UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

MEMORANDUM

REPLY TO ATTENTION OF: 5SCRL

DATE: SEP 27 1990

SUBJECT: Laboratory Evaluation of Weston Gulf Coast, University Park, Illinois for EKCO Housewares, Massillon, Ohio RFI/CMS.

FROM: Charles T. Elly, Acting Director
Central Regional Laboratory

Chuck Elly

TO: William E. Muno, Chief
RCRA Enforcement Branch

ATTN: Sally Averill

INTRODUCTION

In a memorandum report to the RCRA Permits Branch, dated May 9, 1990, the Central Regional Laboratory (CRL) found Weston Gulf Coast to be acceptable for determining Target Compound List (TCL) volatiles by Method 8240. See Table 9-1 of subject site QA Project Plan (Appendix C to Work Plan). In a memorandum to you dated September 7, 1990, we have determined the laboratory to be acceptable for inorganic determinations of QAPP Table 9-3. On July 25, 26, and 27, 1990, Nidia Feliciano, Kenneth Gunter, and Dr. Chi Tang, Chemists, CRL visited Weston Gulf Coast for a detailed Appendix IX evaluation. Two available GC/MS instruments for volatile determinations (1 with packed column for Method 8240 and 1 with capillary column for either Methods 8240 or 524.2) are appropriate for the 2 volatile determinations of the subject RFI/CMS. The July 1990 visit again found Weston Gulf Coast acceptable for the Method 8240 TCL volatiles.

The visit of July 1990 did find that Weston Gulf Coast had changed their volatile Method 524 (See Table 9-2 of QAPP) to Method 524.2, using a DB-624 capillary column, to be in direct compliance with EPA's drinking water programs.

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SUMMARY AND RECOMMENDATIONS

A. During August 1990, Weston Gulf Coast developed a method validation study for Method 524.2 and provided these results and associated calibration and QC records to the CRL for review. See Table 1 to this memo documenting Method Detection Limits that are estimated from this study. Weston did excellent work for Method 524.2 and is to be considered acceptable. Note that cis and trans 1,2 dichloroethene and the 3 xylene isomers are now reported separately by this method instead of as the sum of each isomer group. The seven TCL volatile compounds of QAPP Table 9-2A were part of this validation study.

   1. **Recommendation:** The QAPP should be upgraded to note Method 524 is now Method 524.2. Under current conditions, the volatiles of Tables 9-2 and 9-2A will be reported using Method 524.2

   2. **Recommendation:** Consider Weston Gulf Coast to be acceptable for Method 8240 TCL volatiles and for the inorganics of this RFI/CMS, based on the July 1990 CRL evaluation visit and on a previous one in 1990. This concludes all analyses required for the subject project.

B. Our evaluation visits to Weston Gulf Coast did determine that different levels of documentation are provided by Weston labs as part of a data package or evidential file. See Section 10.2.6 of QAPP.

   1. **Recommendation:** For the subject project, we recommend one level of data package be used - Level III.

cc: G.Schupp, QAS
D.Payne, CRL
C.Tang, CRL
N.Feliciano, CRL
K.Gunter, CRL

Table 1

2PPB

DRINKING WATER/HSL MDL'S METHOD 524.2 07/30/90

	REP 1	REP 2	REP 3	REP 4	REP 5	REP 6	REP 7	REP 8	REP 9		AVG	%REC	S.D.	MDL
Dichlorodifluoromethane	2.05	1.94	2.03	1.96	1.89	1.96	1.93	1.85	1.75	ppb	1.93	96.44	0.09	0.25
Chloromethane	2.07	2.23	2.11	2.07	1.96	2.03	2.08	1.99	1.93	ppb	2.03	101.39	0.07	0.22
Vinyl Chloride	2.18	2.13	2.23	2.14	2.03	2.20	2.22	2.08	2.03	ppb	2.14	107.17	0.07	0.21
Bromomethane	2.10	2.14	2.17	2.13	2.07	2.17	2.24	2.13	2.13	ppb	2.15	107.39	0.05	0.13
Chloroethane	2.20	2.23	2.24	2.32	2.20	2.32	2.34	2.25	2.23	ppb	2.28	113.94	0.04	0.12
Trichlorofluoromethane	2.94	2.88	2.91	3.28	2.92	3.11	3.24	3.10	3.44	ppb	3.09	154.56	0.19	0.54
1,1-Dichloroethene	2.27	2.26	2.31	2.38	2.24	2.41	2.46	2.35	2.36	ppb	2.34	116.89	0.07	0.20
Carbon Disulfide	2.17	2.31	2.37	2.33	2.15	2.34	2.38	2.26	2.29	ppb	2.26	113.06	0.07	0.20
Methylene Chloride	2.93	2.03	2.19	2.34	2.22	2.67	2.59	2.56	2.59	ppb	2.46	123.17	0.26	0.75
Acetone		2.24	2.44	2.40	2.39	1.97	2.10	2.35		ppb	2.27	113.50	0.16	0.51
trans-1,2-Dichloroethene	2.24	2.27	2.22	2.33	2.28	2.43	2.40	2.40	2.42	ppb	2.36	117.94	0.06	0.23
1,1-Dichloroethane	2.15	2.19	2.29	2.31	2.25	2.33	2.42	2.33	2.45	ppb	2.30	115.11	0.09	0.27
2,2-Dichloropropane	2.34	2.30	2.25	2.29	2.05	2.40	2.48	2.25	2.23	ppb	2.29	114.39	0.11	0.33
cis-1,2-Dichloroethene	2.19	2.30	2.38	2.39	2.26	2.41	2.47	2.39	2.50	ppb	2.34	117.22	0.11	0.31
Chloroform	2.19	2.20	2.30	2.35	2.27	2.36	2.47	2.39	2.45	ppb	2.33	116.50	0.09	0.27
Bromochloromethane	2.01	2.01	2.11	2.20	2.11	2.13	2.31	2.20	2.24	ppb	2.15	107.33	0.10	0.28
2-Butanone	2.10	1.83	1.96	2.15	2.00	1.84	2.31	2.06	1.91	ppb	2.02	100.89	0.15	0.42
1,1,1-Trichloroethane	2.14	2.00	2.09	2.13	2.03	2.14	2.19	2.13	2.17	ppb	2.11	105.67	0.06	0.17
Carbon Tetrachloride	2.17	2.15	2.22	2.19	2.12	2.25	2.27	2.19	2.22	ppb	2.20	109.89	0.04	0.13
1,1-Dichloropropene	2.38	2.34	2.42	2.43	2.33	2.45	2.48	2.41	2.43	ppb	2.41	120.28	0.05	0.15
Benzene	2.22	2.18	2.26	2.26	2.19	2.27	2.36	2.30	2.34	ppb	2.26	113.22	0.06	0.17
1,2-Dichloroethane	1.94	1.89	2.01	2.12	2.03	2.06	2.19	2.07	2.16	ppb	2.05	102.72	0.10	0.28
Trichloroethene	2.16	2.19	2.25	2.28	2.23	2.32	2.38	2.36	2.34	ppb	2.34	117.11	0.22	0.65
1,2-Dichloropropane			3.88	4.60	4.39	4.56	4.82	4.62	4.69	ppb	4.51	225.43	0.28	0.89
Vinyl acetate	1.83	1.78	1.68	1.92	1.66	1.93	2.08	1.65	1.96	ppb	1.83	91.61	0.14	0.41
Bromodichloromethane	2.36	2.29	2.33	2.41	2.28	2.34	2.53	2.36	2.38	ppb	2.36	118.22	0.07	0.20
Dibromomethane	2.84	2.81	2.99	3.23	2.91	2.99	3.25	3.10	3.08	ppb	3.02	151.11	0.15	0.43
trans-1,3-Dichloropropene	1.93	1.81	1.88	1.91	1.77	1.83	2.00	1.85	1.82	ppb	1.87	93.33	0.07	0.19
Toluene	2.31	2.22	2.24	2.30	2.16	2.25	2.43	2.26	2.28	ppb	2.27	113.61	0.07	0.20
cis-1,3-Dichloropropene	2.08	2.01	2.05	2.07	1.95	2.03	2.16	2.03	1.99	ppb	2.04	102.06	0.06	0.16
1,1,2-Trichloroethane	2.03	1.95	2.03	2.18	2.00	1.98	2.23	2.03	2.06	ppb	2.05	102.72	0.09	0.25
2-Chloroethylvinylether	1.96	1.84	1.98	1.96	1.81	1.72	1.81	1.69	1.81	ppb	1.83	91.33	0.08	0.24
2-Hexanone	1.86	1.64	1.65	1.86	1.68	1.55	1.81	1.67	1.57	ppb	1.70	84.94	0.11	0.32
4-Methyl-2-pentanone	1.83	1.69	1.77	1.87	1.68	1.73	1.94	1.71	1.68	ppb	1.77	88.61	0.09	0.27
Tetrachloroethene	2.20	2.12	2.15	2.20	2.08	2.17	2.26	2.14	2.16	ppb	2.17	108.28	0.05	0.14
1,3-Dichloropropane	2.01	1.91	1.99	2.07	1.92	1.94	2.15	1.95	1.97	ppb	1.99	99.50	0.07	0.21
Dibromochloromethane	1.93	1.81	1.88	1.94	1.85	1.90	2.11	1.88	1.90	ppb	1.91	95.56	0.08	0.23
1,2-Dibromoethane	1.85	1.88	1.91	1.85	1.82	1.93	2.12	1.92	1.97	ppb	1.96	98.00	0.07	0.21
Chlorobenzene	2.20	2.13	2.16	2.21	2.09	2.16	2.34	2.16	2.21	ppb	2.18	109.22	0.07	0.19
1,1,1,2-Tetrachloroethane	2.12	2.01	2.08	2.12	1.99	2.07	2.26	2.03	2.09	ppb	2.09	104.28	0.08	0.22
Ethylbenzene	2.23	2.27	2.29	2.34	2.22	2.31	2.48	2.30	2.35	ppb	2.32	116.11	0.06	0.18
p-Xylene	2.38	2.29	2.33	2.36	2.24	2.33	2.50	2.31	2.36	ppb	2.34	117.22	0.07	0.20
m-Xylene	2.38	2.29	2.33	2.36	2.24	2.33	2.50	2.31	2.36	ppb	2.34	117.22	0.07	0.20
o-Xylene	4.79	4.52	4.53	4.73	4.45	4.58	4.95	4.57	4.74	ppb	4.65	116.17	0.14	0.41
Styrene	5.34	5.04	5.02	5.07	4.64	5.18	5.67	5.17	5.30	ppb	5.16	128.97	0.26	0.76
Bromoform	2.15	1.92	2.00	2.09	1.96	2.00	2.23	1.95	1.99	ppb	2.03	101.67	0.10	0.29
Isopropylbenzene	2.72	2.45	2.52	2.54	2.43	2.62	2.76	2.52	2.58	ppb	2.56	128.33	0.10	0.29
1,1,2,2-Tetrachloroethane	2.36	2.11	2.13	2.32	2.15	2.22	2.51	2.06	2.16	ppb	2.22	111.22	0.14	0.40
Bromobenzene	2.51	2.23	2.23	2.34	2.25	2.36	2.57	2.29	2.36	ppb	2.35	117.72	0.11	0.32
1,2,3-Trichloropropane	2.30	2.10	2.07	2.14	2.13	2.07	2.46	2.10	2.19	ppb	2.18	109.17	0.12	0.36
n-Propylbenzene	2.75	2.55	2.59	2.57	2.51	2.68	2.84	2.53	2.61	ppb	2.63	131.61	0.10	0.29
2-Chlorotoluene	2.43	2.45	2.47	2.51	2.40	2.57	2.76	2.46	2.51	ppb	2.53	126.44	0.11	0.31

Table 1 con.

4-Chlorotoluene	2.62	2.43	2.44	2.45	2.37	2.54	2.73	2.43	2.49 ppb	2.50	125.00	0.11	0.31
1,3,5-Trimethylbenzene	2.63	2.47	2.50	2.50	2.42	2.62	2.74	2.50	2.57 ppb	2.56	127.73	0.10	0.29
tert-Butylbenzene	2.65	2.46	2.50	2.51	2.43	2.60	2.73	2.49	2.54 ppb	2.55	127.23	0.09	0.26
1,2,4-Trimethylbenzene	2.68	2.46	2.48	2.45	2.42	2.54	2.75	2.47	2.55 ppb	2.54	126.83	0.10	0.30
sec-Butylbenzene	2.77	2.55	2.61	2.61	2.52	2.71	2.84	2.56	2.66 ppb	2.65	132.39	0.10	0.29
p-Isopropyltoluene	2.69	2.44	2.50	2.49	2.43	2.60	2.72	2.58	2.55 ppb	2.56	125.22	0.10	0.30
1,3-Dichlorobenzene	2.59	2.40	2.42	2.46	2.36	2.51	2.73	2.42	2.51 ppb	2.49	124.44	0.11	0.31
1,4-Dichlorobenzene	2.55	2.33	2.36	2.41	2.31	2.46	2.65	2.37	2.46 ppb	2.43	121.67	0.10	0.30
1,2-Dichlorobenzene	2.50	2.30	2.34	2.39	2.26	2.42	2.65	2.34	2.43 ppb	2.40	120.17	0.11	0.32
n-Butylbenzene	2.74	2.52	2.57	2.53	2.48	2.69	2.76	2.48	2.62 ppb	2.60	129.94	0.10	0.30
1,2-Dibromo-3-Chloropropane	2.04	1.86	1.72	1.72	1.91	1.82	2.46	1.84	1.85 ppb	1.91	95.67	0.21	0.62
1,2,4-Trichlorobenzene	2.50	2.44	2.50	2.39	2.42	2.57	2.59	2.39	2.56 ppb	2.49	124.23	0.14	0.52
Hexachlorobutadiene	2.73	2.41	2.45	2.13	2.37	2.55	2.50	2.19	2.36 ppb	2.41	120.50	0.17	0.49
Naphthalene	2.92	2.43	2.47	2.45	2.51	2.50	2.67	2.46	2.61 ppb	2.56	127.89	0.15	0.43
1,2,3-Trichlorobenzene	2.87	2.45	2.52	1.93	2.47	2.57	2.54	2.38	2.60 ppb	2.48	124.06	0.23	0.68

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REGION 5
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CHICAGO, ILLINOIS 60604

MEMORANDUM

REPLY TO ATTENTION OF: 5SCRL

DATE: SEP 07 1990

SUBJECT: Performance Evaluation Results (Metals) Corrective Actions Site Visit to Weston Gulf Coast Laboratories, University Park, Illinois for ECKO Housewares, OH RFI

FROM: Charles T. Elly, Acting Director Chuck Elly
Central Regional Laboratory

TO: William E. Muno, Chief
RCRA Enforcement Branch

ATTN: Sally Averill

On September 5, 1990, Marilyn Shannon, Chemist in the Region V Central Regional Laboratory, visited Weston - Gulf Coast Laboratories. This visit was to review deficiencies found in the Performance Evaluation Sample results of May 10 from this laboratory.

The laboratory has instituted new quality assurance and quality control procedures. The data for performance evaluation samples now are treated in the same manner as regular samples. Internal audits are being done to assure compliance with written procedures. New data review and validation procedures have been added to assure data of acceptable quality. These improvements are sufficient corrective action for the deficiencies found in the PE samples, if maintained.

Weston - Gulf Coast Laboratories is now acceptable for the analysis of metals by RCRA Method 6010 (ICP emission spectroscopy); graphite furnace atomic absorption for arsenic, selenium, lead and thallium; and cold vapor atomic absorption for mercury. We are impressed with the actions taken by Weston - Gulf Coast. The laboratory must be complimented for their positive, successful effort.

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INTRODUCTION

On September 5, 1990 another laboratory audit of Weston Gulf Coast Laboratories was conducted. This audit was to examine the areas found deficient in the analysis of the performance evaluation samples provided to the laboratory on April 8, 1990.

Weston Gulf Coast Laboratories is acceptable for metals analysis in soils and waters. The laboratory has corrected the quality control and quality assurance problems that were of primary concern. Soil digestions have improved. The technical considerations on the ICP emission spectrometer have been corrected.

DETAILS AND RECOMMENDATIONS

1. Examination of the most recent soil sample results indicated a small negative bias in the results. Discussion with a Gulf Coast employee, who had audited the digestion procedure, indicated that the volume reduction in the digestion was not as low as the procedure recommended. The EPA auditor explained that the volume at the time of hydrochloric acid addition was critical to the recovery of several major elements, especially aluminum.

RECOMMENDATION

Emphasize to the chemists preparing the soil samples that the volume reduction in the soil digestion must be to below five milliliters for good results.

2. Weston Gulf Coast has changed certain of its quality assurance and quality control procedures. A data validation reviewer has been added. Performance samples, also, now go through the same review as actual samples. Internal audit procedures have been instituted to assure that the written SOP is being followed. Review of data at the bench has been instituted. All of these are positive changes which indicate concern with quality.

3. Selenium and arsenic results were acceptable and without bias. Newly instituted internal audits are a factor in this improvement. Interpretations of the SOP were clarified to the benefit of the analysis.

4. The sulfate log book was examined and found acceptable. The flexible ruler is being used with regularity.

5. Mercury soil results were acceptable.

6. Several suggestions were made to Weston Gulf Coast during the examination of the ICP data. The most important suggestion was to use three data acquisitions instead of two for the average. Previously they used four. Three will allow the statistics generated by the computer to be useful and valid where two does not. The Interelement Check Solution seemed to show a consistent positive bias on lead and a consistent negative bias on tin. The interelement correction factors on these elements may need adjustment or there may be an uncorrected interference. Investigation is suggested.

c.c. M. Shannon, CRL
D. Payne, CRL
G. Schupp, QAS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF:

JUL 18 1990

5SCRL

MEMORANDUM

Subject: Performance Evaluation Results (Metals) for Weston Gulf Coast Laboratories, University Park, Illinois for ECKO Housewares, Ohio RFI

From: Curtis Ross, Director Chuck Elby for
Central Regional Laboratory

To: William Muno, Chief
RCRA Enforcement Branch

Attn: Sally Averill

The attached report by the Central Regional Laboratory (CRL) staff evaluates the subject laboratory using Performance Evaluation (PE) samples for metals analysis after an on-site evaluation. The laboratory's P.E. sample results and procedure were found generally acceptable for graphite furnace atomic absorption analyses and water mercury analysis by cold vapor atomic absorption. A negative bias is apparent in selenium graphite furnace determinations. This bias can and should be corrected. Unacceptable recovery is noted for mercury in the single soil sample having documented mercury values (Soil Sample 1). Soil digestion procedures need to be further investigated for mercury.

We recommend disapproval of the laboratory for ICP metals analysis (RCRA Method 6010) and further investigations for mercury in soil. The ICP emission spectroscopy determinations of metals suffer from inadequate and unacceptable quality control. Inadequate review of experimental data for ICP instrument printouts resulted in inaccurate results being reported for Soil Sample 1. This has been explained by the laboratory staff as time was not available for data review prior to submission of results to EPA to meet the requested thirty day turn-around time. Serial dilution, sample duplicate, and matrix spike audit results were not adequately reviewed for data acceptance for the two soil samples. ICP analysis procedures for 1) interelemental correction for tin, 2) vanadium wavelength measurement and 3) background corrections for manganese and silver all appear inappropriate. The ICP results for Soil Sample 2 are generally unacceptable and indicate a systematic bias of an unknown nature.

The site evaluation and P.E. Sample results indicate the laboratory provides no interelemental correction for ICP emission spectroscopy other than the common aluminum, iron, calcium, and magnesium of the Contract Laboratory Program Statement of Work Interference Check Sample. RCRA Method 6010 (Table 2 and Section 3.0) mandates other spectral and background interferences be known and corrected as appropriate. For example, an interelemental correction for arsenic on cadmium is needed for the instrumentation of the subject laboratory. The laboratory needs to understand many more interelemental corrections for soils than are presently done. The present experimental conditions for ICP emission spectroscopy are appropriate for routine water analyses. A more thorough knowledge of interelemental effects is needed for soils and wastes; this is mandated by Method 6010. The laboratory needs time to upgrade their knowledge and use of additional interelemental corrections.

We have not the time to stay with the laboratory during the next 2 - 3 months to see that the appropriate QC and analysis procedures are implemented for your project.

After this year's sampling effort for RCRA projects, we will entertain evaluation of Weston Gulf Coast Laboratories during 1991 for ICP metals analysis. If you decide to use Weston Gulf Coast Laboratories for metals analysis in 1990, we recommend a 100% level of data review by U.S.E.P.A. for metals determinations. We believe Weston Gulf Coast will eventually upgrade their ICP analyses for soils and wastes. We cannot predict this time period and the effect(s) on your project.

If you have further questions please contact David A. Payne, 886-1970, or Marilyn Shannon, 353-3594, of the Central Regional Laboratory.

cc:C. T. Elly, CRL
D. Payne, CRL
M. Shannon, CRL
V. Jones, MQAB
G. Schupp, QA, MQAB

Introduction

Pursuant to the facilities evaluation of Weston Gulf Coast Laboratories, Performance Evaluation Samples for metals were provided to the laboratory on April 8, 1990. The samples consisted of

1) Two soil samples labeled 1 and 2
2) A low level water sample labeled water 1
3) A higher but still sub ppm range water sample labeled water 2
4) A low level water sample diluted at two different levels
5) A water sample for sulfates in the upper range of the curve
6) A water sample for sulfates in the lower range of the curve

Samples in categories 1. through 4 were to be analyzed for metals using ICP emission spectroscopy, graphite furnace atomic absorption and cold vapor atomic absorption for mercury. Samples in 5 and 6 were to be analyzed for sulfate only. Gulf Coast was instructed to analyze the Performance Evaluation samples using the same procedures to be used for upcoming RCRA Facility Investigations of Region V.

Performance Evaluation Samples were provided because Weston Gulf Coast had not tested soil Performance Evaluation samples prior to the laboratory evaluation. Sample results were sent by Gulf Coast to the Central Regional Laboratory on May 10, 1990. Additional results for Soil Sample 1 were provided by Gulf Coast to the Central Regional Laboratory on June 14, 1990 because of apparent errors in all ICP results for Soil Sample 1.

I. Summary

Weston Gulf Coast Laboratories has Quality Control and Assurance procedures that are not acceptable. The laboratory is satisfactory for the analysis of sulfate. The laboratory performed well in the analysis of mid-level waters such as those done regularly in other performance evaluations. However, the performance on the soil performance samples was not good. The low level waters were acceptable. Graphite furnace atomic absorption is satisfactory with some small problems noted below.

There is evidence of lack of quality control oversight in the production of the data report. Soil Sample 1 was incorrectly analyzed on the ICP. Although the serial dilution and the duplicate had numerous flags, the error was not found before the data were sent. The explanation of the interelement correction factors chosen for tin states very clearly that calcium was used. In fact, the printout from the instrument lists aluminum as the correcting element. The values found for sulfate were not included in the package even though two samples had been sent for sulfate only. The CLP type pages listing the linear range and the IEC's were also not included.

Our impression of Weston Gulf Coast Laboratories has been that they are committed to producing a quality product. These results do not support that impression.

2. Details and Recommendations

A. Quality Control and Data Review

Soil sample 1 was incorrectly analyzed by ICP. It appears the cup containing the sample was allowed to become empty and the last analysis on the sample was effectively zero. This "zero" value was averaged with three other values by the instrument's data system to give an erroneous average. This sample had all the digestion and dilution QC. The duplicate and serial dilution, particularly, had an unusual number of flags. All levels of review failed to find and correct the error before the data were sent to Region V EPA.

Soil sample 1 shows an interesting pattern in the serial dilution of cadmium. The analysis record shows values of .0002, .0027, .0044, and .0127 in sequence. There are several possible explanations for this pattern. Not enough aspiration time is one; another is a clogged nebulizer. This record was examined because the serial dilution recovery was 46%. The 1/5 dilution of the sample left a value that should have been accurately detected if the IDL is accurate.

The Interelement Correction for tin was reported in a short narrative as coming from Calcium. In fact the instrument is using aluminum for its interelement corrections according to the instrument printout.

RECOMMENDATION

Review data more thoroughly when the number of flags on a number of audits increases. Examine the data review procedures. Use variations in the audits to track and eliminate problems. Have someone familiar with the instrument review any narratives concerning the instrument.

B. Atomic Absorption

There is a bias in the selenium and the arsenic data. Selenium appears to be about 15-25% low on all the samples reported. value/true value - 86/100, 7.5/10, 7.1/10.9, 39.8/50.2, 2.9/4.63 For arsenic the bias is less, about 10 to 15%, and does not appear on the midlevel water. See the attached data summaries for arsenic values and true values.

RECOMMENDATION

Investigate and correct the source(s) of the bias.

C. Audit Practices

Soil sample 2 demonstrated an unusual practice. The sample was analyzed on a different standardization than the duplicate and a designated matrix spike (which wasn't spiked). The lack of added analyte in the spike allowed it to be used as a duplicate. The calculations in Attachment 1 show that the variation between duplicates drops dramatically when the same standardization is used. The duplicate is used in review to estimate the precision of the digestion. The apparent variation of the digestion would be reduced by eliminating the instrument variation. The data would demonstrate its true precision if the analysis were done in the more usual manner.

RECOMMENDATION

Allow the audits to demonstrate the precision of the digestion by requiring the audits be analyzed on the same standardization as the sample.

D. ICP

The provided scans indicate some problems. On the vanadium scan the cursor indicates the major peak is at -23. This is not the peak that the instrument is taking the data from. The instrument is taking the data from the small minor peak in the center of the scan. This is probably causing reduced sensitivity. The minor peak has less interference but an interference is still indicated in the small rise to the negative side of the center peak.

Two scans, manganese and silver, have small circles around the background correction points with arrows indicating that the point should be moved because it is riding on part of an interference peak. If the point was moved, the corrected printout should have been sent. The information sent does not make clear what the current situation is. Have the points been changed or not?

Although Interference Check Solution A is useful, it is only a gross check of interferences. The statement of work makes clear that the interfering elements listed are not the only ones. Other elements should be examined. The narrative on the tin interference read as if the elements in solution A were the only ones necessary. This is definitely not the case. Although considering the gross error made in the narrative, perhaps no conclusions should be drawn from it about laboratory practice.

The found interference of calcium on strontium is probably due to strontium contamination of the calcium standard.

RECOMMENDATION

Analyze other elements such as nickel, arsenic, copper and chromium for possible effects on the other channels. Examine the background correction points and make sure they have been changed to a better position. Examine the vanadium peak and determine if

it is offset or if the minor peak is the one that was wanted. Examine vanadium for interferences.

E. Other Comments on PE samples

Copper and chromium are out of the 95% limits on two of the performance samples. This may indicate a systematic problem with these two elements. Copper does not have any correction factors. This may be a possible source of error. Corrections on the ICP which may be ignored in waters become of great importance in soils with higher levels of interfering elements.

The low level water show some contamination from copper, zinc and iron during sample digestion. These are common contaminants and must be controlled in all laboratories.

RECOMMENDATION

Investigate the errors and correct any systematic problems found.

WESTON GULF COAST PE SAMPLES 6/14

The soil sample was analyzed on a different standardization than the duplicate and the designated spike. This spike did not have added analytes. In this instance it is used as a duplicate to demonstrate the problems caused by analyzing the duplicate and sample on different standardizations.

	SOIL 2			RELATIVE PERCENT DIFFERENCE		
	SX	DUP	SPK	SX-DUP	SX-SP	DUP-SP
AL	4798	4639	4938	3	-3	-6
BA	1276	1501	1147	-16	11	27
BE	1	1	1	13	13	0
CD	98	85	90	14	9	-6
CA	45486	38596	40577	16	11	-5
CR	6989	5990	6282	15	11	-5
CO	6	5	6	9	-4	-13
CU	723	617	653	16	10	-6
FE	24628	22011	23587	11	4	-7
PB	1231	1098	1161	11	6	-6
MG	1764	1564	1652	12	7	-5
MN	234	202	215	15	8	-6
NI	433	371	391	15	10	-5
K	2184	1837	1935	17	12	-5
AG	2	2	2	31	26	-5
NA	72269	61058	63832	17	12	-4
V	1	2	2	-30	-35	-5
ZN	10690	9211	9840	15	8	-7

RESULTS FOR SOIL 1

RESULTS NOT CORRECTED FOR ERROR IN ANALYSIS
CONCENTRATION UNITS ARE IN MG/KG

ELEMENT	MEASURE	MEAN	95% RANGE		%RECOVERY	
ICP						
Al	7990	12179	6910	17400	65.60%	
Sb	4.1	11.1	12	27	36.94%	OUT OF RANGE
Ba	115	163	137	189	70.55%	OUT OF RANGE
Be	6.8	7.75	6.6	8.9	87.74%	
Cd	6.3	8.78	6.5	11	71.75%	OUT OF RANGE
Ca	32000	38661	33901	43400	82.77%	OUT OF RANGE
Cr	27.8	43.6	34	53	63.76%	OUT OF RANGE
Co	32.7	40.8	35	47	80.15%	OUT OF RANGE
Cu	81	109	92	127	74.31%	OUT OF RANGE
Fe	11600	17471	14000	21000	66.40%	OUT OF RANGE
Pb	72.3	93.7	78	110	77.16%	OUT OF RANGE
Mg	16700	19514	16600	22400	85.58%	
Mn	1430	1859	1560	2150	76.92%	OUT OF RANGE
Ni	24.6	39.2	28	50	62.76%	OUT OF RANGE
K	1100	1384	1000	2190	79.48%	
Ag	10.6	15.4	12	18	68.83%	OUT OF RANGE
Na	180	0				NONE PRESENT
V	26.3	39.1	28	50	67.26%	OUT OF RANGE
Zn	177	270	214	326	65.56%	OUT OF RANGE
GFAA						
As	11.2	12.4	8	17	90.32%	
Se	2.9	4.63	1.5	7.7	62.63%	LOW BIAS
Tl	14.3	10	6.8	13	143.00%	OUT OF RANGE
CV						
Hg	4.3	6.82	4.8	8.8	63.05%	OUT OF RANGE

D

RESULTS FOR SOIL 1

RESULTS CORRECTED FOR ERROR IN ANALYSIS
CONCENTRATION UNITS ARE IN MG/KG

ELEMENT	MEASURE	MEAN	95% RANGE		%RECOVERY	
ICP						
Al	10635	12179	6910	17400	87.32%	
Sb	5.9	11.1	12	27	53.15%	OUT OF RANGE
Ba	152	163	137	189	93.25%	
Be	8.7	7.75	6.6	8.9	112.26%	
Cd	8.1	8.78	6.5	11	92.26%	
Ca	42460	38661	33901	43400	109.83%	
Cr	37.7	43.6	34	53	86.47%	
Co	43.4	40.8	35	47	106.37%	
Cu	107.5	109	92	127	98.62%	
Fe	15400	17471	14000	21000	88.15%	
Pb	95.8	93.7	78	110	102.24%	
Mg	22160	19514	16600	22400	113.56%	
Mn	1890	1859	1560	2150	101.67%	
Ni	32.3	39.2	28	50	82.40%	
K	1456	1384	1000	2190	105.20%	
Ag	14.6	15.4	12	18	94.81%	
Na	240	0				NONE PRESENT
V	34.7	39.1	28	50	88.75%	
Zn	236.1	270	214	326	87.44%	
GFAA						
As	11.2	12.4	8	17	90.32%	-
Se	2.9	4.63	1.5	7.7	62.63%	LOW BIAS
Tl	14.3	10	6.8	13	143.00%	OUT OF RANGE
CV						
Hg	4.3	6.82	4.8	8.8	63.05%	OUT OF RANGE

RESULTS FOR SOIL 2

CONCENTRATION UNITS ARE IN MG/KG

ELEMENT	REPORTED	MEAN	95% RANGE		% RECOVERY	
ICP						
Al	4800	6885	2300	11500	69.72%	within 95% range
Cd	97.6	119	104	134	82.02%	OUT OF RANGE
Ca	45500	51816	39100	64600	87.81%	
Cr	6990	9212	8300	10100	75.88%	OUT OF RANGE
Cu	724	884	750	1020	81.90%	OUT OF RANGE
Fe	24600	36243	31200	41300	67.88%	OUT OF RANGE
Pb	1230	1282	1180	1390	95.94%	
Mg	1760	2239	1750	2730	78.61%	lower edge of range
Mn	235	311	263	360	75.56%	OUT OF RANGE
Ni	433	512	444	581	84.57%	OUT OF RANGE
K	2180	2455	1570	3340	88.80%	
Ag	2.3	0	0		ERR	
Na	72300	83263	77100	89400	86.83%	OUT OF RANGE
Zn	10700	13810	12200	15400	77.48%	OUT OF RANGE

RESULTS FOR WATER 1

CONCENTRATION UNITS IN UG/L

ELEMENT	MEASURED	TRUE	95% RANGE FROM	TO	%DEV	
ICP						
Al	178	107	88.9	182	166.36%	within 95% range
Be	26.2	29	24.5	34.1	90.34%	
Cd	9.4	9.1	6.7	10.8	103.30%	
Cr	10.4	6.8	4.7	9.2	152.94%	REASONABLE. NEAR DL
Co	41.6	42.6	36.1	48.5	97.65%	
Cu	16.9	8.9	6.1	13.1	189.89%	REASONABLE. NEAR DL
Fe	51.2	20.9	12.2	32.2	244.98%	OUT OF RANGE
Mn	12.9	12.9	8.2	17.2	100.00%	
Ni	17.7	17.1	11.5	23	103.51%	
V	118	129	99.9	160	91.47%	
Zn	16	9.8	3.6	17.8	163.27%	within 95% range
GFAA						
As	25.8	25.8	19.5	33.9	100.00%	
Pb	42	42.7	33.7	53.72	98.36%	
Se	7.1	10.9	6.5	13.9	65.14%	LOW BIAS
COLD VAPOR AA						
Hg	0.86	0.67	0.3	1.1	128.36%	within 95% range

RESULTS FOR WATER 2

CONCENTRATION UNITS ARE IN UG/L

ELEMENT	MEASURED	MEAN	95% RANGE FROM	TO	%DEV
ICP					
Al	756	729	618	872	103.70%
Be	220	235	207	257	93.62%
Cd	39	39	31	42.8	100.00%
Cr	257	261	209	306	98.47%
Co	250	261	229	289	95.79%
Cu	314	339	302	369	92.63%
Fe	791	797	695	882	99.25%
Pb	432	435	369	492	99.31%
Mn	322	348	304	387	92.53%
Ni	194	207	177	235	93.72%
V	777	846	726	10002	91.84%
Zn	397	418	381	449	94.98%
GFAA					
As	213	235	182	286	90.64%
Se	39.8	50.2	31.5	62.4	79.28%
CVAA					
Hg	8.6	8.73	5.9	11.1	98.51%

RESULTS FOR TWO DILUTIONS OF WATER 3
CONCENTRATION UNITS ARE IN UG/L

No Ranges Available

ELEMENT	MEASURED	MEAN	%RECOVERY	
ICP				
Sb	101	100	101.00%	
Be	96.3	100	96.30%	
Cd	101	100	101.00%	
Ca	171	100	171.00%	INSENSITIVE CHANNEL
Cr	108	100	108.00%	
Co	104	100	104.00%	
Cu	105	100	105.00%	
Fe	139	100	139.00%	CONTAMINATION ?
Mg	136	100	136.00%	INSENSITIVE CHANNEL
Mn	97.2	100	97.20%	
Ni	101	100	101.00%	
V	97.5	100	97.50%	
Zn	220	100	220.00%	CONTAMINATION ?
GFAA				
As	77	100	77.00%	LOW BIAS
Pb	110	100	110.00%	
Se	86	100	86.00%	CONSISTENT BIAS
Tl	91	100	91.00%	

WATER 3. 1 ML

ICP				
Sb	17.6	10	176.00%	REASONABLE
Be	10.2	10	102.00%	
Cd	9.6	10	96.00%	
Ca	119	10	1190.00%	INSENSITIVE CHANNEL
Cr	13	10	130.00%	
Co	8.7	10	87.00%	
Cu	19	10	190.00%	REASONABLE
Fe	71.1	10	711.00%	REASONABLE
Mg	73.9	10	739.00%	REASONABLE
Mn	10.7	10	107.00%	
Ni	13.9	10	139.00%	REASONABLE
V	11.2	10	112.00%	
Zn	15.8	10	158.00%	REASONABLE

WESTON
MANAGERS DESIGNERS/CONSULTANTS
WESTON WAY
WEST CHESTER, PA 19380
PHONE: 215-692-3030
TELEX: 83-5348

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U.S. EPA, REGION V

10 November 1988

Mr. Timothy McGuinness
Manager, Environmental Engineering
American Home Products
685 Third Avenue
New York, NY 10017-4085 W. O. Number 2994-02-03

RE: Pumping Test Technical Memorandum

Dear Mr. McGuinness:

Enclosed you will find the technical memorandum WESTON is required to submit as part of the EKCO Housewares Quality Assurance Management Plan. This is a continuation of our work at the Massillon Facility.

If there are any questions, please contact me at (215) 344-3643.

Very truly yours,

ROY F. WESTON, INC.

Harold G. Byer

Harold G. Byer
Project Manager

HGB/lal

enclosure

cc: Dr. M. N. Bhatla
Mr. W. Nied - EPA5
Mr. M. Eggert - OEPA

DRAFT
PUMP TEST TECHNICAL MEMORANDUM
FOR EKCO HOUSEWARES INC.
MASSILLON, OHIO

The EKCO Housewares, Inc. facility occupies approximately 13 acres on 3rd Street N.W. in the town of Massillon, Stark County, Ohio (see Figure 1 and 2). The site directly overlies glacial drift and outwash deposits with thickness ranging from 32 feet in the Southwest corner of the property to 73 feet in the Northeast portion of the property. Underlying these glacial deposits are sedimentary rocks consisting of sandstone and shale. The existing on-site monitoring wells are completed in both the sandstone and in the unconsolidated glacial deposits. The depth of groundwater ranges from 8 to 26 feet below ground surface for the wells installed in the unconsolidated materials while the groundwater levels in the wells installed in the bedrock range from 22 to 52 feet below ground surface.

Groundwater beneath the EKCO Housewares facility contains organic compounds listed on the EPA's Hazardous Substance List (HSL), including trichloroethylene (TCE), 1,1,1-trichloroethane (TCA), vinyl chloride and dichloroethylene. A groundwater assessment is being performed in order to assess contaminant extent, migration rates and directions. WESTON will perform a recovery/drawdown aquifer test to determine important aquifer properties such as transmissivity and storativity as well as to determine

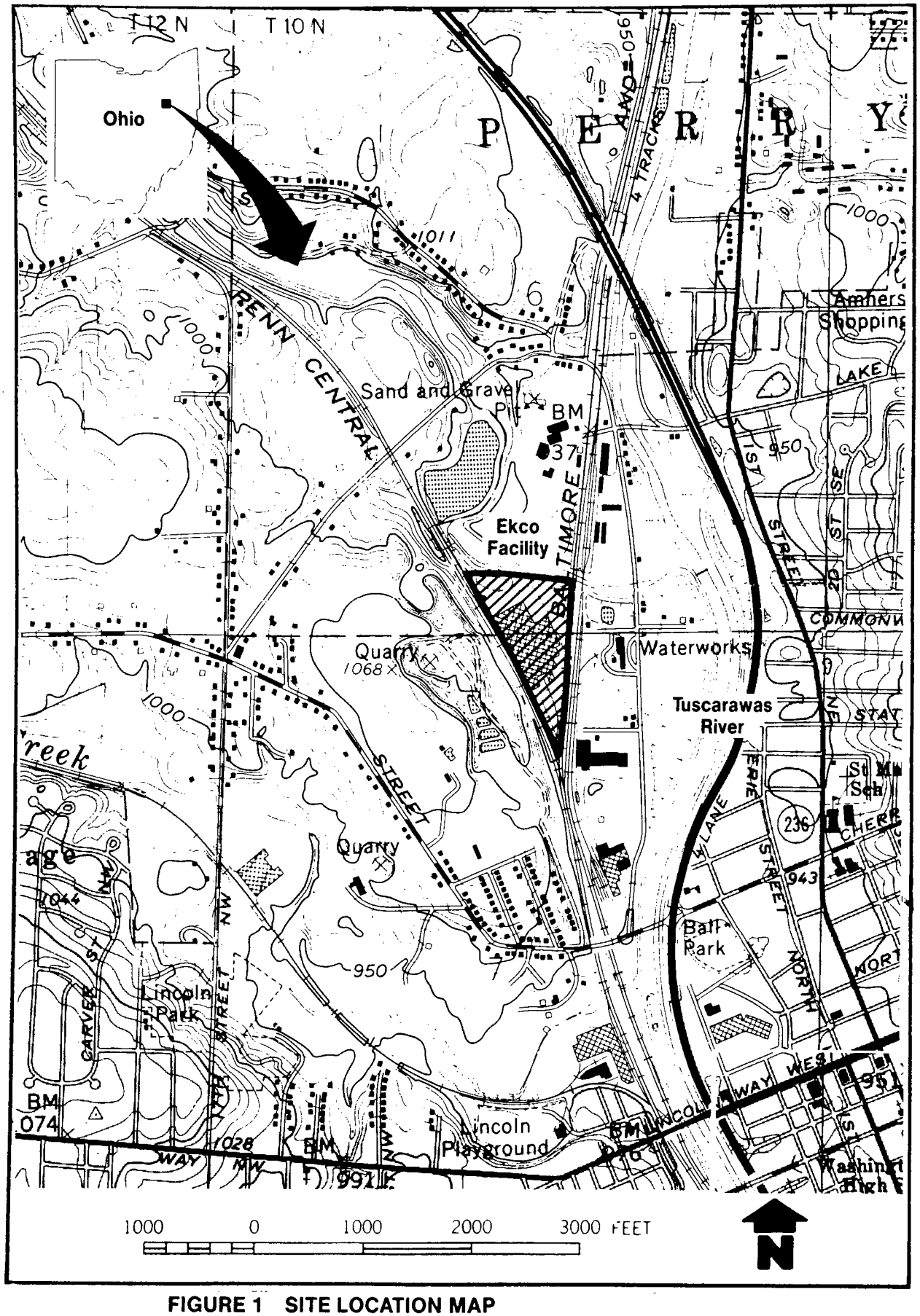

FIGURE 1 SITE LOCATION MAP
EKCO HOUSEWARES, INC., MASSILLON, OHIO

qualitatively whether a hydrologic connection exists between the bedrock aquifer and the overlying unconsolidated sediments.

The test will be performed by shutting off and then restarting the production well (W-10) and monitoring the respective recovery and drawdown rates in the following seven on-site observation wells; bedrock observation wells, R-1, R-2, R-3, and W-1; two shallow observation wells D-4-30 and L-1; and one interface observation well I-2. The recovery and drawdown rates will also be monitored in the production well, W-10. The locations of these wells are presented in Figure 2.

