCP installed monitoring wells at its waste facility. This facility consists of an active brine sludge lagoon and a small, experimental lagoon used for pilot studies of the Chem-fix process for waste stablization.

SUMMARY OF FINDINGS AND CONCLUSIONS

1. Geologic data from soil borings and monitoring wells show that the study area is underlain by 30 to 50 feet of unconsolidated glacial till, organic sediments, peat, and artificial fill. These deposits are generally of low or moderately low permeability and rest on bedrock, the Brunswick shale member of the Triassic Newark Group.

2. The six monitoring wells installed near the LCP brine-sludge lagoon yielded ground-water samples with mercury levels below the U.S. Environmental Agency (USEPA) Primary Interim Drinking Water Standard of 0.002 mg/L (milligrams per litre).

3. Soil samples collected in the monitoring well borings, selected surface sites, and the South Branch Creek bed showed total mercury concentrations between 0.26 and 1,580 mg (milligrams) per kg (kilogram) of soil ppm (parts per million) as received.

4. Shallow, fill soils contained the most mercury (up to 1,580 ppm) while undisturbed, deeper soils had much lower concentrations (0.4 to 6 ppm). Intermediate concentrations (10 to 40 ppm) were found in organic sediments derived from marsh deposits taken at depths up to 17 feet below grade.

5. The soils analyses for mercury indicate ambient levels for this metal in undisturbed (uncontaminated), low permeability deposits up to approximately 5 ppm in this area.

6. Higher levels of soils mercury, up to 40 ppm, indicate contamination by industrially derived fill materials, surface disposal of mercury compounds and/or selective fixation of mercury in organic sediments.

7. The difference between mercury levels in ground-water and soils samples arises because the soil components (silts, clays, and organic matter) tie up mercury through adsorption and complexation. Furthermore, many mercury compounds have low solubilities in water.

8. Water-level data do not reveal present leakage of water from the brine sludge lagoon via the subsurface.

9. Sources of mercury found in streambed sediments from South Branch Creek cannot be determined solely on the basis of soils or ground-water quality data. Potential sources, besides LCP's waste lagoon, may be atmospheric mercury "fallout," runoff, percolation through fill materials, and tide water from the Arthur Kill.

RECOMMENDATIONS

1. LCP should maintain the monitoring wells in good condition for continued sampling as prescribed by RCRA. Care should be taken to avoid contamination of the wells.

2. Re-sampling and analysis of ground water (and soils, if necessary) should be performed according to the protocol currently in use (see Appendix B). All sampling procedures should be kept as constant as possible so that data from different sampling periods can be compared.

3. Water levels should be measured in each well prior to sampling using the "wetted tape" method. The date, time, tidal stage, weather conditions, and other pertinent data should be recorded along with each measurement.

4. If it becomes necessary to abandon any of the monitoring wells, closure must be performed by a licensed New Jersey water-well driller and in accord with state specifications.

THE HYDROGEOLOGIC INVESTIGATION

Purpose and Scope

The New Jersey Department of Environmental Protection (NJDEP) administrative Consent Order of July 31, 1981 requires that LCP implement a monitoring program to evaluate the release of mercury and other metals to the ambient environment (see Appendix C). The monitoring program covers air, surface and ground water, and soils obtained from borings done on land and in the streambed. Geraghty & Miller, Inc., was retained to design and supervise the entire program except for the air monitoring studies, which were conducted by LCP.

The soil borings and monitoring well installations were made at five sites in the vicinity of the waste lagoons. Soils samples were described in detail with respect to lithologic and hydrologic characteristics and were retained for chemical analysis. Individual monitoring wells were screened in the most permeable soil materials penetrated at each boring site. Where more than one permeable zone was encountered, a multiple (cluster) well arrangement was used. Soil samples from four surface sites and a streambed site were also collected for mercury analysis. The soil boring, well construction and analytical procedures for water and soils chemistry followed USEPA procedures (see Appendix B) and were approved by NJDEP prior to field work.

Monitoring Well Installation

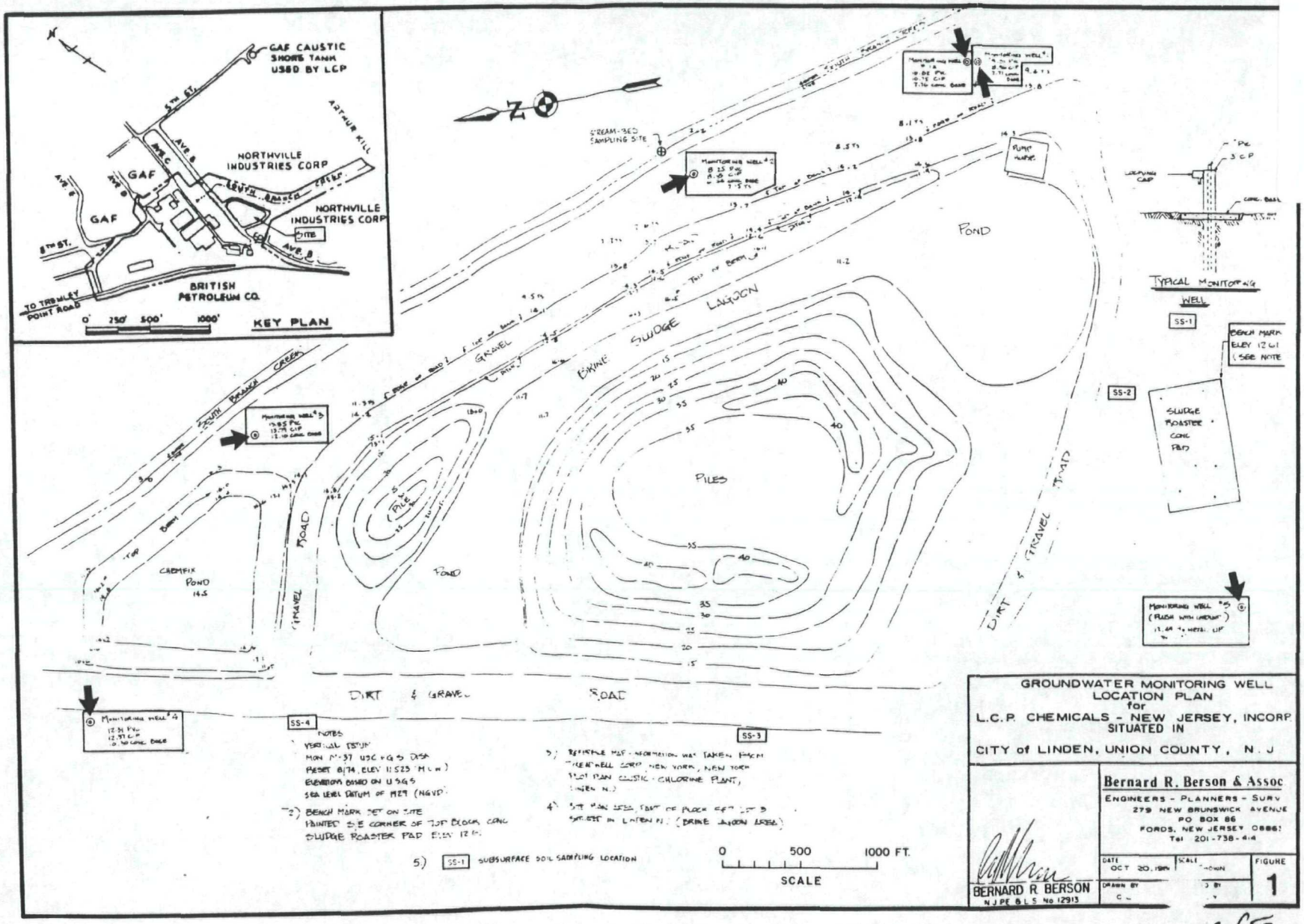
Six monitoring wells were installed between September 29 and October

2, 1981 by H.P. Drilling of National Park, New Jersey, a licensed New Jersey well driller. Drilling permits were obtained for each well in accordance with New Jersey State law. Permit numbers are listed on each well log given in Appendix A.

The monitoring wells were drilled to consolidated bedrock which was encountered between 42.3 and 48.5 feet below grade at the sites shown in Figure 1. The drilling was done by cased borings (Wells 1, 1A, 2, and 3) and hollow-stem auger (Wells 4 and 5) with split-spoon core samples collected at 5-foot intervals or as directed. Water used during drilling was from an approved, potable water source. A sample of this water has been analyzed by LCP.

The monitoring wells are constructed of 1.5-inch diameter PVC pipe and have 30 to 50 feet of 1.5-inch diameter PVC screen; the screen length depended on the geologic deposits encountered. The screen was set in the drilled hole and packed with clean sand of suitable grade for the 0.020-inch screen slot opening. Bentonite seals were placed above and below the screen zone to prevent vertical flow in the drilled hole near the screen. The remaining open hole around the well casing was filled with cement grout. The top of each well is protected by a vented cap and steel standpipe which extends at least 1.5 feet above grade and is embedded in the cement grout. Well 5 was finished in a curb box because it was located in a high access area.

Sediment and water removed from the borings while drilling and from the finished monitoring wells were considered to be contaminated. There-



NOTES

1) VERTICAL DATUM MON #1-37 USC+GS DISK RESET 8/74, ELEV 11.523 (M.L.W.) ELEVATIONS BASED ON USGS SEA LEVEL DATUM OF 1929 (NGVD)

2) BENCH MARK SET ON SITE PAINTED S.E. CORNER OF TOP BLOCK CONC SLUDGE ROASTER PAD ELEV 12.61

3) REFERENCE MAP INFORMATION WAS TAKEN FROM "TREATWELL CORP. NEW YORK, NEW YORK PLOT PLAN CAUSTIC-CHLORINE PLANT, LINDEN N.J."

4) SITE PLAN LESS PART OF BLOCK 6A7 LOT 3 SITUATE IN LINDEN N.J. (BRINE LAGOON AREA)

5) SS-1 SUBSURFACE SOIL SAMPLING LOCATION

GROUNDWATER MONITORING WELL LOCATION PLAN
for
L.C.P. CHEMICALS - NEW JERSEY, INCORP
SITUATED IN
CITY of LINDEN, UNION COUNTY, N.J

BERNARD R BERSON
N.J.P.E. & L.S. No 12913

Bernard R. Berson & Assoc
ENGINEERS - PLANNERS - SURV
279 NEW BRUNSWICK AVENUE
PO BOX 86
FORDS, NEW JERSEY 08861
Tel 201-738-414

DATE OCT 20, 1984 | SCALE SHOWN | FIGURE 1
DRAWN BY C.L. | CHKD BY

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fore, they were deposited in the LCP waste lagoon.

After each monitoring well was completed, all temporary casings, tools, and equipment coming in contact with soils and water were cleaned with uncontaminated water to prevent cross-contamination.

Sampling Methods

Sediment and water samples collected throughout the investigation were delivered immediately after collection to the laboratory at LCP. Geraghty & Miller, Inc., and LCP have a list of samples collected, handled, and analyzed.

Sediment samples were collected while drilling with a split-spoon core barrel (2-inch outside diameter and 24 inches long) and placed in airtight, 8-ounce, clean, glass containers. Two sediment samples were collected from each spoon and are equally representative of the geologic deposits penetrated by the spoon. Water samples were collected from monitoring wells using a peristaltic pump after the wells were developed with a guzzler pump or bailer. Because the formation yield was typically very low, most wells were bailed dry and allowed to recover sufficiently to yield the required sample volume. For the few wells that could be pumped, at least ten times the volume of standing water in the well was removed before sampling as recommended by USEPA.

All tubing on the peristaltic pump was changed between samplings to prevent cross-contamination. Water samples were filtered immediately after collection by LCP laboratory personnel with a 0.45 micron (Millipore-type)

filter and placed in a container, pre-treated with nitric acid to preserve the sample for metals analysis. Two quart-size water samples were collected from each well. Water samples were checked for temperature, pH, and specific conductance immediately after collection.

Hydrogeology

The site is located on Holocene and Pleistocene glacial deposits which thinly cover Triassic bedrock, the Brunswick Formation. The geology is typical of that recorded in eastern Union County by Nemickas (1976).

Unconsolidated geologic deposits in the study area can be separated in four distinct sedimentary units. From youngest to oldest, they are:

Unit A - Miscellaneous fill deposits
Unit B - Dark gray, organic clay
Unit C - Well sorted sands intercalated with poorly sorted gravelly sands
Unit D - Red-brown, tight silty clay, clay, and gravelly clay

The permeabilities of the four units varies because of differences in particle size, packing, and sorting. Observations of the split-spoon samples provide information on the relative permeabilities of these units (Table 1). A description of each unit follows.

Unit A is thin, but covers the study area continuously. It is a heterogeneous mixture of silt, sand, and gravel-sized particles with artificial components, such as slag, crushed stone, and brick. This fill layer varies in thickness from 4.5 feet near the tidal creek to 13.5 feet upgradient of the waste lagoon. The age, source and overall composition of this unit is unknown but was in place before LCP occupied the site. No informa-

Table 1. Permeabilities of Various Units Under the LCP Site.

Unit[1)]	Relative Permeability	Probable Range of K (feet per year)[2)]
A	Semi-permeable	0.1 - 100
B	Low-permeability	0.01 - 10
C	Well sorted sands -- permeable	500
	Poorly sorted sands -- semi-permeable	0.1 - 500
D	Low-permeability	0.01 - 1

1) Units are defined in the text.

2) From Sherard, et al. (1963).

tion about the unit was available in records from the previous plant operator, GAF Corporation. Soil boring records from Hazen and Sawyer (1969) covering the general plant area show this unit to be extensive.

Due to the assortment of grain sizes and tight packing, permeabilities are relatively low. However, the base of the fill appears to be saturated. Well 1A was screened only at the base of the fill and top of Unit B, since this was recognized to be a thin, but semi-permeable zone.

Unit B is characterized by a dark gray clay with organic matter (tidal grasses) appearing throughout. Thin (2- to 12-inch) layers of brown peat are present near the top of this unit. Lenses of gray silt are also present but are generally thin and horizontally limited.

The organic clay is very cohesive and dry when examined in the sample spoons and did not yield significant water during drilling. This unit is present at all sites except five, where a dark gray, organic silty sand with pelecypods and gastropods, is found at the same horizon. This silty sand probably represents a tidal channel where water movement during the time of deposition was faster than in the rest of the area which was a tidal flat.

Unit C is present at well Sites 3, 4, and 5 and varies in thickness from 4.5 to 18 feet. This unit consists of well-sorted sand layers separated by poorly sorted gravelly sand layers. However, they are relatively thin, separated by tight, poorly sorted layers (where present) and are not present at all sites. It appears that this unit is of limited stratigraph-

ic and lateral extent in this area.

Unit D is present at all sites and varies in thickness from about 14 to 29 feet. This unit is a till which is a heterogeneous mixture of particles deposited by a glacier. The upper part of this till unit is a silty clay or clayey silt with occasional occurrences of pebbles and cobble gravel. The middle horizons are composed predominantly of clay, with other sized particles present in trace amounts. The lower horizons above the bedrock surface are very coarse with cobbles and pebbles floating in a tight, clay matrix. The permeability of this unit is very low due to poor sorting of grain sizes, predominance of clay-sized particles, and tight packing of the individual grains. Wells screened in this unit yield water sparingly and recover very slowly after evacuation.

Bedrock was intercepted between 42.3 and 48.5 feet at the well sites. Clasts of Brunswick-type lithologices (siltstone and shale) were found in the coarse till above the bedrock surface.

Table 2 summarizes where each well has been screened with respect to geologic units present at the site.

Water and Soils Chemistry

Water samples bailed from each monitoring well were analyzed by LCP's laboratory for dissolved mercury according to approved procedures. Results are shown in Table 3. Water samples were also sent to Princeton Testing Laboratory to confirm the mercury analyses and to provide results for calcium. barium, and iron. These results appear in Table 4.

Table 2. Units in Which Wells are Screened.

Well No.	Screen Zone	Units Screened In
1	18.5 - 38.5	D
1A	5 - 10	Bottom of A/top of B
2	18 - 28	Top of D
3	15 - 30	Bottom of B, C, and top of D
4	18 - 38	C/top of D
5	8 - 38	Bottom of A, B, C, and D

Table 3. Dissolved Mercury Concentrations in Ground-Water Samples (concentrations in mg/L or ppm).

Well No.	Sampling Date 10-6-81	10-15-81
1	<0.0002	0.0006
1A	<0.0002	0.0009
2	<0.0002	<0.0002
3	<0.0002	<0.0002
4	<0.0002	<0.0002
5	<0.0002	<0.0002

Samples analyzed by the LCP Laboratory, Linden, New Jersey.

Table 4. Results of Ground-Water Quality Analyses (concentrations in mg/L or ppm).

Well No.	Calcium	Barium	Iron	Mercury
1	1,100	3.5	5.9	< 0.001
1A	2,700	7.0	0.10	< 0.001
2	1,000	3.0	2.2	< 0.001
3	800	3.0	0.10	< 0.001
4	500	2.5	0.06	< 0.001
5	500	2.0	0.50	< 0.001

Note: Samples were received for analysis on November 25, 1981 at the Princeton Testing Laboratory, Princeton, New Jersey.

Soil samples from monitoring well borings and from the land surface were analyzed by the LCP laboratory for total desorbable mercury content. Samples were leached according to USEPA protocol and filtered. The filtrate was then analyzed for mercury. The results of soils mercury analyses from borings are given in Table 5.

Surface soil samples and a tidal creek bed sample were collected on October 15, 1981 by hand, retained and analyzed for total mercury in the same way as the other soil samples. Locations of these sampling sites are shown on Figure 1 and analytical results are given in Table 6.

The results of water and soils mercury analysis shows (1) surficial soil contamination with mercury which decreases with depth, and (2) ground water which is essentially free of mercury. Both results indicate little, if any, subsurface migration of mercury from the brine sludge lagoon. Subsurface soil types and calculated permeability values do not appear to allow significant fluid migration from the lagoon. Furthermore, the settled brine sludge itself has very low permeability.

Elevated mercury values in soils collected at depths to a maximum of 12 to 15 feet below grade are more difficult to interpret and might relate to the composition of the fill materials used to reclaim the present indus-industrial site from its past, tidal marsh condition. Ground-water samples from this zone do not contain high levels of mercury, indicating that the metal is bound to the soil particles. In general, the soils penetrated in the well borings (silts and clays predominating) would be expected to trap mercury resulting in the low mercury levels found in ground water.

Table 5. Mercury Concentrations in Soil Boring Samples (depth in feet below grade; concentrations in ppm).

Sample	Depth	Mercury
Well 1		
1-1	0 - 2	225
1-2	5 - 7	17.4
1-3	10 - 12	1.72
1-4	15 - 17	1.3
1-5	20 - 22	1.04
1-6	25 - 27	0.89
1-7	30 - 32	2.81
1-8	35 - 37	1.74
1-9	40 - 42	0.82
Well 2		
2-1	0 - 2	68.1
2-2	5 - 7	2.1
2-3	10 - 12	1.0
2-4	15 - 17	0.32
2-5	20 - 22	0.91
2-6	25 - 27	0.26
2-7	30 - 32	0.34
2-8	35 - 37	0.34
2-9	40 - 42	0.79
Well 3		
3- 1	0 - 2	101
3- 2	5 - 7	528
3- 3	10 - 12	9.12
3- 4	15 - 17	0.68
3- 5	20 - 22	1.00
3- 6	25 - 27	0.40
3- 7	30 - 32	1.18
3- 8	35 - 37	0.48
3- 9	40 - 42	0.85
3-10	45 - 47	0.60
Well 4		
4- 1	0 - 2	772
4- 2	5 - 7	163
4- 3	10 - 12	19.84
4- 4	15 - 17	33.69
4- 5	20 - 22	0.57
4- 6	25 - 27	0.58
4- 7	30 - 32	0.65
4- 8	34 - 36	0.72
4- 9	40 - 42	1.16
4-10	45 - 47	3.47
Well 5		
5- 1	0 - 2	35.71
5- 2	5 - 7	33.39
5- 3	10 - 12	37.02
5- 4	15 - 17	1.99
5- 5	20 - 22	5.73
5- 6	25 - 27	0.83
5- 7	30 - 32	5.28
5- 8	35 - 37	0.42
5- 9	40 - 42	0.60
5-10	43.5 - 45.5	4.59

Samples analyzed by the LCP Laboratory, Linden, New Jersey.

Table 6. Mercury Concentrations in Surface Soil and Tidal Creek Bed Samples (concentrations in ppm).

Sample No.	Mercury
S-1	558
S-2	27.45
S-3	1,070
S-4	1,580
Tidal Creek Bed	46.42

Samples analyzed by the LCP Laboratory, Linden, New Jersey.

The meaning of the mercury levels found in soils at LCP is difficult to assess except in a relative sense. Natural mercury concentrations in rocks average from 0.01 to 20 ppm, with igneous rocks on the low end, and organic-rich sediments on the high end of this range (Wallace, et al., 1971). Higher concentrations may be found in areas of hydrothermal mineral deposition such as along major fault and orogenic belts. The mercury detected in soils beneath the study area most likely represent low solubility mercury compounds such as sulfides, phosphates or carbonates (Mortvedt, et al., 1972).

Pierce, et al. (1970) consider any mercury levels in soils exceeding 1 ppm, to be significant as evidence of mercury mineralization or surface contamination by mercuric wastes. Urbanized, industrial areas are known to have higher background levels of airborne mercury which is disposited on land by precipitation. Unfortunately, no published data on background levels of soil mercury in the Linden, New Jersey, area could be found.

The naturally occurring glacial tills penetrated by the monitoring well borings do not appear to show evidence of mercury contamination by human activities. Mercury levels above 1 ppm, especially near the bedrock contact may relate to ancient hydrothermal activity associated with tectonics and igneous intrusion of the Triassic sediments (Brunswick shale) underlying the site. Organic deposits, such as the peat, show high mercury levels (about 10 to 30 ppm) down to a maximum depth of 17 feet below land surface. These levels probably reflect the strong organic chelation of mercury derived from several possible sources: from surface contamination.

mercury wastes in the artificial fill, the decay of mercury containing minerals, and from mercury contained in atmospheric precipitation. Comparatively high mercury levels (up to 1,500 ppm) occurring in soils obtained at land surface are the likely result of present and/or prior land use.

Respectfully submitted,

GERAGHTY & MILLER, INC.

James DeMartinis
Senior Hydrogeologist

Michael J. McEachern
Senior Scientist

William J. Seevers
Vice President

February 11, 1982

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APPENDIX A

Monitoring Well Boring Logs and Construction Data

GERAGHTY & MILLER
6800 JERICHO TURNPIKE
SYOSSET, NEW YORK 11791

WELL LOG

PROJECT N 418 LD-1
CLIENT LCP Chemicals Inc.
DATE PREPARED 10-9-81 BY J. DeMartinis

DEPTH, ft		DESCRIPTION	L.S.
		EXISTING GRADE EL 7.7 Ft.	
0			
#1.1	S.S.	Fill, Heterogeneous: slag, cinders and bricks	A
#1.2	S.S.	Clay, Black-Gray, Organic, Moist to Dry V. Cohesive: Wet From G.S. To 8 Ft.	B
10			
#1.3	S.S.	Peat, Brown (Layers 2 to 6 in. Thick) Organic Matter Disseminated Througnout; Strong H2S Ordor.	B
#1.4	S.S.	Silty, Red-Brown, Tight, Clayey, Dry; with Fine Sand and Embedded Pebble Gravel	D
20			
#1.5	S.S.	Clay, Red-Brown, Tight, Dry With Fine Sand and Embedded Gravel	D
#1.6	S.S.	Clay, Red-Brown with Embedded Pebbles; Tight.	D
30			
#1.7	S.S.	Clay, Red-Brown, Moist; Less Pebbly Than Above.	D
#1.8	S.S.	Clay, Silty, Red-Brown, Dry With Abundant Pebbles And Cobble, Gravel.	D
40			
#1.9	S.S.	Silty, Clayey, Dry, Red-Brown; Cobbles And Gravel.	D
		Bedrock @ 42.3 Ft. Boring Stopped	

L.S.=Land Surface
# - S.S.=Split Spoon Core Sample Number

OWNER LCP Chemicals Inc.
WELL NO. 1 State = 26-5293
LOCATION Lagoon Area Linden, N.J. Plant
TOPO SETTING Filled Coastal Marsh
GROUND ELEV. 9.7 Ft.

DRILLING STARTED 9-29-81
DRILLING COMPLETED 9-29-81
DRILLER H. P. Drilling
TYPE OF RIG Drive Boring

WELL DATA

HOLE DIAM. 2 1/2 inch.
FINAL DEPTH 38.5 Ft. From LS
CASING DIAM. 1 1/2 inch.
CASING LENGTH 20 Ft. (1.5 Ft. Above LS)
SCREEN DIAM. 1 1/2 inch.
SCREEN SETTING 18.5-38.5 Ft.
SCREEN SLOT & TYPE 20 Slot PVC
WELL STATUS Monitoring

DEVELOPMENT

TEST DATA

STATIC DEPTH TO WATER	4.78 Ft.	4.01 Ft.
DATE MEASURED	10-6-81	10-15-81
	Low Tide	High Tide

Measuring Point Top of PVC Pipe
Meas. Point Elevation 9.01 Ft.

DATE OF TEST
TYPE OF TEST
PUMP SETTING
SPECIFIC CAPACITY

FINAL PUMP CAPACITY
FINAL PUMP SETTING
AVERAGE PUMPAGE

WATER QUALITY

See Appendix

LITHOLOGY REMARKS SEE TABLE 1
A= Miscellaneous Fill Deposits
B= Dark Gray Organic Clay
C= Well Sorted Sands Etc.
D= Silts, Clays Etc. (Glacial Till)

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100304

6800 JERICHO TURNPIKE
SYOSSET, NEW YORK 11791

WELL LOG

PROJECT N 418 LD-1
CLIENT LCP Chemicals Inc.
DATE PREPARED 10-9-81 BY J. DeMartini

DEPTH, ft	DESCRIPTION
0	
	FOR LOG SEE WELL NO. 1
	(DEEP WELL IN CLUSTER)

OWNER LCP Chemicals Inc.
WELL NO. 1-A State #26-5298
LOCATION Lagoon Area
Linden, N. J. Plant
TOPO SETTING Filled Coastal Marsh
GROUND ELEV. 7.7 Ft.

DRILLING STARTED 9-30-81
DRILLING COMPLETED 9-30-81
DRILLER H. P. Drilling
TYPE OF RIG Drive Boring

WELL DATA

HOLE DIAM. 2 1/2 inch.
FINAL DEPTH 10 Ft.
CASING DIAM. 1 1/2 inch.
CASING LENGTH 8 Ft. (3Ft. Above L.S.)
SCREEN DIAM. 1 1/2 inch.
SCREEN SETTING 5-10 Ft.
SCREEN SLOT & TYPE 20 Slot PVC
WELL STATUS Monitoring

DEVELOPMENT

TEST DATA

STATIC DEPTH TO WATER 5.42 Ft 4.54 Ft
DATE MEASURED 10-6-81 10-15-81
Low Tide High Tide
Measuring Point Top of PVC Pipe
Measuring Point Elevation 10.82 Ft.

DATE OF TEST
TYPE OF TEST
PUMP SETTING
SPECIFIC CAPACITY

FINAL PUMP CAPACITY
FINAL PUMP SETTING
AVERAGE PUMPAGE

WATER QUALITY

REMARKS

100305

6800 JERICHO TURNPIKE
SYOSSET, NEW YORK 11791

WELL LOG

PROJECT N 418 LD-1
CLIENT LCP Chemicals Inc.
DATE PREPARED 10-9-81 BY J. DeMartinis

DEPTH, ft		DESCRIPTION	L.S.
0		EXISTING GRADE EL. 6.5 Ft.	
#2.1	S.S.	Fill, Loose Brown Silt and Sand; Abundant Organic Matter	A
#2.2	S.S.	Clay, Silty, Gray; Moist to Dry Organic Matter Disseminated Throughout, Strong H2S. Smell	B
10 #2.3	S.S.	Clay, Silty, Gray, Dry with Strong H2S smell; 0.5 Ft. Layer of Brown Peat	B
#2.4	S.S.	Clay, Silty, Red-Brown, Dry with Fine Sand and Gravel Pockets; Basalt Clasts. Green Staining; Reducing Conditions	D
20 #2.5	S.S.	Clay, Silty, Dry, Red-Brown, Tight with Metamorphic and Ignegous rock fragments.	D
#2.6	S.S.	Clay, Red-Brown, Dry with Sparse Gravel	D
30 #2.7	S.S.	Clay, Red-Brown, Dry, Soft	D
#2.8	S.S.	Clay, Red-Brown, Dry with Embedded Gravel	D
40 #2.9	S.S.	Clay, Red-Brown, Dry with Abundant Gravel; Granite Fragments	D
		Bedrock @ 43 Ft. Boring Stopped	

L. S.=Land Surface
-S. S. = Split Spoon Core Sample Number

OWNER LCP Chemicals Inc.
WELL NO. 2 State = 26-5294
LOCATION Lagoon Area Linden, N.J. Plant
TOPO SETTING Filled Coastal Marsh
GROUND ELEV. 6.5 Ft.

DRILLING STARTED 9-30-81
DRILLING COMPLETED 10-1-81
DRILLER H.P. Drilling
TYPE OF RIG Drive Boring

WELL DATA

HOLE DIAM. 2 1/2 inch.
FINAL DEPTH 28 Ft.
CASING DIAM. 1 1/2 inch.
CASING LENGTH 20 Ft. (2Ft. Above L.S.)
SCREEN DIAM. 1 1/2 inch.
SCREEN SETTING 18-28 Ft.
SCREEN SLOT & TYPE 20 Slot PVC
WELL STATUS Monitoring

DEVELOPMENT

TEST DATA

STATIC DEPTH TO WATER 5.29 Ft. 3.68 Ft
DATE MEASURED 10-6-81 10-15-81
Measuring Point Top of PVC Pipe
Measuring Point Elevation 8.25 Ft.

DATE OF TEST
TYPE OF TEST
PUMP SETTING
SPECIFIC CAPACITY

FINAL PUMP CAPACITY
FINAL PUMP SETTING
AVERAGE PUMPAGE

WATER QUALITY

See Appendix

LITHOLOGY REMARKS SEE TABLE 1
A=Miscellaneous Fill Deposits
B=Dark Gray Organic Clay
C=Well sorted Sands Etc.
D=Silts, Clays Etc. (Glacial Till)

GERAGHTY & MILLER
6800 JERICHO TURNPIKE
SYOSSET, NEW YORK 11791

WELL LOG

PROJECT N 418 LD-1
CLIENT LCP Chemical Inc
DATE PREPARED 10-9-81 BY J. DeMartini

DEPTH, ft		DESCRIPTION	L.S.
		EXISTING GRADE EL. 12.1 Ft.	
0			
#3.1	S.S.	Fill: Gravel and silt, Brown to Black; Slag and Traprock	A
#3.2	SS.	Fill: Medium Sand and Gravel: Yellow to Gray: Clean	A
		Clay, Gray-Black, Orange, Dry H2S Odor	B
10			
#3.3	S.S.	Clay, Gray, Black, Dry, Organic (Plant Material): Thin (1-2 inch) Layers of Brown Peat	B
#3.4	S.S.	As Above W/6 inch Peat Layer Base	B
20			
#3.5	S.S.	Sand, Fine to Medium, Gray, Wet Grading into Silty sands, Clays with Layers of Gray Organic Clay and Brown Peat and Red-Brown, Sandy Silt.	B-C
#3.6	S.S.	Sand, Fine to Medium, Red-Brown, Well Sorted with Poorly Sorted Gravelly Layers 2-6 inches Thich	C
30			
#3.7	S.S.	Clay, Silty, Dry, Cohesive	D
#3.8	S.S.	Clay, Stiff, Dry with Embedded Pebbles	D
40			
#3.9	S.S.	Dry Pebbles in Tight Clay Matrix	D
#3.10	S.S.	Clay, Dry, Silty with Pebbles	D
		Bedrock @ 47.5 Ft. Boring Stopped	

L. S. = Land Surface
- S. S. = Split Spoon Core Sample Number

OWNER LCP Chemicals Inc.
WELL NO. 3 State # 26-5295
LOCATION Lagoon Area Linden, N.J. Plant
TOPO SETTING Filled Coastal Marsh
GROUND ELEV. 12.1 Ft.

DRILLING STARTED 10-1-81
DRILLING COMPLETED 10-1-81
DRILLER H.P. Drilling
TYPE OF RIG Drive Boring

WELL DATA

HOLE DIAM. 2 1/2 inch
FINAL DEPTH 30 Feet
CASING DIAM. 1 1/2 inch
CASING LENGTH 17 Ft. (2Ft. Above L.S.)
SCREEN DIAM. 1 1/2 inch
SCREEN SETTING 15-30 Ft.
SCREEN SLOT & TYPE 20 Slot PVC
WELL STATUS Monitoring

DEVELOPMENT

TEST DATA

STATIC DEPTH TO WATER 7.83 Ft. 7.72 Ft.
DATE MEASURED 10-6-81 10-15-81
PUMPING DEPTH TO WATER Low Tide High Tide
Measuring Point Top of PVC Pipe
Measuring Point Elevation 13.85 Ft.
DATE OF TEST
TYPE OF TEST
PUMP SETTING
SPECIFIC CAPACITY

FINAL PUMP CAPACITY
FINAL PUMP SETTING
AVERAGE PUMPAGE

WATER QUALITY

See Appendix

LITHOLOGY REMARKS SEE TABLE 1
A= Miscellaneous Fill Deposits
B= Dark Gray Organic Clay
C= Well sorted sands Etc.
D= Silts, Clays Etc. (Glacial Till)

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GERAGHTY & MILLER
6800 JERICHO TURNPIKE
SYOSSET, NEW YORK 11791

WELL LOG

PROJECT N 418 LD-1
CLIENT LCP Chemicals Inc.
DATE PREPARED 10-9-81 BY J. DeMartinis

DEPTH, ft		DESCRIPTION	L.S.
		EXISTING GRADE EL. 10.3 Ft.	
0 #4.1	S.S.	Fill, Redish Brown; sand and Gravel	A
#4.2	S.S.	Fill, Heterogengeous, Brown, wet At Base	A
10 #4.3	S.S.	Much, wet, organic changing to dry organic clay with thin layers of brown Peat and Reeds; H2S Smell	A
#4.4	S.S.		
20 #4.5	S.S.	Sand, Fine, Green, wet, Well Sorted Feldspathic wiht Organic materials present; H2S odor grades to Coarser; Brown at Bottom	C
#4.6	S.S.	Clay, Red-Brown, Dry with Embedded pebbles	D
30 #4.7	S.S.		
#4.8	S.S.	Clay, Red-Brown, Dry with Abundant Cobbles	D
40 #4.9	S.S.	Clay, Red-Brown, Dry and Pebbles in clay matrix in alternating layers	D
#4.10	S.S.	Clay, Dense, Dry with Siltstone Clasts	D
		Bedrock @ 48.5 Ft. Boring Stopped	

L.S. = Land Surface

-S.S.= Split Spoon Core Sample Number

OWNER LCP Chemical Inc.
WELL NO. 4 State # 26-5296
LOCATION Lagoon Area
Linden, N.J. Plant
TOPO SETTING Filled Coastal Marsh
GROUND ELEV. 10.3 Ft.

DRILLING STARTED 10-1-81
DRILLING COMPLETED 10-1-81
DRILLER H. P. Drilling
TYPE OF RIG Auger

WELL DATA

HOLE DIAM. 8 inch.
FINAL DEPTH 38 Feet
CASING DIAM. 1 1/2 inch
CASING LENGTH 20 Feet (2' above L.S.)
SCREEN DIAM. 1 1/2 inch
SCREEN SETTING 18-38 Feet
SCREEN SLOT & TYPE 20 Slot PVC
WELL STATUS Monitoring

DEVELOPMENT

TEST DATA

STATIC DEPTH TO WATER 6.64 Ft 6.30 Ft
DATE MEASURED 10-6-81 10-15-81
Low Tide High Tide
Measuring Point Top of PVC pipe
Measuring Point Elevation 12.31 Ft.
DATE OF TEST
TYPE OF TEST
PUMP SETTING
SPECIFIC CAPACITY

FINAL PUMP CAPACITY
FINAL PUMP SETTING
AVERAGE PUMPAGE

WATER QUALITY

See Appendix

REMARKS

A= Miscellaneous Fill Deposits
B= Dark Gray Organic Clay
C= Well Sorted Sands Etc.
D= Silts, Clays Etc. (Glacial Till)

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GERAGHTY & MILLER
6800 JERICHO TURNPIKE
SYOSSET, NEW YORK 11791

WELL LOG

PROJECT N 418 LD-1
CLIENT LCP Chemical Inc.
DATE PREPARED 10-9-81 BY L. DeMartinis

DEPTH, ft		DESCRIPTION	L.S.
		EXISTING GEADE EL. 12.5 Ft.	
0 #5.1	S.S.	Fill: Bricks on top 1 ft. with clean brown sand and abundant traprock cobbles below	A
#5.2	S.S.	Fill: Loose, brown, silty sand with cobbles grading to loose grayish-brown silt and sand; wet at 11.8 Ft.	A
10 #5.3	S.S.		
#5.4	S.S.	Sand, Silty, organic; dark grayish-brown with Molusck shells; moist	B-C
20 #5.5	S.S.	Sand, grayish-Brown, moist with organic matter	C
#5.6	S.S.	Clay, moist, organic and dry, red-brown silty clay with pebbles	B
30 #5.7	S.S.	Sand, silty, gray, organic, moist alternating with poorly sorted, red, wet, gravelly sands	C
#5.8	S.S.	Clay, red-brown, dry, stiff	D
40 #5.9	S.S.	Red-Brown, pebbles gravel in clay matrix grading to a dry cobble and pebbles gravel	D
#5.10	S.S.		
		Bedrock @ 45 Ft. Boring Stopped	

OWNER LCP Chemical Inc.
WELL NO. 5 State #26-5297
LOCATION Lagoon Area Linden, N.J. Plant
TOPO SETTING Filled Coastal Marsh
GROUND ELEV. 12.5 Ft.

DRILLING STARTED 10-2-81
DRILLING COMPLETED 10-2-81
DRILLER H. P. Drilling
TYPE OF RIG Auger

WELL DATA

HOLE DIAM. 8 Inch
FINAL DEPTH 38 Feet
CASING DIAM. 1 1/2 inch
CASING LENGTH 8 Feet
SCREEN DIAM. 1 1/2 inch
SCREEN SETTING 8-38 Ft.
SCREEN SLOT & TYPE 20 Slot PVC
WELL STATUS Monitoring

DEVELOPMENT

TEST DATA

STATIC DEPTH TO WATER 5.99 Ft. 6.99 Ft.
DATE MEASURED 10-6-81 10-15-81
Low Tide High Tide
Measuring Point Top of PVC Pipe
Measuring Point Elevation 12.49 Ft.
DATE OF TEST
TYPE OF TEST
PUMP SETTING
SPECIFIC CAPACITY

FINAL PUMP CAPACITY
FINAL PUMP SETTING
AVERAGE PUMPAGE

WATER QUALITY

REMARKS

A= Miscellaneous Fill Deposits
B= Dark Gray Organic Clay
C= Well Sorted Sands Etc.
D= Silts, Clays Etc. (Glacial Till)

APPENDIX B

Analytical Protocol for Mercury in Water and Soils

EPA-600/4-79-020

METHODS FOR CHEMICAL ANALYSIS OF WATER AND WASTES

March 1979

ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

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DISCLAIMER

The mention of trade names or commercial products in this manual is for illustration purposes, and does not constitute endorsement or recommendation for use by the U.S. Environmental Protection Agency.

INTRODUCTION

This third edition of "Methods for Chemical Analysis of Water and Wastes" contains the chemical analytical procedures used in U.S. Environmental Protection Agency (EPA) laboratories for the examination of ground and surface waters, domestic and industrial waste effluents, and treatment process samples. Except where noted under "Scope and Application", the methods are applicable to both water and wastewaters, and both fresh and saline water samples. The manual provides test procedures for the measurement of physical, inorganic, and selected organic constituents and parameters. Methods for pesticides, industrial organic waste materials, and sludges are given in other publications of the Agency. The methods were chosen through the combined efforts of the EPA Regional Quality Assurance Coordinators, the staff of the Physical and Chemical Methods Branch, Environmental Monitoring and Support Laboratory, and other senior chemists in both federal and state laboratories. Method selection was based on the following criteria:

(1) The method should measure the desired property or constituent with precision, accuracy, and specificity sufficient to meet the data needs of EPA, in the presence of the interfering materials encountered in water and waste samples.
(2) The procedure should utilize the equipment and skills available in modern water pollution control laboratories.
(3) The selected method is in use in many laboratories or has been sufficiently tested to establish its validity.
(4) The method should be rapid enough to permit routine use for the examination of a large number of samples.

Instrumental methods have been selected in preference to manual procedures because of the improved speed, accuracy, and precision. In keeping with this policy, procedures for the Technicon AutoAnalyzer have been included for laboratories having this equipment available. Other continuous flow automated systems using these identical procedures are acceptable.

Intralaboratory and interlaboratory precision and accuracy statements are provided where such data are available. These interlaboratory statements are derived from interlaboratory studies conducted by the Quality Assurance Branch, Environmental Monitoring and Support Laboratory; the American Society for Testing Materials; or the Analytical Reference Service of the US Public Health Service, DHEW. These methods may be used for measuring both total and dissolved constituents of the sample. When the dissolved concentration is to be determined, the sample is filtered through a 0.45-micron membrane filter and the filtrate analyzed by the procedure specified. The sample should be filtered as soon as possible after it is collected, preferably in the field. Where field filtration is not practical, the sample should be filtered as soon as it is received in the laboratory.

Many water and waste samples are unstable. In situations where the interval between sample collection and analysis is long enough to produce changes in either the concentration or the physical state of the constituent to be measured, the preservation practices in Table I are recommended.

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This manual is a basic reference for monitoring water and wastes in compliance with the requirements of the Federal Water Pollution Control Act Amendments of 1972. Although other test procedures may be used, as provided in the Federal Register issue of October 16, 1973 (38FR 28758) and in subsequent amendments, the methods described in this manual will be used by the Environmental Protection Agency in determining compliance with applicable water and effluent standards established by the Agency.

Although a sincere effort has been made to select methods that are applicable to the widest range of sample types, significant interferences may be encountered in certain isolated samples. In these situations, the analyst will be providing a valuable service to EPA by defining the nature of the interference with the method and bringing this information to the attention of the Director, Environmental Monitoring and Support Laboratory, through the appropriate Quality Assurance Coordinator.

MERCURY
Method 245.1 (Manual Cold Vapor Technique)

STORET NO. Total 71900
Dissolved 71890
Suspended 71895

1. Scope and Application
   1.1 This method is applicable to drinking, surface, and saline waters, domestic and industrial wastes.
   1.2 In addition to inorganic forms of mercury, organic mercurials may also be present. These organo-mercury compounds will not respond to the cold vapor atomic absorption technique unless they are first broken down and converted to mercuric ions. Potassium permanganate oxidizes many of these compounds, but recent studies have shown that a number of organic mercurials, including phenyl mercuric acetate and methyl mercuric chloride, are only partially oxidized by this reagent. Potasssium persulfate has been found to give approximately 100% recovery when used as the oxidant with these compounds. Therefore, a persulfate oxidation step following the addition of the permanganate has been included to insure that organo-mercury compounds, if present, will be oxidized to the mercuric ion before measurement. A heat step is required for methyl mercuric chloride when present in or spiked to a natural system. For distilled water the heat step is not necessary.
   1.3 The range of the method may be varied through instrument and/or recorder expansion. Using a 100 ml sample, a detection limit of 0.2 ug Hg/1 can be achieved; concentrations below this level should be reported as < 0.2 (see Appendix 11.2).
2. Summary of Method
   2.1 The flameless AA procedure is a physical method based on the absorption of radiation at 253.7 nm by mercury vapor. The mercury is reduced to the elemental state and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance (peak height) is measured as a function of mercury concentration and recorded in the usual manner.
3. Sample Handling and Preservation
   3.1 Until more conclusive data are obtained, samples should be preserved by acidification with nitric acid to a pH of 2 or lower immediately at the time of collection. If only dissolved mercury is to be determined, the sample should be filtered through an all glass apparatus before the acid is added. For total mercury the filtration is omitted.
4. Interference
   4.1 Possible interference from sulfide is eliminated by the addition of potassium permanganate. Concentrations as high as 20 mg/1 of sulfide as sodium sulfide do not interfere with the recovery of added inorganic mercury from distilled water.

Approved for NPDES and SDWA
Issued 1974

4.2 Copper has also been reported to interfere: however, copper concentrations as high as 10 mg/l had no effect on recovery of mercury from spiked samples.

4.3 Sea waters, brines and industrial effluents high in chlorides require additional permanganate (as much as 25 ml). During the oxidation step, chlorides are converted to free chlorine which will also absorb radiation of 253 nm. Care must be taken to assure that free chlorine is absent before the mercury is reduced and swept into the cell. This may be accomplished by using an excess of hydroxylamine sulfate reagent (25 ml). In addition, the dead air space in the BOD bottle must be purged before the addition of stannous sulfate. Both inorganic and organic mercury spikes have been quantitatively recovered from sea water using this technique.

4.4 Interference from certain volatile organic materials which will absorb at this wavelength is also possible. A preliminary run without reagents should determine if this type of interference is present (see Appendix 11.1).

5. Apparatus

5.1 Atomic Absorption Spectrophotometer: (See Note 1) Any atomic absorption unit having an open sample presentation area in which to mount the absorption cell is suitable. Instrument settings recommended by the particular manufacturer should be followed.

Note 1: Instruments designed specifically for the measurement of mercury using the cold vapor technique are commercially available and may be substituted for the atomic absorption spectrophotometer.

5.2 Mercury Hollow Cathode Lamp: Westinghouse WL-22847, argon filled, or equivalent.

5.3 Recorder: Any multi-range variable speed recorder that is compatible with the UV detection system is suitable.

5.4 Absorption Cell: Standard spectrophotometer cells 10 cm long, having quartz end windows may be used. Suitable cells may be constructed from plexiglass tubing, 1" O.D. X 4-1/2". The ends are ground perpendicular to the longitudinal axis and quartz windows (1" diameter X 1/16" thickness) are cemented in place. The cell is strapped to a burner for support and aligned in the light beam by use of two 2" by 2" cards. One inch diameter holes are cut in the middle of each card; the cards are then placed over each end of the cell. The cell is then positioned and adjusted vertically and horizontally to give the maximum transmittance.

5.5 Air Pump: Any peristaltic pump capable of delivering 1 liter of air per minute may be used. A Masterflex pump with electronic speed control has been found to be satisfactory.

5.6 Flowmeter: Capable of measuring an air flow of 1 liter per minute.

5.7 Aeration Tubing: A straight glass frit having a coarse porosity. Tygon tubing is used for passage of the mercury vapor from the sample bottle to the absorption cell and return.

5.8 Drying Tube: 6" X 3/4" diameter tube containing 20 g of magnesium perchlorate (see Note 2). The apparatus is assembled as shown in Figure 1.

NOTE 2: In place of the magnesium perchlorate drying tube, a small reading lamp with 60W bulb may be used to prevent condensation of moisture inside the cell. The lamp is positioned to shine on the absorption cell maintaining the air temperature in the cell about 10°C above ambient.

6. Reagents

6.1 Sulfuric Acid, Conc.: Reagent grade.

6.1.1 Sulfuric acid, 0.5 N: Dilute 14.0 ml of conc. sulfuric acid to 1.0 liter.

6.2 Nitric Acid, Conc: Reagent grade of low mercury content (See Note 3).

NOTE 3: If a high reagent blank is obtained, it may be necessary to distill the nitric acid.

6.3 Stannous Sulfate: Add 25 g stannous sulfate to 250 ml of 0.5 N sulfuric acid. This mixture is a suspension and should be stirred continuously during use. (Stannous chloride may be used in place of stannous sulfate.)

6.4 Sodium Chloride-Hydroxylamine Sulfate Solution: Dissolve 12 g of sodium chloride and 12 g of hydroxylamine sulfate in distilled water and dilute to 100 ml. (Hydroxylamine hydrochloride may be used in place of hydroxylamine sulfate.)

6.5 Potassium Permanganate: 5% solution, w/v. Dissolve 5 g of potassium permanganate in 100 ml of distilled water.

6.6 Potassium Persulfate: 5% solution, w/v. Dissolve 5 g of potassium persulfate in 100 ml of distilled water.

6.7 Stock Mercury Solution: Dissolve 0.1354 g of mercuric chloride in 75 ml of distilled water. Add 10 ml of conc. nitric acid and adjust the volume to 100.0 ml. 1 ml = 1 mg Hg.

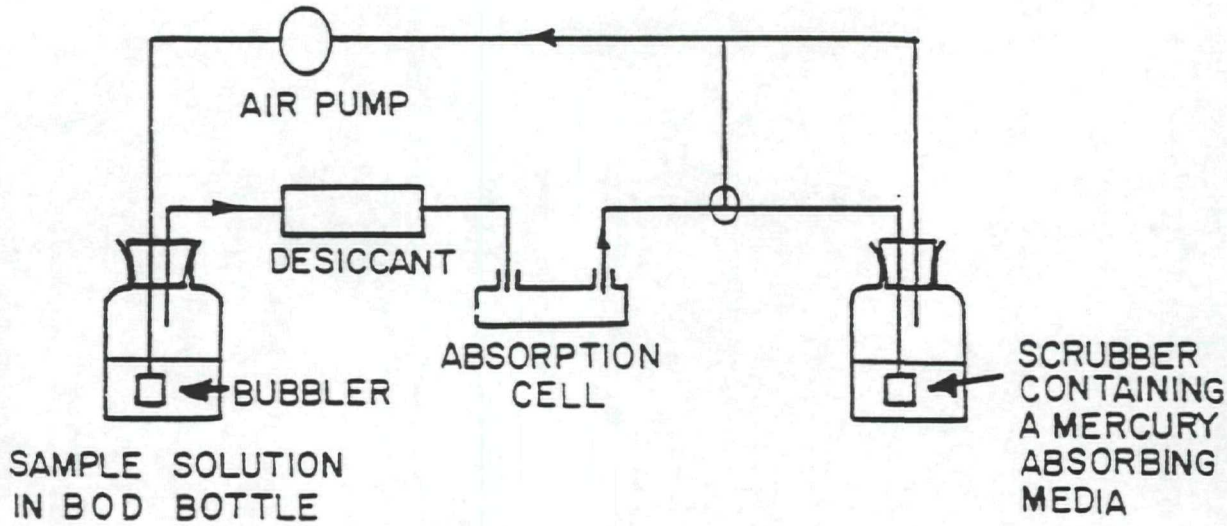

FIGURE 1. APPARATUS FOR FLAMELESS MERCURY DETERMINATION

100317

6.8 Working Mercury Solution: Make successive dilutions of the stock mercury solution to obtain a working standard containing 0.1 ug per ml. This working standard and the dilutions of the stock mercury solution should be prepared fresh daily. Acidity of the working standard should be maintained at 0.15% nitric acid. This acid should be added to the flask as needed before the addition of the aliquot.

7. Calibration

7.1 Transfer 0, 0.5, 1.0, 2.0, 5.0 and 10.0 ml aliquots of the working mercury solution containing 0 to 1.0 ug of mercury to a series of 300 ml **BOD** bottles. Add enough distilled water to each bottle to make a total volume of 100 ml. Mix thoroughly and add 5 ml of conc. sulfuric acid (6.1) and 2.5 ml of conc. nitric acid (6.2) to each bottle. Add 15 ml of $KMnO_4$ (6.5) solution to each bottle and allow to stand at least 15 minutes. Add 8 ml of potassium persulfate (6.6) to each bottle and heat for 2 hours in a water bath maintined at 95°C. Cool and add 6 ml of sodium chloride-hydroxylamine sulfate solution (6.4) to reduce the excess permanganate. When the solution has been decolorized wait 30 seconds, add 5 ml of the stannous sulfate solution (6.3) and immediately attach the bottle to the aeration apparatus forming a closed system. At this point the sample is allowed to stand quietly without manual agitation. The circulating pump, which has previously been adjusted to a rate of 1 liter per minute, is allowed to run continuously (See Note 4). The absorbance will increase and reach maximum within 30 seconds. As soon as the recorder pen levels off, approximately 1 minute, open the bypass valve and continue the aeration until the absorbance returns to its minimum value (see Note 5). Close the bypass valve, remove the stopper and frit from the **BOD** bottle and continue the aeration. Proceed with the standards and construct a standard curve by plotting peak height versus micrograms of mercury.

NOTE 4: An open system where the mercury vapor is passed through the absorption cell only once may be used instead of the closed system.

NOTE 5: Because of the toxic nature of mercury vapor precaution must be taken to avoid its inhalation. Therefore, a bypass has been included in the system to either vent the mercury vapor into an exhaust hood or pass the vapor through some absorbing media, such as:

a) equal volumes of 0.1 M $KMnO_4$ and 10% H_2SO_4

b) 0.25% iodine in a 3% KI solution

A specially treated charcoal that will adsorb mercury vapor is also available from Barnebey and Cheney, E. 8th Ave. and N. Cassidy St., Columbus, Ohio 43219, Cat. #580–13 or #580–22.

8. Procedure

8.1 Transfer 100 ml, or an aliquot diluted to 100 ml, containing not more than 1.0 ug of mercury, to a 300 ml **BOD** bottle. Add 5 ml of sulfuric acid (6.1) and 2.5 ml of conc. nitric acid (6.2) mixing after each addition. Add 15 ml of potassium permanganate solution (6.5) to each sample bottle. For sewage samples additional permanganate may be required. Shake and add additional portions of potassium permanganate solution, if necessary, until the purple color persists for at least 15 minutes. Add 8 ml of potassium persulfate (6.6) to each bottle and heat for 2 hours in a water bath at 95°C. Cool and add 6

ml of sodium chloride-hydroxylamine sulfate (6.4) to reduce the excess permanganate. After a delay of at least 30 seconds add 5 ml of stannous sulfate (6.3) and immediately attach the bottle to the aeration apparatus. Continue as described under Calibration.

9. Calculation

9.1 Determine the peak height of the unknown from the chart and read the mercury value from the standard curve.

9.2 Calculate the mercury concentration in the sample by the formula:

$$\mu g\ Hg/l = \left(\begin{matrix}\mu g\ Hg\ in \\ aliquot\end{matrix}\right)\left(\frac{1{,}000}{\text{volume of aliquot in ml}}\right)$$

9.3 Report mercury concentrations as follows: Below 0.2 $\mu g/l$, <0.2; between 1 and 10 $\mu g/l$, one decimal; above 10 $\mu g/l$, whole numbers.

10. Precision and Accuracy

10.1 In a single laboratory (EMSL), using an Ohio River composite sample with a background mercury concentration of 0.35 $\mu g/l$, spiked with concentrations of 1.0, 3.0 and 4.0 $\mu g/l$, the standard deviations were ±0.14, ±0.10 and ±0.08, respectively. Standard deviation at the 0.35 level was ±0.16. Percent recoveries at the three levels were 89, 87, and 87%, respectively.

10.2 In a joint EPA/ASTM interlaboratory study of the cold vapor technique for total mercury in water, increments of organic and inorganic mercury were added to natural waters. Recoveries were determined by difference. A statistical summary of this study follows:

Number of Labs	True Values µg/liter	Mean Value µg/liter	Standard Deviation µg/liter	Accuracy as % Bias
76	0.21	0.349	0.276	66
80	0.27	0.414	0.279	53
82	0.51	0.674	0.541	32
77	0.60	0.709	0.390	18
82	3.4	3.41	1.49	0.34
79	4.1	3.81	1.12	−7.1
79	8.8	8.77	3.69	−0.4
78	9.6	9.10	3.57	−5.2

11. Appendix

11.1 While the possibility of absorption from certain organic substances actually being present in the sample does exist, EMSL has not encountered such samples. This is mentioned only to caution the analyst of the possibility. A simple correction that may be used is as follows: If an interference has been found to be present (4.4), the sample should be analyzed both by using the regular procedure and again under oxidizing conditions only,

that is without the reducing reagents. The true mercury value can then be obtained by subtracting the two values.

11.2 If additional sensitivity is required, a 200 ml sample with recorder expansion may be used provided the instrument does not produce undue noise. Using a Coleman MAS-50 with a drying tube of magnesium perchlorate and a variable recorder, 2 mv was set to read full scale. With these conditions, and distilled water solutions of mercuric chloride at concentrations of 0.15, 0.10, 0.05 and 0.025 $\mu g/l$ the standard deviations were ±0.027, ±0.006, ±0.01 and ±0.004. Percent recoveries at these levels were 107, 83, 84 and 96%, respectively.

11.3 Directions for the disposal of mercury-containing wastes are given in ASTM Standards, Part 31, "Water", p 349, Method D3223 (1976).

Bibliography

1. Kopp, J. F., Longbottom, M. C. and Lobring, L. B., "Cold Vapor Method for Determining Mercury", AWWA, vol 64, p. 20, Jan., 1972.
2. Annual Book of ASTM Standards, Part 31, "Water", Standard D3223–73, p 343 (1976).
3. Standard Methods for the Examination of Water and Wastewater, 14th Edition, p 156 (1975).

MERCURY IN SEDIMENT

Method 245.5 (Manual Cold Vapor Technique)

1. Scope and Application
   1.1 This procedure[1] measures total mercury (organic + inorganic) in soils, sediments, bottom deposits and sludge type materials.
   1.2 The range of the method is 0.2 to 5 ug/g. The range may be extended above or below the normal range by increasing or decreasing sample size or through instrument and recorder control.
2. Summary of Method
   2.1 A weighed portion of the sample is digested in aqua regia for 2 minutes at 95°C, followed by oxidation with potassium permanganate. Mercury in the digested sample is then measured by the conventional cold vapor technique.
   2.2 An alternate digestion[2] involving the use of an autoclave is described in (8.2).
3. Sample Handling and Preservation
   3.1 Because of the extreme sensitivity of the analytical procedure and the omnipresence of mercury, care must be taken to avoid extraneous contamination. Sampling devices and sample containers should be ascertained to be free of mercury; the sample should not be exposed to any condition in the laboratory that may result in contact or air-borne mercury contamination.
   3.2 While the sample may be analyzed without drying, it has been found to be more convenient to analyze a dry sample. Moisture may be driven off in a drying oven at a temperature of 60°C. No mercury losses have been observed by using this drying step. The dry sample should be pulverized and thoroughly mixed before the aliquot is weighed.
4. Interferences
   4.1 The same types of interferences that may occur in water samples are also possible with sediments, i.e., sulfides, high copper, high chlorides, etc.
   4.2 Volatile materials which absorb at 253.7 nm will cause a positive interference. In order to remove any interfering volatile materials, the dead air space in the BOD bottle should be purged before the addition of stannous sulfate.
5. Apparatus
   5.1 Atomic Absorption Spectrophotometer (See Note 1): Any atomic absorption unit having an open sample presentation area in which to mount the absorption cell is suitable. Instrument settings recommended by the particular manufacturer should be followed.

   NOTE 1: Instruments designed specifically for the measurement of mercury using the cold vapor technique are commercially available and may be substituted for the atomic absorption spectrophotometer.

Issued 1974

5.2 Mercury Hollow Cathode Lamp: Westinghouse WL-22847, argon filled, or equivalent.

5.3 Recorder: Any multi-range variable speed recorder that is compatible with the UV detection system is suitable.

5.4 Absorption Cell: Standard spectrophotometer cells 10 cm long, having quartz end windows may be used. Suitable cells may be constructed from plexiglass tubing, 1" O.D. X 4-1/2". The ends are ground perpendicular to the longitudinal axis and quartz windows (1" diameter X 1/16" thickness) are cemented in place. Gas inlet and outlet ports (also of plexiglass but 1/4" O.D.) are attached approximately 1/2" from each end. The cell is strapped to a burner for support and aligned in the light beam to give the maximum transmittance.

NOTE 2: Two 2" X 2" cards with one inch diameter holes may be placed over each end of the cell to assist in positioning the cell for maximum transmittance.

5.5 Air Pump: Any peristaltic pump capable of delivering 1 liter of air per minute may be used. A Masterflex pump with electronic speed control has been found to be satisfactory. (Regulated compressed air can be used in an open one-pass system.)

5.6 Flowmeter: Capable of measuring an air flow of 1 liter per minute.

5.7 Aeration Tubing: Tygon tubing is used for passage of the mercury vapor from the sample bottle to the absorption cell and return. Straight glass tubing terminating in a coarse porous frit is used for sparging air into the sample.

5.8 Drying Tube: 6" X 3/4" diameter tube containing 20 g of magnesium perchlorate (See Note 3). The apparatus is assembled as shown in the accompanying diagram.

NOTE 3: In place of the magnesium perchlorate drying tube, a small reading lamp with 60W bulb may be used to prevent condensation of moisture inside the cell. The lamp is positioned to shine on the absorption cell maintaining the air temperature in the cell about 10°C above ambient.

6. Reagents

6.1 Aqua Regia: Prepare immediately before use by carefully adding three volumes of conc. HCl to one volume of conc. HNO_3.

6.2 Sulfuric Acid, 0.5 N: Dilute 14.0 ml of conc. sulfuric acid to 1 liter.

6.3 Stannous Sulfate: Add 25 g stannous sulfate to 250 ml of 0.5 N sulfuric acid (6.2). This mixture is a suspension and should be stirred continuously during use.

6.4 Sodium Chloride-Hydroxylamine Sulfate Solution: Dissolve 12 g of sodium chloride and 12 g of hydroxylamine sulfate in distilled water and dilute to 100 ml.

NOTE 4: A 10% solution of stannous chloride may be substituted for (6.3) and hydroxylamine hydrochloride may be used in place of hydroxylamine sulfate in (6.4).

6.5 Potassium Permanganate: 5% solution, w/v. Dissolve 5 g of potassium permanganate in 100 ml of distilled water.

6.6 Stock Mercury Solution: Dissolve 0.1354 g of mercuric chloride in 75 ml of distilled water. Add 10 ml of conc. nitric acid and adjust the volume to 100.0 ml. 1.0 ml = 1.0 mg Hg.

6.7 Working Mercury Solution: Make successive dilutions of the stock mercury solution (6.6) to obtain a working standard containing 0.1 ug/ml. This working standard and the dilution of the stock mercury solutions should be prepared fresh daily. Acidity of the

working standard should be maintained at 0.15% nitric acid. This acid should be added to the flask as needed before the addition of the aliquot.

Calibration

7.1 Transfer 0, 0.5, 1.0, 2.0, 5.0 and 10 ml aliquots of the working mercury solution (6.7) containing 0 to 1.0 ug of mercury to a series of 300 ml BOD bottles. Add enough distilled water to each bottle to make a total volume of 10 ml. Add 5 ml of aqua regia (6.1) and heat 2 minutes in a water bath at 95°C. Allow the sample to cool and add 50 ml distilled water and 15 ml of $KMnO_4$ solution (6.5) to each bottle and return to the water bath for 30 minutes. Cool and add 6 ml of sodium chloride-hydroxylamine sulfate solution (6.4) to reduce the excess permanganate. Add 50 ml of distilled water. Treating each bottle individually, add 5 ml of stannous sulfate solution (6.3) and immediately attach the bottle to the aeration apparatus. At this point, the sample is allowed to stand quietly without manual agitation. The circulating pump, which has previously been adjusted to rate of 1 liter per minute, is allowed to run continuously. The absorbance, as exhibited either on the spectrophotometer or the recorder, will increase and reach maximum within 30 seconds. As soon as the recorder pen levels off, approximately 1 minute, open the bypass value and continue the aeration until the absorbance returns to its minimum value (See Note 5). Close the bypass value, remove the fritted tubing from the BOD bottle and continue the aeration. Proceed with the standards and construct a standard curve by plotting peak height versus micrograms of mercury.

NOTE 5: Because of the toxic nature of mercury vapor precaution must be taken to avoid its inhalation. Therefore, a bypass has been included in the system to either vent the mercury vapor into an exhaust hood or pass the vapor through some absorbing media, such as:

a) equal volumes of 0.1 N $KMnO_4$ and 10% H_2SO_4

b) 0.25% iodine in a 3% KI solution.

A specially treated charcoal that will absorb mercury vapor is also available from Barnebey and Cheney, E. 8th Ave., and North Cassidy St., Columbus, Ohio 43219, Cat. #580–13 or #580–22.

8. Procedure

8.1 Weigh triplicate 0.2 g portions of dry sample and place in bottom of a BOD bottle. Add 5 ml of distilled water and 5 ml of aqua regia (6.1). Heat 2 minutes in a water bath at 95°C. Cool, add 50 ml distilled water and 15 ml potassium permanganate solution (6.5) to each sample bottle. Mix thoroughly and place in the water bath for 30 minutes at 95°C. Cool and add 6 ml of sodium chloride-hydroxylamine sulfate (6.4) to reduce the excess permanganate. Add 55 ml of distilled water. Treating each bottle individually, add 5 ml of stannous sulfate (6.3) and immediately attach the bottle to the aeration apparatus. Continue as described under (7.1).

8.2 An alternate digestion procedure employing an autoclave may also be used. In this method 5 ml of conc. H_2SO_4 and 2 ml of conc. HNO_3 are added to the 0.2 g of sample. 5 ml of saturated $KMnO_4$ solution is added and the bottle covered with a piece of aluminum foil. The samples are autoclaved at 121°C and 15 lbs. for 15 minutes. Cool, make up to a volume of 100 ml with distilled water and add 6 ml of sodium chloride-

hydroxylamine sulfate solution (6.4) to reduce the excess permanganate. Purge the dead air space and continue as described under (7.1).

9. Calculation

9.1 Measure the peak height of the unknown from the chart and read the mercury value from the standard curve.

9.2 Calculate the mercury concentration in the sample by the formula:

$$\mu g\ Hg/g = \frac{\mu g\ Hg \text{ in the aliquot}}{\text{wt of the aliquot in gms}}$$

9.3 Report mercury concentrations as follows: Below 0.1 ug/gm, <0.1; between 0.1 and 1 ug/gm, to the nearest 0.01 ug; between 1 and 10 ug/gm, to nearest 0.1 ug; above 10 ug/gm, to nearest ug.

10. Precision and Accuracy

10.1 The following standard deviations on replicate sediment samples were recorded at the indicated levels; 0.29 ug/g ±0.02 and 0.82 ug/g ±0.03. Recovery of mercury at these levels, added as methyl mercuric chloride, was 97% and 94%, respectively.

Bibliography

1. Bishop, J. N., "Mercury in Sediments", Ontario Water Resources Comm., Toronto, Ontario, Canada, 1971.
2. Salma, M., private communication, EPA Cal/Nev Basin Office, Almeda, California.

APPENDIX C

Administrative Consent Order of August 31, 1981 by State of New Jersey Department of Environmental Protection to Linden Chemicals & Plastics, Inc.

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF THE COMMISSIONER
P. O. BOX 1390
TRENTON, N. J. 08625
609-292-2885

September 18, 1981

Ronald J. Burkett
Vice President, Technical
Linden Chemicals & Plastics, Inc.
Raritan Plaza II
Raritan Center
Edison, New Jersey 08837

Dear Mr. Burkett:

Enclosed please find an original and one copy of the executed Administrative Consent Order concerning the hazardous waste treatment and disposal practices of LCP Chemicals - N.J., Inc.

As always, your courtesies in arriving at an amicable solution of this matter have been appreciated.

The Department's solid waste and waste pollution personnel will continue to work closely with your staff on the expeditious implementation of this Order.

Very truly yours,

Keith A. Onsdorff
Chief, Office of Enforcement

KAO:jb
Enclosure

cc: Jack Stanton
Lee Pereira
Ralph Pasceri
Frank Coolick
Ron Corcory
Michael Diamond
Kathy McBride

CERTIFIED MAIL NO. P18 4219752
RETURN RECEIPT REQUESTED

100% RECYCLED

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STEVEN J. PICCO, ASSISTANT COMMISSIONER
REGULATORY & GOVERNMENTAL AFFAIRS
P.O. BOX 1390
TRENTON, N.J. 08625
609 - 292 - 9289

(IN THE MATTER OF)
(LINDEN CHEMICALS & PLASTICS, INC.)

ADMINISTRATIVE CONSENT ORDER

The following ADMINISTRATIVE CONSENT ORDER is issued pursuant to the authority vested in the Commissioner of the New Jersey Department of Environmental Protection (hereinafter "the Department") and duly delegated to the Director, Division of Environmental Quality, pursuant to his authority under the Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq.

FINDINGS

1) Linden Chemicals & Plastics, Inc. (hereinafter "LCP" or "the company") located in the City of Linden, County of Union, and State of New Jersey has been and is continuing to operate a Hazardous Waste Facility (hereinafter "brine sludge lagoon") by lagooning mercury contaminated brine sludge at the LCP Linden Plant, being more specifically described as Lot 3 of Block 587 on the Tax Map of the City of Linden.

2) LCP also has another lagoon containing mercury contaminated sludge located on the above specified premises, known as the Chem-fix lagoon, which was used for test purposes for four days in 1976 and has not since been operated.

3) LCP has constructed and operated from time to time a mercury brine sludge roaster designed to recapture and recycle the useful portion of this waste.

ORDER

NOW, THEREFORE, by mutual agreement of the parties hereto, Linden Chemicals & Plastics, Inc., is HEREBY ORDERED to undertake the following remedial measures with respect to its Linden Plant's hazardous waste disposal practices:

New Jersey Is An Equal Opportunity Employer

(1) LCP has submitted a complete application, engineering report and design plans for its hazardous waste (roaster) treatment facility. The Department shall endeavor to fully complete the required administrative procedures and render its final decision on this brine sludge roaster application by September 15, 1981.

(2) During the period of time that said application is pending final decision by the SWA, LCP may continue to deposit its brine sludge waste generated at this Linden plant into the above referenced on-site brine sludge lagoon so long as compliance with all the terms and conditions of this Administrative Consent Order are maintained by the company. LCP shall submit written bi-weekly progress reports detailing all actions taken in furtherance of its obligations pursuant to this agreement over the reporting period, said reporting obligations to commence August 5, 1981.

(3) Upon the Department's issuance of its final decision regarding LCP's application for approval of the brine sludge roaster, the company shall forthwith cease depositing these wastes into the on-site brine sludge lagoon. If said decision is affirmative, LCP may commence utilization of its roaster to treat these wastes; but if same should be negative, then the company shall have 10 working days from receipt of this denial or until Jan.1, 19 whichever later, to arrange for off-site disposal of this hazardous waste material at a State or federally approved treatment and/or disposal facility. LCP reserves the right, however, to appeal from any negative decision by the DEP regarding the licensing of the roaster. Furthermore, LCP may petition the Department for an extension of the aforesaid 10 day deadline should off-site disposal require additional time to be implemented. In the event that the Department approves operation of LCP's brine sludge roaster, the company may continue to deposit these wastes into the existing on-site brine sludge lagoon whenever the roaster is removed from operations to be serviced, until the Department completes its review of the brine sludge lagoon closure plan to be submitted by LCP in accordance with the terms of paragraph #4. This authorization for continued use of the existing on-site brine sludge lagoon is expressly contingent upon the environmental evaluation, to be conducted by the company, conclusively showing that the operation and maintenance of the brine sludge lagoon will not cause a violation of any applicable air or water emission and/or ambient quality standard.

(4) Whether the decision is affirmative or negative, LCP, upon receipt of the Department's final decision on said roaster application, shall by no later than 45 days thereafter submit to the SWA an application for the proper, final closure of the existing brine sludge lagoon. Said closure plan, signed and sealed by a licensed New Jersey Professional Engineer, shall provide for the final disposition of all wastes previously deposited into this on-site brine lagoon either by entombment or by complete excavation for ultimate disposal in a manner approved by the Department. Should LCP propose closure of this brine sludge lagoon via entombment, the company must provide sufficient revenues placed into an escrow account or surety bond, to allow for a monitoring system for the RCRA

legally required period of time to be used to verify the continuous integrity of said full containment system. The closure plan shall be reviewed and evaluated in accordance with the requirements of all applicable federal and State regulations governing such facilities.

(5) By no later than 45 days from the date of execution of this agreement, the company shall submit to the SWA an application for the proper, final closure of the Chem-fix lagoon, which closure plan shall be prepared in accordance with all the requirements as specified hereinabove in paragraph four.

(6) In order to fully evaluate all potential avenues of mercury and other metals release into the ambient environment from the operation and maintenance of the aforesaid on-site brine sludge lagoon, LCP shall undertake forthwith the following monitoring program, which shall include but not necessarily be limited to below listed tasks:

a. ambient air monitoring of the on-site brine lagoon to measure for mercury emissions from said waste stockpile. The mobile air monitoring device shall be approved in advance by the DEP and be calibrated to record mercury levels in nanograms per cubic meter of air;

b. installation of a sufficient number of groundwater monitoring wells as required to fully delineate the impacts, if any, of the brine sludge lagoon upon the soils and waters situated in the vicinity of the brine sludge lagoon, in addition to evaluating any impacts upon the tributary flowing into the South Branch Creek and the Creek itself. Twin or cluster well installations shall be drilled if necessary to obtain screen access to all different water bearing zones in the aquifer.

c. a soils boring protocol and water sampling routine as required to obtain a determination of whether the brine sludge lagoon and/or the chem-fix lagoon has or is presently contaminating the ground or surface waters of the State of New Jersey by release of any of the pollutants presently contained therein. Said protocol and routine shall encompass preparation of a water chemistry map and soils permeability calculations -- taken at a minimum of every five foot depth and at every change in the lithology utilizing split spoon sampling techniques.

Should the aforesaid evaluation determine that such contamination has or is occurring, then the company shall prepare a groundwater contour map as part of its program to delineate the full extent of the contamination of these soils and waters and the direction if its migration, if any;

d. all stream sediment samples shall be obtained at several depths beginning at the surface and continuing until the sampling instrument meets substantial resistance. At least one composite soil sample shall be obtained from a minimum of six separate locations in the vicinity of the roaster. All soil samples shall be analyzed by the company for mercury content by dry weight total mercury content;

e. all surface water samples shall be obtained at low tide and both surface and groundwater samples shall be obtained as split samples and analyzed by the company for total mercury content by wet weight. The duplicate sample shall be retained by the company for subsequent analysis by a certified private laboratory at its sole cost should confirmation be deemed warranted in the discretion of the Department. All wells shall also be sampled at least once for the presence of calcium carbonate, barium sulfate, iron hydroxide, calcium sulfate conductivity and pH, in accordance with the aforesaid analytical protocol where applicable;

f. the purging and bailing procedures for all monitoring wells shall be approved by the Department in advance and a representative of the DEP shall be on-site for the commencement of the soils boring program and thereafter at his discretion;

g. the elevations to sea level of the tops of all the monitoring wells shall be determined by a New Jersey licensed surveyor;

h. no later than 30 days after completion of the aforesaid evaluation, all findings and data generated thereby shall be provided to the Department in writing, along with recommendations for all further monitoring as deemed necessary to complete the requirements as set forth in paragraph d.

RESERVATION OF RIGHTS

(7) It is expressly understood and AGREED by the parties hereto that the execution of this Administrative Consent Order does not waive any rights or obligations of either of them to protect the environment from pollution emanating from the industrial activites of LCP as required by all applicable State, federal and local laws, rules and regulations pertaining to these activities conducted at its Linden facility, with the sole exception of the SWA's registration requirements which shall be complied with as set forth hereinabove.

(8) LCP and the DEP hereby consent and agree to comply with all the terms and provisions of this Administrative Consent Order, which shall be fully enforceable in the Superior Court of New Jersey and also may be enforced in the same fashion as an Administrative Order issued pursuant to N.J.S.A. 13:1E-1 et seq.

(9) LCP hereby waives its right to an administrative hearing on the subject matter of this Order.

C.A. Hansen - Sept 1, 1981

C.A. Hansen, Jr.
President
Linden Chemicals & Plastics, Inc.

Date: 9/17/81

John J. Stanton, Director
Division of Environmental Quality
Department of Environmental Protection

REFERENCE NO. 13

FINAL DRAFT

SITE INSPECTION REPORT

AND HAZARDOUS RANKING SYSTEM MODEL

LCP CHEMICALS

LINDEN, NEW JERSEY

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO.

CONTRACT NO. 68-01-6699

02-8403-54A

FOR THE

ENVIRONMENTAL SERVICES DIVISION

U.S. ENVIRONMENTAL PROTECTION AGENCY

DECEMBER 31, 1984

NUS CORPORATION

SUPERFUND DIVISION

SUBMITTED BY

JOSEPH CATTAFE

PROJECT MANAGER

REVIEWED/APPROVED BY

TERRY A. RITTER

REGIONAL PROJECT MANAGER

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SECTION 1

SITE INSPECTION REPORT EXECUTIVE SUMMARY

NUS CORPORATION
A Halliburton Company

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
EXECUTIVE SUMMARY

LCP Chemicals	D079303020
Site Name	EPA Site ID Number
Linden, New Jersey	02-8403-54A
Address	TDD Number

SITE DESCRIPTION

LCP Chemicals, a division of LCP Chemicals and Plastics, Inc., operates a chlorine gas production facility at the foot of S. Wood Avenue in Linden, New Jersey. Chlorine gas is produced by the electrolysis of a sodium chloride brine. The process involved the use of a mercury cell for a period of several years during the 1970's. Sodium hydroxide (caustic soda) sludge, a biproduct of this process, was subsequently contaminated with mercury. The sludge was stored in a lagoon which was located between the production plant and S. Branch Creek to the east. LCP attempted to recover some of the mercury in an experimental chem-fix lagoon which was constructed at the edge of the main lagoon. The project was abandoned, and LCP changed their production procedures to eliminate the hazardous mercury component from the process.

In 1982 the US EPA ordered the LCP plant closed until the lagoon was secured and the hazard to plant workers was eliminated. LCP proposed to excavate the experimental lagoon and place the excavated material along with all mercury contaminated waste into the brine-sludge lagoon. The lagoon would subsequently be capped with an impermeable layer of clay. The proposal was accepted and closure procedures were completed during the fall of 1984.

The landfill covers an area of 62,500 square feet and rises to a point approximately 15 feet above S. Branch Creek, a tributary to the Arthur Kill River. LCP has installed five groundwater monitoring wells around the landfill. LCP samples these wells semi-annually and analyzes the samples for a list of 14 substances.

HAZARD RANKING SCORE: S_M - 13.1 S_{FE} - 18.89 S_{DC} - 20.83

Prepared by: J. S. Cattafe of NUS Corporation Date: 5/21/85

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SECTION 2

ENVIRONMENTAL PROTECTION AGENCY FORM 2070-13

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
LCP Chemicals, Inc.	Foot of S. Wood Avenue

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
Linden	NJ	07036	Union	039	15

09 COORDINATES LATITUDE	LONGITUDE	10 TYPE OF OWNERSHIP (Check one)
40°36'03"N	074°12'32"W	☒ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION	02 SITE STATUS	03 YEARS OF OPERATION
9 / 27 / 84 (MONTH DAY YEAR)	☒ ACTIVE ☐ INACTIVE	1900 (BEGINNING YEAR) / 1984 (ENDING YEAR) ___ UNKNOWN

04 AGENCY PERFORMING INSPECTION (Check all that apply)

☐ A. EPA ☒ B. EPA CONTRACTOR NUS Corp. (Name of firm) ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ___ (Name of firm)
☐ E. STATE ☐ F. STATE CONTRACTOR ___ (Name of firm) ☐ G. OTHER ___ (Specify)

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
J.S. Cattafe	Hydrogeologist	NUS Corp.	(201) 225-6160

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
D. Farley	Hydrogeologist	NUS Corp.	(201) 225-6160
M. Nicholas	Hydrogeologist	NUS Corp.	(201) 225-6160
G. Burchette	Hydrogeologist	NUS Corp.	(201) 225-6160
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO
Mark E. McLaughlin	Technical Supervisor	P.O. Box 484	(201) 862-1666
			( )
			( )
			( )
			( )
			( )

17 ACCESS GAINED BY (Check one)	18 TIME OF INSPECTION	19 WEATHER CONDITIONS
☒ PERMISSION ☐ WARRANT	1000-1640 HRS.	Partly Cloudy, 70° - 75°F, Windy

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Mark Haulenbeek	U.S. EPA Region II	(201) 321-6685

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
J.S. Cattafe		NUS CORP. FIT II	201-225-6160	12 / 10 / 84 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- [X] A. SOLID
- [ ] B. POWDER, FINES
- [X] C. SLUDGE
- [ ] D. OTHER _____ (Specify)
- [ ] E. SLURRY
- [ ] F. LIQUID
- [ ] G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS _____
CUBIC YARDS 30,900
NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

- [X] A. TOXIC
- [X] B. CORROSIVE
- [ ] C. RADIOACTIVE
- [X] D. PERSISTENT
- [ ] E. SOLUBLE
- [ ] F. INFECTIOUS
- [ ] G. FLAMMABLE
- [ ] H. IGNITABLE
- [ ] I. HIGHLY VOLATILE
- [ ] J. EXPLOSIVE
- [X] K. REACTIVE
- [X] L. INCOMPATIBLE
- [ ] M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	Unknown		Brine sludge
OLW	OILY WASTE			
SOL	SOLVENTS	Unknown		Possible spent degreasers
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS	Unknown		Unknown
BAS	BASES	Unknown		Caustics are a biproduct of the
MES	HEAVY METALS			process

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
BAS	Sodium hydroxide	1310-73-2	landfill	unknown	NA

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	Mercury	7439-97-6	FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

Waste Quantity - NUS Files, LCP Chemicals-PA, Background & History

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EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: NJ | 02 SITE NUMBER: D07930320

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 [X] A. GROUNDWATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: 200,000
02 [ ] OBSERVED (DATE _____) [X] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

The potential for groundwater contamination exists as the closed Brine Sludge Lagoon is not lined.

01 [X] B. SURFACE WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: Unknown
02 [ ] OBSERVED (DATE _____) [X] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists if the Brine Sludge Lagoon has not been properly closed, and leachate runs into S. Branch Creek. The creek flows into the Arthur Kill which is used for recreational purposes.

01 [X] C. CONTAMINATION OF AIR
03 POPULATION POTENTIALLY AFFECTED: Unknown
02 [ ] OBSERVED (DATE _____) [X] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists via airborn dust, if the Chem-Fix lagoon was not completely excavated.

01 [ ] D. FIRE EXPLOSIVE CONDITIONS
03 POPULATION POTENTIALLY AFFECTED: None
02 [ ] OBSERVED (DATE _____) [ ] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

No potential exists for fire or explosion caused by the closed Brine Sludge Lagoon.

01 [X] E. DIRECT CONTACT
03 POPULATION POTENTIALLY AFFECTED: 100
02 [ ] OBSERVED (DATE _____) [X] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

The potential exist for worker exposure if the Brine Sludge Lagoon was not properly closed, or if the contents of the "Chem-Fix" lagoon were not completely removed. A fence surrounds the site with a security guard house to prevent the general public from entering onto the property.

01 [X] F. CONTAMINATION OF SOIL
03 AREA POTENTIALLY AFFECTED: 1.5 Acres (Acres)
02 [ ] OBSERVED (DATE _____) [X] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists for soil contamination for the same reasons listed in section E Direct contact.

01 [ ] G. DRINKING WATER CONTAMINATION
03 POPULATION POTENTIALLY AFFECTED: None
02 [ ] OBSERVED (DATE _____) [ ] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

No potential exists for drinking water contamination. Linden receives its drinking water from reservoirs in CLinton, N.J. approximately 30 miles away.

01 [X] H. WORKER EXPOSURE/INJURY
03 WORKERS POTENTIALLY AFFECTED: <100
02 [ ] OBSERVED (DATE _____) [X] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

The closed Brine Sludge Lagoon is not within LCP's main compound, and approximately 100 feet from the main plant.

01 [ ] I. POPULATION EXPOSURE/INJURY
03 POPULATION POTENTIALLY AFFECTED: None
02 [ ] OBSERVED (DATE _____) [ ] POTENTIAL [ ] ALLEGED
04 NARRATIVE DESCRIPTION

No potential exists for exposure to the general public. Site security includes a fence on three sides, S. Branch Creek on the fourth and a guard house at the front gate.

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D79303020

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☒ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists for contamination of estuarine flora.

01 ☒ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)

The potential exists for contamination of estuarine fauna.

01 ☒ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☒ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The potential exists via surface water contamination.

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills, Runoff, Standing liquids, Leaking drums) — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: None — 04 NARRATIVE DESCRIPTION

No problems were observed on the Site Inspection 9/27/84. The facility appeared to be properly capped and graded. Rainwater runoff features and vegetation were being installed on that date.

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No potential exists.

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

No potential exits.

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

The excavation of the "Chem-Fix lagoon and the closure of the Brine Sludge lagoon were both permitted and inspected by the NJDEPand the U.S. EPA.

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

An oily leachate was observed near S. Branch Creek which appeared to be coming from a series of large tanks on the property just south of LCP chemicals.

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files. LCP Chemicals - Site Inspection and Preliminary Assessment
NJDEP Files.

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
☐ A. NPDES				
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☒ A. SURFACE IMPOUNDMENT	30,900	Cubic Yards
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
☐ F. LANDFILL		
☐ G. LANDFARM		
☐ H. OPEN DUMP		
☐ I. OTHER _____ (Specify)		

04 TREATMENT (Check all that apply)
- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER _____ (Specify)

05 OTHER
- ☒ A. BUILDINGS ON SITE

06 AREA OF SITE
_____ (Acres)

07 COMMENTS

Contents of an experimental "Chem-Fix" lagoon were excavated and placed into the Brine-Sludge Lagoon and the lagoon was closed. A clay cap, drainage management features and vegetative cover were installed between 1982 and 1984.

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☒ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ☐ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKING, LINERS, BARRIERS, ETC.

Closure procedures for the 62,500 sq. ft. Brine Sludge Lagoon consisted of compaction and dewatering of all waste, a 2 ft. cap of compacted clay, and final cover of soil and vegetation. A rip-rap berm was installed to manage site drainage and inhibit erosion. The facility is approximately 12 ft. above the 100-year flood stage of the Arthur Kill River.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ☐ YES ☒ NO

02 COMMENTS

Waste is securely closed in the Brine-Sludge Lagoon.

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

NUS Reigon II Fit Files - LCP Chemicals, Site Inspection and Preliminary Assessment.
NJDEP Files.

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check as applicable)	SURFACE	WELL	02 STATUS: ENDANGERED	AFFECTED	MONITORED	03 DISTANCE TO SITE
COMMUNITY	A. ☒	B. ☐	A. ☐	B. ☐	C. ☒	A. 30 (mi)
NON-COMMUNITY	C. ☐	D. ☐	D. ☐	E. ☐	F. ☐	B. (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)

☐ A. ONLY SOURCE FOR DRINKING ☐ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☒ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 0

03 DISTANCE TO NEAREST DRINKING WATER WELL N/A (mi)

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
6 (ft)	To Arthur Kill	40-50 (ft)	626,400 (gpd)	☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including useage, depth, and location relative to population and buildings)

Five monitoring wells have been installed around the closed lagoon. Three wells are situated along So. Branch Creek to the east, one well lies northwest of the lagoon The wells are constructed of two-inch PVC riser pipe and steel outer casings with locking caps.

10 RECHARGE AREA		11 DISCHARGE AREA	
☐ YES ☒ NO	COMMENTS S. Branch Creek exhibits a 2-foot tidal influence which affects the local groundwater gradient during periods of high and low tide.	☒ YES ☐ NO	COMMENTS S. Branch Creek is a tidal creek and changes the local groundwater gradient at high and low tide stages.

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)

☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☐ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☒ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Arthur Kill River	☐	.1 (mi)
S. Branch Creek	☐	0 (mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. 7 NO. OF PERSONS	B. 20,011 NO. OF PERSONS	C. 62,527 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION 1.5 (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE 7178

04 DISTANCE TO NEAREST OFF-SITE BUILDING .2 (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)

The area surrounding the site within a 1.5 mile radius is completely industrialized. Chemical and Oil companies maintain plants or storage facilities over much of the area. The remaining land is undeveloped marsh on the flood plain adjacent to the Arthur Kill River. The New Jersey State Turnpike runs within 3/4 mile of the site. Immediately outside the 1.5 mile radius are residential and densely populated urban areas of West Carteret, Linden and Elizabeth.

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D09303020

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☒ B. $10^{-4} - 10^{-6}$ cm/sec ☐ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☐ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☒ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
40-50 (ft)	Unknown (ft)	7

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
12 (in)	2.5 (in)	25 %	Flat-lying	0 %

09 FLOOD POTENTIAL

SITE IS IN 100 YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE: A. 0 (mi)

OTHER: B. 0 (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species)

0 (mi)

ENDANGERED SPECIES: Peregrin Falcon

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AGRICULTURAL LANDS: AG LAND
A. 0 (mi)	B. 1.5 (mi)	C. >10 (mi)	D. >10 (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY

The closed Brine Sludge Lagoon is situated east of the main plant. So. Branch Creek borders the landfill on the northern and eastern sides. An access road circles the landfill approximately seven feet above the high tide level of S. Branch Creek. The closed lagoon covers an area of 62,900 sq. feet and rises 12 to 15 feet above the creek. Five monitoring wells are located around the landfill. Three wells are situated along So. Branch Creek, a fourth is northwest of the landfill, and the fifth is southwest and across the access road. The surrounding topography is flat-lying and the Landfill rises at an angle of repose to a point approximately twelve feet above grade.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection, Preliminary Assessment.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER	3	organic - Rockwell Int, inorganic - JTC	
SURFACE WATER	2	organic - Rockwell Int, inorganic - JTC	
WASTE			
AIR			
RUNOFF			
SPILL			
SOIL	2	organic and inorganic - JTC	
VEGETATION			
OTHER Sediment	2	organic and inorganic - JTC	

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
Mercury Detector	No levels above background were recorded (NUS Detector inoperable)
	LCP supplied identical model in working condition.
HCL Draeger Tube	The apparatus indicated that there was no HCl in the ambient
	air at the site on 9/27/84.

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☒ GROUND ☐ AERIAL

02 IN CUSTODY OF EPA - photo log attached to Site Inspection Report (Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS A sketch map was compiled at the Site Inspection and is attached to the Site Inspection Report.

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

A field logbook, including sampling team members, weather conditions, samples collected and a chronological list of events which took place during the site inspection. Field Notebook #1017 TDD #02-8403-54A

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection.

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. CURRENT OWNER(S) / **PARENT COMPANY** (if applicable)

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER
LCP Chemicals, Inc		LCP Chemicals and Plastics	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE
P.O. Box 484	2812		

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE
Linden	NJ	07036			

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

01 NAME	02 D+B NUMBER	08 NAME	09 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	12 CITY	13 STATE	14 ZIP CODE

III. PREVIOUS OWNER(S) (List most recent first) / **IV. REALTY OWNER(S)** (if applicable, list most recent first)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
GAF			

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
Dupont			

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection, Preliminary Assessment
Telephone conversation with Linden City Clerk's Office.

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
NJ	D079303020

II. CURRENT OPERATOR (Provide if different from owner) / **OPERATOR'S PARENT COMPANY** (If applicable)

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER
LCP Chemicals		LCP Chemicals and Plastics	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE
P.O. Box 484	2812		

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
Linden	NJ	07036			

08 YEARS OF OPERATION	09 NAME OF OWNER
1970- Present	LCP Chemicals

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner) / **PREVIOUS OPERATORS' PARENT COMPANIES** (If applicable)

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER
GAF			

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE
Foot of S. Wood Avenue			

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE
Linden	NJ	07036			

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1942 - 1970	GAF

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER
Dupont			

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD
1900 - 1942	Dupont

01 NAME	02 D+B NUMBER	10 NAME	11 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	12 STREET ADDRESS (P.O. Box, RFD #, etc.)	13 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	14 CITY	15 STATE	16 ZIP CODE

08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection, Preliminary Assessment
Telephone conversation with Linden City Clerk's Office.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
LCP Chemicals	

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
P.O. Box 484	2812

05 CITY	06 STATE	07 ZIP CODE
Linden	NJ	07036

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER

03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE

05 CITY	06 STATE	07 ZIP CODE	05 CITY	06 STATE	07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection, Preliminary Assessment
Telephone conversation with Linden City Clerks Office.

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☒ E. CONTAMINATED SOIL REMOVED — 02 DATE 9/9/83 — 03 AGENCY EPA, NJDEP
04 DESCRIPTION
The contents of an experimental "Chem-Fix" Lagoon were excavated and placed in the Brine Sludge Lagoon.

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☒ H. ON SITE BURIAL — 02 DATE 8/84 — 03 AGENCY _____
04 DESCRIPTION
The Brine Sludge Lagoon was dewatered, compacted and capped. Operations proceeded with EPA and DEP approval.

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☒ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE 1983 — 03 AGENCY NJDEP
04 DESCRIPTION
The DEP directed that the HCl tanks be diked.

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☒ S. CAPPING/COVERING — 02 DATE 10/84 — 03 AGENCY EPA NJDEP
04 DESCRIPTION
A 2 foot compacted clay cap with vegetative cover and drainage features was installed.

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☒ 1. ACCESS TO SITE RESTRICTED — 02 DATE 1982 - 1984 — 03 AGENCY EPA NJDEP
04 DESCRIPTION
Plant operations were shut down during closure of the Brine Sludge and Chem-Fix Lagoon.

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE 1982-1983 — 03 AGENCY _____
04 DESCRIPTION

Five monitoring wells were installed around the Brine Sludge and Chem-Fix Lagoons.

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

NUS Region II FIT Files - Site Inspection and Preliminary Assessment.
NJDEP Files

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
NJ	D079303020

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY ENFORCEMENT ACTION ☒ YES ☐ NO

02 DESCRIPTION OF FEDERAL STATE LOCAL REGULATORY ENFORCEMENT ACTION

Following shut down of plant activities in 1982, LCP has carried out all DEP and EPA directives including diking, and closure of the Chem-Fix and Brine Sludge Lagoons. LCP presently conducts a semi-annual sampling program and analyzes for an abbreviated list of substances. A xerox copy of this list is attached.

III. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

NUS Region II FIT Files - Preliminary Assessment.
NJDEP Files.

EPA FORM 2070-13 (7-81)

SECTION 3

MAPS AND PHOTOGRAPHS

APPENDIX A

MAPS AND PHOTOS

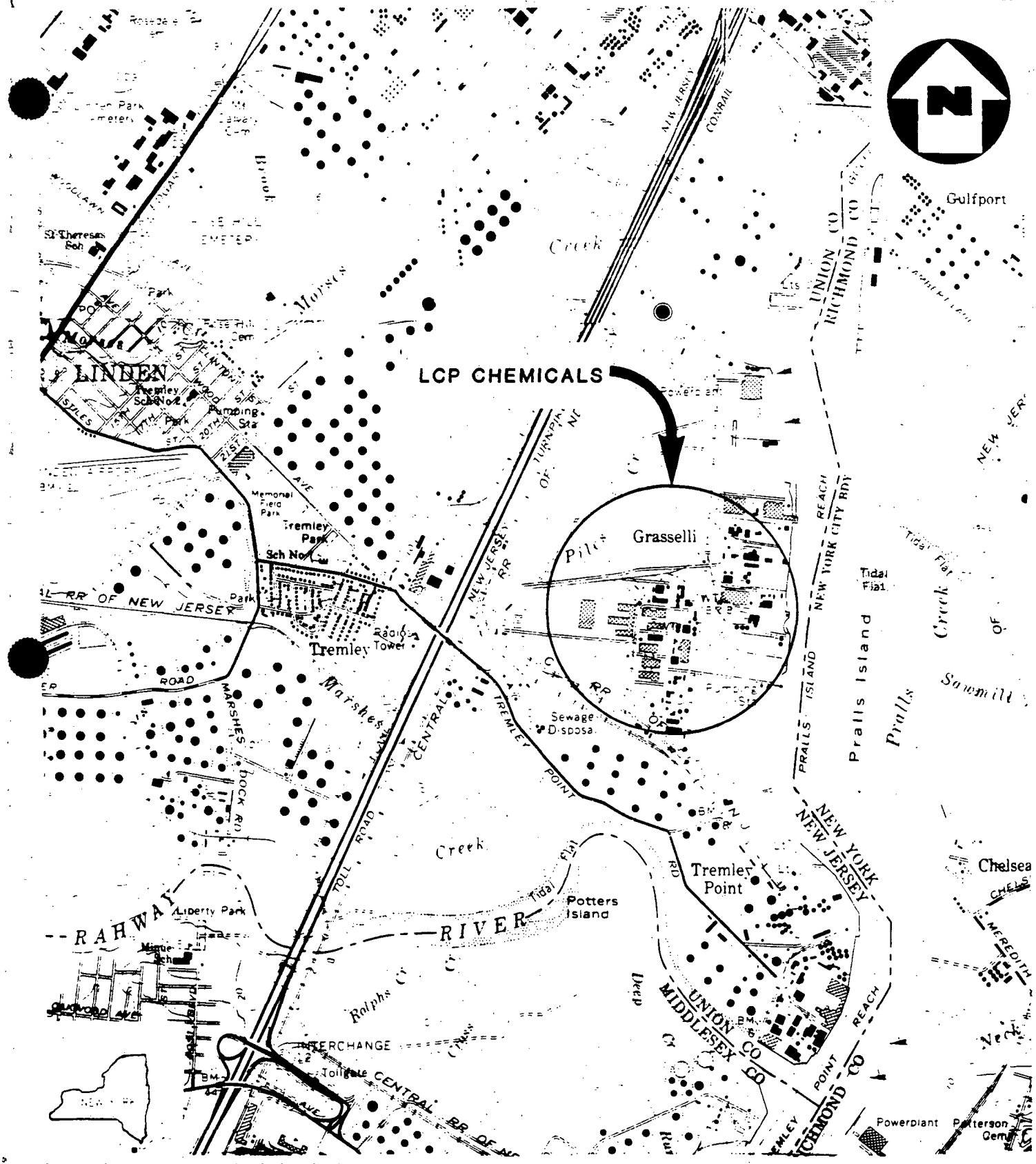
MAPS AND PHOTOS

Figure A-1 provides a Site Location Map.

Figure A-2 provides a Site Map.

Figure A-3 provides a Sample Location Map.

Exhibit A-1 provides photographs of the site.



(QUAD) ARTHUR KILL. N.Y.-N.J.

FIGURE A-1

SITE LOCATION MAP

LCP CHEMICALS SITE, LINDEN, N.J.

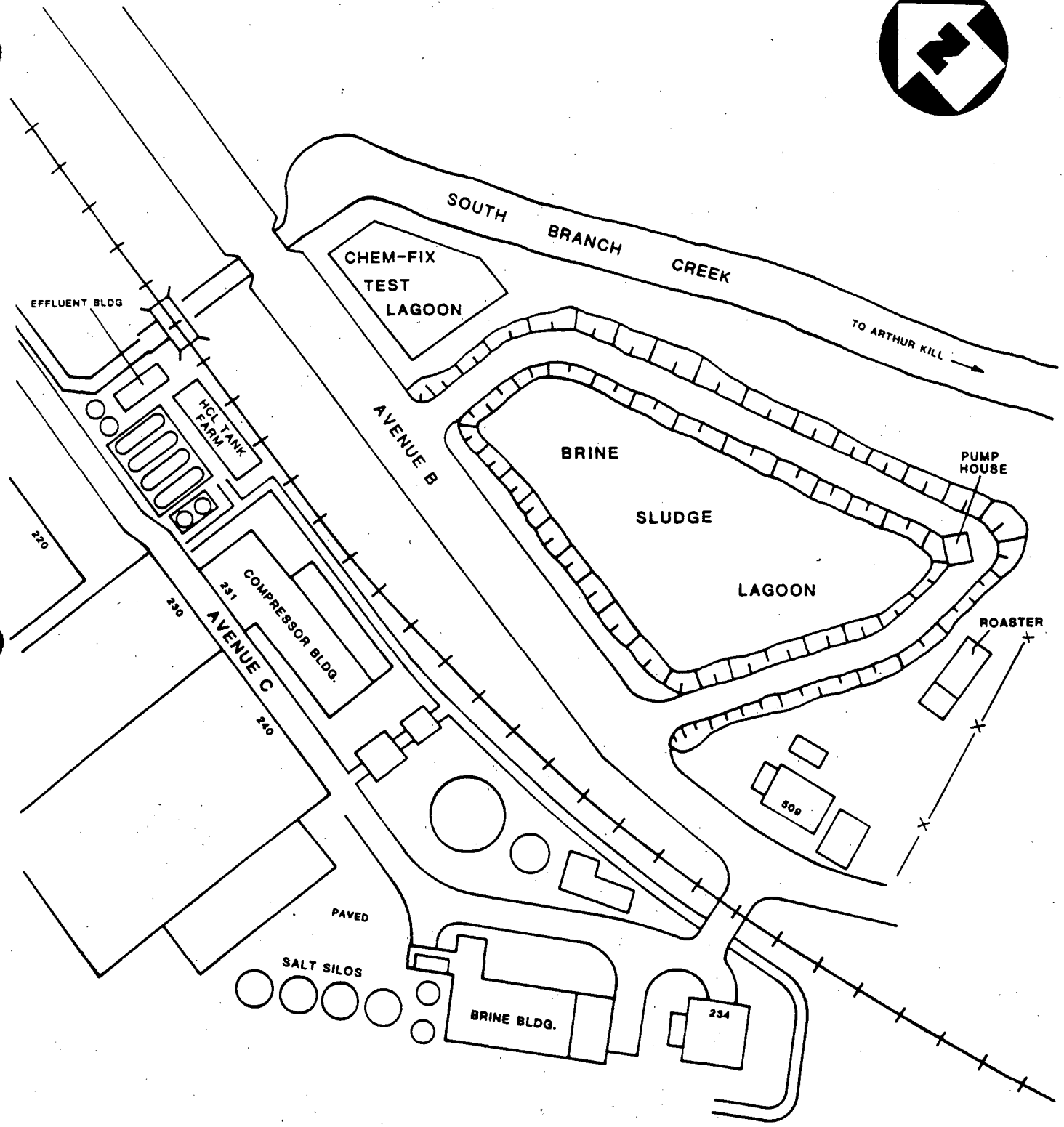
SCALE: 1" = 2000'

NUS CORPORATION

A Halliburton Company

23 of 102

100355



SITE MAP

LCP CHEMICALS SITE, LINDEN, N.J.

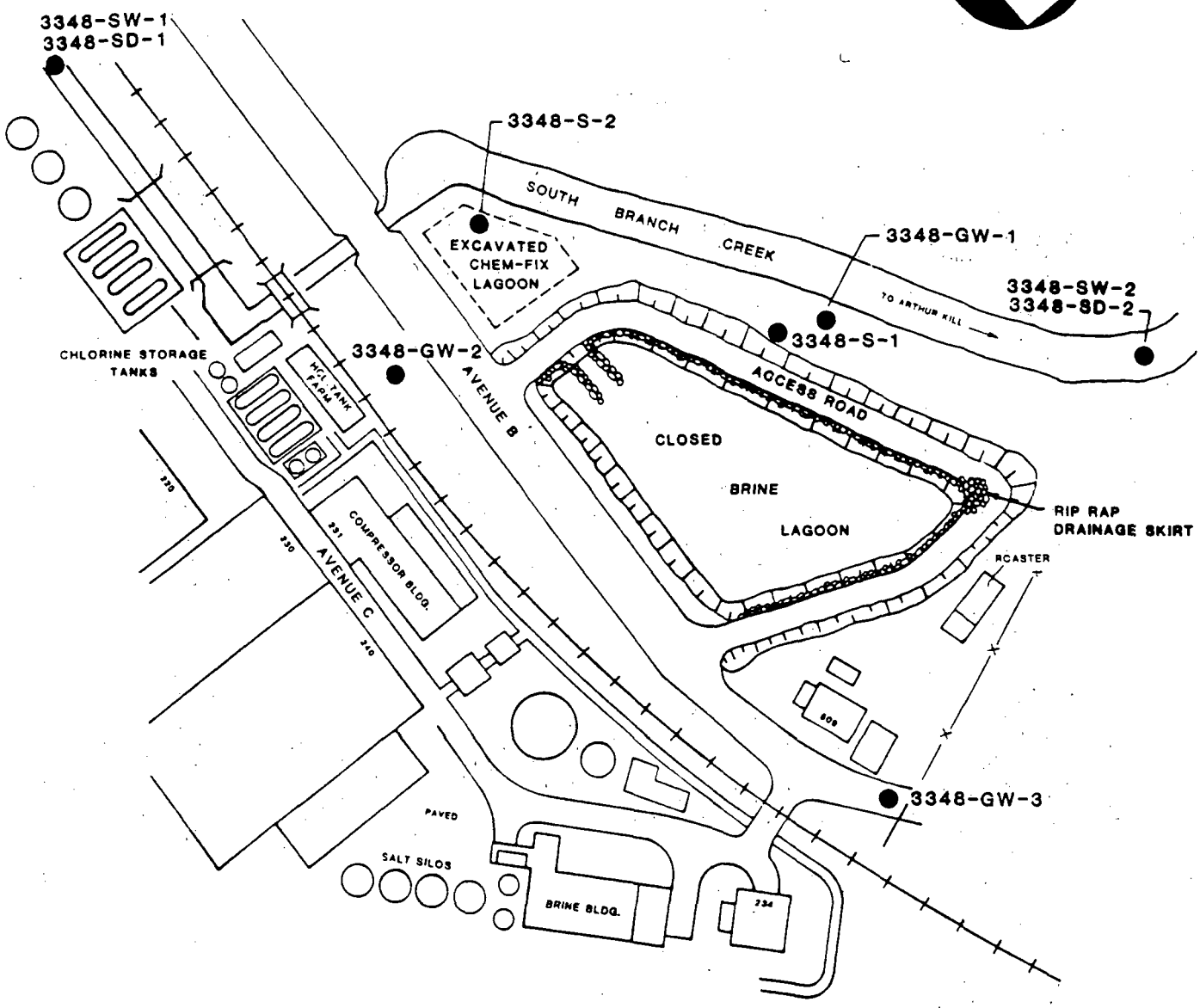
SCALE: 1" = APPROX. 100'

FIGURE A-2

NUS CORPORATION

A Halliburton Company

24 of 102



SAMPLE LOCATION MAP

LCP CHEMICALS SITE, LINDEN, N.J.

(NOT TO SCALE)

FIGURE A-3

NUS CORPORATION

A Halliburton Company

PHOTOGRAPH INDEX

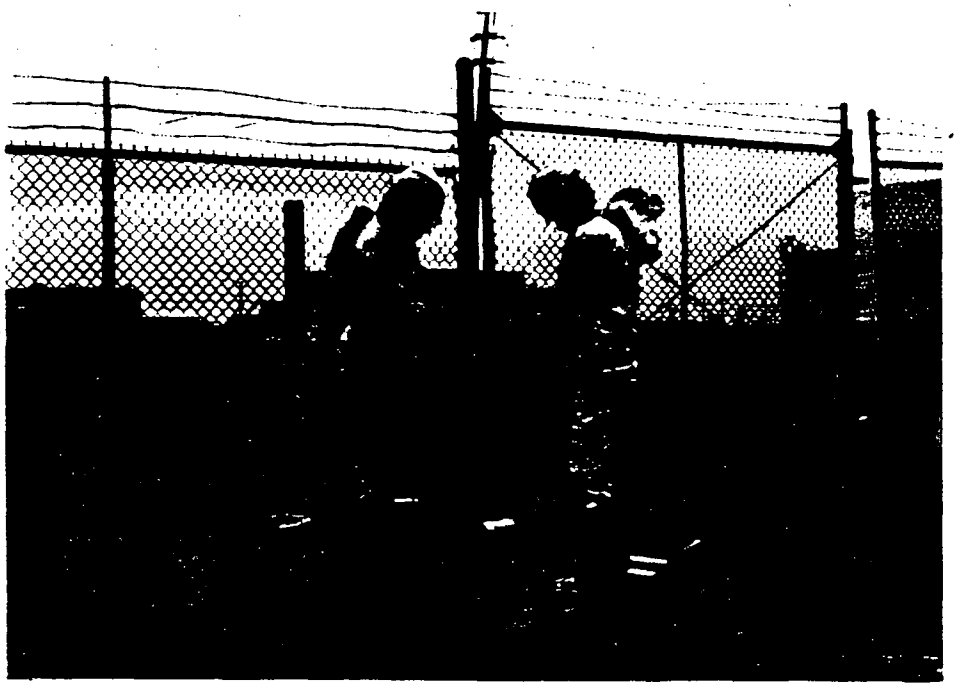
LCP CHEMICALS
LINDEN, NEW JERSEY

SEPTEMBER 27, 1984

Photo Number	Description	Time
1.	September 27, 1984 Dennis Farley (NUS) and Mike Nicholas (NUS) collect sample 3348-GW-3, a groundwater sample, from monitoring well #5. Figure 3 provides a sample location map.	1255 hrs.
2.	September 27, 1984 Dennis Farley (NUS) and Mike Nicholas (NUS) collect sample 3348-GW-1, a groundwater sample, from monitoring well #2. Figure 3 provides a sample location map.	1337 hrs.
3.	September 27, 1984 Mike Nicholas (NUS) collects sample 3348-SW-1, an upstream surface water sample, from S. Branch Creek. Greg Burchette (NUS) carries the clean sampling equipment. Figure 3 provides a sample location map.	1423 hrs.
4.	September 27, 1984 Mike Nicholas (NUS) collects sample 3348-SD-1, an upstream sediment sample from S. Branch Creek. Greg Burchette (NUS) carries the clean sampling equipment. Figure 3 provides a sample location map.	1427 hrs.
5.	September 27, 1984 Dennis Farley (NUS) and Mike Nicholas (NUS), collect sample 3348-GW-2, a groundwater sample, from monitoring well #4. Figure 3 provides a sample location map.	1437 hrs.
6.	September 27, 1984 Dennis Farley (NUS) collects sample 3348-SW-2 a downstream surface water sample, from S. Branch Creek. Figure 3 provides a sample location map.	1517 hrs.

Photo Number	Description	Time
7.	September 27, 1984 Dennis Farley (NUS) collects sample 3348-SD-2, a downstream sediment sample, from S. Branch Creek. Figure 3 provides a sample location map.	1513 hrs.
8.	September 27, 1984 Dennis Farley (NUS) collects sample 3348-S-1, a soil sample between S. Branch Creek and the Closed Brine Sludge Lagoon. Figure 3 provides a sample location map.	1540 hrs.
9.	September 27, 1984 Dennis Farley (NUS) collects sample 3348-S-2, a soil sample, from the area of the excavated "Chem-Fix Lagoon." Figure 3 provides a sample location map.	1547 hrs.

NUS CORPORATION



1. September 27, 1984 1255 hrs.
Dennis Farley (NUS) and Mike Nicholas (NUS) collect sample 3348-GW-3, a groundwater sample, from monitoring well #5 Figure 3 provides a sample location map.

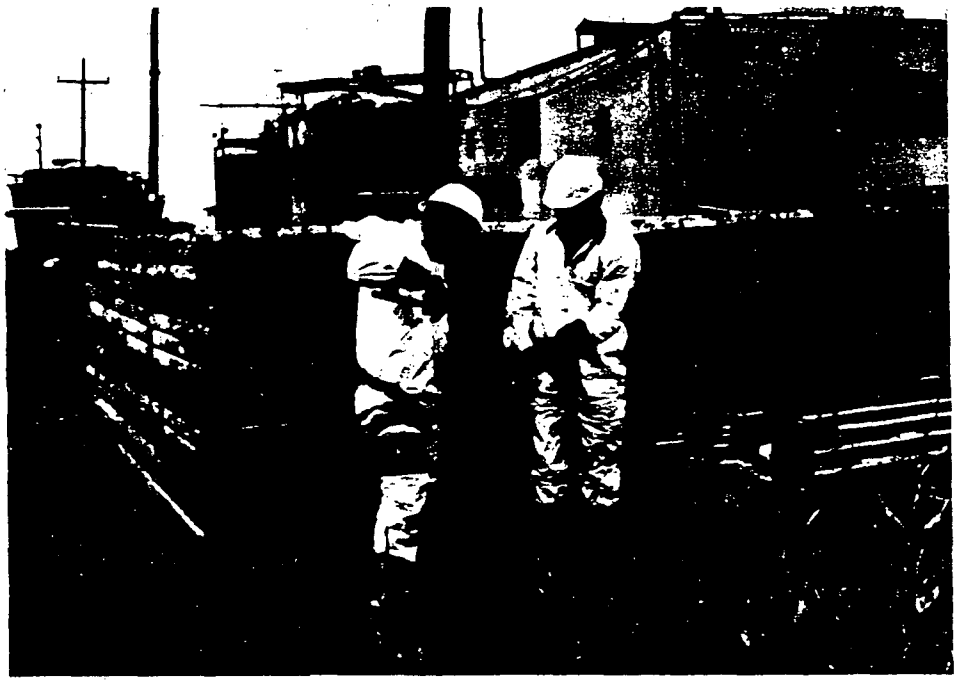
2. September 27, 1984 1337 hrs.
Dennis Farley (NUS) and Mike Nicholas (NUS) collect sample 3348-GW-1, a groundwater sample, from monitoring well #2. Figure 3 provides a sample location map.

NUS CORPORATION

3. September 27, 1984 1423 hrs.
Mike Nicholas (NUS) collects sample 3348-SW-1, an upstream surface water sample, from S. Branch Creek. Greg Burchette (NUS) carries the clean sampling equipment. Figure 3 provides a sample location map.

4. September 27, 1984 1427 hrs.
Mike Nicholas (NUS) collects sample 3348-SD-1, an upstream sediment sample from S. Branch Creek. Greg Burchette (NUS) carries the clean sampling equipment. Figure 3 provides a sample location map.

NUS CORPORATION



5. September 27, 1984 1437 hrs.
Dennis Farley (NUS) and Mike Nicholas (NUS), collect sample 3348-GW-2, a groundwater sample, from monitoring well #4. Figure 3 provides a sample location map.

6. September 27, 1984 1517 hrs.
Dennis Farley (NUS) collects sample 3348-SW-2 a downstream surface water sample, from S. Branch Creek. Figure 3 provides a sample location map.

NUS CORPORATION

7. September 27, 1984 1531 hrs.
Dennis Farley (NUS) collects sample 3348-SD-2, a downstream sediment sample, from S. Branch Creek. Figure 3 provides a sample location map.

8. September 27, 1984 1540 hrs.
Dennis Farley (NUS) collects sample 3348-S-1, a soil sample between S. Branch Creek and the Closed Brine Sludge Lagoon. Figure 3 provides a sample location map.

NUS CORPORATION

9. September 27, 1984 1547 hrs.
Dennis Farley (NUS) collects sample 3348-S-2, a soil sample, from the area of the excavated "Chem-Fix Lagoon." Figure 3 provides a sample location map.

SECTION 4

DOCUMENTATION RECORDS FOR HAZARDOUS RANKING SYSTEM

33f102

100364

R-584-12-84-9

FIT QUALITY ASSURANCE TEAM
DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference. Include the location of the document.