Water levels in the wells listed above will be measured with electric transducers and recorded by two SE-200 data loggers. Water levels will be monitored for 24 hours prior to the test. After pumping has been discontinued in W-10, the water levels in the wells listed above will be monitored until the water levels have reached near static conditions, or for 72 hours, whichever comes first. It is not expected that the aquifer will reach a prestressed condition in 72 hours (72 hours is a restriction imposed by plant production requirements), but a time recovery curve will allow calculation of storativity and transmissivity. After these conditions have been met, pumping will resume in W-10 and the drawdowns will be monitored until the water levels have

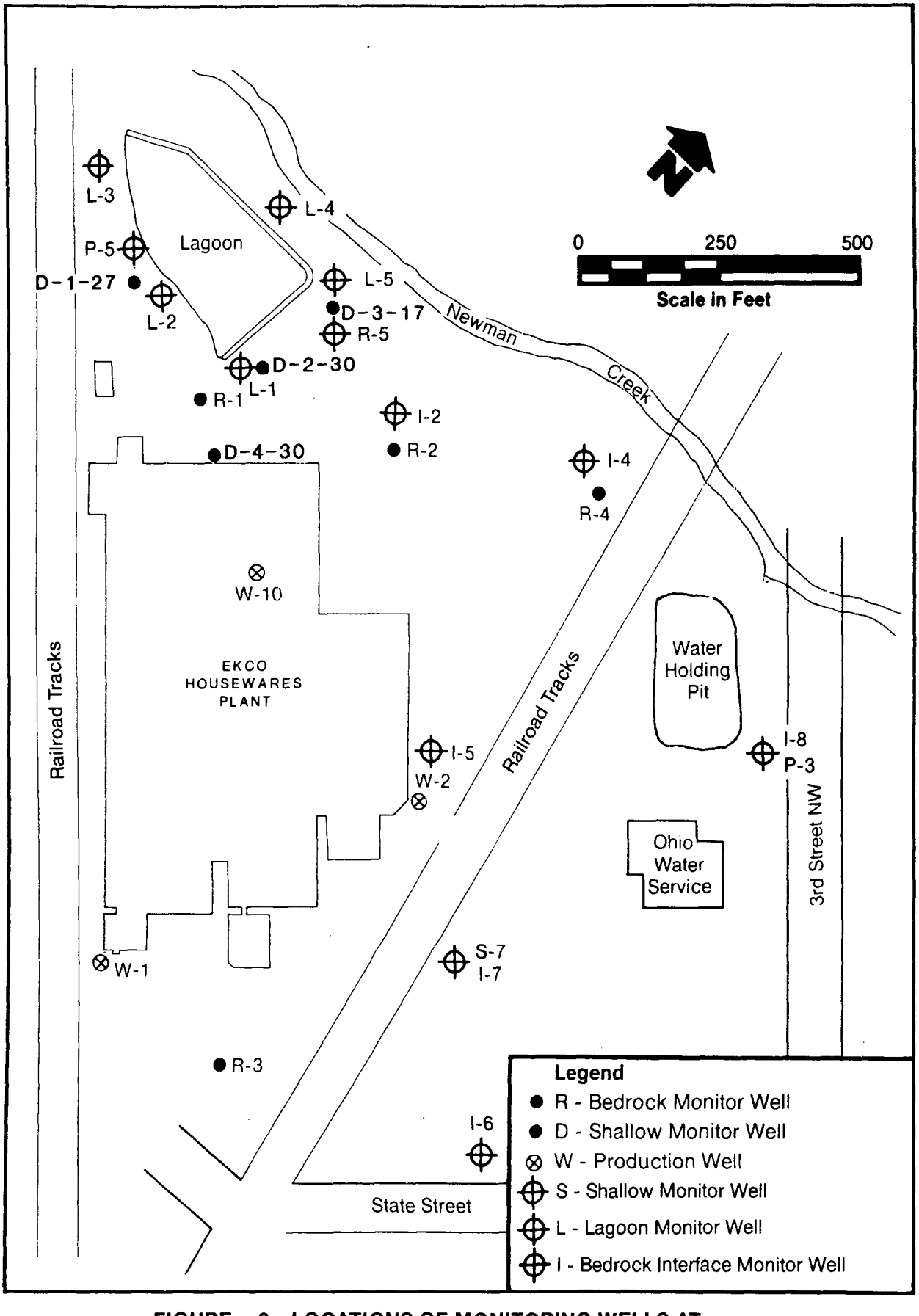

FIGURE 2 LOCATIONS OF MONITORING WELLS AT EKCO HOUSEWARES, INC., MASSILLON, OHIO

returned to near pre-test levels or for 48 hours, whichever comes first.

The specific protocol for the recovery/drawdown test is as follows:

1. Open observation well caps and monitor downhole and ambient air quality with an HNU. Record information in field notebook.

2. Measure and record depth to water from the top of the casing in all on-site wells (see Figure 2 for locations). Record static pumping level (pre-test) in the field notebook.

3. Protect the transducer cables by taping the casing of the observation wells and pumping well with duct tape to cover the top edge.

4. Clean each transducer by sequentially rinsing the probe and attached line with tap water, Alconox in tap water, and distilled water.

5. Lower the transducers into the selected observation wells (R-1, R-2, R-3, W-1, D-4-30, L-1, and I-2) and pumping well (W-10) to a depth of approximately 10 feet

below the top of the static pumping level, calibrate them according to manufacturer's directions, and secure the transducer cable with duct tape.

6. Connect the transducers to the SE-200 data loggers. The data loggers will automatically record water level fluctuations in each of the monitor wells at selected time intervals.

7. Activate the data loggers approximately 24 hours before the start of the recovery test to establish background water level conditions. Record the water levels approximately every 30 minutes. The pumping rates in W-10 and W-1 will be periodically monitored during this time. Both facility production wells are pumped constantly at a steady rate. This will be confirmed by checks every 2-3 hrs.

8. The pump in W-10 will be turned off and water level measurements at the pumping well and observation wells will be taken at the following preselected time intervals:

Time Since Pumping Started (or Stopped) in Minutes	Time Interval Between Measurements in Minutes
0-10	.01-.5
10-15	1
15-60	5
60-termination of test	30

9. Since W-1 will not be turned off, its pumping rate will be monitored periodically throughout the test.

10. Water levels will be measured with a water level probe during the test every 12 hours in the following wells not monitored by the SE-200 data logger: P-5, L-2, D-2-30, R-5, D-3-17, L-5, R-4, I-4, I-5, W-2, I-7, S-7. Record information on the attached information sheet (Table 1).

11. Continue the test until the water levels have returned to near static conditions (three or more consecutive readings indicate same water levels) or up to 72 hours, whichever comes first. Turn the pump at W-10 on and pump at same rate as before the test.

12. Water level drawdown will be measured following the same preselected measurement intervals as during the recovery period. Drawdown will be monitored for a period of 48 hours or until water levels have returned to near pretest levels, whichever comes first.

13. After the test but before the data loggers are stopped, a hard copy of the data readings will be made on the field printer.

14. The SE-200 data loggers will be post-calibrated according to manufacturer's directions to ensure accuracy of the data.

15. The transducers will then be removed from the wells and decontaminated.

16. The well caps will be placed over the casing and locked.

17. Flow rate records of Ohio Water Service wells 1, 2, and 3 for the test period will be obtained to determine if they are affecting groundwater levels at the site from Dennis Roll (Phone No. 216-833-4156). The Ohio Water Service will be notified prior to the test to confirm

that pumping rates/time pumps were turned on will be documented during the test.

18. All data, including water level and time measurements in the pumping and observation wells, pumping rate, and distance between the pumping well and observation wells, will be evaluated using appropriate equations to determine hydraulic characteristics of the aquifer system.

Transmissivity and storativity values will be calculated under the two conditions observed at the site (recovery and drawdown) and the results will be compared. The first set of calculations will be based on the assumption that the long term pumping of the production well establishes equilibrium flow conditions. Under this condition an evaluation procedure developed by Theim is appropriate for calculating aquifer parameters. The success of this approach depends on two unknowns which will be addressed in the first part of the proposed test. These are the location of static or non-pumping water levels and the relationship between monitor wells and the pumping well. The static water level is necessary to calculate equilibrium drawdown and the Theim solution requires drawdown values in two monitor wells in order to calculate aquifer parameters. Assuming that all the necessary data are available from the pumping test, the Theim solution will provide values for transmissivity and storativity.

These values will be compared with values derived from data collected during the second part of the test. Drawdown data collected following the restart of the pumping well is expected to be applicable to the Theim solution method. The critical issue regarding this step is that the recovery of water levels during the non-pumping period must be nearly complete. The assumptions included in the Theim solution require a nearly flat water table surface prior to initiation of any pumping stresses. Provided that recovery is complete, the drawdown response in the pumping well and associated monitor wells will be used to calculate transmissivity and storativity values.

The values estimated under both conditions outlined above will be qualitatively compared to evaluate the relative success of the two different approaches. This will be used to provide interpretation regarding the quality or accuracy of the calculated values. These values will then be used as appropriate such as, to calibrate flow models that may be developed in the corrective measures study.

Measured responses of wells not in the bedrock aquifer will serve to provide a qualitative measurement of interconnection and will also be used to calibrate flow models that may later be developed for the system which includes the shallow water table in the overburden around the plant, the bedrock aquifer and the unconsolidated valley aquifer.

Table 1 - Depth to Water (measured from top of casing) Information Sheet

Well No.	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	Date: Time/Depth to Water	
P-5													
L-2													
D-2-30													
R-5													
D-3-17													
L-5													
R-4													
I-4													
I-5													
W-2													
I-7													
S-7													

Quality Assurance Management Plan
for
EKCO Housewares, Inc.
Massillon, Ohio

September 1988

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MANAGERS DESIGNERS/CONSULTANTS

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QUALITY ASSURANCE MANAGEMENT PLAN

EKCO Housewares, Inc.
Massillon, Ohio

M.N. Bhatla, Ph.D., P.E.
Project Director

Harold G. Byer, Jr.
Project Manager

Richard Johnson, P.G.
Section Manager, Geoscience

Augustus Mergenthaler
Project Engineer

Prepared by:

Roy F. Weston, Inc.
(A Business Trust)

Weston Way
West Chester, Pennsylvania 19380

W.O. No. 2994-02-01

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SECTION 1

PROJECT DESCRIPTION

This Quality Assurance Management Plan (QAMP) has been prepared to detail the procedures for execution of a groundwater quality assessment (GWQA) as outlined in the "Groundwater Quality Assessment Plan for EKCO Housewares, Inc. Massillon, Ohio." The data generated from the groundwater quality assessment will be incorporated with existing and future data. The scope of the GWQA includes monitor well installation, sampling of new and existing monitor and production wells, aquifer testing, a soil gas survey, subsurface soil sampling, sludge sampling, and collection of stream and sediment samples.

It should be noted that the work described in the Groundwater Quality Assessment Plan and the QA/QC procedures proposed in this document exceed the requirements of a groundwater quality assessment specified by the RCRA program. The additional requirements specified in these documents include the investigation of the entire site (i.e., other sources) with some analytical methods and data documentation and validation procedures utilized from other environmental programs such as Superfund and Safe Drinking Water Programs (i.e., CLP data validation packages for critical data points and the lower analytical quantification limits for groundwater quality at specific monitor wells). The work described in this document will be equivalent to or exceed the requirements specified by the RCRA program.

The QAMP contains four basic elements: the Sampling and Analysis Plan, the Quality Assurance Project Plan (QAPP), the Data Management Plan, and the Site Health and Safety Plan. The objectives of these plans are to produce properly documented field and laboratory data of appropriate quality and to ensure the health and safety of field personnel during the field effort.

This document will be used by WESTON project technical personnel to execute the GWQA and will provide a quality assurance guideline for monitoring the project.

1.1 SITE BACKGROUND

1.1.1 General

The EKCO facility occupies approximately 13 acres on 3rd Street NW in the town of Massillon, Stark County, Ohio (see Figure 1-1). The area surrounding the site is largely urban and industrial. Land use to the northwest is more rural with a

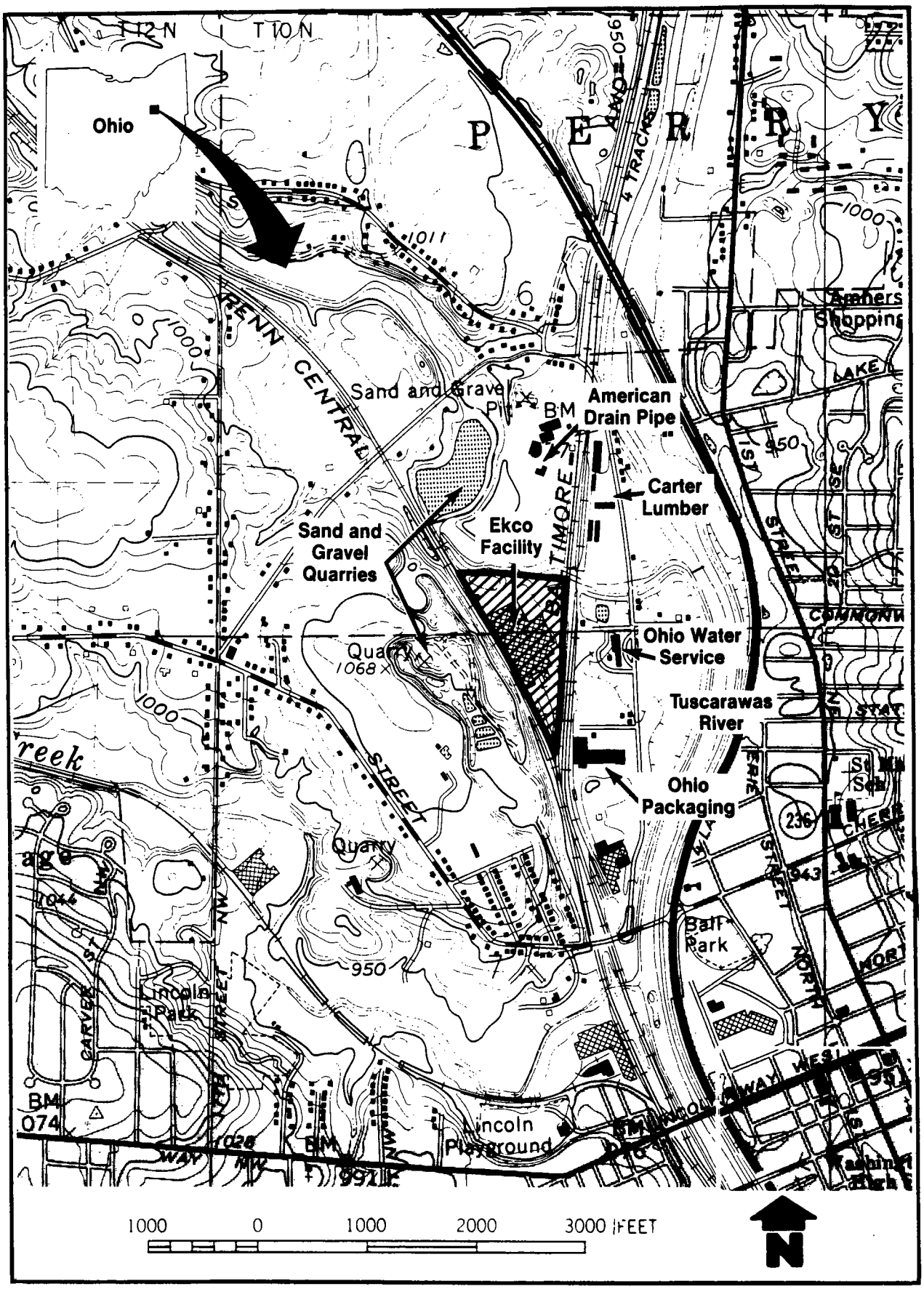

FIGURE 1-1 SITE LOCATION MAP
EKCO HOUSEWARES, INC., MASSILLON, OHIO
(Ref. 7.5 Minute Massillon Quad, Ohio, 1978)

larger proportion of open space. The EKCO property is triangular in shape and lies an estimated 1,500 feet west of the Tuscarawas River. The facility is bordered to the north by Newman Creek. The Penn Central and the Baltimore and Ohio railroads border the EKCO property to the west and east, respectively.

Since 1978, the EKCO facility has been manufacturing pressed and coated nonstick bakeware. Prior to 1978, plant activities included at one time or another the manufacture of 90 mm and 105 mm shell casings for military use, and aluminum, stainless steel, copper-plated, and porcelain/Teflon-coated cookware. Some waste products associated with plant activities were discharged into a surface impoundment operated at the facility from approximately 1953 to mid-1984. These waste products included deionizers, washings, and waste material from the manufacture of porcelain/Teflon-coated aluminum cookware that may have contained cadmium, cobalt, lead, toluene, and selenium, along with aluminum frit and alkaline washer fluids. Plating operations may have led to discharges of copper and nickel plating solutions, as well as chromic and phosphoric acid solutions from associated pickling operations. In addition, TCE and 1,1,1-TCA industrial solvents may have been discharged in degreaser filter water from the plant vapor degreasing operations.

In March 1984, when EKCO applied for a renewal of a NPDES permit for the surface impoundment, the law required the analysis of onsite production well water for volatile organic compounds (VOAs). The analysis indicated the presence of 1,1,1-trichloroethane (TCA) and trichloroethylene (TCE), which have been used at the plant to clean the bakeware prior to plating.

The discovery of TCA and TCE in the groundwater beneath the EKCO plant initiated a number of activities to investigate the problem. These activities included decommissioning the surface impoundment, drilling numerous soil borings, and installing piezometer and groundwater monitor wells. (see Figure 1-2 for the locations of onsite wells.) Soil analyses indicated the presence of VOAs and elevated levels of cadmium, chromium, and lead at some of the sample locations. Water samples collected from the onsite wells revealed varying levels of VOAs in all but one onsite well. The presence of VOAs in onsite wells was confirmed by a WESTON September 1987 production and monitor well baseline sampling assessment for Target Compound List constituents at the EKCO site. Table 1-1 summarizes the constituents detected from the WESTON September 1987 assessment and previous onsite assessments.

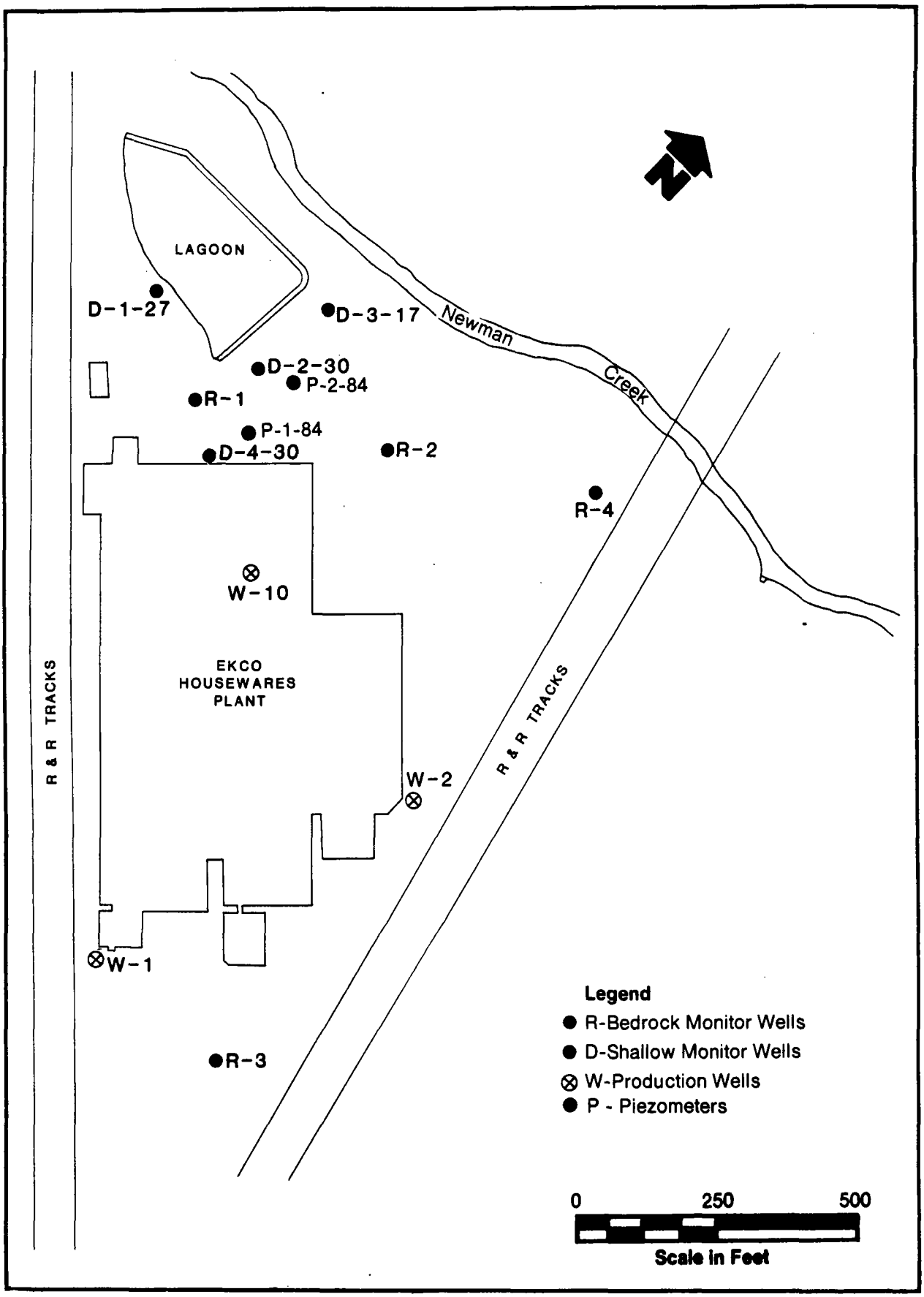

FIGURE 1-2 LOCATION OF EXISTING SITE WELLS
EKCO HOUSEWARES, INC., MASSILLON, OHIO

Table 1-1

Contaminants of Concern

Organic (detected in groundwater and/or surface soils and/or lagoon sludges/subsoils)

- Trichloroethylene (TCE)
- Trichloroethane (TCA)
- Dichloroethylene (DCE)
- Dichloroethane (DCA)
- Dichlorobenzene
- Vinyl Chloride
- 2-Butanone
- Acetone
- Carbon Tetrachloride
- Chloroform
- Methylene Chloride
- Chloromethane

Inorganic (detected in surface soils and lagoon sludges/subsoils in elevated levels)

- Cadmium (total)
- Chromium (total)
- Lead (total)

Since early 1985, EKCO, with approval from Ohio EPA (OEPA), has conducted a groundwater recovery program that includes continual pumping of groundwater from two production wells and treatment of that water in an air stripper. Discharge is ultimately to Newman Creek under a NPDES permit. OEPA outlined the reporting requirements for production well monitoring, air stripper emissions monitoring, monitor well sampling, water level monitoring, and city well sampling.

In July 1987, Roy F. Weston, Inc. (WESTON) was contracted to develop a closure program for the surface impoundment and to develop a groundwater quality assessment program (GWQAP) for the entire EKCO facility.

1.1.2 Geology

The EKCO Housewares plant directly overlies glacial outwash deposits interbedded with fine sand and gravel. These unconsolidated materials appear to thicken to the northeast, with thicknesses ranging from 24 feet near the southwest corner of the plant to 92 feet at well R-4. Thick and highly permeable sand and gravel outwash deposits comprising a deep buried valley are present immediately east of the site.

The bedrock beneath the site consists of interbedded sandstone and shale belonging to the Pottsville group of Pennsylvanian age. The thickness of this formation is reported to be approximately 255 feet (Morningstar, 1922)*. Groundwater movement does take place in the sandstone and shale units through its secondary joints and fractures.

1.1.3 Hydrogeology and Groundwater Use

The deep buried valley deposits just east of the site and the Pottsville sandstone are the principal aquifers utilized in the Massillon area. Because of the predominance of clay in the glacial outwash deposits that directly underlie and surround the EKCO facility, water wells are often drilled through these deposits to the underlying rock. Within a 1-mile radius of the site, approximately 50 domestic and five commercial wells (including site production wells W-1, W-2, and W-10) are completed in the Pottsville sandstone, and approximately six municipal wells tap the highly permeable sand and gravel deep buried valley deposits. No information is available on the average depth of the domestic wells, but depths of the commercial and municipal wells average approximately 225 and 150 feet, respectively.

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*Morningstar, H., 1922. Pottsville Fauna of Ohio. Ohio Division of Geological Survey, Fourth Series, Bulletin 25.

Although the literature has reported groundwater yields from individual wells installed in the Pottsville sandstone of only 25 to 100 gallons per minute, the two onsite production wells collectively withdraw over 400 gallons per minute. Yields of over 2,000 gallons per minute have been obtained from the local municipal wells completed in the deep buried valley deposits located just east and northeast of the site.

The depth to groundwater ranges from 8 to 26 feet below ground surface for the onsite wells installed in the glacial outwash deposits. The groundwater level in the onsite wells installed in the Pottsville sandstone ranges from 22 to 52 feet below ground surface. Adjusting for elevation, this represents a vertical head difference of 15 to 25 feet between the overburden and bedrock. The groundwater flow direction in the shallower water table zone appears to be to the southeast, parallel to Newman Creek, and towards the Tuscarawas River. The regional gradient in the bedrock aquifer is obscured due to the groundwater withdrawal from onsite production wells W-1 and W-10, thus causing a cone of depression at the property center.

1.2 PROJECT OBJECTIVES

The objectives of the GWQA are as follows:

- To define groundwater flow direction and to identify vertical and lateral extent of groundwater contamination.
- To define the depth and extent of soil contamination and its impact on groundwater quality.
- To identify other sources (present or past) of onsite contaminants to groundwater.
- To evaluate the effectiveness of the groundwater recovery and air stripping activities relating to removal of organics in the soils and groundwater.
- To establish a compliance groundwater monitoring program for the lagoon closure.

The QAMP is intended to address the procedures for each field activity necessary to accomplish the above objectives.

1.3 SCOPE OF WORK

The following scope of work has been developed for completion of the GWQA Plan for the site and includes:

- The placement of monitor wells beyond the lateral and vertical extent of known groundwater contamination.

- The installation of monitor wells in the shallow water-bearing zone around the abandoned surface impoundment.
- The sampling of monitor and production wells.
- A recovery/drawdown pump test to determine important aquifer properties.
- A soil gas survey followed by a subsurface soil sampling program to assess potential sources of contamination.
- The direct sampling of the sludge and subsurface soils at specific depth intervals beneath the impoundment.
- The sampling of surface water and stream sediments in Newman Creek.

1.3.1 Monitor Well Installation

Eight (8) groundwater monitor wells were installed to characterize the stratigraphy of the water-bearing zone(s), to determine the depth to bedrock, to assess the hydrologic interconnection between the unconsolidated sand, gravel, and clay aquifer and the Pottsville sandstone, and to identify the vertical and lateral extent of groundwater contamination.

1.3.2 Surface Impoundment Monitor Well Installation

In order to complete the surface impoundment monitoring network as required by RCRA Part 265 Subpart F, five shallow downgradient monitor wells were installed adjacent to the surface impoundment. One of these wells will be located between the surface impoundment and Newman Creek, and one well was installed upgradient to provide background groundwater quality data.

1.3.3 Groundwater Sampling

Upon completion, installation, and development of the wells, a complete set of samples will be collected from all onsite wells except D-1-27, D-2-30, and D-3-17, and from Ohio Water Service well No. 4 in order to characterize the groundwater contaminants, to determine the direction of any contaminant migration from the site, and to delineate the contaminant plume. The number of samples and analytical methods are specified in Section 4 of this document.

1.3.4 Aquifer Testing

A recovery/drawdown test in several onsite wells will be performed in order to determine important aquifer properties for the sandstone aquifer such as transmissivity and storativity. These properties will help assess contamination migration rates and directions, as well as determine whether a hydraulic connection exists between the sandstone aquifer and the overlying unconsolidated sediments.

1.3.5 Soil Gas Survey and Subsurface Soil Sampling Program

Soil gas sampling will screen the shallow soils at the site for the presence of target volatile compounds. Based on the WESTON September 1987 Groundwater Baseline Assessment for Full Target Compound List (TCL) Constituents, the presence of VOAs listed in Table 1-1 at the site was confirmed. The soil gas survey will identify potential areas of elevated VOAs (above background level and/or above instrument detection limit) and locate the potential source areas of these volatile organic compounds. Thirteen potential onsite sources have already been identified, which include the surface impoundment; buried and aboveground tanks containing either fuel oil, gasoline, degreasers, or solvents; and documented solvent spills within the plant building, hazardous waste storage areas, an incinerator, waste discharge sewer lines, and the railroad yard surrounding the EKCO property.

In order to further define the extent and to quantify the levels of VOAs, soil samples will be collected from a soil boring located where elevated levels of VOAs were identified in the soil gas survey. It is anticipated that between 10 and 15 borings will be drilled to the top of the water table. One additional boring will be drilled to the top of the water table at a location where no VOAs were detected in the soil gas survey and will serve to establish baseline soil conditions. The exact number and location of soil borings will be finalized after the results of the soil gas survey have been reviewed.

1.3.6 Surface Impoundment Sludge and Subsurface Soil Characterization

To sufficiently characterize the material within and surrounding the surface impoundment, a total of nine test borings were drilled. Six borings were bottom soil borings (BSB) and will be drilled to a depth of at least 16 feet below grade in the bottom of the surface impoundment or until auger refusal. The remaining three borings were slope soil borings (SSB) and where possible will be drilled to a depth of at least 6 feet below grade on the encircling berm and embankment.

1.3.7 Surface Water and Stream Sediment Sampling

Three surface water and five stream sediment samples will be collected from various locations in Newman Creek in order to assess if plant activities have had any impact on stream quality.

1.4 SITE HEALTH AND SAFETY PLAN

A Health and Safety Plan (HSP) has been prepared for the EKCO site and is presented in Appendix A. The purpose of this HSP is to define specific procedures and protocols that will be implemented to ensure the health and safety of all WESTON personnel, their subcontractors, and EKCO personnel during field activities related to the well installation and to the water, sludge, soil, and sediment sampling at the EKCO site. A copy of the HSP will be given to each subcontractor and a copy will be available at the work location. The information contained in this document is proprietary and cannot be released or duplicated without written permission. The HSP also includes emergency procedures and contacts.

As previously stated, this HSP applies to all subcontractors of WESTON and all subcontractors to WESTON subcontractors. In addition, visitors to WESTON work locations who are onsite will also be asked to adhere to WESTON Health and Safety protocols. Any deviations from the WESTON Health and Safety Plan or program will be noted in WESTON's Site Health and Safety Log. Consideration was given to the following references during the development of this plan:

- WESTON Health and Safety Operating Practices.
- OSHA 29 CFR 1900 to 1920.
- U.S. EPA Environmental Response Team operating guidelines.
- OSHA/NIOSH/EPA/Coast Guard: "Occupational Health and Safety Guidelines for Activities at Hazardous Waste Sites."
- NIOSH Pocket Guide to Chemical Hazards.
- (ACGIH) Threshold Limit Values for 1985 through 1987.

1.5 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC) OBJECTIVES

The specific QA/QC objectives for this project are summarized in Table 1-2. The objectives are divided into three groups briefly described below.

- Precision - Data must be reproducible. The degree of agreement between the numerical values of a set of duplicate samples performed in an identical fashion constitutes the precision of the measurement.

- Accuracy - Data must approach its accepted (or true) value. Accuracy is assessed by means of reference samples and percent recoveries. Error may arise from personal, instrumental, or methods factors. Analytical accuracy is expressed as the percent recovery of an analyte that has been added to the sample (or standard matrix, i.e., blank) at a known concentration before analysis and is expressed by the following formula:

$$\text{Accuracy} = \%\ \text{Recovery} = \frac{A^T - A^O}{A^F} \times 100\%$$

  Where:

  A^T = Total amount found in fortified sample.
  A^O = Amount found in unfortified sample.
  A^F = Amount added to sample.

  The fortified concentration may be specified by contract or laboratory quality control requirements, or may be determined relative to background concentrations observed in the unfortified sample. In the latter case, the fortified concentration should be different enough (2 to 5 times higher) from the background concentration to permit a reliable recovery calculation.

- Completeness - Data must be complete. A measure of relative number of analytical data points meeting all acceptance criteria for accuracy, precision, and other criteria required by the specific methods factors.

To meet these objectives, the field work and laboratory analysis will follow the standardized methods or procedures described in Sections 3 and 5.

Table 1-2

Summary of Precision, Accuracy, and Completeness Objectives

Measurement Parameter (Method)	Reference	Matrix	Precision (Relative % Difference)	Accuracy (% Recovery)	Completeness
HSL VOAs (GC/MS)	U.S. EPA CLP Statement of Work for Organics Analysis July 1987	Soil Sediment Water	See Note	See Note	90%
HSL Inorganics[1] (AA/ICP)	U.S. EPA CLP Statement of Work for Inorganics Analysis July 1987	Soil Sediment Water	±20%	±20%	90%

[1]Includes metals and cyanide.

Note: Precision and accuracy for HSL VOAs in U.S. EPA CLP are set on a compound-specific basis per CLP contract Part 5, except for EPA Method 524.2.

1.6 PROJECT RESPONSIBILITIES

The organization of these project responsibilities described below are also presented in Figure 1-3, the Project Responsibilities Chart.

1.6.1 Project Director

M.N. Bhatla, Ph.D., P.E., will be responsible for project objectives, scope, budget, and quality of the submittals.

1.6.2 Project Manager

Harold G. Byer, Jr., will be responsible for planning, coordinating, integrating, monitoring, and appraising (i.e., managing) project activities.

1.6.3 Quality Assurance Coordinators

Frederick Bopp, Ph.D., P.G., Michael Corbin, P.E., and Anthony DeFalco, P.E., will be responsible for the accuracy and precision of field-generated sample data and information. They will have the authority to impose proper procedures or to halt an operation. Their duties include QA review and approval of sampling procedures, field documentation, and all technical data.

1.6.4 Technical Managers

Richard C. Johnson, P.G., and Augustus Mergenthaler will be responsible for the identification and ultimate resolution of technical problems and the technical coordination of the field efforts, hydrogeological evaluation, and contamination assessment.

1.6.5 Project Field Team Leader and Safety Coordinator

L. Sherrerd Steele will be responsible for ensuring that all procedures for the field activities are executed in the proper manner and are documented.

The Field Safety Coordinator will be responsible for 1) having an up-to-date Health and Safety Plan in place; 2) overseeing that subcontractors adhere to the HSP; 3) training of all personnel involved in Health and Safety procedures; 4) control in emergencies; 5) a logbook of activities; and 6) supervising the decontamination area and work site setup.

1.6.6 Laboratory Manager

John Boudreau will be responsible for the accuracy and precision of laboratory-generated data and information and will ensure proper procedures and protocols are being followed so that high-quality data are produced.

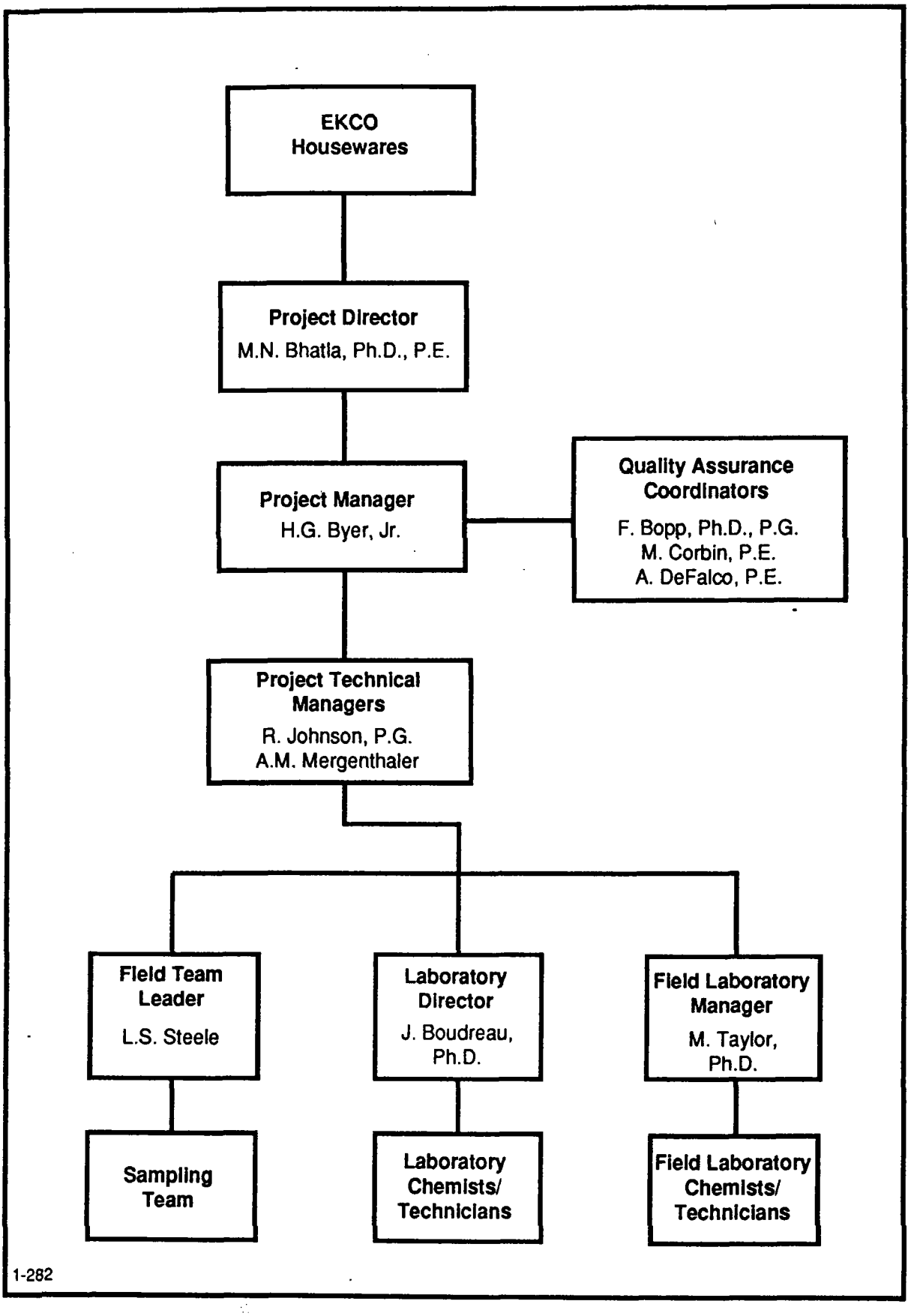

FIGURE 1-3 PROJECT RESPONSIBILITIES CHART

1.6.7 Mobile Laboratory Manager

Michael Taylor, Ph.D., will be responsible for the accuracy and precision of the mobile laboratory-generated data and information and will ensure proper procedures and protocols are being followed so that high-quality data are produced.

1.7 SCHEDULE

The schedule for the implementation of the groundwater quality assessment is presented in Figure 1-4.

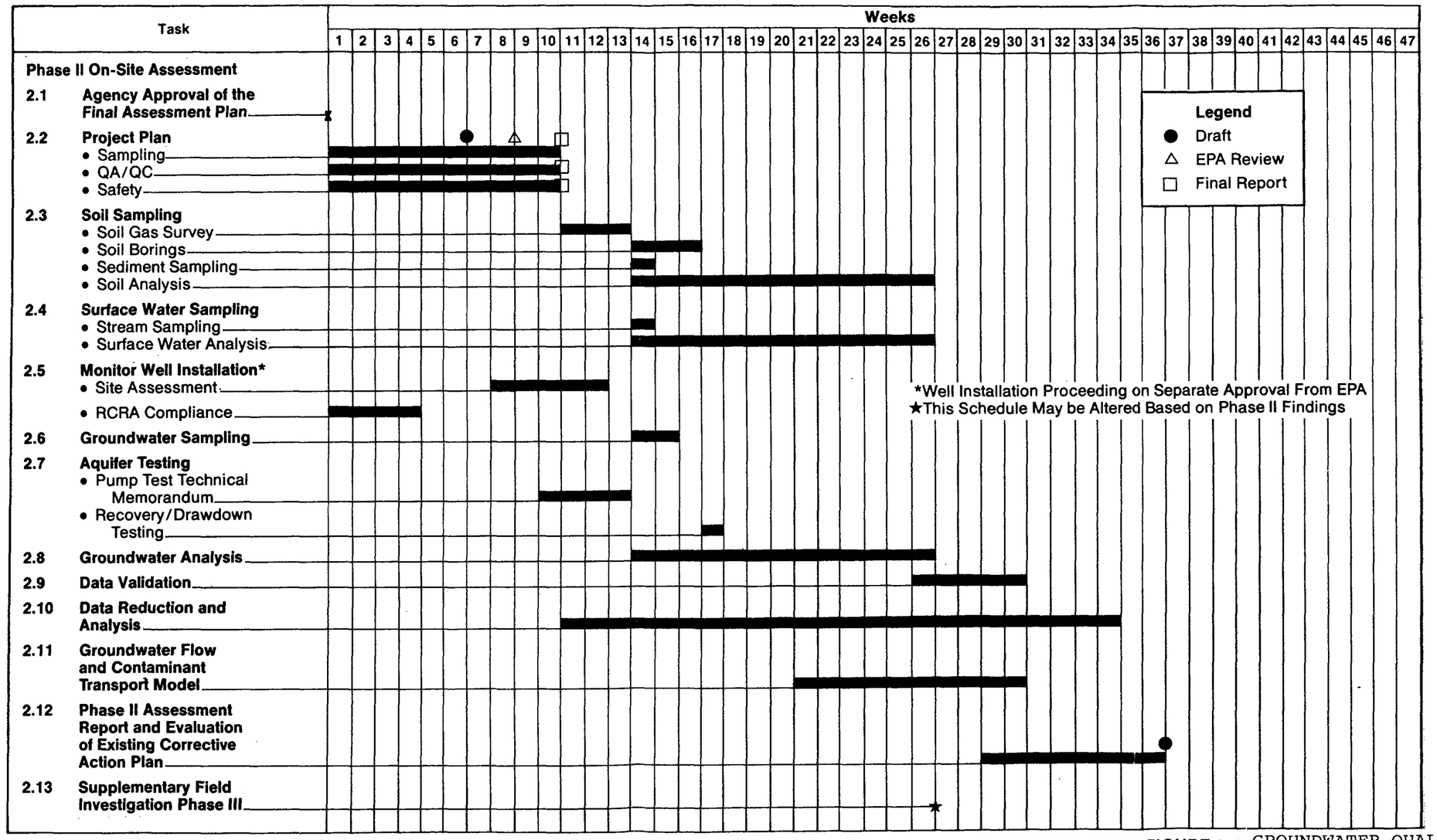

FIGURE 1-4 GROUNDWATER QUALITY ASSESSMENT SCHEDULE

SECTION 2

FIELD INVESTIGATION PROCEDURES

2.1 MONITOR WELL INSTALLATION

A total of 13 groundwater monitor wells were installed at the site as a part of the GWQA at the approximate locations shown in Figure 2-1. The screened interval and lithology of each well is provided in Table 2-1. Prior to the start of drilling activities, the proposed well locations were staked, cleared of underground obstructions and utilities, and were then approved by representatives of EKCO.

Drilling methods are described in Subsection 2.1.1 and well construction is described in Subsection 2.1.2. Monitor well development is described in Subsection 2.1.3. The well installation was approved prior to this plan by U.S. EPA Region V in a letter dated 29 April 1988 to Mr. Timothy McGuinness from Mr. Joseph M. Boyle. This letter is included in Appendix B. Therefore, monitor well installation has occurred.

Following well installation and development, the top of casing and surface elevations for all new wells will be surveyed relative to the mean sea level datum, water level measurements will be collected, and all monitor and production wells will be sampled.

2.1.1 Drilling Methods

Borings for the five RCRA compliance monitor wells were completed using 8-inch ID hollow stem augers. Borings for the remaining eight monitor wells were completed using a cable tool rig with an 8-inch ID bit. No drilling fluids were used except potable water.

Split-spoon soil samples were collected for lithologic description at 5-foot intervals. Where wells were coupled, split-spoons were taken in the deepest boring. Rock cutting samples for lithologic description were collected in well R-5 at 5-foot intervals with a cable tool bucket.

Prior to the start of drilling, all downhole equipment (the drilling rods, rig tools, and split-spoon samplers) was decontaminated according to the procedures outlined in Subsection 3.1.1.