FACILITY NAME: LCP Chemicals

LOCATION: Foot of S. Wood Avenue, Linden, New Jersey

DATE SCORED: 12/12/84

PERSON SCORING: J.S. Cattafe

PRIMARY SOURCE(S) OF INFORMATION (e.g., EPA region, state, FIT, etc.):
NUS Region II FIT files - Site Inspection, Preliminary Accessment
NJDEP files

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

COMMENTS OR QUALIFICATIONS:
Direct contact was scored using a documented release of mercury to surface water and sediment in S. Branch Creek which borders the landfill.The analytical results of samples collected during the Site Inspection document a release of mercury to both the groundwater and surface water. Elevated concentrations of lead, arsenic and chromium were also detected, however there appears to be no evidence relating these contaminants to LCP Chemicals at the present time. Air route scored zero because samples taken won't confirm air contamination. This route should be scored zero based on SI readings.

100365

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

Mercury, Lead, Arsenic, Chromium

Ref: #10

Rationale for attributing the contaminants to the facility:

LCP Chemicals formerly used mercury as part of their chlorine production process. There appears to be no proof to connect lead, arsenic and chromium to LCP at the present time. Although Well #5 was designed as an upgradient well, the extent of the tidal influence on groundwater flow is unknown. This arises some questions as to the positioning of well #5 as an upgradient well.

Ref: #4

* * *

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern:

Brunswick formation - a sequence of alluvial sandstones and shales in which groundwater is transmitted through joints and bedding-plane fractures. The fractures are generally enlarged in one direction causing groundwater to move preferentially along this set of fractures. There appears to be no overall trend in the direction of the enlarged fractures.

Ref: #1, #3

Depth(s) from the ground surface to the highest seasonal level of the saturated zone water table(s) of the aquifer of concern:

Approximately 40-50 feet.

Ref: #3

Depth from the ground surface to the lowest point of waste disposal/storage:

The waste is contained in a landfill constructed above grade and is actually a few feet above the natural ground surface.

Ref: #4

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

45 inches

Ref: #7

Mean annual lake or seasonal evaporation (list months for seasonal):

33 inches

Ref: #7

Net precipitation (subtract the above figures):

12 inches

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Alluvium - silts, clays and some fine-grained sand

Ref: #4

Permeability associated with soil type:

10^{-5}-10^{-7} cm/sec

This range is based on general flood plain sediment permeabilities.

Ref: #6

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Solid. - The waste is composed of dewatered and compacted brine sludge and mercury contaminated carbon.

Ref: #4

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Waste is contained in a closed (capped) brine sludge lagoon. The lagoon is unlined allowing a release of contaminants to the local groundwater.

Ref: #4

Method with highest score:

Surface impoundment with no liner.

Ref: #5

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Mercury (elemental, inorganic)

Ref: #4

Compound with highest score:

Mercury (elemental, inorganic)

Ref: #5

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

30,900 cubic yards

Ref: #4

Basis of estimating and/or computing waste quantity:

LCP estimated the quantity of waste in the Brine Sludge lagoon as of February, 1983, just prior to closure.

Ref: #4

* * *

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5 TARGETS

Groundwater Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

Groundwater is used for industrial purposes in the city of Linden, New Jersey.

Ref: #3

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Along S. Wood Ave., just south of school #6.

Ref: #3

Distance to above well or building:

Approximately 2.75 miles.

Ref: #3

Population Served by Groundwater Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

N/A. Linden, New Jersey's water is supplied by the Elizabethtown Water Company. The source is two reservoirs which are located in Clinton, N.J. approximately 30 miles to the west. The well mentioned above serves the town of Rahway, New Jersey.

Ref: #4

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre).

N/A. Locally, the land is not used for agricultural purposes. Industry surrounds the site within a radius of 1.5 miles and charges to a densely populated urban environment beyond that point.

Ref: #8

Total population served by groundwater within a 3-mile radius:

N/A. For reasons stated above.

Ref: #4

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SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

Mercury, Lead, Cadmium

Rationale for attributing the contaminants to the facility:

LCP Chemicals formerly used mercury in their chlorine production process. Concentrations of mercury, lead and cadmium are all elevated in the downstream sample as compared to the upstream sample in S. Branch Creek.

* * *

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

25% The facility rises to a point approximately twelve feet above grade. The slope is equal in all directions.

Ref: #4

Name/description of nearest downslope surface water:

South Branch Creek, a tributary to the Arthur Kill River lies approximately 30' to 50' east of the site. The creeks confluence with the Arthurkill is approximately 1000' down stream.

Ref: #3, #8

Average slope of terrain between facility and above-cited surface water body in percent:

15%

Ref: #4

Is the facility located either totally or partially in surface water?

No, the base of the facility lies approximately five to seven feet above the high tide level of S. Branch Creek.

Ref: #4

Is the facility completely surrounded by areas of higher elevation?

No, the facility is surrounded by areas of lower elevation.

Ref: #4

1-Year 24-hour Rainfall in Inches

2.5 inches

Ref: #7

Distance to Nearest Downslope Surface Water

30'-50'

Ref: #4

Physical State of Waste

Solid - the waste consists of dewatered sludge and solids.

Ref: #4

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Waste is contained in a closed (capped) brine sludge lagoon. The lagoon is unlined.

Ref: #4

Method with highest score:

Surface impoundment with no liner.

Ref: #6

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Mercury (elemental, inorganic)

Ref: #4

Compound with highest score:

Mercury (elemental, inorganic)

Ref: #5

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

30,900 cubic yards

Ref: #4

Basis of estimating and/or computing waste quantity:

LCP made estimates based on volume of waste in the brine sludge lagoon as of February, 1983, just prior to closure.

Ref: #4

* * *

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Recreation - Boating was observed along stretches of the Arthur Kill River

Ref: #4

Is there tidal influence?

Yes, the tidal range in S. Branch Creek was approximately two feet. Effects of this tidal influence were observed in down-gradient monitoring well #2.

Ref: #4

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

The site is situated within a coastal wetland.

Ref: #4, #8

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

N/A

Ref: #4, #8

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

The wetlands surrounding the site are breeding grounds for water fowl which could be consumed by the peregrine falcon. Falco peregrinus disappeared along the east coast in the early 1960's as a result of DDT contamination. They are now being reintroduced to the area.

Ref: #4

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

N/A - The Arthur Kill River is not used as a source of potable water or irrigation.

Ref: #4

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

N/A

Ref: #4, #8

Total population served:

N/A

Ref: #4

Name/description of nearest of above water bodies:

N/A

Ref: #4, #8

Distance to above-cited intakes, measured in stream miles.

N/A

Ref: #4

AIR ROUTE

1 OBSERVED RELEASE

Contaminants detected:

Date and location of detection of contaminants

Methods used to detect the contaminants:

Rationale for attributing the contaminants to the site:

A mercury detector and on HCL Draeger Assembly were employed to screen the air at the site. The instruments did not detect the presence of contaminants in the ambient air.

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Mercury (elemental, inorganic)

Ref: #5

Most incompatible pair of compounds:

(HgO, HgS, Hg, Hg_3P_2) and Cl_2, LCP produces Cl_2 gas at their Linden facility.

Ref: #5

Toxicity

Most toxic compound:

Mercury (elemental, inorganic)

Ref: #5

Hazardous Waste Quantity

Total quantity of hazardous waste:

30,900 cubic yards

Ref: #4

Basis of estimating and/or computing waste quantity:

LCP made estimates of waste volume in the Brine sludge lagoon in February, 1983 just prior to closure.

Ref: #4

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi	0 to 1 mi	0 to 1/2 mi	0 to 1/4 mi
201,010	7	0	0

Ref: #2

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

The site is situated within a coastal wetland.

Ref: #4, #8

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

N/A

Ref: #4, #8

Distance to critical habitat of an endangered species, if 1 mile or less:
The wetlands which surround the site are breeding of grounds for water fowl which could be consumed by the peregrine falcon. Falco peregrinus disappeared along the east coast in the early 1960's as a result of DDT contamination. They are now being reintroduced to the area.
Ref: #4

Land Use

Distance to commercial/industrial area, if 1 mile or less:
The site is surrounded by an industrial area.
Ref: #8

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:
N/A
Ref: #8

Distance to residential area, if 2 miles or less:
A residential section of Linden, New Jersey is situated 1.5 miles to the west.
Ref: #8

Distance to agricultural land in production within past 5 years, if 1 mile or less:
N/A
Ref: #8

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:
N/A
Ref: #8

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?
N/A
Ref: #4, #8

FIRE AND EXPLOSION

1 CONTAINMENT

Hazardous substances present:

Mercury (elemental, inorganic)

Ref: #4

Type of containment, if applicable:

The facility is a former brine sludge lagoon which has been dewatered, compacted, capped with two feet of clay and covered with six inches of soil stabilized with vegitation.

Ref: #4

* * *

2 WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Ignitability

Compound used:

Mercury (elemental, inorganic)

Ref: #4

Reactivity

Most reactive compound:

Mercury - reacts violently with chlorine gas. LCP produces Cl_2 gas at the Linden facility.

Ref: #5

Incompatibility

Most incompatible pair of compounds:

Mercury (HgO, HgS Hg, Hg_3P_2) and Cl_2, LCP produces Cl_2 gas at the Linden facility.

Ref: #5

* * *

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Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

30,900 cubic yards

Ref: #4

Basis of estimating and/or computing waste quantity:

LCP estimated the volume of waste in the Brine-Sludge lagoon as of February, 1983, just prior to closure.

Ref: #4

* * *

3 TARGETS

Distance to Nearest Population

LCP's Linden Plant is located 100-150 feet from the closed brine sludge lagoon. The closest residential population is approximately 1.5 miles away.

Ref: #4

Distance to Nearest Building

100' to 150'

Ref: #4

Distance to Sensitive Environment

Distance to wetlands:

The site lies within the flood plain of the Arthur Kill River.

Ref: #4

Distance to critical habitat:

It is possible that the peregrine falcon may feed on the water fowl population of the adjacent wetlands. Falco peregrinus is being reintroduced to the area following its disappearance due to DDT poisoning.

Ref: #4

Land Use

Distance to commercial/industrial area, if 1 mile or less:

The closed brine sludge lagoon is on LCP property and approximately 100'-150' from the LCP plant.

Ref: #4

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

N/A

Ref: #8

Distance to residential area, if 2 miles or less:

A residential section of Linden, New Jersey is situated 1.5 miles west of the site.

Ref: #8

Distance to agricultural land in production within past 5 years, if 1 mile or less:

N/A

Ref: #8

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

N/A

Ref: #8

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

N/A

Ref: #4, #8

Population Within 2-Mile Radius

20,011

Ref: #2

Buildings Within 2-Mile Radius

7178

Ref: #2

DIRECT CONTACT

1 OBSERVED INCIDENT

Date, location, and pertinent details of incident:

* * *

2 ACCESSIBILITY

Describe type of barrier(s):

A security fence surrounds LCP's facility on three sides. A 24-hour security guard house is situated at entrance to the compound. S. Branch Creek which borders the sites eastern boundary exhibits levels of mercury above the U.S. EPA. Ambient Water Quality Standards. The sediment along the creek also shows elevated concentrations of lead and mercury.

Ref: #4

* * *

3 CONTAINMENT

Type of containment, if applicable:

The mercury contaminated waste is contained in a closed brine sludge lagoon. Closure features include a two-foot clay cap, vegitative cover and run off management system. The facility is unlined.

Ref: #4

* * *

4 WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

Mercury (elemental, inorganic)

Ref: #4

Compound with highest score:

Mercury (elemental, inorganic)

Ref: #5

5 TARGETS

Population Within One-Mile Radius

0

Ref: #2

Distance to Critical Habitat (of Endangered Species)

The peregrine falcon, which is begin reintroduced to the area, may feed on locally contaminated water fowl.

Ref: #4

SECTION 5

HAZARDOUS RANKING SYSTEM SCORING FORMS

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Facility name: LCP Chemicals

Location: Foot of S. Wood Avenue

EPA Region: II

Persons(s) in charge of the facility: Contact during site inspection: Mark McLaughlin

Technical Supervisor

Replacement as of December 1984 - Terry Duran

Name of Reviewer: J.S. Cattafe **Date:** 12/17/84

General description of the facility:
(For example: landfill surface impoundment pile, container; types of hazardous substances; location of the facility; contamination route of major concern; type of information needed for rating; agency action, etc.)

LCP Chemicals is located in the Tremly Point section of Linden, New Jersey, a heavily industrialized area along the low lying wetlands of the Arthurkill River. The subject of the Site Inspection is a closed brine sludge lagoon, which accepted mercury contaminated waste. The facility lies within the LCP compound and adjacent to S. Branch Creek, a tributary of the Arthurkill River. The waste is situated five to seven feet above the high tide level of S. Branch Creek.

Score: S_M 13.1 (S_{gw} 6.12 S_{sw} 21.82 S_a = 0)

S_{FE} =18.89

S_{DC} =20.83

HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
	Total Route Characteristics Score			15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	8	8	
	Total Waste Characteristics Score		26	26	
5 Targets					3.5
Ground Water Use	0 1 2 3	3	3	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 35 40	1	0	40	
	Total Targets Score		3	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			3510	57,330	
7 Divide line 6 by 57,330 and multiply by 100		S_{gw} =	6.12		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	45	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
1-yr. 24-hr. Rainfall	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	8	8	
Total Waste Characteristics Score			26	26	
5 Targets					4.5
Surface Water Use	0 1 2 3	3	6	9	
Distance to a Sensitive Environment	0 1 2 3	2	6	6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	0	40	
Total Targets Score			12	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			14,040	64,350	
7 Divide line 6 by 64,350 and multiply by 100		S_{sw} = 21.82			

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	0	45	5.1
Date and Location:					
Sampling Protocol:					
If line 1 is 0, the S_a = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2 Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 (3)	1	3	3	
Toxicity	0 1 2 (3)	3	9	9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)	1	8	8	
	Total Waste Characteristics Score		20	20	
3 Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 (21) 24 27 30	1	21	30	
Distance to Sensitive Environment	0 1 2 (3)	2	6	6	
Land Use	0 1 2 (3)	1	3	3	
	Total Targets Score		30	39	
4 Multiply 1 x 2 x 3			0	35,100	
5 Divide line 4 by 35,100 and multiply by 100		S_a =	0		

FIGURE 9
AIR ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	6.12	37.45
Surface Water Route Score (S_{sw})	21.82	476.11
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		513.56
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		22.66
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		13.1

FIGURE 10
WORKSHEET FOR COMPUTING S_M

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Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1	1	3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1	0	3	
Ignitability	0 1 2 3	1	0	3	
Reactivity	0 1 2 3	1	3	3	
Incompatibility	0 1 2 3	1	3	3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	8	8	
Total Waste Characteristics Score			17	20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1	4	5	
Distance to Nearest Building	0 1 2 3	1	2	3	
Distance to Sensitive Environment	0 1 2 3	1	3	3	
Land Use	0 1 2 3	1	2	3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1	4	5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1	1	5	
Total Targets Score			16	24	
4 Multiply 1 x 2 x 3			272	1,440	
5 Divide line 4 by 1,440 and multiply by 100			S_{FE} = 18.89		

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Incident	0 45	1	0	45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 3	1	1	3	8.2
3 Containment	0 15	1	15	15	8.3
4 Waste Characteristics Toxicity	0 1 2 3	5	5	15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4	5	20	
Distance to a Critical Habitat	0 1 2 3	4	12	12	
Total Targets Score			20	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			420	21,600	
7 Divide line 6 by 21,600 and multiply by 100		S_{DC} = 22.55			

FIGURE 12
DIRECT CONTACT WORK SHEET

100390

SECTION 6

BIBLIOGRAPHY OF INFORMATION SOURCES

BIBLIOGRAPHY OF INFORMATION SOURCES

HRS MODEL

	SOURCE	LOCATION
1.	Anderson, H.R., Geology and Groundwater Resources of the Rahway Area, New Jersey. USGS Special Report No. 27, Washington D. C.: Government Printing Office, 1968.	NUS Corp., Edison, NJ
2.	Graphical Exposure Modeling System. General Software Corporation, 1984.	NUS Corp., Edison, NJ
3.	Nemikas, B., Geology and Groundwater Resources of Union County, New Jersey. USGS Water-Resources Investigations 76-73, 1976.	NUS Corp., Edison, NJ
4.	NUS Region II FIT Files.	NUS Corp., Edison, NJ
5.	Sax, N.I. Dangerous Properties of Industrial Materials. New York, N.Y.: Van Nostrand Reinhold Company, 1979.	NUS Corp., Edison, NJ
6.	The MITRE Corporation, users manual.	NUS Corp., Edison, NJ
7.	U.S. Environmental Protection Agency, "National Oil and Hazardous Substances Contingency Plan". Federal Register Vol. 47, No. 137, Washington D.C.: Government Printing Office, 1982.	NUS Corp., Edison, NJ
8.	United States Geological Survey. Arthurkill Quadrangle, New Jersey 7.5 Minute Series (Topographic). Reston, Va.: USGS, 1966.	NUS Corp., Edison, NJ
9.	Organic Sample Analyses from Environmental Monitoring and Services, Inc.	NUS Corp. Edison, NJ
10.	Inorganic Sample Analyses from JTC Environmental Consultants, Inc.	NUS Corp. Edison, NJ

NUS Corp. FIT Region II

SECTION 7

PRESS RELEASE SUMMARY–MITRE HAZARDOUS RANKING SYSTEM

Summary Statement
LCP Chemicals
Linden, New Jersey

LCP Chemicals, a division of LCP Chemicals and Plastics, Inc., operates a chlorine gas production facility at the foot of S. Wood Avenue in Linden, New Jersey. Chlorine gas is produced by the electrolysis of a sodium chloride brine. The process involved the use of a mercury cell for a period of several years during the 1970's. Sodium hydroxide (caustic soda) sludge, a biproduct of this process, was subsequently contaminated with mercury. The sludge was stored in a lagoon which was located between the production plant and S. Branch Creek to the east. LCP attempted to recover some of the mercury in an experimental chem-fix lagoon which was constructed at the edge of the main lagoon. The project was abandoned, and LCP changed their production procedures to eliminate the hazardous mercury component from the process.

In 1982 the US EPA ordered the LCP plant closed until the lagoon was secured and the hazard to plant workers was eliminated. LCP proposed to excavate the experimental lagoon and place the excavated material along with all mercury contaminated waste into the brine-sludge lagoon. The lagoon would subsequently be capped with an impermeable layer of clay. The proposal was accepted and closure procedures were completed during the fall of 1984.

The landfill covers an area of 62,500 square feet and rises to a point approximately 15 feet above S. Branch Creek, a tributary to the Arthur Kill River. LCP has installed five groundwater monitoring wells around the landfill. LCP samples these wells semi-annually and analyzes the samples for a list of 14 substances.

SECTION 8

ATTACHMENTS- CITED DOCUMENTS

State of New Jersey

JOHN A. GASTON, JR., P.E.
DIRECTOR

DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF WATER RESOURCES
CN 029
TRENTON, NEW JERSEY 08625

DERK C. HOFMAN, P.E.
DEPUTY DIRECTOR

CERTIFIED MAIL
RETURNED RECEIPT REQUESTED

LCP Chemicals & Plastics, Inc. - N.J.
Raritan Plaza II, Raritan Center
Edison, N.J. 08837

DEC 27 1983

Re: NJPDES Permit No. NJ0003778
Effective Date: 2-1-84

Dear Sir:

Enclosed is the final NJPDES/Ground Water Discharge Permit and Notice of Authorization to discharge pollutants to the ground water, issued in accordance with the New Jersey Pollutant Discharge Elimination System Regulations, N.J.A.C. 7:14A-1 et seq. Violation of any condition of this permit may subject you to significant penalties.

Within 30 calendar days following your receipt of this permit, under N.J.A.C. 7:14A-8.6 you may submit a request to the Administrator for an adjudicatory hearing to reconsider or contest the conditions of this permit. Regulations regarding the format and requirements for requesting an adjudicatory hearing may be found in N.J.A.C. 7:14A-8.9 through 8.13. The request should be made to:

Administrator
Water Quality Management Element
Division of Water Resources
CN-029
Trenton, New Jersey 08625

Application for renewal of this permit must be submitted at least 180 days prior to expiration of this permit pursuant to N.J.A.C. 7:14A-2.1(f)5.

If you have any questions on this action, please contact Robert Berg, Supervisor, Land Application of Wastewater at (609) 292-0424.

Very truly yours,

John J. Trela, Chief
Ground Water Discharge Permits Bureau
Water Quality Management

New Jersey Is An Equal Opportunity Employer

Table [illegible] Ground Water Monitoring Requirements and Limitations for Initial Interim NJPDES Permits for Industrial Waste Management Facilities and Hazardous Waste Interim Status Facilities

The permittee shall install and sample a total of 5 ground water monitoring wells according to the schedule below. All ground water elevations must be determined prior to pumping and sampling the ground water monitoring wells. Sampling of the ground water monitoring wells be performed according to the methodology specified in Section 6.12 of the NJPDES regulati and the Department's Field Procedures Manual for Water Data Acquisition. The permittee sha sample for all parameters for which there is an "X" to the left of the parameter name. Sampling shall be performed during the months which are specified for that parameter.

	PARAMETER	LIMITATION	SAMPLING MONTH	SAMPLE TYPE	REPORTING MONTH
___	Aldrin/Dieldrin	0.003 ppb	JanAprJulOct	Grab	FebMayAugNov
___	Ammonia-Nitrogen	0.5 ppm	JanAprJulOct	Grab	FebMayAugNov
X	Arsenic and Compounds	0.05 ppm	JanAprJulOct	Grab	FebMayAugNov
X	Barium	1.0 ppm	JanAprJulOct	Grab	FebMayAugNov
___	Benzidine	0.1 ppb	JanAprJulOct	Grab	FebMayAugNov
___	Biochemical Oxygen Demand (BOD_5)	ppm	JanAprJulOct	Grab	FebMayAugNov
X	Cadmium	0.01 ppm	JanAprJulOct	Grab	FebMayAugNov
___	Calcium	ppm	JanAprJulOct	Grab	FebMayAugNov
___	Chemical Oxygen Demand (COD)	ppm	JanAprJulOct	Grab	FebMayAugNov
X	Chloride	ppm	JanAprJulOct	Grab	FebMayAugNov
X	Chromium (Hexavalent) and Compounds	0.05 ppm	JanAprJulOct	Grab	FebMayAugNov
___	Coliform Bacteria	(1)	JanAprJulOct	Grab	FebMayAugNov
___	Color	None Noticeable	JanAprJulOct	Grab	FebMayAugNov
___	Copper	1.0 ppm	JanAprJulOct	Grab	FebMayAugNov
___	Cyanide	0.2 ppm	JanAprJulOct	Grab	FebMayAugNov
___	DDT and Metabolites	0.001 ppb	JanAprJulOct	Grab	FebMayAugNov
___	Endrin	0.004 ppb	JanAprJulOct	Grab	FebMayAugNov
___	Fecal Coliform, MPN per 100 ml	( )	JanAprJulOct	Grab	FebMayAugNov
___	Fluoride	2.0 ppm	JanAprJulOct	Grab	FebMayAugNov
___	Foaming Agents	0.5 ppm	JanAprJulOct	Grab	FebMayAugNov
___	Gross Alpha		JanAprJulOct	Grab	FebMayAugNov
___	Gross Beta		JanAprJulOct	Grab	FebMayAugNov
___	Hardness	ppm	JanAprJulOct	Grab	FebMayAugNov
X	Iron	0.3 ppm	JanAprJulOct	Grab	FebMayAugNov

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GROUND WATER MONITORING REQUIREMENTS AND LIMITATIONS - Page 2

	PARAMETER	LIMITATION		SAMPLING MONTH	SAMPLE TYPE	REPORTING MONTH
___	Kjeldahl Nitrogen		ppm	JanAprJulOct	Grab	FebMayAugNov
X	Lead and Compounds	0.05	ppm	JanAprJulOct	Grab	FebMayAu
___	Lindane		ppb	JanAprJulOct	Grab	FebMayAu
___	Magnesium		ppm	JanAprJulOct	Grab	FebMayAu
X	Manganese	0.05	ppm	JanAprJulOct	Grab	FebMayAugNov
X	Mercury and Compounds	0.002	ppm	JanAprJulOct	Grab	FebMayAugNov
___	Methoxychlor		ppb	JanAprJulOct	Grab	FebMayAugNov
___	Nitrate-Nitrogen (NO_3-N)		ppm	JanAprJulOct	Grab	FebMayAugNov
___	Odor and Taste	None Noticeable		JanAprJulOct	Grab	FebMayAugNov
___	Oil and Grease	10.0	ppm	JanAprJulOct	Grab	FebMayAugNov
X	pH		S.U.	JanAprJulOct	Grab	FebMayAugNov
X	Phenols		ppb	JanAprJulOct	Grab	FebMayAugNov
___	Phosphate, Total		ppm	JanAprJulOct	Grab	FebMayAugNov
___	Polychlorinated Biphenyls (PCBs)	0.001	ppb	JanAprJulOct	Grab	FebMayAugNov
___	Radionuclides	(2)		JanAprJulOct	Grab	FebMayAugNov
___	Radium			JanAprJulOct	Grab	FebMayAugNov
X	Selenium and Compounds		ppm	JanAprJulOct	Grab	FebMayAugNov
X	Silver and Compounds	0.05	ppm	JanAprJulOct	Grab	FebMayAugNov
X	Sodium		ppm	JanAprJulOct	Grab	FebMayAugNov
X	Specific Conductance (mmho·cm)			JanAprJulOct	Grab	FebMayAugNov
X	Sulfate		ppm	JanAprJulOct	Grab	FebMayAugNov
X	Total Dissolved Solids (TDS)		ppm	JanAprJulOct	Grab	FebMayAugNov
X	Total Organic Carbon (TOC)		ppm	JanAprJulOct	Grab	FebMayAugNov
X	Total Organic Halogen (TOH or TOX)		ppm	JanAprJulOct	Grab	FebMayAugNov
___	Total Volatile Organics by GC/MS Scan (3)	50	ppb	JanAprJulOct	Grab	FebMayAugNov
___	Toxaphene	0.005	ppb	JanAprJulOct	Grab	FebMayAugNov
___	Turbidity		ppm	JanAprJulOct	Grab	FebMayAugNov
___	Zinc and Compounds	5.0	ppm	JanAprJulOct	Grab	FebMayAugNov
___	2,4 D		ppb	JanAprJulOct	Grab	FebMayAugNov
___	2,4,5-TP Silvex		ppb	JanAprJulOct	Grab	FebMayAugNov

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GROUND WATER MONITORING REQUIREMENTS AND LIMITATIONS - Page 3

	PARAMETER	LIMITATION	SAMPLING MONTH	REPORTING MONTH
X	Elevation of Top of Monitor Well Casing (To be determined once, but reported as indicated)		JanAprJulOct	FebMayAugNov
X	Depth of Water Table from Top of Casing Prior to Sampling		JanAprJulOct	FebMayAugNov
X	Depth to Water Table from Original Ground Level Prior to Sampling		JanAprJulOct	FebMayAugNov

Notes: (1) A. By membrane filtration, not to exceed four per 100 ml in more than one sample when less than 20 are examined per month, or B. by fermentation tube, with a standard 10 ml portion, not to be present in three or more portions in more than one sample when less than 20 are examined per month, or C. prevailing criteria adopted pursuant to The Federal Safe Drinking Water Act (PL 93-523).

(2) Prevailing regulations adopted by USEPA pursuant to Sections 1412, 1415, and 1450 of The Public Health Services Act as amended by The Safe Drinking Water Act (PL 93-523).

(3) The minimum detection level shall be at least 10 ppb for all volatile organic chemicals. The concentration limit for specific volatile organic chemicals shall be that specified in Appendix F of the NJPDES regulations for the 10^{-5} Cancer Risk, but in no case shall the total concentration for all volatile organic chemicals exceed 50 ppb.

The Permittee shall complete the forms required on the "Monitoring Report - Transmittal Sheet" (Form T-VWX-014) which is included as a part of this Permit. Failure to submit sampling data on the forms required on the "Monitoring Report - Transmittal Sheet" shall be considered by the Department to be a violation of the Permit sampling requirements and may place the Permittee subject to civil and administrative penalties pursuant to N.J.S.A. 58:10A-10.

It shall be the Permittee's sole responsibility to maintain an adequate supply of the required report forms.

Dangerous Properties of Industrial Materials

Fifth Edition

N. IRVING SAX

Assisted by:

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VAN NOSTRAND REINHOLD COMPANY
NEW YORK CINCINNATI TORONTO LONDON MELBOURNE

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MERCUROUS HYPOPHOSPHATE. $Hg_4P_2O_6$, mw: 960.3.
THR = HIGH. See mercury compounds. Unstable. Decomp explosively. [*19*]

MERCUROUS IODATE. Yellowish crystals. $Hg_2(IO_3)_2$, mw: 751.06, mp: decomp.
THR = See mercury compounds, inorganic, and iodates.

MERCUROUS IODIDE. Yellow tetragonal crystals or amorphous powder. HgI, mw: 327.50, mp: sublimes @ 140°, bp: decomp @ 290°, d: 7.70.
Acute tox data: Oral LD_{50} (mouse) = 110 mg/kg; ipLD_{50} (mouse) = 50 mg/kg. [*3*]
THR = HIGH via oral and ip routes. See mercury compounds, inorganic, and iodides.

MERCUROUS MONOHYDROGEN-*o*-ARSENATE. Yellow-red crystals. Hg_2HAsO_4, mw: 541.14.
THR = HIGH. See arsenic compounds and mercury compounds, inorganic.

MERCUROUS NITRATE. Short, colorless, efflorescent crystals. $Hg_2(NO_3)_2 \cdot 2H_2O$, mw: 561.26, mp: 70°, d: 4.79 @ 4°.
Acute tox data: Oral LD_{50} (rat) = 297 mg/kg; oral LD_{50} (mouse) = 388 mg/kg; ipLD_{50} (mouse) = 5 mg/kg. [*3*]
THR = HIGH via oral and ip routes. See mercury compounds, inorganic, and nitrates. Violent reaction with C, P. [*19*]

MERCUROUS NITRATE, AMMONIATED. Syn: *black precipitate*. Black powder, $Hg_2ONH_2 \cdot Hg_2(NO_3)_2$, mw: 958.4.
THR = See mercury compounds, inorganic, and nitrates.

MERCUROUS NITRITE. Yellow crystals. $Hg_2(NO_2)_2$, mw: 493.24, mp: decomp @ 100°, d: 7.33.
THR = HIGH. See mercury compounds, inorganic, and nitrites.

MERCUROUS OXALATE. White crystals. $Hg_2C_2O_4$, mw: 489.24.
THR = See oxalates and mercury compounds, organic.

MERCUROUS OXIDE, BLACK. Black to grayish-black powder. Hg_2O, mw: 417.22, mp: decomp @ 100°, d: 9.8.
THR = HIGH. See mercury compounds, inorganic.
Fire Hazard: Mod. by chemical reaction; an oxidizer. Reacts violently with H_2O_2, K, Na, S, (H_2S + BaO + air). [*19*]
Disaster Hazard: Dangerous; when heated to decomp, emits highly toxic fumes of mercury; can react with reducing materials.

MERCUROUS PHOSPHATE. Heavy white powder. Hg_3PO_4, mw: 696.85.
THR = See mercury compounds, inorganic.

MERCUROUS SULFATE. White crystalline powder. Hg_2SO_4, mw: 497.28, mp: decomp, d: 7.56.
THR = See mercury compounds, inorganic, and sulfates.

MERCUROUS SULFIDE. Black crystals. Hg_2S, mw: 433.24, mp: decomp.
THR = See mercury compounds, inorganic, and sulfides.

MERCUROUS TARTRATE. Yellowish-white crystalline powder. $Hg_2C_4H_4O_6$, mw: 549.29.
THR = See mercury compounds, organic.

MERCURY. Silvery liquid, metallic element. Hg, atwt: 200.7, mp: −38.89°, bp: 356.9°, d: 13.546, vap. press: 1 mm @ 126.2°.
Acute tox data: Oral LD_{LO} (human) = 1429 mg/kg; inhal TC_{LO} (human) = 0.17 mg/m^3 for 40 yrs ⟶ CNS problems; ivTD_{LO} (human) = 29 mg/kg; ⟶ GI symptoms. [*3*]
THR = HIGH to CNS, GI tract. See mercury compounds. An exper neo. [*3*] Reacts violently with acetylene, NH_3, BPI_2, Cl_2, ClO_2, CH_3N_3, Na_2C_2, nitromethane (butyne diol + acid). [*19*]
Radiation Hazard: For permissible levels, see Section 5, Table 5A.5. Artificial isotope ^{203}Hg, $T_{\frac{1}{2}}$ = 47d. Decays to stable ^{203}Tl by emitting β's of 0.21 MeV. Emits γ's of 0.28 MeV.
Disaster Hazard: Dangerous; when heated emits highly toxic fumes.

MERCURY ACETAMIDE. White powder. CH_3CONHg, mw: 257.7.
THR = HIGH. See mercury compounds, organic.

MERCURY ACETATE. See mercurous acetate or mercuric acetate.

MERCURY ALANINE. See mercury-α-aminopropionate.

MERCURY-*p*-AMINOPHENOL ARSENATE. See mercury atoxylate.

MERCURY-α-AMINOPROPIONATE. Syn: *mercury alanine*. White crystals, water-sol. $Hg[CH_3CH(NH_2)COO]_2$, mw: 374.8.
THR = HIGH. See mercury compounds, organic.

MERCURY, AMMONIATED. See mercuric ammonium chloride.

MERCURY ANTIMONY SULFIDE. Gray-black powder. Mixture of equal parts of black mercury sulfide and gray antimony sulfide.
THR = See mercury compounds, antimony and sulfides.

MERCURY ARC RADIATION. A recog carc. [*14*]
See radiation, ultra-violet.

MERCURY ATOXYLATE. Syn: *mercury-p-aminophenol arsenate.* White powder. $C_{12}H_{14}O_6N_2As_2Hg$, mw: 632.71.
THR = HIGH. See arsenic compounds and mercury compounds, organic.

MERCURY BENZAMIDE. White powder. C_6H_5CONHg, mw: 319.7.
THR = HIGH. See mercury compounds, organic.

MERCURY BISULFATE. See mercuric sulfate.

MERCURY CARBOLATE. See mercuric phenate.

MERCURY COLLOIDAL. See mercury.

MERCURY COMPOUNDS, INORGANIC.
THR = Mercury is a general protoplasmic poison; after absorption it circulates in the blood and is stored in the liver, kidneys, spleen and bone. It is eliminated in the urine, feces, sweat, saliva and milk. In industrial poisoning, the chief effect is upon the CNS and upon the mouth and gums. Colitis has been reported frequently; a nephritis or nephrosis is rarely reported. Fulminate of mercury rarely produces symptoms of systemic poisoning, but frequently causes a dermatitis. The cardinal symptoms of industrial mercury poisoning are stomatitis, tremors, and psychic disturbances. Usually the first complaints are of excessive salivation and pain on chewing; in severe cases there may be gingivitis, with loosening of the teeth, and a dark line on the gum margins, resembling the "lead line." In slow poisoning the salivation may be absent, and the only complaint dryness of the throat and mouth. Tremor and psychic disturbances are commonly seen in the slow chronic form of the poisoning; the tremor is of the intention type, and may be seen when the patient spreads the outstretched fingers or protrudes the tongue, or attempts to perform specified movements. Muscles of the face, hands and arms are chiefly affected. In more severe cases there may also be convulsive or shaking movements; writing is frequently illegible. Hyperactive kneejerks and scanning speech may be present in advanced cases. The psychic disturbance (so called "erethism") includes such changes as loss of memory, insomnia, lack of confidence, irritability, vague fears and depression.

The dermatitis produced by fulminate of mercury takes the form of small, discrete ulcers on the exposed parts, and is usually accompanied by conjunctivitis and inflammation of the mu mem of the nose and throat.

Elemental mercury is probably not absorbed through the gastrointestinal tract, but many mercury compounds are. A number of mercury compounds, in addition to the fulminate, can cause skin irr and can be absorbed through the skin; they are strong allergens (Section 9).

These are common air contaminants.

Disaster Hazard: Dangerous; when heated to decomp, they emit highly toxic fumes of mercury.

MERCURY COMPOUNDS, N.O.S. LIQUID. See mercury compounds, inorganic and organic.

MERCURY COMPOUNDS, N.O.S. SOLID. See mercury compounds, inorganic and organic.

MERCURY COMPOUNDS, ORGANIC.
THR = The customary grouping of all organic mercurials in a single category is not fully justified by the toxicity of the compounds. Alkyl mercurials have very high toxicity, aryl compounds, particularly the phenyls, are much less toxic, and the organomercurials used in therapeutics are less toxic. The alkyls and aryls commonly cause skin burns and other forms of irr, and both can be absorbed through the skin. Fatal poisoning has occurred due to exposure to alkyl mercurials and permanent damage to the brain has been reported. Extensive human observation on exposure to the phenyl mercurials have shown no greater toxicity than is caused by metallic mercury. In fact, up to the present time there has not been an authenticated case of occupational poisoning due to the phenyl mercurials reported in the literature. Organic mercury compounds, like organic lead compounds, seem to have an affinity for lipoid-containing organs, resulting in CNS disturbances such as from tetraethyl lead. These are common air contaminants.

Disaster Hazard: Dangerous; when heated to decomp, they emit highly toxic fumes of mercury.

MERCURY CYANIDE. See mercuric cyanide.

MERCURY ETHYLENE DIAMINE SULFATE. See sublamin.

MERCURY FULMINATE, MERCURIC FULMINATE. See fulminate of mercury, dry.

MERCURY MORPHINE OLEATE. An oleaginous mass.
THR = See mercury compounds, organic, and morphine.

MERCURY NAPHTHENATE. White crystals; syn: *dinaphthyl mercury*, mw: 454.9, d: 1.929, bp: 249°, mp: 188°.
THR = See mercury compounds, organic.

MERCURY-β-NAPHTHOL. See mercuric naphtholate.

ion and may affect other tissues of the body in addi-
to those of the CNS; in many cases the chlorine
tive is quite toxic. Thus, chloroform, in addition
its narcotic qualities, may cause liver, heart, and
ney damage.

As a general rule, the unsaturated chlorine derivatives are highly narcotic but less toxic than the saturated derivatives, thus causing degenerative changes in the liver and kidneys less frequently. In the saturated group, the narcotic effect is enhanced with an rease in the number of chlorine atoms. However, there is less relationship between the number of chlorine atoms present and the toxicity of the compound.

In dealing with these chlorinated HC, it must be nembered that a toxic action may result from repeated exposure to conc which are too low to produce narcotic effect, and which, consequently, are too v to give warning of danger. Individual susceptibility is also important when poisoning by this group of solvents is being considered. Certain workmen may seriously affected by conc that seem to have no ect on fellow employees in the same exposure. A (S)carc of the liver, lung, skin and blood forming tissues. [*14*]

saster Hazard: Dangerous; when heated to decomp, they emit highly toxic fumes of phosgene; they react violently with Al, liquid O_2, K, Na. [*19*]

RINATED HYDROCARBONS, AROMATIC. In most instances it is difficult to predict the toxicity these compounds. However, in the case of most aromatic chlorine compounds, their toxicity is usually no greater, and frequently is less, than that of the corresponding aromatic hydrocarbons, with the notable ception of naphthalene. A (S) carc. [*14*]

re Hazard: U.

Explosion Hazard: React violently with Al, liquid O_2, K, Na. [*19*]

saster Hazard: Dangerous; when heated to decomp, they emit toxic fumes; they can react with oxidizing materials.

ORINATED HYDROCHLORIC ETHER. See ethylidene chloride.

ORINATED LIME. See bleaching powder.

HLORINATED NAPHTHALENES.

THR = HIGH irr via oral, inhal and dermal routes. A (S) carc of liver. [*14*] Also see chlorinated diphenyls. The action of the chlorinated naphthalenes on the body is quite similar to that of the chlorinated diphenyls, the chief effects being the production of chloracne of the skin and, systematically, an te yellow atrophy of the liver. [*14*]

ster Hazard: Dangerous; see chlorides.

CHLORINATED PHENOLS.

THR = HIGH irr via oral, inhal and dermal routes. An exper (+) carc. [*3, 1*]

Disaster Hazard: Dangerous; when heated to decomp, they emit highly toxic fumes.

CHLORINATED TRIPHENYLS.

THR = MOD to LOW oral; MOD via dermal routes. An exper (+) transplacental carc. [*3, 1*] See also chlorinated diphenyls.

Disaster Hazard: Dangerous; when heated to decomp, they emit highly toxic fumes of chlorides.

CHLORINE. Greenish-yellow gas, liquid, or rhombic crystals. Cl_2, mw: 70.914, mp: −101°, bp: −34.5°, d: (liq) 1.47 @ 0° (3.65 atm), vap. press: 4800 mm @ 20°, vap. d: 2.49.

Acute tox data: Inhal TC_{LO} (human) = 15 ppm ⟶ pulmonary problems; inhal LD_{LO} (humans) = 430 ppm for 30 min; inhal LC_{50} (rat) = 293 ppm for 1 hr. [*3*]

THR = HIGH irr via inhal route. Chlorine is extremely irr to the mu mem of the eyes and the respiratory tract. It combines with moisture to liberate nascent oxygen and form hydrochloric acid. Both these substances, if present in quantity, cause inflammation of the tissues with which they come in contact. If the lung tissues are attacked, pulmonary edema may result. A conc of 3.5 ppm produces a detectable odor; 15 ppm causes immediate irritation of the throat. Conc of 50 ppm are dangerous for even short exposures, 1,000 ppm may be fatal, even where the exposure is brief.

Because of its intensely irritating properties, severe industrial exposure seldom occurs, as the workman is forced to leave exposure before he can be seriously affected. In cases where this is impossible, the initial irr of the eyes and mu mem of the nose and throat is followed by cough, a feeling of suffocation, and later, pain and a feeling of constriction in the chest. If exposure has been severe, pulmonary edema may follow, with rales being heard over the chest. It is a common air contaminant.

Radiation Hazard: For permissible levels, see Section 5, Table 5A.5. Artificial isotope ^{36}Cl, $T_{\frac{1}{2}} = 3 \times 10^5$y, decays to stable ^{36}A via β's of 0.71 MeV.

Fire Hazard: Can react to cause fires or explosions upon contact with turpentine, ether, ammonia gas, illuminating gas, hydrocarbons, hydrogen and powdered metals, polydimethyl siloxane, polypropylene, drawing wax, rubber, sulfamic acid, $As_2(CH_3)_4$, UC_2, acetaldehyde, C_2H_2, alcohols, alkyl isothiourea salts, alkyl phosphines, Al, Sb, As, AsS_2, AsH_3, Ba_3P_2, C_6H_6, Bi, B, BPI_2, B_2S_3, brass, BrF_5, Ca, (CaC_2 + KOH), $Ca(ClO_2)_2$, Ca_3N_2, Ca_3P_2, C, CS_2,

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Cs, $CsHC_2$, Co_2O, Cs_3N, ($C + Cr(OCl)_2$), Cu, CuH_2, CuC_2, dialkyl phosphines, diborane, dibutyl phthalate, $Zn(C_2H_5)_2$, C_2H_6, C_2H_4, ethylene imine, $C_2H_5PH_2$, F_2, Ge, glycerol, $(NH_2)_2$, (H_2O + KOH), I_2, hydroxylamine, Fe, FeC_2, Li, Li_2C_2, Li_6C_2, Mg, Mg_2P_3, Mn, Mn_3P_2, HgO, HgS, Hg, Hg_3P_2, CH_4, Nb, NI_3, OF_2, H_2SiO, (OF_2 + Cu), PH_3, P, $P(SNC)_3$, P_2O_3, PCB's, K, KHC_2, KH, Ru, $RuHC_2$, Si, SiH_2, Ag_2O, Na, $NaHC_2$, Na_2C_2, SnF_2, SbH_3, Sr_3P, Te, Th, Sn, WO_2, U, V, Zn, ZrC_2. [*19*]

Disaster Hazard: Dangerous; when heated, emits highly toxic fumes; will react with water or steam to produce toxic and corrosive fumes of hydrogen chloride.

CHLORINE AZIDE. Syn: *chlor(o)azide.* An explosive gas. ClN_3, mw: 77.48.

THR = HIGH irr via inhal route.

Explosion Hazard: Severe, when shocked, exposed to heat, flame or 1,3-butadiene, C_2H_6, C_2H_4, CH_4, C_3H_8. [*19*]

Disaster Hazard: Dangerous; shock can explode it; when heated to decomp, emits highly toxic fumes of chlorine and NO_x; will react with water or steam to produce toxic and corrosive fumes of hydrogen chloride.

CHLORINE CYANIDE. See cyanogen chloride.

CHLORINE DIOXIDE. Red-yellow gas or orange-red crystals. ClO_2, mw: 67.5, mp: −59°, bp: 9.9° @ 731 mm explodes, d: 3.09 g/liter @ 11°.

Acute tox data: Inhal TC_{LO} (human) = 19 ppm. [*3*]

THR = HIGH irr via inhal route.

Fire Hazard: Dangerous, a powerful oxidizer.

Disaster Hazard: Dangerous; reacts violently with P, KOH, S, conc @ from 0.1 to 1 atm of > 10% in air explodes, also F_2Hg, organic matter, NHF_2. [*19*] When heated to decomp, emits highly toxic fumes of chlorine; will react with water or steam to produce toxic and corrosive fumes of hydrochloric acid.

CHLORINE DIOXIDE HYDRATE, FROZEN. See chlorine dioxide.

CHLORINE FLUOROXIDE. ClOF, mw: 70.5.

THR = HIGH irr via inhal route. Explosively unstable. [*19*]

CHLORINE HEPTAOXIDE. Colorless oil. Cl_2O_7, mw: 182.91, mp: −91.5°, bp: 82°, vap. press: 100 mm @ 29.1°.

THR = HIGH irr poison. Very unstable.

Fire Hazard: Dangerous; a very powerful oxidizing agent.

Explosion Hazard: Severe, when shocked or exposed to heat or flame.

Disaster Hazard: Dangerous; shock or heat will ex plode it; on decomp, emits highly toxic fumes o chlorine; will react with water or steam to produc toxic and corrosive fumes.

CHLORINE HYDRATE. Rhombic light yellow crys tals. $Cl_2 \cdot 8H_2O$, mw: 215.04, mp: decomp @ 9.6°, c 1.23.

THR = HIGH irr and tox. See also chlorine.

Disaster Hazard: Dangerous; see chlorine; will reac with water or steam to produce toxic and corrosiv fumes.

CHLORINE MONOFLUORIDE. Nearly colorless gas ClF, mw: 54.46, mp: −154 ± 0.5°, bp: −100.8°, d 1.62 @ −100°.

THR = HIGH irr via inhal route. A very irr poison Very unstable. Reacts violently with water, Te, or ganic matter. [*19*] See fluorides and chlorine.

CHLORINE MONOXIDE. Yellow-red gas or red brown liquid. Cl_2O, mw: 86.91, mp: −20°, bp: 2.2° d: 3.89 g/liter @ 0°, lel = 23.5%, uel = 100%.

THR = See chlorine.

Explosion Hazard: Severe, when shocked or expose to heat of 39°. Reacts violently with NH_3, Sb Sb_2S_3, Se, BaS, Ca_3P_2, C, CS_2, charcoal, H_2S, HgS metal sulfides, NO, organic matter, PH_3, P, S, SnS SnS_2, turpentine. [*19*]

Fire Hazard: Very dangerous via heat, flame or re ducing agents.

Disaster Hazard: Dangerous; see chlorine; will reac with water or steam to produce toxic and corrosiv fumes. When heated it explodes.

CHLORINE TETROXIDE. See chlorine dioxide.

CHLORINE TETROXYFLUORIDE. See fluorine per chlorate.

CHLORINE TRIFLUORIDE. Colorless gas to yellow liquid, sweet odor, ClF_3, mw: 92.46, mp: −83°, bp 11.8°, d: 1.77 @ 13°.

THR = HIGH irr via inhal route. See also fluorides chlorine and fluorine.

Fire Hazard: Dangerous. Spont flam.

Explosion Hazard: Reacts violently with organi matter, glass wool, acetic acid, Al, Sb, As, Cu, H I_2, Ir, Fe, Pb, Mg, Mo, Os, P, K, Rh, Se, Si, Ag Na, S, Te, Sn, W, Zn, oxides, NH_3, benzene, CO CrO_3, ether, graphite, H_2S, HgI_2, HNO_3, K_2CO_3 KI, rubber, $AgNO_3$, NaOH, H_2SO_4, V_2P_5, water WO_3. [*19*]

Disaster Hazard: Dangerous; when heated to decomp or on contact with acid or acid fumes, emits highly toxic fumes; will react with water or steam to produce much heat and toxic and corrosive fumes; reacts vigorously with reducing materials.

DRAFT

GRAPHICAL EXPOSURE MODELING SYSTEM

(GEMS)

USER'S GUIDE

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF PESTICIDES AND TOXIC SUBSTANCES
EXPOSURE EVALUATION DIVISION
Task No. 4
Contract No. 68016618
William Wood - Project Officer
Loren Hall - Task Manager

Prepared by:

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Submitted: June 25, 1984

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(Selected Files)	data on the following environmental parameters: agriculture, climate, vegetation, forestry, air quality, land, natural areas, population, water quality, terrain (soils) and wildlife.
GAGE	The GAGE dataset contains primarily stream flow rates monitored consistently by approximately 99,500 stream gaging stations throughout the country, and some estimated flows.
IFDDIR	IFDDIR contains industrial facility data for approximately 28,000 direct dischargers excluding publicly owned treatment works (POTWs)
IFDIND	IFDIND contains limited industrial facility data for approximately 12,000 indirect dischargers which discharge through other facilities, usually POTWs.
Master Area Reference File (MARF) 1980 census	This dataset contains a variety of location identification information, population count by race, the number of occupied and owner-occupied

TABLE 2-2. GEMS Datasets (Continued)

DATASET NAME	DESCRIPTION
	number of families for all the enumeration district/block groups for continental USA, Hawaii, and Alaska.
Meteorological Data	Several meteorological data files are contained in this category: (1) the Stability Tabular Array (STAR) data file has meteorological data for 394 first order weather stations in the continental USA, (2) A master index file (STARSEL), and (3) An auxiliary file (AUX).
Publicly Owned Treatment Works (POTWs)	This dataset contains 1982 survey data on the unit treatment process, the influent and effluent and hour rates, and the population served by 33,000 publicly owned treatment works around the country.

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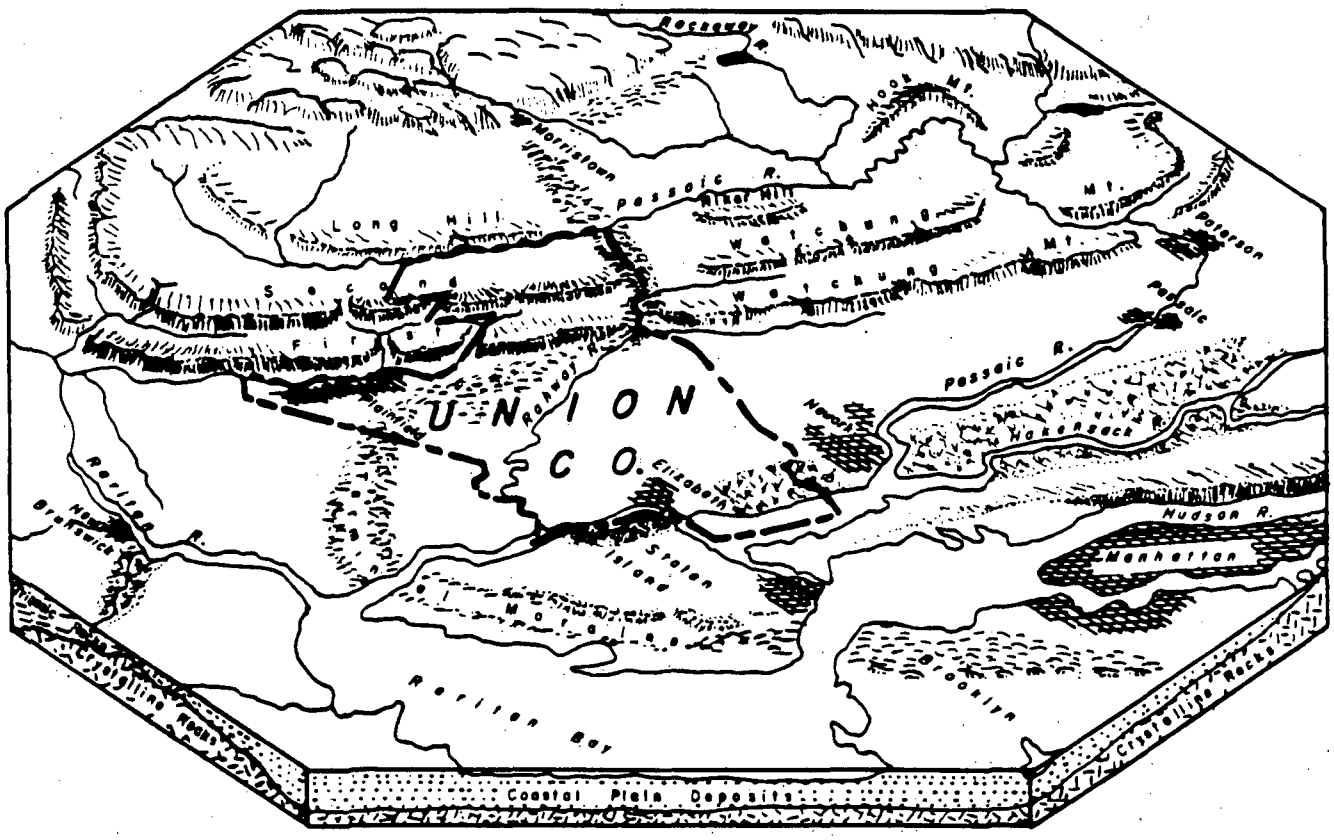
GEOLOGY AND GROUND-WATER RESOURCES OF UNION COUNTY, NEW JERSEY

U.S. GEOLOGICAL SURVEY

Water-Resources Investigations 76–73



Prepared in cooperation with

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION, DIVISION OF WATER RESOURCES

100407

760E101

GEOLOGY AND GROUND-WATER RESOURCES OF UNION COUNTY, NEW JERSEY

By Bronius Nemickas

ABSTRACT

Ground water in Union County occurs in the voids of unconsolidated stratified drift deposits of Pleistocene age and in the joints and fractures of the Brunswick Formation and Watchung Basalt of Late Triassic age.

Wells (6 inches or greater in diameter) in the stratified drift deposits yield from 180 to 690 gpm (gallons per minute). The specific capacity of these wells range from 4.0 to 69 and average 19 gpm per foot of drawdown. High yielding wells in the stratified drift deposits are located primarily in the valley-fill deposits in the bedrock valleys that were cut by streams before the Wisconsin Glaciation in Pleistocene time.

Wells (6 inches or greater in diameter) in the Brunswick Formation yield from 12 to 870 gpm; the most productive water-bearing zones are commonly between depths of 200 to 600 feet. The specific capacity of wells in the Brunswick Formation range from 0.04 to 25 and average 3.5 gpm per foot of drawdown. Wells (6 inches or greater in diameter) in the Watchung Basalt yield from 20 to 164 gpm and the specific capacities of the wells range from 0.24 to 2.5 and average 1.2 gpm per foot of drawdown.

The quality of ground water from the stratified drift deposits is generally acceptable for most uses. Hardness ranges from 110 mg/l (milligrams per liter) to 210 mg/l. The pH ranges from 6.4 (slightly acidic) to 8.5 (slightly alkaline). The quality of ground water from the Brunswick Formation is acceptable throughout the country for most uses. Hardness ranges from 71 mg/l to 1193 mg/l. The pH ranges from 6.3 to 8.5. Calcium and magnesium are the predominant cations. Sulphate is the predominant anion in water having dissolved solids greater than 500 mg/l and bicarbonate is the predominant anion in water having dissolved solids less than 500 mg/l.

Withdrawals of ground water from all aquifers in Union County by public supply are estimated to average about 16.0 mgd (million gallons per day) in 1968. The greatest quantity of ground water is withdrawn from the Brunswick Formation--about 11.6 mgd for public supply in 1968. The stratified drift aquifers yield substantial quantities of water--about 4.4 mgd in 1968--but the deposits are of limited extent. The Watchung Basalt is of minor importance as an aquifer in Union County.

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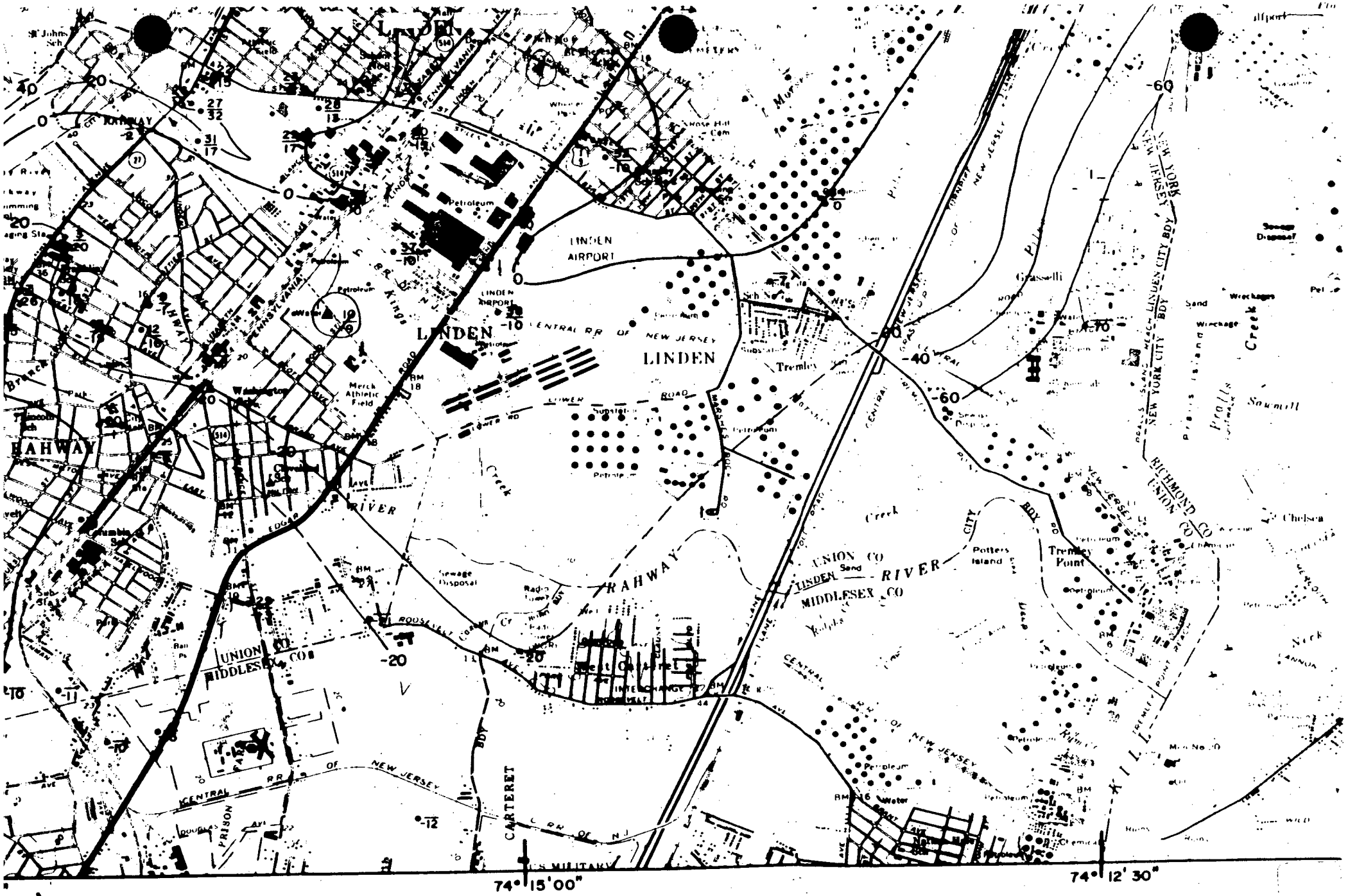

Wells in Union County, New Jersey

ELLS IN UNION COUNTY, NEW JERSEY.

100409

New York State Department of Environmental Conservation

RECEIVED

MAY 20 1985

NUS CORPORATION
REGION II
SENT TO

Henry G. Williams
Commissioner

Endangered Species Unit
Wildlife Resources Center
Delmar, NY 12054-9767

16 May 1985

Mr. Joe Katofy
NUS Corporation
Raritan Plaza 3
Fieldcrest Avenue
Edison, NJ 08837

Dear Mr. Katofy,

With reference to your request for information concerning peregrine falcon use of the Tremley Point area, I feel it is very likely that peregrines could hunt in the wetlands near L.C.P. Chemicals in Linden.

Peregrines feed almost entirely on birds caught in open areas such as wetlands and fields.

We have records of single peregrines this year at the Goethals Bridge and Outerbridge Crossing, which are only a few miles away. There is also a pair nesting at the Verrazano Narrows Bridge. Last year there was also an unsuccessful pair of falcons at the Outerbridge.

If I can provide any additional information, please do not hesitate to contact me.

Sincerely,

Barbara Allen Loucks

Barbara Allen Loucks
Research Scientist I
Endangered Species Unit

RECEIVED

NOV 26 1984

NUS CORPORATION
REGION II
SENT TO _____

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

DIVISION OF
FISH, GAME AND WILDLIFE
RUSSELL A. COOKINGHAM
DIRECTOR

PLEASE REPLY TO:
CN 400
TRENTON, NEW JERSEY 08625

November 15, 1984

Charlotte Ryden
NUS Corporation
Raritan Plaza III
King George Rd.
Edison, NJ 08837

Re: Important biological resources in the vicinity of Perth Amboy

Dear Ms. Ryden;

As we discussed over the phone, the only particularly sensitive species known to reside in or use the area of concern is the peregrine falcon. A pair of falcons attempted unsuccessfully to nest on Outerbridge Crossing during the spring/summer of 1984. These birds are likely offspring from birds reintroduced along the east coast to replace the extinct east coast population of Falco perigrinus. This population disappeared during the late 1950's, early 1960's primarily as a result of pesticide (DDT) contamination. While there is no evidence that industrial pollution and toxic wastes are entering the food chain and influencing peregrine breeding, I would not consider such a finding surprising.

Peregrines residing in the vicinity of Perth Amboy, Staten Island, and Woodbridge undoubtedly feed on birds (pigeons, gulls, shorebirds, etc.) which are likely contaminated to some degree from local sources of chemical pollution.

Due to the area's highly developed and industrialized status it is unlikely that other potentially fragile species occur in the area of concern.

I hope the information I have provided is of some help to you. Should you need additional informationplease do not hesitate to contact me.

Sincerely,

C. David Jenkins
Central Regional Zoologist
Endangered and Nongame Species Program

CDJ:cy

c; J. Frier-Murza

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SAMPLING TRIP REPORT

SITE NAME: LCP Chemicals Site

TDD #: 02-8403-54A

SAMPLING DATE: 9/27/84

EPA CASE NO: 3348

1. Site Location: See Figure 1

2. Sample Locations: See Figure 2

3. Sample Descriptions: See Table 1

4. Laboratories Receiving Samples:

Sample Type	Name and Address of Laboratory
Organics (Aqueous and Soil/ Sediment)	Rockwell International EESD-EMSC 2421 W. Hillcrest Drive, Newbury Park Ventura County, CA 91320
Inorganics (Aqueous and Soil/ Sediment)	JTC Environmental Consultants 4 Research Place, Suite L-10 Rockville, MD 20850

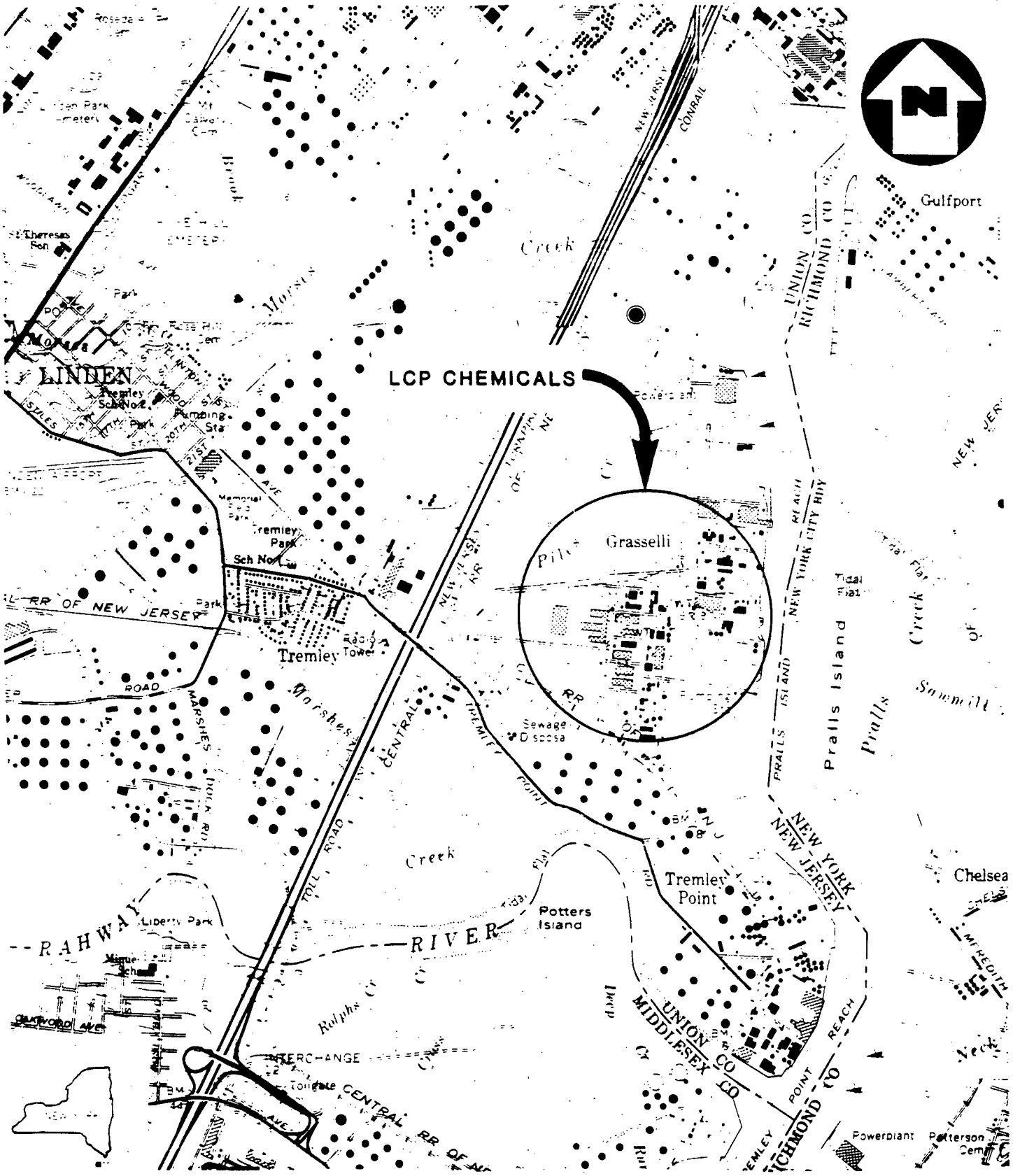
5. Sample Dispatch Data:

All samples were shipped to the labs by FIT personnel via Federal Express on 9/27/84, at 1720 hrs. All samples for organic analysis were shipped under airbill #718393406. All samples for inorganic analysis were shipped under airbill #718393395. Shipments conformed with all DOT regulations for low concentration samples.

6. Sampling Personnel:

Name	Organization	Duties on Site
Joseph Cattafe	NUS Corp. - FIT II	Project Manager
Gregory Burchette	NUS Corp. - FIT II	Sampler
Dennis Farley	NUS Corp. - FIT II	Site Safety Officer
Roy Redmond	NUS Corp. - FIT II	Sampler

7. Weather Conditions: Cloudy, 60°-65°F, windy



(QUAD) ARTHUR KILL. N.Y.-N.J.

FIGURE 1

SITE LOCATION MAP

LCP CHEMICALS SITE, LINDEN, N.J.

SCALE: 1" = 2000'

NUS CORPORATION

A Halliburton Company

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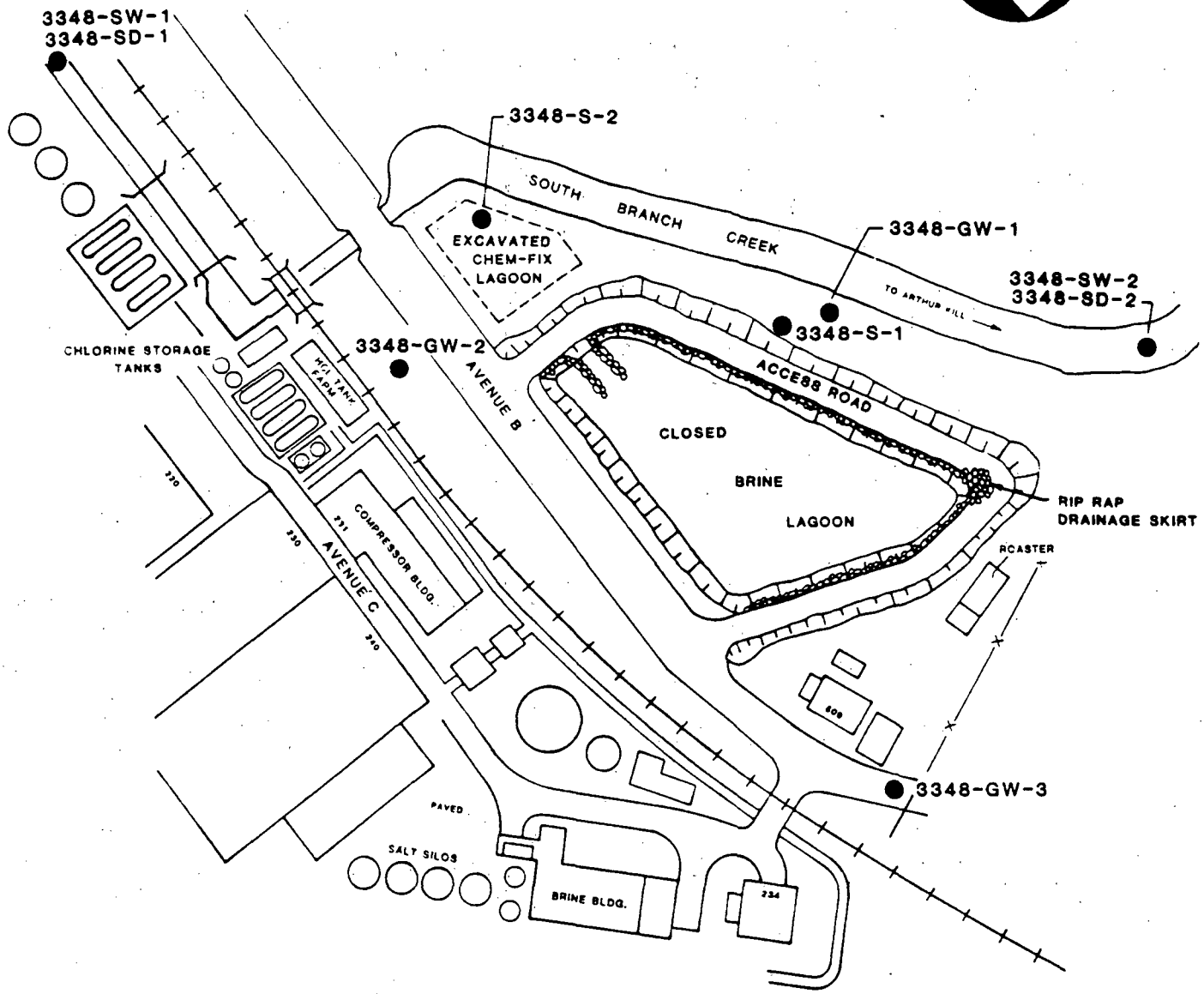

SAMPLE LOCATION MAP

LCP CHEMICALS SITE, LINDEN, N.J.

(NOT TO SCALE)

FIGURE 2

NUS CORPORATION

A Halliburton Company

TABLE 1
Sample Descriptions
LCP Chemicals Site
Linden, New Jersey
Case #3348
9/27/84

Sample Number	Sample Type	Traffic Report #	Federal Express Airbill Number	Time	Location
3348-GW-1	Organic Aqueous Inorganic Aqueous	B3750 MB0851	718393406 718393395	1337	Monitoring well #2
3348-GW-2	Organic Aqueous Inorganic Aqueous	B3751 MB0839	718393406 718393395	1437	Monitoring well #4
3348-GW-3	Organic Aqueous Inorganic Aqueous	B3752 MB0841	718393406 718393395	1255	Monitoring well #5
3348-SW-1	Organic Aqueous Inorganic Aqueous	B3754 MB0145	718393406 718393395	1423	S. Branch Creek upstream of lagoon.
3348-SW-2	Organic Aqueous Inorganic Aqueous	B3785 MB0146	718393406 718393395	1517	S. Branch Creek downstream of lagoon.
3348-AB-1	Organic Aqueous (a) Inorganic Aqueous (a)	B3786 MB0147	718393406 718393395	NA[c]	U.S. EPA, Edison, NJ.
3348-SD-1	Organic Sediment Inorganic Sediment	B3787 MB0148	718393406 718393395	1427	S. Branch Creek upstream of lagoon.
3348-SD-2	Organic Sediment Inorganic Sediment	B3788 MB0149	718393406 718393395	1531	S. Branch Creek downstream of lagoon.
3348-S-1	Organic Soil Inorganic Soil	B3789 MB0150	718393406 718393395	1540	Between S. Branch Creek and closed Brine Sludge lagoon.
3348-S-2	Organic Soil Inorganic Soil	B3790 MB0151	718393406 718393395	1547	In area of excavated "Chem-Fix" lagoon.
3348-SSB-1	Organic Soil[b] Inorganic Soil[b]	B3791 MB0152	718393406 718393395	NA[c]	U.S. EPA, Edison, NJ.

NOTES:

a) Organic and Inorganic aqueous blanks contained deionized, distilled water collected from the EPA Lab, Edison, N.J., on 9/25/84.

b) Organic and Inorganic soil/sediment blanks contained deionized, distilled water collected from the EPA Lab, Edison, N.J., on 9/25/84.

c) NA = Not Applicable.

8. Additional Comments:

All samples collected during this investigation were analyzed for the complete list of EPA's hazardous substances. A total of six (6) aqueous samples were collected including one (1) QA/QC blank. A total of five (5) soil/sediment samples were collected including one blank.

9. Report Prepared By: Joseph S. Cattafe Date: 9/28/84

10. Approved By: Ronald M. Kanar Date: 9/28/84

[illegible]

[illegible]

[illegible] NUMBER [illegible] [illegible]	[illegible] WATER [illegible]	[illegible] WATER [illegible]	[illegible] [illegible] [illegible]	[illegible] [illegible] [illegible]
Chloromethane			[illegible]	[illegible]
Bromomethane			[illegible]	[illegible]
[illegible] Chloride			[illegible]	[illegible]
Chloroethane			[illegible]	[illegible]
Methylene Chloride	[illegible]	170B	[illegible]	[illegible]
Acetone	[illegible]		[illegible]	[illegible]
Carbondisulfide			[illegible]	[illegible]
[illegible]-Dichloroethene			[illegible]	[illegible]
1,2-Dichloroethane			[illegible]	[illegible]
Trans-1,2-Dichloroethene			[illegible]	[illegible]
Chloroform	57	[illegible]	[illegible]	[illegible]
[illegible]-Dichloroethane			[illegible]	[illegible]
2-Butanone			[illegible]	[illegible]
1,1,1-Trichloroethane			[illegible]	[illegible]
Carbon Tetrachloride			[illegible]	[illegible]
Vinyl Acetate			[illegible]	[illegible]
Bromodichloromethane	20		[illegible]	[illegible]
1,1,2,2-Tetrachloroethane			[illegible]	[illegible]
1,2-Dichloropropane			[illegible]	[illegible]
Trans-1,3-Dichloropropene			[illegible]	[illegible]
Trichloroethene			[illegible]	[illegible]
Dibromochloromethane	25		[illegible]	[illegible]
1,1,2-Trichloroethane			[illegible]	[illegible]
Benzene			[illegible]	[illegible]
[illegible]-Dichloropropene			[illegible]	[illegible]
[illegible]-Chloroethylvinylether				
Bromoform	[illegible]		[illegible]	[illegible]
2-Hexanone			[illegible]	[illegible]
4-Methyl-2-Pentanone			[illegible]	[illegible]
Tetrachloroethene	[illegible]		[illegible]	[illegible]
Toluene	[illegible]	[illegible]	[illegible]	[illegible]
Chlorobenzene	[illegible]		[illegible]	[illegible]
Ethylbenzene			[illegible]	[illegible]
Styrene			[illegible]	[illegible]
Total Xylenes			[illegible]	[illegible]

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit

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100417

[illegible]
[illegible] CHEMICALS, [illegible]
SAMPLING DATE, [illegible]
[illegible]

VOLATILES

SAMPLE NUMBER MATRIX UNITS	[illegible] SOIL UG/KG	[illegible] SOIL UG/KG	[illegible] SOIL UG/KG
Chloromethane	E	E	E
Bromomethane	E	E	E
Vinyl Chloride	E	E	E
Chloroethane	E	E	E
Methylene Chloride	E	E	E
Acetone	E	E	E
Carbondisulfide	E	E	E
1,1-Dichloroethene	E	E	E
1,2-Dichloroethane	E	E	E
Trans-1,2-Dichloroethene	E	E	E
Chloroform	E	E	E
1,2-Dichloroethane	E	E	E
2-Butanone	E	E	E
1,1,1-Trichloroethane	E	E	E
Carbon Tetrachloride	E	E	E
Vinyl Acetate	E	E	E
Bromodichloromethane	E	E	E
1,1,2,2-Tetrachloroethane	E	E	E
1,2-Dichloropropane	E	E	E
Trans-1,3-Dichloropropene	E	E	E
Trichloroethene	E	E	E
Dibromochloromethane	E	E	E
1,1,2-Trichloroethane	E	E	E
Benzene	E	E	E
Cis-1,3-Dichloropropene	E	E	E
2-Chloroethylvinylether	E	E	E
Bromoform	E	E	E
2-Hexanone	E	E	E
4-Methyl-2-Pentanone	E	E	E
Tetrachloroethene	E	E	E
Toluene	E	E	E
Chlorobenzene	E	E	E
Ethylbenzene	E	E	E
Styrene	E	E	E
Total Xylenes	E	E	E

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATE: 9/27/94
CASE: 5340

VOLATILES

SAMPLE NUMBER	B3750	B3751	B3752	B3754
MATRIX	WATER	WATER	WATER	WATER
UNITS	UG/L	UG/L	UG/L	UG/L
Chloromethane				
Bromomethane				
Vinyl Chloride			J	
Chloroethane				
Methylene Chloride	E	E	E	E
Acetone	E	2400B	180B	450B
Carbondisulfide				
1,1-Dichloroethene				
1,2-Dichloroethane				
Trans-1,2-Dichloroethene			4	
Chloroform				E
1,2-Dichloroethane				42
2-Butanone				
1,1,1-Trichloroethane				
Carbon Tetrachloride				
Vinyl Acetate				
Bromodichloromethane				3
1,1,2,2-Tetrachloroethane				J
1,2-Dichloropropane				
Trans-1,3-Dichloropropene				
Trichloroethene			2	
Dibromochloromethane				6
1,1,2-Trichloroethane				J
Benzene				24
Cis-1,3-Dichloropropene				
2-Chloroethylvinylether				
Bromoform				10
2-Hexanone				5
4-Methyl-2-Pentanone				6
Tetrachloroethene			1	
Toluene	E	E	E	13B
Chlorobenzene				14
Ethylbenzene				E
Styrene			E	
Total Xylenes			E	E

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATE: 9/27/94
CASE: 3348

VOLATILES

SAMPLE NUMBER	B3785	B3786	B3787	B3788
MATRIX	WATER	WATER	SOIL	SOIL
UNITS	UG/L	UG/L	UG/KG	UG/KG
Chloromethane			E	E
Bromomethane			E	E
Vinyl Chloride			E	E
Chloroethane			E	E
Methylene Chloride	E	170B	E	E
Acetone	E		E	E
Carbondisulfide			E	E
1,1-Dichloroethene			E	E
1,2-Dichloroethane			E	E
Trans-1,2-Dichloroethene			E	E
Chloroform	57	1	E	E
1,2-Dichloroethane			E	E
2-Butanone			E	E
1,1,1-Trichloroethane			E	E
Carbon Tetrachloride			E	E
Vinyl Acetate			E	E
Bromodichloromethane	20		E	E
1,1,2,2-Tetrachloroethane			E	E
1,2-Dichloropropane			E	E
Trans-1,3-Dichloropropene			E	E
Trichloroethene			E	E
Dibromochloromethane	25		E	E
1,1,2-Trichloroethane			E	E
Benzene			E	E
Cis-1,3-Dichloropropene			E	E
2-Chloroethylvinylether			E	E
Bromoform	31		E	E
2-Hexanone			E	E
4-Methyl-2-Pentanone			E	E
Tetrachloroethene	2		E	E
Toluene	E	E	E	E
Chlorobenzene	5		E	E
Ethylbenzene			E	E
Styrene			E	E
Total Xylenes			E	E

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATE: 9/27/84
CASE# 3748

VOLATILES

SAMPLE NUMBER	B3789	B3790	B3791
MATRIX	SOIL	SOIL	SOIL
UNITS	UG/KG	UG/KG	UG/KG
Chloromethane	E	E	E
Bromomethane	E	E	E
Vinyl Chloride	E	E	E
Chloroethane	E	E	E
Methylene Chloride	E	E	E
Acetone	E	E	E
Carbondisulfide	E	E	E
1,1-Dichloroethene	E	E	E
1,2-Dichloroethane	E	E	E
Trans-1,2-Dichloroethene	E	E	E
Chloroform	E	E	E
1,2-Dichloroethane	E	E	E
2-Butanone	E	E	E
1,1,1-Trichloroethane	E	E	E
Carbon Tetrachloride	E	E	E
Vinyl Acetate	E	E	E
Bromodichloromethane	E	E	E
1,1,2,2-Tetrachloroethane	E	E	E
1,2-Dichloropropane	E	E	E
Trans-1,3-Dichloropropene	E	E	E
Trichloroethene	E	E	E
Dibromochloromethane	E	E	E
1,1,2-Trichloroethane	E	E	E
Benzene	E	E	E
Cis-1,3-Dichloropropene	E	E	E
2-Chloroethylvinylether	E	E	E
Bromoform	E	E	E
2-Hexanone	E	E	E
4-Methyl-2-Pentanone	E	E	E
Tetrachloroethene	E	E	E
Toluene	E	E	E
Chlorobenzene	E	E	E
Ethylbenzene	E	E	E
Styrene	E	E	E
Total Xylenes	E	E	E

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/84
CASE NUMBER : 5548

SEMI-VOLATILES

SAMPLE NUMBER	23750	23751	23752	23754
MATRIX	WATER	WATER	WATER	WATER
UNITS	UG/L	UG/L	UG/L	UG/L
Fluoranthene	E	E	E	E
Benzidine	E	E	E	E
Pyrene	E	E	E	E
Butylbenzylphthalate	E	E	E	E
3,3'-Dichlorobenzidine	E	E	E	E
Benzo(a)Anthracene	E	E	E	E
Bis(2 Ethylhexyl)Phthalate	E	E	E	E
Chrysene	E	E	E	E
Di-n-Octyl Phthalate	E	E	E	E
Benzo(b)Fluoranthene	E	E	E	E
Benzo(K)Fluoranthene	E	E	E	E
Benzo(a)Pyrene	E	E	E	E
Indeno(1,2,3-cd)Pyrene	E	E	E	E
Dibenzo(a,h)Anthracene	E	E	E	E
Benzo(ghi)Perylene	E	E	E	E

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/84
CASE NUMBER : 3348

100423

SEMI-VOLATILES

SAMPLE NUMBER MATRIX UNITS	B3785 WATER UG/L	B3786 WATER UG/L	B3787 SOIL UG/KG	B3788 SOIL UG/KG
N-Nitrosodimethylamine	E	E	E	E
Phenol	E	E	E	E
Aniline	E	E	E	E
Bis(2-Chloroethyl)Ether	E	E	E	E
2-Chlorophenol	E	E	E	E
1,3-Dichlorobenzene	E	E	E	E
1,4-Dichlorobenzene	E	E	E	E
Benzyl Alcohol	E	E	E	E
1,2-Dichlorobenzene	E	E	E	E
2-Methylphenol	E	E	E	E
Bis(2-Chloroisopropyl)Ether	E	E	E	E
4-Methylphenol	E	E	E	E
N-Nitroso-Di-n-Propylamine	E	E	E	E
Hexachloroethane	E	E	E	E
Nitrobenzene	E	E	E	E
Isophorone	E	E	E	E
2-Nitrophenol	E	E	E	E
2,4-Dimethylphenol	E	E	E	E
Benzoic Acid	E	E	E	E
Bis(2-Chloroethoxy)Methane	E	E	E	E
2,4-Dichlorophenol	E	E	E	E
1,2,4-Trichlorobenzene	E	E	E	E
Naphthalene	E	E	E	E
4-Chloroaniline	E	E	E	E
Hexachlorobutadiene	E	E	E	E
4-Chloro-3-Methylphenol	E	E	E	E
2-Methylnaphthalene	E	E	E	E
Hexachlorcyclopentadiene	E	E	E	E
2,4,6-Trichlorophenol	E	E	E	E
2,4,5-Trichlorophenol	E	E	E	E
2-Chloronaphthalene	E	E	E	E
2-Nitroaniline	E	E	E	E
Dimethyl Phthalate	E	E	E	E
Acenaphthylene	E	E	E	E
3-Nitroaniline	E	E	E	E
Acenaphthene	E	E	E	E
2,4-Dinitrophenol	E	E	E	E
4-Nitrophenol	E	E	E	E
Dibenzofuran	E	E	E	E
2,4-Dinitrotoluene	E	E	E	E
2,6-Dinitrotoluene	E	E	E	E
Diethyl Phthalate	E	E	E	E
4-Chlorophenyl-phenylether	E	E	E	E
Fluorene	E	E	E	E
4-Nitroaniline	E	E	E	E
4,6-Dinitro-2-Methylphenol	E	E	E	E
N-Nitrosodiphenylamine	E	E	E	E
4-Bromophenyl-Phenylether	E	E	E	E
Hexachlorobenzene	E	E	E	E
Pentachlorophenol	E	E	E	E
Phenanthrene	E	E	E	E
Anthracene	E	E	E	E
Di-n-Butylphthalate	E	E	E	E

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ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/84
CASE NUMBER : 3348

SEMI-VOLATILES

SAMPLE NUMBER	B3785	B3786	B3787	B3788
MATRIX	WATER	WATER	SOIL	SOIL
UNITS	UG/L	UG/L	UG/KG	UG/KG
Fluoranthene	E	E	E	E
Benzidine	E	E	E	E
Pyrene	E	E	E	E
Butylbenzylphthalate	E	E	E	E
3,3'-Dichlorobenzidine	E	E	E	E
Benzo(a)Anthracene	E	E	E	E
Bis(2 Ethylhexyl)Phthalate	E	E	E	E
Chrysene	E	E	E	E
Di-n-Octyl Phthalate	E	E	E	E
Benzo(b)Fluoranthene	E	E	E	E
Benzo(k)Fluoranthene	E	E	E	E
Benzo(a)Pyrene	E	E	E	E
Indeno(1,2,3-cd)Pyrene	E	E	E	E
Dibenzo(a,h)Anthracene	E	E	E	E
Benzo(ghi)Perylene	E	E	E	E

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit

ANALYTICAL DATA
LCT CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/94
CASE NUMBER : 3340

100425

SEMI-VOLATILES

SAMPLE NUMBER MATRIX UNITS	B3789 SOIL UG/KG	B3790 SOIL UG/KG	B3791 SOIL UG/KG
N-Nitrosodimethylamine	E	E	E
Phenol	E	E	E
Aniline	E	E	E
Bis(2-Chloroethyl)Ether	E	E	E
2-Chlorophenol	E	E	E
1,3-Dichlorobenzene	E	E	E
1,4-Dichlorobenzene	E	E	E
Benzyl Alcohol	E	E	E
1,2-Dichlorobenzene	E	E	E
2-Methylphenol	E	E	E
Bis(2-Chloroisopropyl)Ether	E	E	E
4-Methylphenol	E	E	E
N-Nitroso-Di-n-Propylamine	E	E	E
Hexachloroethane	E	E	E
Nitrobenzene	E	E	E
Isophorone	E	E	E
2-Nitrophenol	E	E	E
2,4-Dimethylphenol	E	E	E
Benzoic Acid	E	E	E
Bis(2-Chloroethoxy)Methane	E	E	E
2,4-Dichlorophenol	E	E	E
1,2,4-Trichlorobenzene	E	E	E
Naphthalene	E	E	E
4-Chloroaniline	E	E	E
Hexachlorobutadiene	E	E	E
4-Chloro-3-Methylphenol	E	E	E
2-Methylnaphthalene	E	E	E
Hexachlorocyclopentadiene	E	E	E
2,4,6-Trichlorophenol	E	E	E
2,4,5-Trichlorophenol	E	E	E
2-Chloronaphthalene	E	E	E
2-Nitroaniline	E	E	E
Dimethyl Phthalate	E	E	E
Acenaphthylene	E	E	E
3-Nitroaniline	E	E	E
Acenaphthene	E	E	E
2,4-Dinitrophenol	E	E	E
4-Nitrophenol	E	E	E
Dibenzofuran	E	E	E
2,4-Dinitrotoluene	E	E	E
2,6-Dinitrotoluene	E	E	E
Diethyl Phthalate	E	E	E
4-Chlorophenyl-phenylether	E	E	E
Fluorene	E	E	E
4-Nitroaniline	E	E	E
4,6-Dinitro-2-Methylphenol	E	E	E
N-Nitrosodiphenylamine	E	E	E
4-Bromophenyl-Phenylether	E	E	E
Hexachlorobenzene	E	E	E
Pentachlorophenol	E	E	E
Phenanthrene	E	E	E
Anthracene	E	E	E
Di-n-Butylphthalate	E	E	E

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/94
CASE NUMBER : 33348

SEMI-VOLATILES

SAMPLE NUMBER	B3789	B3790	B3791
MATRIX	SOIL	SOIL	SOIL
UNITS	UG/KG	UG/KG	UG/KG
Fluoranthene	E	E	E
Benzidine	E	E	E
Pyrene	E	E	E
Butylbenzylphthalate	E	E	E
3,3'-Dichlorobenzidine	E	E	E
Benzo(a)Anthracene	E	E	E
Bis(2 Ethylhexyl)Phthalate	E	E	E
Chrysene	E	E	E
Di n-Octyl Phthalate	E	E	E
Benzo(b)Fluoranthene	E	E	E
Benzo(K)Fluoranthene	E	E	E
Benzo(a)Pyrene	E	E	E
Indeno(1,2,3-cd)Pyrene	E	E	E
Dibenzo(a,h)Anthracene	E	E	E
Benzo(shi)Perylene	E	E	E

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/94
CASE NUMBER : 3348

PESTICIDES/PCBs

SAMPLE NUMBER	B3750	B3751	B3752	B3754
MATRIX	WATER	WATER	WATER	WATER
UNITS	UG/L	UG/L	UG/L	UG/L
Alpha-BHC				
Beta-BHC				
Delta-BHC				
Gamma-BHC (Lindane)				
Heptachlor				
Aldrin				
Heptachlor Epoxide				
Endosulfan I				
Dieldrin				
4,4'-DDE				
Endrin				
Endosulfan II				
4,4'-DDD				
Endrin Aldehyde				
4,4'-DDT				
Methoxychlor				
Endrin Ketone				
Chlordane				
Toxaphene				
Arochlor-1016				
Arochlor-1221				
Arochlor-1232				
Arochlor-1242				
Arochlor-1248				
Arochlor-1254				
Arochlor-1260				

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/84
CASE NUMBER : 3348

PESTICIDES/PCBs

SAMPLE NUMBER	B3785	B3786	B3787	B3788
MATRIX	WATER	WATER	SOIL	SOIL
UNITS	UG/L	UG/L	UG/KG	UG/KG
Alpha-BHC				
Beta-BHC				
Delta-BHC				
Gamma-BHC (Lindane)				
Heptachlor				
Aldrin				
Heptachlor Epoxide				
Endosulfan I				
Dieldrin				
4,4'-DDE				
Endrin				
Endosulfan II				
4,4'-DDD				
Endrin Aldehyde				
4,4'-DDT				
Methoxychlor				
Endrin Ketone				
Chlordane				
Toxaphene				
Arochlor-1016				
Arochlor-1221				
Arochlor-1232				
Arochlor-1242				
Arochlor-1248				
Arochlor-1254				
Arochlor-1260				

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit

ANALYTICAL DATA :
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/84
CASE NUMBER : 2340

PESTICIDES/PCBs

SAMPLE NUMBER	B3789	B3790	B3791
MATRIX	SOIL	SOIL	SOIL
UNITS	UG/KG	UG/KG	UG/KG
Alpha-BHC			
Beta-BHC			
Delta-BHC			
Gamma-BHC (Lindane)			
Heptachlor			
Aldrin			
Heptachlor Epoxide			
Endosulfan I			
Dieldrin			
4,4'-DDE			
Endrin			
Endosulfan II			
4,4'-DDD			
Endrin Aldehyde			
4,4'-DDT			
Methoxychlor			
Endrin Ketone			
Chlordane			
Toxaphene			
Arochlor-1016			
Arochlor-1221			
Arochlor-1232			
Arochlor-1242			
Arochlor-1248			
Arochlor-1254			
Arochlor-1260			

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/84
CASE NUMBER : 3348

INORGANICS	502	51	52	2
SAMPLE NUMBER	MB0149	MB0150	MB0151	MB0152
MATRIX	SOIL	SOIL	SOIL	WATER
UNITS	MG/KG	MG/KG	MG/KG	UG/L
Aluminum	3350	3140	4220	
Antimony	1.0			
Arsenic	44	26	50	
Barium	3300	77	5114	
Beryllium				
Cadmium	3.0		2.6	
Chromium	8.4	6.5	12	
Cobalt	4.8			
Copper	41	9.0	22	
Iron	6590	5590	7690	
Lead	784	185	128	
Manganese	94	8.6	51	
Mercury	170	2.6	53	
Nickel	12		7.9	
Selenium	0.39		0.28	
Silver	0.72			
Thallium				
Tin	6.3			33
Vanadium	11	14	16	
Zinc	152	7	171	19

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit

ANALYTICAL DATA
CUP CHEMICALS, INDIANA
SAMPLING DATA : 9/27/94
CASE NUMBER : 3348

INORGANICS	SW1	SW2		SD1
SAMPLE NUMBER	MB0145	MB0146	MB0147	MB0148
MATRIX	WATER	WATER	WATER	SOIL
UNITS	UG/L	UG/L	UG/L	MG/KG
Aluminum	199	323		1380
Antimony	65	97		
Arsenic	157	E	16	54
Barium	420	480		150
Beryllium				
Cadmium	1.0	70		0.89
Chromium				13
Cobalt	51	108		2.5
Copper		134		28
Iron	921	1760		7250
Lead	18	77		30
Manganese	71	247		92
Mercury	20	212		12.5
Nickel	97	177		10
Selenium	131	249		0.64
Silver	^12			0.61
Thallium				
Tin	E	1691	29	1.9
Vanadium				21
Zinc	E	1740	17	59

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection limit

ANALYTICAL DATA
LCP CHEMICALS, LINDEN, NJ
SAMPLING DATA : 9/27/84
CASE NUMBER : 3348

INORGANICS	GW2	[illegible]	
SAMPLE NUMBER	MB0839	MB0841	MB0851
MATRIX	WATER	WATER	WATER
UNITS	UG/L	UG/L	UG/L
Aluminum	181,000	532,000	767,000
Antimony	161	188	335
Arsenic	745	3790	4280
Barium	6700	15400	16300
Beryllium	12	12	32
Cadmium	89	7.2	154
Chromium	273	502	1350
Cobalt	200	326	899
Copper	444	1300	1860
Iron	204,000	297,000	2110000
Lead	284	726	1072
Manganese	9040	12400	61500
Mercury	253	116	1.4
Nickel	432	688	1940
Selenium	383	35	439
Silver		43	17
Thallium			41
Tin	368	E	662
Vanadium	222	581	2940
Zinc	1590	2640	12200

NOTES:
Blank space - compound analyzed for but not detected
E - analysis did not pass QA/QC requirements
J - compound present below the specified detection

ANALYTICAL DATA
[illegible]
SAMPLING DATE : 9/27/84
CASE NUMBER : 1040

100433

SEMI-VOLATILES

SAMPLE NUMBER MATRIX UNITS	D3750 WATER UG/L	D3751 WATER UG/L	D3752 WATER UG/L	D3754 WATER UG/L
N-Nitrosodimethylamine	E	E	E	E
Phenol	E	E	E	E
Anilines	E	E	E	E
Bis(2-Chloroethyl)Ether	E	E	E	E
2-Chlorophenol	E	E	E	E
1,3-Dichlorobenzene	E	E	E	E
1,4-Dichlorobenzene	E	E	E	E
Benzyl Alcohol	E	E	E	E
1,2-Dichlorobenzene	E	E	E	E
2-Methylphenol	E	E	E	E
Bis(2-Chloroisopropyl)Ether	E	E	E	E
4-Methylphenol	E	E	E	E
N-Nitroso-Di-n-Propylamine	E	E	E	E
Hexachloroethane	E	E	E	E
Nitrobenzene	E	E	E	E
Isophorone	E	E	E	E
2-Nitrophenol	E	E	E	E
2,4-Dimethylphenol	E	E	E	E
Benzoic Acid	E	E	E	E
Bis(2-Chloroethoxy)Methane	E	E	E	E
2,4-Dichlorophenol	E	E	E	E
1,2,4-Trichlorobenzene	E	E	E	E
Naphthalene	E	E	E	E
4-Chloroaniline	E	E	E	E
Hexachlorobutadiene	E	E	E	E
4-Chloro-3-Methylphenol	E	E	E	E
2-Methylnaphthalene	E	E	E	E
Hexachlorocyclopentadiene	E	E	E	E
2,4,6-Trichlorophenol	E	E	E	E
2,4,5-Trichlorophenol	E	E	E	E
2-Chloronaphthalene	E	E	E	E
2-Nitroaniline	E	E	E	E
Dimethyl Phthalate	E	E	E	E
Acenaphthylene	E	E	E	E
3-Nitroaniline	E	E	E	E
Acenaphthene	E	E	E	E
2,4-Dinitrophenol	E	E	E	E
4-Nitrophenol	E	E	E	E
Dibenzofuran	E	E	E	E
2,4-Dinitrotoluene	E	E	E	E
2,6-Dinitrotoluene	E	E	E	E
Diethyl Phthalate	E	E	E	E
4-Chlorophenyl-phenylether	E	E	E	E
Fluorene	E	E	E	E
4-Nitroaniline	E	E	E	E
4,6-Dinitro-2-Methylphenol	E	E	E	E
N-Nitrosodiphenylamine	E	E	E	E
4-Bromophenyl-Phenylether	E	E	E	E
Hexachlorobenzene	E	E	E	E
Pentachlorophenol	E	E	E	E
Phenanthrene	E	E	E	E
Anthracene	E	E	E	E
Di-n-Butylphthalate	E	E	E	E

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REFERENCE NO. 14

100434

CLOSURE AND POST-CLOSURE PLAN

FOR BRINE-SLUDGE LAGOON

LCP CHEMICALS - N.J., INC., LINDEN, N.J.

ENGINEERING

JULY 16, 198:

100435

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CLOSURE AND POST-CLOSURE PLAN
FOR BRINE-SLUDGE LAGOON
LCP CHEMICALS - N.J., INC., LINDEN, N.J.

INTRODUCTION

LCP Chemicals - N.J., Inc. intends to close a Brine Sludge Lagoon RCRA Facility No. NJD 079303020) on its property at Linden, N.J., in cc'.d with this plan which complies with 40 CFR 265.110 and minimizes he post closure escape of hazardous constituents to the environment.

FACILITY DESCRIPTION

he LCP Brine Sludge Lagoon "the facility" received mercury contaminated aste generated in the electrolysis of sodium chloride to make chlorine.

he facility is located near the northeast corner of the LCP plant site Lot 3; Block 587) adjacent to the tidal South Branch Creek. The lagoon as constructed prior to LCP Chemical's purchase of the site in 1972. he facility is triangular in shape with a total surface area of approxmately 33,500 square feet. LCP has modified its process stream to elimnate this hazardous component and to reduce the volume of process waste to ermit the offsite removal of drummed waste. The generation of brine muds K-071) was terminated in March 1982. LCP has completed the process of shing the plant's waste lines to the facility. The waste inventory as f March 1982 is 22,000 cubic yards. The contents of an experimental chemix lagoon will be excavated and placed into the Brine-Sludge lagoon prior o closure (Chem fix Lagoon closure plan submitted October 30, 1981.)

he facility is surrounded by earth dikes that are approximately 10 feet igher than the average plant ground elevation and approximately 15 feet igher than the creek high tide level. The dikes show no evidence of leakge, erosion, or slumping. The dike tops are graded so that rainwater runs nto a trench on the inner dike margin and flows into the facility. A pumpng station located at the eastern corner of the facility was used to return ater to the plant after the solids settled out.

JUSTIFICATION FOR IN-PLACE CLOSURE

his facility has been operated for approximately 15 years. Down-gradient onitoring wells located in the immediate vicinity of the facility have ot intercepted contamination migrating from the facility (see Appendix A - onitoring Well Water Analyses.) The waste material is of a dense and low ermeable nature. The absence of ground-water contamination in the saturatec one surrounding the facility provides sufficient evidence to indicate hat the 40 CFR 265.111 closure standard can be satisfied with the waste aterial remaining in place after closure.

Summary of Results

Independent Well Results

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indicated in Appendix A, contamination of ground water is not evi-
nt. To ensure the indefinite integrity of this waste site, review
s made of potential disturbance that could effect the site and more
ecifically, disturbance resulting from:

. Erosion resultant from waste settling due to inadequate dewatering
d compaction. The specific details outlined under Physical Closure:
tivities and Specifications have been designed to: 1) eliminate the
tential of erosion from settling, and 2) minimize the cost of main-
nance.

. Purposefull modification. From a view point of realistic economics
nsidering the area occupied by the site, the inaccessibility of the site
three sides due to permanent structures and natural barriers, it is
likely that economic justification would ever be proposed to modify
e site for other purposes.

. Vandalism/Sabotage. The existing site location is inaccessible ex-
pt through facilities of LCP Chemicals and Northville Terminal Industries.
th facilities are protected by a chain link fence to impede any potential
truder. Both facilities are manned on an round-the-clock basis with per-
nnel cognizant of and responsible for elimination of a potential in-
ruder.

RCRA SUBPART G CLOSURE PLAN (40 CFR 265.110)

eneral Nature of Facility Closure

CP will close the facility with the waste material in place. The facility
s inactive and will be closed as a unit (no partial closure.)

RCRA ground-water monitoring system is in place at the facility with wells
ocated at three downgradient locations close to the hazardous waste
acility boundary. These wells are screened in unconsolidated material to
etect hazardous constituents migrating from the facility in the ground
ater. The monitoring data from these wells indicate that the facility
as not leaked. The absence of mercury and mercury-related contaminants
n ground water at the downgradient facility boundary demonstrates that
he facility has not contaminated the ground water and there is a suffi-
iently low potential for migration to justify closure in place.

ANTICIPATED CLOSURE SCHEDULE

CP cannot know the precise date that the Regional Administrator will ap-
rove this plant before the fact. This closure schedule identifies pro-
ect milestones and estimated time using target dates from the anticipated
ate that the Regional Administrator approves the closure plan.

tivity (Milestone)	Target Dates
A Approval	October 1982
location of Chem-fix sludge in Brine-Sludge Lagoon	January 1983
watering completed	5/83 - 9/83
contouring equipment decontaminated	September 1983
ste compaction	9/83 - 4/84
acement of final cover initiated	April 1984
acement of final cover completed	August 1984
nal cover graded and planted	September 1984
ysical equipment decontamination	September 1984
gineer's certification	September 1984

TE: Should the RA require changes in this closure plant pursuant to the EPA's review (40 CFR 265.112(c)), LCP may have to amend the estimated schedule.

DECOMMISSIONING AND DECONTAMINATION OF EQUIPMENT AND STRUCTURES

e following equipment and structures are associated with the facility:

- 600 feet of 4 inch steel pipe
- Two Durco 4x3 stainless steel centrifugal pumps
- Plywood pumphouse on concrete slab

CP plans the following decommissioning and decontamination activities:

- All pipe will be excavated as necessary, manually disassembled or cut with a torch. Decontaminated pipe will be sold as scrap.

- Pumps will be decontaminated and reused by LCP.

- The plywood pumphouse will be dismantled and placed in the facility prior to cover.

- The concrete slab will be decontaminated, washed, and left in place.

econtamination will be accomplished by high pressure washing with water nd HCl or water and HGX (a compound that binds mercury.) Pipe, pumps, nd earth moving equipment used in the physical closure will be decon-aminated in the LCP plant. Wash water will be sent to the plant's waste-ater treatment plant (A NPDES permitted facility.) LCP personnel will arry out decontamination activities and will be supervised by the LCP lant Engineer.

The target dates for closure milestones take into account the seasonal factors of temperature and precipitation that are critical to the proper execution of each closure operation in regard to performance standards. Hence changes in the RA approval date might require substantial revision of the closure schedule.

GAS & LEACHATE COLLECTION SYSTEMS

e are required since the waste will not generate gasses or leachate.

PROTECTION AGAINST FLOODING

facility is located in an area classified as "flood prone" by the . Geological Survey (Arthur Kill quadrangle, 1973.) The area where ndation is predicted during a "100-year" flood coincides with the foot elevation contour with respect to mean sea level. The grade vation near the facility is approximately 8 feet, and the facility es extend another 10 to 12 feet above grade. The facility would not inundated even if the "100-year" flood elevation were exceeded by 50 cent. As part of this closure, LCP will protect the dike on all three es by covering it with clay to a minimum thickness of 1 foot, followed an additional 18" of rip rap. These costs are reflected in the closure t estimate.

POST CLOSURE MAINTENANCE AND INSPECTION

st closure maintenance will consist of the care and renovation of both e soil and vegetative cover as necessary to prevent erosion. The site l be inspected by LCP personnel on a weekly basis and repairs to the ver, surface draingage system and/or the dikes will be made on an as-eded basis.

P does not anticipate using the closed area. As the closed facility l not be used, the integrity of the cap and cover is not jeopardized.

e facility is located at an industrial site that is fenced for security rposes. The site is not accessible to the public or to livestock or mestic animals. Contact with the closed facility will not pose a risk persons or animals.

pendent upon the type of vegetative cover utilized, and the care require-nts of same, LCP estimates the total cost of inspection, vegetative care, d necessary maintenance not to exceed $10,000 annually.

POST CLOSURE MONITORING PLAN

ound-water monitoring wells are in place as required by 40 CFR 265.91 d 265.117. Monitoring for the following constituents will be performed ring the first post closure year:

	Times Per Year	Replicates	Total Analyses
rium	4	1	4
dmium	4	1	4
ad	4	1	4
rcury	4	1	4
lver	4	1	4
loride	4	1	4
dium	4	1	4
lphate	4	1	4
	4	1	4
ecific Conductance	4	1	4

nitoring for the following constituents will be implemented after e first monitoring year

loride	2	1	2
rcury	2	1	2
dium	2	1	2
	2	1	2
ecific Conductance	2	1	2

is monitoring program does not preclude LCP's petition for relief rsuant to 40 CFR 265.117(d).

PHYSICAL CLOSURE: ACTIVITIES AND SPECIFICATIONS

e physical closure of the facility will entail the following steps:

- The facility will be dewatered by pumping standing liquid to the LCP waste treatment plant (a NPDES facility.) Estimated volume is 50,000 to 70,000 gallons. Nature of the materials in the lower areas of the lagoon are such that the top 12-18 inches of material typicall retain moisture for a significant period of time. To eliminate the potential of any further settling as a result of this phenomenon, material in these lower areas will be systematically spread over the higher areas of the lagoon in thin layers to maximize dewatering. These lower areas will then be filled with dry dewatered material from the higher areas, mechanically compacted, and sloped to ensure rain water runoff. This procedure is expected to take 4 months, after which near final contouring will take shape and final mechanical compaction. Several months of natural settling, followed by a final mechanical compaction will ~~occur prior to~~ capping.

Collection of rain water runoff during this dewatering, compaction and contouring phase will be via the perimeter collection system presently in existence.

Elimination of any collected runoff will be through the LCP Waste Treatment plant (an NPDES Permitted facility.)

- Two feet of clay (with maximum permeability rate of 1 x 10-7 cm/sec) will be placed in maximum lifts of 6 inches and compacted to 90% minimum per ASTM D-1557 Method C.

- A 1-foot thick layer of soil will cover the clay cap, the top 6 inches of soil will be capable of supporting vegetation. The bottom 6 inches will be designed to provide adequate drainage. Total estimated volume of soil is 2,500 cubic yards.

- A vegetative cover approved by the NJDEP will be seeded as soon as seasonal conditions permit.

Final grading shall facilitate drainage with a maximum final top grade of at least 5%. Where this grade cannot be achieved, the final grade will be suitably terraced.

The clay cap and soil cover shall comply with general closure requirements (NJAC 7:26-9.8).

ESTIMATED CLOSURE COST (1982 DOLLARS)

estimates the cost of physical closure as follows:

Dewatering	$21,000
Reinforce north, east, and south banks using approximately 900 cubic yards of off-site clay (permeability of 10-7 cm/sec)	14,000
Recontour sludge prior to capping	20,000
Supply and install 2-foot thick clay cap	65,000
Supply and install 3-foot thick soil cover, fertilize, seed, and mulch	45,000
Decommission and decontaminate pipe, pump & pumphouse	2,000
Decontaminate equipment used in closure program	1,000
Plus 15 percent contingency override	25,200
Estimated Closure Cost	$193,200

WEEKLY INSPECTION REPORT
WASTE ENTOMBMENT

TE _____ TIME _____ TEMP. _____ TIDE LEVEL _____

EMBANKMENT

	ERROSION Yes	ERROSION No	DISPLACED RIP RAP Yes	DISPLACED RIP RAP No	COMMENT
E. Side	☐	☐	☐	☐	_____
S. Side	☐	☐	☐	☐	_____
W. Side	☐	☐	☐	☐	_____

SIDE SLOPES

	ERROSION Yes	ERROSION No	Bare Spots Yes	Bare Spots No	COMMENT
E. Side	☐	☐	☐	☐	_____
S. Side	☐	☐	☐	☐	_____
W. Side	☐	☐	☐	☐	_____

	VEGETATION	SECURITY
E. Side	_____ " Height	Fence Condition _____
S. Side	_____ " Height	Fence Condition _____
W. Side	_____ " Height	Fence Condition _____

RIMETER ROADWAY CONDITION _____

TION TAKEN	YES	NO
pair Order Written	☐	☐
pair Order Number _____	☐	☐
rkman Assigned		
rk Duration _____ (hours)	☐	☐
ntractor Notified		
ntractor P.O. # _____		
pair Work Scheduled / /		

pected by: _____
proved by: _____
(Manager, Operations)

STRUCTION: Comments must be specific.
- Errosion to be defined by depth, width, and length in inches.
- Bare spots, displaced rip rap, and roadway deterioration to be defined in sq. ft.

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100442

DISSOLVED Hg CONCENTRATIONS IN GROUND WATER

SAMPLES (CONCENTRATIONS IN MG/L OR PPM)

Done By Sample Date	LCP 10-6-81	LCP 10-15-81	LCP 2-6-82	ETC 3-15-82	LCP 6-14-82
Well #					
1	< 0.0002	0.0006	0.0006	0.0006	0.0006
1A	< 0.0002	0.0009	0.0009		0.0005
2	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
3	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
4	< 0.0002	< 0.0002	< 0.0002		< 0.0002
5	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002

Drinking Water Standard = 0.002

Equipment Limit .0002

Equipment Specification
Perkin Elmer
Mod 50A
Cold Vapor Method

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

April 21, 1982

TECHNICAL REPORT

for

LCP CHEMICALS, NJ INC.
SOUTH WOOD AVE.
LINDEN, NJ 07036

on

Analysis of
LCP Chemicals, NJ Inc.
Sample Well #3

ETC Sample Number 001342
Order Number 0251

prepared by

Denis C. K. Lin, PhD.
Vice President
Research/Operations

100445

ETC ENVIRONMENTAL TESTING and CERTIFICATION CORPORATION

DENIS C.K. LIN, Ph.D.
Vice President
Research and Operations

April 21, 1982

Mr. John Downes
Manager
Engineering and Technical Services
LCP Chemicals, NJ Inc.
South Wood Ave.
Linden, NJ 07036

Dear Mr. Downes:

We at ETC are pleased to submit the attached laboratory reports in response to your testing requirements. The analyses were performed by my staff and we are confident that you will find the results are of the highest quality.

If you have any questions regarding your report, we encourage you to contact our Customer Service organization (201/225-5600) and they will coordinate your request with appropriate laboratory personnel. You are also invited to visit with either Swep Davis or Henry Beal, Esq., if you have any questions regarding the regulatory or the legal aspects of your project. Dr. George Vander Velde is also available to assist you in defining the requirements for future testing programs.

All of us at ETC welcome your next call if we can be of further service to your organization in the future.

Sincerely,

Denis C. K. Lin, PhD.
Vice President
Research/Operations

DCKL:mam

Attachments

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284 RARITAN CENTER PARKWAY • EDISON, NJ 08837 (201) 225-5600

ETC ENVIRONMENTAL TESTING and CERTIFICATION

April 21, 1982

TECHNICAL REPORT

for

LCP CHEMICALS, NJ INC.
SOUTH WOOD AVE.
LINDEN, NJ 07036

on

Analysis of
LCP Chemicals, NJ Inc.
Sample Well ~~#4~~ 5

ETC Sample Number 001343
Order Number 0251

prepared by

Denis C. K. Lin, PhD.
Vice President
Research/Operations

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ETC ENVIRONMENTAL TESTING and CERTIFICATION CORPORATION

DENIS C.K. LIN, Ph.D.
Vice President
Research and Operations

April 21, 1982

Mr. John Downes
Manager
Engineering and Technical Services
LCP Chemicals, NJ Inc.
South Wood Ave.
Linden, NJ 07036

Dear Mr. Downes:

We at ETC are pleased to submit the attached laboratory reports in response to your testing requirements. The analyses were performed by my staff and we are confident that you will find the results are of the highest quality.