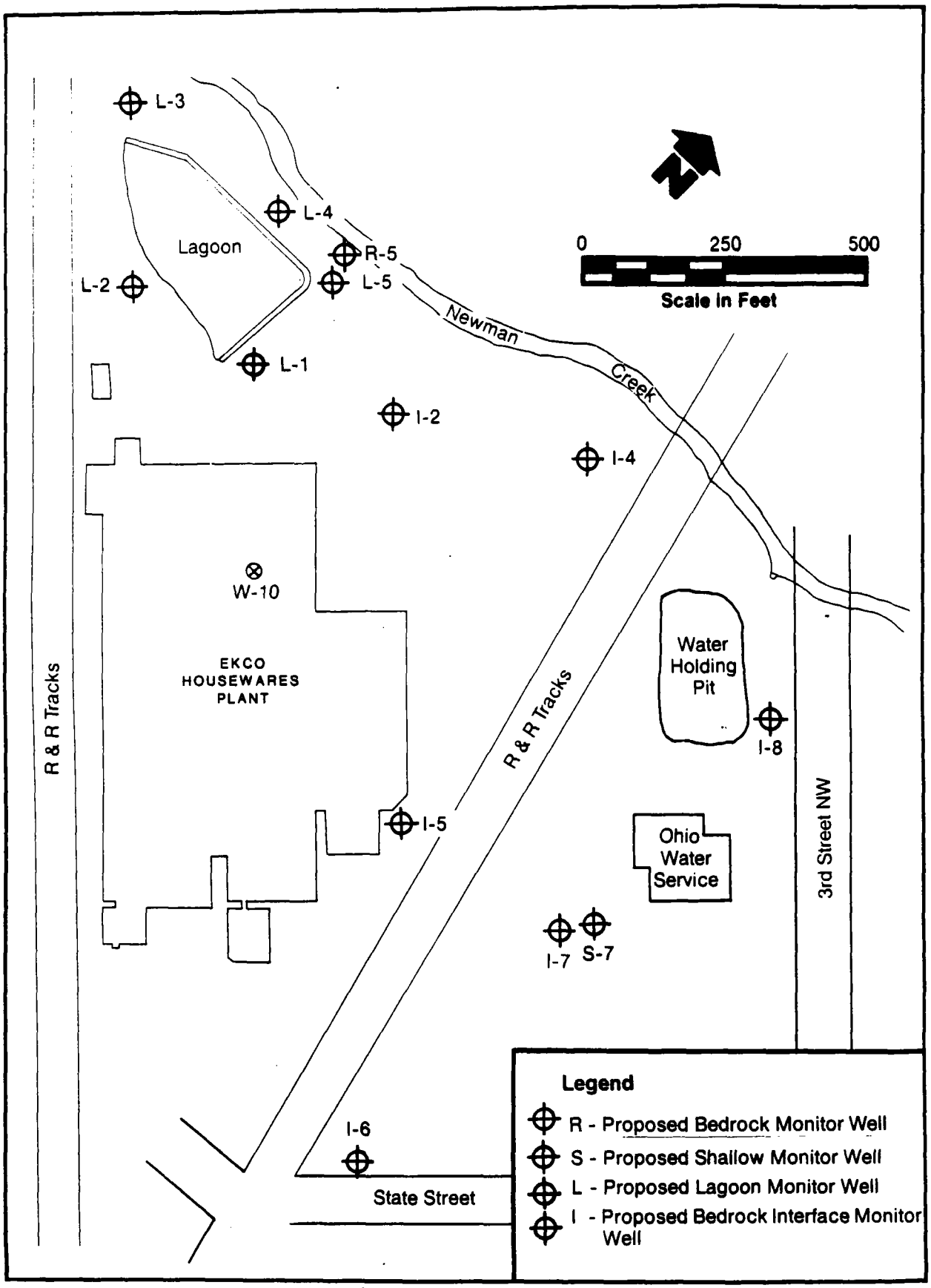

FIGURE 2-1 LOCATIONS OF PROPOSED MONITORING WELLS AT EKCO HOUSEWARE, INC., MASSILLON, OHIO

Table 2-1

Completed Monitor Well Locations and Screen Intervals
EKCO Housewares, Inc.
(Installed June - July 1988)

Number	Location of Bottom of Screen	Screened Interval (feet BGS)	Lithology of Screened Interval
L-1	15' into first H_2O	29.5-39.5	Sandy silt with rounded cobbles and fine sand.
L-2	15' into first H_2O	25-15	Fill material.
L-3	15' into first H_2O	19.5-9.5	Sandy silt, silt, and subangular gravel.
L-4	15' into first H_2O	16-6	Silt and gravel grading into fine sand and gravel.
L-5	15' into first H_2O	24-14	Fine to medium sand and gravel intermixed with some silt and gravel.
I-2	To top of bedrock	40-30	Find to medium sand and gravel with sandy silt.
I-3	No well installed because no water was encountered above the bedrock.		
I-4	To top of bedrock	72.5-62.5	Large rounded cobbles in a coarse sand matrix.
I-5	To top of bedrock	65-55	Medium to coarse sand with cobbles and some clay.
I-6	To top of bedrock	130-120	Fine to coarse sand and gravel with trace of clay.
I-7	To top of bedrock	61-51	Medium sand and gravel with clay.
I-8	To top of bedrock	76-66	Fine to medium sand with some small cobbles and some sandy clay.
S-7	15' into first H_2O	38-28	Coarse sand and cobbles with clay.
R-5	N/A (open bedrock well)	Open from 43 (top of bedrock) to 60 feet.	Bedrock.

All soil cuttings generated from drilling activities will be containerized and properly disposed of.

2.1.2 Monitor Well Construction

The shallow and bedrock overburden interface wells are constructed of 4-inch diameter wound wire type 304 stainless steel screens, low-carbon steel risers, and a protective black iron surface casing with lockable cap as previously approved by the U.S. EPA. The shallow monitor wells L-1 through L-5 and S-7 have 10-foot screens installed into the first encountered water-bearing zone (in the unconsolidated sediments). A generalized well construction diagram for these shallow wells is presented in Figure 2-2. Similar construction of the bedrock interface wells, I-2 and I-4 through I-8, was used except that the 10-foot screens were installed to the bedrock/unconsolidated sediment interface. (I-3 was not installed because water was not encountered above the bedrock.)

The bedrock well (R-5) is constructed of 6-inch low-carbon steel casing installed 5 feet into competent rock. R-5 was completed as a 5 7/8-inch open bedrock well to the first water-bearing zone. The well depth is 60 feet below ground surface, or approximately 20 feet into bedrock. At this depth, the well could produce only approximately 10 gallons per minute.

At the determined depth in the shallow wells, the well screen and riser were installed and the augers withdrawn to the top of the screen. Silica sand was used to backfill the annular space after the augers were withdrawn. When plumbing the hole indicated that the sand pack was at the desired height, a 2-foot bentonite pellet seal was placed on the top of the sand pack as the augers were gradually withdrawn. The shallow wells were completed by gravity-feeding a neat cement mixture into the remaining annular space. After completion, the grout was checked for settlement and more neat cement was added. The upper 2.5 feet of annular space was filled with a cement/sand mixture and a protective casing was installed.

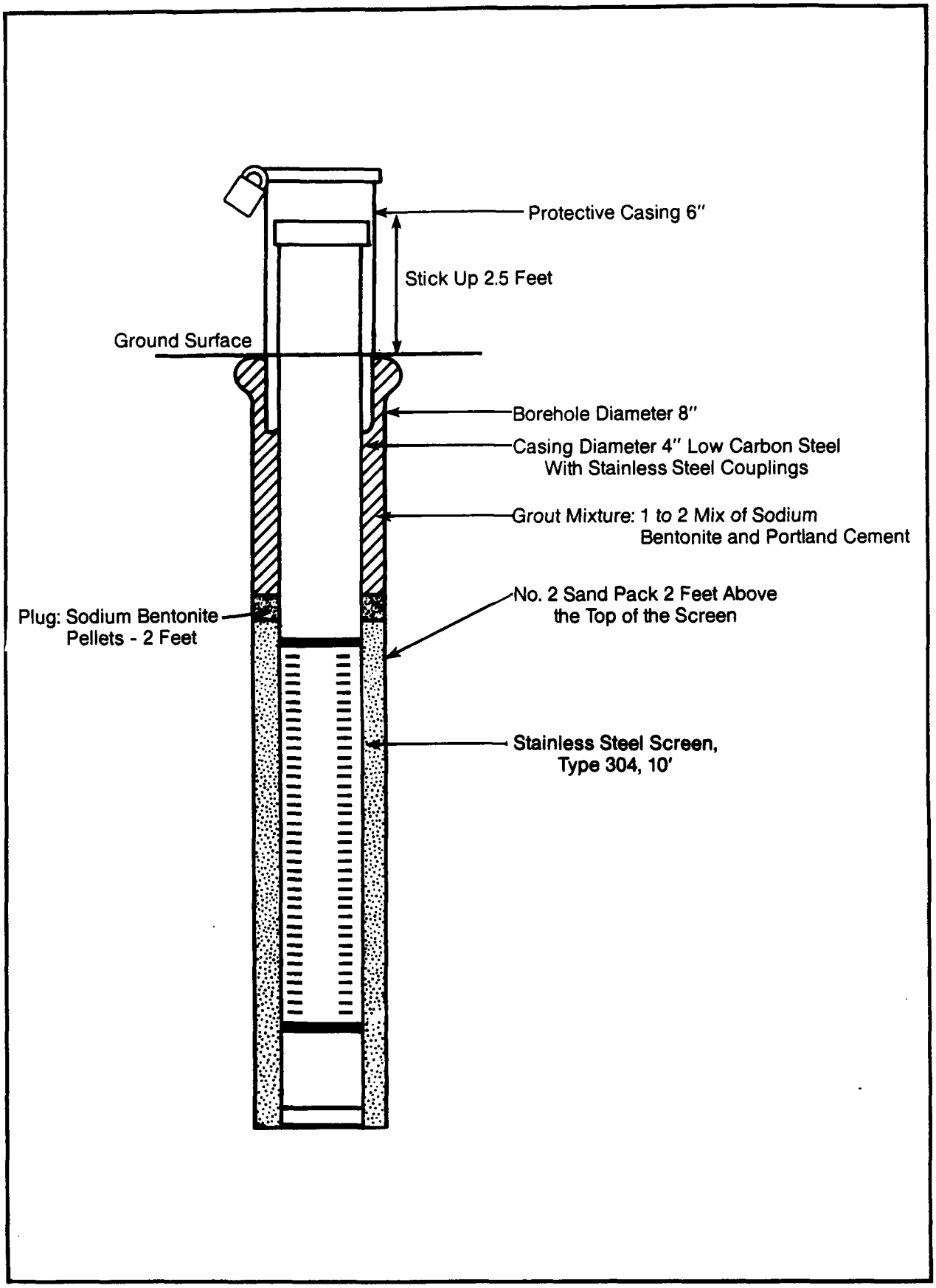

FIGURE 2-2 SUMMARY SPECIFICATIONS FOR MONITOR WELL COMPLETION

Similar well installation techniques were used for bedrock/overburden interface wells. A natural sand pack extends approximately 2 feet above the screen, and a bentonite slurry was tremied from the top of the sand pack as the drive casing was gradually withdrawn so that no collapse of the borehole occurred. These wells were completed by treming a neat cement mixture to the bottom of the hole to displace the water in the annular space. As the drive casing was slowly withdrawn, the level of the grout was maintained inside the drive casing by pumping additional grout to the bottom of the hole. A protective black iron casing was then installed.

Bedrock well R-5 casing was sealed and grouted with a cement slurry in a manner similar to that used in the bedrock/overburden interface wells.

All data were recorded on the well construction summary form (Figure 2-3).

2.1.3 Monitor Well Development

Each new well was developed approximately 1 month after installation with a pump or bailer until a steady flow of clear water was obtained and until at least five well volumes were removed. The pump intake was moved through the length of the screen or open borehole during development. When a sufficient head could not be maintained during pumping, a bailer and surge block method was employed. All onsite purge water was collected in a tanker provided by EKCO and was taken to the onsite air stripper for processing and discharge.

All development equipment was decontaminated prior to use in each well in accordance with procedures described in Subsection 3.1.2.

2.2 GROUNDWATER SAMPLING

The objective of this sampling task is to characterize the groundwater contaminants, to determine the direction of any contaminant migration from the site, and to delineate the contaminant plume. Groundwater samples will be collected from all wells, except monitor wells D-1-27, D-2-30, and D-3-17, and from Ohio Water Service well No. 4. These samples will be submitted to WESTON's Analytical Laboratory for analyses of VOAs, metals, and cyanide. (The WESTON Laboratory is a U.S. EPA-certified CLP laboratory.) Groundwater samples will also be collected from each well for field analyses measurements of pH, temperature, and specific conductance. After initially calibrating the instruments according to the methods detailed in Subsection 3.8, measurements will be taken and the data will be recorded in the field logbooks. The instrument probes will be flushed with distilled/deionized water between sample measurements.

WESTON

Well _____

Well Construction Summary

Location or Coords: _____ Elevation: Ground Level _____

Top of Casing _____

Location _____

Personnel _____

Project _____

Drilling Summary:

Total Depth _____

Borehole Diameter _____

Driller _____

Rig _____

Bit(s) _____

Drilling Fluid _____

Surface Casing _____

Well Design:

Basis: Geologic Log ____ Geophysical Log ____

Casing String(s): C · Casing S · Screen

Casing: C1 _____

C2 _____

Screen: S1 _____

S2 _____

Centralizers _____

Filter Material _____

Cement _____

Other _____

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling				
Geophys Logging:				
Casing:				
Filter Placement:				
Cementing:				
Development:				
Other:				

Well Development:

Comments:

FIGURE 2-3 WELL CONSTRUCTION SUMMARY FORM

All data will be recorded on the well sampling forms (Figures 2-4 and 2-5).

2.2.1 Monitor Well Sampling

The objective of this task is to obtain representative groundwater samples. Wells suspected of having low contaminant concentrations will be sampled prior to those suspected of having medium or high contaminant concentrations. The field measurements of the water levels in the wells will be used to prepare separate potentiometric maps for the bedrock and unconsolidated deposits.

The procedure for sampling monitor wells is as follows:

1. Scan the area around the well with HNu/OVA. Record external air measurements in logbook.

2. Open well cap and monitor downhole and ambient air quality utilizing monitoring equipment.

3. Record the following well information and measurements on well sampling forms (Figures 2-4 and 2-5):

   a. Well identification and location (at the time of each sampling).

   b. Well integrity.

   c. Height of casing above ground surface (in feet).

   d. Downhole and ambient air readings detected with HNu/OVA (at the time of each sampling).

   e. Depth of water level (feet) from the top of casing (at the time of each sampling).

      Water level measurements will be taken to the nearest 0.01-foot with respect to mean sea level on top of the well casing. All measuring devices used in the well will be washed with laboratory-grade detergent solution and thoroughly rinsed with distilled water prior to reuse. The depth to the top of the water will be subtracted from the total casing depth to determine the height and, subsequently, the volume of standing water in the casing.

   f. Total depth of well and depth to top of sediment layer, if present (in feet).

   g. Total volume of standing water in the well.

WESTON

GENERAL INFORMATION

Date: _____
Weather: _____

Well Number (Purge Well): _____
Reported by: _____
Sampling Team: _____

WELL MEASUREMENTS

Other Comments:

Protective Casing: Intact/Damaged
Locked: Yes/No Key#: _____
Concrete Base: Intact/Damaged
Casing Diameter: _____
Stick-Up Height: _____

HNu/OVA Readings
Initial: _____
During Purging: _____
During Sampling: _____

Floating Layer: Yes/No
Thickness: _____
Sampled: Yes/No

Depth to Water*: _____
Depth to Well Bottom*: _____
Column of Standing Water: _____
Well Volume: _____
(4":0.65, 6":1.47, 8":2.61)
Well Evacuation Method: _____
(Bailer, Pump, Other)
Pump Setting Depth(s)*: _____

Begin Purge Time: _____
Purging Rate (gpm): _____

*From Top of Casing
Other Comments: _____

FIGURE 2-4 WELL SAMPLING SHEET

WESTON

Date: _____

Observation Well(s) Well No. _____

	Purge Well:	1 Well #:	2 Well #:	3 Well #:
Pre-Purge:				
Depth to Water*/Time				
During Purging:				
Depth to Water*/Time				
Depth to Water*/Time				
Depth to Water*/Time				

End of Purge Time: _____

Volume of Water Evacuated: _____

# of Drums Filled: _____

Recovery Rate After Purging:	Purge Well:	1 Well #:	2 Well #:	3 Well #:
Depth to Water*/Time				
Depth to Water*/Time				
Depth to Water*/Time				
Estimated Yield (gpm)				

SAMPLE INFORMATION	(Pre-Purge)	(During Purging)		(End Purge)
Time				
Temperature °C:				
pH:				
Specific Conduct:				
Odor: Yes/No:				
Turbid: Yes/No:				
Color:				

Other Comments: _____

FIGURE 2-5 WELL SAMPLING SHEET

4. Take a sample for dense, nonaqueous phase liquids in the bottom of all onsite wells to be sampled using a BAT Envitech Hydroprobe Sampler. If the visual inspection and/or head space analysis of the vial indicates the presence of a dense, nonaqueous phase liquid, then the groundwater will not be sampled in this well(s). The BAT sample vial will then be sent to the laboratory for volatile organic analysis. Appendix C contains the instruction handbook/operations manual for the BAT Envitech Hydroprobe Sampler. The hydroprobe will be decontaminated between samples by steam cleaning the outside of the sampling unit and activation tubing. The hypodermic needle and sampling vial will be replaced between wells.

5. Evacuate a minimum of three well volumes of water from shallow and deep wells using a submersible or suction pump. If the well recharges fast enough during purging so that the water level is not drawn down or drawdown is slow, place the pump intake near the top of the water level and lower as needed. This will ensure that the water near the top of the casing that will be sampled by the bailer is replaced. Record the volume of water removed and the elapsed time of purging. The purge water will be discharged into a tanker and taken to the air stripper for processing.

6. Allow well to recharge. Record time required for recharge.

7. Use a dedicated, precleaned, stainless steel or Teflon bottom-filling bailer with stainless steel leaders to obtain the sample. Attach a braided polyethylene cord to the bailer and slowly lower the bailer into the well. After the bailer has filled, slowly raise the bailer from the well. Do not allow the bailer to touch the ground. Fill the VOA bottle first, checking to confirm that the vial is free of all air bubbles. The sample for dissolved metals will be filtered through a 0.45-micron filter prior to preservation. Fill the remaining sample containers by splitting each bail full of water among the various sample jars. Add preservatives to the sample containers, as appropriate. Appropriately discard the cord after each use.

8. Seal and label the sample bottles. Record all pertinent information on each sample (color, odor, sheen, etc.) in the field sampling notebook.

9. Record the field parameters (pH, electric conductivity, and temperature) at each sample collection point.

10. Replace well cap. Make sure well is readily identifiable as to the source of the sample. Well sample analysis parameters, sample volumes, and container types are given in Table 3-1.

11. Pack samples for shipping as directed in Subsection 3.7. Add ice and vermiculite and seal the cooler for shipment.

12. All sampling equipment will be decontaminated after sampling as detailed in Subsection 3.1.3 to prevent cross-contamination.

2.2.2 Site Production Well Sampling

Groundwater sampling of the site production wells will be accomplished using the existing permanent pumps. The static pumping rate will be measured. Wells that are on-line at the time of sampling will be purged by allowing water to flow through the sampling valve for 1 minute. Wells not on-line but serviceable at the time of sampling will be restarted by a EKCO representative and allowed to run for approximately 15 minutes prior to opening the sampling valve. After the wells have been purged, each sample container will be gently filled from the pump line taking care to avoid aeration and turbulence in the sample. A clean glass rod may be used, if necessary, to conduct the flow into the sample container. Samples will be labeled and handled as stated in Subsection 2.2.1, steps 7 to 11.

2.2.3 R-1 Through R-4 Monitor Well Sampling

Groundwater samples will not be collected from the dedicated pumps in the R-1 through R-4 monitor wells. The pumps will first be pulled from these wells and then sampled in the same manner as listed in Subsection 2.2.1.

2.3 AQUIFER TESTING

A recovery/drawdown test in eight of the onsite wells will be performed in order to determine important aquifer properties such as transmissivity and storativity. This test will be performed by shutting off the continuously pumping production well (W-10) and monitoring the recovery rates in bedrock wells R-1, R-2, R-3, W-1, and W-10. Two shallow wells (D-4-30 and L-1) and one interface well (I-2) will also be monitored during the test to assess whether the bedrock and unconsolidated units function as one or two hydrologic zones. Depending upon the results of this test and the subsurface conditions encountered during drilling activities, an assessment will be made as to whether small-scale pumping and/or slug tests will be conducted in the shallow wells. If these additional tests are necessary,

specific protocols will be submitted in a technical memorandum and will be submitted to both U.S. EPA and OEPA 2 weeks prior to the start of these field activities.

Water levels will be measured with two SE-200 data loggers (or equivalent) and will be monitored after pumping has ceased in W-10, until the water levels have reached near static conditions, or for 48 hours, whichever comes first. It is not expected that the aquifer will reach a prestressed condition in 48 hours (48 hours is a restriction imposed by plant production requirements), but a time recovery curve will allow calculation of storativity and transmissivity. After these conditions have been met, pumping will resume in W-10 and the drawdowns will be monitored until the water levels have returned to near initial levels.

The specific protocol for the recovery/drawdown test is as follows:

1. Open well caps and monitor downhole and ambient air quality utilizing monitoring equipment. Record information in field notebook.

2. Measure and record depth to water from the top of the casing in all observation wells to be tested and also in the pumping well. Record as static pumping level (pretest level) in the field notebook.

3. Protect the transducer cables by taping the casing of the observation wells and pumping well with duct tape to cover the top edge.

4. Clean each transducer by sequentially rinsing the probe and attached line with tap water, Alconox in tap water, and distilled water.

5. Lower the transducers into the observation wells and pumping well to a depth of approximately 10 feet below the top of the static pumping level, calibrate them according to manufacturer's directions, and secure the transducer cable with duct tape.

6. Connect the SE-200 data loggers (or equivalent) to the transducers. The data loggers serve to automatically record water level fluctuations in each of the monitor wells with time.

7. Activate the data loggers at least 12 hours before the start of the recovery/drawdown test to establish background water level conditions. Record the water levels approximately every 30 minutes. The pumping rates in

W-10 and W-1 will be monitored for 1 week prior to the start of the test and will be held steady for as long as practical. It should be noted that all facility production wells are pumped at a steady rate constantly and will be maintained prior to aquifer testing.

8. The pump will be turned off and water level measurements at the pumping well and observation wells will be taken at the following preselected time intervals:

Time Since Pumping Started (or Stopped) in Minutes	Time Interval Between Measurements in Minutes
0-10	.01-.5
10-15	1
15-60	5
60-termination of test	30

9. The pumping rate in W-1 will be closely monitored throughout the test. As necessary, adjustments will be made to the pump in order to maintain a constant pumping rate.

10. Continue the test until the water levels have returned to near static conditions (three or more consecutive readings) or up to 48 hours, whichever comes first. Turn the pump on and pump at same rate as before the test.

11. Water level drawdown will be measured following the same preselected measurement intervals as during the recovery period. Drawdown will be monitored for a period of 24 hours or until water levels have returned to near pretest levels, whichever comes first.

12. After the test but before the data loggers are stopped, a hard copy of the data readings will be made on the field printer.

13. The SE-200 will be post-calibrated according to manufacturer's directions to ensure accuracy of the data.

14. The transducers and the pump will then be removed from the wells and decontaminated.

15. The well caps will be placed over the casing and locked.

16. Obtain flow rate records of Ohio Water Service wells 1, 2, and 3 for the test period to determine if they are affecting groundwater levels at the site.

17. All data, including water level and time measurements in the pumping and observation wells, pumping rate, and distance between the pumping well and observation wells, will be evaluated using appropriate equations to determine hydraulic characteristics of the aquifer system.

2.4 SOIL GAS

Soil gas sampling will be used to quickly screen the shallow soils at the site for the presence of target volatile compounds and thus identify "hot spots" that could indicate possible source areas of these volatile organic compounds (VOAs). Subsequent soil borings will then be advanced in these possible source areas to assess the quantity and vertical distribution of the volatile compounds present in the soils.

Soil gas sampling will be initially performed on a 50-foot horizontal grid spacing along the foundation of the facility and in the areas of suspect point sources. The soil gas along the entire perimeter of the plant will also be sampled in order to fully characterize the site. If VOAs are observed at levels of concern (above background level and/or above instrument detection level), a grid will be established perpendicular to the foundation of the facility and will be reduced to 25 feet in order to establish the limit of a plume or the location of a point source. The grid system will continue until the observed VOA levels drop off to background levels or until the property boundary is reached, whichever occurs first. Therefore, grid spacing will be modified accordingly, depending upon the distribution of volatile organic compounds obtained in the field. It is anticipated, however, that the sampling program will consist of approximately 100 to 150 sampling sites.

The specific soil gas sampling protocol is as follows:

1. Soil gas samples will be collected at the locations already identified as potential point sources and along the perimeter of the plant building and property at a 50-foot grid spacing. Grid spacing will be modified accordingly, depending upon the distribution of the volatile organic compounds obtained from this survey.

2. A soil gas probe will be installed to approximately 3 to 5 feet using a hand-held piston-hammer.

3. A Teflon tube encased in the copper tubing will be installed in each hole and sealed from the ambient air.

4. A portable vacuum pump operated at a low flow rate will be used to purge and evacuate the soil gas.

5. After a purge time of approximately 5 minutes a sample will be collected in gas-tight sampling bulbs directly connected to the Teflon sample line upstream of the vacuum pump and flow meter. (Each sampling bulb will be flushed before sampling by heating in the gas chromotagraph (GC) oven to prevent any cross-contamination.)

6. A duplicate sample will be collected at a select location in each potential point source area.

7. All appropriate information such as sampling time, sample number, location, sampling depth, and evacuation time before sampling will be entered into the field logbook.

8. The samples will be transported to the field laboratory and analyzed for VOAs within a few minutes of collection.

9. The vacuum pump will be turned off and disconnected from the Teflon tube.

10. The probe will be removed from the ground using the piston-hammer and will be stored with the equipment to be decontaminated. (Each sample probe will be used only once daily and will be decontaminated by washing it in Alconox and tap water followed by steam cleaning.)

11. The probe hole will be backfilled, if necessary.

2.5 SOIL SAMPLING

2.5.1 Source Soil Borings

Soil borings will be advanced in areas of high soil gas readings in order to assess the quantity and vertical distribution of the VOAs present in the soil in these areas. Since 13 potential point sources exist onsite, it is anticipated that between 10 and 15 borings will be drilled to the top of the water table. One additional boring will be drilled to the top of the water table at a location where no VOAs were detected in the soil gas survey. This boring will serve to establish baseline soil conditions. The exact number and location of soil borings will be finalized after the results of the soil gas survey have been reviewed.

At each location samples will be collected from depths of 0 to 2 feet, 4 to 6 feet, and 10 to 12 feet below ground surface or at the discretion of the onsite geologist based upon vapor detection, discoloration, or other field indicators. The samples will be analyzed for VOAs, metals, and cyanide.

The specific soil sampling protocol is as follows:

1. Boring locations will be staked and then approved by representatives of EKCO.

2. Boreholes will be drilled using a hollow stem auger drilling rig.

3. Soil samples will be continuously collected from the boreholes. These subsurface samples will be obtained with a 2-foot long split-spoon sampler driven in advance of the bottom of the auger hole according to the ASTM (D-1586) Standard Penetration Test to the top of the water table.

4. A detailed drilling log and record of all samples will be maintained by the field geologist/soil scientist. Each split-spoon barrel will be decontaminated between samples according to specifications discussed in Subsection 3.1.3. Extraneous sample material and drilling cuttings will be containerized and disposed of properly.

5. The boring holes will be backfilled immediately after sampling.

6. One discrete sample will be collected for chemical analysis from each interval of 0 to 2 feet, 4 to 6 feet, and 10 to 12 feet, or from the intervals that the field geologist/soil scientist deems most likely to have contamination.

7. One sample for every 10 collected for analysis will have a duplicate for quality control. See Subsection 3.6.

The actual steps to be followed while collecting the samples are:

a. Record split-spoon depth, blow count, and driller's comments in field logs.

b. If samples for chemical analysis are required, as outlined above, the sampler will immediately transfer selected samples into prepared appropriate size jars.

The outside portion of the sample will be scrapped away and discarded. An aliquot should be left in the spoon for later description. See Subsection 3.2 for sample container and preservation requirements.

c. Examine and record in the field logbook the descriptions of the split-spoon sample including sample recovery, color, grain size, distribution, plasticity, and moisture content. Organic vapor detector readings will also be recorded. These data will be transferred to a boring log form (see Figure 2-6).

d. Close and label sample bottles and record all information in field notebooks. See Subsections 3.3 and 3.4.

e. Decontaminate the split-spoon according to methods specified in the Subsection 3.1.3.

f. Prepare samples for shipping as environmental samples. See Subsection 3.7, Sample Packaging and Shipment.

2.5.2 Surface Impoundment Soil Borings

To sufficiently characterize the material within the lagoon, a total of nine test borings were drilled. Six borings were bottom soil borings (BSB) and were drilled to a depth of at least 16 feet below grade in the bottom of the lagoon or until auger refusal. The remaining three borings were slope soil borings (SSB) and were drilled to a depth of at least 6 feet below grade on the encircling berm and embankment. Figure 2-7 locates the lagoon soil borings and their respective drilling depths. Figure 2-8 illustrates a plan view of each type of boring.

The BSBs were located roughly on two perpendicular lines, with the lateral line starting at the former lagoon outfall and running approximately north to south. Two BSBs were located on the lateral line, one on each side of the longitudinal line. The longitudinal line runs lengthwise in the lagoon, which located the remaining four BSB: one east of the latitudinal line and three in the western end of the lagoon. Each BSB was continuously sampled with a 2-foot split-spoon sampler, giving a total of eight samples per boring. Each sample was analyzed for total metals and cyanide. Four of these samples (the 1st, 3rd, 5th, and 8th sample) were also analyzed for volatile organics.

Since the lagoon is roughly triangular in plan view, one SSB was located on the northern berm, one on the eastern berm, and one on the natural embankment that forms the southwest boundary.

WESTON
MANAGERS DESIGNERS/CONSULTANTS

DRILLING LOG

WELL NUMBER: _____ OWNER: _____
LOCATION: _____ ADDRESS: _____
_____ _____
_____ TOTAL DEPTH _____
SURFACE ELEVATION: _____ WATER LEVEL: _____
DRILLING COMPANY: _____ DRILLING METHOD: _____ DATE DRILLED: _____
DRILLER: _____ HELPER: _____

LOG BY: _____

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)

* A.S.T.M. D1586

SHEET ____ OF ____

FIGURE 2-6 SOIL BORING LOG FORM

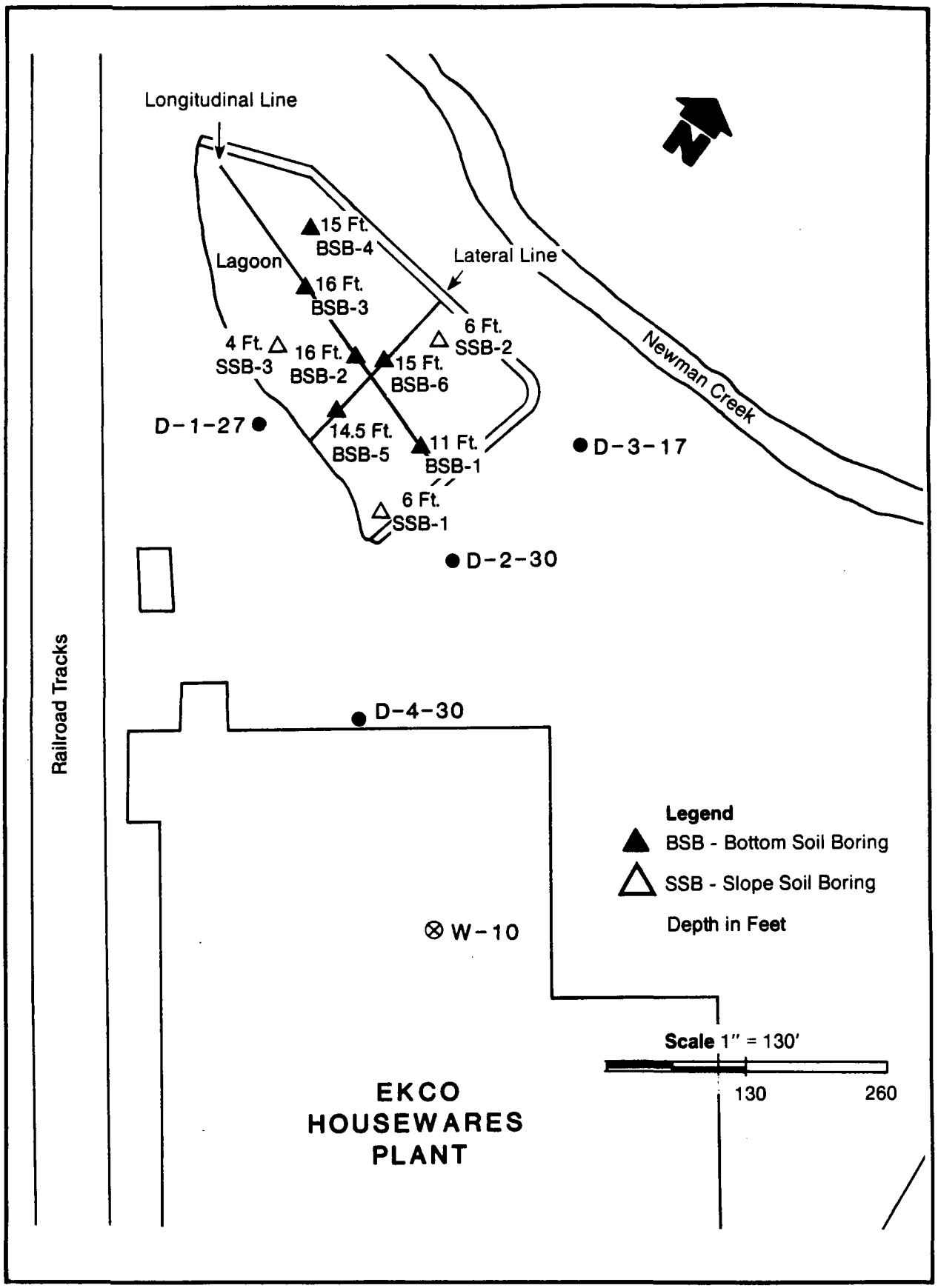

FIGURE 2-7 LOCATIONS OF LAGOON SOIL BORINGS
EKCO HOUSEWARES, INC., MASSILLON, OHIO

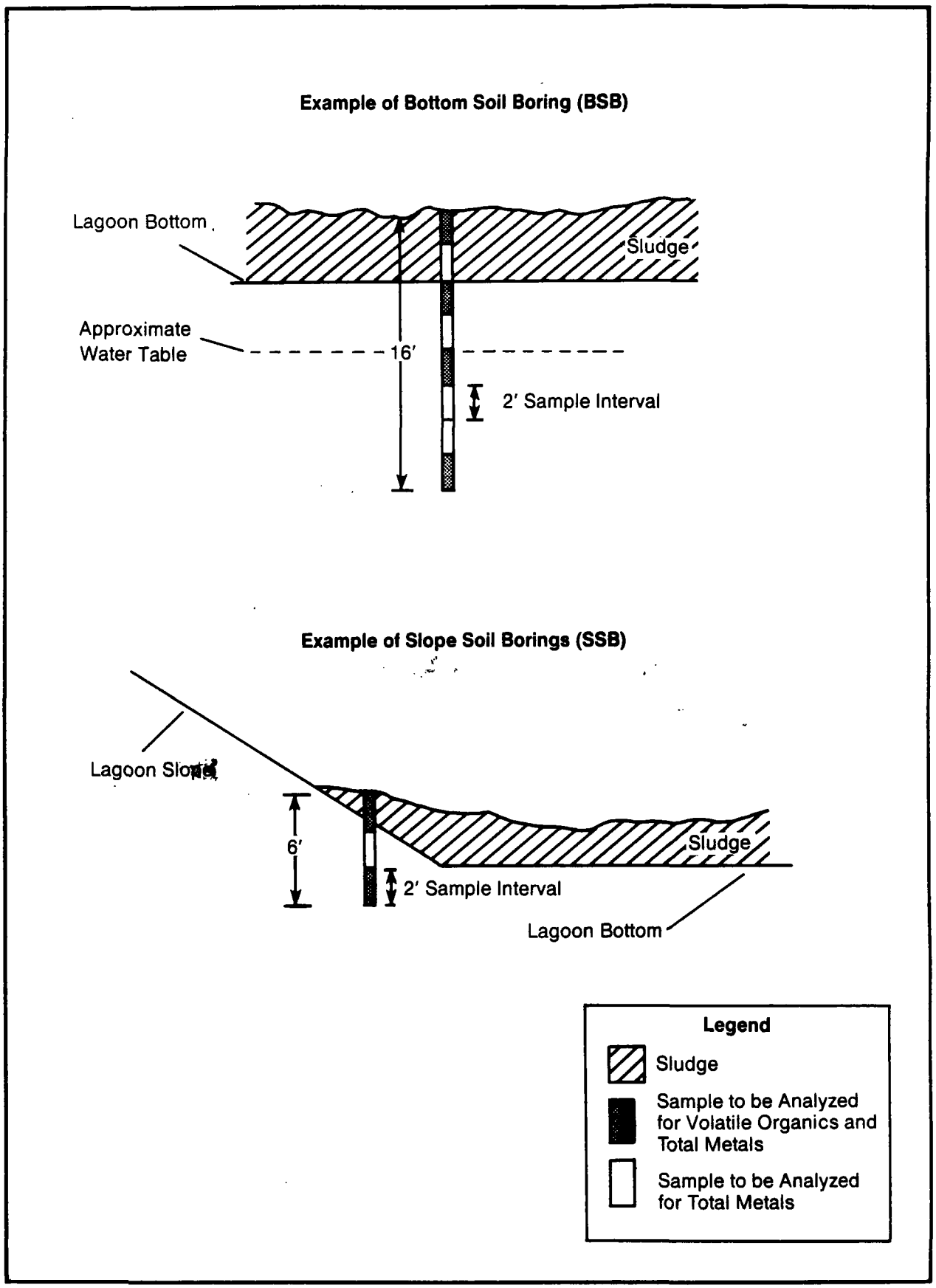

FIGURE 2-8 PLAN VIEW OF THE BOTTOM SOIL BORINGS (BSB) AND SLOPE SOIL BORINGS (SSB)

Continuous split-spoon samples were taken from each SSB boring. Each SSB sample was analyzed for total metals and cyanide. Volatile organic analyses were also performed on the first (sludge) and the last sample from each SSB.

Specific soil sampling protocols as discussed in Subsection 2.5.1 were followed.

2.6 SURFACE WATER SAMPLING

The surface water in Newman Creek will be sampled at three locations in order to determine if plant activities have had any impact on stream quality. The sample points shall be located upstream, adjacent to, and downstream of the surface impoundment. Locations of the surface water sampling points are shown in Figure 2-9.

The surface water will be sampled in a downstream to upstream fashion during low flow conditions. Chemical-resistant gloves and boots will be worn when collecting samples. The samples will be analyzed for VOAs, metals, and cyanides.

The specific sediment sampling protocol is as follows:

1. Each location will be staked before sampling.

2. The sampler will stand downstream of the sampling point while collecting the sample.

3. The samples will be collected directly into the sample bottles as specified in Subsection 3.2, with the exception of the samples for metals analyses. The samples for metals analyses will be collected in clean, unused containers, will be field-filtered, and then poured into the container to which appropriate preservative will subsequently be added.

4. All pertinent information will be recorded in the field logbook (time of collection, field parameter data, physical characteristics of the sample, etc.).

5. The samples will be packaged as specified in Subsection 3.7, and chain-of-custody records, sample tags, and other required documentation will be completed and included with the shipment.

6. After sampling, the velocity of the stream will be measured using a Marsh - McBirney current meter and will be measured near the upstream sample location and near the downstream location at various locations in the stream cross-section. The information will then be recorded into the field logbook.

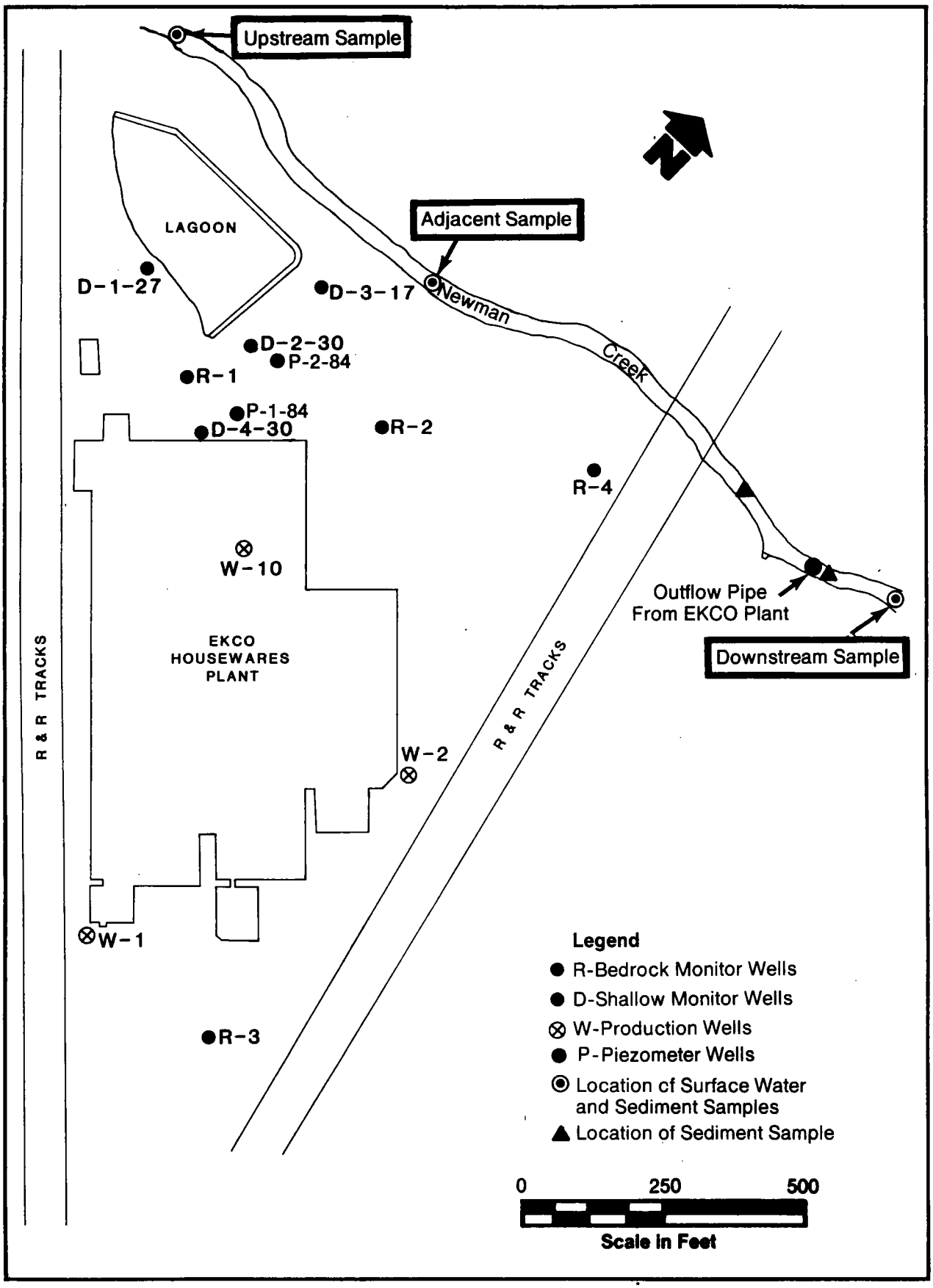

FIGURE 2-9 LOCATIONS OF SURFACE WATER AND SEDIMENT SAMPLES EKCO HOUSEWARES, INC. MASSILLON, OHIO

7. At the downstream sampling location, a cross-sectional area will be measured so that total flow can be estimated using USGS methods, as specified in Chapter 1 of the USGS "National Handbook of Recommended Methods for Water Data Acquisition," USGS 1977. Outflow from the EKCO plant will be measured at the same time.

2.7 STREAM SEDIMENT SAMPLING

Five stream sediment samples will be collected from Newman Creek at the locations shown in Figure 2-9 to determine if plant activities have had any impact on stream quality. Three of these samples will be taken upstream, adjacent to, and downstream of the surface impoundment at the same locations as the surface water samples. Two additional samples will be taken at locations between the adjacent and downstream samples, one directly upstream and one directly downstream of the plant's outflow pipe. The stream's sediments will be collected using precleaned, dedicated stainless steel trowels from the top 1 to 2 centimeters of deposited material. These samples will be analyzed for VOAs, metals, and cyanides.

The stream's sediments will be sampled in a downstream to upstream fashion. Chemical-resistant gloves and boots will be worn when collecting samples.

The specific sediment sampling protocol is as follows:

1. The sampler will stand downstream of the sampling point while collecting the sample.

2. The sediments will be collected using precleaned, stainless steel trowels from the top 1 to 2 centimeters of deposited material.