If you have any questions regarding your report, we encourage you to contact our Customer Service organization (201/225-5600) and they will coordinate your request with appropriate laboratory personnel. You are also invited to visit with either Swep Davis or Henry Beal, Esq., if you have any questions regarding the regulatory or the legal aspects of your project. Dr. George Vander Velde is also available to assist you in defining the requirements for future testing programs.

All of us at ETC welcome your next call if we can be of further service to your organization in the future.

Sincerely,

Denis C. K. Lin, PhD.
Vice President
Research/Operations

DCKL:mam

Attachments

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284 RARITAN CENTER PARKWAY • EDISON, NJ 08837 (201) 225-5600

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INTRODUCTION

This report contains the analytical results on your sample, Well #1, submitted on March 15, 1982. In your order, Total Organic Halide analysis (TOX) was requested on this sample. However, due to the sample matrix it was not possible to obtain meaningful data.

The results we obtained on your sample are presented in a tabular format immediately after this introduction. Following the sample results, the quality assurance data on your specific sample are tabulated to verify the validity of the results obtained. Also presented in the quality assurance data report is the chain-of-custody record.

The established methods we used in the analysis of your sample are described in the Methodology section after the Results. In the analysis we followed a rigidly controlled Quality Assurance Protocol. This Protocol is described after the Methodology section.

We hope our report format is useful in assisting you to obtain pertinent information on your sample.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

April 21, 1982

TECHNICAL REPORT

for

LCP CHEMICALS, NJ INC.
SOUTH WOOD AVE.
LINDEN, NJ 07036

on

Analysis of
LCP Chemicals, NJ Inc.
Sample Well #1

ETC Sample Number 001340
Order Number 0251

prepared by

Denis C. K. Lin, PhD.
Vice President
Research/Operations

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TC ENVIRONMENTAL TESTING and CERTIFICATION CORPORATION

S C.K. LIN, Ph.D.
ice President
ch and Operations

April 21, 1982

Mr. John Downes
Manager
Engineering and Technical Services
LCP Chemicals, NJ Inc.
South Wood Ave.
Linden, NJ 07036

Dear Mr. Downes:

We at ETC are pleased to submit the attached laboratory reports in response to your testing requirements. The analyses were performed by my staff and we are confident that you will find the results are of the highest quality.

If you have any questions regarding your report, we encourage you to contact our Customer Service organization (201/225-5600) and they will coordinate your request with appropriate laboratory personnel. You are also invited to visit with either Swep Davis or Henry Beal, Esq., if you have any questions regarding the regulatory or the legal aspects of your project. Dr. George Vander Velde is also available to assist you in defining the requirements for future testing programs.

All of us at ETC welcome your next call if we can be of further service to your organization in the future.

Sincerely

Denis C. K. Lin, PhD.
Vice President
Research/Operations

DCKL:mam

Attachments

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284 RARITAN CENTER PARKWAY • EDISON, NJ 08837 (201) 225-5600

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Appendix D

INTRODUCTION

This report contains the analytical results on your sample, Well #3, submitted on March 15, 1982. In your order, Total Organic Halide analysis (TOX) was requested on this sample. However, due to the sample matrix, it was not possible to obtain meaningful data.

The results we obtained on your sample are presented in a tabular format immediately after this introduction. Following the sample results, the quality assurance data on your specific sample are tabulated to verify the validity of the results obtained. Also presented in the quality assurance data report is the chain-of-custody record.

The established methods we used in the analysis of your sample are described in the Methodology section after the Results. In the analysis we followed a rigidly controlled Quality Assurance Protocol. This Protocol is described after the Methodology section.

We hope our report format is useful in assisting you to obtain pertinent information on your sample.

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RESULTS

The results obtained on your sample are listed in Table 1. For analysis of Groundwater Monitoring Metals, Pesticides and Herbicides, the contaminants are listed with their EPA Hazardous Waste number, sample concentration, and Method Detection Limit. A metal detected below its Method Detection Limit is reported in Table 1 as BMDL (Below Method Detection Limit). When a metal is searched for and cannot be found, it is reported as ND (Not Detected). In GC/ECD analysis, a contaminant not detected at or above its Method Detection Limit is reported in Table 1 as "< the method detection limit" established for that contaminant.

Quality Assurance Report (A), Table 2, contains the results obtained on the Method Blank and Spiked Blank for your sample. Quality Assurance Report (B), Table 3, lists the data on the Replicate and Matrix Spike Analysis.

The Chain-of-Custody Record on your sample is also included at the end of this Result section.

TABLE 1: QUANTITATIVE DATA ON COMPOUNDS OF INTEREST

ETC Sample No. 001340 Customer Sample ID. Well #1

GROUND WATER MONITORING METALS, PESTICIDES AND HERBICIDES

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l	METHOD DETECTION LIMIT IN ug/l
D004	Arsenic	ND	5
D005	Barium	700	100
D006	Cadmium	BMDL	5
D007	Chromium	ND	50
D008	Lead	ND	100
D009	Mercury	0.6	0.2
D010	Selenium	ND	5
D011	Silver	BMDL	25
D012	Endrin	<0.1	0.1 *
D013	Lindane	<2.0	2.0 *
D014	Methoxychlor	<50	50 *
D015	Toxaphene	<2.5	2.5 *
D016	2,4-D	<50	50 *
D017	2,4,5-TP (Silvex)	<5	5 *
Parameters establishing ground water quality	Iron	BMDL	50
	Manganese	4600	100
	Sodium	6000000	50

* GC/ECD Method Detection Limit established for your individual sample matrix. When a compound is not detected at or above the specific Method Detection Limit, that particular

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TABLE 1: QUANTITATIVE DATA ON PARAMETERS OF INTEREST

ETC Sample No. 001340 Customer Sample ID. Well #1

CONVENTIONALS

PARAMETER	CONCENTRATION mg/l	METHOD DETECTION LIMIT mg/l
Biological Oxygen Demand (BOD), 5 day	-	-
Chemical Oxygen Demand (COD)	-	-
Total Dissolved Solids (TDS)	-	-
Chloride	12400	200
Fluoride	0.88	0.1
Nitrate as N	<0.1	0.1
Total Kjeldahl Nitrogen	-	-
Sulfate as S	490	10
Total Phenols	<0.005	0.005
Total Organic Carbon	8	1

Specific Conductance	24000	umhos/cm	2000	umhos/cm
pH	7.0	Standard Units		
Turbidity	4.3	JTU	0.1	JTU

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TABLE QUANTITATIVE DATA ON PARAMETERS OF INTEREST

ETC Sample No. 001340 Customer Sample ID. Well #1

RADIOLOGICAL	CONCENTRATION pCi/L
Gross Alpha	<30
Gross Beta	<40

BACTERIOLOGICAL	COLONIES/100ml
Total Coliform	-
Fecal Coliform	-

"TNTC" Indicates Too Numerous to Count
"CF" Indicates Confluent Growth

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TABLE 2: QUALITY ASSURANCE REPORT (A): BLANK AND SPIKED BLANK

PESTICIDES AND HERBICIDES

For ETC Sample Numbers: 001327, 001328, 001330 to 001333, 001340 to 001343

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l BLANK	SPIKED BLANK	
			AMOUNT ADDED	% RECOVERY
D012	Endrin	<0.1	0.2	90
D013	Lindane	<2.0	2.0	116
D014	Methoxychlor	<50	100	118
D015	Toxaphene	<2.5	5.0	100
D016	2,4-D	<50	100	83
D017	2,4,5-TP (Silvex)	<5	10	100

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TABLE 3: QUALITY ASSURANCE REPORT (B): REPLICATE ANALYSIS AND MATRIX SPIKE ANALYSIS

** PESTICIDES AND HERBICIDES **

For ETC Sample Numbers: 001327, 001328, 001330 to 001333, 001340 to 001343

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l SAMPLE	REPLICATE	SAMPLE	SPIKED SAMPLE	AMOUNT ADDED	% RECOVERY
D012	Endrin	<0.1	<0.1	<0.1	0.18	0.2	90
D013	Lindane	<2.0	<2.0	<2.0	4.8	4.0	120
D014	Methoxychlor	<50	<50	<50	120	100	120
D015	Toxaphene	<2.5	<2.5	<2.5	6.0	5.0	120
D016	2,4-D	<50	<50	<50	5	100	5*
D017	2,4,5-TP (Silvex)	<5	<5	<5	2.7	10	27

* Matrix effect. Good recovery for spiked blank.

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ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

PHONE FOR CUSTOMER SERVICE: (201) 225-5600
TOLL FREE OUTSIDE NEW JERSEY: (800) 631-5382

CUSTODY NUMBER	DATE SHUTTLE SEALED
6517 6518	3/10/82

ATTENTION

This form is for the convenience of our clients. If used and sent to ETC it will serve as part of a complete chain of custody record held confidentially by ETC for the exclusive use of the client.

This form may be used in a legal proceeding. Accuracy and completeness are important. The purpose of this form is to document the chain of custody from the time the sample shuttle seal is broken until the shuttle is resealed. A person has a sample under custody if:

- It is in his/her actual possession; or
- It is his/her view, after being in actual possession, or
- It was in his/her actual possession and he/she places it in a locked or otherwise secure place to which any access by others is fully recorded

ETC maintains chain of custody records before a sample shuttle is sent and after it is returned. ETC maintains records of shipping manifests. Together these forms document a complete chain of custody for a sample.

A			
COMPANY	LCP Chemicals Inc	ATTENTION	max Obra
PLANT		ACCOUNT NUMBER	
ADDRESS	South Wood Ave Linden NJ 07036	REQUISITION NUMBER	000251
		TELEPHONE NUMBER	

B SAMPLE NUMBER	BOTTLE CODES:			
1B	E ____ to ____	M ____ to ____	V ____ to ____	VB ____ to ____
	CN ____ to ____	PH ____ to ____	PCB ____ to ____	WO 5 to 8

PLEASE COMPLETE THE REMAINDER OF THIS FORM. ALWAYS COMPLETE ITEMS C, E AND G. COMPLETE ITEM D IF SAMPLE APPEARANCE, CONSISTENCY, ODOR WARRANT NOTICE. COMPLETE ITEMS MARKED F AS NEEDED. ADD ANOTHER SHEET FOR F 7/8 AND SO ON IF NEEDED. THE LAST PERSON TO RECEIVE THE SAMPLE MUST, IN ADDITION TO COMPLETING THE APPROPRIATE F ITEM, ALSO COMPLETE ITEM G.

C SAMPLE LOCATION OR CODE (e.g., a permit code)	D SAMPLE DESCRIPTION
WELL #1	FILTERED WATER SAMPLE

E TO BE COMPLETED BY THE PERSON WHO ASSUMES RESPONSIBILITY FOR THE SAMPLE AND OBSERVES THE BREAKING OF THE SEAL.

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	[signature]	SEAL NO.	6517
SEAL INTACT	✓ YES ____ NO	SEAL BREAK TIME	7:00 AM
CODE OF ANY LEAKING BOTTLES			
CODE OF ANY BROKEN BOTTLES			

IF SEAL IS *NOT* INTACT PLEASE CALL

WARNING
IF ANY BOTTLE IS LEAKING OR BROKEN, DO NOT HANDLE. SOME BOTTLES CONTAIN ACID. PLEASE CALL.

F1 RELINQUISHED BY	F2 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT: MAXIMO A. OBRA	TONI KUZMACK 3pm (TIME)	
SIGN: [signature]	Toni Kuzmack 3/15 (DATE)	

F3 RELINQUISHED BY	F4 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT:	TIME / DATE	
SIGN:		

F5 RELINQUISHED BY	F6 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT:	TIME / DATE	
SIGN:		

G TO BE FILLED IN BY THE PERSON WHO HAS RESPONSIBILITY FOR THE SAMPLE AND OBSERVES RESEALING OF SAMPLE SHUTTLE.

REPLACE FORM IN ENVELOPE
PUT ENVELOPE IN SHUTTLE

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	[signature] 260-161		
RESEAL TIME	10:00 AM	SEAL NO.	6518

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

PHONE FOR CUSTOMER SERVICE: (201) 225-5600
TOLL FREE OUTSIDE NEW JERSEY: (800) 631-5362

100461

CUSTODY NUMBER	DATE SHUTTLE SEALED
6515 6516	3/10/82

ATTENTION

This form is for the convenience of our clients. If used and sent to ETC it will serve as part of a composite chain of custody record held confidentially by ETC for the exclusive use of the client.

This form may be used in a legal proceeding. Accuracy and completeness are important. The purpose of this form is to document the chain of custody from the time the sample shuttle seal is broken until the shuttle is resealed. A person has a sample under custody if:

- It is in his/her actual possession; or
- It is his/her view, after being in actual possession, or
- It was in his/her actual possession and he/she places it in a locked or otherwise secure place to which any access by others is fully recorded

ETC maintains chain of custody records before a sample shuttle is sent and after it is returned. ETC maintains records of shipping manifests. Together, these forms document a complete chain of custody for a sample.

A

COMPANY	LCP Chemicals Inc	ATTENTION	Max Obra
PLANT		ACCOUNT NUMBER	
ADDRESS	South Wood Ave	REQUISITION NUMBER	000251
	Linden NJ 07036	TELEPHONE NUMBER	

B SAMPLE NUMBER: 1A

BOTTLE CODES: E ____ to ____ M 1 to ____ V ____ to ____ VB ____ to ____
CN ____ to ____ PH ____ to ____ PCB ____ to ____ WO 1 to 4

PLEASE COMPLETE THE REMAINDER OF THIS FORM. ALWAYS COMPLETE ITEMS C, E AND G. COMPLETE ITEM D IF SAMPLE APPEARANCE, CONSISTENCY, ODOR WARRANT NOTICE. COMPLETE ITEMS MARKED F AS NEEDED. ADD ANOTHER SHEET FOR F7-8 AND SO ON IF NEEDED. THE LAST PERSON TO RECEIVE THE SAMPLE MUST, IN ADDITION TO COMPLETING THE APPROPRIATE F ITEM, ALSO COMPLETE ITEM G.

C SAMPLE LOCATION OR CODE (e.g., a permit code): WELL #1

D SAMPLE DESCRIPTION: FILTERED WATER SAMPLE

TO BE COMPLETED BY THE PERSON WHO ASSUMES RESPONSIBILITY FOR THE SAMPLE AND OBSERVES THE BREAKING OF THE SEAL.

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	[signature]	SEAL NO.	6515
SEAL INTACT	✓ YES ____ NO	SEAL BREAK TIME	7:20 AM
CODE OF ANY LEAKING BOTTLES			
CODE OF ANY BROKEN BOTTLES			

IF SEAL IS *NOT* INTACT PLEASE CALL

WARNING
IF ANY BOTTLE IS LEAKING OR BROKEN, DO NOT HANDLE. SOME BOTTLES CONTAIN ACID. PLEASE CALL.

F1 RELINQUISHED BY	F2 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE: AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT: MAXIMO A. OBRA	TONI KUZMACK 3pm (TIME)	
SIGN: [signature]	Toni Kuzmack 3/15 (DATE)	

F3 RELINQUISHED BY	F4 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE: AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT:	TIME:	
	DATE:	
SIGN:		

F5 RELINQUISHED BY	F6 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES.
PRINT:	TIME	
	DATE	
SIGN:		

TO BE FILLED IN BY THE PERSON WHO HAS RESPONSIBILITY FOR THE SAMPLE OBSERVES RESEALING OF SAMPLE SHUTTLE.

REPLACE FORM IN ENVELOPE
PUT ENVELOPE IN SHUTTLE

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	[signature]		26 of 161
RESEAL TIME	-8- 10:10 AM	SEAL NO.	6516

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

Company: LCP Chemicals Inc Job No. 251

Address: South Wood Ave
Linden NJ

Attention: Max Obra

8 Sample Shuttle(s) Received by: Joni Kuzmack

Time: 11:00Am Date: 3/15/82

Seal Number(s)	6516	6518	6520	6522
Seal Intact*	Y	Y	Y	Y
Seal Number(s)	6524	6526	6528	6530
Seal Intact*	Y	Y	Y	Y
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				

Yes (Y) No (N)

100462

284 RARITAN CENTER PARKWAY, EDISON, NEW JERSEY 08837 • (201) 225-5600

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ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY

ETC Sample Number 001340 to 001343

Relinquished By Joni Kuzmack

Received By [illegible] Date 3/15/82 Time 5:10 p.m.

Relinquished By _____

Received By _____ Date _____ Time _____

Relinquished By _____

Received By _____ Date _____ Time _____

Relinquished By _____

Recieved By _____ Date _____ Time _____

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284 RARITAN CENTER PARKWAY, EDISON, NEW JERSEY 08837 • (201) 225-5600

100464

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY CHRONICLE

ETC Sample Number 001340

Sample Preparation For	Analyst	Date
Base/Neutral/PCB's & Pesticides		
~~Acids~~ Pesticides in H_2O	Ben Yu / Stephanie Dobbs	3/30/82
Metals	Christine J Kull	3-24-82
Others Herbicides in Water	Paul Krajczar	3/30/82

Sample Analysis For	Analyst	Date
Base/Neutral/PCB's & Pesticides		
Acids		
VOA/Purgeables		
Metals	C J Kull / A. W. Massaro	3-28-82 to 4-1-82
Others Herbicides in Water	Paul Krajczar	4/1/82
Others Pesticides in Water	Paul Krajczar	4/2-3,8/82

Verified By

300f161

284 RARITAN CENTER PARKWAY, EDISON, NEW JERSEY 08837 • (201) 225-5600

TABLE 1: QUANTITATIVE DATA ON COMPOUNDS OF INTEREST

ETC Sample No. 001341 Customer Sample ID. Well #2

GROUND WATER MONITORING METALS, PESTICIDES AND HERBICIDES

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l	METHOD DETECTION LIMIT IN ug/l
D004	Arsenic	BMDL	5
D005	Barium	BMDL	100
D006	Cadmium	10	5
D007	Chromium	ND	50
D008	Lead	BMDL	100
D009	Mercury	BMDL	0.2
D010	Selenium	ND	5
D011	Silver	ND	25
D012	Endrin	<0.1	0.1 *
D013	Lindane	<2.0	2.0 *
D014	Methoxychlor	<50	50 *
D015	Toxaphene	<2.5	2.5 *
D016	2,4-D	<50	50 *
D017	2,4,5-TP (Silvex)	<5	5 *
	Iron	820	50
	Manganese	1800	100
	Sodium	5000000	50

* GC/ECD Method Detection Limit established for your individual sample matrix. When a compound is not detected at or above the specific Method Detection Limit, that particular compound is reported as "< the detection limit."

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TA[illegible] 1: QUANTITATIVE DATA ON PARAMETERS OF [illegible]TEREST

ETC [illegible]ple No. 001341 Customer Sample ID. Well #2

CONVENTIONALS

PARAMETER	CONCENTRATION mg/l	METHOD DETECTION LIMIT mg/l
Biological Oxygen Demand (BOD), 5 day	-	-
Chemical Oxygen Demand (COD)	-	-
Total Dissolved Solids (TDS)	-	-
Chloride	16200	200
Fluoride	0.31	0.1
Nitrate as N	<0.1	0.1
Total Kjeldahl Nitrogen	-	-
Sulfate as S	240	10
Total Phenols	<0.005	0.005
Total Organic Carbon	6	1

Specific Conductance	26000	umhos/cm	2000	umhos/cm
pH	7.2	Standard Units		
Turbidity	0.35	JTU	0.1	JTU

326f161

100466

TABLE 1: QUANTITATIVE DATA ON PARAMETERS OF INTEREST

ETC Sample No. 001341 Customer Sample ID. Well #2

RADIOLOGICAL	CONCENTRATION pCi/L
Gross Alpha	<30
Gross Beta	44 +/- 20

BACTERIOLOGICAL	COLONIES/100ml
Total Coliform	-
Fecal Coliform	-

"TNTC" Indicates Too Numerous to Count
"CF" Indicates Confluent Growth

TABLE 2: QUALITY ASSURANCE REPORT (A): BLANK AND SPIKED BLANK

PESTICIDES AND HERBICIDES

For ETC Sample Numbers: 001327, 001328, 001330 to 001333, 001340 to 001343

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l BLANK	SPIKED BLANK	
			AMOUNT ADDED	% RECOVERY
D012	Endrin	<0.1	0.2	90
D013	Lindane	<2.0	2.0	116
D014	Methoxychlor	<50	100	118
D015	Toxaphene	<2.5	5.0	100
D016	2,4-D	<50	100	83
D017	2,4,5-TP (Silvex)	<5	10	100

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TABLE 3: QUALITY ASSURANCE REPORT (B): REPLICATE ANALYSIS AND MATRIX SPIKE ANALYSIS

** PESTICIDES AND HERBICIDES **

For ETC Sample Numbers: 001327, 001328, 001330 to 001333, 001340 to 001343

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l SAMPLE	REPLICATE	SAMPLE	SPIKED SAMPLE	AMOUNT ADDED	% RECOVERY
D012	Endrin	<0.1	<0.1	<0.1	0.18	0.2	90
D013	Lindane	<2.0	<2.0	<2.0	4.8	4.0	120
D014	Methoxychlor	<50	<50	<50	120	100	120
D015	Toxaphene	<2.5	<2.5	<2.5	6.0	5.0	120
D016	2,4-D	<50	<50	<50	5	100	5*
D017	2,4,5-TP (Silvex)	<5	<5	<5	2.7	10	27

* Matrix effect. Good recovery for spiked blank.

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100469

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

100470

CHAIN OF CUSTODY

PHONE FOR CUSTOMER SERVICE: (201) 225-5600
TOLL FREE OUTSIDE NEW JERSEY: (800) 631-5382

CUSTODY NUMBER	DATE SHUTTLE SEALED
6521 6522	3/10/82

ATTENTION

This form is for the convenience of our clients. If used and sent to ETC it will serve as part of a complete chain of custody record kept confidentially by ETC for the exclusive use of the client.

This form may be used in a legal proceeding. Accuracy and completeness are important. The purpose of this form is to document the chain of custody from the time the sample shuttle seal is broken until the shuttle is resealed. A person has a sample under custody if

- it is in his/her actual possession; or
- it is his/her view after being in actual possession; or
- it was in his/her actual possession and he/she places it in a locked or otherwise secure place to which any access by others is fully recorded.

ETC maintains chain of custody records before a sample shuttle is sent and after it is returned. ETC maintains records of shipping manifests. Together these forms document a complete chain of custody for a sample.

A COMPANY	LCP Chemicals-NJ Inc	ATTENTION	Max Obra
PLANT		ACCOUNT NUMBER	
ADDRESS	South Wood Ave Linden NJ 07036	REQUISITION NUMBER	000251
		TELEPHONE NUMBER	

B SAMPLE NUMBER: 2D

BOTTLE CODES: E ____ to ____ M ____ to ____ V ____ to ____ VB ____ to ____
CN ____ to ____ PH ____ to ____ PCB ____ to ____ WO 5 to 8

PLEASE COMPLETE THE REMAINDER OF THIS FORM. ALWAYS COMPLETE ITEMS C, E AND G. COMPLETE ITEM D IF SAMPLE APPEARANCE, CONSISTENCY, ODOR WARRANT NOTICE. COMPLETE ITEMS MARKED F AS NEEDED. ADD ANOTHER SHEET FOR F3, F4 AND SO ON IF NEEDED. THE LAST PERSON TO RECEIVE THE SAMPLE MUST, IN ADDITION TO COMPLETING THE APPROPRIATE F ITEM, ALSO COMPLETE ITEM G.

C SAMPLE LOCATION OR CODE (e.g., a permit code)	WELL #2	D SAMPLE DESCRIPTION	FILTERED WATER SAMPLE

TO BE COMPLETED BY THE PERSON WHO ASSUMES RESPONSIBILITY FOR THE SAMPLE AND OBSERVES THE BREAKING OF THE SEAL.

NAME	MAXIMO A. OBRA	DATE	3/15/8
SIGNATURE	[signature]	SEAL NO.	6521
SEAL INTACT	✓ YES ____ NO	SEAL BREAK TIME	7:00 AM
CODE OF ANY LEAKING BOTTLES			
CODE OF ANY BROKEN BOTTLES			

IF SEAL IS NOT INTACT PLEASE CALL

WARNING
IF ANY BOTTLE IS LEAKING OR BROKEN, DO NOT HANDLE. SOME BOTTLES CONTAIN ACID. PLEASE CALL.

F1 RELINQUISHED BY	F2 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT: MAXIMO A. OBRA	TONI KUZMACK 3pm	
SIGN: [signature]	Toni Kuzmack 8/15	

F3 RELINQUISHED BY	F4 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT	TIME / DATE	
SIGN		

F5 RELINQUISHED BY	F6 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT	TIME / DATE	
SIGN		

TO BE FILLED IN BY THE PERSON WHO HAS RESPONSIBILITY FOR THE SAMPLE AND OBSERVES RESEALING OF SAMPLE SHUTTLE.

NAME	MAXIMO A. OBRA	DATE	3/15/8
SIGNATURE	[signature] 36f161		
RESEAL TIME	10:20 AM	SEAL NO.	6522

REPLACE FORM IN ENVELOPE
PUT ENVELOPE IN SHUTTLE

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

100471

CHAIN OF CUSTODY

PHONE FOR CUSTOMER SERVICE: (201) 225-5800
TOLL FREE OUTSIDE NEW JERSEY: (800) 631-6362

CUSTODY NUMBER	DATE SHUTTLE SEALED
6519 6520	3/10/82

ATTENTION

This form is for the convenience of our clients. If used and sent to ETC it will serve as part of a complete chain of custody record held confidentially by ETC for the exclusive use of the client.

This form may be used in a legal proceeding. Accuracy and completeness are important. The purpose of this form is to document the chain of custody from the time the sample shuttle seal is broken until the shuttle is resealed. A person has a sample under custody if:

- It is in his/her actual possession; or
- It is his/her view, after being in actual possession; or
- It was in his/her actual possession and he/she places it in a locked or otherwise secure place to which any access by others is fully recorded

ETC maintains chain of custody records before a sample shuttle is sent and after it is returned. ETC maintains records of shipping manifests. Together, these forms document a complete chain of custody for a sample.

A			
COMPANY	LCP Chemicals-NJ Inc	ATTENTION	Max Obra
PLANT		ACCOUNT NUMBER	
ADDRESS	South Wood Ave	REQUISITION NUMBER	000251
	Linden NJ 07036	TELEPHONE NUMBER	

B SAMPLE NUMBER: 2A

BOTTLE CODES: E ____ to ____ M 1 to ____ V ____ to ____ VB ____ to ____
CN ____ to ____ PH ____ to ____ PCB ____ to ____ WO 1 to 4

PLEASE COMPLETE THE REMAINDER OF THIS FORM. ALWAYS COMPLETE ITEMS C, E AND G. COMPLETE ITEM D IF SAMPLE APPEARANCE, CONSISTENCY, ODOR, WARRANT NOTICE. COMPLETE ITEMS MARKED F AS NEEDED. ADD ANOTHER SHEET FOR F 7-9 AND SO ON IF NEEDED. THE LAST PERSON TO RECEIVE THE SAMPLE MUST, IN ADDITION TO COMPLETING THE APPROPRIATE F ITEM, ALSO COMPLETE ITEM G.

C		D	
SAMPLE LOCATION OR CODE (e.g., a permit code)	WELL #2	SAMPLE DESCRIPTION	FILTER WATER SAMPLE

E TO BE COMPLETED BY THE PERSON WHO ASSUMES RESPONSIBILITY FOR THE SAMPLE AND OBSERVES THE BREAKING OF THE SEAL.

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	[signature]	SEAL NO	6519
SEAL INTACT	✓ YES ____ NO	SEAL BREAK TIME	7:00AM
CODE OF ANY LEAKING BOTTLES			
CODE OF ANY BROKEN BOTTLES			

IF SEAL IS NOT INTACT PLEASE CALL

WARNING
IF ANY BOTTLE IS LEAKING OR BROKEN, DO NOT HANDLE. SOME BOTTLES CONTAIN ACID. PLEASE CALL.

F1 RELINQUISHED BY	F2 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT: MAXIMO A. OBRA	Toni Kuzmack 3pm (TIME)	
SIGN: [signature]	TONI KUZMACK 3/15 (DATE)	

F3 RELINQUISHED BY	F4 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT	TIME / DATE	
SIGN		

F5 RELINQUISHED BY	F6 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT	TIME / DATE	
SIGN		

G TO BE FILLED IN BY THE PERSON WHO HAS RESPONSIBILITY FOR THE SAMPLE AND OBSERVES RESEALING OF SAMPLE SHUTTLE.

REPLACE FORM IN ENVELOPE
PUT ENVELOPE IN SHUTTLE

NAME	MAXIMO A. OBRA	DATE	3/15/8
SIGNATURE	[signature] 37 of 161		
RESEAL TIME	10:15 AM	SEAL NO.	6520

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

Company: LCP Chemicals Inc Job No. 251

Address: South Wood Ave
Linden NJ

Attention: Max Obra

8 Sample Shuttle(s) Received by: Joni Kuzmack

Time: 11:00Am Date: 3/15/82

Seal Number(s)	6516	6518	6520	6522
Seal Intact*	Y	Y	Y	Y
Seal Number(s)	6524	6526	6528	6530
Seal Intact*	Y	Y	Y	Y
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				

* Yes (Y) No (N)

100472

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ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY

ETC Sample Number 001340 to 001343

Relinquished By Joni Kuzmack

Received By [illegible] Date 3/15/82 Time 5:10 p.m.

Relinquished By _____

Received By _____ Date _____ Time ____

Relinquished By _____

Received By _____ Date _____ Time ____

Relinquished By _____

Recieved By _____ Date _____ Time ____

100473

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398-161

100474

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY CHRONICLE

ETC Sample Number 001341

Sample Preparation For	Analyst	Date
Base/Neutral/PCB's & Pesticides		
~~Acids~~ Pesticides in H_2O	Ben Gulin / Stephanie Dobbs	3/30/82
Metals	Christine J Kuhl	3-24-82
Others Herbicides in Water	Pearl Krajczar	3/30/82

Sample Analysis For	Analyst	Date
Base/Neutral/PCB's & Pesticides		
Acids		
VOA/Purgeables		
Metals	K J Kuhl / A. W. Massaro	3-28-82 to 4-1-82
Others Herbicides in Water	Pearl Krajczar	4/1/82
Others Pesticides in Water	Pearl Krajczar	4/2-3, 8/82

Verified By [signature]

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100475

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

Company: Chyun Associates Job No. 251

Address 1101 State Rd
Princeton NJ

Attention: Mike Wright

Sample Description:

ETC Sample #:	To be Analyzed for
01340W06 to 001343W06	TOC & total phenols
01340 W07 to 001343 W07	Conventionals: Specific conductance. Chloride, sulfate fluoride, Nitrate, Turbidity

Please run TOC and specific conductance in quad. for sample #001343

Sample(s) Relinquished by: Carl Mattello

Time: 11:20 AM Date: 3-18-82

Sample(s) Received by: Michael Wright

Time: 1120 HM Date: 3/18/82

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100476

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY

001340 W06 to 001343W06

ETC Sample Number 001340 W07 to 001343 W07

Relinquished By Toni Kuzmack

Received By Carl DeLello Date 3-18-82 Time 10:20am

Relinquished By _____

Received By _____ Date _____ Time ____

Relinquished By _____

Received By _____ Date _____ Time ____

Relinquished By _____

Received By _____ Date _____ Time ____

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100477

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

To Teledyne Isotopes:

Please complete this document and include with your report.

This shuttle contains:

ETC Sample numbers:		To be analyzed for:
001331	W05	Gross Alpha/Beta
001332	W05	Gross Alpha/Beta
001333	W05	Gross Alpha/Beta
001340	W05	Gross Alpha/Beta
001341	W05	Gross Alpha/Beta

Sample Shuttle sealed by: Joni Kuzmach

Date: 3/17/82 Time: 3:18 pm Seal Number: 6585

Sample Shuttle opened by: Edna C. Cunningham

Date: 3/18/82 Time: 1600 Seal Number: 0006585

Was seal intact? Yes ✓ No

For return:

Sample Shuttle sealed by: Edna C. Cunningham

Date: 3/19/82 Time: 1145 Seal Number: 0006586

Sample Shuttle opened by: Joni Kuzmach

Date: 3/22/82 Time: 11:37 Seal Number: 6586

Was seal intact? Yes ✓ No

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METHODOLOGY

Analysis of Metals

The methods employed in the analysis of your sample for metals are established EPA methods for priority pollutants.

Metals analysis is performed according to the methods published by EPA in "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-70-020, March 1979. Arsenic, selenium, thallium, and antimony are analyzed by furnace AA while calcium, magnesium, barium, beryllium, chromium, nickel, copper, zinc, silver, cadmium, and lead are analyzed by flame AA. Potassium and sodium are analyzed by flame emmission. Mercury is analyzed by cold vapor technique.

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100478

Analysis of Pesticides and Herbicides

The methods employed in the analysis of your water sample for pesticides and herbicides are established EPA methods taken from the "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," June, 1980. The pesticide method can be summarized as follows: A measured volume of sample, approximately 500-1000ml, to which sodium sulfate has been added, is extracted with methylene chloride. The methylene chloride extract is dried and concentrated to approximately 0.5ml. The extract is brought to a final volume with hexane and injected into a gas chromatograph equipped with a ^{63}Ni electron capture detector.

The herbicide method can be summarized as follows: A measured volume of sample, approximately 500-1000 ml, to which sodium sulfate has been added, is acidified and extracted with methylene chloride. The methylene chloride extract is evaporated to dryness, and the residue is derivatized with a BF_3 esterification reagent. The derivatives are extracted into hexane for subsequent injection into a gas chromatograph equipped with a ^{63}Ni electron capture detector.

The GC operating parameters were as follows:

COLUMN

6' x 4mm glass 1.5% SP-2250 & 1.95% SP-2401
Supelcoport 100/120 mesh

CARRIER FLOW

60ml/min. Argon/Methane

SEPTUM PURGE

5ml/min. Argon/Methane

COLUMN OVEN

210°C

INJECTOR TEMPERATURE

225°C

DETECTOR TEMPERATURE

300°C

QUALITY ASSURANCE PROTOCOL

The quality assurance protocol followed in the analysis of your sample is based on the "Handbook for Analytical Control in Water and Wastewater Laboratories," EPA-600/4-79-019, March, 1979; National Enforcement Investigation Center Policies, and Procedures manual; and EPA-330/9/79/001-R, October, 1979.

Analysis of Metals (Standards)

- New working standards are prepared for each batch of samples.
- Normal calibration is performed using a blank and four standards that have been carried through the entire sample preparation procedure. A regression analysis is used to construct the calibration curve.
- For each sample analysis in the standard additions technique, a three point calibration is performed using U. S. EPA Methods for Chemical Analysis of Water and Wastes, 1979. Results are obtained using linear regression analysis. Any results obtained with a coefficient of correlation below 0.990 are considered erroneous, necessitating raw data editing or sample re-analysis.
- Normal calibration curves are constructed using greater than or equal to 5 times the Instrumental Detection Limit (IDL) as the lowest concentration level.
- All calibration standards are analyzed in duplicate, as a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to establish the validity of the normal calibration curve.

Analysis of Metals (Sample, for all metals except Mercury)

For all homogeneous samples (minimum of 42% QC), each sample batch may include up to 30 samples and the following fixed number of QC samples:

- 3 Replicates.
- ~~2 Replicate~~ spikes.
- 2 Replicate independent reference standards.
- 8 Calibration standards (processed using the sample preparation method).
- 2 Blanks (using sample preparation method).
- 4 Calibration standards (without sample preparation).
- 1 Blank (without sample preparation).

For all heterogeneous samples (minimum of 65% QC), every field sample in a sample batch is run in duplicate. A sample batch may include up to 30 samples and the following fixed number of QC samples:

- 4 Replicates.
- 4 Replicate spikes.
- 2 Replicate independent reference standards.
- 8 Calibration standards (processed using the sample preparation method).
- 2 Blanks (using sample preparation method).
- 4 Calibration standards (without sample preparation).
- 1 Blank (without sample preparation).

Analysis of Metals (Sample, Mercury)

For every matrix (minimum of 66% QC), all the field samples in sample batch are run in duplicate. A sample batch may include up to 20 samples and the following fixed number of QC samples:

- 3 Replicates.
- 2 Replicate spikes.
- 2 Replicate independent reference standards.
- 10 Calibration standards (processed using the sample preparation method).
- 2 Blanks.

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Analysis of Pesticides and Herbicides

- In every block of 20 samples extracted, there are 16 field samples, one blank, one spiked blank, one sample spiked with the standard mixture, and a duplicate field sample.

- Blind quality control samples are included in field samples at a minimum of one every hundred samples.

- GC performance criteria as specified in EPA Method 608 are met before analysis starts.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;
- outgoing shipping manifests;
- the chain-of-custody form completed by the person (s) breaking the seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;
- incoming shipping manifests;
- breaking the Shuttle's reseal;
- storing each labeled sample bottle in a secured area;.
- disposition of each sample to an analyst or technician and;
- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The record shows for each link in this process:

- the person with custody;
- the time and date each person accepted or relinquished custody.

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REPORT APPENDICES

The following appendices provide the support analytical data associated with your sample analyses. They are arranged as follows:

Appendix A

1) Reconstructed total ion chromatogram of GC/MS analyses of your sample.

2) The individual mass spectra of all priority pollutant compounds which have been identified as being present in your sample.

3) The individual mass spectra of the corresponding compounds as obtained from the standards.

Appendix B

1) The mass spectra of the calibration compounds, 4-bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP), as obtained on the data of sample analyses.

Appendix C [for plus 10 and 50% internal standard option]

1) Spectra of tentatively identified compounds, with their differences.

Appendix D

1) Subcontractor's report.

These data are provided to present a complete report on your sample and to provide the data on which analytical decisions have been based. We hope this will aid you in your own analysis of the data.

APPENDIX

100486

TELEDYNE ISOTOPES

REFERENCE: WO 3-3562

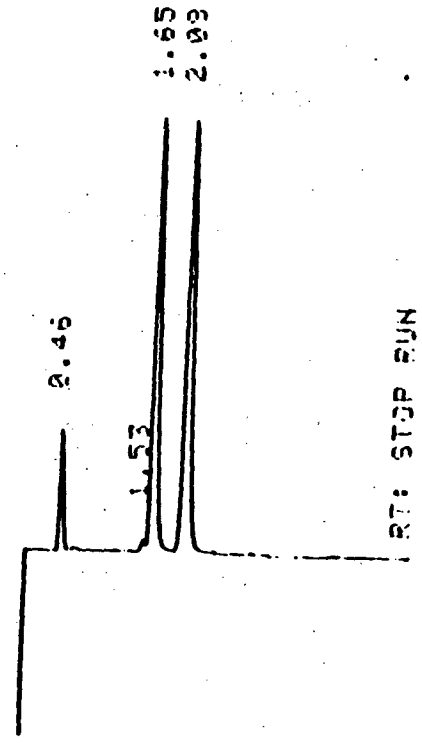
TI# 26280 is being analyzed for Ra-226 (because the GR-A was greater than 5.0 pCi/ℓ) and the result will be reported on a new Work Order.

It was not possible to reach a detection limit of 5 pCi/ℓ for GR-A for four samples because of heavy residue, even after filtration:

TI#	RESIDUE (g/ℓ)
26277	35.1
26278	31.0
26282	15.9
26283	17.9

RECEIVED APR 12 1982

APPENDIX D



Gas Chromatogram of 2,4-D and 2,4,5-TP(Silvex) Standard
(10 ug/ml & 1 ug/ml)

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TABLE 1: QUANTITATIVE DATA ON COMPOUNDS OF INTEREST

ETC Sample No. 001342 Customer Sample ID. Well #3

GROUND WATER MONITORING METALS, PESTICIDES AND HERBICIDES

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l	METHOD DETECTION LIMIT IN ug/l
D004	Arsenic	10	5
D005	Barium	500	100
D006	Cadmium	BMDL	5
D007	Chromium	ND	50
D008	Lead	BMDL	100
D009	Mercury	BMDL	0.2
D010	Selenium	ND	5
D011	Silver	ND	25
D012	Endrin	<0.1	0.1 *
D013	Lindane	<2.0	2.0 *
D014	Methoxychlor	<50	50 *
D015	Toxaphene	<2.5	2.5 *
D016	2,4-D	<50	50 *
D017	2,4,5-TP (Silvex)	<5	5 *
	Iron	300	50
	Manganese	700	100
	Sodium	2000000	50

* GC/ECD Method Detection Limit established for your individual sample matrix. When a compound is not detected at or above the specific Method Detection Limit, that particular compound is reported as "[illegible]

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RESULTS

The results obtained on your sample are listed in Table 1. For analysis of Groundwater Monitoring Metals, Pesticides and Herbicides, the contaminants are listed with their EPA Hazardous Waste number, sample concentration, and Method Detection Limit. A metal detected below its Method Detection Limit is reported in Table 1 as BMDL (Below Method Detection Limit). When a metal is searched for and cannot be found, it is reported as ND (Not Detected). In GC/ECD analysis, a contaminant not detected at or above its Method Detection Limit is reported in Table 1 as "< the method detection limit" established for that contaminant.

Quality Assurance Report (A), Table 2, contains the results obtained on the Method Blank and Spiked Blank for your sample. Quality Assurance Report (B), Table 3, lists the data on the Replicate and Matrix Spike Analysis.

The Chain-of-Custody Record on your sample is also included at the end of this Result section.

TABLE 1: QUANTITATIVE DATA ON PARAMETERS OF INTEREST

ETC Sample No. 001342 Customer Sample ID. Well #3

RADIOLOGICAL	CONCENTRATION pCi/L
Gross Alpha	<60
Gross Beta	330 +/- 60

BACTERIOLOGICAL	COLONIES/100ml
Total Coliform	-
Fecal Coliform	-

"TNTC" Indicates Too Numerous to Count
"CF" Indicates Confluent Growth

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TABLE 1: QUANTITATIVE DATA ON PARAMETERS OF INTEREST

ETC Sample No. 001342 Customer Sample ID. Well #3

CONVENTIONALS

PARAMETER	CONCENTRATION mg/l		METHOD DETECTION LIMIT mg/l	
Biological Oxygen Demand (BOD), 5 day	-		-	
Chemical Oxygen Demand (COD)	-		-	
Total Dissolved Solids (TDS)	-		-	
Chloride	13100		200	
Fluoride	0.32		0.1	
Nitrate as N	<0.1		0.1	
Total Kjeldahl Nitrogen	-		-	
Sulfate as S	170		10	
Total Phenols	<0.005		0.005	
Total Organic Carbon	21		1	
Specific Conductance	28000	umhos/cm	2000	umhos/cm
pH	7.3	Standard Units		
Turbidity	1.2	JTU	0.1	JTU

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TABLE 3: QUALITY ASSURANCE REPORT (B): REPLICATE ANALYSIS AND MATRIX SPIKE ANALYSIS

** PESTICIDES AND HERBICIDES **

For ETC Sample Numbers: 001327, 001328, 001330 to 001333, 001340 to 001343

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l SAMPLE	REPLICATE	SAMPLE	SPIKED SAMPLE	AMOUNT ADDED	% RECOVERY
D012	Endrin	<0.1	<0.1	<0.1	0.18	0.2	90
D013	Lindane	<2.0	<2.0	<2.0	4.8	4.0	120
D014	Methoxychlor	<50	<50	<50	120	100	120
D015	Toxaphene	<2.5	<2.5	<2.5	6.0	5.0	120
D016	2,4-D	<50	<50	<50	5	100	5*
D017	2,4,5-TP (Silvex)	<5	<5	<5	2.7	10	27

* Matrix effect. Good recovery for spiked blank.

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'ABLE 2: QUALITY ASSURANCE REPORT (A): BLANK AND SPIKED BLANK

*PESTICIDES AND HERBICIDES**

or ETC Sample Numbers: 001327, 001328, 001330 to 001333, 001340 to 001343

EPA AZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l BLANK	SPIKED BLANK	
			AMOUNT ADDED	% RECOVERY
D012	Endrin	<0.1	0.2	90
D013	Lindane	<2.0	2.0	116
D014	Methoxychlor	<50	100	118
D015	Toxaphene	<2.5	5.0	100
D016	2,4-D	<50	100	83
D017	2,4,5-TP (Silvex)	<5	10	100

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ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

PHONE FOR CUSTOMER SERVICE: (201) 225-6800
TOLL FREE OUTSIDE NEW JERSEY: (800) 631-6382

CUSTODY NUMBER	DATE SHUTTLE SEALED
6525 6526	3/10/82

ATTENTION

This form is for the convenience of our clients. If used and sent to ETC it will serve as part of a complete chain of custody record held confidentially by ETC for the exclusive use of the client.

This form may be used in a legal proceeding. Accuracy and completeness are important. The purpose of this form is to document the chain of custody from the time the sample shuttle seal is broken until the shuttle is resealed. A person has a sample under custody if

- It is in his/her actual possession; or
- It is his/her view, after being in actual possession; or
- It was in his/her actual possession and he/she places it in a locked or otherwise secure place to which any access by others is fully recorded.

ETC maintains chain of custody records before a sample shuttle is sent and after it is returned. ETC maintains records of shipping manifests. Together these forms document a complete chain of custody for a sample.

COMPANY	LCP Chemicals-NJ Inc	ATTENTION	Max Obra
PLANT		ACCOUNT NUMBER	
ADDRESS	South Wood Ave	REQUISITION NUMBER	000251
	Linden NJ 07036	TELEPHONE NUMBER	

SAMPLE NUMBER: 3B

BOTTLE CODES: E ____ to ____ M ____ to ____ V ____ to ____ VB ____ to ____
CN ____ to ____ PH ____ to ____ PCB ____ to ____ WO 5 to 8

PLEASE COMPLETE THE REMAINDER OF THIS FORM. ALWAYS COMPLETE ITEMS C, E AND G. COMPLETE ITEM D IF SAMPLE APPEARANCE, CONSISTENCY, ODOR, WARRANT NOTICE. COMPLETE ITEMS F AND E AS NEEDED. ADD ANOTHER SHEET FOR F7, F8 AND SO ON IF NEEDED. THE LAST PERSON TO RECEIVE THE SAMPLE MUST, IN ADDITION TO COMPLETING THE APPROPRIATE E ITEM, ALSO COMPLETE ITEM G.

SAMPLE LOCATION OR CODE (a permit code)		D SAMPLE DESCRIPTION	

TO BE COMPLETED BY THE PERSON WHO ASSUMES RESPONSIBILITY FOR THE SAMPLE AND OBSERVES THE BREAKING OF THE SEAL.

IF SEAL IS NOT INTACT PLEASE CALL

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	Maximo A. Obra	SEAL NO.	6525
SEAL INTACT	✓ YES ____ NO	SEAL BREAK TIME	7:00 AM
CODE OF ANY LEAKING BOTTLES			
CODE OF ANY BROKEN BOTTLES			

WARNING
IF ANY BOTTLE IS LEAKING OR BROKEN, DO NOT HANDLE. SOME BOTTLES CONTAIN ACID. PLEASE CALL.

RELINQUISHED BY	RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
	F2 RECEIVED BY ____ DATE	
RELINQUISHED BY	F4 RECEIVED BY ____ TIME ____ DATE	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
RELINQUISHED BY	F6 RECEIVED BY ____ TIME ____ DATE	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES

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G FILLED IN BY THE PERSON WHO HAS RESPONSIBILITY FOR THE SAMPLE AND OBSERVES RESEALING OF SAMPLE SHUTTLE

REPLACE FORM IN ENVELOPE
PUT ENVELOPE IN SHUTTLE

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	Maximo A. Obra		
RESEAL TIME	10:30 AM	SEAL	6526

100497

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

PHONE FOR CUSTOMER SERVICE: (201) 226-5600
TOLL FREE OUTSIDE NEW JERSEY: (800) 631-5382

CUSTODY NUMBER	DATE SHUTTLE SEALED
6523 6524	3/10/82

ATTENTION

This form is for the convenience of our clients. If used and sent to ETC it will serve as part of a complete chain of custody record held confidentially by ETC for the exclusive use of the client.

This form may be used in a legal proceeding. Accuracy and completeness are important. The purpose of this form is to document the chain of custody from the time the sample shuttle seal is broken until the shuttle is resealed. A person has a sample under custody if:

- It is in his/her actual possession; or
- It is his/her view, after being in actual possession, or
- It was in his/her actual possession and he/she places it in a locked or otherwise secure place to which any access by others is fully recorded

ETC maintains chain of custody records before a sample shuttle is sent and after it is returned. ETC maintains records of shipping manifests. Together these forms document a complete chain of custody for a sample.

A			
COMPANY	LCP Chemicals-NJ Inc	ATTENTION	Max Obra
PLANT		ACCOUNT NUMBER	
ADDRESS	South Wood Ave Linden NJ 07036	REQUISITION NUMBER	000251
		TELEPHONE NUMBER	

B SAMPLE NUMBER: 3A

BOTTLE CODES: E ____ to ____ M 1 to ____ V ____ to ____ VB ____ to ____
CN ____ to ____ PH ____ to ____ PCB ____ to ____ WO 1 to 4

PLEASE COMPLETE THE REMAINDER OF THIS FORM. ALWAYS COMPLETE ITEMS C, E AND G. COMPLETE ITEM D IF SAMPLE APPEARANCE, CONSISTENCY, ODOR WARRANT NOTICE. COMPLETE ITEMS MARKED F AS NEEDED. ADD ANOTHER SHEET FOR F 7/8 AND SO ON IF NEEDED. THE LAST PERSON TO RECEIVE THE SAMPLE MUST, IN ADDITION TO COMPLETING THE APPROPRIATE F ITEM, ALSO COMPLETE ITEM G.

C SAMPLE LOCATION OR CODE (e.g., a permit code)	WELL # 3	D SAMPLE DESCRIPTION	FILTERED WATER SAMPLE

TO BE COMPLETED BY THE PERSON WHO ASSUMES RESPONSIBILITY FOR THE SAMPLE AND OBSERVES THE BREAKING OF THE SEAL

IF SEAL IS *NOT* INTACT PLEASE CALL

WARNING
IF ANY BOTTLE IS LEAKING OR BROKEN, DO NOT HANDLE. SOME BOTTLES CONTAIN ACID. PLEASE CALL.

NAME	MAXIMO A. OBRA	DATE	3/15/8
SIGNATURE	Maximo A. Obra	SEAL NO.	6523
SEAL INTACT	✓ YES ____ NO	SEAL BREAK TIME	7:00AM
CODE OF ANY LEAKING BOTTLES			
CODE OF ANY BROKEN BOTTLES			

F1 RELINQUISHED BY	F2 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT: MAXIMO A. OBRA	TONI KUZMACK 3pm (DATE)	
SIGN: Maximo A. Obra	Toni Kuzmack 3/15	
F3 RELINQUISHED BY	**F4 RECEIVED BY** TIME	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT	DATE	
SIGN		
F5 RELINQUISHED BY	**F6 RECEIVED BY** TIME	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
PRINT	DATE	
SIGN		

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TO BE FILLED IN BY THE PERSON WHO HAS RESPONSIBILITY FOR THE SAMPLE AND OBSERVES RESEALING OF SAMPLE SHUTTLE

REPLACE FOAM IN ENVELOPE
PUT ENVELOPE IN SHUTTLE

NAME	MAXIMO A. OBRA	DATE	3/15/8
SIGNATURE	Maximo A. Obra		

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY

TC Sample Number 001340 to 001343

elinquished By Tom Kuzmack

eceived By [illegible] Date 3/15/82 Time 5:10 p.m.

elinquished By _____

eceived By _____ Date _____ Time ____

elinquished By _____

eceived By _____ Date _____ Time ____

elinquished By _____

cieved By _____ Date _____ Time ____

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100498

284 RARITAN CENTER PARKWAY, EDISON, NEW JERSEY 08837 • (201) 225-5600

100499

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

Company: LCP Chemicals Inc Job No. 251

Address: South Wood Ave
Linden NJ

Attention: Max Obra

8 Sample Shuttle(s) Received by: Joni Kuzmack

Time: 11:00Am Date: 3/15/82

Seal Number(s)	6516	6518	6520	6522
Seal Intact*	Y	Y	Y	Y
Seal Number(s)	6524	6526	6528	6530
Seal Intact*	Y	Y	Y	Y
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				

Yes (Y) No (N)

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100500

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

Company: Chyrin Associates Job No. 251

Address 1101 State Rd
Princeton NJ

Attention: Mike Wright

Sample Description:

ETC Sample #:	To be Analyzed For
001340W06 to 001343W06	TOC & total phenols
001340 W07 to 001343 W07	Conventionals: Specific conductance, chloride, sulfate, fluoride, Nitrate, Turbidity

Please run TOC and Specific conductance in quad for sample #001343

Sample(s) Relinquished by: Carl Mattello

Time: 11:20 AM Date: 3-18-82

Sample(s) Received by: Michael Wright

Time: 1120 HM Date: 3/18/82

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100501

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY CHRONICLE

ETC Sample Number 001342

Sample Preparation For	Analyst	Date
Base/Neutral/PCB's & Pesticides		
~~Acids~~ Pesticides in H_2O	Ben Gufin / Stephanie Dobbs	3/30/82
Metals	Christine J. Kuhl	3-24-82
Others Herbicides in Water	Pearl Krajczar	3/30/82

Sample Analysis For	Analyst	Date
Base/Neutral/PCB's & Pesticides		
Acids		
VOA/Purgeables		
Metals	K J Kuhl / A. W. Massaw	3-28-82 to 4-1-82
Others Herbicides in Water	Pearl Krajczar	4/1/82
Others Pesticides in Water	Pearl Krajczar	4/2-3, 8/82

Verified By [signature] 67 of 161

284 RARITAN CENTER

100502

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

To Teledyne Isotopes

Please complete this document and include with your report.

This shuttle contains:

ETC Sample numbers:		To be analyzed for:
001327	W05	Gross Alpha/Beta
001328	W05	Gross Alpha/Beta
001330	W05	Gross Alpha/Beta
001342	W05	Gross Alpha/Beta
001343	W05	Gross Alpha/Beta

Sample Shuttle sealed by: Joni Kuzmack

Date: 3/17/82 Time: 3:15 pm Seal Number: 6583

Sample Shuttle opened by: Edna C Cunningham

Date: 3/18/82 Time: 1600 Seal Number: 0006583

Was seal intact? Yes ✓ No

For return:

Sample Shuttle sealed by: Edna C Cunningham

Date: 3/19/82 Time: 1150 Seal Number: 0006584

Sample Shuttle opened by: Joni Kuzmack

Date: 3/22/82 Time: 11:39 Seal Number: 6584

Was seal intact? Yes ✓ No

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68bf161

100503

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY

001340 W06 to 001343 W06

TC Sample Number 001340 W07 to 001343 W07

elinquished By Toni Kuzmack

eceived By Carl DiLello Date 3-18-82 Time 10:20am

inquished By _____

eceived By _____ Date _____ Time ____

elinquished By _____

eceived By _____ Date _____ Time ____

elinquished By _____

ecieved By _____ Date _____ Time ____

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284 RARITAN CENTER PARKWAY, EDISON, NEW JERSEY 08837 • (201) 225-5600

Analysis of Pesticides and Herbicides

The methods employed in the analysis of your water sample for pesticides and herbicides are established EPA methods taken from the "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," June, 1980. The pesticide method can be summarized as follows: A measured volume of sample, approximately 500-1000ml, to which sodium sulfate has been added, is extracted with methylene chloride. The methylene chloride extract is dried and concentrated to approximately 0.5ml. The extract is brought to a final volume with hexane and injected into a gas chromatograph equipped with a ^{63}Ni electron capture detector.

The herbicide method can be summarized as follows: A measured volume of sample, approximately 500-1000 ml, to which sodium sulfate has been added, is acidified and extracted with methylene chloride. The methylene chloride extract is evaporated to dryness, and the residue is derivatized with a BF_3 esterification reagent. The derivatives are extracted into hexane for subsequent injection into a gas chromatograph equipped with a ^{63}Ni electron capture detector.

The GC operating parameters were as follows:

COLUMN

6' x 4mm glass 1.5% SP-2250 & 1.95% SP-2401
Supelcoport 100/120 mesh

CARRIER FLOW

60ml/min. Argon/Methane

SEPTUM PURGE

5ml/min. Argon/Methane

COLUMN OVEN

210°C

INJECTOR TEMPERATURE

225°C

DETECTOR TEMPERATURE

300°C

METHODOLOGY

Analysis of Metals

The methods employed in the analysis of your sample for metals are established EPA methods for priority pollutants.

Metals analysis is performed according to the methods published by EPA in "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-70-020, March 1979. Arsenic, selenium, thallium, and antimony are analyzed by furnace AA while calcium, magnesium, barium, beryllium, chromium, nickel, copper, zinc, silver, cadmium, and lead are analyzed by flame AA. Potassium and sodium are analyzed by flame emmission. Mercury is analyzed by cold vapor technique.

QUALITY ASSURANCE PROTOCOL

The quality assurance protocol followed in the analysis of your sample is based on the "Handbook for Analytical Control in Water and Wastewater Laboratories," EPA-600/4-79-019, March, 1979; National Enforcement Investigation Center Policies, and Procedures manual; and EPA-330/9/79/001-R, October, 1979.

Analysis of Metals (Standards)

- New working standards are prepared for each batch of samples.
- Normal calibration is performed using a blank and four standards that have been carried through the entire sample preparation procedure. A regression analysis is used to construct the calibration curve.
- For each sample analysis in the standard additions technique, a three point calibration is performed using U. S. EPA Methods for Chemical Analysis of Water and Wastes, 1979. Results are obtained using linear regression analysis. Any results obtained with a coefficient of correlation below 0.990 are considered erroneous, necessitating raw data editing or sample re-analysis.
- Normal calibration curves are constructed using greater than or equal to 5 times the Instrumental Detection Limit (IDL) as the lowest concentration level.
- All calibration standards are analyzed in duplicate, as a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to establish the validity of the normal calibration curve.

Analysis of Metals (Sample, for all metals except Mercury)

For all homogeneous samples (minimum of 42% QC), each sample batch may include up to 30 samples and the following fixed number of QC samples:

- 3 Replicates.
- 2 Replicate spikes.
- 2 Replicate independent reference standards.
- 8 Calibration standards (processed using the sample preparation method).
- 2 Blanks (using sample preparation method).
- 4 Calibration standards (without sample preparation).
- 1 Blank (without sample preparation).

For all heterogeneous samples (minimum of 65% QC), every field sample in a sample batch is run in duplicate. A sample batch may include up to 30 samples and the following fixed number of QC samples:

- 4 Replicates.
- 4 Replicate spikes.
- 2 Replicate independent reference standards.
- 8 Calibration standards (processed using the sample preparation method).
- 2 Blanks (using sample preparation method).
- 4 Calibration standards (without sample preparation).
- 1 Blank (without sample preparation).

Analysis of Pesticides and Herbicides

- In every block of 20 samples extracted, there are 16 field samples, one blank, one spiked blank, one sample spiked with the standard mixture, and a duplicate field sample.

- Blind quality control samples are included in field samples at a minimum of one every hundred samples.

- GC performance criteria as specified in EPA Method 608 are met before analysis starts.

Analysis of Metals (Sample, Mercury)

For every matrix (minimum of 66% QC), all the field samples in sample batch are run in duplicate. A sample batch may include up to 20 samples and the following fixed number of QC samples:

- 3 Replicates.
- 2 Replicate spikes.
- 2 Replicate independent reference standards.
- 10 Calibration standards (processed using the sample preparation method).
- 2 Blanks.

REPORT APPENDICES

The following appendices provide the support analytical data associated with your sample analyses. They are arranged as follows:

Appendix A

1) Reconstructed total ion chromatogram of GC/MS analyses of your sample.

2) The individual mass spectra of all priority pollutant compounds which have been identified as being present in your sample.

3) The individual mass spectra of the corresponding compounds as obtained from the standards.

Appendix B

1) The mass spectra of the calibration compounds, 4-bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP), as obtained on the data of sample analyses.

Appendix C [for plus 10 and 50% internal standard option]

1) Spectra of tentatively identified compounds, with their differences.

Appendix D

1) Subcontractor's report.

These data are provided to present a complete report on your sample and to provide the data on which analytical decisions have been based. We hope this will aid you in your own analysis of the data.

100510

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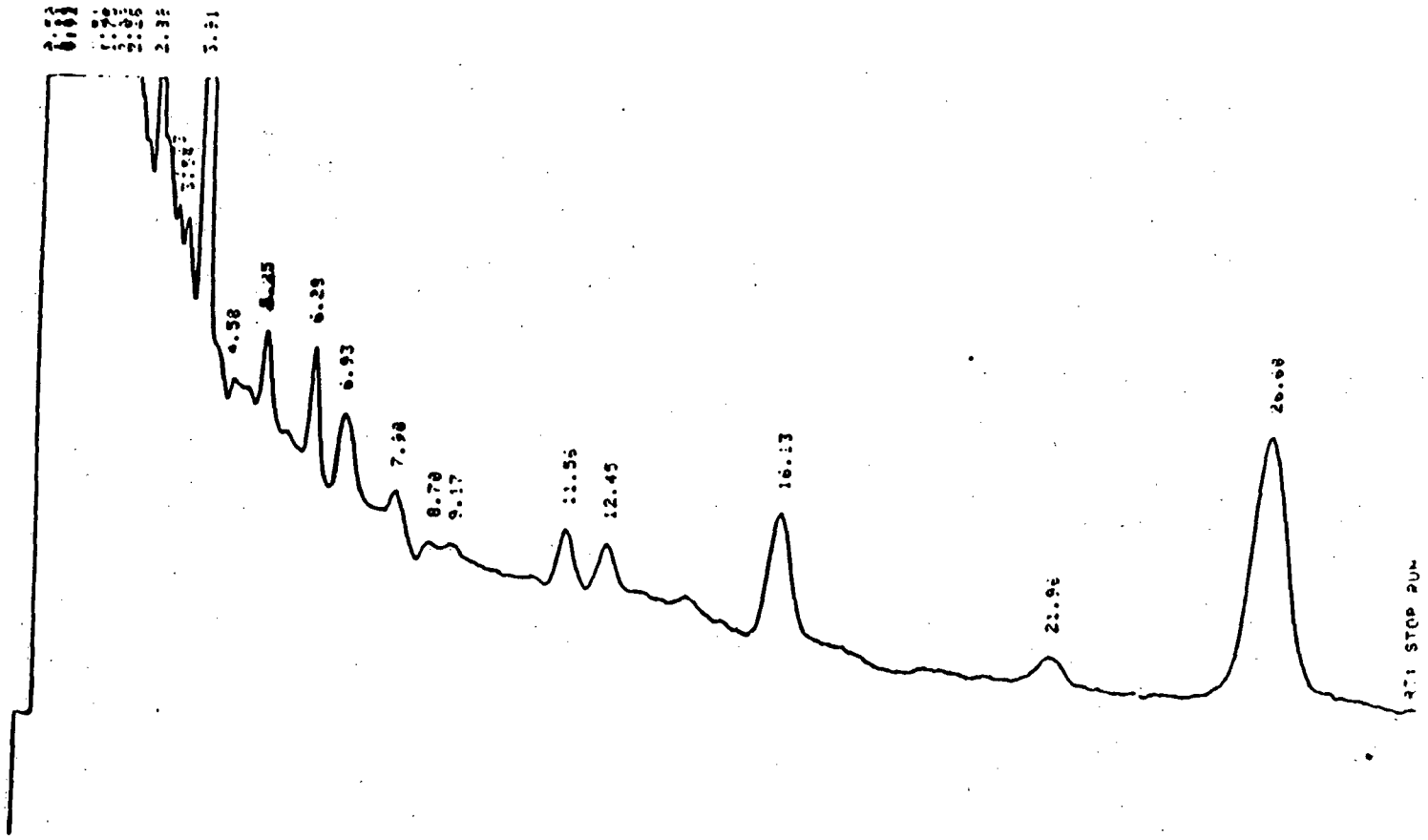
Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;
- outgoing shipping manifests;
- the chain-of-custody form completed by the person (s) breaking the seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;
- incoming shipping manifests;
- breaking the Shuttle's reseal;
- storing each labeled sample bottle in a secured area;
- disposition of each sample to an analyst or technician and;
- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The record shows for each link in this process:

- the person with custody;
- the time and date each person accepted or relinquished custody.



Gas Chromatogram of Well #3
ETC Sample No. 001342
for the Analysis of Endrin and Toxaphene

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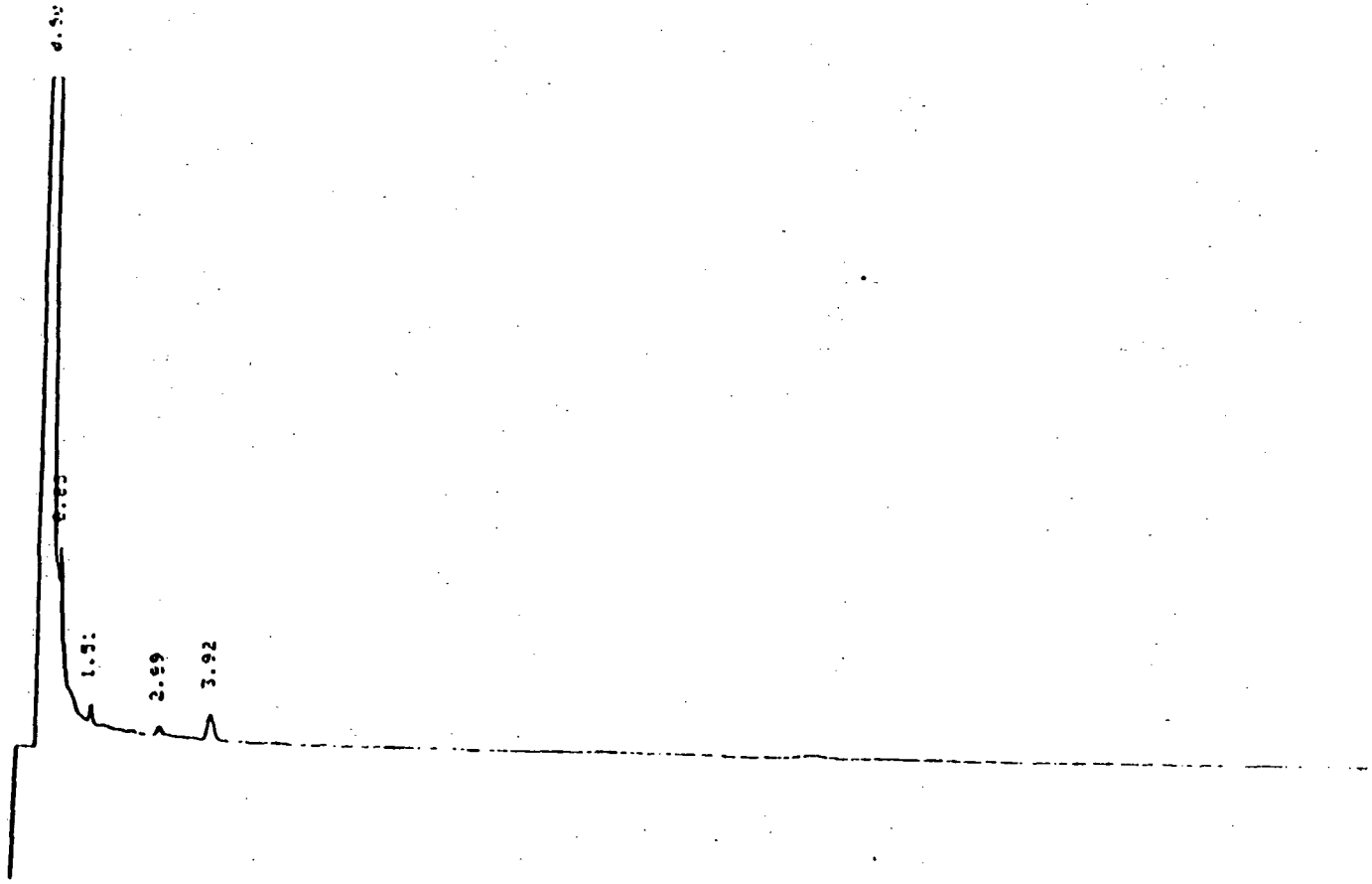
APPENDIX



Gas Chormatogram of Well #3
ETC Sample No. 001342
for the Analysis of Lindane

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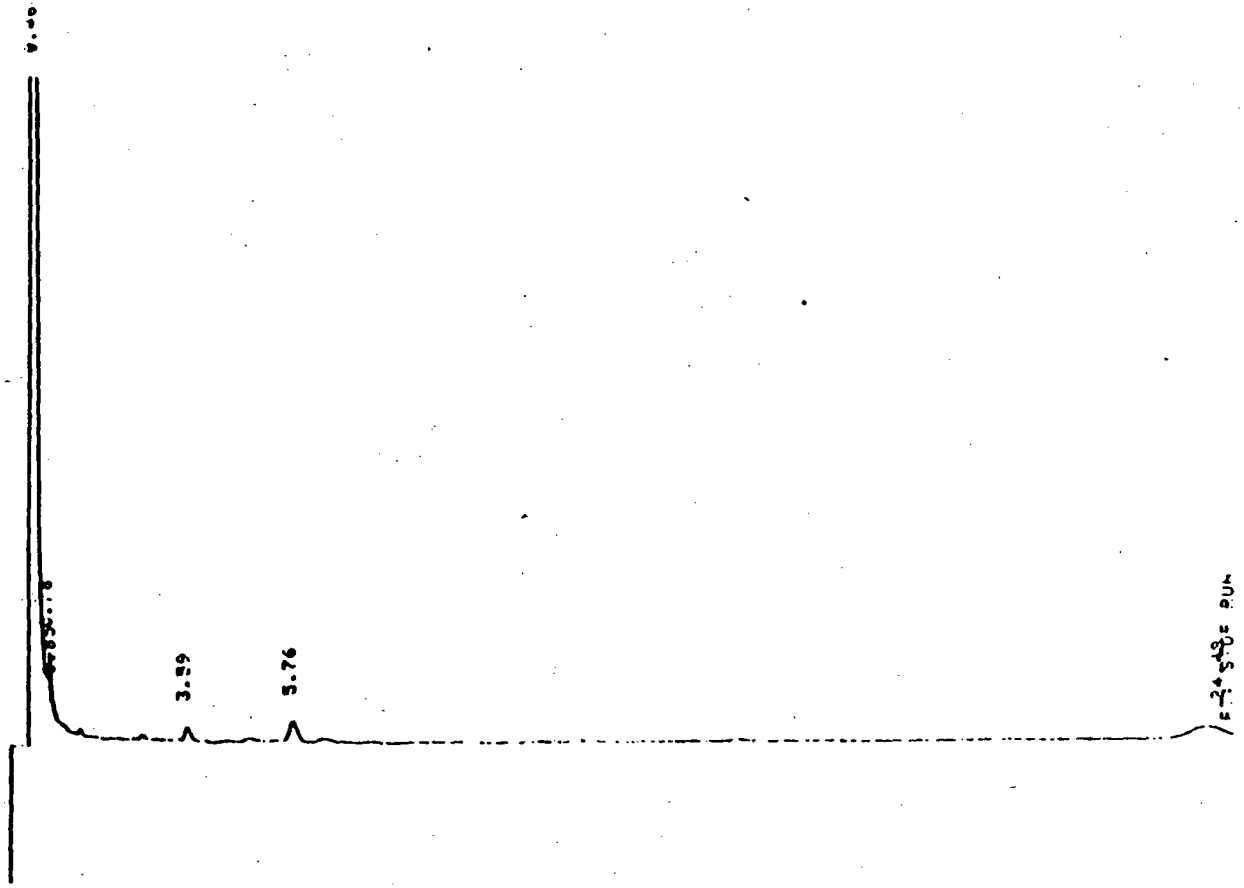

Gas Chromatogram of Well #3
ETC Sample No. 001342
for the Analysis of Methoxychlor

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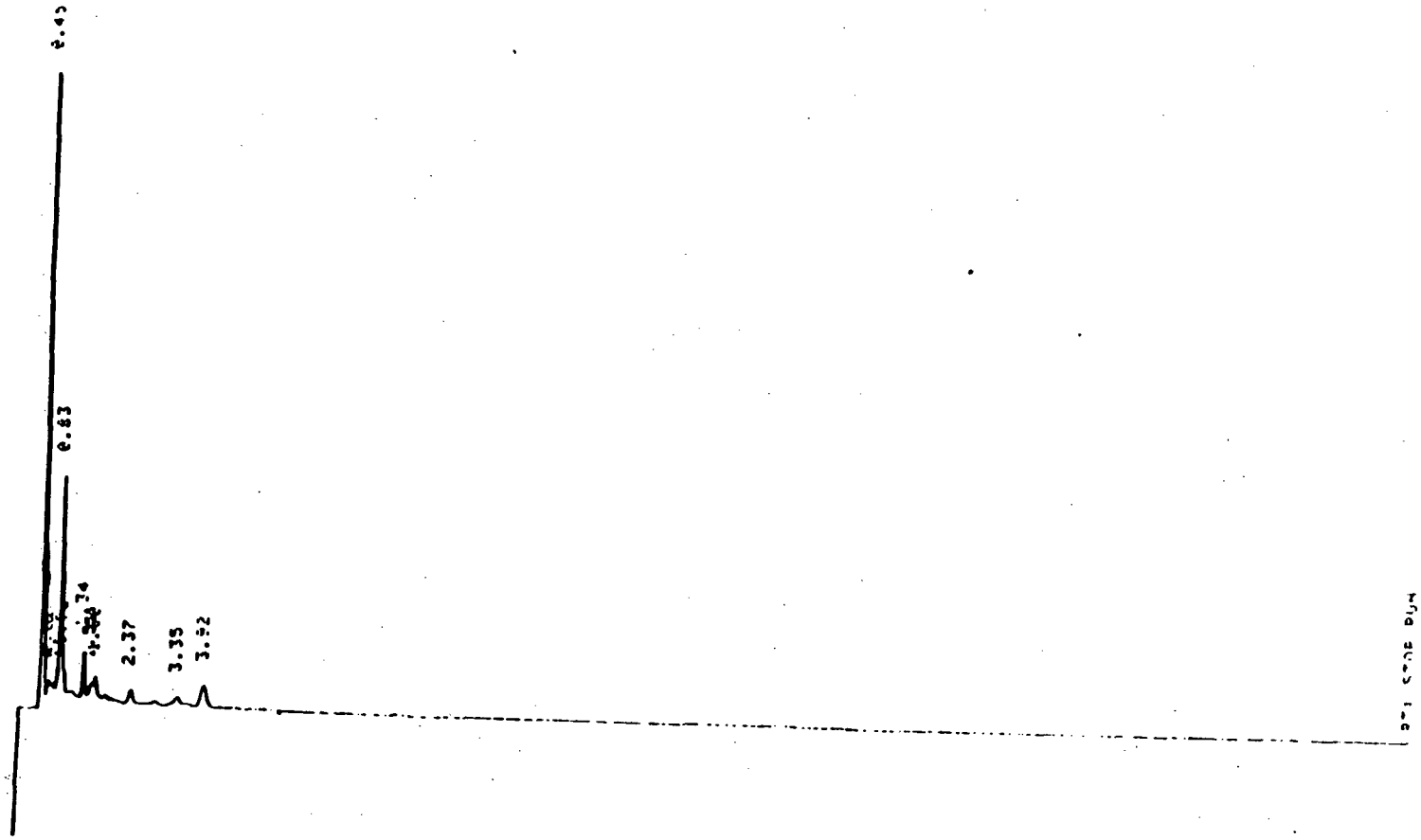
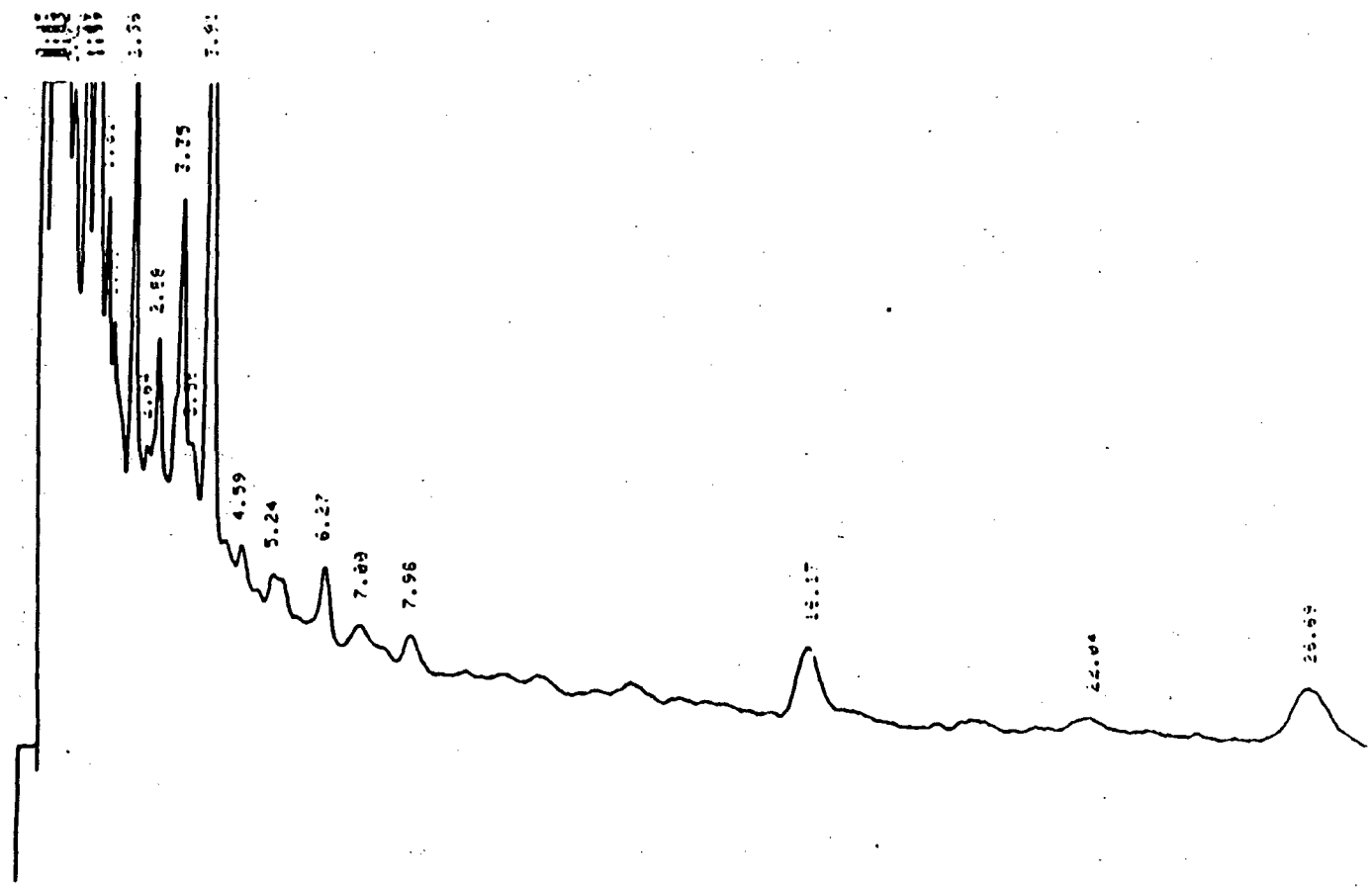
100515



Gas Chromatogram of Well #2
ETC Sample No. 001341
for the Analysis of Lindane

100516
Page 161



Gas Chromatogram of Well #2
ETC Sample No. 001341
for the Analysis of Endrin and Toxaphene

100517

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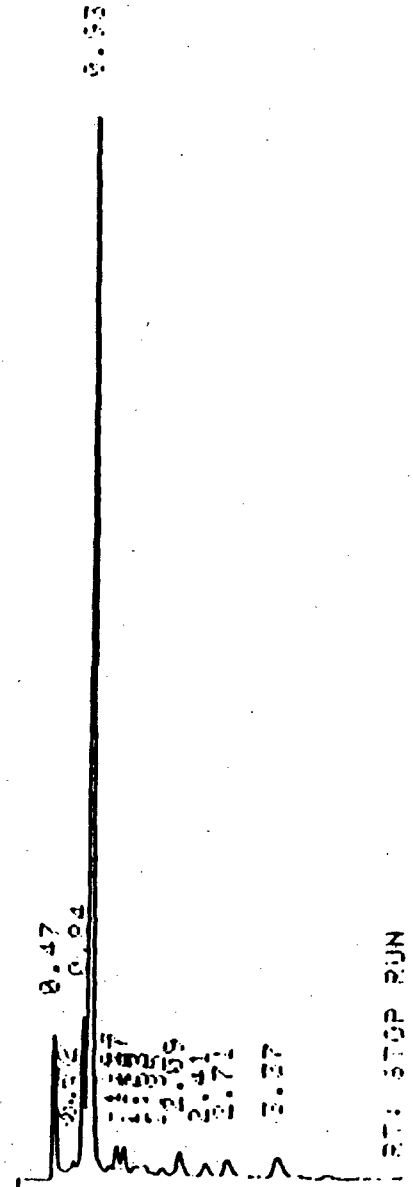

Gas Chromatogram of Well #2
ETC Sample No. 001341
for the Analysis of 2,4-D and 2,4,5-TP (Silvex)

100518

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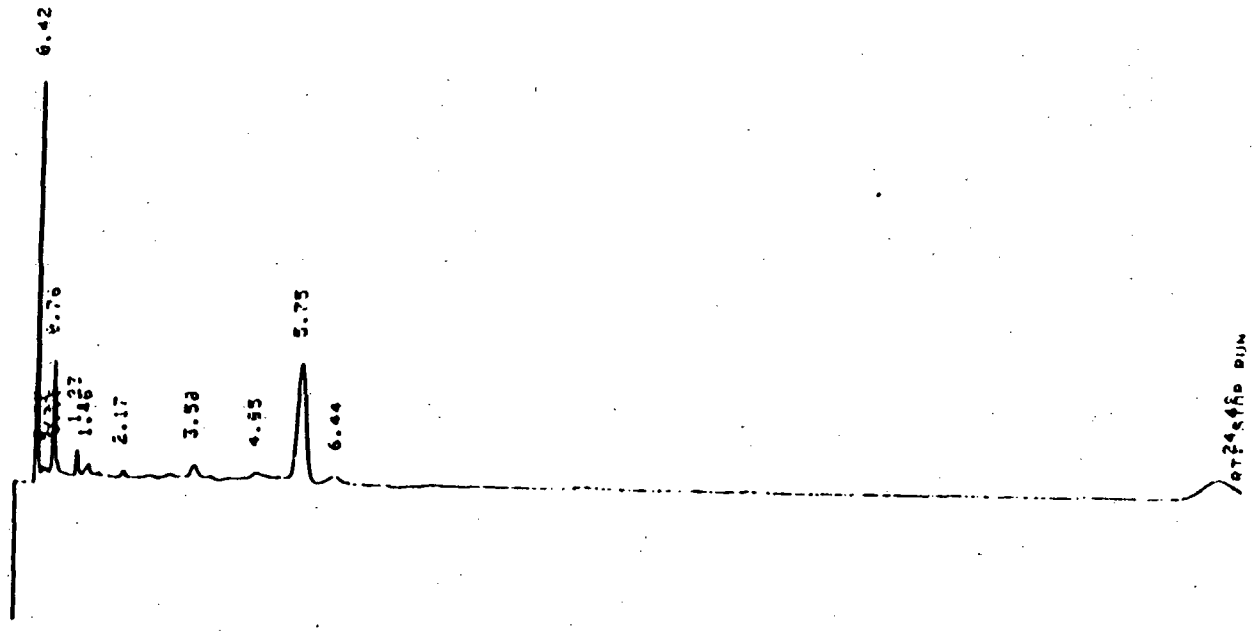

Gas Chromatogram of Well #2
ETC Sample No. 001341
for the Analysis of Methoxychlor

100519

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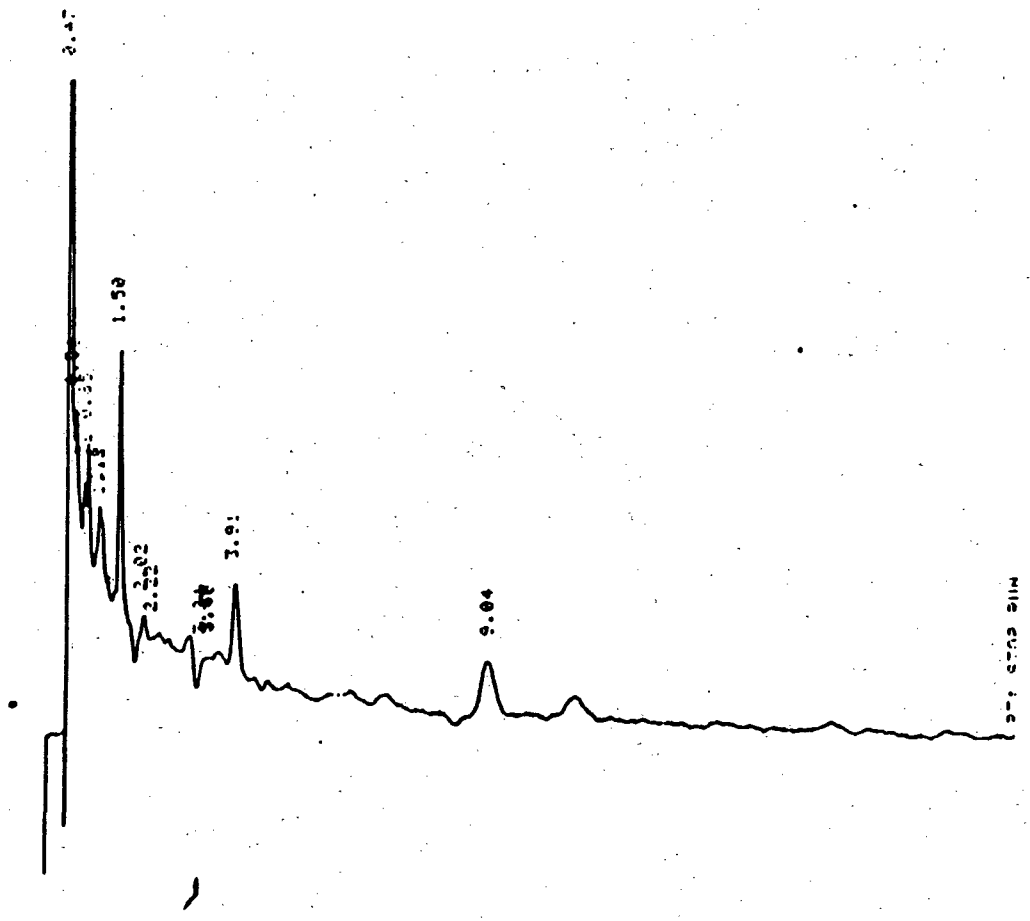

Gas Chromatogram of Endrin Standard
(0.01 ng/ul)

100520
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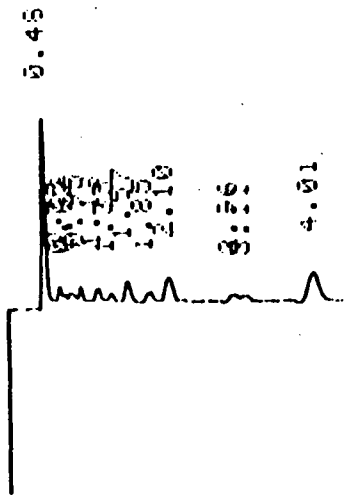
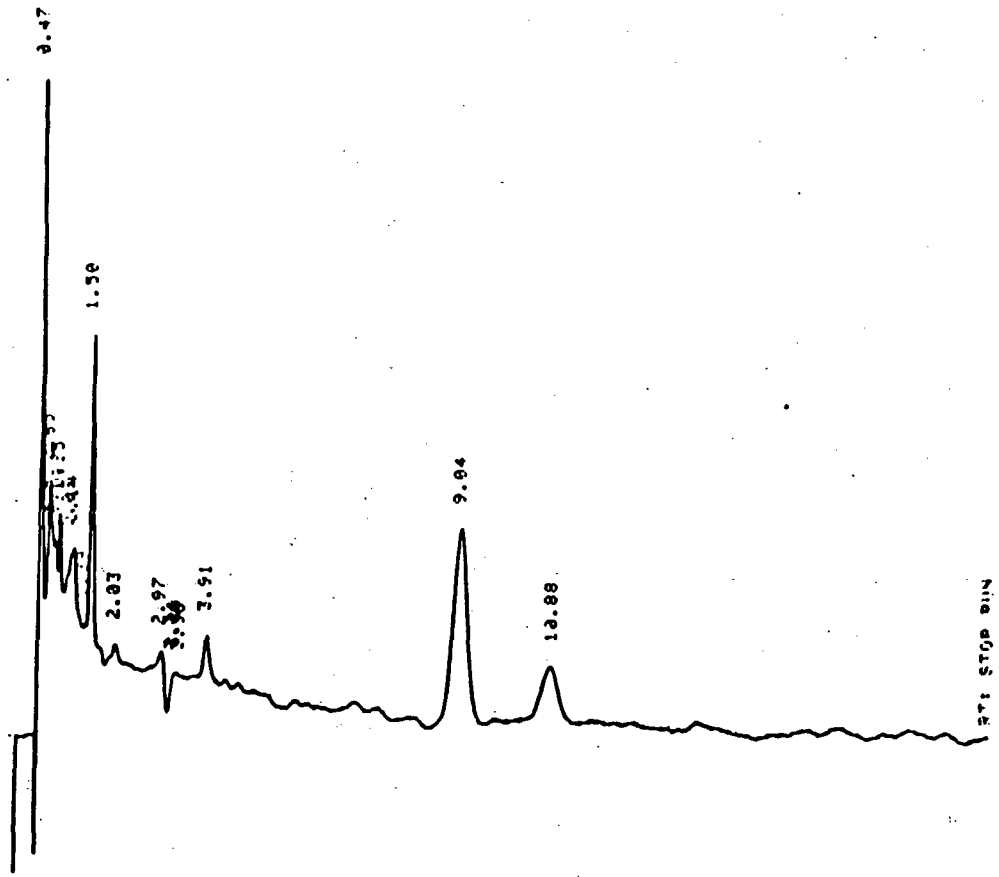


Gas Chromatogram of Well #3
ETC Sample No. 001342
for the Analysis of 2,4-D and 2,4,5-TP (Silvex)

100521



Gas Chromatogram of Endrin Standard
(0.05 ng/ul)

100522

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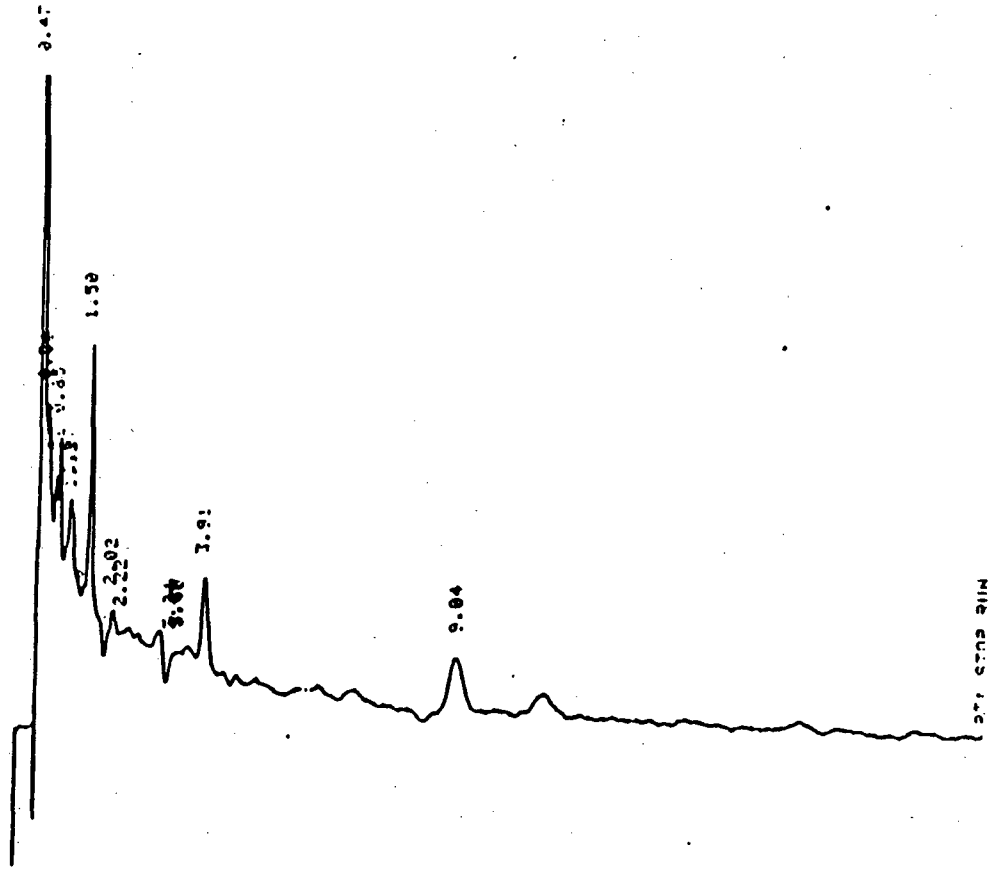
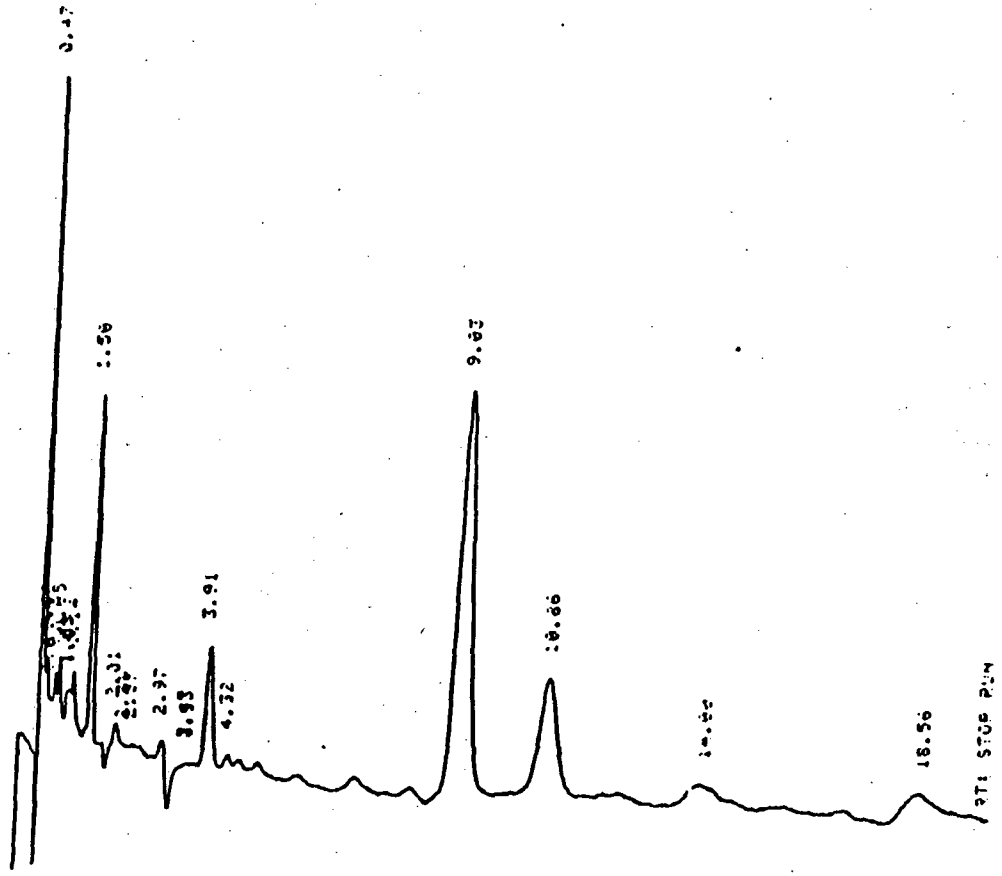


Gas Chromatogram of Endrin Standard
(0.01 ng/ul)

100523

191/298



Gas Chromatogram of Endrin Standard
(0.1 ng/ul)

100524

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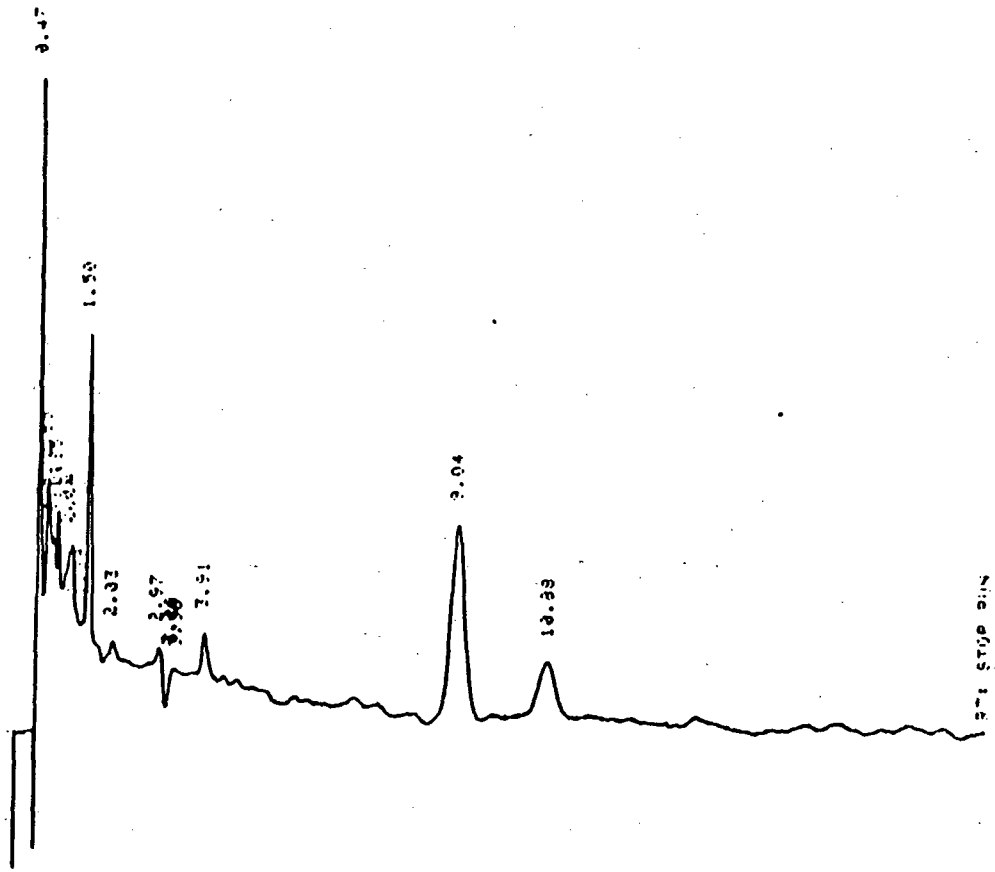

Gas Chromatogram of Endrin Standard
(0.05 ng/ul)

100525

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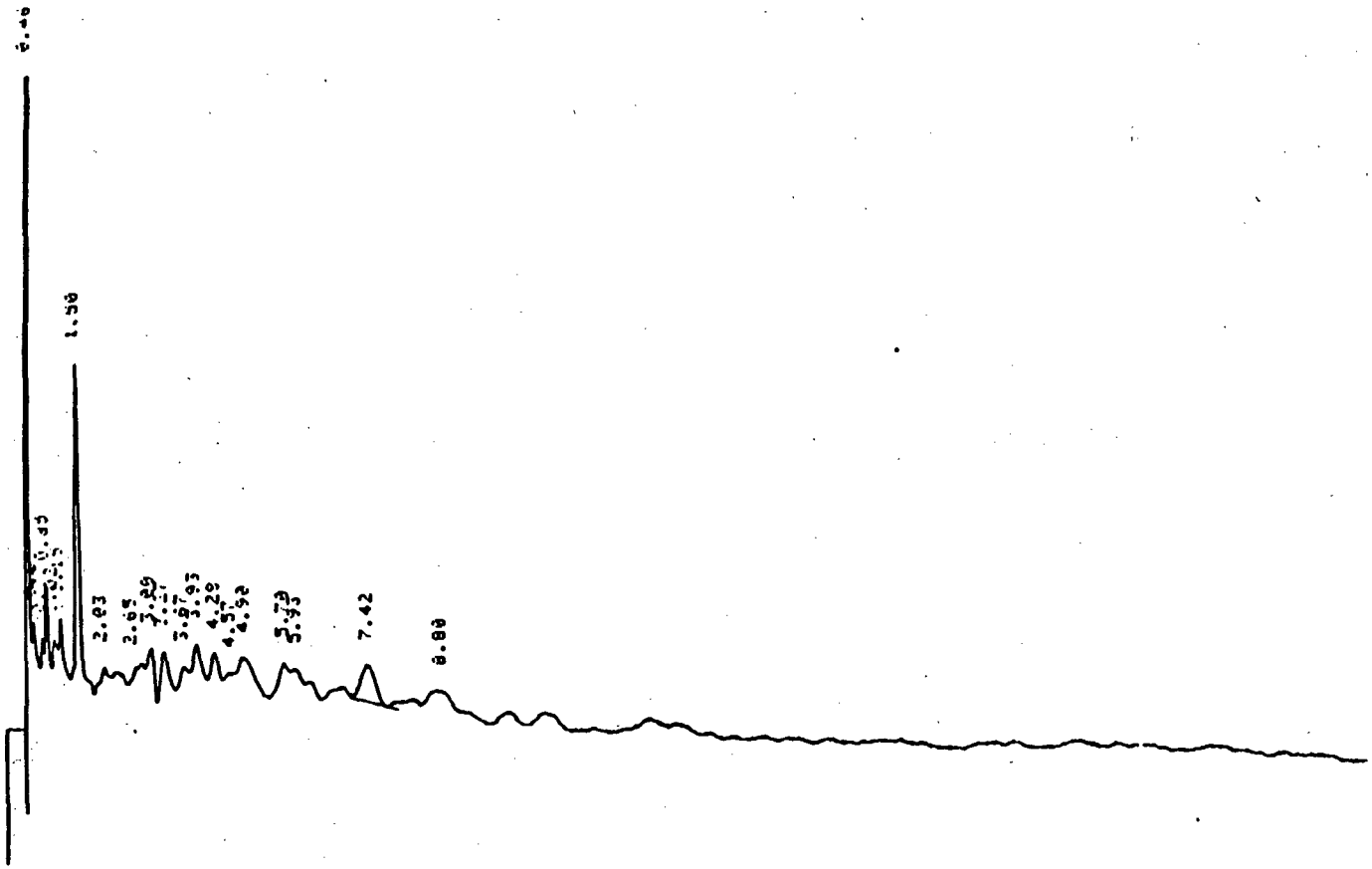
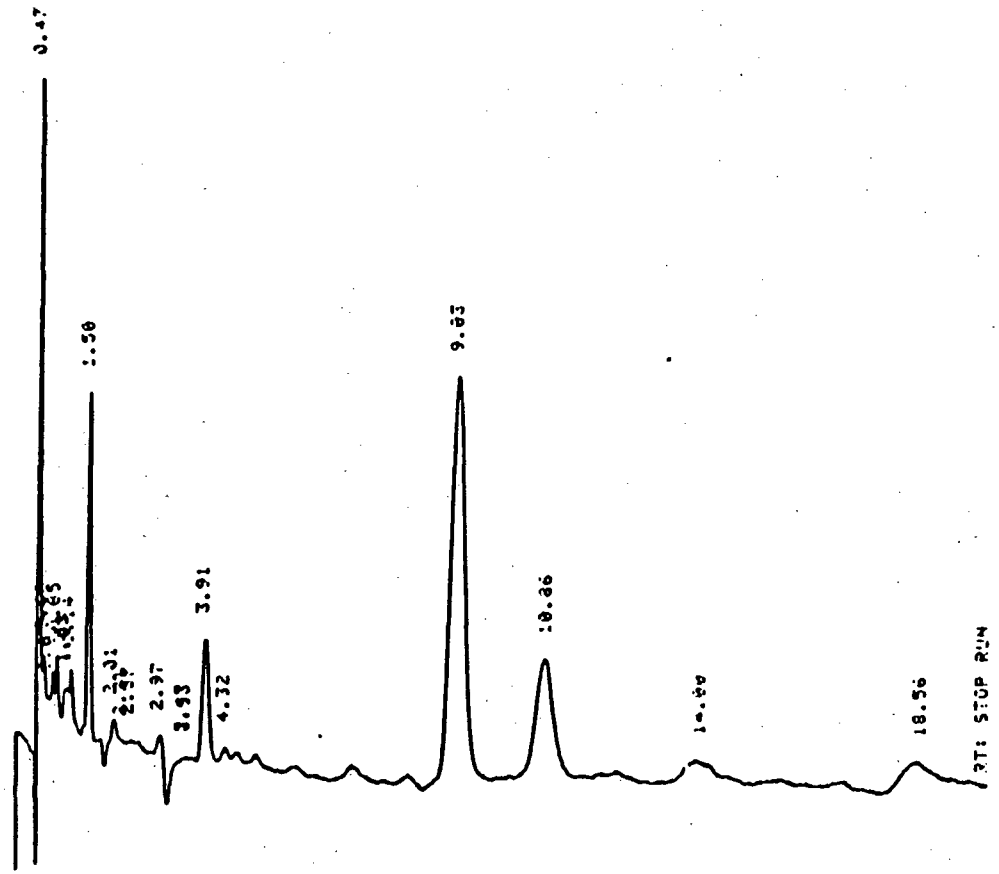


Gas Chromatogram of Toxaphene Standard
(0.25 ng/ul)

100526

926/161



Gas Chromatogram of Endrin Standard
(0.1 ng/ul)

100527
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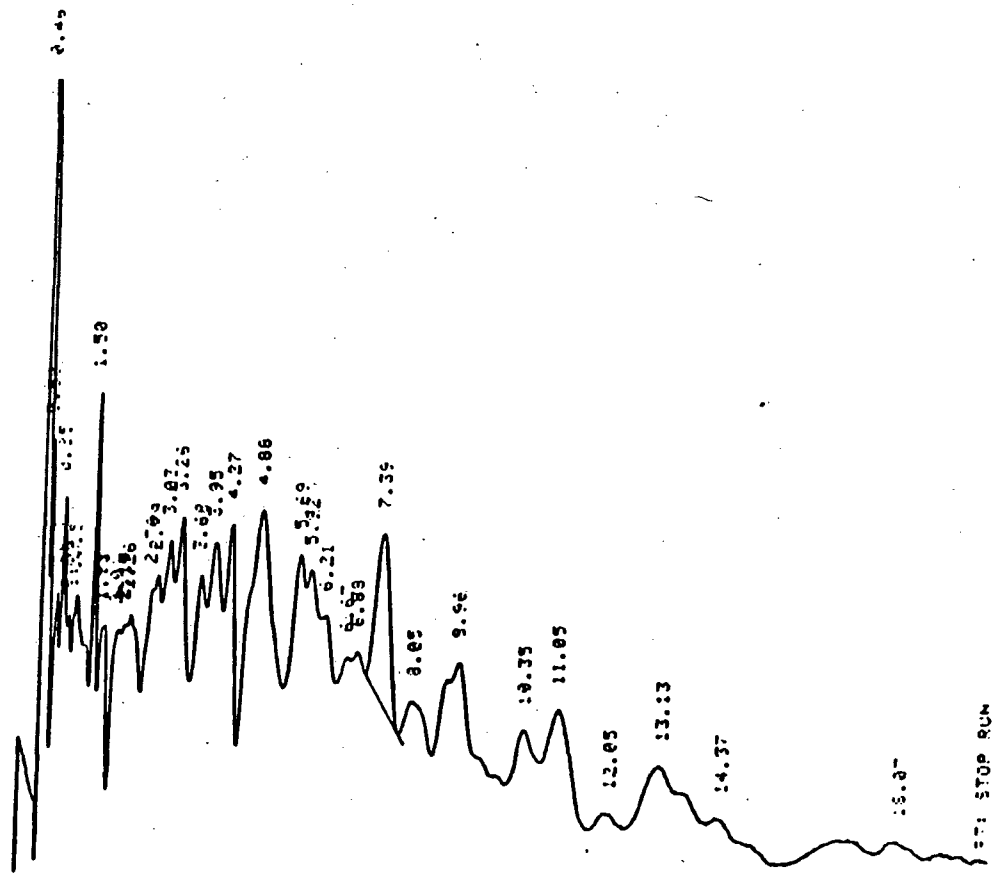
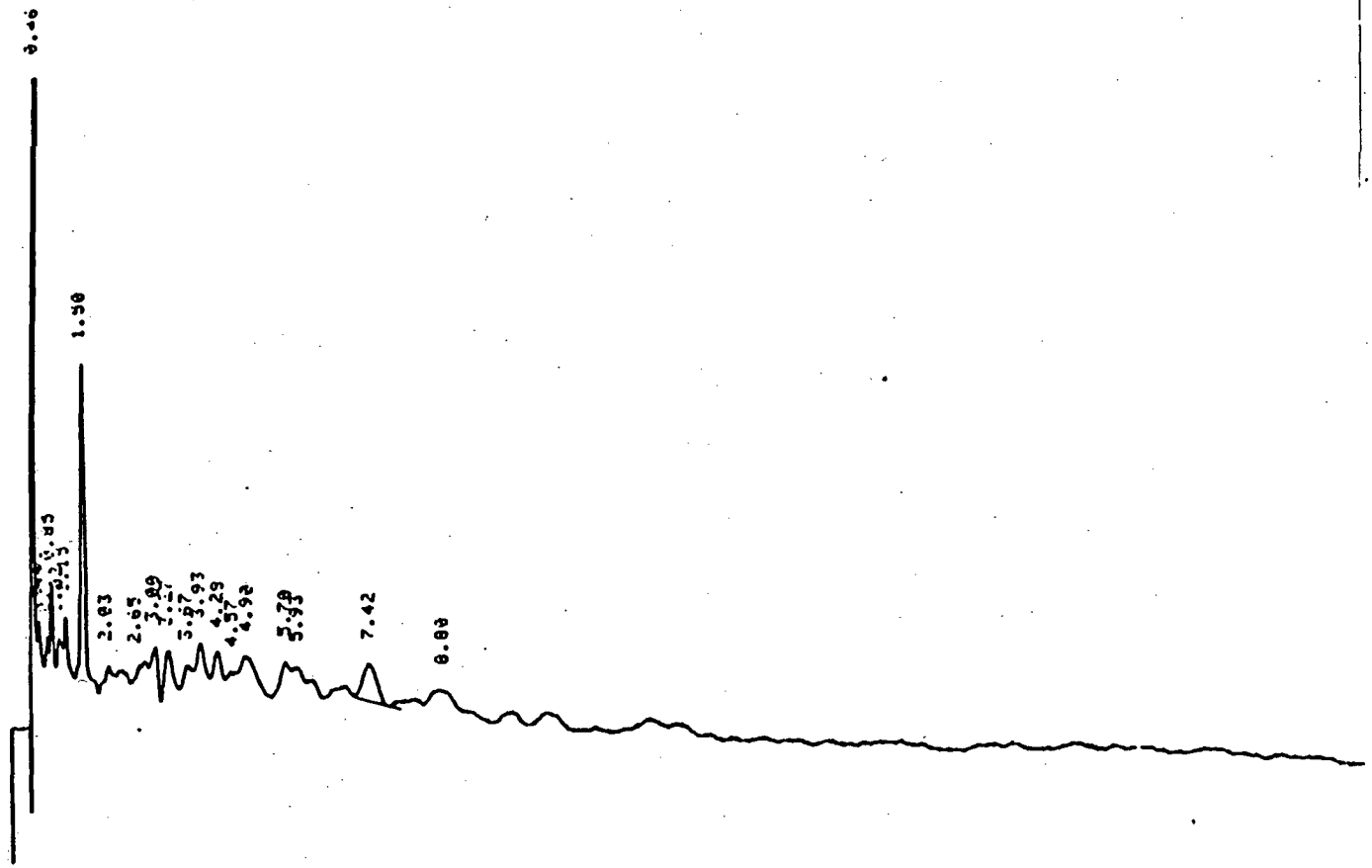


Gas Chromatogram of Toxaphene Standard
(1.0 ng/ul)

100528

946161



Gas Chromatogram of Toxaphene Standard
(0.25 ng/ul)

100529

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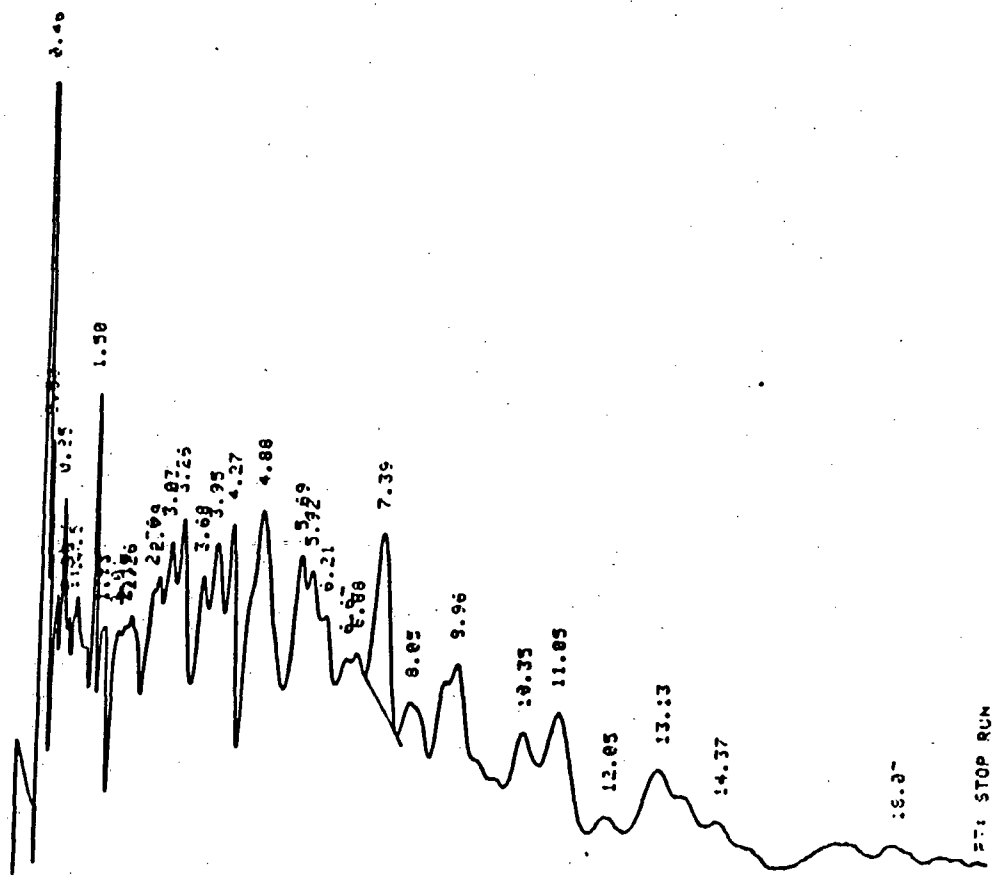

Gas Chromatogram of Toxaphene Standard
(1.0 ng/ul)