3. The collected sediments will be placed into a precleaned, stainless steel bucket and then will be sieved through a size 10 precleaned, stainless steel sieve into another precleaned, stainless steel bucket to remove larger pebbles, rocks, and organic debris.

4. The samples will be placed in the sample containers specified in Subsection 3.2. The volatile organic portion of the sample will be collected first, ensuring that the vial is completely filled to avoid excess headspace. The Teflon liner should rest on the contents of the vial.

5. All pertinent information will be recorded in the field logbook (time of collection, physical characteristics of the sample, etc.).

6. The samples will be packaged as specified in Subsection 3.7 and chain-of-custody records, sample tags, and other required documentation will be completed and included with the shipment.

7. The dedicated stainless steel trowels, sieves, and buckets will be decontaminated using the procedures described in Subsection 3.1.3.

2.8 SURVEYING

A general site plan will be developed for the EKCO site. Additional vertical and horizontal locations of new monitor wells will be surveyed and will be added to the existing survey database. Top of casing elevations will be surveyed to the nearest 0.01-foot relative to mean sea level (MSL). Horizontal locations of wells and borings will be determined to the nearest foot based upon direct measurements from buildings and other permanent markers. From this site plan and the water level data two potentiometric maps will be prepared for the bedrock and unconsolidated formations.

2.9 WATER LEVEL DATA COLLECTION

The tops of the inside well casings of all monitor wells will be surveyed for elevation to the nearest 0.01-foot. The wells will be horizontally located to an accuracy of 1 foot and will be located on the site maps to be prepared for this project.

Groundwater level measurements will be taken using an electric water level probe in all wells prior to sampling. Measurements will be taken from the surveyed reference point marked on the top of the low-carbon steel risers. These data will determine the amount of water to be evacuated from each well prior to sampling (see Subsection 2.2.1). Water level measurements will be taken three times per well or until measurements are within ±0.01-foot. Measurements will be recorded in the field notebook and on field sampling sheets.

2.10 FIELD ANALYTICAL PROCEDURES

As part of the analytical protocol for all samples, several parameters will be tested in the field. All liquid samples will be tested for temperature, pH, and specific conductance (SC). At each sampling location a sample aliquot will be collected in a clean, 8-ounce jar for the purpose of field testing. The following subsections describe the procedures for analysis of field parameters.

2.10.1 pH Measurement

The pH of all liquid samples will be measured using a Fisher Model No. 107 portable water pH meter (or similar). Before analyzing a sample, the pH meter will be calibrated and will be checked against standard buffer solutions. The probe will then be rinsed with distilled water and placed in the sample to be tested. One minute will be allowed for the meter to stabilize, and the reading will then be recorded in the field logbook. After the reading is taken, the probe will be rinsed with distilled water and placed in pH 7.0 buffer solution until its next use.

2.10.2 Specific Conductance and Temperature Measurement

The specific conductance and temperature of all liquid samples will be taken with a YSI Model 33 meter (or similar). The probe will be rinsed with distilled water in between samples. The temperature will be taken with the knob set on "temperature" and the specific conductance measured using the appropriate range of the "conductance" setting. One minute should be allowed for the reading to stabilize prior to recording the measurement in the field logbook. When not in use, the probe will be placed in a jar of distilled water.

SECTION 3

FIELD QUALITY ASSURANCE/QUALITY CONTROL

3.1 DECONTAMINATION

All material and equipment will arrive onsite in clean condition. Recommended procedures for equipment decontamination, described in the subsections below, will be followed where applicable. (Procedures for personal decontamination are presented in Appendix A.)

3.1.1 Drilling, Soil Sampling, and Monitor Well Installation Equipment Decontamination

Prior to the start of drilling, all drill rods, augers, bits, and split-spoon samplers will be steam cleaned at an area set up onsite for this purpose. The decontamination will be performed by the drilling subcontractor to the satisfaction of the site geologist and will be documented in the field notebook.

Augers, tools, drill rods, casings, and screens will be inspected to ensure that residue such as muds and machines oils are removed. Similar decontamination procedures will be implemented between each boring to prevent cross-contamination and to ensure the integrity of soil samples. All equipment will also be decontaminated prior to removal from the facility.

3.1.2 Well Development Equipment Decontamination

Submersible pumps and equipment used for well development will be decontaminated between wells. Pumps will be decontaminated by submerging the pump intake or downhole portions in a washing solution (laboratory-grade detergent), then in clean potable water, and then pumping the solutions through the pump and line.

3.1.3 Water and Soil Sampling Equipment Decontamination

Bailers used for water sampling, as well as other miscellaneous sampling equipment (split-spoons, buckets, sieves), will be decontaminated between sampling points. Pumps used for well purging will be decontaminated by submerging the pump intake first in a washing solution (laboratory-grade detergent), then in clean potable water, and then pumping these solutions through the pump system until the discharge is free of detergent.

The procedure for decontaminating sampling equipment between sampling points and for precleaning dedicated sampling equipment is as follows:

- Place dirty equipment, (e.g., bailers, pumps, buckets, etc.) on a plastic ground sheet at the head of the "decontamination line."
- Rinse equipment in a tub of potable water to remove surface dirt and mud, if necessary.
- Scrub equipment with a bristle brush in a basin filled with laboratory-grade detergent and potable water.
- Rinse off soap in a tub of potable water.
- Rinse with reagent-grade methanol.
- Allow equipment to dry.
- Final rinse with distilled water.
- Allow equipment to dry before use.
- Wrap equipment in aluminum foil to protect from contamination, where appropriate.

3.2 SAMPLE CONTAINER AND PRESERVATION REQUIREMENTS

All samples submitted for analysis on this project will be collected by WESTON personnel. Sampling containers and preservatives will be provided on request by WESTON's analytical laboratory. The specific requirements for sample containers, preservatives, and analytical holding times are discussed in the following subsections.

3.2.1 Sample Containers

All containers provided by WESTON will be obtained from I-Chem, Hayward, California, the bottle contractor to the U.S. EPA Contract Laboratory Program. The containers provided are those described in 40 CFR Part 136, No. 209, 26 October 1984. These containers are cleaned by I-Chem in accordance with U.S. EPA protocols. The containers purchased from I-Chem are I-Chem Series 200 containers. Each lot of these containers is analyzed in accordance with I-Chem quality control requirements and is not shipped by I-Chem unless the QC requirements are met. The types of containers that will be provided for each analyte are listed in Table 3-1, along with the holding times and preservatives required for each analysis.

Table 3-1

Sample Containers, Sample Volumes, Preservation, and Holding Times

Aqueous Samples

Analyte	Container	Volume	Preservation	Maximum Holding Time[1]
Volatile Organics	G, w/Teflon-lined silicone rubber septum	2x40 ml	Cool, 4°C	14 days
Metals	P, Teflon-lined cap	1 L	Field - filter groundwater only HNO_3 pH<2 Cool, 4°C	180 days[2]
Cyanide	P, Teflon-lined cap	1 L	NaOH pH>12 Cool, 4°C	14 days

Soil Samples

Analyte	Container	Volume	Preservation	Maximum Holding Time[1]
Volatile Organics	G, w/Teflon-lined silicone rubber septum	2x40 ml	Cool, 4°C	14 days
Metals	G, amber wide-mouth, Teflon-lined cap[3]	500 ml	Cool, 4°C	180 days[2]
Cyanide	G, amber wide-mouth, Teflon-lined cap[3]	500 ml	Cool, 4°C	14 days

G = Glass.
P = Plastic.
[1]This is the maximum holding time from date of collection.
[2]Mercury holding time is 28 days.
[3]Samples for metals and cyanide analyses may be collected in the same 500-ml jar.

All sample containers provided by WESTON will be shipped with chain-of-custody records (see Subsection 3.5). These chain-of-custody records will be completed by the field sampling personnel and shipped with the samples.

3.2.2 Sample Preservation

The preservatives required for all analyses will be provided by WESTON with the sample containers. The required preservation methods for target analyses are listed in Table 3-1.

3.2.3 Holding Times

The holding times for all required analyses are measured from time of sample collection and are given in Table 3-1.

Upon sample receipt at the WESTON laboratory, all sample collection dates are noted by the sample custodian. The required date for completion of analysis (or extraction) is noted and is keyed to the holding time. All analyses that have holding times of 48 hours or less are identified by the sample custodian, and the appropriate Laboratory Section Manager and analyst are notified that the samples are in the laboratory. A Laboratory Project Manager has been assigned and will be responsible for ensuring proper execution of all required analyses.

3.3 SAMPLE IDENTIFICATION AND DOCUMENTATION

Each sample container will be labeled with the following information:

- Sample identification code specified in Subsection 3.4.
- Date/time of collection.
- Preservative.
- Analysis requested.
- Any special information including potential level of contamination.

After sample collection and before proceeding to the next sampling point, the samplers will complete the following procedures:

- Enter the sample into the chain-of-custody record per Subsection 3.5.
- Apply signed custody seals on opposite sides of the container lid.

A bound field notebook will be maintained by the Field Team Leader at the site to record daily activities including sample collection and tracking information. Entries will be made in waterproof ink. A separate entry will be made for each sample collected. Entries will include at least the following information:

- Sample identification code.
- Sample location and depth.
- Date and time of collection.
- Sample container/preservative (i.e., cool at 4°C).
- Analysis requested (i.e., VOA).
- Sampling personnel.
- Comments and other relevant observations, such as sampling technique and any modifications to the sampling procedure, color, odor, texture, and other sample characteristics.

3.4 SAMPLE IDENTIFICATION CODE

A unique sample code will be assigned to each sample collected. This will consist of a character code that describes the sample type and location. The sample location is indicated by two characters and a number that are identified as one of the following:

- Subsurface soil samples.
- Sediment samples.
- Groundwater samples.
- Surface water samples.

The number indicates which sampling location in Figures 1-2, 2-1, 2-7, or 2-8 was sampled. Since three soil samples will be taken at every soil boring location, this number is followed by another number that indicates the interval sampled in the particular soil boring. Sample types and location designations are presented in Table 3-2.

3.5 CHAIN-OF-CUSTODY PROCEDURES

All WESTON field personnel will follow the U.S. EPA chain-of-custody procedures to ensure preservation of the integrity of all samples. WESTON chain-of-custody records will be used for all sample manifesting on the project. The chain-of-custody records will be initiated by the WESTON laboratory at the time

Table 3-2

Sample Identification Codes

Sample Type	Sample Location Identifiers	Sample Type Identifier	Additional Sample Identifier
Subsurface Soils	SSB1-SSB3 BSB1-BSB6 SB-1-SB-15	SS	Split-spoon sample interval (i,e.,1 to 3 ft)
Sediment	1-5	CS	---
Groundwater	Well designation R1 - R5 I-1 - I-8 L-1 - L-5	GW	Date of sampling event (i.e., 9/1/88)
Surface Water	1-3	SW	---

Notes:

1. Quality control samples will be identified by the addition of the following identifiers as required:
   MS - Matrix Spike
   MSD - Matrix Spike/Duplicate Spike
   FB - Field Blank
   TB - Trip Blank
   Dup - Duplicate

2. Example: A subsurface soil sample taken from SB-1 at the 1 to 3-foot interval will be designated as SB-1-SS-1-3, or a groundwater duplicate sample taken on 12 October 1988 from L-1 will be designated as L-1-GW-10/12/88.

of sample bottle preparation and will follow each bottle through the sequence from bottle preparation through completion of chemical analysis. A copy of this form is included as Figure 3-1.

Collected samples will be under lock and key or under visual control at all times until their shipment to the laboratory. WESTON field samplers will act as sample custodians and document control officers to monitor the location of collected samples and to record vital sample information in field log-books.

Each sample will receive a unique WESTON sample number at the laboratory and will be logged into the laboratory computer. The sample will be assigned to an analysis lot after it is logged in the computer system. A chain-of-custody form will accompany all samples throughout sample movement in the laboratory. Every person handling a sample will note the location change, time, date, and reason for movement.

3.6 QUALITY CONTROL SAMPLES

The reliability and credibility of analytical laboratory results is established by QC samples such as the inclusion of scheduled replicate analyses, analysis of standard or spiked samples, and the analysis of split samples. Section 5 describes in greater detail the Laboratory Quality Assurance Program.

Field QC samples will consist of replicate soil, sediment, and water samples, field blank samples (equipment decontamination rinsate), and trip blank samples. Replicate, field, and trip blank samples will be analyzed for VOAs. Replicates will be collected at a minimum frequency of one per every 20 soil, sediment, or water samples collected. The replicates or duplicates will be analyzed for the same parameters as those analyzed in the samples of the media.

A field blank begins with a group of laboratory-cleaned sample containers. The containers are transported empty into the field and are used in collecting "rinse water" obtained by pouring laboratory demonstrated analyte-free (HPLC) water over the equipment used to receive the various types of samples. Field blanks will be analyzed for the same parameters as the samples obtained with the equipment from which the blank was collected. One field blank will be collected for each 20 samples.

Trip blanks will be provided by the laboratory and will consist of two 40-ml vials with septum caps containing deionized water. The trip blanks will be capped in the laboratory and will remain capped until returned to the laboratory with the field samples. The trip blanks, to be analyzed for VOAs, will be handled and transported in the same manner as field samples.

Custody Transfer Record/Lab Work Request

Received By _____ Client _____ RFW Contact _____

Date _____ Client Contact _____ Date Due _____

Assigned to _____ Phone _____ Project Number _____

SAMPLE IDENTIFICATION						ANALYSES REQUESTED							
Sample No.	Client ID No.	Description	Matrix	Date Collected	Container/Preservative								

Matrix:

S- Soil **DS-** Drum Solids
W- Water **DL-** Drum Liquids
O- Oil **X-** Other

Special Instructions:

Items/Reason	Relinquished By	Received By	Date	Time	Items/Reason	Relinquished By	Received By	Date	Time

RFW 21-21-001/A-3/86

FIGURE 3-1 CHAIN-OF-CUSTODY FORM

3.7 SAMPLE PACKAGING AND SHIPMENT

All samples shipped to WESTON's laboratories will be packaged and shipped as environmental samples. Sample packaging procedures will comply with all U.S. Department of Transportation (DOT) requirements for shipment of environmental samples as follows:

- The lid of each labeled jar will be secured with a strip of custody tape.
- Individual sample jars will then be sealed in Ziploc plastic bags and placed in coolers.
- Vermiculite will be placed around the bags in the cooler. Ice will be placed in the cooler.
- One chain-of-custody form will be completed for each cooler, placed in a large Ziploc bag, and taped to the inside lid of the cooler.
- The cooler will be taped closed and sealed with custody tape on two sides such that opening the cooler will break the custody tape.
- The following labels will be placed on the cooler:
  - Upward pointing arrow labels on all four sides.
  - "This End Up" on top.

Samples will typically be transported from the field to WESTON's laboratory using an overnight carrier service.

3.8 FIELD EQUIPMENT CALIBRATION

The reliability and credibility of analytical field measurements will be ensured by calibration of the instrumentation. The following subsections review calibration procedures and frequencies for the following in-field analytical instruments to be used during the investigation:

- HNu Photoionization Analyzer.
- Organic Vapor Analyzer (OVA).
- Specific Conductance Meter/Temperature Probe.
- pH Meter.

The instruments will be calibrated before and after each field use or as otherwise described below. Where necessary, instruments will be calibrated each day during field use. The manufacturer's recommended calibration procedures will be followed.

3.8.1 HNu Photoionization Analyzer

The HNu photoionization analyzer is designed to measure the concentration of trace gases in many industrial or plant atmospheres. The analyzer employs the principle of photoionization for detection. A sensor, consisting of a sealed ultraviolet light source, emits photons having sufficient energy to ionize many trace species, particularly organics. The instrument will be calibrated by following the listed procedures:

1. Insert one end of the T tube into probe. Insert the second end of the probe into calibration gas to the 20-200 ppm range. The third end of the probe should have the rotometer (bubble meter) attached.

2. Set the function switch to the 0-200 ppm range.

3. Crack the valve on the pressured calibration gas container until a slight flow is indicated on the rotometer. The instrument will draw in the volume required for detection, with the rotometer indicating excess flow.

4. Adjust the span potentiometer so that the instrument is reading the exact value of the calibration gas (calibration gas value is labeled on the cylinder).

5. Turn instrument switch to the standby position and check the electronic zero. Reset zero potentiometer as necessary.

6. Record on the form provided all original and readjusted settings as specified by the form.

7. Next, set the function switch to the 0-20 ppm range. Remove the mid-range (20-200 ppm) calibration gas cylinder and attach the low-range (0-20 ppm) calibration gas cylinder as described above.

8. Do not adjust the span potentiometer. The observed reading should be ± 3 ppm of the concentration specified for the low-range calibration gas. If this is not the case, recalibrate the mid-range scale repeating procedures 1 to 7 listed above. If the low-range reading consistently falls outside the recommended tolerance range, the probe light source window likely needs cleaning. When the observed reading is within the required tolerances, the instrument is fully calibrated.

The HNu instrument will be calibrated once per week at minimum.

3.8.2 Organic Vapor Analyzer

The OVA is capable of detecting nearly all organic compounds. The instrument is factory calibrated to a methane-in-air standard, but it can be easily calibrated to any of a variety of compounds for precise analyses.

A "Gas Select" control on the instrument panel is used to set the electronic gain to a particular organic compound. Internal electronic adjustments are provided to calibrate and align the electronic circuits. There are four adjustments on the electronics board, but one adjustment potentiometer, R-38, is used to set the power supply voltage and has a one-time factory adjustment. The other three adjustments, R-31, R-32, and R-33, are used for setting the electronic amplifier gain for each of the three calibration ranges. The instrument must be removed from its case to access these adjustments.

To calibrate the OVA to methane, follow the procedures for gain adjustment and bias adjustment.

Gain Adjustment

1. Turn on instrument. Set "Calibrate" switch to x10 and "Gas Select" control to 300.

2. Use the "Calibrate Adjust" knob to adjust the meter reading to zero.

3. Introduce a methane sample of a known concentration (near 100 ppm) and adjust trimpot R-32 on the circuit board so that the meter reads the concentration as equivalent to that of the known sample. This sets the instrument gain for methane, with the gain adjustment on the panel ("Gas Select" knob) set at a reference of 300.

4. Turn off the H_2 "Supply Valve" to put out the flame.

Bias Adjustment

5. Leave the "Calibrate" switch on x10 position and use the "Calibrate Adjust" knob to adjust the meter reading to 4 ppm.

6. Turn the "Calibrate" switch to x1. Using trimpot R-31 on the circuit board, adjust the meter reading to 4 ppm.

7. Set the "Calibrate" switch to x10 again and use the "Calibrate Adjust" knob to set the meter reading to 40 ppm.

8. Move the "Calibrate" switch to x100 position and use trimpot R-33 on the circuit board to adjust the meter to 40 ppm.

9. Set the "Calibrate" switch to x10 position and use the "Calibrate Adjust" knob to adjust the meter to zero.

The unit is now balanced from range to range, calibrated to methane, and ready for use.

The OVA instrument will be calibrated once per week at a minimum.

3.8.3 Specific Conductance Meter/Temperature Probe

The YSI Model 33, or equivalent, is a portable, battery-operated, transistorized instrument used to measure salinity, specific conductance, and temperature in surface water, groundwater, and wastewater systems. The meter is calibrated daily or each time the meter is turned on (if more than once per day) by turning the MODE control to REDLINE and adjusting the REDLINE control so that the indicator lines up with the redline on the meter face.

3.8.4 pH Meter

The Fisher Model No. 107 pH meter, or equivalent, is a portable pH monitoring instrument for determining pH in surface and groundwaters, waste systems, and other water quality applications.

The instrument requires field calibration daily or each time the meter is turned on (if more than once per day). Distilled water and buffer solutions (pH 7 and pH 4) are required for field calibration. All solutions must be at the same temperature to reduce meter stabilization time and to maintain accuracy. The instrument is calibrated as follows:

1. Rinse the electrode in distilled water.

2. Place the electrode in the pH 7 buffer solution and allow the meter reading to stabilize.

3. Adjust the control using the knob on the front panel of the instrument until the meter reads pH 7.

4. Rinse the electrode in distilled water.

5. Place the electrode in pH 4 solution and allow the meter readout to stabilize.

6. Adjust the control knob until the meter reads the correct value of the pH 4 solution.

7. Rinse probe in distilled water.

8. Repeat steps 2 through 7.

9. Record results in logbook.

SECTION 4

ANALYTICAL PROGRAM

All analytical work performed in the assessment of groundwater, soil, and stream/sediment contamination for the EKCO facility will be performed by WESTON Analytics using EPA-approved methods. Analytical methods will be those specified in SW846, except for specific samples, which will be analyzed using modified EPA Method 524 for VOAs to acquire lower quantification limits. EPA Method 524 will be modified appropriately in order to quantify the following compounds:

- Acetone.
- Carbon Disulfide.
- Trans-1,2-Dichloroethene.
- Vinyl Acetate.
- 2-Butanone.
- 2-Hexanone.
- 4-Methyl-2-Pentanone.
- 2-Chloroethylvinylether.

Quality assurance and documentation procedures in accordance with CLP guidelines will be performed on an "as needed" basis.

All samples will be analyzed for the volatile organic compounds, metals, and cyanides specified in Table 4-1, Table 4-2, Table 4-3, and Table 4-4, as required by the specified analytical method with the corresponding quantification/detection limits. All groundwater samples will be analyzed for the specified volatile organics, metals, and cyanide. Soil gas will be analyzed in accordance with Subsection 2.4. Subsurface soil samples will be analyzed for the same volatile organics, metals, and cyanides. Three samples will be taken per soil boring, and all will be taken above the water table. Surface water samples and sediments taken from Newman Creek will also be analyzed for VOAs, metals, and cyanide. Table 4-5 summarizes the groundwater assessment/analyses program at EKCO. A detailed discussion of analytical methods, objectives, and data reporting for each environmental media of concern is given in the following subsections.

4.1. GROUNDWATER ANALYSIS

Groundwater quality at the site will be monitored at all monitor wells (with the exception of D-1-27, D-2-30, and D-3-17). Additionally, the three production wells, W-1, W-2, and W-10, and the Ohio Water Service well no. 4 will be sampled for analysis.

Table 4-1

Volatile Organic Constituents and Detection Limits
for EPA Method 8240[1]

	Compound[3]	CAS Number	Detection Limits[2] Low Water ug/L	Low Soil/Sediment ug/Kg
Volatiles				
1.	Chloromethane	74-87-3	10	10
2.	Bromomethane	74-83-9	10	10
3.	Vinyl Chloride	75-01-4	10	10
4.	Chloroethane	75-00-3	10	10
5.	Methylene Chloride	75-09-2	5	5
6.	Acetone	67-64-1	10	10
7.	Carbon Disulfide	75-15-0	5	5
8.	1,1-Dichloroethene	75-35-4	5	5
9.	1,1-Dichloroethane	75-35-3	5	5
10.	trans-1,2-Dichloroethane	156-60-5	5	5
11.	Chloroform	67-66-3	5	5
12.	1,2-Dichloroethane	107-06-2	5	5
13.	2-Butanone	78-93-3	10	10
14.	1,1,1-Trichloroethane	71-55-6	5	5
15.	Carbon Tetrachloride	56-23-5	5	5
16.	Vinyl Acetate	108-05-4	10	10
17.	Bromodichloromethane	75-27-4	5	5
18.	1,1,2,2-Tetrachloroethane	79-34-5	5	5
19.	1,2-Dichloropropane	78-87-5	5	5
20.	trans-1,3-Dichloropropane	10061-02-6	5	5
21.	Trichloroethene	79-01-6	5	5
22.	Dibromochloromethane	124-48-1	5	5
23.	1,1,2-Trichloroethane	79-00-5	5	5
24.	Benzene	71-43-2	5	5
25.	cis-1,3-Dichloropropane	10061-01-5	5	5

[1]Detection limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.
[2]Specific detection limits are highly matrix-dependent. The detection limits listed herein are provided for guidance and may not always be achievable.
[3]Dichlorobenzene will be quantified by extending the method run time. The MDL is 5 ug/L in both water and soil.

Table 4-1[1]
(continued)

	Compound[3]	CAS Number	Detection Limits[2] Low Water ug/L	Low Soil/Sediment ug/Kg
26.	2-Chloroethyl Vinyl Ether	110-75-8	10	10
27.	Bromoform	75-25-2	5	5
28.	2-Hexanone	591-78-6	10	10
29.	4-Methyl-2-pentanone	108-10-1	10	10
30.	Tetrachloroethene	127-18-4	5	5
31.	Toluene	108-88-3	5	5
32.	Chlorobenzene	108-90-7	5	5
33.	Ethyl Benzene	100-41-4	5	5
34.	Styrene	100-42-5	5	5
35.	Total Xylenes	100-43-5	5	5

[1]Detection limits listed for soil/sediment are based on wet weight. The detection limits calculated by the laboratory for soil/sediment, calculated on dry weight basis, will be higher.
[2]Specific detection limits are highly matrix-dependent. The detection limits listed herein are provided for guidance and may not always be achievable.
[3]Dichlorobenzene will be quantified by extending the method run time. The MDL is 5 ug/L in both water and soil.

Table 4-2

Standard Analytes and Minimum Detection Limits (MDLs) for EPA Method 524

Analyte[1]	Retention Time (minutes) Column[2]	MDL (ug/L)
Chloromethane	0.97	0.41
Vinyl Chloride	1.04	0.23
Bromomethane	1.29	0.27
Chloroethane	1.45	0.14
1,1-Dichloroethene	2.33	0.26
1,2-Dichloroethene	3.54	0.17
Methylene Chloride	2.66	0.5
1,1-Dichloroethane	4.03	0.17
Chloroform	5.55	0.14
1,1,1-Trichloroethane	6.76	0.5
1,2-Dichloroethane	7.00	0.1
Carbon Tetrachloride	7.41	0.08
Benzene	7.41	0.07
1,2-Dichloropropane	8.94	0.24
Trichloroethene	9.02	0.27
Bromodichloromethane	9.34	0.52
Toluene	11.51	0.30
1,1,2-Trichloroethane	11.99	0.20
1,3-Dichloropropane	12.48	0.23
Dibromochloromethane	12.80	0.18
Tetrachloroethene	13.20	0.19
Chlorobenzene	14.33	0.18
Ethylbenzene	14.73	0.19
p-Xylene	15.30	0.19
m-Xylene	15.30	0.19
Bromoform	15.70	0.15
o-Xylene	15.78	0.16
Styrene	15.78	0.18
1,1,2,2-Tetrachloroethane	15.78	0.23
<u>Internal Standard</u>		
Fluorobenzene	8.81	6.45

[1]Additional analytes will be quantified as noted in Table 4-3.
[2]The column is a 30-meter x 0.32-mm ID DB-5 capillary with a film thickness of 1 µm.

Table 4-3

Additional Analytes and Minimum Detection Limits (MDLs) for Modified EPA Method 524

Analyte	MDL (ug/L)
2-Butanone	1.0
Acetone	1.0
Carbon Disulfide	0.5
4-Methyl-2-Pentanone	1.0
2-Chloroethylvinylether	1.0
Vinyl Acetate	1.0
2-Hexanone	1.0

Table 4-4

Inorganic Constituents and Detection Limits

Element	Detection Level Water (ug/L)	Detection Level Soil (mg/kg)
Aluminum	200	40.0
Antimony	60	12.0
Arsenic	10	2.0
Barium	200	40.0
Beryllium	5	1.0
Cadmium	5	1.0
Calcium	5,000	1,000
Chromium	10	2.0
Cobalt	50	10.0
Copper	25	5.0
Iron	100	20.0
Lead	5	1.0
Magnesium	5,000	1,000
Manganese	15	3.0
Mercury	0.2	0.2 (ug/l)
Nickel	40	8.0
Potassium	5,000	1,000
Selenium	5	1.0
Silver	10	2.0
Sodium	5,000	1,000
Thallium	10	2.0
Vanadium	50	10.0
Zinc	20	4.0
Cyanide	10	1.0

Table 4-5

Data Objectives
EKCO Housewares, Inc.

Matrix	Location	Parameters	Data Objectives	Lab	Methods	Data Deliverable Package
Groundwater	Monitor wells L-1, L-2, L-3, L-4, L-5	Volatile organics, metals, and cyanide	RCRA Subpart F Groundwater Quality Monitoring	WESTON Analytics in all cases	8240, 6000/7000, 9010	WESTON Level I
	Monitor wells R-1, R-2, R-3, W-1, W-2, W-10	Volatile organics, metals, and cyanide	Assessment of horizontal and vertical extent of contaminant migration	WESTON Analytics in all cases	8240, 6000/7000, 9010	WESTON Level I
	Monitor wells D-4-30, I-2, I-5	Volatile organics, metals, and cyanide	Assessment of horizontal and vertical extent of contaminant migration	WESTON Analytics in all cases	8240, 6000/7000, 9010	WESTON Level I
	Monitor wells R-4, R-5, I-4, I-6, I-7, I-8, S-7, and Ohio Water Service well No. 4	Volatile organics, metals, and cyanide	Assessment of horizontal and vertical extent of contaminant migration	WESTON Analytics in all cases	524, 6000/7000, 9010	WESTON Level III
Soil Gas	Soils in the vicinity of the use of or bulk storage of volatile organic compounds	Volatile organics	Screening of subsurface soils at the site for target volatile compounds leading to source areas of these compounds	WESTON Analytics in all cases	Roy F. Weston, Inc.	N/A
Soils	Up to 15 soil borings taken in the area of high soil gas readings	Volatile organics, metals, and cyanide	Quantification of VOAs, metals, and cyananide levels in subsurface soils	WESTON Analytics in all cases	8240, 6000/7000, 9010	WESTON Level III, to verify negative results from soil gas survey or 10%. Remainder Level I
Surface Water	Newman Creek	Volatile organics, metals, and cyanide	Quantification of contaminant migration into Newman Creek	WESTON Analytics in all cases	8240, 6000/7000, 9010	WESTON Level I

Table 4-5
(continued)

Matrix	Groundwater Assessment Analysis Component	Parameters	Data Objectives	Lab	Methods	Data Deliverable Package
Stream Sediment Samples	Newman Creek	Volatile organics, metals, and cyanide	Quantification of contaminant retention into Newman Creek	WESTON Analytics in all cases	8240, 6000/7000, 9010	WESTON Level I

Note: WESTON Level III is full CLP documentation and WESTON Level I is the standard commerical documentation package.

Groundwater quality will be analyzed for volatile organic compounds (Tables 4-1, 4-2, and 4-3) and inorganic constituents (specified in Table 4-4). The analytical methods are those specified in EPA SW846, with the exception of modified EPA Method 524 for volatile organic compounds, which is an analytical method approved by EPA under the Safe Drinking Water Program. Modified EPA Method 524 will be used for offsite or perimeter wells to obtain the lower quantification limits of this method at those locations.

Two levels of data documentation will be obtained for these analyses. WESTON Level I (standard commercial) data packages will be provided for the majority of groundwater quality analyses. However, WESTON Level III (full CLP) data packages will be provided for offsite or perimeter wells that are felt to be critical data points in the assessment. These wells are specified in Table 4-5.

4.2 SOIL ANALYSIS

4.2.1 Soil Gas Analysis

Details of soil gas analyses are described in Subsection 2.4. Specific locations where soil gas analysis will be conducted are as follows:

- Tanks.
  - Underground storage.
    - Fuel oil.
    - Gasoline.
    - Solvent.
- Aboveground tanks.
  - Trichloroethylene storage tanks.
  - At degreaser tanks within the plant boundary.
- At process well W-10.
- In the vicinity of the incinerator.
- At the hazardous waste storage area.
- At various locations surrounding the surface impoundment.
- At the effluent discharge sewer to Newman Creek.
- At various locations in the railroad yard surrounding the property to the east and west.

This analysis will be performed in the field.

The specific soil gas analytical protocol is as follows:

1. The soil gas samples will be analyzed in the field using a mobile GC unit with an appropriate detector specific to the target compounds. Because TCA and TCE have been identified at the highest levels in groundwater samples from the site, these two compounds will be considered the target compounds and an electron capture detector and appropriate standards will be utilized. The analytical QA/QC will follow laboratory QA/QC procedures for gas chromatography referenced in Subsection 5.4.1.

2. Samples will be drawn from the bulbs with gas-tight syringes that will be directly injected into the GC unit.

3. Detection limits will depend upon the interferences from other compounds present in the soil gas.

4. Quantifications of the target compounds will be accomplished by the external standard method, with calibration check standards being run at least four (4) times daily.

5. All samples will be run in duplicate, usually at different sample volumes. Air, nitrogen, and hexane blanks will also be run frequently to check for and to minimize the effects of carryover or cross-contamination between separate runs.

6. It is anticipated that approximately 15 samples will be collected and analyzed each day.

4.2.2 Soil Boring Analysis

Results of the soil gas survey described in Subsection 4.2.1 will be used to assist in the determination of the location of soil borings. Soil borings will be taken to further define the extent and to quantify the levels of VOAs in the unsaturated soils in areas identified in the soil gas survey. Up to 15 borings will be taken, depending on the soil gas findings.

Selected borings will be sampled at 0-2 feet, 4-6 feet, and 10-12 feet below ground level or at the discretion of the onsite geologist. Factors influencing selection of boring material for analysis include the presence of characteristic vapors or discoloration not indigenous to the soil type.

As before, the boring material will be analyzed for volatile organics, metals, and cyanide. Volatile organic compounds will be analyzed using EPA Method 8240 as specified in Table 4-1. Metals will be analyzed via the EPA 6000/7000 Series Method and cyanide will be analyzed by EPA Method 9010.

A full U.S. EPA CLP data validation and deliverable package will be prepared for soil boring samples selected at random (WESTON Level III). The number of these samples selected for CLP data treatment will not cause the total number of all samples selected for CLP data treatment to exceed 10 percent of the total samples analyzed. Samples not selected for the EPA CLP data validation will receive the standard commercial data deliverable format (WESTON Level I).

4.3 SURFACE WATER/STREAM SEDIMENT

Newman Creek runs along the northern boundary of the EKCO Housewares property in the proximity of the surface impoundment (see Figure 2-1). Surface water and stream sediment will be sampled from this creek to quantity the impact of plant activity on stream quality. Sampling will be conducted as follows. Surface water will be sampled upstream, adjacent to, and downstream relevant to the surface impoundment. Sediment samples will also be taken at these locations and two additional sediment samples will be taken between the original adjacent and downstream samples.

Surface water samples will be analyzed for volatile organics via EPA Method 8240. Metals and cyanide will be analyzed by appropriate methods found in SW-846. Analytical data obtained from surface water will be presented via the standard commercial data deliverable format (WESTON Level I). Analytical results from stream sediment samples will be presented in accordance with U.S. EPA CLP data deliverable guidelines (WESTON Level III).

4.4 SAMPLE ANALYSIS PROGRAM

Table 4-6 summarizes the number of sample containers that need to be filled for each sample matrix and analysis, including QC requirements.

Table 4-6

Approximate Totals for Number of Container Samples

Environmental Media	Number of Sampling Locations	Containers Per Location	Containers Subtotal	Duplicate Sample Container (1 for every 20 field samples)	Field Blank Container (1 for every 20 field samples)	Matrix Spike/Matrix Spike Duplicate Sample Container (1 for every 20 field samples)	Approximate Total Number of Containers*
Groundwater	22	2 VOC 1 Metal 1 Cyanide	88	1	5	1	95
Surface Water	3	2 VOC 1 Metal 1 Cyanide	12	1	1	1	15
Soil Boring Samples	5 3 depth intervals	2 VOC 1 Metal 1 Cyanide	180	9	9	9	207
Stream Sediment Samples	5	2 VOC 1 Metal 1 Cyanide	20	1	1	1	23

*Totals are only approximate since daily totals will control the number of duplicate, QC, and matrix spike/matrix spike duplicate samples.

SECTION 5

LABORATORY QA/QC CHECKS

The purpose of quality assurance/quality control checks is to produce precise, accurate, and complete data. The specific QA objectives for this project are discussed in Subsection 1.4. Table 1-2 summarizes the QA/QC control for each analytical method used.

5.1 OVERVIEW

Quality assurance checks are usually divided into two groups:

- Internal checks and laboratory methods.
- External checks usually accomplished by multilaboratory evaluation of split samples.

The internal checks described in this section will be employed specifically for this project. Site-specific external quality assurance checks are not planned for use during this project because WESTON has been subjected to periodic external performance audits under the U.S. EPA Contract Laboratory Program. As part of those audits, the laboratory has participated quarterly in the analysis of performance evaluation samples from the U.S. EPA Contract Laboratory Program for organics and inorganics.

5.2 INTERNAL QUALITY ASSURANCE CHECKS

Internal quality assurance procedures are designed to ensure consistency and continuity of data. These procedures include:

- Instrument performance checks.
- Instrument calibration.
- Retrieval of documentation pertaining to instrument standards, samples, and data.
- Documentation of analytical methodology and QC methodology (QC methodology includes spiked samples, duplicate samples, blanks, and check standards for method accuracy and precision).
- Documentation of sample preservation and transport (see Subsections 3.2 and 3.7).

Internal quality assurance checks on field activities will be performed by the Field Team Leader. Internal quality assurance checks for laboratory activities will be the responsibility of the Laboratory Manager.

5.3 QUALITY ASSURANCE REPORTS

The Laboratory Quality Assurance Officer will prepare a report detailing the following information:

- Data accuracy.
- Data precision.
- Completeness with respect to planned analyses.
- Results of any performance or systems audits conducted during the project.
- Significant QA problems and recommended solutions.

This information will be made a part of the final report.

Comprehensive QA records will be maintained to provide evidence of the quality assurance activities. Records of the quality assurance program implementation will be written and retained on file. Quality assurance documents will be archived in the project file along with raw data, laboratory notebooks, and other information pertinent to the project.

The retention of quality assurance records is essential to provide support in evidentiary proceedings. The original quality assurance records, including the front pages of the chain-of-custody forms for the EKCO site, will be retained in the project file. Long-term storage of these documents in archives is described in Subsection 6.3. Quality assurance evaluations will be performed prior to releasing data for U.S. EPA and OEPA review.

The Laboratory Manager will be responsible for ensuring that quality assurance records are properly filed and stored and that they can be readily retrieved.

5.4 FREQUENCY OF INTERNAL QUALITY CONTROL CHECKS

The frequency of quality checks is based on the type of analysis. Regularly scheduled analysis of known duplicates, standards, and spiked samples are a routine aspect of the data reduction, validation, and reporting procedures. Specific frequency criteria for internal quality assurance checks cited below are presented in the WESTON Analytical Laboratory Quality Assurance Plan.

5.4.1 Gas Chromatography/Mass Spectroscopy (GC/MS)

5.4.1.1 GC/MS Instrument Performance Documentation

Mass spectrometers are tuned on a daily basis to manufacturer's specifications with FC-43. In addition, once per shift these instruments are tuned with decafluorotriphenylphosphine (DFTPP) or 4-bromo-fluorobenzene (BFB) for semivolatiles or volatiles, respectively. Ion abundances will be within the windows dictated by the specific program requirements. Once an instrument has been tuned, initial calibration curves for analytes (appropriate to the analyses to be performed) are generated for at least five (5) solutions containing known concentrations of authentic standards of compounds of concern. The calibration curve will bracket the anticipated working range of analyses.

Calibration data, to include linearity verification determined by response factor evaluation (RSD <30 percent for compounds named in ensuing Subsection 5.4.1.2 of this operating practice), will be maintained in the laboratory's permanent records of instrument calibrations.

5.4.1.2 GC/MS Method Performance Documentation

During each operating shift, a midpoint calibration standard is analyzed to verify that the instrument responses are still within the initial calibration determinations. The calibration check compounds will be those analytes used in the EPA Contract Laboratory Program's multicomponent analyses (e.g., priority pollutants and hazardous substances list), with the exception that benzene is used in place of vinyl chloride (volatiles) and di-n-octyl phthalate is deleted from the semivolatile list.

The response factor drift (% D, i.e., percent difference compared to the average response factor from the initial calibration) will be calculated and recorded. If significant (>30%) response factor drift is observed, appropriate corrective actions will be taken to restore confidence in the instrumental measurements.

All GC/MS analyses will include analysis of a method blank and two spikes (semivolatiles and pesticides/PCBs, as appropriate) in each lot of twenty (20) or fewer samples. The U.S. EPA-CLP matrix spike solutions will be used for both matrix spikes and blank spikes. In addition, appropriate surrogate compounds specified in EPA methods will be spiked into each sample. Recoveries from method spikes and surrogate compounds are calculated and recorded on control charts to maintain a history of system performance.

A method blank spike duplicate (BSD) sample may be analyzed in place of the matrix spike for analytical lots of less than ten (10) samples.

Audit samples will be periodically analyzed to compare and verify laboratory performance against standards prepared by outside sources.

5.4.1.3 GC/MS Detection Limits

The U.S. EPA-CLP contract required quantitation limits (CRQL) are used for reporting GC/MS data (volatiles). These detection limits are compared with laboratory-determined instrument detection limits to ensure that the reported values are attainable. Instrument detection limits are determined from triplicate analysis of target compounds measured at three to five times the CRQL. The calculated instrument detection limit is three times the standard deviation of the measured values.

5.4.1.4 GC Calibration

Gas chromatographs will be calibrated prior to each day of use. Calibration standard mixtures will be prepared from appropriate reference materials and will contain analytes appropriate for the method of analysis.

Working calibration standards will be prepared fresh daily. The working standards will include a blank and a minimum of five concentrations to cover the anticipated range of measurement. At least one of the calibration standards will be at or below the desired instrument detection limit. The correlation coefficient of the plot of known versus found concentrations (or response) must be at least 0.996 in order to consider the responses linear over a range. If a correlation coefficient of 0.996 cannot be obtained, additional standards must be analyzed to define the calibration curve. A midpoint calibration check standard will be analyzed each shift to confirm the validity of the initial calibration curve. The check standard must be within 20 percent of the initial response curve to demonstrate that the initial calibration curse is still valid.

Calibration data, including the correlation coefficient, will be entered into laboratory notebooks to maintain a permanent record of instrument calibrations.

5.4.1.5 GC Quality Control

At least one method blank and two method spikes will be included in each laboratory lot of samples representing a minimun of 5 percent of QC. Lot sizes vary depending on the

volume of sample submitted for analysis. Regardless of the matrix being processed, the method spikes and blanks will be in aqueous media. Method spikes will be at a concentration of approximately five times the detection limits.

The method blanks will be examined to determine if contamination is being introduced in the laboratory.

The method spikes will be examined to determine both precision and accuracy. Accuracy will be measured by the percent recovery of the spikes. These recoveries will be plotted on control charts to monitor method accuracy. Precision will be measured by the reproducibility of both method spikes and will be calculated as relative percent difference (% RPD). These percent RPDs will be plotted on control charts to monitor method precision.

5.4.2 Atomic Absorption Spectrophotometry (AA)

Atomic absorption spectrophotometers will be calibrated prior to each day of use.

Calibration standards will be prepared from appropriate reference materials, and working calibration standards will be prepared fresh daily. The working standards will include a blank and a minimum of three concentrations to cover the anticipated range of measurement.

Duplicate injections will be made for each concentration. At least one of the calibration standards will be at or below the desired instrument detection limit. The correlation coefficient of the plot of known versus found concentrations will be at least 0.996 in order to consider the responses linear over a range. If a correlation coefficient of 0.996 cannot be achieved, the instrument will be recalibrated prior to analysis of samples.

Calibration data, including the correlation coefficient, will be entered into laboratory notebooks to maintain a permanent record of instrument calibrations.

5.4.2.1 AA Method Performance Documentation

At least one method blank and two method blank spikes (laboratory control samples (LCS)) will be included in each laboratory lot of samples. Regardless of the matrix being processed, the LCS and blanks will be in aqueous media. The LCS will be at a concentration of approximately five times the detection limit.

The method blanks will be examined to determine if contamination is being introduced in the laboratory and will be introduced at a frequency of one per analytical lot or five percent of the samples, whichever is more. The LCS will be examined to determine both precision and accuracy. Accuracy will be measured by the percent recovery (percent R) of the spikes. The recovery must be within the range 80 to 120 percent to be considered acceptable, with the exception of antimony and silver due to documented method deficiencies in achieving reliable results. Additionally, the LCS percent R will be plotted on control charts to monitor method performance.

Precision will be measured by the reproducibility of both LCS's and will be calculated as relative percent difference (percent RPD). Results must agree within 20 percent RPD in order to be considered acceptable.

5.4.2.2 AA Detection Limits

The laboratory routinely reports EPA-CLP contract required quantification limits (CRQLs) for client reports. The CRQLs correspond to the SW-846 6000/7000 series detection limits listed in Table 4-3. These limits are compared with laboratory-determined Instrument Detection limits (IDLs) on a quarterly basis to ensure that the reported values are attainable. IDLs are determined from three nonconsecutive days analysis of seven consecutive measurements of target compounds at three to five times the IDL. Each day's seven measured values are averaged and the respective standard deviation calculated. Three times the standard deviation of the average of the standard deviations obtained from the three days' analysis is defined as the IDL. The IDL must be at or below the CRQLs.

5.4.3 Inductively Coupled Plasma Spectroscopy (ICP)

5.4.3.1 ICP Calibration

The inductively coupled plasma spectrometer will be calibrated prior to each day of use. Calibration standards will be prepared from reliable reference materials and will contain all metals for which analyses are being conducted. Working calibration standards will be prepared fresh daily. The working standards will include a blank and a minimum of five concentrations to cover the anticipated range of measurement. Duplicate readings will be made for each concentration. At least one of the calibration standards will be at or below the desired instrumental detection limit. In order to consider the responses linear, the correlation coefficient of the plot of responses versus concentrations will be at least 0.996. If a correlation coefficient of 0.996 cannot be obtained, the spectrometer will be recalibrated prior to analysis of samples. This calibration will be done quarterly to verify the linear range of the instrument.

Calibration data, including the correlation coefficient, will be entered into laboratory notebooks to maintain a permanent record of instrument calibrations.

On a daily basis, the instrument will be calibrated using a standard at the high end of the calibration range. This standard must not deviate more than ±5 percent from the quarterly established value. The calibration is verified with a mid-range calibration check standard that is prepared from a different source than the instrument calibration standard. This standard must not deviate more than ±10 percent from the target value. In addition, a linear range check at approximately two times the detection limit will be analyzed to verify linearity near the detection limit.

5.4.3.2 ICP Quality Control

At least one method blank and two method blank spikes (laboratory control samples: LCS) will be included in each laboratory lot of samples. Regardless of the matrix being processed, the LCS's and blanks will be in aqueous media. The LCS will be at a concentration of approximately five times the detection limit.

The method blanks will be examined to determine if contamination is being introduced in the laboratory.

The LCS results will be examined to determine both precision and accuracy. Accuracy will be measured by the percent recovery (% R) of the spikes. The recovery must be within the range of 80 to 120 percent to be considered acceptable. Additionally, the LCS % R will be plotted on control charts to monitor method accuracy.

Precision will be measured by the reproductability of both LCS's and will be calculated as relative percent difference (% PRD). Results must agree within 20 percent RPD in order to be considered acceptable.

5.4.3.3 ICP Detection Limits

The laboratory routinely provides EPA-CLP contract required quantitation limits (CRQLs) for client reports. The CRQLs correspond to the SW-846 6000/7000 series detection limits listed in Table 4-3. These limits are compared with laboratory determined Instrument Detection Limits (IDLs) on a quarterly basis to ensure that the reported values are attainable. IDLs are determined from three nonconsecutive days' analysis of seven consecutive measurements of target compounds at three to five times of IDL. Each day's seven measured values are averaged and the respective standard deviation calculated. Three times the standard deviation of the average of the standard deviations obtained from the three days' analysis is defined as the IDL. The IDLs must be at or below the CRQLs.

5.5 QUALITY CONTROL SAMPLES

Standard analytical quality control checks to be instituted by field and laboratory personnel include but are not limited to:

- Field Blanks - Samples prepared using analyte-free water supplied by the laboratory (or purchased from commercial sources that certify the quality of the water) by running the water through the decontaminated sampling implements and directly into a prepared sample container. During field sampling a field blank will be collected and analyzed from each group of samples of a similar matrix type for each batch of samples or for each 10 samples received, whichever is more frequent.

- Trip Blanks - Volatile organic samples prepared in the laboratory using analyte-free water. The trip blanks accompany the field samples during transport to the site, during collection, packaging, and transport to the lab, during analysis, and will be contained in the same type of sample container as those used in the current sampling effort. One trip blank sample will be analyzed for each day of sampling.

- Duplicate Samples - Samples collected from the same sampling location at the same time. Soil duplicates will be homogenized (with exception of VOA samples). At least one duplicate sample will be analyzed from each group of samples of a similar matrix type or for each 20 samples received, whichever is more frequent.

- Matrix Spike/Matrix Spike Duplicate - Samples in which compounds are added before extraction and analyses. The recoveries for spiked compounds can be used to accept or reject data. At least one spiked sample analysis will be performed on each group of samples of a similar matrix type and concentration for each batch of samples or for each 20 samples received, whichever is more frequent.

5.6 SOIL GAS QA/QC PROCEDURES

WESTON has developed a QA/QC program for soil-gas investigation that has been accepted by U.S. EPA for use on Superfund sites. The main points of the program are:

- Copper/Teflon probes are used only once during the day and then steam cleaned at the end of each working day to eliminate the possibility of cross-contamination.

- Probe adaptors (steel reducer and tubing) are continually checked for contamination by running system blanks. Adaptors are also cleaned at the end of each working day by baking in a GC oven.

- Glass syringes are purged with carrier gas (nitrogen) and baked out between probe samplings.

The analytical QA/QC will follow laboratory QA/QC procedures for gas chromatography and GC/MS referenced in WESTON Analytics QA/QC plan. In addition, quantification of the compounds in the soil gas will be accomplished by the external standard method, with calibration check standards being run several times daily. Twenty percent of the samples will be run in duplicate, usually at different sample volumes. At one soil gas sampling point, replicate samples will be taken over a period of time in order to demonstrate precision and lack of variability of concentrations at a particular site over small periods of time. Air, nitrogen, and hexane blanks will also be run frequently to check for and minimize the effects of carryover or cross-contamination between separate runs.

SECTION 6

DATA MANAGEMENT

6.1 FIELD AND TECHNICAL DATA

The field and technical (non-laboratory) data that will be collected can generally be characterized as either "objective" or "subjective" data.

Objective data include all direct measurements of field data such as field screening/analytical parameters and water level measurements. Subjective data include descriptions and observations. Soil boring and well logs (Figures 2-3 through 2-6) include both types of data in that the data recorded in the field are descriptive, but can be reduced using a standardized lithologic coding system.

Field Logs

All data collection activities performed at a site will be documented either in a field notebook or on appropriate forms. Entries will be as detailed and descriptive as possible so that a particular situation can be recalled without reliance on the collector's memory. All field log entries should be dated. Field notebooks will be bound books and will be assigned to individual field personnel for the duration of their stay in the field. All field log forms will be kept in ring binders assigned to individual field personnel.

The cover of each notebook or ring binder will contain the following information:

- Person to whom the book is assigned.
- Project name.
- Start date.
- End date.

6.1.1 Data Reduction

As described in Subsection 6.1, all field data will be recorded by field personnel in bound field notebooks and on the appropriate forms in ring binders. For example, during drilling activities the field team member supervising a rig will keep a chronologic log of drilling activities, a vertical descriptive log of lithologies encountered, other pertinent drilling information (staining, odors, field screening, atmospheric measurements, water levels, geotechnical data), and a

labor and materials accounting in his/her bound notebook. Upon completion of each test boring or monitor well, a form will be completed that will include lithologic codes along with descriptive data.

After checking the data in the field notes and forms (see Data Validation in Subsection 6.1.2 below), the Laboratory Data Administrator will reduce the data to tabular form, wherever possible, by entering it in data files. Where appropriate, the data files will be set up for direct input into the database. For example, the form for a test boring or well log will be checked against the field notes and then keypunched directly to the database. Other objective data may be set up in spreadsheet type tabular files (e.g., water level data). Subjective data will be filed as hard copies for later review by the Technical Manager and for incorporation into technical reports as appropriate.

6.1.2 Data Validation

Validation of objective field and technical data will be performed at two different levels. On the first level, data will be validated at the time of collection by following standard procedures and QC checks (e.g., triplicate measurements) specified in Subsection 6.2. At the second level, data will be validated by the Data Administrator who will review it to ensure that the correct codes and units have been included.

After data reduction into tables or arrays, the data will be reviewed for anomalous values. Any inconsistencies of anomalies discovered by the Data Administrator will be resolved immediately, if possible, by seeking clarification from the field personnel responsible for collecting the data.

Subjective field and technical data will be validated by the Technical Leader, who will review field reports for reasonableness and completeness. In addition, random checks of sampling and field conditions will be made by the Field Supervisor, who will check recorded data at that time to confirm the recorded observations. Whenever possible, peer review will also be incorporated into the data validation process, particularly for subjective data, in order to maximize consistency between field personnel. For example, during drilling activities the Field Supervisor will schedule periodic reviews of archived lithologic samples to ensure that the appropriate lithologic descriptions and codes are being consistently applied by all field personnel.

6.2 LABORATORY DATA

The laboratory data will include all data generated from laboratory analysis of samples, such as results from physical and chemical testing.

6.2.1 Data Logging

The sample custodian, upon receipt of samples for analysis accompanied by a completed request for analysis and/or chain-of-custody form, will perform the following:

- Verify completeness of submitted documents including the chain-of-custody forms.
- Log in samples, assign unique lot log numbers, and attach the numbers to the sample container(s).
- Open the project file and enter data on the laboratory computer.
- Assign priority and hazard rating criteria.
- Store samples in refrigerated sample bank.

6.2.2 Data Collection

In addition to the data collected in the field and recorded on the chain-of-custody forms, data describing the processing of samples will be accumulated in the laboratory and recorded in laboratory notebooks. Laboratory notebooks will contain:

- Date of processing.
- Sample numbers.
- Client (optional).
- Analyses or operation performed.
- Calibration data.
- Quality control samples included.
- Concentrations/dilutions required.
- Instrument readings.
- Special observations (optional).
- Analyst's signature.

6.2.3 Data Reduction

Data reduction is performed by the individual analysts and consists of calculating concentrations in samples from the raw data obtained from the measuring instruments. The complexity of the data reduction will be dependent on the specific analytical method and the number of discrete operations (extractions, dilutions, and concentrations) involved in obtaining a sample that can be measured.

For those methods using a calibration curve, sample responses will be applied to the linear regression line to obtain an initial raw result, which is then factored into equations to obtain the estimate of the concentration in the original sample. Rounding will not be performed until after the final result is obtained to minimize rounding errors and results will not normally be expressed in more than two significant figures.

Copies of all raw data and the calculations used to generate the final results will be retained on file to allow reconstruction of the data reduction process at a later date.

6.2.4 Data Validation

System reviews are performed at all levels. The individual analyst constantly reviews the quality of data through calibration checks, quality control sample results, and performance evaluation samples. These reviews are performed prior to submission to the Laboratory Section Managers or to the Analytical Project Manager.

The Laboratory Section Manager and/or the Analytical Project Manager will review data for the precision, accuracy, and completeness criteria to assess the validity of the measurements. Selected hard copy output of data (chromatograms, spectra, etc.) will be reviewed to ensure that results are correctly interpreted. Unusual or unexpected results will be reviewed and a resolution will be made as to whether the analysis should be repeated. In addition, the Laboratory Project Manager or Laboratory Section Manager will recalculate selected results to verify the calculation procedure.

The final routine review is performed by the Laboratory Manager prior to reporting the results to the client. Nonroutine audits are performed by regulatory agencies and client representatives. The level of detail and the areas of concern during these reviews are dependent on the specific program requirements.

6.2.5 Data Reporting

Reports will contain final results (uncorrected for blanks and recoveries), methods of analysis, levels of detection, surrogate recovery data, and method blanks data. In addition, special analytical problems and/or any modifications of referenced methods will be noted. The number of significant figures reported will be consistent with the limits of uncertainty inherent in the analytical method. Consequently, most analytical results will be reported to no more than two significant figures. Data are normally reported in units commonly used for the analyses performed. Concentrations in

liquids are expressed in terms of weight per unit volume (e.g., milligrams per liter). Concentrations in solid or semisolid matrices are expressed in terms of weight per unit weight of sample (e.g., micrograms per gram).

Reported detection limits will be the concentration in the original matrix corresponding to the low-level instrument calibration standard after concentration, dilution, and/or extraction factors are accounted for.

6.2.6 Data Deliverable Package

Upon completion of the data reporting for a batch of samples, a deliverable package will be assembled for EKCO Housewares, Inc., U.S. EPA, and OEPA review. The type and content of each deliverable package will depend on the data objectives from the samples being analyzed. The two different package types being used for this project are summarized below.

6.2.6.1 Level I: Standard Commercial Data Deliverable Package

Level I is the standard commercial data package that includes:

- A cover page describing data qualifiers, sample collection, extraction, and analysis dates, and a description of any technical problems encountered with the analysis.
- Spreadsheet sample data with QC result summaries.

6.2.6.2 Level III WESTON Analytics

A Level III data deliverable package is the full U.S. EPA CLP data report as described in the U.S. EPA CLP Statement of CLP Work (7/85).

6.3 DATA ARCHIVING

The laboratories will maintain on file all of the raw data, laboratory notebooks, and other documentation pertinent to the work on a given project. This file will be maintained for 5 years from the date of invoice unless a written request is received for an extended retention time.

Data retrieval from archives will be handled in a similar fashion as a request for analysis. Specifically, a written work request to include a quotation must be submitted for retrieval of data. Client confidentiality will be maintained with retrieved data. Consequently, the laboratory will honor only those requests for data authorized by the original client.

6.4 DATA REPORTING

At the conclusion of this study a final report will be prepared. The report will first be submitted as a preliminary draft for regulatory agency review and comment. The report will include discussion of regional and site-specific hydrogeology, well and boring logs, water level data, cross sections, groundwater contour maps, chemical analysis results from soil and water samples, and quality assurance/quality control documentation. Laboratory results will include results from both field and laboratory quality control samples.

SECTION 7

PERFORMANCE AND SYSTEM AUDITS

7.1 GENERAL

Independent audits of field sampling, preservation, shipping, and equipment cleaning procedures conducted by U.S. EPA or OEPA representatives are anticipated during the course of the project. Audits, if any, will be conducted during actual field operations.

After such an audit has taken place, the OEPA auditor will be requested to brief the Field Team Leader to discuss any nonconforming actions or procedures observed. Corrective action (if any) that may be taken as a result of the audit will be documented in the project files.

7.2 FIELD AUDITS

An unannounced audit of the ECKO Housewares, Inc. site pertaining to conformance with QA/QC procedures may be performed by designated WESTON personnel. The auditing of field operations is in keeping with WESTON Corporate QA policy and is primarily performed for internal use. The Corporate QA Manager randomly chooses the project to audit. The auditor informs the Project Manager of the audit the day prior to auditing. A written report on the results of this audit (and where necessary a notice of nonconformance) will be submitted to the following:

- U.S. EPA Site Manager.
- OEPA Site Manager.
- Project Manager.
- Field Team Leader.

A nonconformance notice describes any nonconforming conditions and sets a date for response and corrective action. The response is reviewed by the U.S EPA Site Manager and, if satisfactory, is approved in writing.

At the completion of the project, a final quality assurance audit will be performed. A statement will be included in the final report that summarizes any deviations from approved methods and their impact on results. Data completeness, precision, and accuracy will be evaluated to determine sufficiency of the data obtained during the project.

7.3 EXTERNAL AUDITS

Unannounced audits of the field procedures or laboratory may be conducted by U.S. EPA or OEPA. Written reports on the results of these audits will be distributed to the same individuals listed in Subsection 7.2. Nonconformances will be addressed in a manner similar to the procedures applicable to field audits.

External performance audits are periodically conducted as requirements for formal laboratory certification programs, such as analyzing public drinking water systems. WESTON does participate in these external audits.

7.4 CORRECTIVE ACTION

7.4.1 General

The Project Manager will ensure that additional work that is dependent on the nonconforming activity is not performed until the nonconformance is corrected.

When a nonconformance or deficiency is identified during a formal U.S. EPA or OEPA audit or during a routine WESTON QA inspection, corrective action will be initiated by the Field Team Leader or other appropriate individual (e.g., Laboratory Quality Assurance Manager). The auditor will also be responsible for ensuring corrective actions that adequately address the nonconformance have been taken. A nonconformance report form will be filed for nonlaboratory-related deficiencies.

Technical staff will be responsible for reporting suspected technical nonconformances by initiating a nonconformance report on any issue, deliverable, or document. Project personnel will be responsible for reporting suspected quality assurance nonconformances by initiating a nonconformance report. The technical and/or analytical Project Manager will be responsible for ensuring that corrective actions for nonconformances are implemented by the following:

- Evaluation of reported nonconformances.
- Control of additional work on nonconforming items.
- Determination of disposition or action to be taken.
- Maintenance of a log of nonconformance.
- Review of nonconformance reports.
- Evaluation of disposition or action taken.
- By ensuring conformance.

7.4.2 Laboratory Activities

7.4.2.1 Gas Chromatography/Mass Spectrometry

The GC/MS instrumentation will be employed in this project for organic compound analyses. During each shift the analyst will verify that the instrument responses are within the initial calibration. The response factor drift (percent RSD) will be calculated and recorded. If calibration check compound (CCC) and system performance check compound (SPCC) criteria are not met, corrective action will be taken as per the U.S. EPA CLP Statement of Work for Organics Analysis.

7.4.2.2 AA/ICP Spectroscopy

An inductively coupled plasma (ICP) spectrometer and an AA spectrometer will be employed for the analysis of inorganics (metals). As described in OP 21-20-019, the calibration curve frequency and criteria will be utilized with specified corrective action taken as required. Such corrective action follows the U.S. EPA CLP Statement of Work for Inorganic Analysis.

SECTION 8

PREVENTIVE MAINTENANCE

8.1 FIELD EQUIPMENT

An inventory control system governing field equipment and instrumentation will be maintained by the equipment storeroom supervisor as the basis for maintenance and calibration control. The inventory control documentation includes the following:

- Description of instrument.
- Manufacturer, model number, and serial number.
- Identification number.
- Name, address, and telephone number of company that services the instrument or equipment.
- Type of service policy.
- Timing and frequency of routine maintenance, service, and calibration.

8.2 GENERAL EQUIPMENT MAINTENANCE AND REPAIR

Instruments will be maintained in accordance with manufacturers' specifications. More frequent maintenance may be required depending on operational performance. Instrument logs will be maintained to document the date and type of maintenance performed.

Contracts on major instruments with manufacturers and service agencies are used to provide routine preventive maintenance and to ensure rapid response for emergency repair service. Minimal instrument down-time is experienced through the use of these contracts.

8.3 LABORATORY EQUIPMENT

The following instrumentation will be used for chemical analyses:

1. Analysis by gas chromotography of organic compounds consisting of:
    - Volatiles (VOAs).

2. Analysis by AA and/or ICP of inorganic compounds consisting of:

- Metals.
- Cyanide.

Procedures for maintenance and calibration are in accordance with the manufacturer's specifications and are described in the WESTON Laboratory Quality Assurance Plan (OP 21-20-018). Full manufacturer's service agreements are maintained for all GC, AA, and ICP instrumentation. Typical response to emergency repairs takes place within 24 to 48 hours. Spare parts are retained in the laboratory's inventory for routine repair. Trained service representatives may be consulted or used for more complex repairs.

APPENDIX A

HEALTH AND SAFETY PLAN

1206E

WESTON
Personnel Protective and Safety Equipment Request Form

Client: EKCO / AMERICAN HOME PRODUCTS Date: 5/3/88

Project: WELL INSTALLATION

W.O.#: 2994-02-01-

WESTON Work Location: MASSILLON OHIO

Task: WELL INSTALLATION

Equipment requested by: L. Sherrerd Steele
(Name)

Requested by Telephone: _____
(Name)

Requested by Telephone: _____
(Date)

Equipment required by: MAY 16, 1988 (Monday)
(Date)

Equipment to be returned by: JUNE 3, 1988
(Date)

Ship Equipment to: L. Sherrerd Steele (WESTON) c/o Tom Singlet
EKCO Housewares
359 State Ave, NW. Massillon OHIO 44648

Site Safety Coordinator: L. Sherrerd Steele
(Name)

Site Level of Protection: D
(A, B, C, D)

Site Safety Plan:

(✓) Submitted to HSD on 1/8/88
(Date)

(✓) Approved by HSD on 1/11/88
(Date)

( ) Submitted to DSO/RSO on _____
(Date)

( ) Approved by DSO/RSO on _____
(Date)

( ) Other _____

( ) Note required _____

Project Manager Approval By: [signature] Date: [illegible]

Health & Safety Approval By: [signature] Date: 5.5.88

Equipment Manager or Supervisor: _____ Date: _____

Signature of person receiving the equipment: _____

RFW04-05-002/A-11/87 Pink - Health and Safety Yellow - Requestor White - Central Equipment Stores

Entered

PLAN Ecko Housewares

REVIEWER Non

HASP REVIEW CHECKLIST

Purpose of Review Plan: [ ] Information/Draft Plan Review

[✓] Pre-approval Review

[✓] PD/PM Approval

[ ] RSO/DSO Approval (no)

[ ] Personnel on Plan Certified - NOT identified

[✓] SHSC Certified

[ ] Is the Plan Technically Sound?

[✓] Great [ ] Good [ ] Bad

[✓] Is the Plan "Do-able"; Reality? _____

[✓] Deficiencies: Explain: _____

(1) No list of personnel and their certifications

(2) No subcontractor identified

[✓] Did You Talk to Plan's Author? (Identify who you talked to and key items.) yes. Sherwood will get list of people and sub before equipment request

[ ] Status: [✓] ~~OK for~~ NON Approved [ ] Wait For Corrections

[ ] Corrections Made on Plan [✓] Other _____

wait for above before equip

ATTACH TO PLAN! LOG IN INFORMATION ON HASP LOG! THANK YOU!

WESTON

WORK LOCATION PERSONNEL PROTECTION AND SAFETY EVALUATION FORM

Attach Pertinent Documents/Data

Fill in Blanks As Appropriate

WO # 2994-02-01

Division ECON

Office WEST CHESTER

Prepared by L. Sherrerd Steele

Date 1/8/88

Reviewed by M. O'Neill

Date 1-11-88

Approved by M. O'Neill

Date 1-11-88

A. Work Location Description

1. Name ECKO HOUSEWARES

2. Location 3rd Street N
MASSillon, OHIO

3. Type: HW Site ( ) Industrial (X)
Spill ( ) Construction ( )
( ) Existing WESTON Work Location
( ) Existing Client Work Location
Other (X) Describe GRANDWATER / SOIL CONTAMINATION AT SITE

4. Status Active FACILITY

5. Anticipated activities: GRAND WATER ASSESSMENT: SOIL BORI, Well INSTALLATION, SOIL GAS Survey, Stream + GW Sampling

6. Size ≅ 130 Acres

7. Surrounding Population City of MASSILLON just 2,000 feet to EAS

8. Buildings/Homes/Industry Light to Heavy Industry; RURAL Resid homes to EAST + South, Suburban Residential homes to North + We

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WESTEEN

9. Topography Generally flat (alluvial plain) gently sloping to Newman Creek and the Tuscarawas River.

10. Anticipated Weather Late winter → Early Spring

11. Unusual Features Plant property surrounded by B&O Penn Central Railroads. A lagoon which previously contained products is located just north of the plant.

12. Site History 1945 began making cookware using electroplating a 1967 used porcelain + teflon coating operations. In 1954 used for making military shell casings. Currently, plant makes only bakeware (coated) from purchased tin-plated iron mat

B. Hazard Description

1. Background Review: Complete (X) Partial ( )

If partial, why? _____

2. Hazard Level: A ( ) B ( )

Unknown ( ) C (X) D (X)

Justification Documented levels of Volitiles in Air/water

3. Types of Hazards: (Attach additional sheets as necessary)

A. Chemical (X) Inhalation (X) Explosive (

Biological ( ) Ingestion (X) O_2 Def. (

Skin Contact (X) Toxic (

Describe Document levels of TCA, TCE, Vinyl chloride, and Several metals

B. Physical (X) Cold Stress (X) Noise (X

Heat Stress (X) Other (

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WESTON

Describe Tripping on residual metal debris / over Rail road tracks.

C. Radiation ( )

Describe

4. Nature of Hazards:

Air (X) Describe Volitilization of organics may occur while opening / purging / sampling wells

Soil (X) Describe Possible residual metals in sub-surface soils near lagoon (Cr, Pb, Cd)

Surface Water ( ) Describe

Groundwater (X) Describe Contains ppm levels of TCA, TCE Dichloroethane, Trans, 1,2 Dichloroethene, Xylenes. Contact may occur while sampling as well as inhalation / injestion

Other ( ) Describe

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5. Chemical Contaminants of Concern ( ) N/A

Contaminant	TLV (PPM)	I.D.L.H. (PPM)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	IP	Rel. % Resp	Instruments Used to Monitor Contaminant
TCA	350	?	GW/soils	Inhalation/ Injestion/ Contact	Drowsiness, unconsciousness dizziness, eye irritant. Dematitis	?	105	?
TCE	50	1000			Vertigo, headache, visual distortion, nausea, vomiting irritant of nose + eye	9.5	70	HNU 10.2/OVA
1,1 Dichloroethane	100(PEL)	4,000			Drowsiness, unconsciousness skin irritant, Kidney Dam.	?	80	?
1,1 Dichloroethene	200(PEL)	4,000			irrit. eyes, resp. system. Injestion: Depression	9.65	50	HNU 10.2/OVA
trans 1,2 Dichloroethene	?	?			Dizziness, Nausea vomiting	9.96	50	HNU 10.2/OVA
Ethyl Benzene	100(PEL)	2,000			coma, respiratory + mucous membrane irrit., eye irrit., skin discoloration	8.76	100	HNU 10.2/OVA
Toluene	100	2,000			weakness, headaches, drowsiness, coma, respiratory eye + skin irrit.	8.8	100	HNU 10.2/OVA
Xylenes	100(PEL)	10,000			Dizziness, excitement, drow. inco, staggering, irrit. of eyes, nose, throat, vomit abdominal pain, dermatitis	8.56	116	HNU 10.2/OVA
Vinyl Chloride	1ppm - 5ppm 15 min. Ceiling →			Inhalation	Weak, abdom. PAIN, GI bleeding, hemato-megaly, [Carc]	9.995	40	HNU 10.2/OVA

6. Physical Hazards of Concern ( ) N/A

Hazard	Description	Location	Procedures Used to Monitor Hazard
Cold Stress	Skin slightly flushed, changes to white or greyish yellow, blisters Numbness, hypothermia	outside in Elements	Stay out of wind monitor work/rest ratios.
Heat Stress	Dehydration, pale cool moist skin, heavy sweating, dizziness, nausea, fainting	Outside in Sun.	monitor work/rest ratios by testing heart rate/pulse rates.
Tripping	———	Near Rail road tracks + scrap waste area	Be alert + aware of where you're walking

WESTON

7. Work Location Instrument Readings ( ) N/A

Location on site wells (except Production wells + Piezometers)

% O_2 — % LEL —

Radioactivity — PID ND

FID — Other —

Other — Other —

Location W-1 (production well)

% O_2 — % LEL —

Radioactivity — PID 3ppm+, 0ppm++, 3ppm+, 0

FID — Other

Other — Other

Location W-10 (production well)

% O_2 — % LEL —

Radioactivity — PID 50ppm+, 0ppm++, 55ppm+,

FID — Other

Other — Other

Location P-4-30 P-1-84 (Piezometers)

% O_2 — % LEL —

Radioactivity — PID 10ppm, 0ppm, 25ppm 55ppm, 0ppm, 6ppm, 0,

FID — Other

Other — Other

8. Hazards expected in preparation for work assignment. (X) N/A

Describe:

+ = Inside casing when first opened.
++ = Breathing zone " "
+ = Inside casing 2 mins after opening.

(R-1 -> R-4, W-1, W-10 and possibly New wells)

WESTON

And New wells if read exceed 10 ppm

C. Personnel Protective Equipment

1. Level of Protection

A ( ) B ( ) C (X) D ( ) Location/Activity:
Soil Boring, drilling in "hot spots", GW sampling of "D" wells

A ( ) B ( ) C ( ) D (X) Location/Activity:
Soil Gas, MW installation, GW sampling in wells not exceeding FID readings 10 ppm, Sediment Sampling, Splash sampling

2. Protective Equipment (specify probable quantity required)

Respiratory ( ) N/A

( ) SCBA, Airline

(X) Full Face Respirator (Cart. GMC-H)

( ) Escape Mask

( ) None

( ) Other_____

( ) Other_____

Clothing ( ) N/A

( ) Fully Encapsulating Suit

( ) Chemically Resistant Splash Suit

( ) Apron, Specify_____

( ) Tyvek Coverall

(C) (X) Saranex Coverall

(D) (X) Coverall, Specify cotton

( ) Other_____

( ) Other_____

Head & Eye ( ) N/A

(X) Hard Hat

(X) Goggles

( ) Face Shield

( ) Chemical Eyeglasses

( ) None

( ) Other_____

Hand Protection ( ) N/A

(C+D) (X) Undergloves latex (Type)

( ) Gloves _____ (Type)

(C+D) (X) Overgloves PVC (Type)

( ) None

( ) Other_____

WESTON

Foot Protection ( ) N/A

(C+D) (X) Safety Boots

(+N) (X) Disposable Overboots

( ) Other _____

_____

3. Monitoring Equipment ( ) N/A

( ) CGI

( ) O_2 Meter

( ) Rad Survey

( ) Detector Tubes

Type: _____

_____

_____

(X) PID

(X) FID

( ) Other _____

_____

( ) Other _____

_____

D. **Personnel Decontamination** (Attach Diagram)

Required (X) Not Required ( )

Equipment Decontamination (Attach Diagram)

Required (X) Not Required ( )

If required, describe and list equipment _____

Alconox

Dionized water

Trash BAGS.

Buckets

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E. Personnel

	NAME	WORK LOCATION TITLE/TASK	MEDICAL CURRENT	FIT TEST CURRENT	CERTIFIC LEVEL
1.			( )	( )	( )
2.			( )	( )	( )
3.			( )	( )	( )
4.			( )	( )	( )
5.			( )	( )	( )
6.			( )	( )	( )
7.			( )	( )	( )
8.			( )	( )	( )
9.			( )	( )	( )
10.			( )	( )	( )

Site Safety Coordinator_____

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DATES NOT confirmed, to date

F. **Activities Covered Under this Plan** Soil gas sampling, Soil borings, MW installation groundwater sampling, Surface water sampling, Sediment Sampling

Task No.	Description	Preliminary Schedule

G. Subcontractor's Health and Safety Program Evaluation ( ) N/A

Name and Address of Subcontractor: Subcontractor not procured yet.

Activities to be Conducted by Subcontractor: _____

EVALUATION CRITERIA

Item	Adequate	Inadequate	Comments
Medical Surveillance Program	( )	( )	
Personal Protective Equipment Availability	( )	( )	
On-Site Monitoring Equipment Availability	( )	( )	
Safe Working Procedures Specification	( )	( )	
Training Protocols	( )	( )	
Ancillary Support Procedures (if needed)	( )	( )	
Emergency Procedures	( )	( )	
Evacuation Procedures Contingency Plan	( )	( )	
Decontamination Procedures Equipment	( )	( )	
Decontamination Procedures Personnel	( )	( )	

GENERAL HEALTH AND SAFETY PROGRAM EVALUATION: ADEQUATE ( ) INADEQUATE ( )

ADDITIONAL COMMENTS: _____

EVALUATION CONDUCTED BY: _____ DATE: _____

H. Contingency Contacts

Agency	Contact	Phone Number
Fire Department		833-105
Police Department		830-1735
Health Department		
Poison Control Center		
State Environmental Agency Ohio EPA	William Miller	425-917
EPA-Regional Office		
EPA-ERT. ICOM		
Spill Contractor		
State Police		
F.A.A.		
Civil Defense		
On Site Coordinator		
Site Telephone		
Nearest Telephone		
Other Weston H+S	martin O'Neil (Location)	430-740
	George Crawford	430-741

I. Contingency Plans

Spill, Accidental Release; Describe immediately evacuate site and notify fire/police Dept.

Fire Explosion; Describe "

Other; Describe

Exit Routes, Communication Systems; Describe

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WESTON

MEDICAL EMERGENCY

Name of Hospital Massillon Community Hospital

Address: 875 8th Str. NE Phone No. 832-8761

Name of Contact

Address: Phone No.

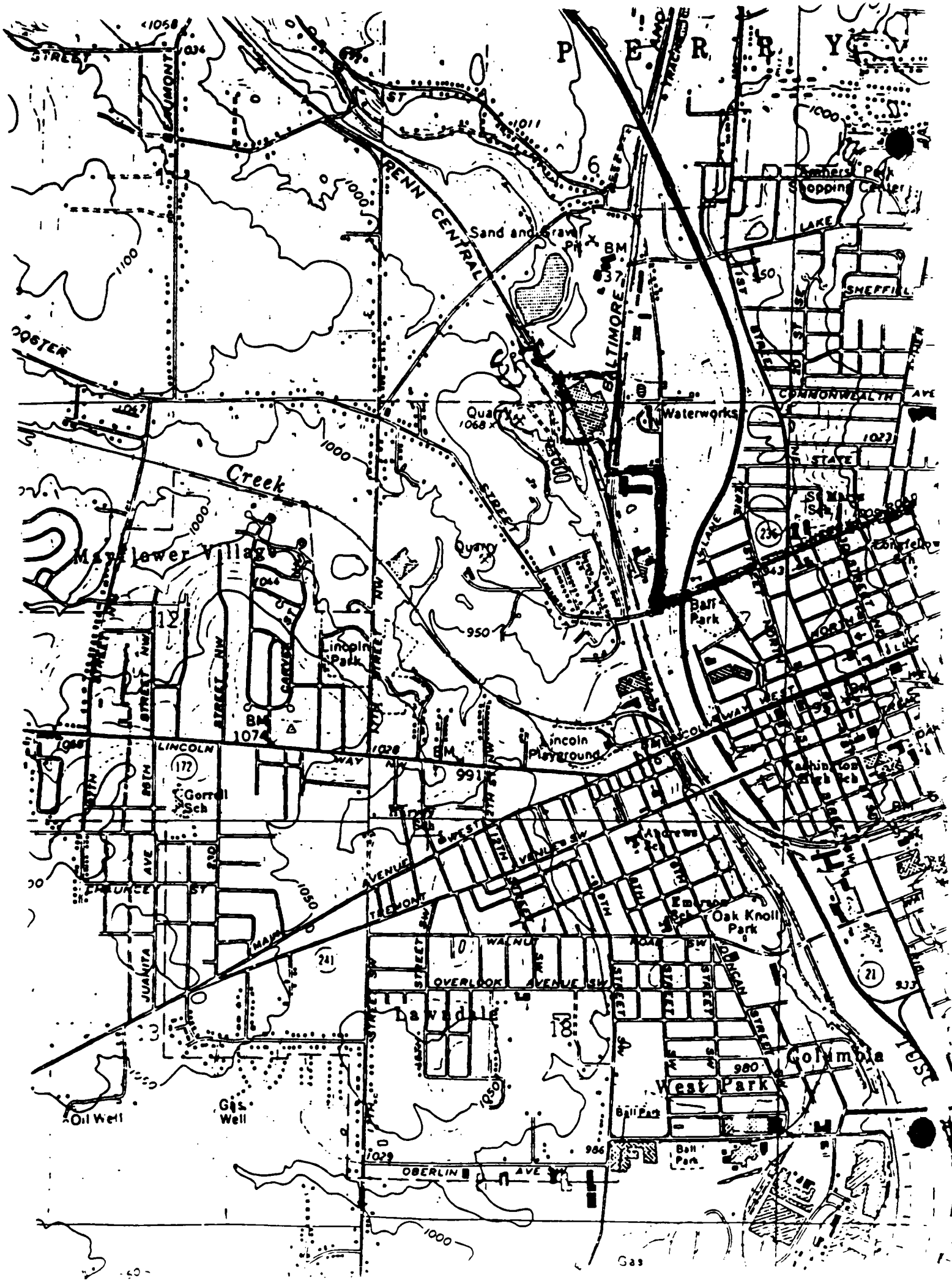
Route to Hospital: (Attach Map) Take (R) out of site road onto 3rd. (L) onto Cherry St. Drive to 8th Street - take (L). Go 2 blocks and Hospital is on (L)

Travel Time From Site (Minutes) 5

Distance to Hospital (Miles) 1.5

Name/Number of 24 Hr. Ambulance Service 833-1051

Same as fire



PERRY
RENN CENTRAL
BALTIMORE
Sand and Gravel Pit
BM
Amherst Park Shopping Center
LAKE
SHEFFIELD
COMMONWEALTH AVE
Waterworks
Quarry
Creek
Mayflower Village
Quarry
Ball Park
Lincoln Park
Lincoln Playground
LINCOLN WAY
Gorrell Sch
Oak Knoll Park
Lawndale
Columbia
West Park
Ball Park
Oil Well
Gas Well
OBERLIN AVE SW
Gas

WESTON

HEALTH AND SAFETY PLAN
APPROVAL/SIGN OFF FORMAT

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

Name	Signature	Date
L. Sherreed Steele	L. Sherreed Steele	5/9/88
Site Safety Co-ordinator		

* MON APPROVAL 1/14/88

TED BLACKBURN for GMC	Ted Blackburn	5-9-88
Director, Corporate Health and Safety		
RANDALL MCALISTER	Randall P. McAlister	05/09/88
Project Manager		
Project Director/ Department Manager		

Personnel Health and Safety Briefing Conducted By:

Name	Signature	Date

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APPENDIX B

U.S. EPA APPROVAL LETTER, 29 APRIL 1988

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF
5HS-12

APR 29 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Timothy McGuiness, Manager
Environmental Engineering
American Home Products, Incorporated
685 Third Avenue
New York, New York 10017

Re: Ekco Housewares, Inc.
OHD 045 205 424

Dear Mr. McGuiness:

My staff has reviewed Ekco Houseware, Inc.'s revised Groundwater Quality Assessment Plan which was received by the United States Environmental Protection Agency (U.S. EPA) on April 4, 1988. This plan is approved by the U.S. EPA with the following modifications:

1. Your implementation schedule has been revised to expedite the installation of the Phase 1 monitoring wells (See Attachment);

2. Our Agency requires the installation of a monitoring well cluster located off-site to the northeast of Newman Creek at the same site where the Interim Measures Piezometer will be constructed; and

3. Install an additional bedrock monitoring well adjacent to proposed lagoon monitoring well L-3 that is screened in the Sharon Sandstone aquifer.

Upon receipt of this approval with modification letter, begin all activities committed to within your Groundwater Quality Assessment Plan. It is understood that the installation of monitoring wells, in advance of your proposed schedule within your revised plan, is approved by the U.S. EPA provided that the Installation Protocol is followed. The only revision of the Monitoring Well Installation Protocol necessary is that all unconsolidated monitoring wells be installed with 10 foot and not 20 foot screens.

Please contact Walter Nied of my staff at (312) 886-0992, if you have any questions concerning the approval letter.