100530

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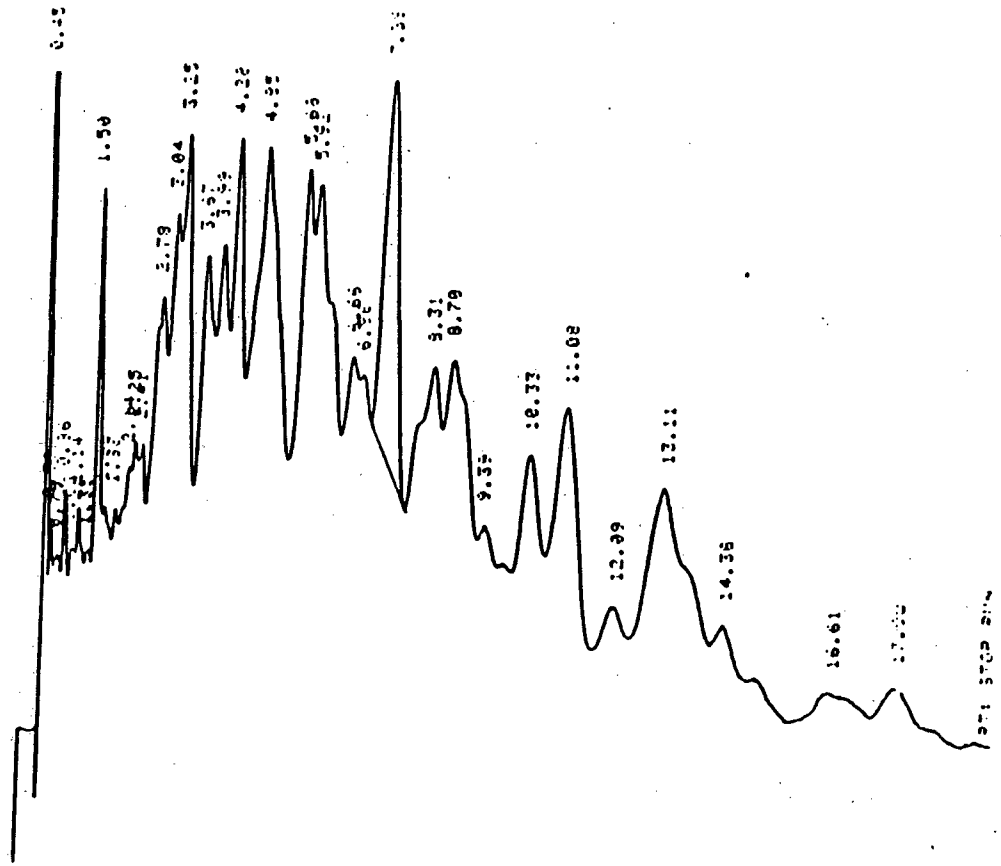

Gas Chromatogram of Toxaphene Standard
(2.0 ng/ul)

100531

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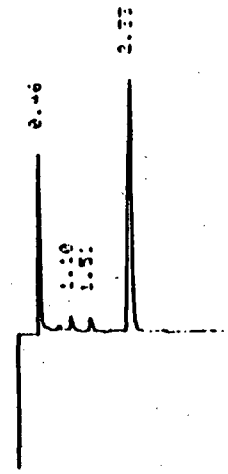
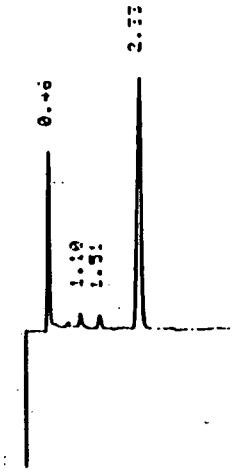


Gas Chromatogram of Lindane Standard
(0.2 ug/ml)

100532
Ref 161



Gas Chromatogram of Lindane Standard
(0.2 ug/ml)

100533
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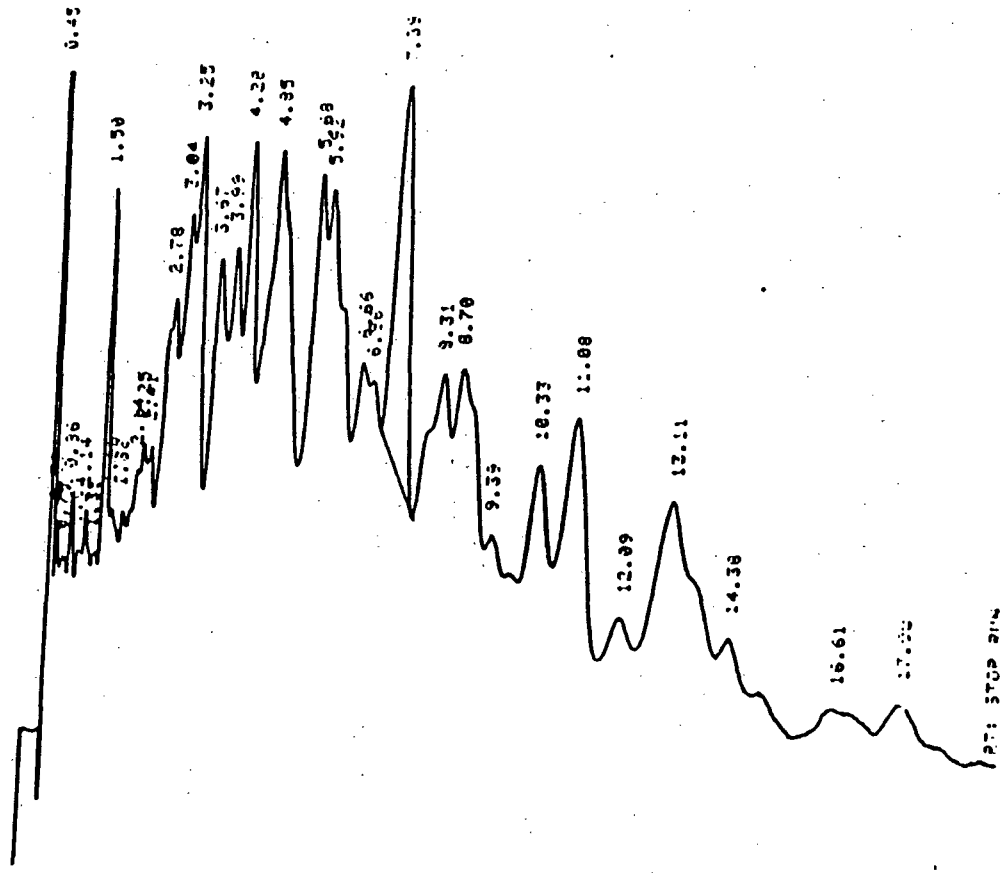

Gas Chromatogram of Toxaphene Standard
(2.0 ng/ul)

100534

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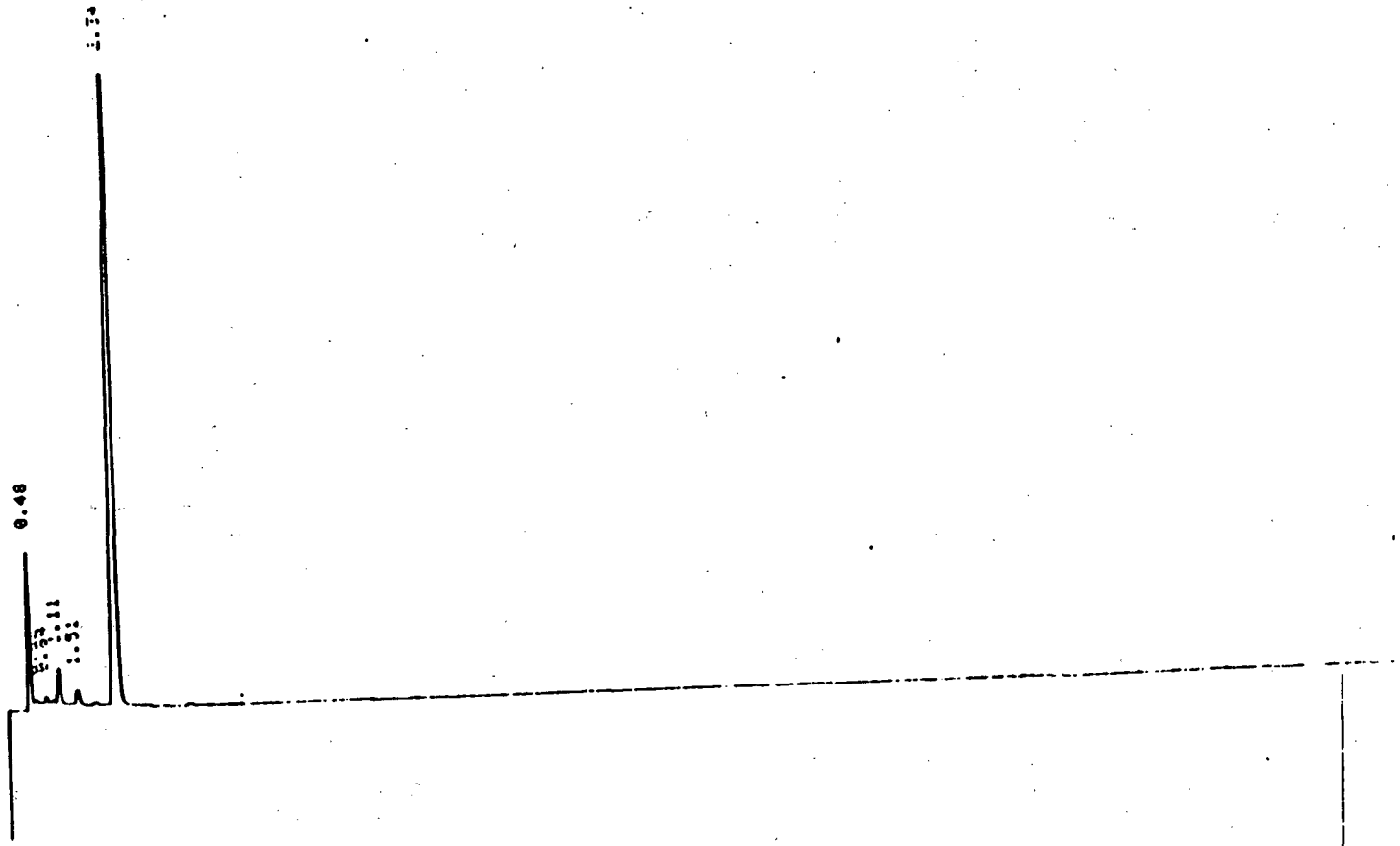

Gas Chromatogram of Lindane Standard
(0.5 ng/ul)

100535

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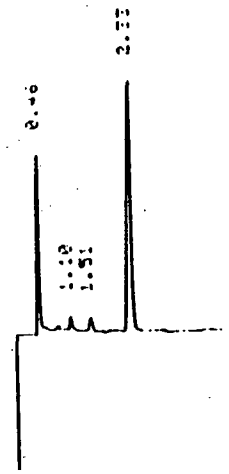

Gas Chromatogram of Lindane Standard
(0.2 ug/ml)

100536

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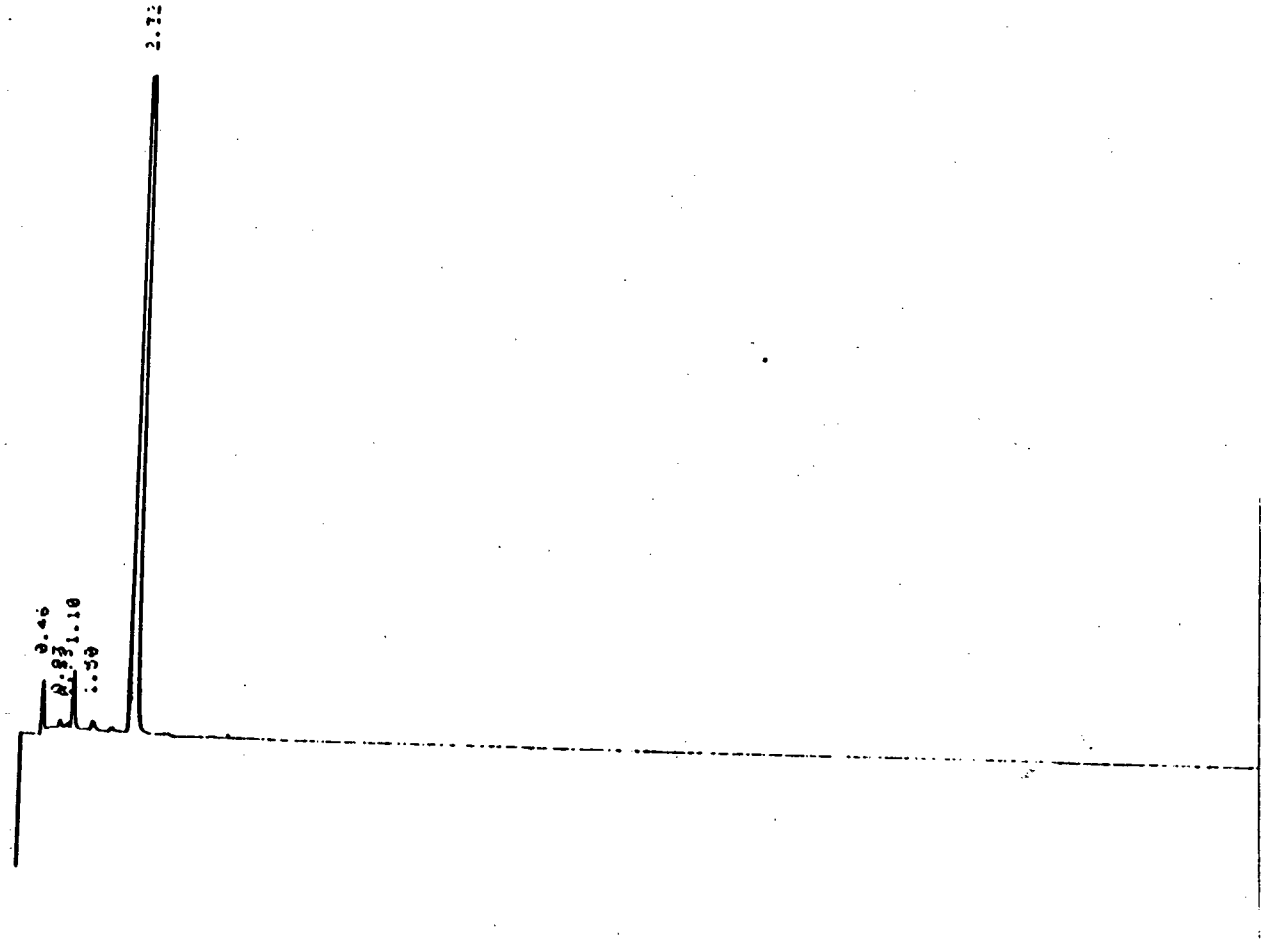

Gas Chromatogram of Lindane Standard
(1.0 ng/ul)

100537
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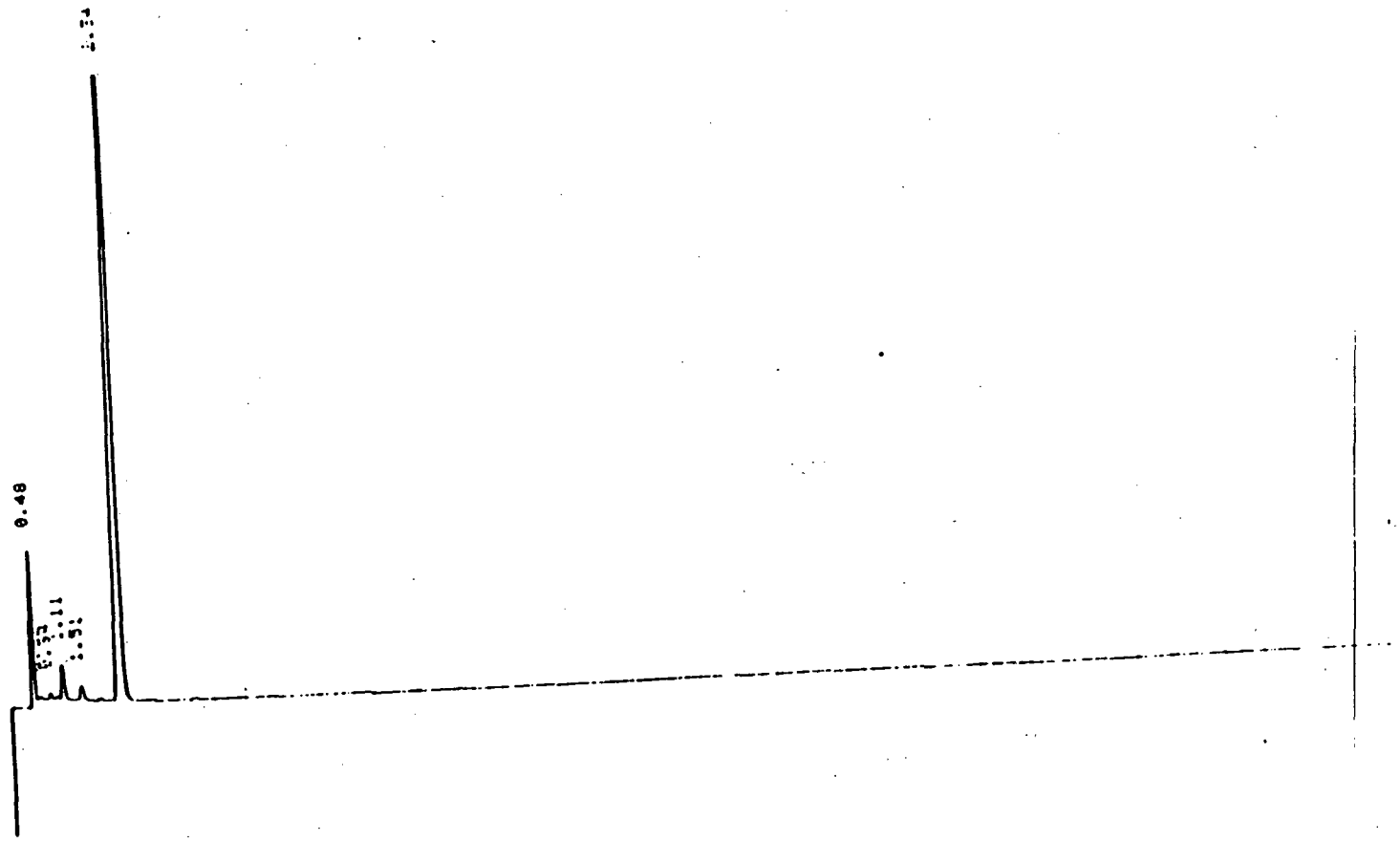
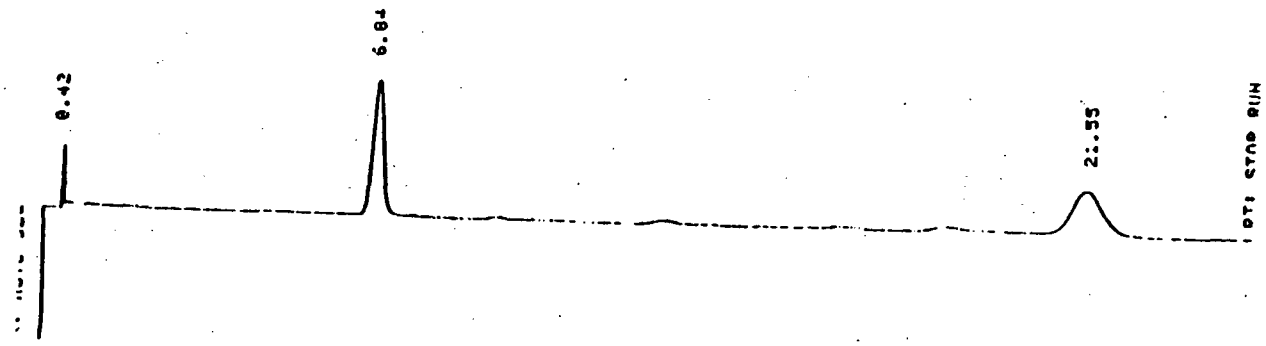


Gas Chromatogram of Lindane Standard
(0.5 ng/ul)

100538

1040f



Gas Chromatogram of Methoxychlor Standard
(5.0 ng/ul)

100539

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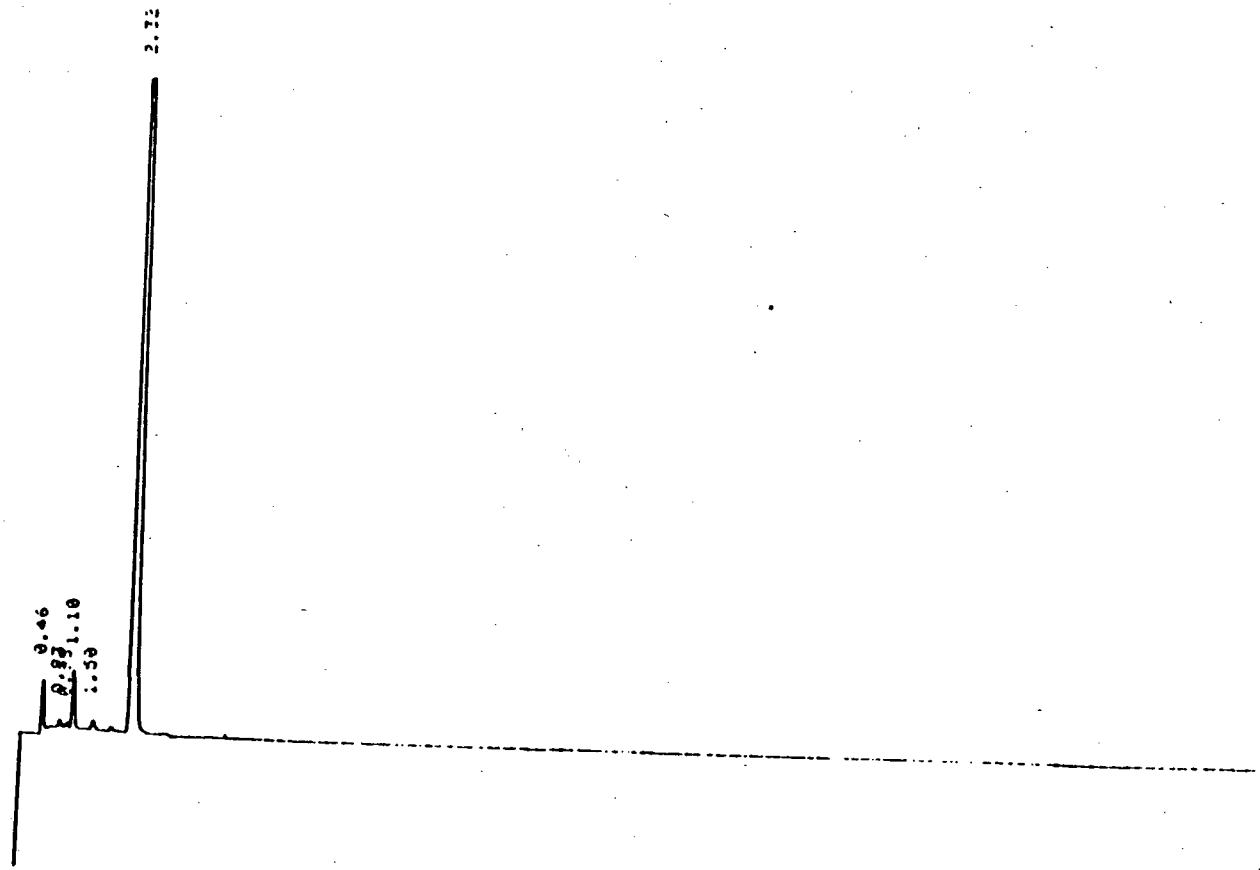
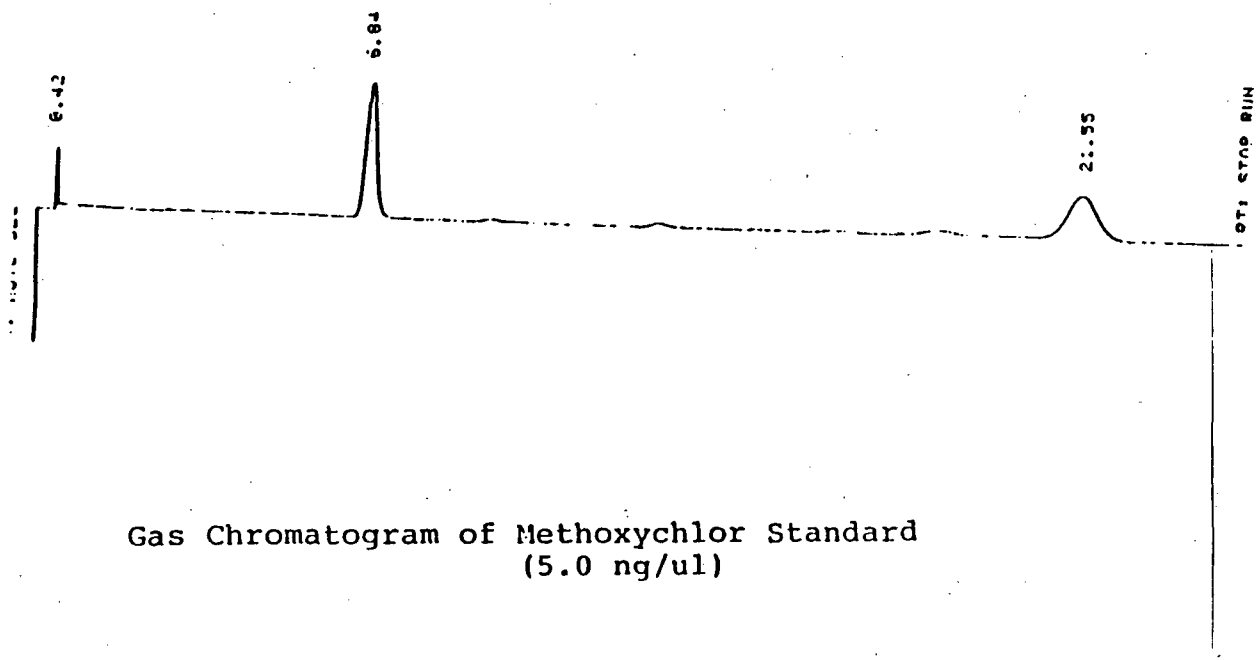


Gas Chromatogram of Lindane Standard
(1.0 ng/ul)

100540

161



Gas Chromatogram of Methoxychlor Standard
(5.0 ng/ul)

100541

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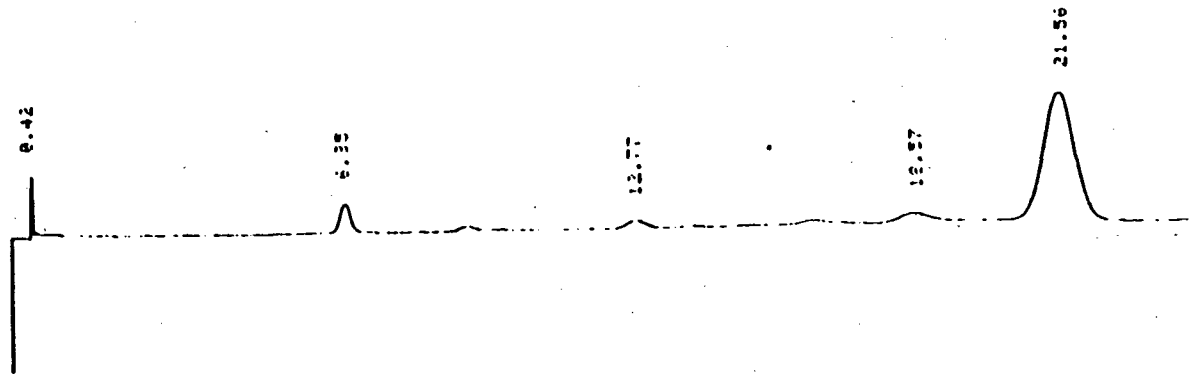

Gas Chromatogram of Methoxychlor Standard
(10.0 ng/ul)

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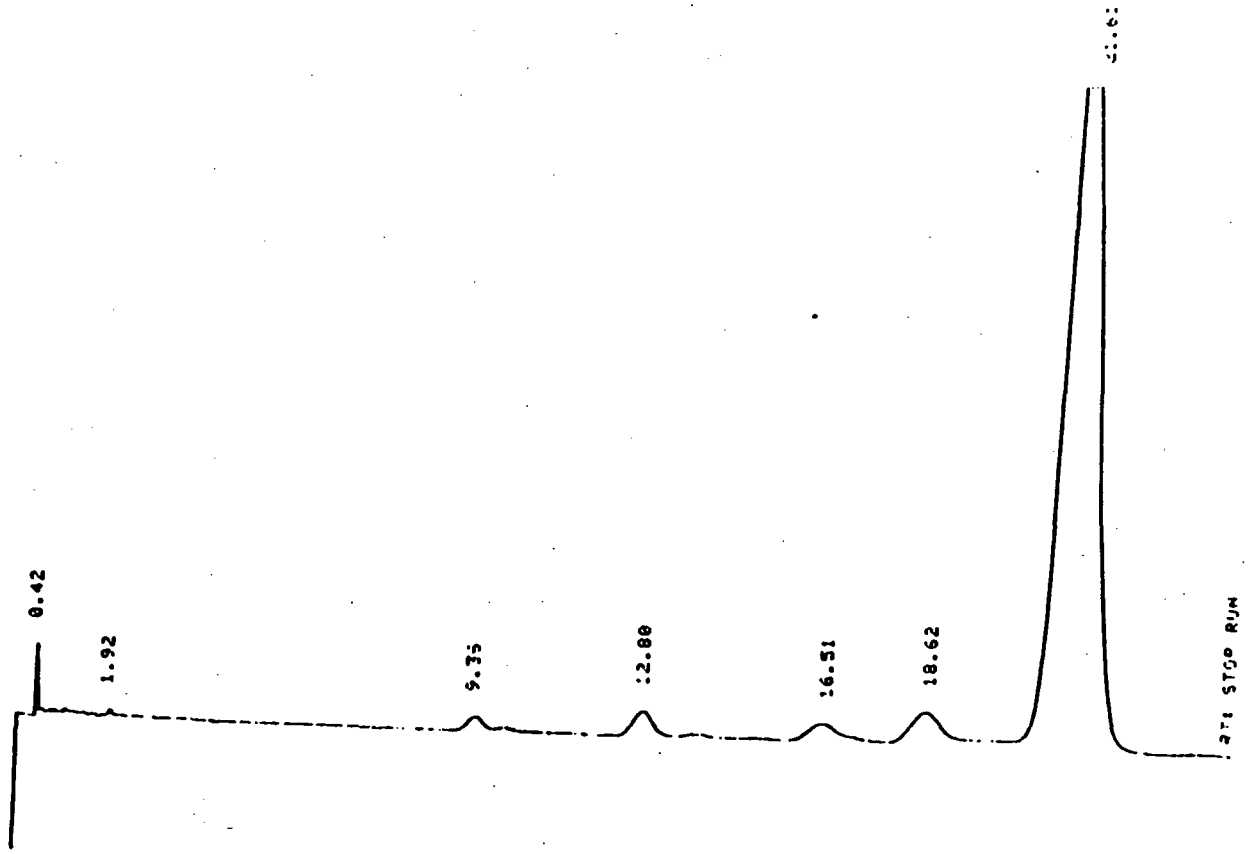

Gas Chromatogram of Methoxychlor Standard
(50.0 ng/ul)

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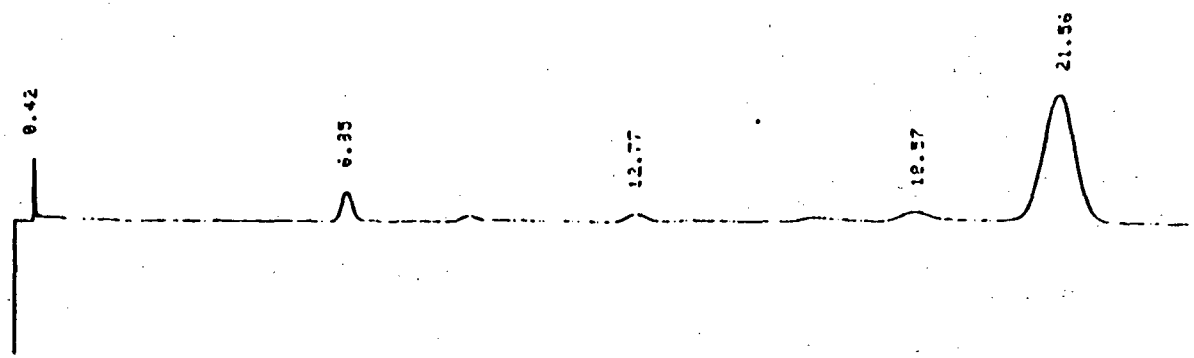

Gas Chromatogram of Methoxychlor Standard
(10.0 ng/ul)

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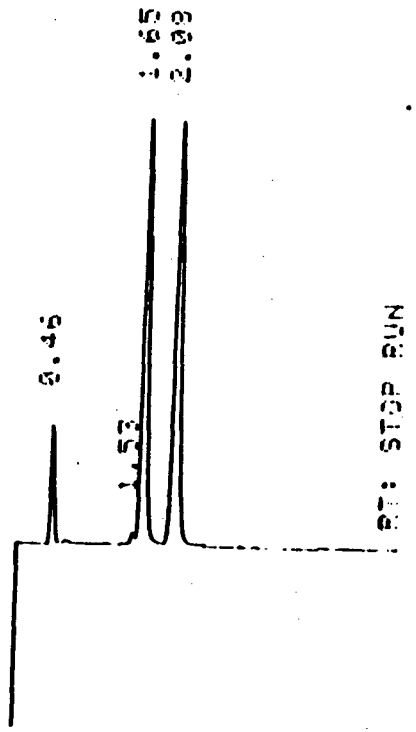

Gas Chromatogram of 2,4-D and 2,4,5-TP(Silvex) Standard
(10 ug/ml & 1 ug/ml)

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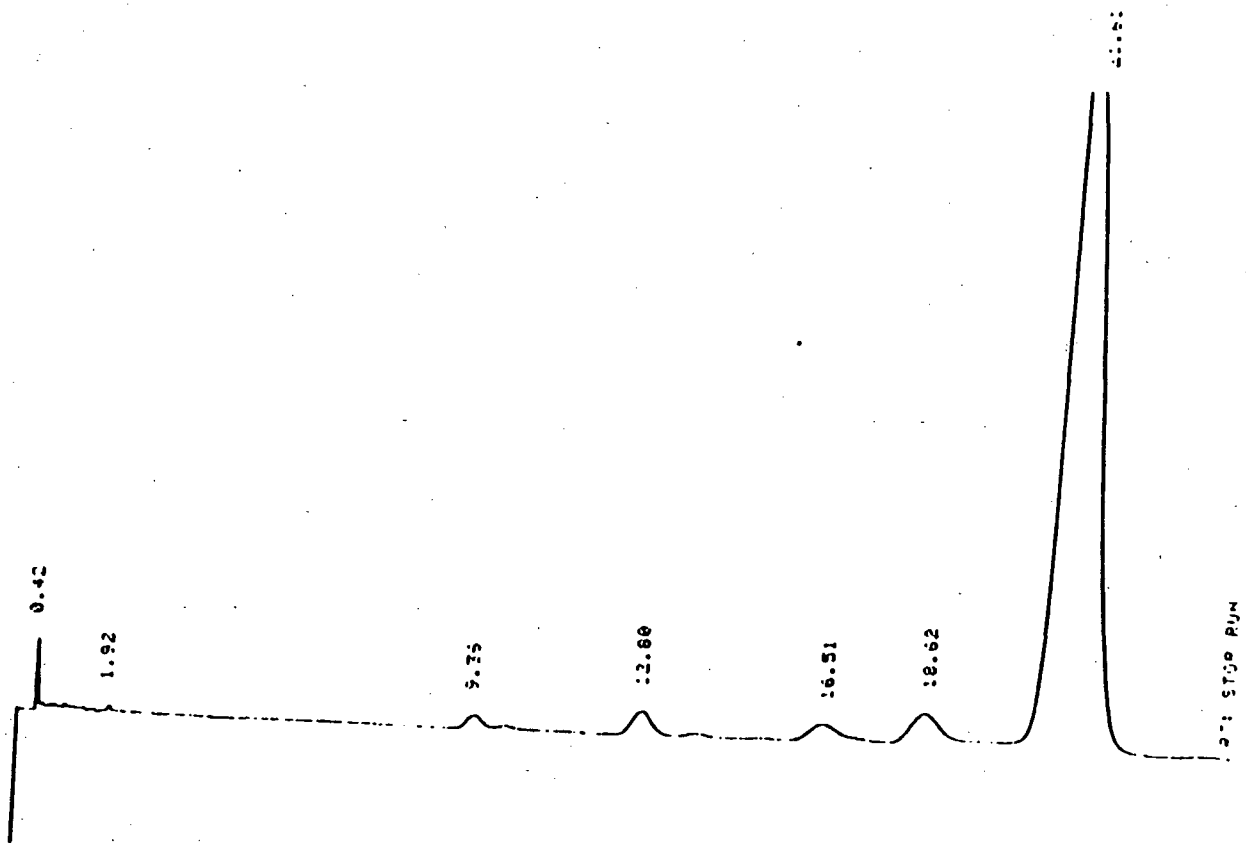

Gas Chromatogram of Methoxychlor Standard
(50.0 ng/ul)

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CHYUN ASSOCIATES
Architectural, Engineering & Laboratory

1101 State Road, Building B
Princeton, New Jersey 08540
609-924-5151

LABORATORY ANALYSIS REPORT

Client: ETC Corporation
Address: 284 Raritan Center Parkway
Edison, N.J. 08837

Attention: Dr. Denis Lin

Test Number: L82125
Date Received: 3/18/82
Date Sampled: Unknown

Job Number: 02299

SAMPLE NUMBER	SAMPLE DESIGNATION/DESCRIPTION
1	001340
2	001341
3	001342
4	001343
DL	Detection Limit

CHARGED APR 2 1982

PARAMETER/CONSTITUENT	SAMPLE NUMBER 1	2	3	4	DL
Total Organic Carbon	8	6	21	12	1
Phenolics as Phenol	<0.005	<0.005	<0.005	0.006	0.005
Specific Conductance, micromhos	24,000	26,000	28,000	24,000	2,000
Chloride	12,400	16,200	13,100	10,500	200
Fluoride	0.88	0.31	0.32	0.21	0.1
Nitrate as N	<0.1	<0.1	<0.1	<0.1	0.1
Sulfate	490	240	170	290	10
Turbidity (JTU)	4.3	0.35	1.2	0.55	0.1

All results in mg/1 (ppm) except where noted.

Laboratory ID No. 11198

March 30, 1982
Date

Michael Wright
Laboratory Supervisor

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TELEDYNE ISOTOPES

REFERENCE: WO 3-3562

TI# 26280 is being analyzed for Ra-226 (because the GR-A was greater than 5.0 pCi/ℓ) and the result will be reported on a new Work Order.

It was not possible to reach a detection limit of 5 pCi/ℓ for GR-A for four samples because of heavy residue, even after filtration:

TI#	RESIDUE (g/ℓ)
26277	35.1
26278	31.0
26282	15.9
26283	17.9

RECEIVED APR 12 1982

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REPORT OF ANALYSIS

RUN DATE 04/07/82

WORK ORDER NUMBER	CUSTOMER P.O. NUMBER	DATE RECEIVED	DELIVERY DATE	PAGE
3-3562		03/18/82	04/20/82	1

MS D FOSTER
EIC ENVIRON TESTING & CERT CORP
200 RARITAN CENTER PKWY
EDISON NJ 08837

RECEIVED APR 1 2 1982

WATER

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	START TIME	STOP DATE	STOP TIME	NUCLIDE	ACTIVITY (pCi/liter)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	MID-COUNT TIME TIME	VOLUME - UNITS ASH-WGHT-% *	LAB.
26274	NO 001327 WO5		03/08				GR-A	L.T. 1. E 00		03/31			3
							GR-B	1.2 +-0.2 E 01		03/31			3
26275	NO 001328 WO5		03/08				GR-A	L.T. 3. E 00		03/31			3
							GR-B	5.9 +-2.4 E 00		03/31			3
26276	NO 001330 WO5		03/08				GR-A	L.T. 2. E 00		03/31			3
							GR-B	4.0 +-1.7 E 00		03/31			3
26277	NO 001342 WO5		03/08				GR-A	L.T. 6. E 01		03/31			3
							GR-B	3.3 +-0.6 E 02		03/31			3
26278	NO 001343 WO5		03/08				GR-A	L.T. 5. E 01		03/31			3
							GR-B	1.3 +-0.4 E 02		03/31			3
26279	NO 001331 WO5		03/08				GR-A	L.T. 4. E 00		03/31			3
							GR-B	1.8 +-0.3 E 01		03/31			3
26280	NO 001332 WO5		03/08				GR-A	5.3 +-1.9 E 00		03/31			3
							GR-B	2.3 +-0.3 E 01		03/31			3
26281	NO 001333 WO5		03/08				GR-A	L.T. 2. E 00		03/31			3
							GR-B	8.6 +-2.2 E 00		03/31			3
26282	NO 001340 WO5		03/08				GR-A	L.T. 3. E 01		03/31			3
							GR-B	L.T. 4. E 01		03/31			3
26283	NO 001341 WO5		03/08				GR-A	L.T. 3. E 01		03/31			3
							GR-B	4.4 +-2.0 E 01		03/31			3

LAST PAGE OF REPORT

APPROVED BY H. KING H. King 04/07/82

SEND 1 COPIES TO EM450S MS D FOSTER

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - Ge(Li) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB.

100549

INTRODUCTION

This report contains the analytical results on your sample, Well #4, submitted on March 15, 1982. In your order, Total Organic Halide analysis (TOX) was requested on this sample. However, due to the sample matrix, it was not possible to obtain meaningful data.

The results we obtained on your sample are presented in a tabular format immediately after this introduction. Following the sample results, the quality assurance data on your specific sample are tabulated to verify the validity of the results obtained. Also presented in the quality assurance data report is the chain-of-custody record.

The established methods we used in the analysis of your sample are described in the Methodology section after the Results. In the analysis we followed a rigidly controlled Quality Assurance Protocol. This Protocol is described after the Methodology section.

We hope our report format is useful in assisting you to obtain pertinent information on your sample.

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Introduction

Results

Table 1: Quantitative Data

Table 2: QA Report (A): Blank and Spiked Blank Analyses

Table 3: QA Report (B): Replicate and Matrix Spike Analyses

Chain-of-Custody Record

Methodology

QA Protocol

Report Appendices

Appendix

Appendix D

TABLE 1: QUANTITATIVE DATA ON COMPOUNDS OF INTEREST

ETC Sample No. 001343 Customer Sample ID. Well #4

GROUND WATER MONITORING METALS, PESTICIDES AND HERBICIDES

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l	METHOD DETECTION LIMIT IN ug/l
D004	Arsenic	BMDL	5
D005	Barium	800	100
D006	Cadmium	BMDL	5
D007	Chromium	ND	50
D008	Lead	BMDL	100
D009	Mercury	BMDL	0.2
D010	Selenium	ND	5
D011	Silver	ND	25
D012	Endrin	<0.1	0.1 *
D013	Lindane	<2.0	2.0 *
D014	Methoxychlor	<50	50 *
D015	Toxaphene	<2.5	2.5 *
D016	2,4-D	<50	50 *
D017	2,4,5-TP (Silvex)	<5	5 *
	Iron	150	50
	Manganese	8500	100
	Sodium	5000000	50

* GC/ECD Method Detection Limit established for your individual sample matrix. When a compound is not detected at or above the specific Method Detection Limit, that particular compound is reported as "< the detection limit."

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RESULTS

The results obtained on your sample are listed in Table 1. For analysis of Groundwater Monitoring Metals, Pesticides and Herbicides, the contaminants are listed with their EPA Hazardous Waste number, sample concentration, and Method Detection Limit. A metal detected below its Method Detection Limit is reported in Table 1 as BMDL (Below Method Detection Limit). When a metal is searched for and cannot be found, it is reported as ND (Not Detected). In GC/ECD analysis, a contaminant not detected at or above its Method Detection Limit is reported in Table 1 as "< the method detection limit" established for that contaminant.

Quality Assurance Report (A), Table 2, contains the results obtained on the Method Blank and Spiked Blank for your sample. Quality Assurance Report (B), Table 3, lists the data on the Replicate and Matrix Spike Analysis.

The Chain-of-Custody Record on your sample is also included at the end of this Result section.

TABLE 1: QUANTITATIVE DATA ON PARAMETERS OF INTEREST

ETC Sample No. 001343 Customer Sample ID. Well #4

CONVENTIONALS

PARAMETER	CONCENTRATION mg/l	METHOD DETECTION LIMIT mg/l
Biological Oxygen Demand (BOD), 5 day	-	-
Chemical Oxygen Demand (COD)	-	-
Total Dissolved Solids (TDS)	-	-
Chloride	10500	200
Fluoride	0.21	0.1
Nitrate as N	<0.1	0.1
Total Kjeldahl Nitrogen	-	-
Sulfate as S	290	10
Total Phenols	0.006	0.005
Total Organic Carbon (quadruplicate)	12 12 12 10	1
Specific Conductance (quadruplicate)	24000 umhos/cm 22000 24000 25000	2000 umhos/cm
pH (quadruplicate)	7.8 Standard Units 7.7 7.7 7.7	
Turbidity	0.55 JTU	0.1 JTU

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TABLE 1: QUANTITATIVE DATA ON PARAMETERS OF INTEREST

ETC Sample No. 001343 Customer Sample ID. Well #4

RADIOLOGICAL	CONCENTRATION pCi/L
Gross Alpha	<50
Gross Beta	130 +/- 40

BACTERIOLOGICAL	COLONIES/100ml
Total Coliform	-
Fecal Coliform	-

"TNTC" Indicates Too Numerous to Count
"CF" Indicates Confluent Growth

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TABLE 2: QUALITY ASSURANCE REPORT (A): BLANK AND SPIKED BLANK

PESTICIDES AND HERBICIDES

For ETC Sample Numbers: 001327, 001328, 001330 to 001333, 001340 to 001343

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l BLANK	SPIKED BLANK	
			AMOUNT ADDED	% RECOVERY
D012	Endrin	<0.1	0.2	90
D013	Lindane	<2.0	2.0	116
D014	Methoxychlor	<50	100	118
D015	Toxaphene	<2.5	5.0	100
D016	2,4-D	<50	100	83
D017	2,4,5-TP (Silvex)	<5	10	100

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TABLE 3: QUALITY ASSURANCE REPORT (B): REPLICATE ANALYSIS AND MATRIX SPIKE ANALYSIS

** PESTICIDES AND HERBICIDES **

For ETC Sample Numbers: 001327, 001328, 001330 to 001333, 001340 to 001343

EPA HAZARDOUS WASTE NUMBER	CONTAMINANT	CONCENTRATION IN ug/l SAMPLE	REPLICATE	SAMPLE	SPIKED SAMPLE	AMOUNT ADDED	% RECOVERY
D012	Endrin	<0.1	<0.1	<0.1	0.18	0.2	90
D013	Lindane	<2.0	<2.0	<2.0	4.8	4.0	120
D014	Methoxychlor	<50	<50	<50	120	100	120
D015	Toxaphene	<2.5	<2.5	<2.5	6.0	5.0	120
D016	2,4-D	<50	<50	<50	5	100	5*
D017	2,4,5-TP (Silvex)	<5	<5	<5	2.7	10	27

* Matrix effect. Good recovery for spiked blank.

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TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

PHONE FOR CUSTOMER SERVICE: (201) 225-5800
TOLL FREE OUTSIDE NEW JERSEY: (800) 831-5382

CUSTODY NUMBER	DATE SHUTTLE SEALED
6529 6530	3/10/82

ATTENTION

Form is for the convenience of our clients. If used and sent to ETC it will serve as part of a complete chain of custody record held confidentially by ETC for the exclusive use of the client.

This form may be used in a legal proceeding. Accuracy and completeness are important. The purpose of this form is to document the chain of custody from the time the sample shuttle seal is broken until the shuttle is resealed. A person has a sample under custody if:

- it is in his/her actual possession; or
- it is his/her view after being in actual possession; or
- it was in his/her actual possession and he/she places it in a locked or otherwise secure place to which any access by others is fully recorded

ETC maintains chain of custody records before a sample shuttle is sent and after it is returned. ETC maintains records of shipping manifests. Together these forms document a complete chain of custody for a sample.

A

COMPANY	LCP Chemicals - NJ Inc	ATTENTION	Max Obra
PLANT		ACCOUNT NUMBER	
ADDRESS	South Wood Ave	REQUISITION NUMBER	000251
	Linden NJ 07036	TELEPHONE NUMBER	

B SAMPLE NUMBER: 4B

BOTTLE CODES: E ____ to ____ M ____ to ____ V ____ to ____ VB ____ to ____
CN ____ to ____ PH ____ to ____ PCB ____ to ____ WO 5 to 8

PLEASE COMPLETE THE REMAINDER OF THIS FORM. ALWAYS COMPLETE ITEMS C, E AND G. COMPLETE ITEM D IF SAMPLE APPEARANCE, CONSISTENCY, ODOR WARRANT NOTICE. COMPLETE ITEMS MARKED F AS NEEDED. ADD ANOTHER SHEET FOR F 7-8 AND SO ON IF NEEDED. THE LAST PERSON TO RECEIVE THE SAMPLE MUST, IN ADDITION TO COMPLETING THE APPROPRIATE F ITEM, ALSO COMPLETE ITEM G.

C SAMPLE LOCATION OR CODE (e.g., permit code): WELL #5

D SAMPLE DESCRIPTION: FILTERED WATER SAMPLE

COMPLETED BY THE PERSON WHO ASSUMES RESPONSIBILITY FOR THE SAMPLE AND OBSERVES THE BREAKING OF THE SEAL.

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	[signature]	SEAL NO.	6529
SEAL INTACT	✓ YES ____ NO	SEAL BREAK TIME	7:00 AM
CODE OF ANY LEAKING BOTTLES			
CODE OF ANY BROKEN BOTTLES			

IF SEAL IS *NOT* INTACT PLEASE CALL

WARNING
IF ANY BOTTLE IS LEAKING OR BROKEN, DO NOT HANDLE. SOME BOTTLES CONTAIN ACID. PLEASE CALL.

F1 RELINQUISHED BY (PRINT / SIGN)	F2 RECEIVED BY / DATE	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
F3 RELINQUISHED BY (PRINT / SIGN)	F4 RECEIVED BY / TIME / DATE	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
F5 RELINQUISHED BY (PRINT / SIGN)	F6 RECEIVED BY / TIME / DATE	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES

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FILLED IN BY THE PERSON WHO HAS RESPONSIBILITY FOR THE SAMPLE AFTER RESEALING OF SAMPLE SHUTTLE

REPLACE FORM IN ENVELOPE
PUT ENVELOPE IN SHUTTLE

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	[signature]		
RESEAL TIME	10:35 AM	SEAL NO.	6530

100559

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

PHONE FOR CUSTOMER SERVICE: (201) 225-5800
TOLL FREE OUTSIDE NEW JERSEY: (800) 631-5382

CUSTODY NUMBER	DATE SHUTTLE SEALED
6527 6528	3/10/82

ATTENTION

This form is for the convenience of our clients. If used and sent to ETC it will serve as part of a complete chain of custody record held confidentially by ETC for the exclusive use of the client.

This form may be used in a legal proceeding. Accuracy and completeness are important. The purpose of this form is to document the chain of custody from the time the sample shuttle seal is broken until the shuttle is resealed. A person has a sample under custody if

- It is in his/her actual possession; or
- It is his/her view, after being in actual possession; or
- It was in his/her actual possession and he/she places it in a locked or otherwise secure place to which any access by others is fully recorded.

ETC maintains chain of custody records before a sample shuttle is sent and after it is returned. ETC maintains records of shipping manifests. Together these forms document a complete chain of custody for a sample.

A			
COMPANY	LCP Chemicals-NJ Inc	ATTENTION	Max Obra
PLANT		ACCOUNT NUMBER	
ADDRESS	South Wood Ave	REQUISITION NUMBER	000251
	Linden NJ 07036	TELEPHONE NUMBER	

B SAMPLE NUMBER	BOTTLE CODES:							
4A	E ___ to ___	M 1 to ___	V ___ to ___	VB ___ to ___	CN ___ to ___	PH ___ to ___	PCB ___ to ___	WO 1 to 4

PLEASE COMPLETE THE REMAINDER OF THIS FORM. ALWAYS COMPLETE ITEMS C, E, AND G. COMPLETE ITEM D IF SAMPLE APPEARANCE, CONSISTENCY, ODOR, WARRANT NOTICE. COMPLETE ITEMS MARKED F AS NEEDED. ADD ANOTHER SHEET FOR F 7, 8 AND SO ON IF NEEDED. THE LAST PERSON TO RECEIVE THE SAMPLE MUST, IN ADDITION TO COMPLETING THE APPROPRIATE F ITEM, ALSO COMPLETE ITEM G.

C SAMPLE LOCATION OR CODE (e.g. a permit code)	WELL #5	D SAMPLE DESCRIPTION	FILTERED WATER SAMPLE

E COMPLETED BY THE PERSON WHO ASSUMES RESPONSIBILITY FOR THE SAMPLE AND OBSERVES THE BREAKING OF THE SEAL.

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	[signature]	SEAL NO.	6527
SEAL INTACT	✓ YES ___ NO	SEAL BREAK TIME	7:00 AM
CODE OF ANY LEAKING BOTTLES			
CODE OF ANY BROKEN BOTTLES			

IF SEAL IS *NOT* INTACT PLEASE CALL

WARNING
IF ANY BOTTLE IS LEAKING OR BROKEN, DO NOT HANDLE: SOME BOTTLES CONTAIN ACID. PLEASE CALL.

F1 RELINQUISHED BY:	F2 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE, AND CODE OF ANY MISSING OR DAMAGED BOTTLES
F3 RELINQUISHED BY	F4 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE; AND CODE OF ANY MISSING OR DAMAGED BOTTLES
F5 RELINQUISHED BY	F6 RECEIVED BY	NOTE: GIVE REASON FOR CUSTODY CHANGE; AND CODE OF ANY MISSING OR DAMAGED BOTTLES

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G FILLED IN BY THE PERSON WHO HAS RESPONSIBILITY FOR THE SAMPLE AFTER RESEALING OF SAMPLE SHUTTLE.

NAME	MAXIMO A. OBRA	DATE	3/15/82
SIGNATURE	[signature]		
RESEAL TIME	[illegible]	SEAL	[illegible]

REPLACE FORM IN ENVELOPE
PUT ENVELOPE IN SHUTTLE

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY

ETC Sample Number 001340 to 001343

Relinquished By Tom Kuzmach

Received By [illegible] Date 3/15/82 Time 5:10 p.m.

Relinquished By _____

Received By _____ Date _____ Time ____

Relinquished By _____

Received By _____ Date _____ Time ____

Relinquished By _____

Received By _____ Date _____ Time ____

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284 RARITAN CENTER PARKWAY, EDISON, NEW JERSEY 08837 • (201) 225-5600

100560

100561

ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

Company: LCP Chemicals Inc Job No. 251

Address: South Wood Ave
Linden NJ

Attention: Max Obra

8 Sample Shuttle(s) Received by: Joni Kuzmack

Time: 11:00AM Date: 3/15/82

Seal Number(s)	6516	6518	6520	6522
Seal Intact*	Y	Y	Y	Y
Seal Number(s)	6524	6526	6528	6530
Seal Intact*	Y	Y	Y	Y
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				
Seal Number(s)				
Seal Intact*				

*Yes (Y) No (N)

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284 RARITAN CENTER PARKWAY, EDISON, NEW JERSEY 08837 • (201) 225-5600

L-1029 3/82

100562

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

CHAIN OF CUSTODY

Company: Chyun Associates Job No. 251

Address 1101 State Rd
Princeton NJ

Attention: Mike Wright

Sample Description:

ETC Sample #:	To be Analyzed for
001340W06 to 001343W06	TOC & total phenols
001340 W07 to 001343 W07	Conventionals: Specific conductance. chloride, sulfate fluoride, Nitrate, Turbidity

Please run TOC and Specific conductance in quad. for Sample #001343

Sample(s) Relinquished by: Carl Mitello

Time: 11:20 Am Date: 3-18-82

Sample(s) Received by: Michael Wright

Time: 1120 HM Date: 3/18/82

128 of 161

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L-1009 3/82R

100563

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY CHRONICLE

ETC Sample Number 001343

Sample Preparation For	Analyst	Date
Base/Neutral/PCB's & Pesticides		
~~Acids~~ Pesticides in H_2O	Ben Gufin / Stephanie Dobbs	3/30/82
Metals	Kristine J Kuhl	3-24-82
Others Herbicides in Water	Pearl Krajczar	3/30/82

Sample Analysis For	Analyst	Date
Base/Neutral/PCB's & Pesticides		
Acids		
VOA/Purgeables		
Metals	KJ Kuhl / A.W. Massaro	3-28-82 to 4-1-82
Others Herbicides in Water	Pearl Krajczar	4/1/82
Others Pesticides in Water	Pearl Krajczar	4/2-3, 8/82

Verified By [signature]

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100564

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

To Teledyne Isotopes:

Please complete this document and include with your report.