Sincerely yours,

Paul F. Dumais

for Joseph M. Boyle, Acting Chief
RCRA Enforcement Branch

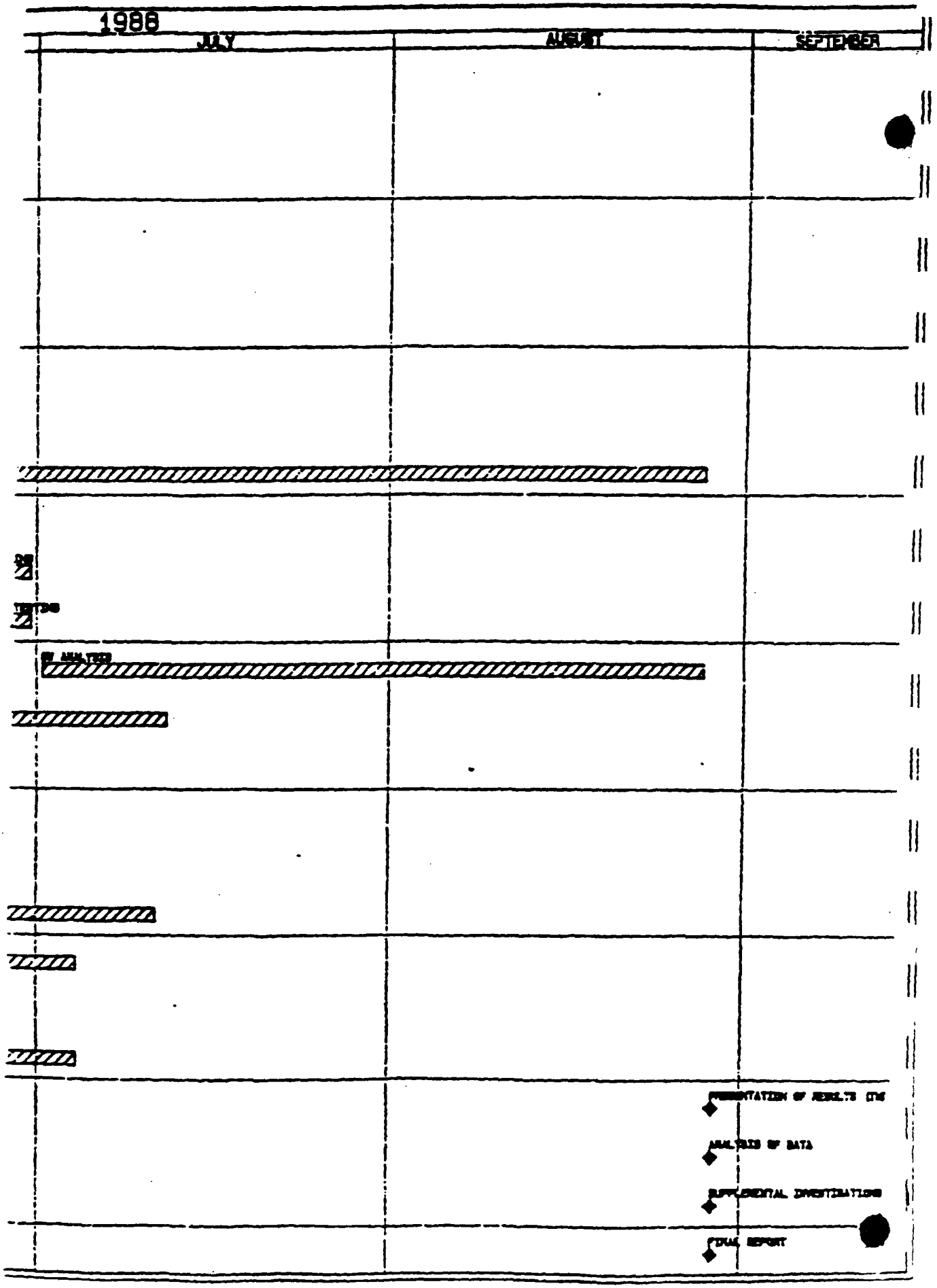
Enclosure

cc: Michael Savage, OEPA-CO
Michael Eggert, OEPA-CO
Susan McCauslin, OEPA-NEDO

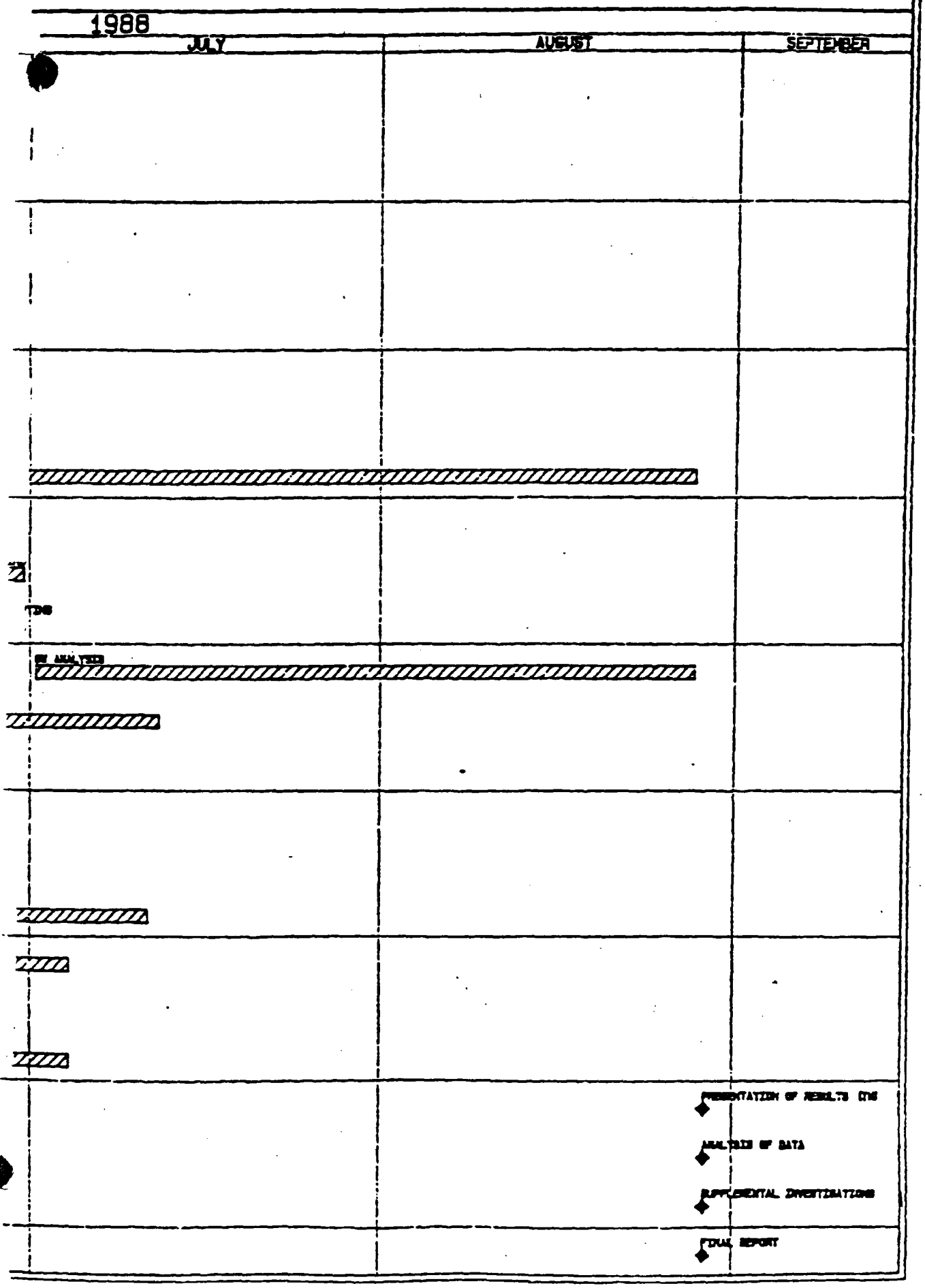
EKCO HOUSEWARES GROUNDWATER

Description	MAY	JUNE
APPROVAL OF GWQAP	APPROVAL OF GWQAP	
PREPARATION OF PLANS	PREPARATION OF PLANS	
REVIEW OF SAMPLING PLAN	REVIEW OF SAMPLING PLAN	
APPROVAL OF SAMPLING PLAN		APPROVAL OF SAMPLING PLAN
REVIEW OF HEALTH AND SAFETY PLAN	REVIEW OF HEALTH AND SAFETY PLAN	
APPROVAL OF H & S PLAN		APPROVAL OF H & S PLAN
REVIEW OF QA\QC PLAN	REVIEW OF QA\QC PLAN	
APPROVAL OF QA\QC PLAN		APPROVAL OF QA\QC PLAN
GROUND WATER INVESTIGATIONS	GROUND WATER INVESTIGATIONS	
WELL INSTALLATION	WELL INSTALLATION	
GW SAMPLING		
AQUIFER TESTING		
GW ANALYSIS		
SOIL INVESTIGATIONS		SOIL INVESTIGATIONS
SOIL GAS SAMPLING		SOIL GAS SAMPLING
SOIL BORINGS		SOIL BORINGS
SEDIMENT SAMPLING		SEDIMENT SAMPLING
SOIL ANALYSIS		SOIL ANALYSIS
SURFACE WATER INVESTIGATIONS		SURFACE WATER INVESTIGATIONS
STREAM SAMPLING		STREAM SAMPLING
SW ANALYSIS		SW ANALYSIS
PRESENTATION OF RESULTS (TM)		
ANALYSIS OF DATA		
SUPPLEMENTAL INVESTIGATIONS		
FINAL REPORT		

SSMENT PLAN SCHEDULE



MENT PLAN SCHEDULE



APPENDIX C

BAT ENVITECH HYDROPROBE SAMPLER INSTRUCTION HANDBOOK

BAT®

HYPOPROBE™ SAMPLER

INSTRUCTION HANDBOOK

BAT ENVITECH AB
RINKEBYVXGEN 1
S-182 36 DANDERYD
SWEDEN
(08) 753 0120

BAT ENVITECH INC.
P.O. BOX 7826
LONG BEACH, CA 90807
U.S.A.
(213) 427 - 6824

BAT® HYPOPROBE™ SAMPLER

TABLE OF CONTENTS

1. Introduction
   A. Principle of operation
   B. Hypoprobe sampler variations

2. Kit description - components

3. Downhole sampler description

4. Preparation of housing subassemblies
   A. Top assembly
   B. Bottom assembly
   C. Optional "Millipore" filter adapter
   D. Lower needle assembly
   E. Optional central needle assembly

5. Sample vial preparation
   A. Vials for standard Hypoprobe
   B. Vials for cascaded Hypoprobe
   C. Evacuation of vials
   D. Use of the aspirator
   E. Use of the syringe

6. Final sampler assembly

7. Use of the Hypoprobe sampler
   A. Sampler activation
   B. Sampler deactivation

8. Maintenance

9. Troubleshooting
   A. Hypodermic needles
   B. No sample

10. Sampling checklist

Text by Andrew M. Petsonk
Illustrations by Bengt-Arne Torstensson and Brett Martens

(c) BAT Envitech AB 1986, 1987.
BAT Envitech Inc. 1986, 1987.

1. INTRODUCTION

The Hypoprobe sampler is a "grab" type sampler designed for use in small-diameter wells or boreholes, or in open water systems such as lakes or the marine environment. The Hypoprobe provides a means for obtaining hermetically sealed and pressurized samples from virtually any depth below water up to 1000 meters*. This type of sample is particularily valuable when analyzing for dissolved gases or volatile components.

Other features of the Hypoprobe sampler include time-and-depth independent activation of sampling and elimination of many possible sources of sample contamination. For example, there is no contact between the sample vial and fluid from any depth or source other than that being sampled. Human contact with the sample is also inhibited by the methodology used in the Hypoprobe Sampler.

1.A. PRINCIPLE OF OPERATION

The Hypoprobe sampler is typically configured as shown in Figure 1. It is lowered into the body to be sampled (eg. a well) on the end of an activation tubing. The other end of the tubing is connected to a hand pump used to activate the sampling mechanism.

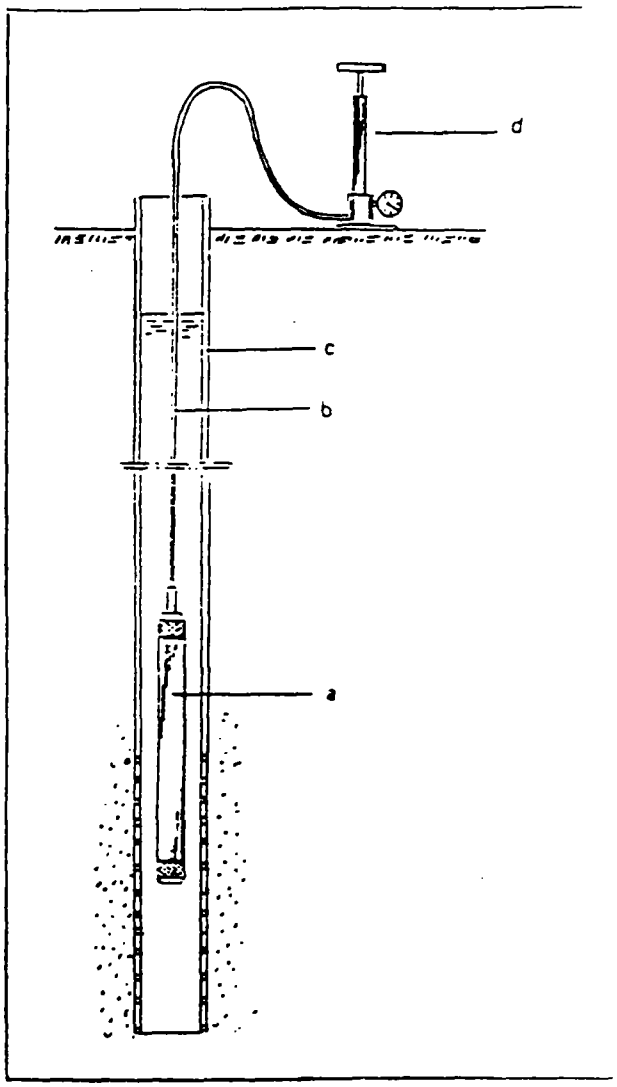


Figure 1. Hypoprobe Sampler.
Principle of Operation.
a) Hypoprobe Sampler.
b) activation tubing.
c) well casing.
d) hand pump for activation

* 1000 m using stainless steel vials, 100 m using glass vials.

In a closeup view (Figure 2), the Hypoprobe is seen to contain an evacuated sample vial, sealed by a septum. A spring-loaded double-ended hypodermic needle is located between this septum and another septum which seals the lower end of the sampler housing.

The sampler is activated by using the hand pump (Figure 1) to apply air pressure on a piston mounted in the upper end of the sampler. The piston is therefore forced downward, causing in turn the needle to penetrate first the lower septum, and then the septum in the vial. The vacuum in the vial then causes fluid from the sampled body to enter the vial. This process continues until the pressure in the vial has increased to that found at the current depth.

When the vial has been filled, the sampler may be deactivated by releasing the air pressure applied through the activation tubing. The spring will relax, causing the piston to contract and the septa to reseal. Pressure in the sample vial will be maintained.

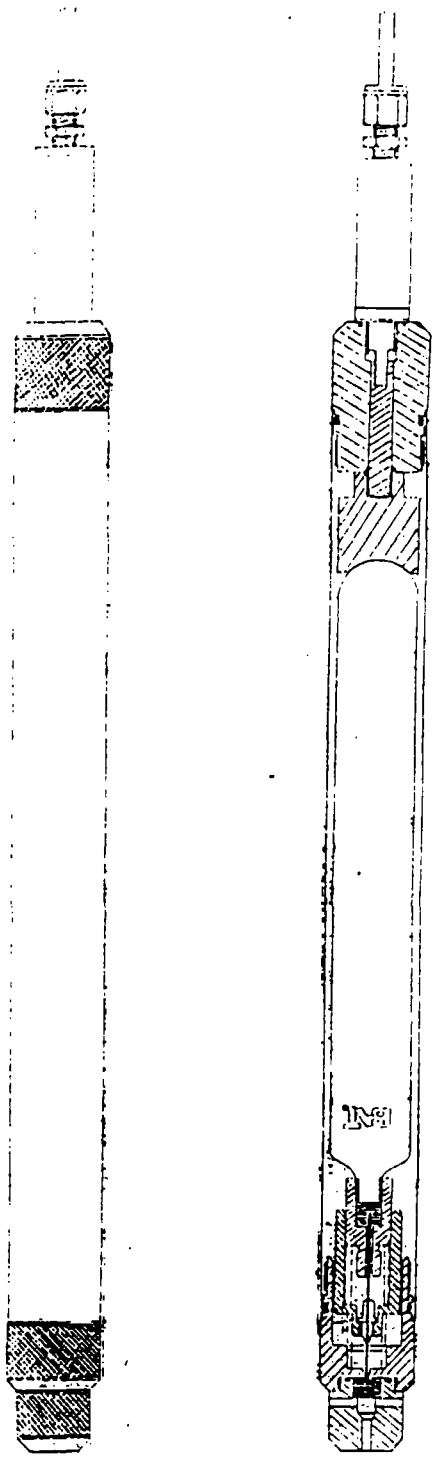


Figure 2. Standard Hypoprobe Sampler.

1.B. HYPOPROBE SAMPLER VARIATIONS

There are a number of different variants of the basic Hypoprobe sampler which may be selected; all are covered by this manual. For instance, by use of both single- and double-ended sample vials and an additional (central) needle assembly, sample vials may be cascaded (Figure 3). This permits simultaneous retrieval of duplicate samples, or samples in which head-space has been eliminated.

Hypoprobe sampler housings and sample vials are also available in a range of sizes and materials. Vials may be made in glass or stainless steel, and have a volume of 35, 150 or 500 milliliters. Housings may be made from various plastic materials or stainless steel, for any of the available sample sizes.

Optional equipment for the Hypoprobe includes manually operated tubing reels, in-line/down-hole "Millipore"-type filtration adapters, and a housing evacuation port.

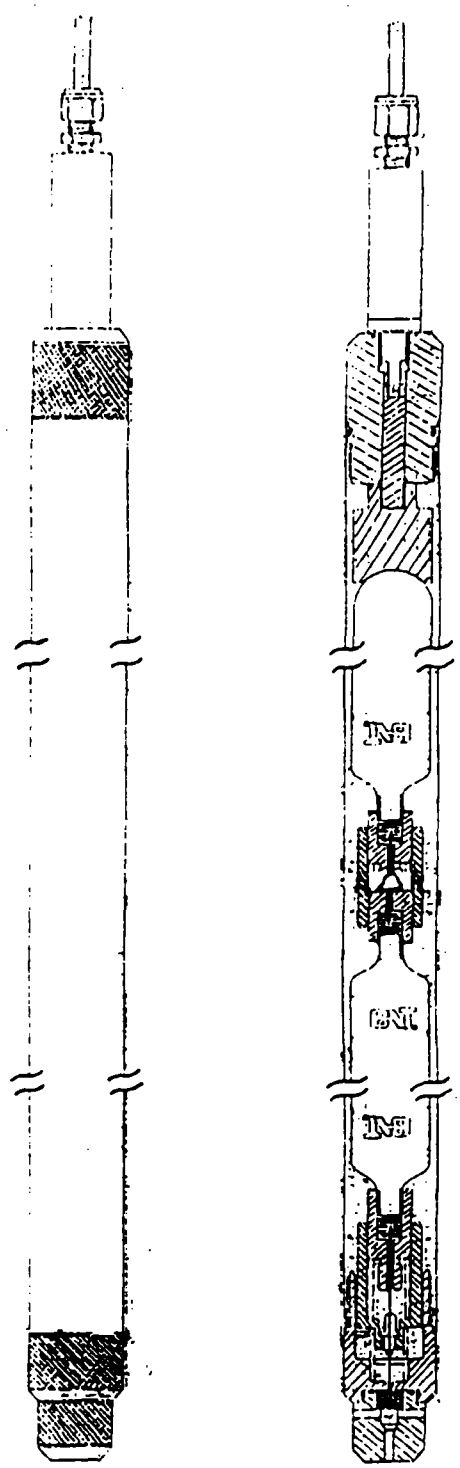


Figure 3. Cascaded Sampler.

2. KIT DESCRIPTION - COMPONENTS

The BAT Hypoprobe Sampling Kit is delivered in a sturdy plywood carrying case. Included is all equipment necessary for use of the Sampler with existing monitoring well installations or open water systems. As described in section 1, there is a kit for each of the three basic sample sizes. All of the kits have the same basic contents, with the only major difference being in the size of various components. The kits for 35 and 150 ml samples, both standard and cascaded, also include a number of sample vials.

Upon delivery, it is important that you familiarize yourself with the contents of this manual. You should also learn as soon as possible the name, quantity, use and location of all items in the kit. Figure 4 is a drawing of an open carrying case. The spaces are labelled, and a short description of the part(s) contained in each space is given in Table I.

Note that no tools other than those included in the kit are required for assembly and operation of the Hypoprobe Sampler, nor should any others be used. All parts are precision machined and designed to be assembled gently, by hand. Use of tools will likely damage the fine finish, and perhaps even the parts themselves.

Table I. Hypoprobe™ Sampler Kit parts list.

a. Sampler housing.
b. Top assembly.
c. Bottom assembly.
d. Lower needle assembly.
e. (Central needle assembly.)
f. ("Millipore" filter adapter.)
g. Hand operated activation pump and accessories.
h. Double-ended hypodermic needles (25 pcs).
i. Long (yellow, 0.9x40 mm) single-ended hypodermic needles (10 pcs).
j. Short (blue, 0.6x25 mm) single-ended hypodermic needles (10 pcs).
k. Syringe 5 ml.
l. Set of spare springs (2 pcs each) for needle assemblies:
   lower 1.5x12x25 mm,
   2.0x14x25 mm,
   (central 1.0x12x25 mm).
m. Set of spare 12.5x8 mm septa for sample vials (10 pcs).
n. Set of spare 12.5x8 mm sep[illegible] for septum insert (10 pcs).
o. Small screwdriver with tool in handle for handling hypodermic needles.
p. Set of spare O-rings (5 pcs each) for:
   bottom assem. 500ml 30.2x3.0m
   150ml 30.2x3.0m
   35ml 15.3x2.4mm
   top assembly 500ml 39.2x3.0m
   150ml 30.2x3.0m
   35ml 15.3x2.4mm;
   septum insert, filter adapter 13.3x2.4m
q. Water driven aspirator for evacuating sample vials.
r. Large piece of tubing with rubber stopper for use with aspirator.
s. Hose with needle adaptors for use with aspirator.
t. Wrenches (14 mm) for use with "Swagelok" fittings (2 pcs).
u. Tweezers for handling needles

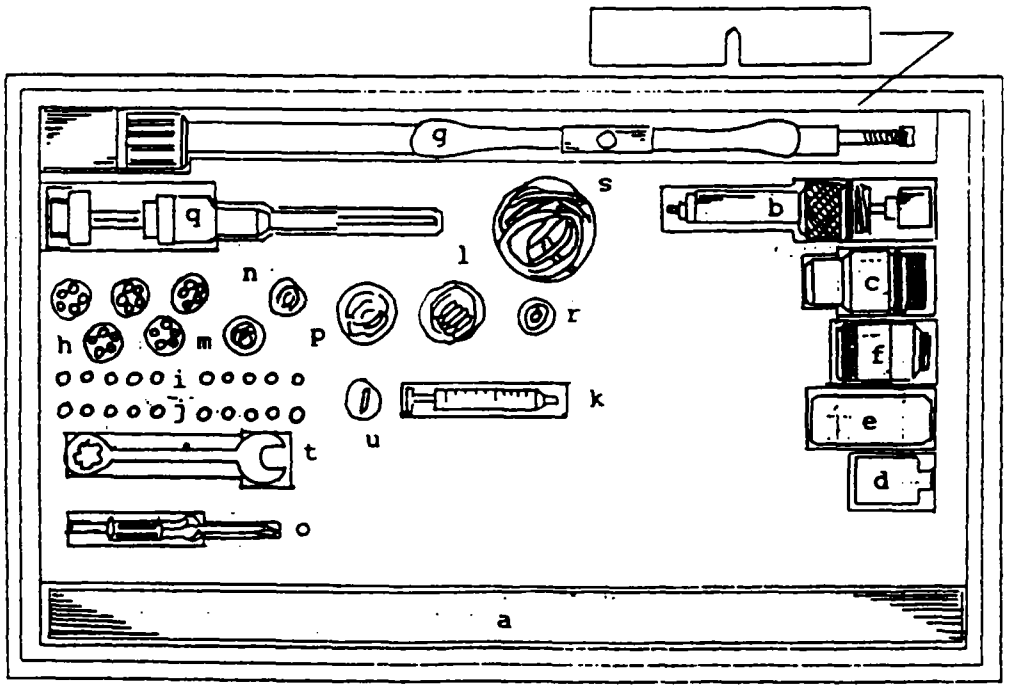


Figure 4. Sampling kit carrying case.

3. DOWNHOLE SAMPLER DESCRIPTION

Cross sections of the down-hole portions of the Hypoprobe samplers are shown in Figures 5A and 5B. The standard sampler contains six major subassemblies; the cascaded sampler, seven. Detailed descriptions and instructions for assembly of each of these units is found in later sections of this handbook.

a) The activation tubing connects to the sampler using a "Swagelok"-type fitting.

b) The top assembly, which supports the sampler housing, consists of the top adapter and its extensions, the activation piston housing and the activation plunger.

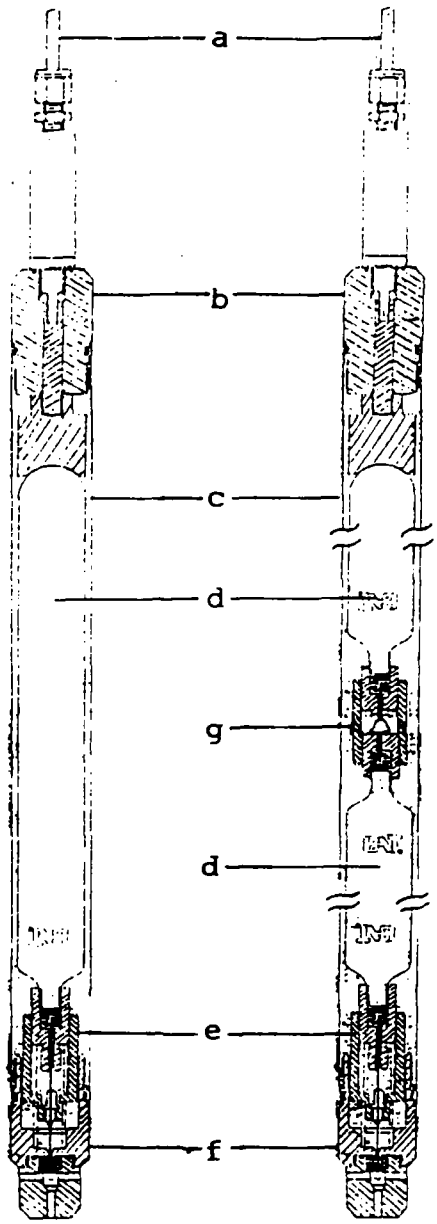
c) The sampler housing is a cylinder threaded internally at both ends. Note that although the ends of the housing may appear to be identical, sample vials can only be inserted into one end.

d) Inside the housing is the sample vial or vials.

e) The lower needle assembly fits into the housing below the vial, and is spring-loaded to ensure proper activation and mainten ance of pressures.

f) The bottom assembly completes the Sampler housing and provides the access path for fluid flow.

g) The central needle assembly is used only with a cascaded sampler. It fits into the housing between the two vials, and like the lower needle assembly, is also spring-loaded.



A. Standard Hypoprobe

B. Cascaded Hypoprobe

Figure 5. Sampler subassemblies.
a) activation tubing.
b) top assembly.
c) sampler housing.
d) sample vial(s).
e) lower needle assembly.
f) bottom assembly.
g) (central needle assembly.)

4. PREPARATION OF HOUSING SUBASSEMBLIES

The downhole sampler and each of its subassemblies requires certain preparations.

4.A. TOP ASSEMBLY

The top assembly, shown in Figure 6, consists of the top adapter (a) with its two appendages, the activation piston housing (b) and the activation plunger (c). Around the adapter body is an O-ring (d), which ensures the integrity of the seal created when the adapter is screwed into the sampler housing.

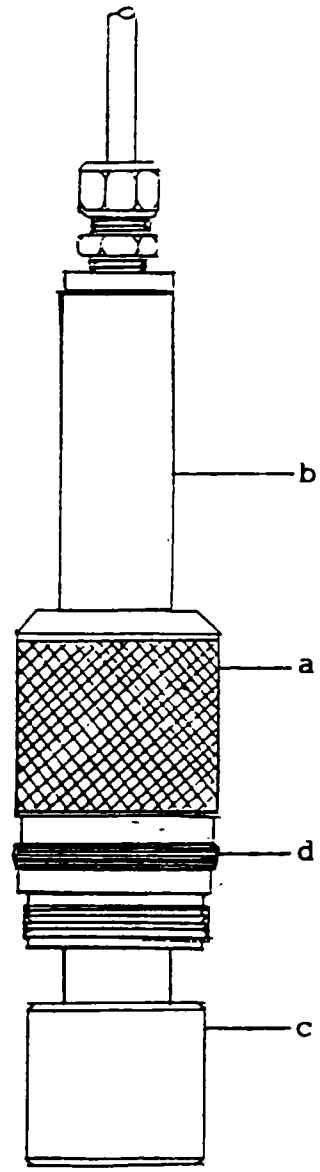


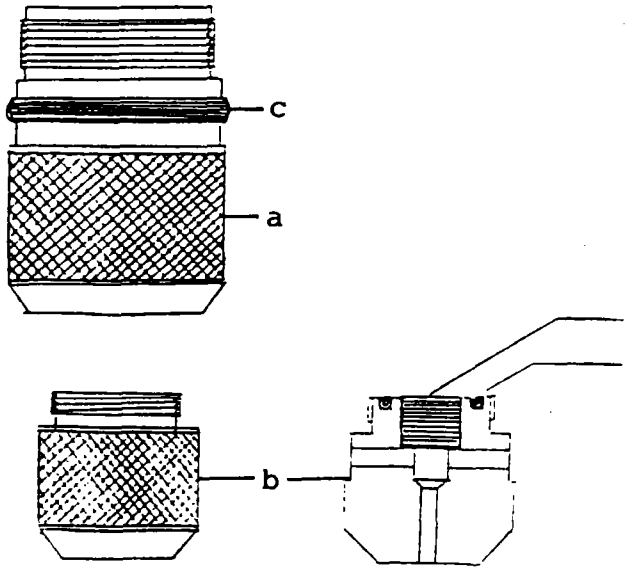
Figure 6. Top assembly.
a) top adapter.
b) activation piston housing.
c) activation plunger.
d) o-ring 30.2x3.0 mm (150 ml), or 39.2x3.0 mm (500 ml), or 15.3x2.4 mm (35 ml).

4.B. BOTTOM ASSEMBLY

The bottom assembly is shown in Figure 7A. It has two components, a closure plug (a) and a septum insert (b). Figure 7B is a cross section of the septum insert.

It will periodically be necessary to replace the septum, as shown in Figure 8. Using the screwdriver found in the Kit, pry out the septum. Wet a new septum with distilled water to aid insertion, and push it so that it just fastens in the insert. By screwing the insert into the closure plug, the septum will be forced the rest of the way into place.

Both the closure plug and septum insert use o-rings (c and e in Figure 7) to ensure the integrity of the seals created when they are screwed together and attached to the housing.



A. exterior B. cross sectior

Figure 7. Bottom assembly.
a) closure plug.
b) septum insert.
c) o-ring 30.2x3.0 mm (150 ml), or 30.2x3.0 mm (500 ml), or 15.3x2.4 mm (35 ml).
d) septum 12.5x8.0 mm.
e) o-ring 13.3x2.4 mm.

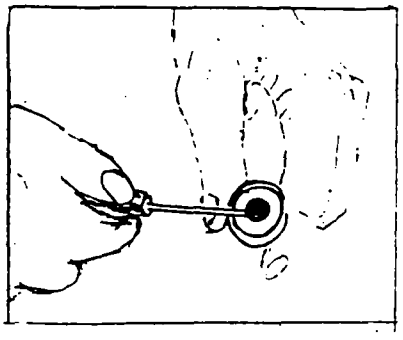


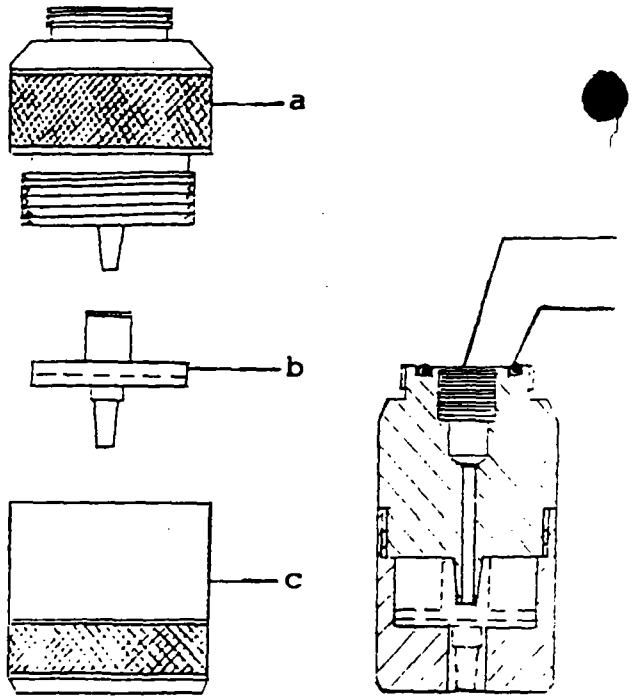
Figure 8. Removal of septum from septum insert and sample vials.

4.C. OPTIONAL "MILLIPORE" FILTER ADAPTER

The adapter for in-line filtering is shown in Figure 9. If used, this unit replaces the septum insert in the bottom assembly. It consists (Figure 9A) of a filter adapter connector (a), a disposable filter unit (b), and a filter adapter housing (c). As seen in cross section (Figure 9B), the connector contains a septum (d) and o-ring (e) identical to those found in the septum insert.

4.D. LOWER NEEDLE ASSEMBLY

The lower needle assembly (Figure 10) consists of a plastic needle holder (a) in which a double-ended hypodermic needle (b) is mounted. This needle must be replaced prior to each sampling operation. Remove the old needle by covering its long end with the needle handling tool and screwing counter-clockwise. Carefully discard the needle. USE CAUTION! Bodily contact with needles can lead to infection, contamination or disease (eg. hepatitis).



A. exterior B. cross secti

Figure 9. Filter adapter.
a) filter adapter connector.
b) "Millex" 25 mm diameter disposable filter unit.
c) filter adapter housing.
d) septum 12.5x8.0 mm.
e) o-ring 13.3x2.4 mm.

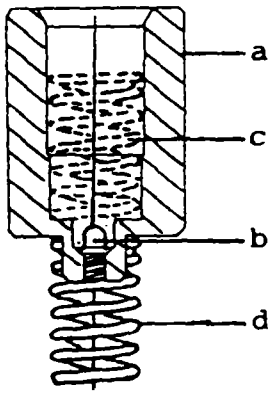


Figure 10. Lower needle assembly.
a) needle holder.
b) double-ended needle.
c) spring 1.5x12x25 mm.
d) spring 2.0x14x25 mm.

To prepare a new needle for use, twist off both ends of its plastic case. Hold the needle by the plastic adapter, not on the metal! Using the tweezers provided with the kit, remove the rubber guard from the short end of the needle (Figure 11).

Place the long end of the needle into the needle handling tool. Use the tool to carefully insert the short end of the needle through the larger opening in the needle holder, and into the small hole in the center of the holder (Figure 12). Screw in the needle clockwise just until it seats. Don't over-tighten!' Then remove the needle tool. The springs on the needle holder (Fig. 10, c and d) should always be kept in place.

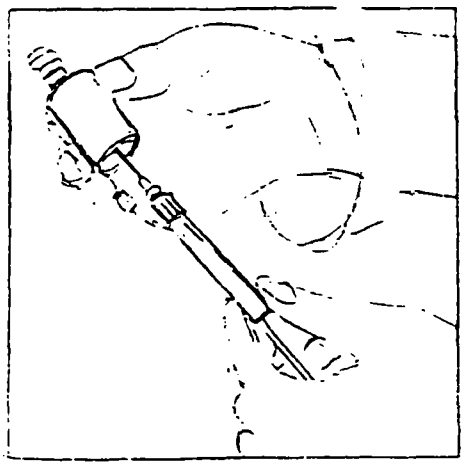


Figure 12. Insert the needle into the needle assembly.

4.E. OPTIONAL CENTRAL NEEDLE ASSEMBLY

The central needle assembly (Figure 13) is used only with cascaded samplers. Needle removal and insertion is done in a manner similar to that for the lower needle assembly. Be sure to insert the needle from the end of the holder having a long, narrow interior shaft.

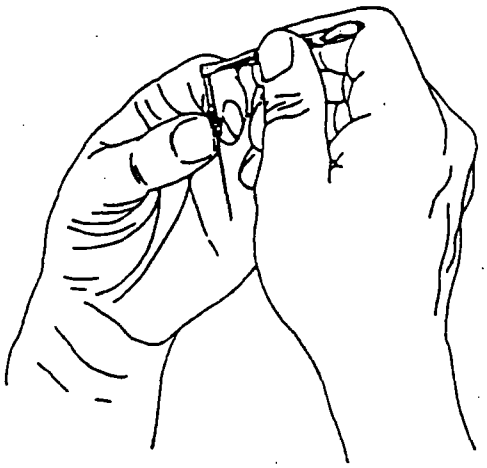


Figure 11. Remove the rubber needle guard.

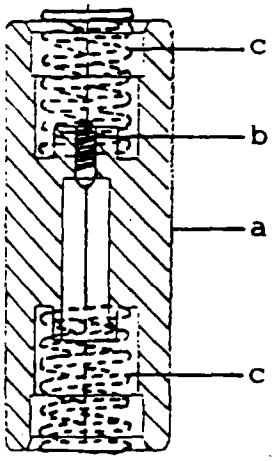


Figure 13. Central needle assembly.
a) Needle holder.
b) double-ended needle.
c) springs 1.0x12x25 mm.

5. SAMPLE VIAL PREPARATION

A vial which holds a representative, undisturbed fluid sample is the ultimate goal of any sampling system. By always carefully following the instructions given in this and other sections of this manual, such samples can be taken routinely, with a minimum of effort, and maximum confidence.

Sample vials should be labelled with a removeable, adhesive-type label (not included in the kit). Labels should be numbered in a unique, non-repeating sequence.

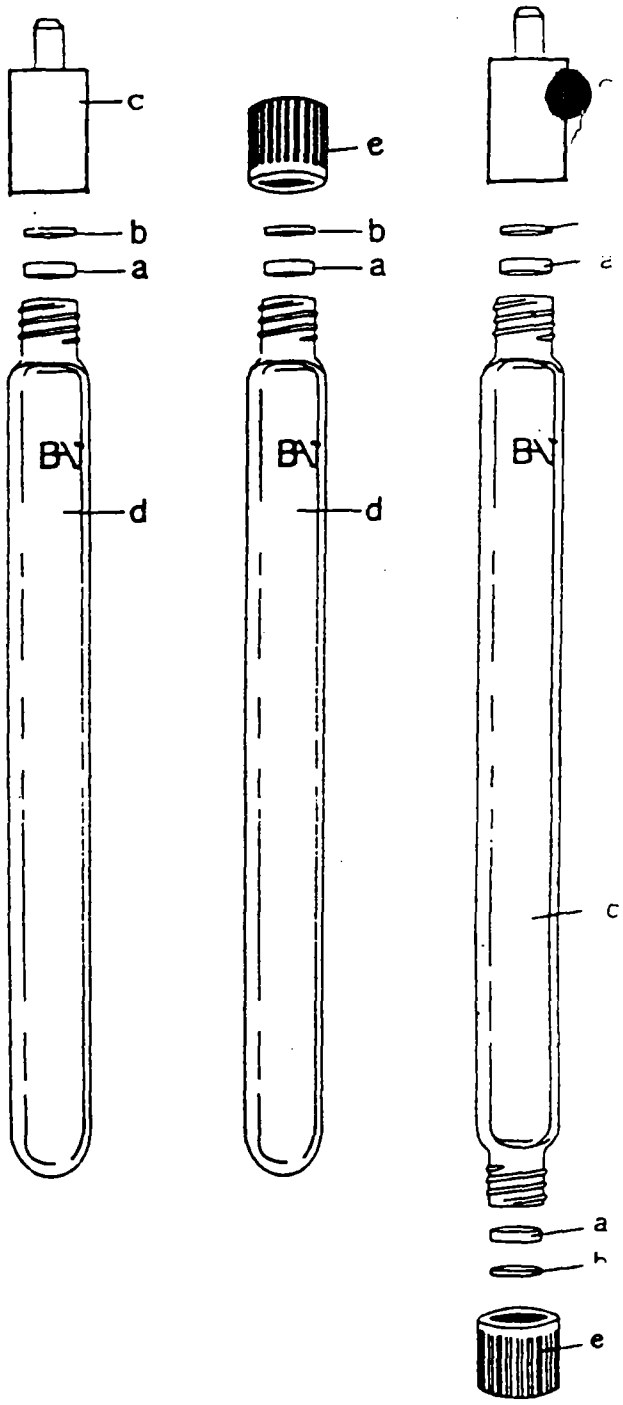
All vial parts, disassembled, can be thoroughly washed and sterilized by an appropriate means, eg. boiled or autoclaved for 10 minutes at 105 degrees Celsius (221 degrees Farenheit). When cool and dry, the parts may be reassembled finger tight. Do not overtighten! No tools need be used.

5.A. VIALS FOR STANDARD HYPOPROBE

A single-ended sample vial for the standard Hypoprobe (Figure 14A) consists of four parts. A flexible septum (a), together with a teflon washer (b), is mounted inside a type "H" plastic cap (c). This assembly is screwed onto a threaded, single-ended glass (or stainless steel) tube (d).

5.B. VIALS FOR CASCADED HYPOPROBE

A cascaded sampler uses both single- and double-ended vials. The single-ended vial (Figure 14B) is identical to that in a standard Hypoprobe, except for the type "I" cap (e). The double-ended vial (Figure 14C) has one each of both cap types.



A. Standard Hypoprobe

B. Cascaded Hypoprobe

C.

Figure 14. Sample vials.
a) septum 12.5x8 mm.
b) PTFE washer 12.5x3x1 mm.
c) plastic cap (type "H").
d) vial (glass).
e) plastic cap (type "I").

5.C. EVACUATION OF SAMPLE VIALS

The air/gas in the sample vial must be at a lower pressure than the fluid at the level to be sampled, if fluid is to enter the vial. The vial is therefore usually evacuated. This may be accomplished using the aspirator or the syringe. The sample vial may be filled with nitrogen prior to evacuation to minimize risk of contamination.

Note that if a sample is to be taken far below the groundwater, surface-water or piezometric level, it may be sufficient to use a vial without evacuation, although this is rarely recommended.

5.D. USE OF THE ASPIRATOR

The aspirator (a simple suction pump) should be used to obtain a relatively complete evacuation of the sample vial. This will produce both more volume of sample, and speed up the sampling process.

To use the aspirator, first press the rubber stopper into one end of the thick piece of tubing, and put the other end over the nozzle on the side of the pump (Figure 15). Attach the pump to a water faucet by screwing it gently onto the mouth of the faucet (Figure 16). Either a 1/2" or a 3/4" cylindrical pipe faucet may be used.

Peel off the paper wrapper from the end of a short (blue) single-ended needle package. Hold the package and use it to press the needle onto one of the adaptors on the small hose, as shown in Figure 17. Repeat using a long (yellow) single-ended needle for the other end of the hose.

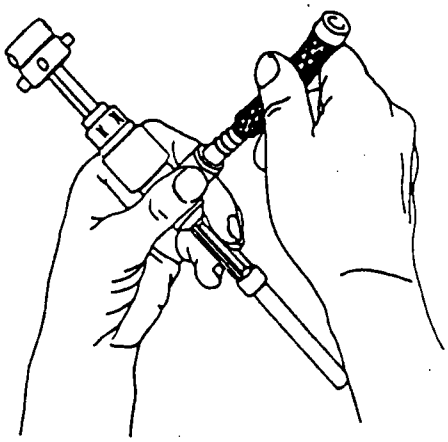


Figure 15. Assemble the aspirator.

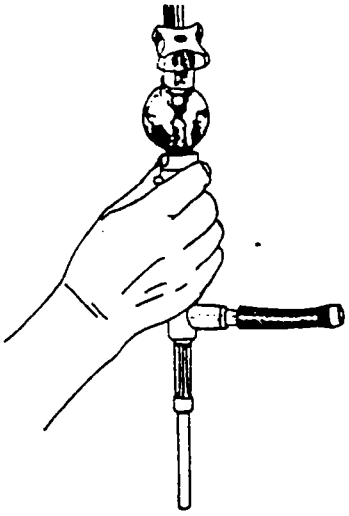


Figure 16. Attach the aspirator to a faucet.

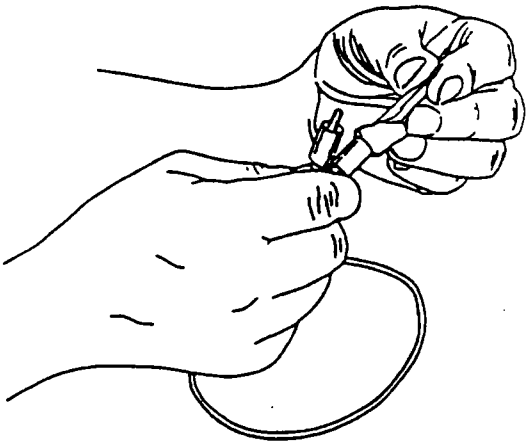


Figure 17. Put a needle on the small aspirator hose.

Push the shorter (blue) needle through the rubber stopper at the aspirator (Figure 18); the longer (yellow) needle should be pushed through the flexible septum on the sample vial (Figure 19). Now, turn on the water at the faucet. A 95% vacuum level is attained after approximately three minutes (for a 150 ml vial).

When desired, a pore pressure sensor and digital read-out unit (if available) may be used to check the evacuation level. A complete vacuum corresponds to a pressure of -10.33 m of water column.

When the vial has been sufficiently evacuated, pull the needle out of the vial first (Figure 20), and then, turn off the flow of water. If another vial is to be evacuated, attach it as discussed above and shown in Figure 19. Then repeat the evacuation procedure. To minimize confusion, do not store evacuated and unevacuated containers together.

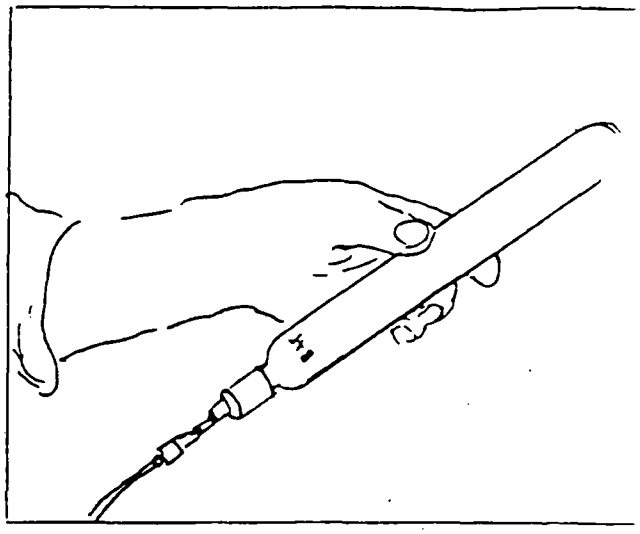


Figure 19. Attach the end of the hose with the long (yellow) needle to the sample container.

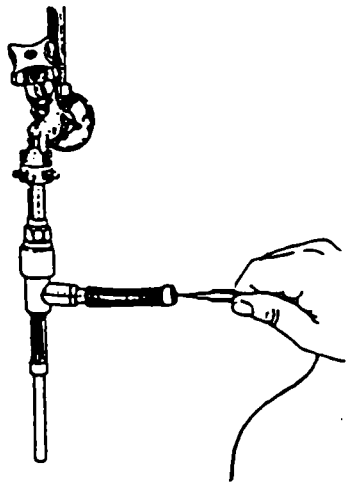


Figure 18. Attach the end of the hose with the short (blue) needle to the aspirator.

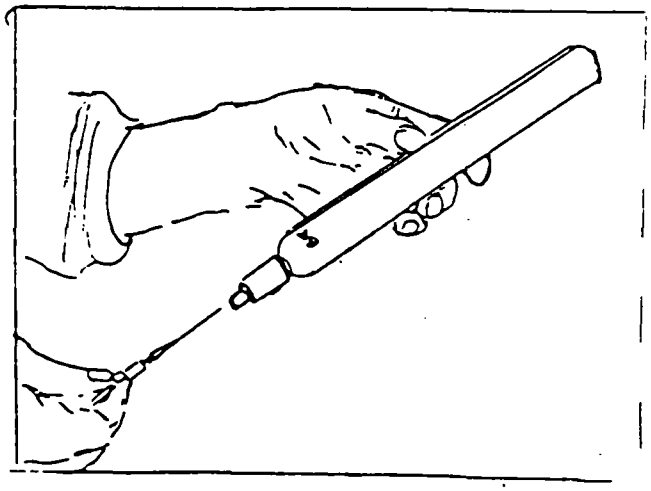


Figure 20. Remove the needle from the sample vial first

Double-ended vials are also evacuated as described in this section. Either end of the vial may be used as the evacuation port.

If properly assembled and evacuated, the vials can maintain vacuum pressures for long periods of time. However, for best results it is suggested that the vials be evacuated close to the time of use, ie. within 24 hours.

When no more vials are to be evacuated, withdraw the needle from the stopper, and dismantle the apparatus in the reverse order of assembly. Dry all parts thoroughly before placing them back in the carrying case. Note that used needles can be safely stuck into the foam insulation in the case until they may be appropriately discarded. Needles should generally not be reused.

5.E. USE OF THE SYRINGE

The syringe may also be used to evacuate small (35 ml) sample vials. This method is not recommended for larger vials. Peel off the paper wrapper from the end of a long (yellow) single-ended needle package. Hold the package and use it to press the needle onto the nozzle of the syringe, in the manner shown in Figure 17 for the aspirator hose.

With the syringe plunger completely inserted, push the needle through the septum in the sample vial. Withdraw the plunger partially, and then quickly pull the entire syringe/needle unit away from the vial. Repeat this process until the desired level of evacuation is attained. For a 35 ml vial, a 75% vacuum (approx. 7 or 8 meters of water column) will normally be reached after about 5 repetitions; It is quite difficult to achieve a greater vacuum with this method.

When all vials have been evacuated, remove and discard the needles, and restore all parts to the carrying case.

6. FINAL SAMPLER ASSEMBLY

To prepare the Sampler for use, the subassemblies described above must be properly assembled together as shown in Figure 5.

A. Place an evacuated sample vial (single-ended - Figure 14A - for standard, double-ended - Figure 14C - for cascaded) into the housing. The end of the vial with the "pointed" (type "H") cap should be inserted first (Figure 21).

B. Place the lower needle assembly into the bottom assembly.

C. Place the bottom and needle assemblies against the lower end of the vial, making sure the long end of the double-ended needle is centered in the opening in the "pointed" vial cap (Figure 22). Push the vial, needle and bottom assemblies into the housing, and screw the bottom assembly into the housing (Figure 23). Wetting the o-ring will facilitate this operation.

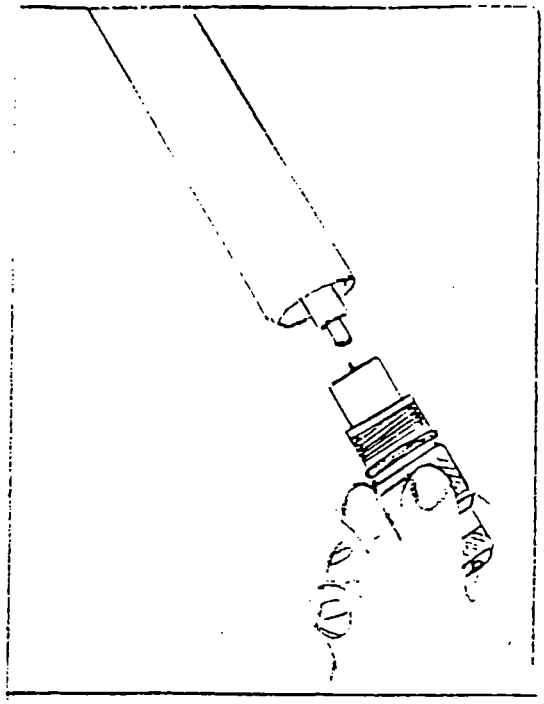


Figure 22. Center the needle in the vial cap.

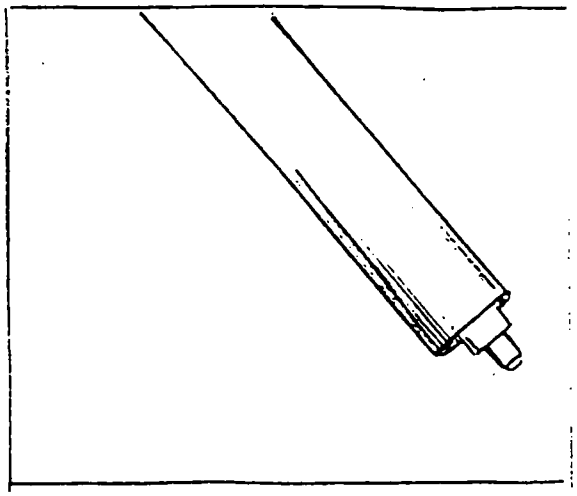


Figure 21. Insert the vial into the slightly inclined housing.

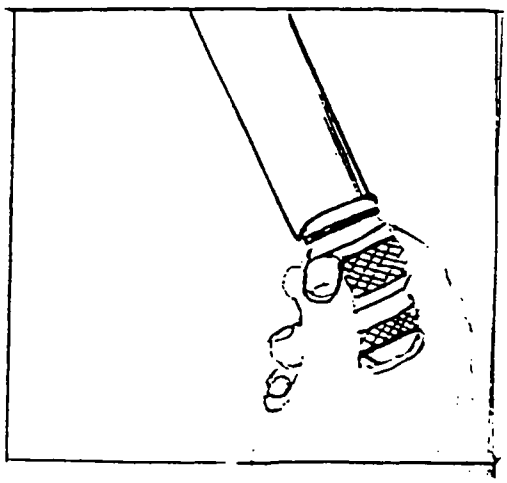


Figure 23. Screw the bottom assembly into the housing.

D. For cascaded samplers, slide the central needle assembly into the housing, while holding the housing in an almost horizontal position. The orientation of the needle assembly is immaterial. Then, insert a single-ended vial with a "non-pointed" (type "I") cap (Figure 14B) into the housing (Figure 24).

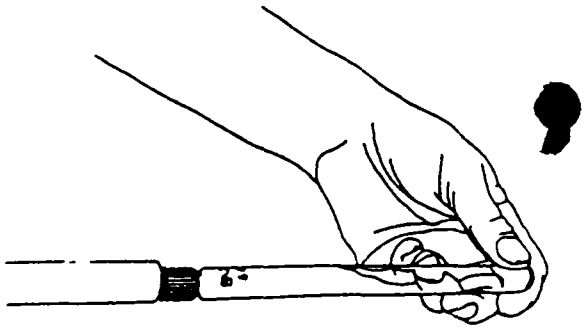


Figure 24. Insert the upper vial into the housing.

E. Screw the top assembly into the housing (Figure 25). The o-ring should be wet to facilitate this operation. Since this action will also connect the vials in a cascaded sampler, care should be taken to not release the top assembly until the threads are engaged. Otherwise, the vials could separate, with a resulting vacuum loss.

F. If the septum insert (Figure 7B) has not been screwed into the closure plug, do so at this time. Note that the septum insert can be removed without affecting the vials in the interior of the (deactivated) housing.

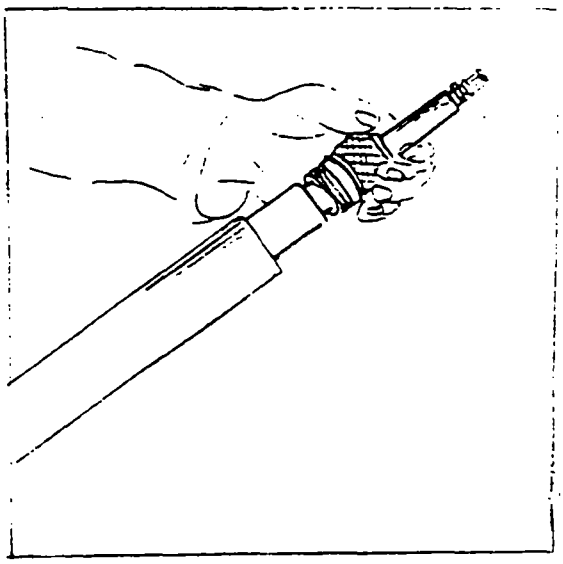


Figure 25. Screw the top assembly into the housing.

G. Attach the activation tubing to the top assembly using the "Swagelok" fitting (Figure 26). First tighten the nut on this fitting by hand. Then it should be snugged tightly using two wrenches (Figure 27) to ensure its integrity.

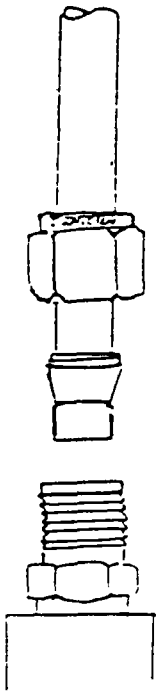


Figure 26. A Swagelok fitting attaches the activation tubing to the top assembly.

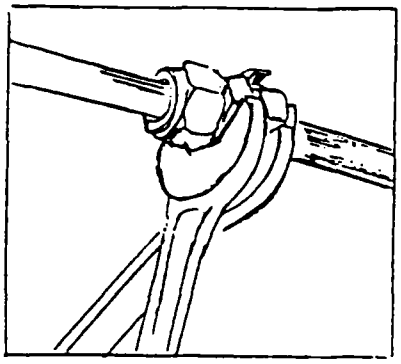


Figure 27. Snug the fitting using two wrenches.

7. USE OF THE HYPOPROBE SAMPLER

The Hypoprobe is now ready for use. With a firm grip on the activation tubing, carefully lower the assembled sampler down into the open borehole, well or body of water (Figure 28). Don't drop it!

IMPORTANT:

To avoid contamination of the fluid being sampled, always keep the activation tubing clean, and off the ground. Wipe it off with a clean rag while lowering the sampling unit.

When the sampler has been lowered to the desired depth (there are normally markings along the activation tubing), it may be held in place by the wooden support tool (Figure 29).

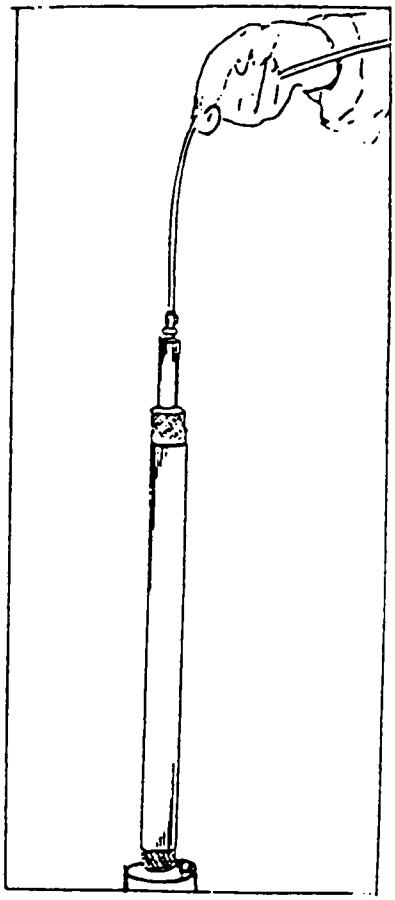


Figure 28. Lower the sampler into the well casing.

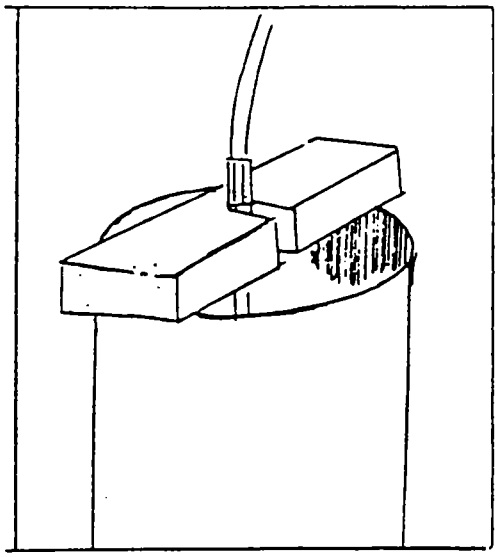


Figure 29. Support the activation tubing with the wooden support tool.

7.A. SAMPLER ACTIVATION

To activate the sampler, press the upper end of the activation tubing into the hand-pump connector (Figure 30). Close the release valve (Figure 31).

Then proceed to pump until a constant pressure of 6 bars has been reached, as indicated on the hand pump pressure gauge. This pressure must be maintained during the entire sampling operation. (Little, if any, additional pumping should be required.)

Table II illustrates the approximate amount of time needed for sampling, assuming 95% evacuation of the sample vial (the level which can be achieved by the aspirator in the Kit).

Table II. Sampling Time

Sample size (ml)	Time (min) Standard	Cascaded
35	2	5
150	5	10
500	15	-

7.B. SAMPLER DEACTIVATION

When sampling has been completed, deactivate the sampler by opening the release valve on the hand-pump connector (Figure 31). Depending on the amount of activation tubing used, it can take from two minutes (for 40 meters) up to thirty minutes (1000 m) for all pressure to dissipate.

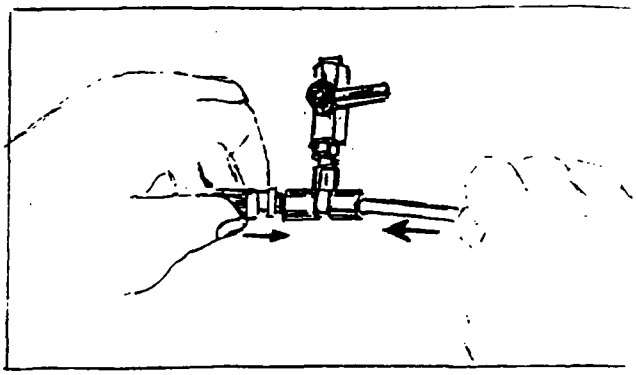


Figure 30. Connect the activation tubing to the pump.

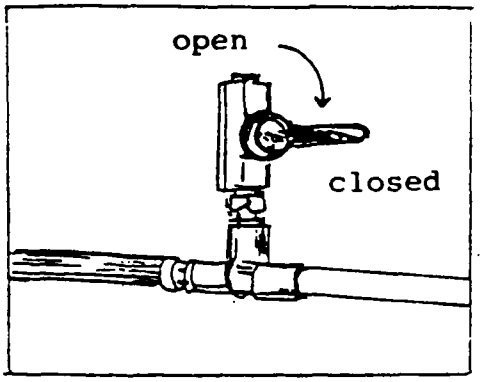


Figure 31. Close the release valve.

After deactivation is complete, pull up the sampler. If no additional sampling is to done, disconnect the activation tubing from the hand pump connector. To do this, press the "collar" towards the connector, while pulling out on the tubing (Figure 32).

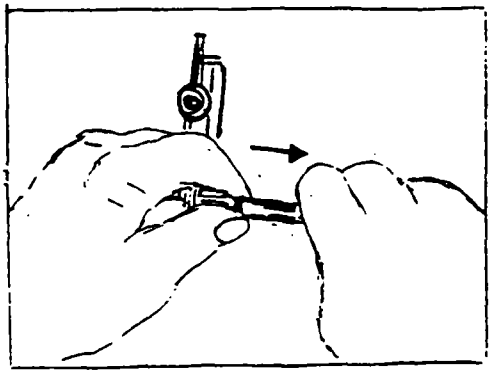


Figure 32. Disconnect the activation tubing from the pump.

To remove the sample vial(s) from the housing, unscrew the top assembly. Slide the (upper) vial out of the housing. (Then, for cascaded samplers, carefully remove the central needle assembly and other vial.) Take out the lower needle assembly.

Remove the double-ended hypodermic needles from the needle assemblies and properly discard them.

Finally, unscrew the bottom assembly. Replace the septum if worn.

Identify the sample on its label with the date; time; site, project and location identification; depth; name of person sampling; tool identification; etc. Chain-of-custody forms and journals should be used as appropriate.

Samples may be extracted from a vial for analysis using the same methodology used for sampling; ie. a hypodermic needle. If necessary, a filter adapter may be placed between the extracting device and the vial. In order to maintain pressures in the vial, always connect any transfer apparatus first to the analysis device, and then to the sample vial. Disconnect first from the vial.

8. MAINTENANCE

To ensure that your Hypoprobe Sampling Kit remains functional, only a few simple steps need be followed. Most important, as was stressed above, is to not use any tools during assembly/ disassembly other than as explicitly directed.

All parts should be thoroughly cleaned and dried after each use, and restored to their place in the carrying case (Figure 4; Table I).

Needles should be used only once and then carefully discarded. This minimizes risk of inadvertant contamination and/or injury. Bodily contact with needles can lead to infection, contamination or disease (eg. hepatitis).

To replace a septum in a sample vial, unscrew the cap from the vial, and use the kit's tweezers and/or screwdriver to pry out the septum (Figure 8). When inserting a new septum, make sure that the washer is between the septum and the cap, and not between the septum and the body of the vial.

The septum in the bottom assembly (Figure 7B) needs periodic replacement, lest it should lose its resealing ability. The o-ring may also need to be infrequently replaced. Use the procedures described above for subassembly preparation.

9. TROUBLESHOOTING

The design of the BAT Hypoprobe Sampling Kit ensures generally troublefree operation, if the above instructions are followed. This section will present solutions to the most commonly noted problems which may arise.

9.A. HYPODERMIC NEEDLES

By far the largest single class of problems relates to use of the hypodermic needles. These must be handled with great care, both as a safety measure, and in order that the system should function properly. Always check to see that the needles are properly installed.

Needles should be checked to see that they are straight and clean (no foreign matter inside or on end). They must be mounted carefully, aligned exactly with the center of the sampling unit.

9.B. NO SAMPLE

If a sampling operation does not result in a sample, even when a clearly sufficient period of time has been allowed, there are several prime sources of error which should be checked.

See if the double-ended hypodermic needle in the needle assembly is intact. If either end is bent or broken, the needle was probably incorrectly mounted, or the sub-assemblies were inserted into the housing improperly (eg. sample vial upside down). Figure 5 shows correctly assembled samplers.

Loss of sample vial vacuum is a major failure cause. Unscrew the top of the vial or pierce the septum with a needle. If the vacuum is not heard escaping,

there probably wasn't any. Perhaps the vacuum was lost during evacuation of the vial, eg. if the connection to the evacuating source (syringe, aspirator) was removed before the connection to the vial, rather than vice-versa.

If the flexible septa in the sample vial(s), septum insert, or filter adapter have been used often, one may have been perforated by the needle too many times. Replace these as described in the assembly and maintenance sections of the manual.

Other possible sources of failure include:

a) The pump was not properly connected to the activation hose.

b) The release valve on the pump connector was not closed during activation, or opened for deactivation.

c) Insufficient time was allowed for deactivation, resulting in sample expulsion.

d) A "Swagelok" fitting between activation tubing sections or between the tubing and the sampler housing was tightened insufficiently and is leaking.

e) There is a leak at a connection between the housing and top or bottom assemblies, septum insert or filter adapter. The appropriate o-ring seal must be cleaned and/or replaced.

f) A piece is missing from the assembled sampler, for example a septum, needle, or spring.

10. SAMPLING CHECKLIST

Prepare housing subassemblies
- Select septum insert or filter adapter
- Replace septum in bottom assembly if necessary
- Replace needle in needle assemblies

Sample vial preparation
- Wash, sterilize parts of sampling vial(s)
- Assemble, label when cool

Evacuation of vials by use of aspirator
- Assemble, connect to sample vial and faucet
- Evacuate by running water
- Disconnect from sample vial first
- Dismantle aspirator

Evacuation of vials by use of syringe
- Put needle on syringe, connect to sample vial
- Withdraw plunger partially, pull syringe out of vial
- Repeat to desired evacuation

Final Sampler assembly
- Insert evacuated sample vial into housing
- Insert lower needle assembly into bottom assembly
- Screw bottom assembly into housing
- (Insert central needle assembly)
- (Insert second evacuated vial into housing)
- Screw top assembly into housing
- Attach Sampler to activation tubing

Sampler use
- Lower sampler while wiping activation tubing
- Support sampler using wooden tool
- Connect activation tubing to hand pump
- Close release valve
- Pump to stable 6 bar pressure to activate sampler
- Wait for vial(s) to fill
- Open release valve, wait for deactivation
- Withdraw sampler from well
- Detach activation tubing from hand pump
- Disassemble sampler
- Remove sample vial(s)
- Remove and dispose of needle(s)
- Identify sample on label, journal
- Extract for analysis using hypodermic needles

10. SAMPLING CHECKLIST (cont)

Maintenance
- Clean, dry, stow all parts
- Discard all needles
- Replace septa and o-rings as required

Troubleshooting
- Check needle alignment, cleanliness
- Check sample container direction
- Check release valve
- Replace septa if required
- Check pump connection to activation tubing
- Check Swagelok fittings
- Test o-ring seals for leaks
- Check for missing items

APPENDIX F

SOIL BORING LOGS
WESTON LAGOON SOIL BORING PROGRAM
MARCH/APRIL 1988

Date: December 1988

Revision No. 0

EPA ID No. OHD 015205424

APPENDIX F-2g

TRAINING OUTLINE

HEALTH AND SAFETY PROGRAM OUTLINE

HAZARD RECOGNITION AND EVALUATION

Part 1: The Incident Response System
Part 2: Incident Characterization
Part 3: Principles of Safety
Part 4: Hazardous Substances
Part 5: Introduction to Toxicology
Part 6: Exposure Guidelines
Part 7: Behavior of Chemicals in the Environment
Part 8: Glossary and Acronyms

INFORMATION

Part 1: Sources of Information and Response Assistance
Part 2: Use of the Hazardous Substance Data Sheet
Part 3: Hazardous Substance Identification Systems
Part 4: References and Resources

PERSONNEL PROTECTION

Part 1: Introduction to Respiratory Protection
APPENDIX I - 29 CFR Section 1910.134
APPENDIX II - NIOSH/OSHA Respirator Decision Logic
APPENDIX III - 30 CFR Part 11 (Table of Contents)
APPENDIX IV - NIOSH Certified Equipment List
Part 2: Air Purifying Respirators
APPENDIX I - References for Repirator Cartridge Efficiencies Studies
APPENDIX II - Warning Concentrations of Various Chemicals
APPENDIX III - Respirator Fit Testing
APPENDIX IV - Respirator Negative and Positive Pressure Test
APPENDIX V - Care and Cleaning of Respirators
Part 3: Self-Contained Breathing Apparatus
APPENDIX I - DOT Specification Cylinders
APPENDIX II - SCBA Checkout Procedures
Part 4: Protective Clothing
APPENDIX I - Permeation References
APPENDIX II - Sources of OSHA Standards
Part 5: Donning and Doffing of Fully Encapsulated Suits and Self-Contained Breathing Apparatus
Part 6: Manufacturers and Suppliers of Personnel Protective Gear

HEALTH AND SAFETY PROGRAM OUTLINE
(continued)

STANDARD OPERATING SAFETY GUIDES

Part 1: Environmental Incidents
Part 2: Standard Procedures
Part 3: Site Entry - General Measures and Requirements
Part 4: Site Entry - Survey and Reconniassance
Part 5: Site Entry - Levels of Protection
Part 6: Site Control - Work Zones
Part 7: Site Control - Decontamination
Part 8: Air Surveillance
Part 9: Site Safety Plan
APPENDIX I - Characteristics of the HNU Photo-ionizer and the Organic Vapor Analyzer
APPENDIX II - Rationale for Relating Total Vapor Concentrations to the Selection Level of Protection to Personnel
APPENDIX III - Dermal Toxicity Data

RESPONSE OPERATIONS

Part 1: Respone Organization
Part 2: National Oil and Hazardous Substances Contingency Plan (July 16, 1982)
Part 3: Clean-up Techniques and Resources
Part 4: Incident Mitigation
Part 5: Treatment Methods
Part 6: Disposal of Hazardous Wastes

FIELD MONITORING

Part 1: Air Monitoring Instruments
Part 2: Atmospheric Sampling Instruments
Part 3: Radiation Monitoring
Part 4: Manufacturers and Suppliers of Field Monitoring Instruments

SAMPLING OF HAZARDOUS MATERIALS

Part 1: Hazardous Materials Sampling
Part 2: Documentation and Chain-of-Custody Procedures
Part 3: Packaging, Marking, Labeling and Shipping of Hazardous Materials Samples
APPENDIX I - Guide for Hazardous Materials Shipping Papers
APPENDIX II - Guide for Markings
Part 4: Suggested References

APPENDIX G

LAGOON MONITORING WELLS
CONSTRUCTION SUMMARIES
WESTON GROUNDWATER
MONITORING WELL INSTALLATION
MAY 1988

Well P-5

Well Construction Summary

Location or Coords: 5 feet west of D-1-27

Elevation: Ground Level 946.11

Top of Casing 948.34

Project American Home Products

Location Ekco, Massillon, OH

Personnel L. Sherrerd Steele

Drilling Summary:

Total Depth 33'

Borehole Diameter 8" OD

Driller Bowser-Morner
Joe Falbo

Rig Hollow Stem Auger

Bit(s)

Drilling Fluid Potable water

Surface Casing N/A

Well Design:

Basis: Geologic Log X Geophysical Log

Casing String(s): C = Casing S = Screen

C	-	27	+2		-		
S	-	33	27		-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		

Casing: C1 2" ID PVC pipe

C2 N/A

Screen: S1 5' of 2" PVC screen, 10-slot.

S2

Centralizers N/A

Filter Material Sand, No. 2, 2 feet above top of screen.

Cement Type 1 Portland cement from 23' - 0'.

Other o Seal: Bentonite pellets 2 ft. above sand pack.
o Protective casing

Construction Time Log:

Task	Start Date 1988	Start Time	Finish Date 1988	Finish Time
Drilling: 8"	5/17	0909	5/17	1621
Geophys. Logging:				
Casing: /Screen 2"	6/3	0715	6/3	0730
Filter Placement:	6/3	0735	6/3	0810
Cementing:	6/3	0830	6/3	0930
Development:	6/28	1400	6/3	1030
Other:				
Bentonite Seal	6/3	0812	6/3	0817

Well Development:

Developed by Air Lifting. Total of 35 gals. pumped. Went dry after several minutes of pumping.

Comments:

WESTON DESIGNERS CONSULTANTS

Well L-5

Well Construction Summary

Location or Coords: Northeast side of lagoon by Newman Creek

Elevation: Ground Level 934.54

Top of Casing 936.86

Location Ekco, Massillon, OH

Personnel L. Lawlor

Project American Home Products

CEMENT GROUT

Drilling Summary:

Total Depth 27'

Borehole Diameter 8"

Driller Bowser-Morner
John Filbrun

Rig Hollow Stem Auger

Bit(s) N/A

Drilling Fluid N/A

Surface Casing N/A

Well Design:

Basis: Geologic Log X Geophysical Log ___

Casing String(s): C = Casing S = Screen

C	-	14	+2		-		
S	-	24	14		-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		

Casing: C1 4" Low carbon steel riser

C2 N/A

Screen: S1 4" Stainless steel, Type 304, 10 feet

S2 N/A

Centralizers N/A

Filter Material Sand, No. 2 from bottom to 1 foot above top of screen.

Cement Portland, Type 1 from 8 ft. BGS to surface.

Other o Seal: Bentonite pellets from top of sand to 8 feet BGS.
o Protective casing

Construction Time Log:

Task	Start Date 1988	Start Time	Finish Date 1988	Finish Time
Drilling:				
8"	5/24	0915	5/24	1328
Geophys. Logging:				
Casing/Screen				
4"	5/24	1405	5/24	1407
Filter Placement:	5/24	1400	5/24	1520
Cementing:	5/24	1535	5/24	1555
Development:	6/28	1545	6/29	1015
Other:				
SEAL	5/24	1530	5/24	1531

Well Development:

Developed by bailing and pumping. Pumped a total of 75 gals. @ ½gpm.

Comments:

WESTON DESIGNERS CONSULTANTS

Well L-4

Well Construction Summary

Location or Coords: North side of lagoon near Newman Creek

Elevation: Ground Level 936.01

Top of Casing 938.11

Location Ekco, Massillon, OH

Personnel L. Lawlor

Project American Home Products

Drilling Summary:

Total Depth 16'

Borehole Diameter 8"

Driller Bowser-Morner

Rig Hollow Stem Auger

Bit(s) N/A

Drilling Fluid N/A

Surface Casing N/A

Well Design:

Basis: Geologic Log X Geophysical Log ___

Casing String(s): C = Casing S = Screen

C	-	6	+2		-		
S	-	16	6		-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		

Casing: C1 4" low carbon steel riser

C2 N/A

Screen: S1 4" Stainless steel, Type 304, 10 feet

S2 N/A

Centralizers N/A

Filter Material Sand, No. 2 from bottom to 1 foot above top of screen

Cement Portland, Type I from 5 feet BGS to surface.

Other o Seal: Bentonite pellets from top of sand to 2.5 ft. BGS

o Protective casing

Construction Time Log:

Task	Start Date 1988	Start Time	Finish Date 1988	Finish Time
Drilling: 8"	5/23	0945	5/23	1300
Geophys. Logging:				
Casing/Screen: 4"	5/23	1500	5/23	1505
Filter Placement:	5/23	1510	5/23	1530
Cementing:	5/23	1540	5/23	1700
Development:	6/28	1530	6/29	1600
Other: SEAL	5/23	1531	5/23	1533

Well Development:

Developed by Bailing. Slow recovery. Water cloudy at finish.

Comments:

WESTON DESIGNERS CONSULTANTS

Well L-3

Well Construction Summary

Location or Coords: Northwest side of lagoon

Elevation: Ground Level 945.98
Top of Casing 946.78

Project American Home Products
Location Ekco, Massillon, OH
Personnel L. Lawlor

Drilling Summary:

Total Depth 20'
Borehole Diameter 8" OD

Driller Bowser-Morner
John Filbrun

Rig Hollow Stem Auger
Bit(s)

Drilling Fluid Potable water

Surface Casing N/A

Well Design:

Basis: Geologic Log X Geophysical Log

Casing String(s): C = Casing S = Screen

C	-	9.5	+2		-		
S	-	19.5	9.5		-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		

Casing: C1 4" Low carbon steel riser pipe
C2

Screen: S1 4" Stainless steel, Type 304, 10 feet.
S2

Centralizers N/A

Filter Material Sand, No. 2 to 8.0'

Cement Portland, Type I from 5.0' to surface

Other o Seal: Bentonite pellets 3' above top of casing
o Protective casing

Construction Time Log:

Task	Start Date 1988	Start Time	Finish Date 1988	Finish Time
Drilling: 8"				
Geophys. Logging:				
Casing/Screen: 4"	5/22	1600	5/22	1604
Filter Placement:	5/22	1605	5/22	1645
Cementing:	5/22	1715	5/22	1730
Development:	6/28	1500	6/29	1530
Other: SEAL:	5/22	1700	5/22	1705

Well Development:

Developed by Bailing. Bailed 18 gals. Water remained dark grey.

Comments:

WESTON DESIGNERS CONSULTANTS

Well L-2

Well Construction Summary

Location or Coords: 6.8' SE of D-1-27

Elevation: Ground Level 946.06

Top of Casing 947.48

Location Ekco, Massillon, OH

Personnel L. Lawlor

Project American Home Products

CEMENT GROUT

Drilling Summary:

Total Depth 25'

Borehole Diameter 8" D.D.

Driller Bowser-Morner
Joe Falbo

Rig Hollow Stem Auger

Bit(s) N/A

Drilling Fluid N/A

Surface Casing N/A

Well Design:

Basis: Geologic Log X Geophysical Log

Casing String(s): C = Casing S = Screen

C	-	15	+2		-		
S	-	25	15		-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		
	-				-		

Casing: C1 4" Low Carbon Steel riser pipe

C2

Screen: S1 4" Stainless Steel, type 304, 10 feet

S2

Centralizers N/A

Filter Material Sand, No. 2, 2 feet above top of screen

Cement Portland Type I from 10 ft. to the surface.

Other o SEAL: Bentonite pellets 3 feet above top of sand.
o Protective casing

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling: 8"	1988 5/25	0740	1988 5/25	0822
Geophys. Logging:				
Casing/Screen SEAL:	5/25	0915	5/25	0916
Filter Placement:	5/25	0916	5/25	0920
Cementing:	5/25	0935	5/25	1030
Development:	6/28	1430	6/29	1500
Other: SEAL:	5/25	0923	5/25	0935

Well Development:

Developed by Bailing. Purged 65 gals. Well is slow to recover and water is cloudy.

Comments:

WESTON DESIGNERS CONSULTANTS

Well L-1

Well Construction Summary

Location or Coords: Southeast side of the lagoon

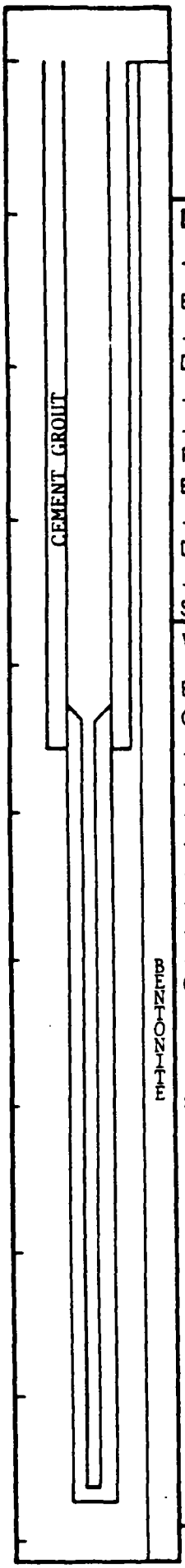
Elevation: Ground Level 944.76

Top of Casing 946.25

Location Massillon, OH

Personnel L. Sherrerd Steele

Project American Home Products



Drilling Summary:

Total Depth 40'

Borehole Diameter 8" O.D.

Driller Bowser-Morner, Joe Falbo

Rig Hollow Stem Auger

Bit(s) N/A

Drilling Fluid Potable water

Surface Casing N/A

Well Design:

Basis: Geologic Log X Geophysical Log ___

Casing String(s): C = Casing S = Screen

C	29.5	+2			
S	39.5	29.5			

Casing: C1 4" ID Low Carbon Steel Riser

C2 N/A

Screen: S1 4" ID Stainless Steel, Type 304, 10'

S2 N/A

Centralizers N/A

Filter Material Sand, No. 2, 1.5' above top of screen

Cement Portland, Type I from 25' to surface

Other o Seal: Bentonite pellets, 3' above sand pack.

o Protective casing

Construction Time Log:

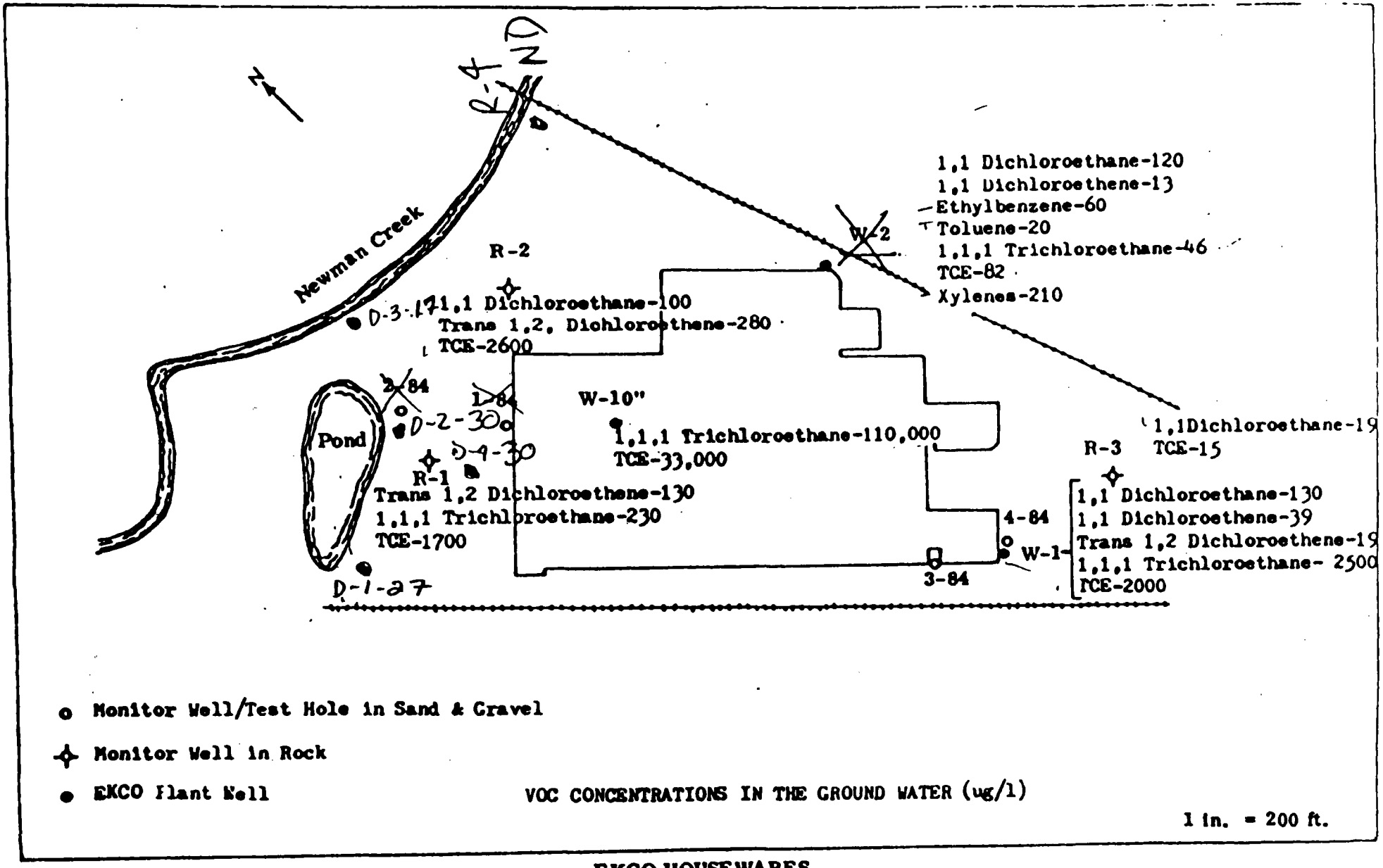
Task	Start Date 1988	Start Time	Finish Date 1988	Finish Time
Drilling:				
8"	5/25	1358	5/25	1650
Geophys. Logging:				
Casing/Screen:				
4"	5/26	0825	5/26	0826
Filter Placement:	5/26	0830	5/26	0842
Cementing:	5/26	0910	5/26	1030
Development:	6/29	1015	6/29	1600
Other:				
SEAL	5/26	0900	5/26	0901

Well Development:

Developed by Bailing. Very slow recovery and remained brown throughout development.

Comments:

WESTON DESIGNERS CONSULTANTS



EKCO HOUSEWARES

Figure 2.

WESTON
DESIGNERS CONSULTANTS

BY _____ DATE _____ DIV _____ SHEET _____ OF _____
CHKD BY _____ DATE _____ DEPT _____ W.O. NO. _____
PROJECT _____
SUBJECT _____

Level C		Level D
Step 1	Remove Boot tape Remove boot Cover	Remove Boot tape Remove Boot cover
Step 2	Remove wrist TAPE Remove Outer glove	Remove out glove
Step 3	Remove disposable Coverall	remove Cotton Coverall
Step 4	Remove APR	Remove Surgical gla
Step 5	Remove Surgical Gloves	WASH / rinse HANDS
Step 6	WASH / Rinse Hands.	

DRILLING LOG

WELL NUMBER: L-1 OWNER:

LOCATION: Southeast side of lagoon ADDRESS:

TOTAL DEPTH: 42'

SURFACE ELEVATION: 944.76 WATER LEVEL:

DRILLING COMPANY: Bowser-Morner DRILLING METHOD: HSA DATE DRILLED: 5/25/88

DRILLER: John Filbrun HELPER: Ken Boehmer

LOG BY: L. Sherrerd Steele

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					
	5-7	1	SS	1-2 3-3	Slag gravel material, black-dark brown in a fine sand and silt matrix, some cinders, brick fragments (Fill), poorly sorted, dry.
10	10-12	2	SS	11-5 4-4	Top 3": Sandy and silty clay with some gravel, cinders, brick fragments, dark brown, poorly sorted, dry. Mid 3": Silt, orange brown with subangular gravel and trace fine sand. Bottom 4": Slag gravel, dark orange brown-brown in a medium-coarse sand matrix (Fill), very moist.
	15-17	3	SS	3-14 16-16	Fill material: Clayey and sandy silt, dark brown, poorly sorted, somewhat plastic with wood fragments. Grades into a medium clayey sand with iron staining and a large sandstone cobble in bottom.
20	20-22	4	SS	12-10 10-12	Top 7": Clayey silt with some medium sand, cobbles, dark brown to black. Cinders intermixed. - Fill. Bottom 10": Medium sand, well sorted, dark brown to light grey, moist.
	25-27	5	SS	80-85/5"	Plug material.
30	30-32	6	SS	12-9 30-21	Sandy silt, light brown with some small gravel intermixed, somewhat hard, dry.
	35-37	7	SS	135-32 34-31	White granular rock followed by sandy silt, hard, dry, dark brown with rounded cobbles, stratified, fine sand (red-brown) and hard sandstone.
40	40-42	8	SS	100/6'	Shale, grey to dark grey, platey, very broken up.

* ASTM D1586

DRILLING LOG

WELL NUMBER: L-3
OWNER:
LOCATION: Northwest side of lagoon, Massillon, OH
ADDRESS:
TOTAL DEPTH: 20'
SURFACE ELEVATION: 945.98
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 5/22/88
DRILLER: John Filbrun
HELPER: Ken Boehmer
LOG BY: L. Lawlor

SKETCH MAP

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					
		1	SS	3-3 4-5	3-5': Organic silty sand, dark black, moist grading into light brown silt, moist, high plasticity, moderately stiff, nonstratified.
5					
		2	SS	3-3 4-6	8-10': Sandy silt, light brown with 15% gravel up to 1¼" diameter, subangular, soft, moist, low plasticity, lenses of black organic material and brown to red material
10					
		3	SS	50-90/5"	13-15': Top 6", sandy silt (as above). Lower 5", Silt, grey, dry, medium cementation, crumbles in fingers, nonstratified.
15					
		4	SS	60-51 44-43	18-20': Shale, dark grey, plately, weathered, dry - first encountered at 16.5'.
20					

*ASTM D1586

SHEET 1 OF 1

WESTON

DRILLING LOG

WELL NUMBER: L-4
OWNER:
LOCATION: North side of lagoon near Newman Creek
ADDRESS:
TOTAL DEPTH: 16'
SURFACE ELEVATION: 936.01'
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 5/23/88
DRILLER: John Filbrun
HELPER: Ken Boehmer
LOG BY: L. Lawlor

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					
		1	SS	16-12 7-5	3-5': Sandy silt, light brown, dry, some organic material, medium cementation. Bottom 2": Grey silt, moist with gravel up to 1½" diameter, subrounded.
5					
					Water first encountered at 7.0'.
		2	SS	10-8	8-10': Silt and gravel, some sand. Grey silt with 30% gravel up to 1½" diameter, subrounded, saturated, some medium sand (20%), stiff, nonstratified.
10					
		3	SS	32-40 60/3"	As above.
15		4	SS	10-44 45-57	14-16': Sand and gravel, fine grey sand, well graded, saturated, weak cementation, with 20% large (1"-2" diameter) gravel.
20					

* ASTM D1586

SHEET 1 OF 1

WESTON

DRILLING LOG

WELL NUMBER: L-5
OWNER:
LOCATION: Northeast side of lagoon by Newman Creek
ADDRESS:
TOTAL DEPTH: 27'
SURFACE ELEVATION: 934.54
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 5/24/88
DRILLER: John Filbrun
HELPER: Ken Boehmer
LOG BY: L. Lawlor

SKETCH MAP

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0					
5		1	SS	1-2 4-9	5-7': No recovery.
		2	SS	9-10 20-17	7-9': Sandy silt and gravel, 30% gravel up to 1" diameter, subrounded, grey silt, saturated, nonstratified, weak cement.
10		3	SS	14-11 14-20	9-11': Silt and gravel, trace sand, grey silt with 30% gravel up to 1" diameter, subrounded, stiff, low plasticity, some sand lenses (1/8" thick) wet.
		4	SS	9-7 20-18	11-13': Sand and gravel, 10% gravel up to 1" diameter, grey fine-medium sand, saturated, weak cement, non-stratified.
		5	SS	25-18 18-21	13-15': fine-medium sand, saturated, grey, weak cement, well graded.
15		6	SS	13-17 19-15	15-17': Top 10" - as above. Bottom 2": Sand as above with some silt.
		7	SS	9-16 16-16	17-19': Top 6": Silt and gravel up to 1" diameter, grey. Lower 12": Fine-medium sand, saturated, well graded, weak cement, grey.
20		8	SS	8-10 7-10	19-21': Sand, as above.