This shuttle contains:

ETC Sample numbers:		To be analyzed for:
001327	W05	Gross Alpha/Beta
001328	W05	Gross Alpha/Beta
001330	W05	Gross Alpha/Beta
001342	W05	Gross Alpha/Beta
001343	W05	Gross Alpha/Beta

Sample Shuttle sealed by: Joni Kuzmack

Date: 3/17/82 Time: 3:15 pm Seal Number: 6583

Sample Shuttle opened by: Edna C Cunningham

Date: 3/18/82 Time: 1600 Seal Number: 0006583

Was seal intact? Yes ✓ No

For return:

Sample Shuttle sealed by: Edna C Cunningham

Date: 3/19/82 Time: 1150 Seal Number: 0006584

Sample Shuttle opened by: Joni Kuzmack

Date: 3/22/82 Time: 11:39 Seal Number: 6584

Was seal intact? Yes ✓ No

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100565

ETC ENVIRONMENTAL TESTING AND CERTIFICATION CORPORATION

LABORATORY CHAIN-OF-CUSTODY

ETC Sample Number 001340 W06 to 001343 W06
001340 W07 to 001343 W07

Relinquished By Toni Kuzmack

Received By Carl DeLello Date 3-18-82 Time 10:20am

Relinquished By _____

Received By _____ Date _____ Time ____

Relinquished By _____

Received By _____ Date _____ Time ____

Relinquished By _____

Recieved By _____ Date _____ Time ____

284 RARITAN CENTER PARKWAY, EDISON, NEW JERSEY 08837 • (201) 225-5600

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METHODOLOGY

Analysis of Metals

The methods employed in the analysis of your sample for metals are established EPA methods for priority pollutants.

Metals analysis is performed according to the methods published by EPA in "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-70-020, March 1979. Arsenic, selenium, thallium, and antimony are analyzed by furnace AA while calcium, magnesium, barium, beryllium, chromium, nickel, copper, zinc, silver, cadmium, and lead are analyzed by flame AA. Potassium and sodium are analyzed by flame emmission. Mercury is analyzed by cold vapor technique.

Analysis of Pesticides and Herbicides

The methods employed in the analysis of your water sample for pesticides and herbicides are established EPA methods taken from the "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," June, 1980. The pesticide method can be summarized as follows: A measured volume of sample, approximately 500-1000ml, to which sodium sulfate has been added, is extracted with methylene chloride. The methylene chloride extract is dried and concentrated to approximately 0.5ml. The extract is brought to a final volume with hexane and injected into a gas chromatograph equipped with a ^{63}Ni electron capture detector.

The herbicide method can be summarized as follows: A measured volume of sample, approximately 500-1000 ml, to which sodium sulfate has been added, is acidified and extracted with methylene chloride. The methylene chloride extract is evaporated to dryness, and the residue is derivatized with a BF_3 esterification reagent. The derivatives are extracted into hexane for subsequent injection into a gas chromatograph equipped with a ^{63}Ni electron capture detector.

The GC operating parameters were as follows:

COLUMN

6' x 4mm glass 1.5% SP-2250 & 1.95% SP-2401
Supelcoport 100/120 mesh

CARRIER FLOW

60ml/min. Argon/Methane

SEPTUM PURGE

5ml/min. Argon/Methane

COLUMN OVEN

210°C

INJECTOR TEMPERATURE

225°C

DETECTOR TEMPERATURE

300°C

100567

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QUALITY ASSURANCE PROTOCOL

The quality assurance protocol followed in the analysis of your sample is based on the "Handbook for Analytical Control in Water and Wastewater Laboratories," EPA-600/4-79-019, March, 1979; National Enforcement Investigation Center Policies, and Procedures manual; and EPA-330/9/79/001-R, October, 1979.

Analysis of Metals (Standards)

- New working standards are prepared for each batch of samples.
- Normal calibration is performed using a blank and four standards that have been carried through the entire sample preparation procedure. A regression analysis is used to construct the calibration curve.
- For each sample analysis in the standard additions technique, a three point calibration is performed using U. S. EPA Methods for Chemical Analysis of Water and Wastes, 1979. Results are obtained using linear regression analysis. Any results obtained with a coefficient of correlation below 0.990 are considered erroneous, necessitating raw data editing or sample re-analysis.
- Normal calibration curves are constructed using greater than or equal to 5 times the Instrumental Detection Limit (IDL) as the lowest concentration level.
- All calibration standards are analyzed in duplicate, as a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to establish the validity of the normal calibration curve.

Analysis of Metals (Sample, for all metals except Mercury)

For all homogeneous samples (minimum of 42% QC), each sample batch may include up to 30 samples and the following fixed number of QC samples:

- 3 Replicates.
- 2 Replicate spikes.
- 2 Replicate independent reference standards.
- 8 Calibration standards (processed using the sample preparation method).
- 2 Blanks (using sample preparation method).
- 4 Calibration standards (without sample preparation).
- 1 Blank (without sample preparation).

For all heterogeneous samples (minimum of 65% QC), every field sample in a sample batch is run in duplicate. A sample batch may include up to 30 samples and the following fixed number of QC samples:

- 4 Replicates.
- 4 Replicate spikes.
- 2 Replicate independent reference standards.
- 8 Calibration standards (processed using the sample preparation method).
- 2 Blanks (using sample preparation method).
- 4 Calibration standards (without sample preparation).
- 1 Blank (without sample preparation).

Analysis of Metals (Sample, Mercury)

For every matrix (minimum of 66% QC), all the field samples in sample batch are run in duplicate. A sample batch may include to 20 samples and the following fixed number of QC samples:

- 3 Replicates.
- 2 Replicate spikes.
- 2 Replicate independent reference standards.
- 10 Calibration standards (processed using the sample preparation method).
- 2 Blanks.

Analysis of Pesticides and Herbicides

- In every block of 20 samples extracted, there are 16 field samples, one blank, one spiked blank, one sample spiked with the standard mixture, and a duplicate field sample.
- Blind quality control samples are included in field samples at a minimum of one every hundred samples.
- GC performance criteria as specified in EPA Method 608 are met before analysis starts.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;
- outgoing shipping manifests;
- the chain-of-custody form completed by the person (s) breaking the seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;
- incoming shipping manifests;
- breaking the Shuttle's reseal;
- storing each labeled sample bottle in a secured area;
- disposition of each sample to an analyst or technician and;
- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The record shows for each link in this process:

- the person with custody;
- the time and date each person accepted or relinquished custody.

REPORT APPENDICES

The following appendices provide the support analytical data associated with your sample analyses. They are arranged as follows:

Appendix A

1) Reconstructed total ion chromatogram of GC/MS analyses of your sample.

2) The individual mass spectra of all priority pollutant compounds which have been identified as being present in your sample.

3) The individual mass spectra of the corresponding compounds as obtained from the standards.

Appendix B

1) The mass spectra of the calibration compounds, 4-bromofluorobenzene (BFB) and decafluorotriphenylphosphine (DFTPP), as obtained on the data of sample analyses.

Appendix C [for plus 10 and 50% internal standard option]

1) Spectra of tentatively identified compounds, with their differences.

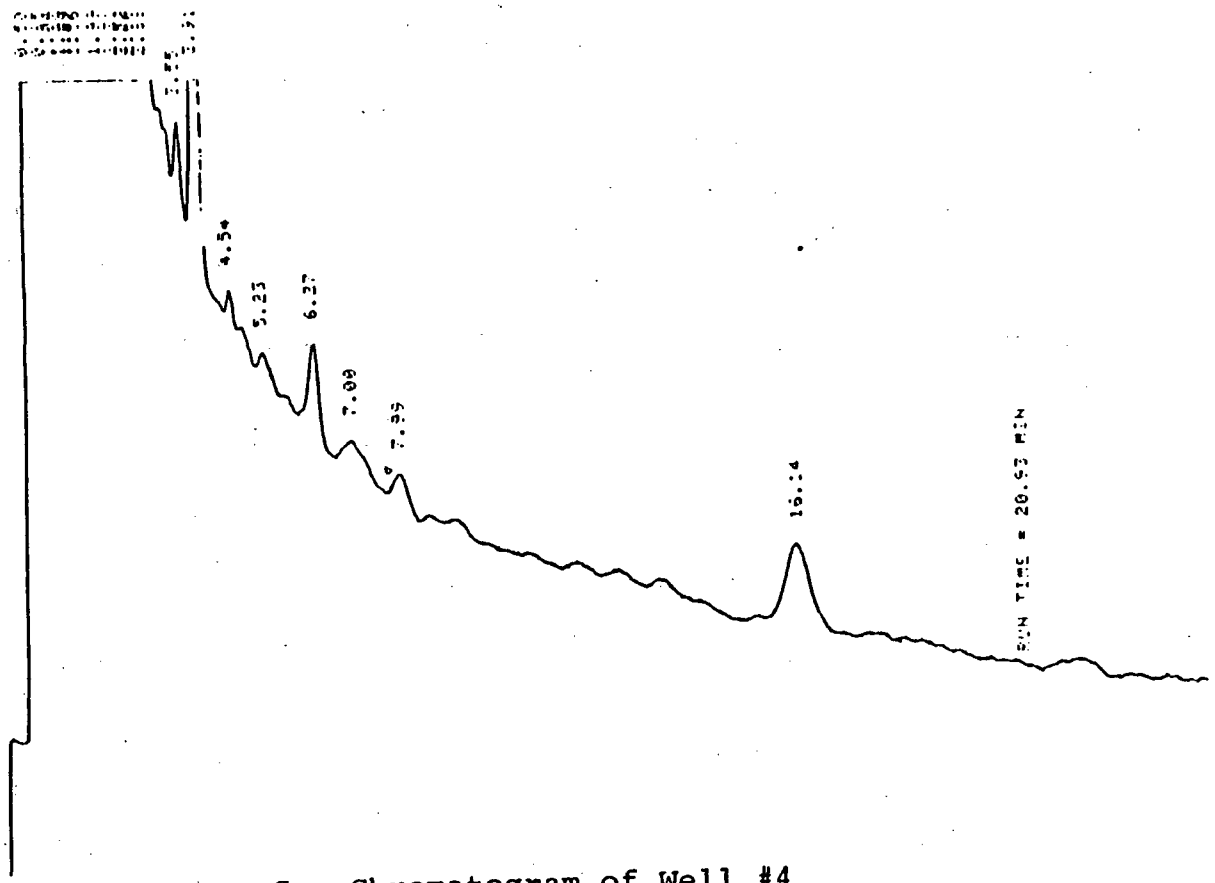
Appendix D

1) Subcontractor's report.

These data are provided to present a complete report on your sample and to provide the data on which analytical decisions have been based. We hope this will aid you in your own analysis of the data.

APPENDIX

100574



Gas Chromatogram of Well #4
ETC Sample No. 001343
for the Analysis of Endrin and Toxaphene

100575
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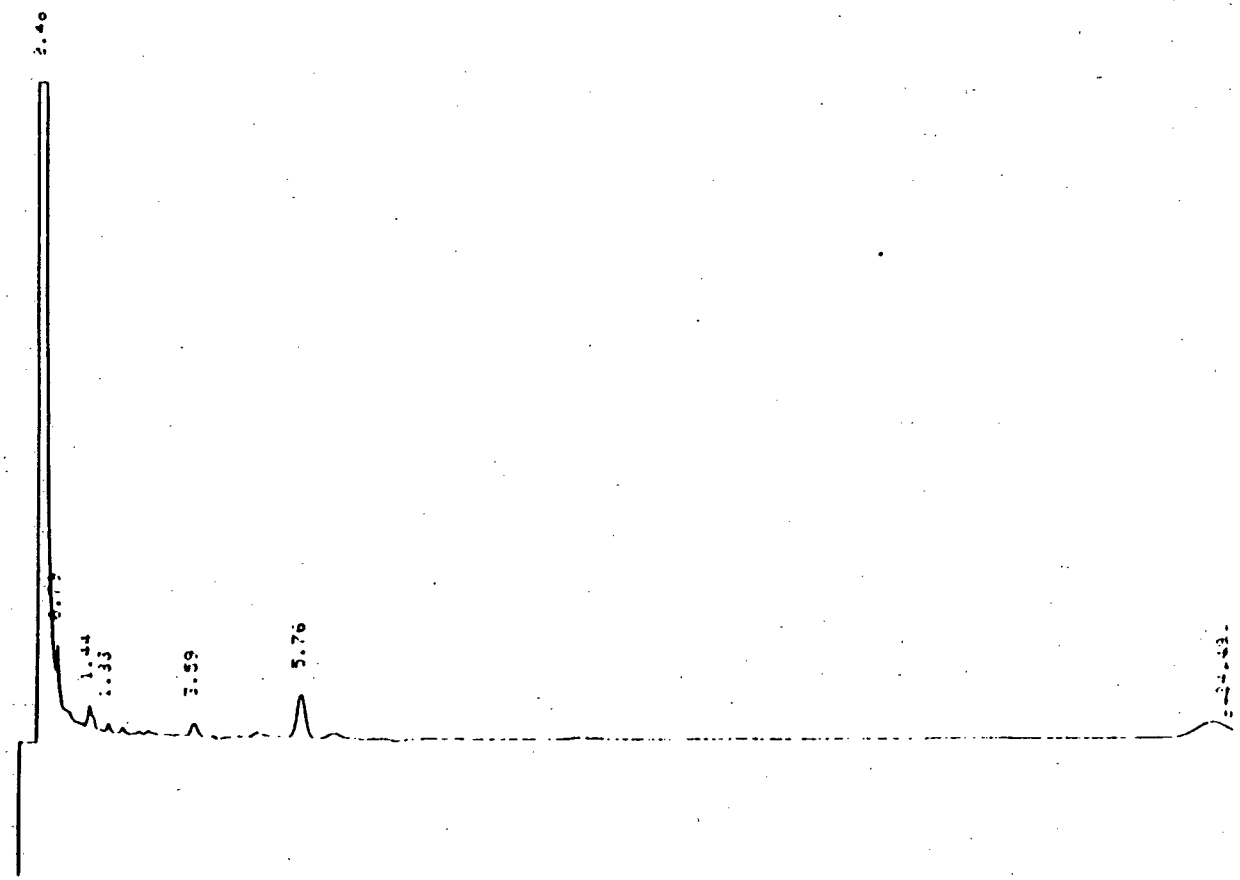
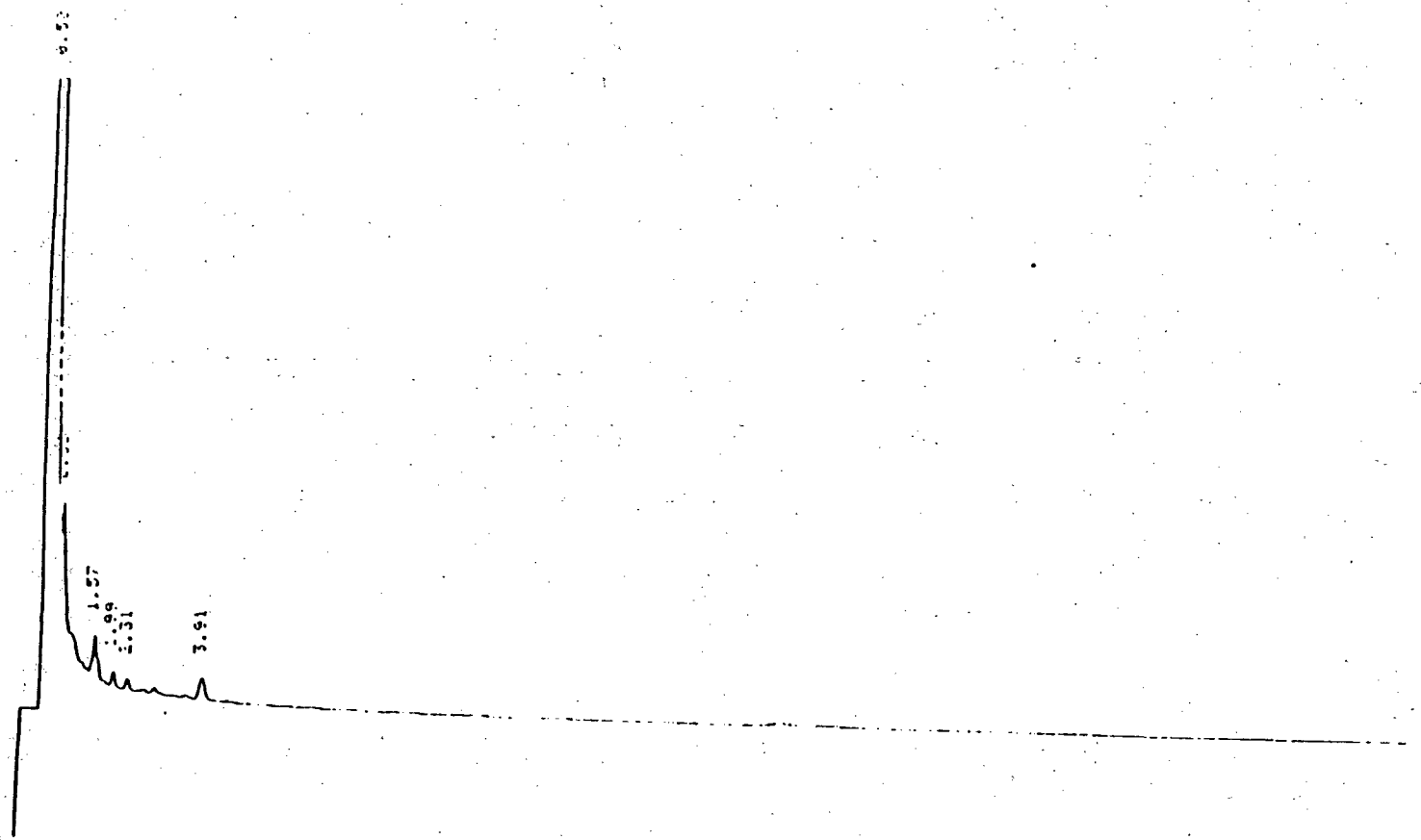


Gas Chromatogram of Well #4
ETC Sample No. 001343
for the Analysis of Methoxychlor

100576
142 of 161



Gas Chromatogram of Well #4
ETC Sample No. 001343
for the Analysis of Lindane

100577

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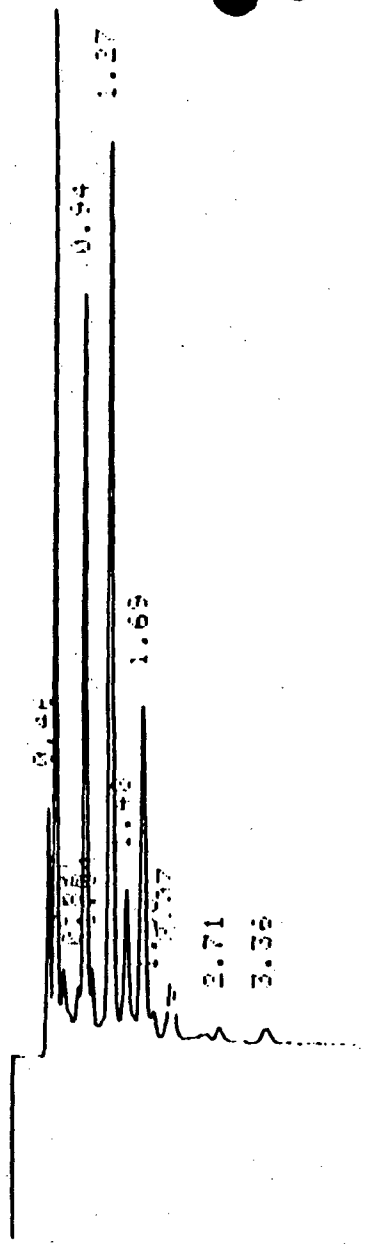
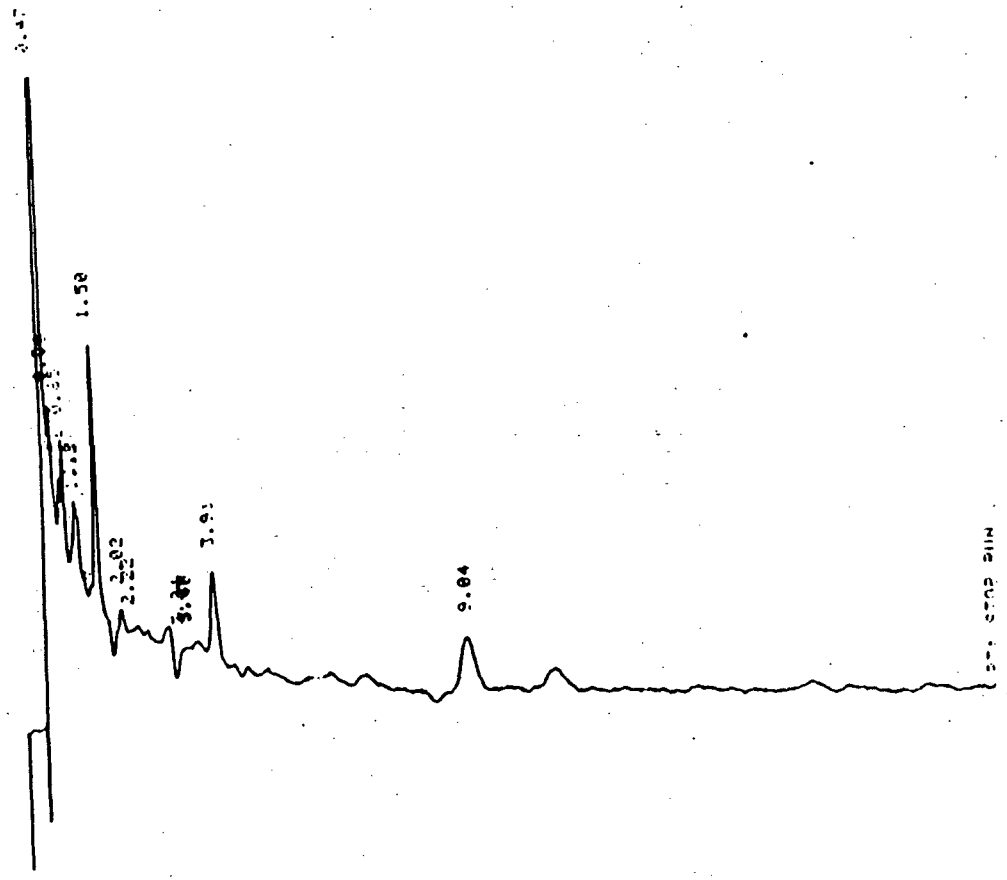


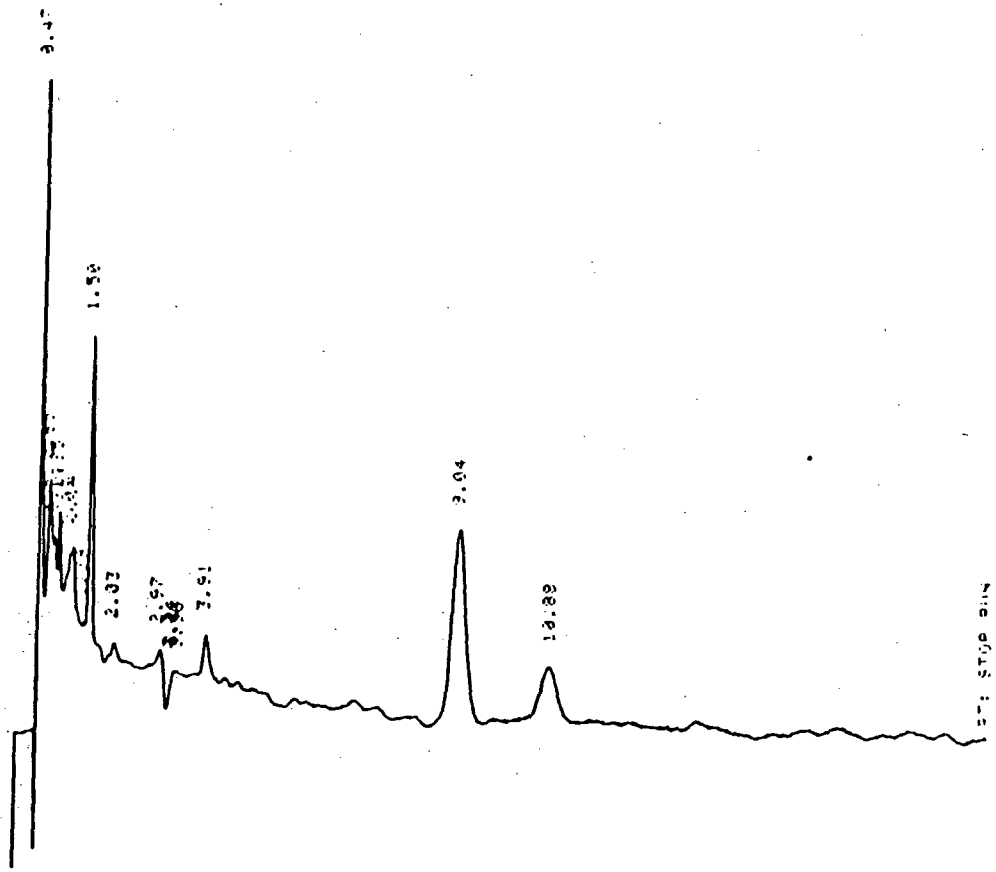
Gas Chromatogram of Well #4
ETC Sample No. 001343
for the Analysis of 2,4-D and 2,4,5-TP (Silvex)

100578
14467161



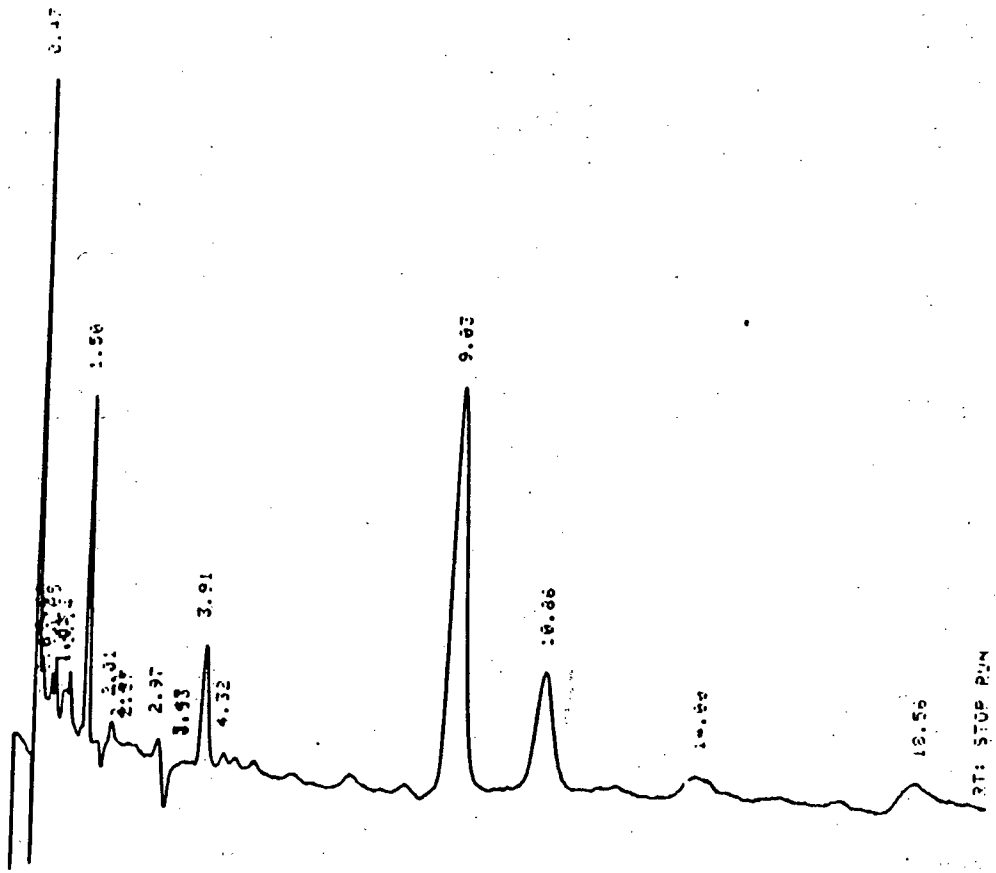
Gas Chromatogram of Endrin Standard
(0.01 ng/ul)

100579
145 of 161



Gas Chromatogram of Endrin Standard
(0.05 ng/ul)

100580
191 of 191



Gas Chromatogram of Endrin Standard
(0.1 ng/ul)

100581

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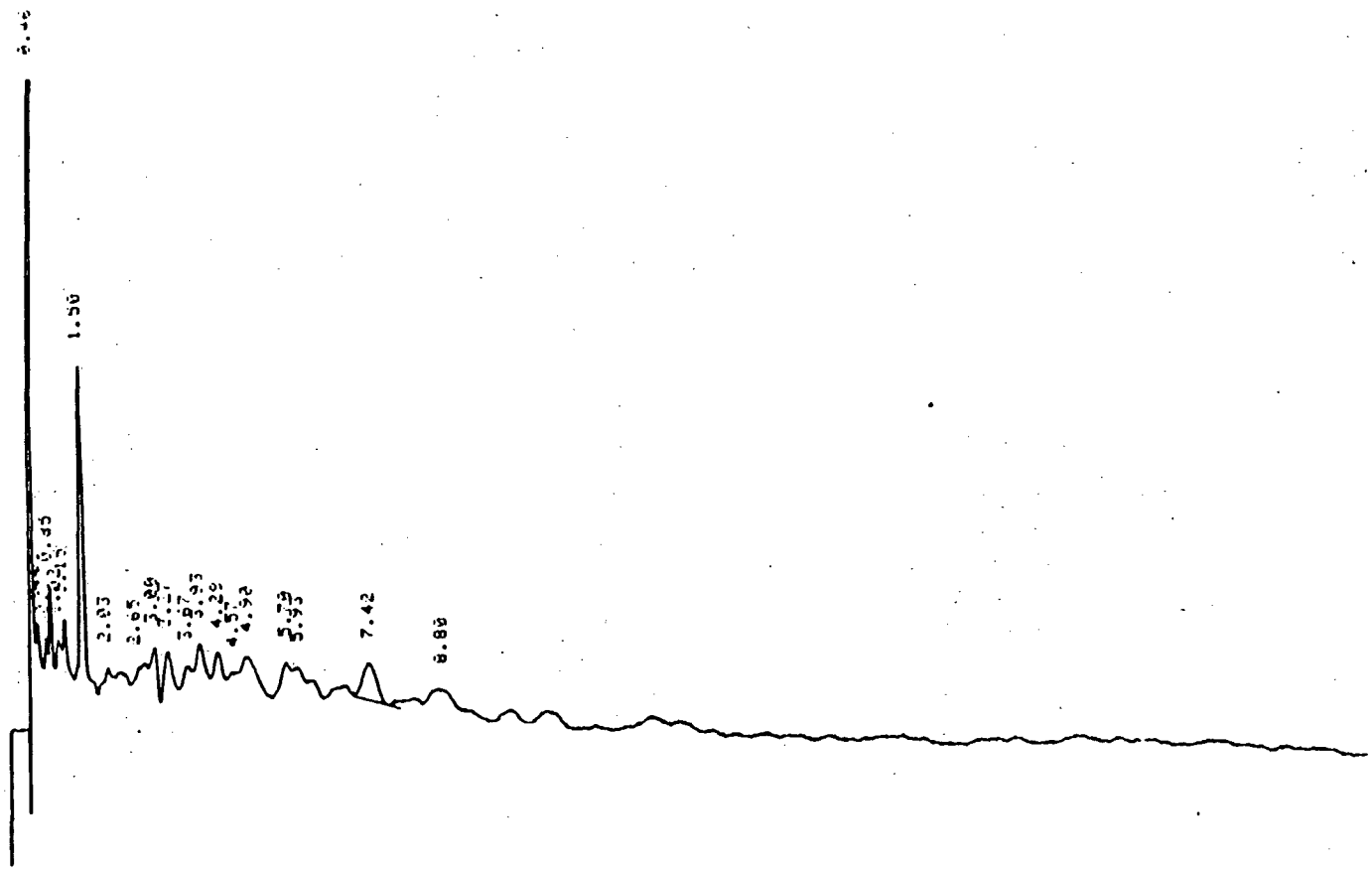

Gas Chromatogram of Toxaphene Standard
(0.25 ng/ul)

100582

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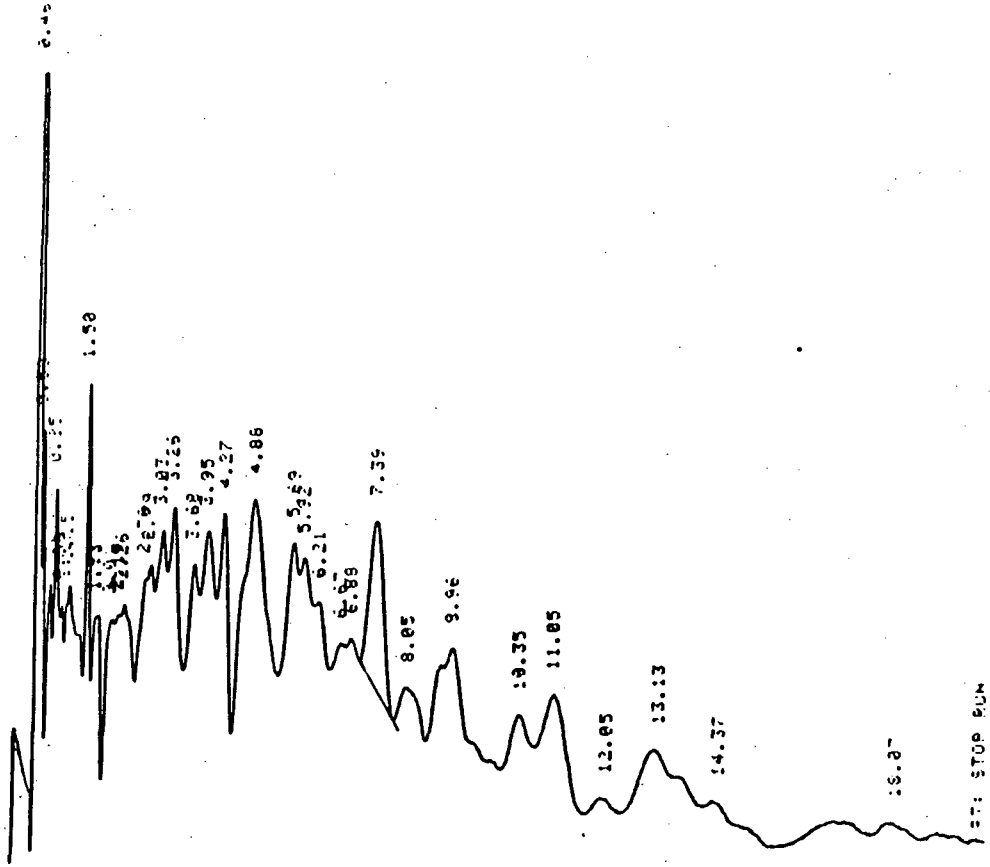
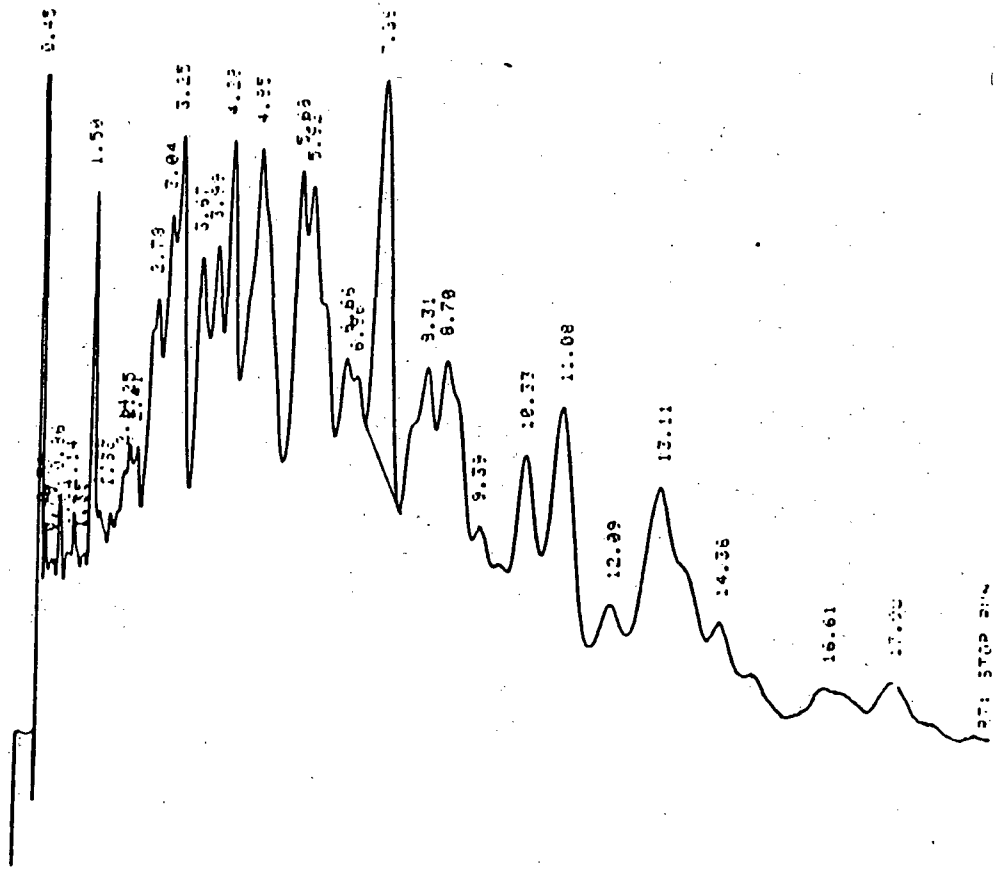


Gas Chromatogram of Toxaphene Standard
(1.0 ng/ul)

100583
1946/41



Gas Chromatogram of Toxaphene Standard
(2.0 ng/ul)

100584

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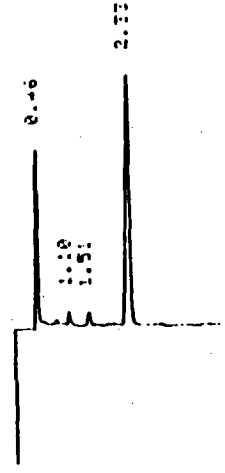

Gas Chromatogram of Lindane Standard
(0.2 ug/ml)

100585

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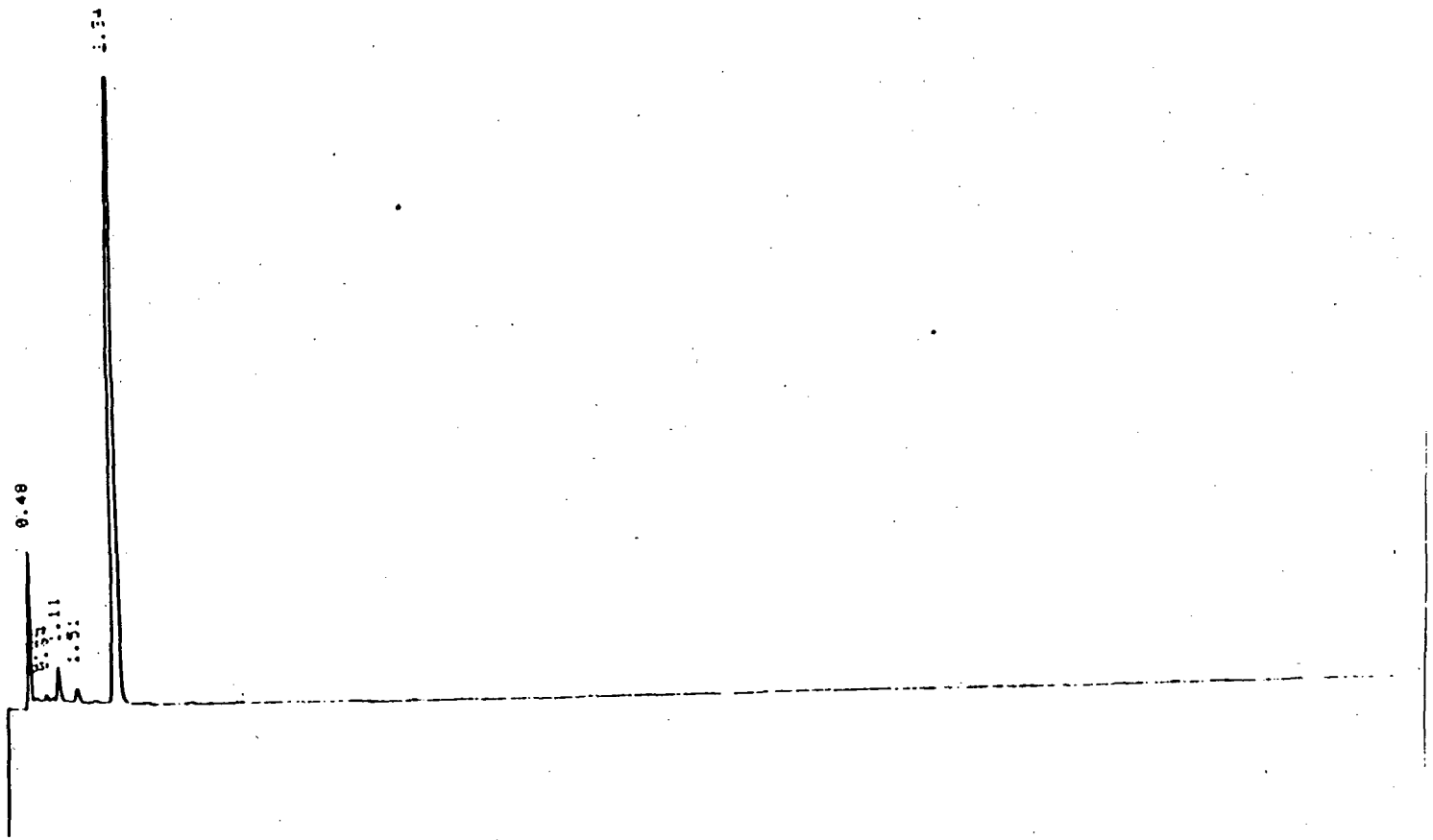

Gas Chromatogram of Lindane Standard
(0.5 ng/ul)

100586

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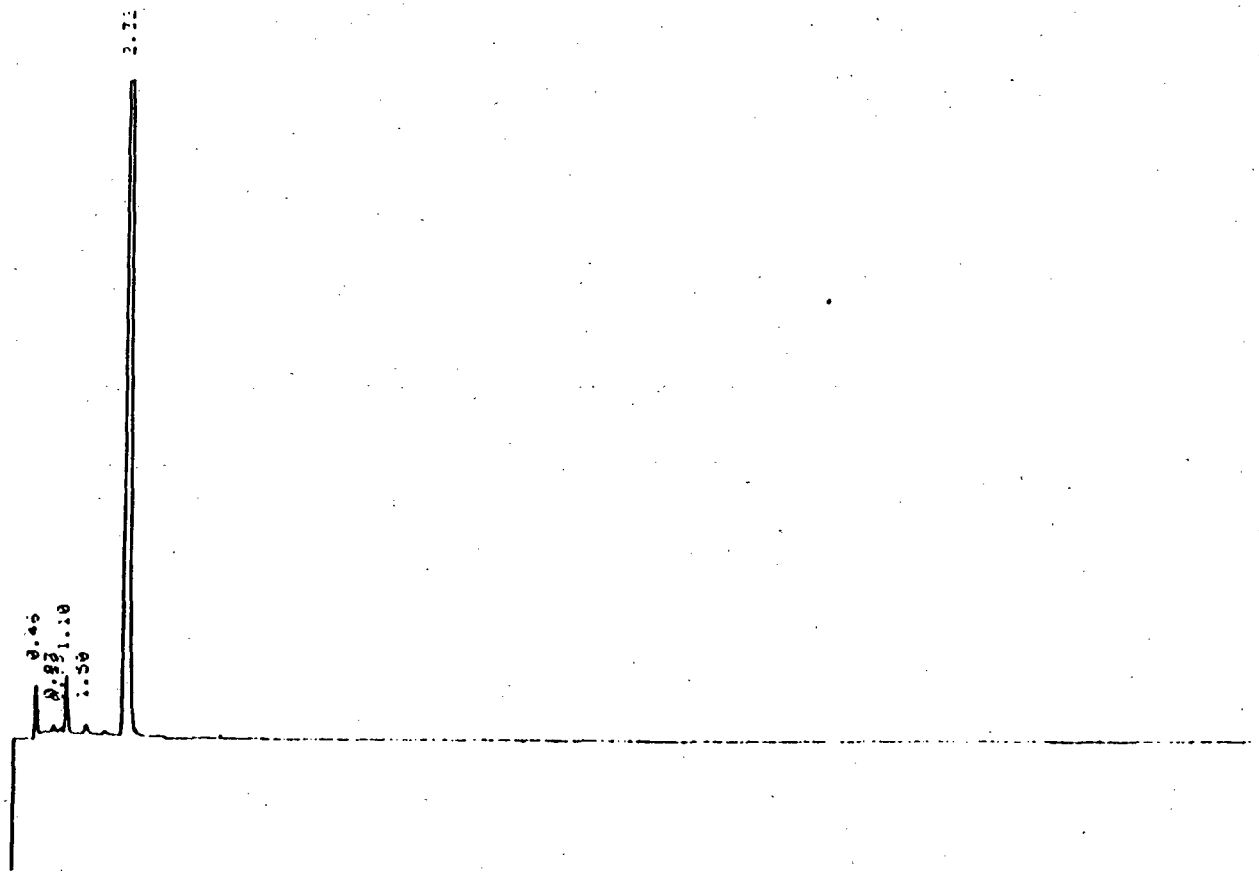

Gas Chromatogram of Lindane Standard
(1.0 ng/ul)

100587

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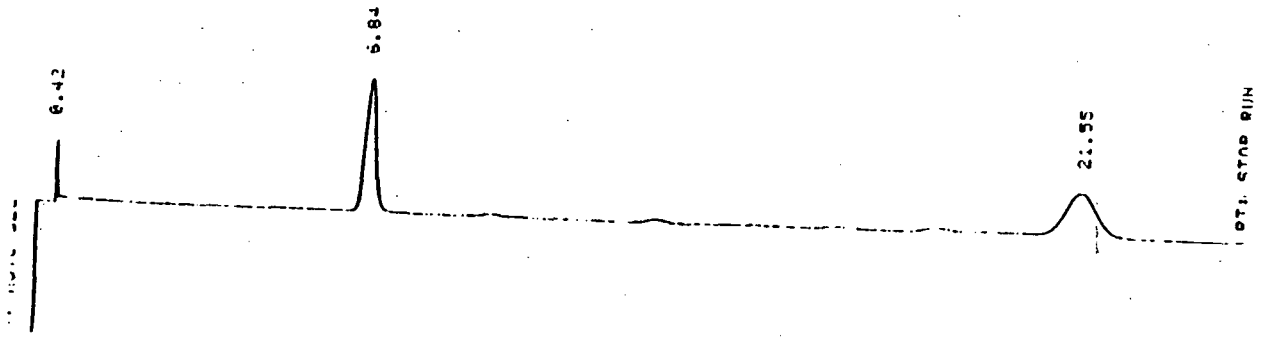
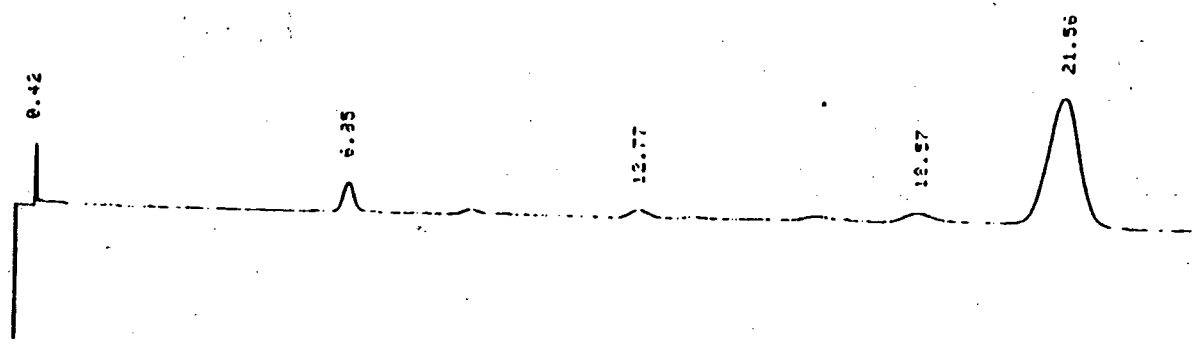


Gas Chromatogram of Methoxychlor Standard
(5.0 ng/ul)

100588
1846/61



Gas Chromatogram of Methoxychlor Standard
(10.0 ng/ul)

100589

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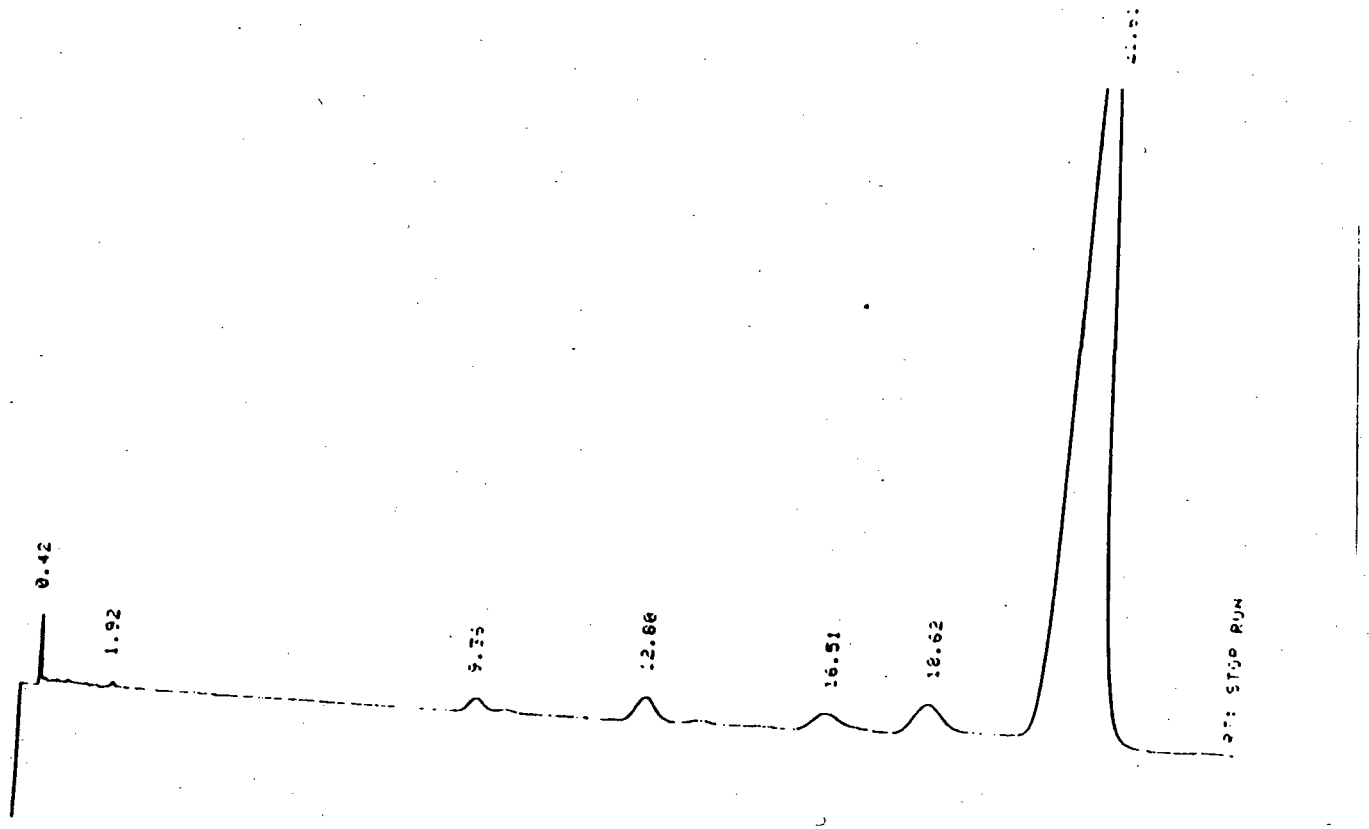
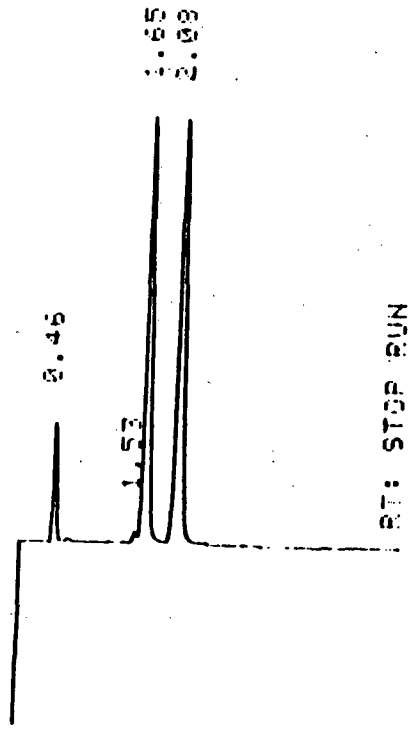


Gas Chromatogram of Methoxychlor Standard
(50.0 ng/ul)

100590

1567/161



Gas Chromatogram of 2,4-D and 2,4,5-TP(Silvex) Standard
(10 ug/ml & 1 ug/ml)

100591

APPENDIX D

100593

CHYUN ASSOCIATES
Architectural, Engineering & Laboratory

1101 State Road, Building B
Princeton, New Jersey 08540
609-924-5151

LABORATORY ANALYSIS REPORT

Client: ETC Corporation
Address: 284 Raritan Center Parkway
Edison, N.J. 08837

Attention: Dr. Denis Lin

Test Number: L82125
Date Received: 3/18/82
Date Sampled: Unknown

Job Number: 02299

SAMPLE NUMBER	SAMPLE DESIGNATION/DESCRIPTION
1	001340
2	001341
3	001342
4	001343
DL	Detection Limit

CHARGED APR 2 1982

PARAMETER/CONSTITUENT	SAMPLE NUMBER 1	2	3	4	DL
Total Organic Carbon	8	6	21	12	1
Phenolics as Phenol	<0.005	<0.005	<0.005	0.006	0.005
Specific Conductance, micromhos	24,000	26,000	28,000	24,000	2,000
Chloride	12,400	16,200	13,100	10,500	200
Fluoride	0.88	0.31	0.32	0.21	0.1
Nitrate as N	<0.1	<0.1	<0.1	<0.1	0.1
Sulfate	490	240	170	290	10
Turbidity (JTU)	4.3	0.35	1.2	0.55	0.1

All results in mg/l (ppm) except where noted.

Laboratory ID No. 11198

March 30, 1982
Date

Michael Wright
Michael Wright
Laboratory Supervisor

TELEDYNE ISOTOPES

REPORT OF ANALYSIS

RUN DATE 04/07/82

WORK ORDER NUMBER	CUSTOMER P.O. NUMBER	DATE RECEIVED	DELIVERY DATE	PAGE
3-3562		03/18/82	04/20/82	1

MS D FOSTER
EIC ENVIRON TESTING & CERT CORP
260 RARITAN CENTER PKWY
EDISON NJ 08837

RECEIVED APR 1 2 1982

WATER

TELEDYNE SAMPLE NUMBER	CUSTOMER'S IDENTIFICATION	STA NUM	COLLECTION-DATE START DATE	START TIME	STOP DATE	STOP TIME	NUCLIDE	ACTIVITY (pCi/liter)	NUCL-UNIT-% U/M *	MID-COUNT TIME DATE	MID-COUNT TIME TIME	VOLUME - UNITS ASH-WGHT-% *	LAB.
26274	NO 001327 WO5		03/08				GR-A	L.T. 1. E 00		03/31			3
							GR-B	1.2 +-0.2 E 01		03/31			3
26275	NO 001328 WO5		03/08				GR-A	L.T. 3. E 00		03/31			3
							GR-B	5.9 +-2.4 E 00		03/31			3
26276	NO 001330 WO5		03/08				GR-A	L.T. 2. E 00		03/31			3
							GR-B	4.0 +-1.7 E 00		03/31			3
26277	NO 001342 WO5		03/08				GR-A	L.T. 6. E 01		03/31			3
							GR-B	3.3 +-0.6 E 02		03/31			3
26278	NO 001343 WO5		03/08				GR-A	L.T. 5. E 01		03/31			3
							GR-B	1.3 +-0.4 E 02		03/31			3
26279	NO 001331 WO5		03/08				GR-A	L.T. 4. E 00		03/31			3
							GR-B	1.8 +-0.3 E 01		03/31			3
26280	NO 001332 WO5		03/08				GR-A	5.3 +-1.9 E 00		03/31			3
							GR-B	2.3 +-0.3 E 01		03/31			3
26281	NO 001333 WO5		03/08				GR-A	L.T. 2. E 00		03/31			3
							GR-B	8.6 +-2.2 E 00		03/31			3
26282	NO 001340 WO5		03/08				GR-A	L.T. 3. E 01		03/31			3
							GR-B	L.T. 4. E 01		03/31			3
26283	NO 001341 WO5		03/08				GR-A	L.T. 3. E 01		03/31			3
							GR-B	4.4 +-2.0 E 01		03/31			3

LAST PAGE OF REPORT

APPROVED BY H. KING H. King 04/07/82

SEND 1 COPIES TO EN450S MS D FOSTER

2 - GAS LAB. 3 - RADIO CHEMISTRY LAB. 4 - Ge(Li) GAMMA SPEC LAB. 5 - TRITIUM GAS/L.S. LAB.

100594

16 of 16

. Denis Lin
ETC Corporation
Test Report L82125
Job No. 02299
March 30, 1982
Page 2

Sample Number	Trial	Specific Conductance micromhos	TOC mg/l
001343	1	24,000	12
	2	22,000	12
	3	24,000	12
	4	25,000	10

CHARGED APR 2 1982

100595

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