*ASTM D1586

DRILLING LOG

WELL NUMBER: L-5
OWNER:
LOCATION: Northeast side of lagoon by Newman Creek
ADDRESS:
TOTAL DEPTH: 27'
SURFACE ELEVATION: 934.54
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 5/24/88
DRILLER: John Filbrun
HELPER: Ken Boehmer
LOG BY: L. Lawlor

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
20					
		9	SS	5-18 22-17	21-23': Upper 3": Sand, as above. Lower 15": Silt and gravel, 30% gravel up to 1" diameter, subrounded, grey, stiff, low plasticity, nonsaturated, saturated, trace sand.
		10	SS	7-11 16-21	23-25': Silt with gravel, trace sand, grey, stiff, low plasticity, nonstratified.
25		11	SS	11-14 15-30	25-27': As above.
		12	SS	10-26 25-21	27-29': As above.
30					

* ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER: P-5
OWNER:
LOCATION: ≈ 5 feet west of D-1-27
ADDRESS:
Massillon, OH
TOTAL DEPTH: 33'
SURFACE ELEVATION: 946.11
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 5/17/88
DRILLER: Joe Falbo
HELPER: Lee Bechtel
LOG BY: L. Lawlor

SKETCH MAP

NOTES: HNu background = 1.0ppm

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	1-2	1	SS	-	Organic silty sand with gravel, grey-brown, moist. HNu = 4-5ppm.
	2-3		SS	-	Organic clay, dark brown, wet.
	3.5-5	2	SS	-	Silty clay, dark brown with white and red specks, some coarse sand, soft, moist.
	5-6	3	SS	-	Clay, light brown, high plasticity, little sand, moist.
5					
	8.5-10	4	SS	-	Fill material, clay, dark brown-light brown, black cinders, steel scrap, moist.
10					
	13-15	5	SS	13-8 10-12	Fill material, clay, dark brown-light brown, brick fragments, metal fragments, moist.
15					
	18.5	6	SS	15-30 50/5"	Fill material, dark brown-black silty sand, wet.
	19.5 20.5	7	SS	15-50 50/4"	3" light brown clay, wet with some fine sand, followed by 9" grey sand, silt with little gravel, dry (probably fill).
20					

* ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER: P-5 OWNER:

LOCATION: = 5 feet west of D-1-27 ADDRESS:

Massillon, OH TOTAL DEPTH: 33'

SURFACE ELEVATION: 946.11 WATER LEVEL:

DRILLING COMPANY: Bowser-Morner DRILLING METHOD: HSA DATE DRILLED: 5/17/88

DRILLER: Joe Falbo HELPER: Lee Bechtel

LOG BY: L. Lawlor

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
20					
21-21.5		8	SS	50/4"	Fill material, dark grey silty clay, wet.
22		9	SS	50-50/3"	Fill material, silt, grey, some gravel, moist.
23-24.5		10	SS	40-27 34-40	Fine sand, grey to light brown with streaks of reddish brown to dark brown, moist.
25					
25-27		11	SS	30-24 14-17	Fine sand, light brown, trace silt, moist.
27-29		12	SS	18-14 14-18	Fine-medium sand, light brown, trace clay (1/8" layers), some gravel, subrounded, up to ½" diameter, cemented, stiff, moist.
29-31		13	SS	39-37 38-35	Silty sand, trace clay, stiff, moist, light brown, medium plasticity, little gravel.
30					
31-33		14	SS	15-50 50/2"	Silt, brown with 20% gravel, up to 1/8" diameter, subrounded, very stiff, moist, high plasticity.
33-35		16	SS	50/3"	Sandstone, grey, dry.
35					

* ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER: SSB-1
OWNER:
LOCATION: In lagoon on side slope
ADDRESS:
TOTAL DEPTH: 6'
SURFACE ELEVATION: 936.07
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 3/24/88
DRILLER: Joe Falbo
HELPER: Lee Bechtel
LOG BY: D. Ashleigh

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	0-2	1R	SS	2-4 4-4	Reddish brown silt, some sand, trace gravel with black spots and streaks. Green granular material in top of spoon. moist.
	2-4	2R	SS	3-3 6-6	Black and some reddish brown and gray blotchy uniform clay, cohesive, hard, moist.
	4-6	3R	SS	5-5 6-11	Black with reddish-brown and gray spots, clay grading to same with intermixed gray sand.
5					
10					
15					
20					

*ASTM D1586

SHEET 1 OF 1

WESTON

DRILLING LOG

WELL NUMBER: SSB-2 OWNER:

LOCATION: in lagoon on side slope ADDRESS:

TOTAL DEPTH: 6'

SURFACE ELEVATION: 935.18 WATER LEVEL:

DRILLING COMPANY: Bowser-Morner DRILLING METHOD: HSA DATE DRILLED: 3/24/88

DRILLER: Joe Falbo HELPER: Lee Bechtol

LOG BY: D. Ashleigh

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	0-2	1R	SS	4-12 8-13	Brown clay, some silt, moist.
	2-4	2R	SS	9-6 4-4	Brown clay, some silt, moist.
	4-6	3R	SS	4-3 3-5	Black and brown clay, some sand, streaked, wet.
5					
10					
15					
20					

* ASTM D1586

SHEET 1 OF 1

DRILLING LOG

WELL NUMBER: SSB-3
OWNER:
LOCATION: in lagoon on side slope
ADDRESS:
TOTAL DEPTH: 4'
SURFACE ELEVATION: 936.59
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD:
DATE DRILLED: 3/26/88
DRILLER: Joe Falbo
HELPER: Lee Bechtol
LOG BY: D. Ashleigh

SKETCH MAP

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	0-2	1R	SS	*	Top 4": Green jello-like material, brown, muddy, granular material (weathered brick?), moist.
	2-4	2R	SS	*	Green brown, soft clay-sludge, moist.
5					
10					
15					
20					

* ASTM D1586

SHEET 1 OF 1

* This boring was not done with the rig, therfore there are no blow counts.

WESTON

DRILLING LOG

WELL NUMBER: BSB-1
LOCATION: in bottom of lagoon
SURFACE ELEVATION: 933.96
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 3/24/88
DRILLER: Joe Falbo
HELPER: Lee Bechtol
LOG BY: D. Ashleigh
OWNER:
ADDRESS:
TOTAL DEPTH: 12'
WATER LEVEL:

SKETCH MAP

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	0-2	1R	SS	5-7 7-8	Fill, dark brown, black, some brick color, some sand and silt, moist.
	2-4	2R	SS	5-5 5-6	Silt, dark brown, black streaks and spots, green granular fill at top of spoon, moist.
	4-6	3R	SS	5-7 7-13	Very fine sand, green granular fill at top of spoon, moist.
5	6-8	4R	SS	9-19 11-11	Sand, some clay and silt, gravel in bottom, green-brown with gray-black oily soil in tip of spoon, green angular fill, some organics.
	8-10	5R	SS	25-50/0	Green-brown mud, rock in tip of spoon, some gravel, little gray fine grained material, wet.
10	10-12	6R	SS	9-30/3	Green-brown wet mud on outside of sample. Dark gray uniform hard clay, some sand, little gravel, moist.
15					
20					

* ASTM D1586

SHEET 1 OF 1

WESTON

DRILLING LOG

WELL NUMBER: BSB-2
LOCATION: in bottom of lagoon
SURFACE ELEVATION: 934.64
OWNER:
ADDRESS:
TOTAL DEPTH: 16'
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 3/25/88
DRILLER: Joe Falbo
HELPER: Lee Bechtol
LOG BY: D. Ashleigh

SKETCH MAP

NOTES

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	0-2	1R	SS	3-3 1-1	Green granular, jello-like material with red and white grains (top 3"). Dark red-brown granular material, moist.
	2-4	2R	SS	1-1 1-1	Green granular material (top 2"). Gray clay with black streaks.
	4-6	3R	SS	3-3 9-30/5	Gray clay with black streaks, little sand layers, light gray sand in bottom of spoon.
5	6-8	4R	SS	17-20 10-10	Green angular, jello-like material with red-yellow and white specks, black cinder-like layer, light brown-red sand layer, dark gray clay and gravel layer.
	8-10	5R	SS	17-23 27-30	Gravel, some gray sand, trace brown sand.
10	10-12	6R	SS	8-10 23-23	Gravel, some green-brown sand, wet.
	12-14	7R	SS	30-23 27-19	Intermixed gray clay, gravel and light brown sand.
	14-16	8R	SS	12-14 17-22	Medium sand and gravel, brown.
15					
20					

*ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER: BSB-3
OWNER:
LOCATION: in bottom of lagoon
ADDRESS:
TOTAL DEPTH: 16'
SURFACE ELEVATION: 934.31
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 3/25/88
DRILLER: Joe Falbo
HELPER: Lee Bechtol
LOG BY: D. Ashleigh

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	0-2	1R	SS	4-4 2-2	Brown sand, some silt (1" of green granules), wet, grading to black and gray clay, some silt.
	2-4	2R	SS	3-3 3-3	Black to brown-gray clay, some silt, trace sand, moist.
	4-6	3R	SS	7-17 20-20	Brown-gray silt, little patches of light brown sand, trace gravel.
5	6-8	4R	SS	17-19 77	2" of green, yellow, and red, streaky, jello-like substance, little gravel, some black clay, brown silt.
	8-10	5R	SS	14-12 10-10	Gray, hard clay and light brown and gray sand, moist.
10	10-12	6R	SS	4-4 4-4	Brown-gray clay, trace gravel, grading to brown gray medium sand, trace gravel, moist.
	12-14	7R	SS	16-14 8-8	Brown-gray silt, some sand and clay, moist.
	14-16	8R	SS	8-9 23-30/5	Brown, medium sand, 2" in middle of brown-gray silty clay.
15					
20					

* ASTM D1586

SHEET 1 OF 1

DRILLING LOG

WELL NUMBER: BSB-4 OWNER:
LOCATION: in bottom of lagoon ADDRESS:
TOTAL DEPTH: 16'
SURFACE ELEVATION: 934.72 WATER LEVEL:
DRILLING COMPANY: Bowser-Morner DRILLING METHOD: HSA DATE DRILLED: 3/25/88
DRILLER: Joe Falbo HELPER: Lee Bechtol

LOG BY: D. Ashleigh

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	0-2	1R	SS	4-7 5-4	Green, granular, jello-like material (top 2") with red and white specks. Reddish-brown medium sand, some clay, little gravel (black cinders) grading to black-brown, hard, cohesive clay, moist.
	2-4	2R	SS	4-5 5-9	Dark brown-black, hard clay, some silt and sand with gray and black patches throughout, moist.
	4-6	3R	SS	30/2	Green-brown silt, some sand, wet.
5	6-8	4R	SS	7-8 9-9	2" of green granular, jello-like material grading to black clay and red-brown silt, grading to gray sand, some silt.
	8-10	5R	SS	13-23 15-15	Gray, hard packed sand, dry.
10	10-12	6R	SS	6-12 12-13	No recovery.
	12-14	7R	SS	13-19 15-30	Gray clay, some silt, trace gravel, moist (top 1'). Light brown medium sand, well sorted, saturated.
15	14-16	8R	SS	12 30/5	Brown medium sand, well sorted, saturated (top 3"). Light gray, hard clay (bottom 3").
20					

* ASTM D1586

SHEET 1 OF 1

WESTON

DRILLING LOG

WELL NUMBER: BSB-5 OWNER:
LOCATION: in bottom of lagoon ADDRESS:
TOTAL DEPTH: 14.5'
SURFACE ELEVATION: 935.50 WATER LEVEL:
DRILLING COMPANY: Bowser-Morner DRILLING METHOD: HSA DATE DRILLED: 3/26/88
DRILLER: Joe Falbo HELPER: Lee Bechtol

LOG BY: D. Ashleigh

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION · SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	0-2	1R	SS	1-1 1-2	Top 3": Green brown, jello-like material with white and red streaks. 1" of gravel (black cinder), a thin layer of pure white chalk-like material.
	2-4	2R	SS	7-3 3-3	Green brown with red, white and yellow streaks and spots, jello-like material, moist.
5	4-6	3R	SS	7-8 3-23	Black-gray with oily sheen, sandy, sludge-like material, wet.
	6-8	4R	SS	23-28 18-10	Top 3": Same as above. Crushed cobble, brown-gray silt and sand. Bottom 1" is medium, gray-brown sand, moist.
	8-10	5R	SS	5-5 5-5	Brown fine sand, grading to gray, medium sand, moist.
10	10-12	6R	SS	4-4 6-14	Brown-green coarse sand, moist.
	12-14	7R	SS	21 30/3	Brown-green, medium to coarse sand, trace rock fragments, moist.
15	14-16	8R	SS	29	Brown gravel, wet.
20					

* ASTM D1586

WESTON

DRILLING LOG

WELL NUMBER: BSB-6
OWNER:
LOCATION: in bottom of lagoon
ADDRESS:
TOTAL DEPTH: 15'
SURFACE ELEVATION: 934.75
WATER LEVEL:
DRILLING COMPANY: Bowser-Morner
DRILLING METHOD: HSA
DATE DRILLED: 3/25/88
DRILLER: Joe Falbo
HELPER: Lee Bechtol
LOG BY: D. Ashleigh

SKETCH MAP

NOTES:

DEPTH (FEET)	GRAPHIC LOG	SAMPLE NUMBER	SAMPLE TYPE	SAMPLE BLOWS*	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0	0-2	1R	SS	3-4 8-8	Green, granular, jello-like material with white and red specks and brick red and brown material - crushed brick?, dry.
	2-4	2R	SS	1-1 1-1	Gray with black streaks, clay (sludge).
	4-6	3R	SS	2-2 2-16	Gray-brown hard clay with brick-red streaks, wet.
5	6-8	4R	SS	10-12 12-11	Green granular material with red-white specks (top 5"). Dark brown-black clay with pieces of wood debris, moist.
	8-10	5R	SS	10-13 13-25	Brown-green mud, silt and some gravel, wet.
10	10-12	6R	SS	12-20 23-19	Brown sand, some gravel, 1", gray sand layer, moist.
	12-14	7R	SS	8 30/5	Light brown hard clay, moist.
	14-16	8R	SS	25 33/4	Light brown to gray hard clay, moist.
15					
20					

* ASTM D1586

SHEET 1 OF 1

APPENDIX G

ANALYTICAL DATA
WESTON LAGOON SOIL BORING PROGRAM
MARCH/APRIL 1988

Date: December 1988

Revision No. 0

EPA ID No. OHD 015205424

APPENDIX G-2

CORRESPONDENCE RELATED TO PAST RELEASES

1349E

HERB ZABEL PERRY SWIHART FEB. 28, 1972

CC: DAVE CANMANN

Mr. Don L. Mycko, Enforcement Agent of the State Department of Wildlife, visited the Massillon plant on Thursday, February 24. He made a complete tour of the facility and, as a result, made the following request.

(1) That we fill that area adjacent the creek at the back of our property so as to cover any trace where oil may have been dumped.

(2) We have two drains in our shipping area where the trucks park to be loaded. We are to determine whether or not these go to the creek. If so, relocate the drains to eliminate or plug the drains from the sumps.

He did not cite us for violation as apparently there was none. His recommendations were made on the basis that there could be a violation in Paragraph 1 above in times of high water when the creek overflows its banks, and Paragraph 2 excessive leakage of gasoline and/or oil from the trucks, and when we wash down the parking area.

He will recheck us in thirty days (about April 1) to determine what action we are taking.

PERRY SWIHART

PS/lm

INTER-OFFICE COMMUNICATION

TO FILE - Ekco Marsillon DATE 6/29/84

FROM: Bill Miller

SUBJECT: Plant Visit 6/28

I was accompanied by Thomas J. Shingleton Plant Mgr; James O. Eggs, Chief Engineer; & Dr. Stephens of Wadsworth. The company handed me a report of testing done by Wadsworth. I gave the company copies of well logs in Water Pollution Control Board file.

The south well (W-1) (see map) is contaminated. The east well was abandoned years ago - has no pump. Company will be given copy of water well regs so required closure procedures can be followed.

No one knows where the pollutants now in the groundwater came from. The plant stopped using trichloroethene in the mid-60

FORM GEN 1001

and before that had only one small open-topped degreaser.

At no time did the plant ever use both both 1,1,1 TCA and TCE at the same time

The refrigeration system was found by the company to be releasing small amounts of 1,1,1 TCA but they have corrected this, with little effect on the problem.

Plant inspection revealed that the platers & the deionizers are gone. The degreasers are mostly along the west wall of the building, but the "stainless" degreaser is in the NE part of the plant.

The company distills its degreaser to keep oil out of the degreaser; still bottoms are drummed & sent to Robert Ross for burning

There are floor drains near both the west wall degreasers & the stainless degreaser. It is believed these lead to outfall 001. The truck dock drains are sealed.

The refrigerant is totally separate from the degreaser. They condense water & separate it from the refrigerant.

Scrubber waters are dumped into the lagoon 2-3 times/yr. This is really their only process water. The rest is cooling water. There is no surface outfall from the lagoon it infiltrates.

There is no known leakage from solvent storage tanks; all known tanks are above ground except for a buried fuel oil tank. Lines from storage tanks are above ground. Purchase & use records for 1,1,1 TCA agree.

FRANK J. LAUSCHE, Governor

JOHN D. PORTERFIELD, M.D., M.P.H.
Director of Health

306 Ohio Departments Building
Columbus 15, Ohio

STATE OF OHIO

DEPARTMENT OF HEALTH

Public Health Council

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Phillip T. Knies, M.D.

Re: Massillon
Industrial Wastes

December 28, 1953.

Mr. George E. Barnes,
Case Institute of Technology,
Cleveland 6, Ohio.

Dear Sir:

Your report including general plans of proposed industrial waste disposal facilities for the Ekco Products Company, Massillon, has been reviewed and approved. We have the following questions and comments on the plans which should be considered in the submission of detail plans for these facilities.

1. What is the lagoon capacity? No dimensions were given.

2. What pump capacities are planned?

3. On Sheet 2 of the treatment plant plans sloping bottoms are detailed on the accumulation tank and sludge pit in the substructure plan but are not shown on the section view. What is planned? Also, what will be the capacities of these two tanks?

4. On the detail plan of the treatment tanks the lower effluent outlet is 2.5 feet above the tank bottom. How is the remaining 2000 gallons of treated waste to be withdrawn?

5. What type of rate controllers are planned?

6. During our sampling at Ekco Products this past summer considerable oil was noted at both outlets. Should not facilities be provided to remove this oil?

7. We believe permanent recording pH meters should be installed on both outlets to insure satisfactory housekeeping and waste control measures.

8. The approval of the plans is for the military production part of the waste only. It is expected that detail plans of satisfactory disposal facilities for the civilian production will be submitted. Consideration should also be given to the treatment of the concentrated waste tank dumps from the civilian production as this department does not consider dumping on the ground a satisfactory disposal method for this type of waste.

ohio sesquicentennial 1803-1953

396-86

Very truly yours,

F. H. [illegible]
Chief Sanitary Engineer.

by [signature]
Bruce [illegible]
Engineer in Charge.
Water Pollution Control.

Company feels it would spot any leakage since there is a tar base under the tanks.

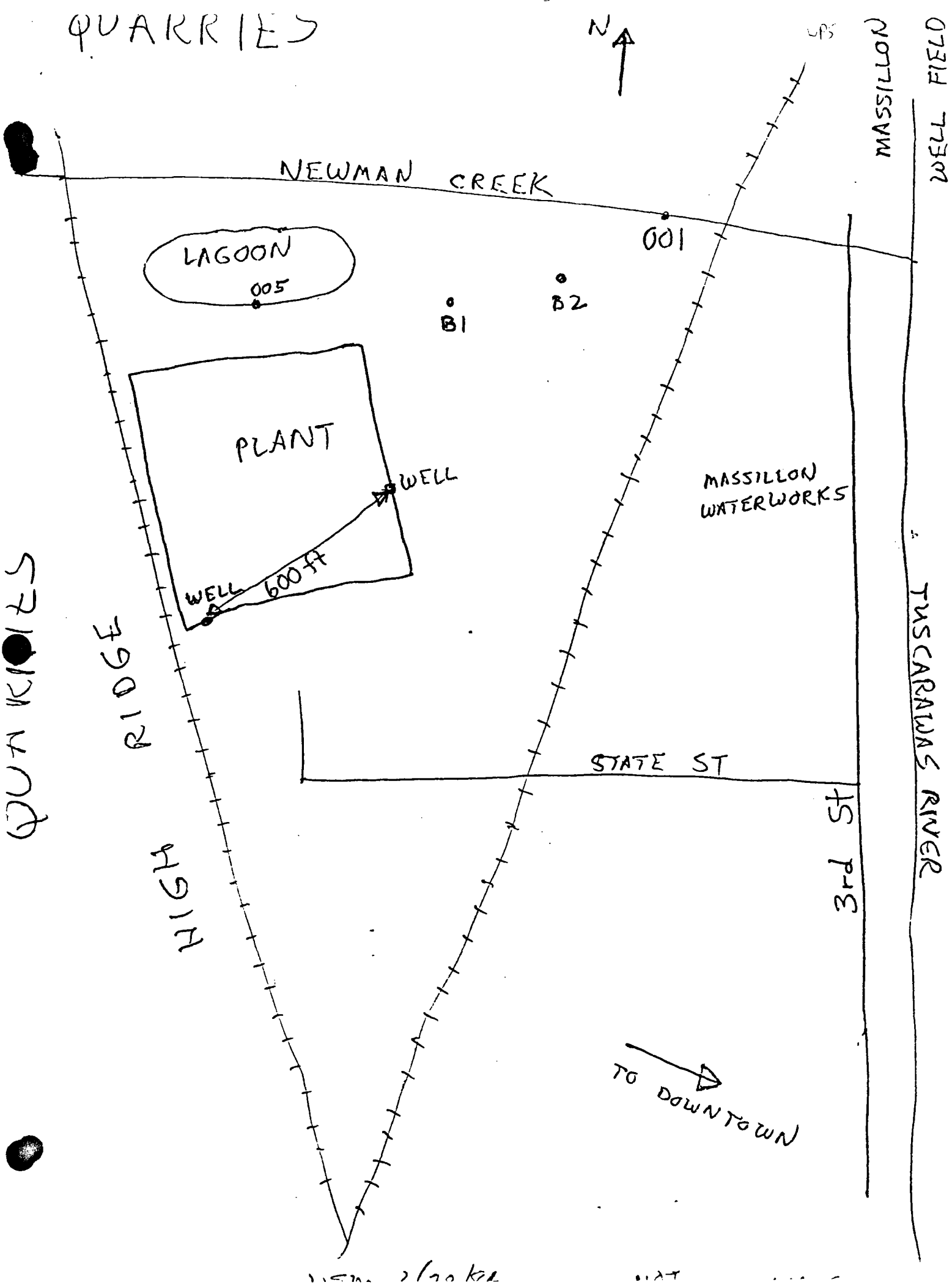
There is a high ridge west of the plant. The lagoon is protected by tall trees. The lagoon had no odor.

At 3 ppm and 300 gpm, the well produces, over 24 hr, 10.8 lb of material. This, assuming the well pumps 24 hr/d, is about 1 55-gal drum of material/wk.

In hazardous waste, Rodney Beals will handle this matter. In water supply, Dan Underwood. In water quality, Eileen Mohr.

cc Eileen Mohr
Dan Underwood
Rodney Beals
Jim Epps

QUARRIES



QUARRIES

Re: Ekco Houseware Company
Stark County
OHD 045-205-424
Generator

Mr. Leo Haun
Ekco Houseware Company
359 State Avenue Extension N.W.
Massillon, Ohio 44646

August 1, 1984

Dear Mr. Haun:

On July 20, 1984, I conducted an inspection of the Ekco Houseware Company facility located at 359 State Avenue Extension, N.W., Massillon, Ohio, to determine compliance of this facility with regards to the Ohio Hazardous Waste regulations. You, Mr. Thomas Shingleton, and Mr. Thomas Epps represented Ekco during this inspection.

The following violations were noted during this inspection:

1. Containers of hazardous waste stored on-site for 90 days or less without a RCRA storage permit must be clearly marked with the words "Hazardous Waste" and the date of accumulation (Ohio Administrative Code (OAC) 3745-52-34).

2. A generator must provide a Personnel Training Program (OAC 3745-52-32: OAC 3745-65-16) including:

   a. A written description of the type and amount of both introductory and continuing training that will be given to personnel who handle hazardous waste at the facility.

   b. Records that document completion of required training by facility personnel.

   c. Job titles and descriptions for each hazardous waste management position at your facility, and the names of the employees filling these positions.

3. A Contingency Plan containing information described in OAC 3745-65-50 through 3745-65-56 must be prepared for this facility (OAC 3745-52-34).

4. Each area where containers are stored must be inspected weekly for evidence of leaks or corrosion (OAC 3745-52-34; OAC 3745-66-74). Inspections must be recorded in an inspection log which includes the date of inspection, the name of the inspector, and a space to acknowledge remedial actions.

cc Tom Shingleton
Jim Epps - 8-2-84

Northeast District Office
2110 E. Aurora Road, Twinsburg, Ohio 44087-1969 (216) 425-9171

During this inspection we briefly discussed the topic of the contaminated ground water aquifer discovered by Ekco. The contamination was found as a result of required VOC analysis of your facility's non-contact cooling water NPDES discharge to Newman Creek. This analysis showed that a number of volatile organic compounds including 1,1,1 trichloroethane and trichloroethylene have been introduced to the ground water aquifer from an unknown source or sources.

Because of these findings, we have requested a meeting with Ekco, scheduled for 9:00 a.m., August 10, 1984 at the OEPA, Northeast District Office, 2110 East Aurora Road, Twinsburg, Ohio, to discuss:

1. Possible sources of ground water contamination.

2. The potential for further testing and monitoring of local ground water to determine the exact source of contamination.

3. Possible remedial actions.

Three possible sources of contamination have been identified from further testing conducted by Ekco. These areas include the two product tank farms and the surface lagoon, which are all located at the Ekco facility. From our discussion during the inspection, it is my understanding that Ekco has used either 1,1, 1 trichloroethane or trichloroethylene in degreasing operations for at least the past 20 years. It is also my understanding that solvent contaminated water generated primarily from condensation within the degreaser units has been physically segregated and discharged via storm sewers to the on-site surface lagoon for a period of time dating back to at least 1979. Pending clarification by this Agency, this surface lagoon may be considered a hazardous waste surface impoundment because of the discharge of listed hazardous waste to the lagoon and the subsequent storage of this hazardous waste within the lagoon.

With exception to the material that will be discussed during our August 10,1984 meeting, please submit to my attention within sixty (60) days from the date of this letter documentation to verify compliance with the second and third violations noted above. Once this material has been reviewed, a reinspection will be scheduled to verify compliance of this facility with the remaining violations.

A copy of this inspection report is enclosed for your information. This report will become a part of the official records of the Ohio Environmental Protection Agency's Division of Solid and Hazardous Waste Management.

Please feel free to contact me at (216) 425-9171 if you have any questions.

Yours truly,

Rodney Beals

Rodney Beals
Environmental Scientist
Division of Solid and Hazardous Waste Management
Northeast District Office

RB:kr

Enc.

cc: P. Cotter, DSHWM, C.O.
D. Hasbrouck, OEPA, NEDO
W. Skowronski, OEPA, NEDO
D. Lee/B. Miller, OEPA, NEDO
D. Underwood, OEPA, NEDO
E. Mohr, OEPA, NEDO

Re: Ekco Housewares Company
Stark County
OHD 045-205-424
Generator

cc: P. Miller
cc: D. Barczak
FYI
Tom S.
2/11

Mr. Thomas Shingleton
Ekco Housewares Company
359 State Avenue Extension N.W.
Massillon, Ohio 44646

January 7, 1985

Dear Mr. Shingleton:

This letter is written in confirmation of the December 5, 1984, meeting conducted at the OEPA, Northeast District Office, concerning ground water contamination at the Ekco facility located in Massillon. In attendance at this meeting were:

Tom Shingleton - Ekco Housewares Company
Dennis Barczak - Ekco Housewares Company
Jim Epps - Ekco Housewares Company
George Mayhew - Ohio Drilling Company
Rodney Beals - OEPA, Division of Solid & Hazardous Waste Management, Northeast District Office
Eileen Mohr - OEPA, Division of Water Quality Monitoring and Assessment, Northeast District Office
Steve Tuckerman - OEPA, Division of Solid & Hazardous Waste Management, Northeast District Office

At this meeting, Mr. Mayhew presented a discussion concerning the results of the hydrogeological study conducted by the Ohio Drilling Company at the Ekco facility. The purpose of this study was to:

1. Determine the source (s) of ground water contamination at the Ekco facility.

2. Determine the vertical and lateral extent of ground water contamination, and

3. Approximate the cone of depression produced from on-site pumping from wells.

Four (4) test holes (1-84 through 4-84) were drilled at the Ekco facility to study shallow soils. Test Hole (T.H.) 1-84 drilled in the north tank farm area showed concentrations of 1,1,1 trichloroethane (TCA) and trichloroethylene (TCE) ranging from .50 mg/kg and 50 mg/kg respectively, in the top four feet of soil, to 23 mg/kg and 3 mg/kg between 15 and 20 feet below the surface. You feel this contamination is the result of mismanagement

or spillage of products. T.H. 2-84, presumably downgradient from T.H. 1-84 showed lesser amounts of VOC's. Fluids collected from these test holes after a rain event documented the same trend. Because of the lesser concentrations of VOC's downgradient from the tank farm, you feel that any contamination resulting from the tank farm will be naturally flushed from the soil by precipitation. T.H. 3, drilled in the west tank farm, was abandoned and not sampled. T.H. 4, drilled on the south side of the plant showed only slight levels of VOC's.

Three test holes (R1 through R3) were drilled through the water-bearing sandstone to study vertical and lateral contaminant migration. These wells were properly developed and ground water samples were obtained for each 20 feet of the water producing aquifer at each well site. These wells were sampled at discrete depths using packers. Results demonstrated that ground water contamination exists on the north and northeast sides of the Ekco facility. Vertical profiles of contamination at each well site suggest similar vertical distribution of contamination throughout the water bearing aquifer.

In addition to these three wells very high concentrations of TCE and TCA (143,000 ppb combined) were observed in water samples collected from an improperly abandoned well (W-10") within the plant. This contamination you believe, is the result of a spill occurring from a nearby degreasing unit five or six years ago.

To verify the contaminant concentrations in W-10" Ohio Drilling would like to pump this well for several hours at approximately 200 gpm and resample the well for VOC's. At this meeting, permission was requested from the OEPA to pump this well as described above, treat the water removed via a portable air-stripping treatment unit, and discharge the treated water to the on-site surface impoundment. Since this information is vital to the ultimate design of the on-site air-stripper treatment unit that will be used to decontaminate the ground water contamination, the Agency agrees it is practical to pump and resample this well as long as the water pumped from this well is treated and discharged to the surface impoundment.

The following is in response to information supplied to us during this meeting. In some instances the Agency is in disagreement with your conclusions.

The first purpose of this study was to identify the sources of contamination. From results supplied by Ohio Drilling, this study identified shallow soil contamination with respect to the north tank farm and contamination in well W-10" apparently caused by a single solvent spill occurring five or six years ago. Considering the concentration of contaminants found in W-10" and the concentrations of VOC's which are still being observed in the south well, it can not be assumed that the spill that occurred can be totally responsible for the ground water contamination. From information calculated by Bill Miller, Industrial Wastewater, approximately 55 gallons of TCE or TCA are presently being discharged via the NPDES outfall weekly. A single spill event could not possibly produce this much contamination for an extended period of time.

It is our feeling that spillage from the tank farm and leakage from the on-site surface impoundment may also be responsible for the identified contamination. To abate further contamination the elimination of all contaminant sources appears imperative.

January 7, 1985

Unless these areas can be proven to not be sources of contamination, contaminated soils resulting from product spillage near the north tank farm should be removed and the surface impoundment should be closed per RCRA closure standards. If a RCRA closure of the surface impoundment is agreed upon by Ekco including off-site removal of all contaminated soils in the basin of the impoundment, no further ground water monitoring of the impoundment will be required. If this course is taken, a RCRA closure plan addressing the requirements of the Closure Performance Standard (OAC 3745-66-11) for the surface impoundment must be submitted to this office. In addition a plan for contaminated soil removal from the north tank farm should also be submitted.

The second purpose of this study was to identify the extent of vertical and lateral migration of ground water contamination. Three wells R1 through R3 were drilled for this purpose. Analyses from R-1 and R-2 suggests that the vertical distribution of contaminants extends through the water-bearing aquifer to the shale bedrock. The lateral extent of contamination has not been adequately described. Information supplied during this meeting suggests ground water movement to the north or northeast from the Ekco facility. Well R-2 confirms that contamination is present in this direction. To define the vertical and lateral extent of ground water contamination from this site, an additional well (s) should be drilled and tested at 20 foot intervals to the bedrock. The well (s) should be located so as to define the northern-most extent of contamination.

Please forward to my attention upon completion the results of the resampling of W-10". Once a course of action concerning the topics of this letter has been decided upon by Ekco and Ohio Drilling, please contact Eileen Mohr. At this time we may be able to establish the specific discharge limits for the air stripper treatment unit.

Please feel free to contact me at (216) 425-9171 if you have any questions.

Yours truly,

Rodney Beals
Environmental Scientist
Division of Solid & Hazardous Waste Management
Northeast District Office

RB:kr

cc: George Mayhew, The Ohio Drilling Company
Doug Hasbrouck, District Chief, OEPA, NEDO
Bill Skowronski/Dave Wertz, OEPA, DSHWM, NEDO
Eileen Mohr, OEPA, DWQMA, NEDO
Dennis Lee/Bill Miller, OEPA, DWW, NEDO
Dan Underwood, OEPA, DPWS, NEDO
Paula Cotter, OEPA, DSHWM, Central Office

THE OHIO DRILLING CO., INC.

P. O. BOX 526

COMPLETE INDUSTRIAL AND MUNICIPAL WELL WATER SUPPLIES
MASSILLON, OHIO 44646

February 11, 1985

Mr. Thomas J. Shingleton
Plant Manager
Ekco Housewares
359 State N.W.
Massillon, Ohio 44646

Re: Ground Water Contamination

Dear Tom:

This letter is written in response to Mr. Rodney Beals' letter of January 7, 1985. Mr. Beals, an environmental scientist with the Ohio Environmental Protection Agency, made several suggestions regarding the investigation of ground water contamination at the Ekco plant in Massillon.

We had reported to the Ohio EPA that we felt the VOC contamination of the ground water was due to some large spills in the plant and to spillage during filling of the VOC tanks in the north tank farm. The EPA suggested that the surface impoundment might also be a source. They had calculated that you have been removing approximately 55 gallons of VOCs each week by pumping the south well. There is an error in this calculation. The concentration of VOCs in the south well is about 4700 ug/l and the pumping rate is approximately 350 gpm. Consequently, about 16.5 gallons of VOCs are removed each week.

Water samples taken from the bottom of the lagoon by Wadsworth Testing Laboratories had VOC concentrations of 4320 ug/l and 4160 ug/l. Water from test well A-1, which is about 80 feet southeast of the lagoon, has a VOC concentration of 1930 ug/l. Approximately 280 feet further southeast the 10" well in the plant has a VOC concentration of 104,000 ug/l and the south well, which is 600 feet further southeast, has a VOC concentration of 4710 ug/l. The south well has been pumped at a rate of 300 to 400 gpm for a number of years. If the lagoon were a major source of VOC pollution, we would expect water samples from A-1 to have higher concentrations of VOCs than samples from the south well. Because the concentration increases away from the lagoon, the lagoon does not appear to be a major source of the VOCs in the ground water.

THE OHIO DRILLING CO., INC.

Mr. Thomas J. Shingleton

Soil samples in the vicinity of the north tank farm at test hole 1-84 had high concentrations of VOCs (20 - 200 mg/kg) down to a depth of at least 20 feet. Approximately 155 feet to the northwest, the soil samples from test hole 2-84 had VOC concentrations of 7.3 - 25.6 mg/kg to a depth of 12 feet. The Ohio EPA has suggested that the contaminated soils at the north tank farm be removed and that the surface impoundment be closed per RCRA closure standards. It would cost 7.1 to 8.9 million dollars to send the soil from the north tank farm to an approved disposal site. In addition there would be a substantial cost for the excavating and filling. You have received an estimated cost of $700,000.00 to close the lagoon.

Your pumping of the south well has maintained a cone of depression underneath the lagoon and the north tank farm. Water levels in the area have been measured and the ground water surface has been contoured. In the vicinity of the lagoon and the north tank farm there is a gradient of approximately 2.5 feet per 100 feet towards the south well. Any contaminant leaching or percolating down to the water table will be kept on your property and it will be pumped from the aquifer.

The letter from the Ohio EPA suggests that one or more additional test holes be drilled to define the vertical and lateral extent of ground water contamination in a northern direction. Water from test well R-2 had 2980 ug/l of VOCs. This test well is 250 feet from the highly contaminated 10" well and only about 95 feet from the plant building. A solvent spill in the plant could exit the building fairly near this test well. It was recommended that any additional test holes be tested at 20 foot intervals to bedrock. The bedrock is at a depth of about 44 feet in this area. I believe that the OEPA wanted water samples pumped at 20 foot intervals in the sandstone aquifer. However, I do not think that additional test drilling is necessary, because the concentration of the contaminant plume has been shown to be decreasing rapidly to the north. Also access for a drilling machine to the north would be difficult because there is a levee adjacent to Newman Creek.

We have authorized Malcolm Pirnie Engineers to design an air stripper using the following conditions.

(a) Influent of 600 gpm with a VOC concentration of 40,000 ug/l consisting primarily of TCE and 1,1,1 Trichloroethane. South well pumped at 400 gpm and the 10" well pumped at 200 gpm.

THE OHIO DRILLING CO., INC.

Mr. Thomas J. Shingleton

(b) Effluent to have no more than 200 ug/l of VOCs.

(c) Air emissions not to exceed 290 pounds per day of total VOCs.

The influent water will be used for non contact manufacturing purposes and the effluent from the air stripper will be discharged to Newman Creek via the present NPDES outfall. Construction will begin on the air stripper as soon as the design has been determined.

I think clean up of the ground water should proceed as follows:

1. Erect the air stripper as soon as it is constructed.

2. Install a pump in the 10" well and pipe it to the air stripper.

3. Drill two test holes and collect soil samples to determine VOC concentrations at the north tank farm - Repeat this step every six months to determine how quickly the soils are cleaning from leaching.

4. Pump water from the lagoon to the air stripper and monitor VOC concentration of effluent.

5. Test soils in bottom of lagoon to determine if removal is necessary.

6. Collect water samples and have them analyzed for VOC concentrations on the following schedule.

   (a) Sample the south well, the 10" well and the effluent from the air stripper each week for four weeks and then each month.

   (b) Sample test wells R-1, R-2 and R-3 every three months to determine the rate of clean up.

7. Send monthly reports to the Northeast District of the Ohio EPA which will include the following.

THE OHIO DRILLING CO., INC.

Mr. Thomas J. Shingleton

(a) Water levels in each well at time of sample collection.

(b) Pumping rates.

(c) Total amount of water pumped to date and total since last report.

(d) Results from all analyses since last report.

(e) Total weight of VOCs emitted to atmosphere.

8. If the rate of clean up of the soils is unsatisfactory as described in step 3 above, experimental work will be done with a vacuum system to accelerate the clean up.

Estimated costs of some of the above described work are listed below:

1. Engineering by Malcolm Pirnie on the tower design - $16,000.00 (firm). Includes (a) design memorandum of aeration process, and (b) detailed design of aeration system.

2. Construction of air stripper and erection on the site - $51,270.00 (firm). Does not include influent or effluent piping.

3. Two soil sample holes every six months - $1,500.00 (firm).

4. Installation of vacuum system if required - $20,000.00 (estimate).

5. Preparation of monthly reports with water analyses - $300.00 (estimate).

6. Quarterly report in lieu of monthly report - $450.00 (estimate).

7. Biannual analyses of soil samples - $450.00 (estimate).

8. Operational costs to run pump in 10" well and blower motor on air stripper - $5,500.00 per year (estimate).

THE OHIO DRILLING CO., INC.

Mr. Thomas J. Shingleton

9. Maintenance to well pump and air stripper - $5,000.00 per year (estimate).

The cost of piping the effluent and influent for the air stripper cannot be estimated accurately until a location is chosen for the air stripper. If water from the plant has to be pumped to the air stripper there will be an added cost.

I hope this letter gives you sufficient information so that you can answer questions asked by Ohio EPA people.

Very truly yours,

THE OHIO DRILLING COMPANY

By George H. Mayhew

George H. Mayhew, Ph.D.

GHM:ee

February 19, 1985

Mr. Rodney Beals
Ohio Environmental Protection Agency
Northeast District Office
2110 East Aurora Road
Twinsburg, Ohio 44087

Dear Mr. Beals:

This letter is in response to your letter of January 7, 1985 relative to our meeting of December 5, 1984, your conclusions to our study and recommendations for removal of contaminants from the ground water on our property.

Two major points as discussed in your letter should be clarified to prevent any further misunderstanding.

The solvent spill that occurred five to six years ago was not brought to your attention as the "only spill" but rather the only major recorded spill. We recognize that in the area of these two vapor degreasers there have been many unreported spills over the past two decades that would have, in fact, contributed to the high level of VOC's in the now abandoned W-10" well located in the same general location as the degreasers.

The calculation made by Mr. Miller that 55 gallons of VOC's are being pumped out weekly in our water supply is in error. This calculation of 3 ppm of VOC's and a pumping rate of 300 gpm over 24 hours produces 10.8 lbs. of material per day or 75 lbs. per week. We have calculated 4.7 ppm and a pumping rate of 350 gpm removes 16.5 gallons of VOC's or 2.4 gallons per day.

Water samples taken from the bottom of the lagoon had VOC concentration of 4320 ug/l and 4160 ug/l. Water from test well A-1 (80 ft. southeast of the lagoon) has a VOC concentration of 1930 ug/l. -280 feet further southeast the 10" well in the plant has a VOC concentration of 104,000 ug/l and the south well, 600 feet further southeast, has a VOC concentration of 4710 ug/l. The south well has been pumping at 300-400 gpm for the past 32 years. If the lagoon was a major source of VOC pollution, we would expect water samples from A-1 to have a higher concentration of VOC's than samples from the south well. Because the concentration increases away from the lagoon, the lagoon does not appear to be a major source of the VOC's in the ground water.

Because of the higher concentrations of VOC's at test hole 1-84, you have suggested that the contaminated soils at the north tank farm be removed and the surface impoundment be closed per RCRA closure standards. It is estimated that 25,000 cubic

February 19, 1985

yards of soil would have to be removed and disposed of at an approved disposal site which would cost 7 to 9 million dollars plus excavating and filling costs. Preliminary costs for closing of the lagoon have been quoted at $700,000.00.

Further conclusions reached by Mr. George Mayhew of Ohio Drilling in response to your January 7 letter are:

1. The pumping of the south well has maintained a cone of depression underneath the lagoon and the north tank farm. Water levels in the area have been measured and the ground water surface has been contoured. In the vicinity of the lagoon and the north tank farm there is a gradient of approximately 2.5 feet per 100 feet towards the south well. Any contaminant leaching or percolating down to the water table will be kept on our property and it will be pumped from the aquifer.

2. The letter from the Ohio EPA suggests that one or more additional test holes be drilled to define the vertical and lateral extent of ground water contamination in a northern direction. Water from test well R-2 had 2980 ug/l of VOC's. This test well is 250 feet from the highly contaminated 10" well and only about 95 feet from the plant building. A solvent spill in the plant could exit the building fairly near this test well. It was recommended that any additional test holes be tested at 20 foot intervals to bedrock. The bedrock is at a depth of about 44 feet in this area. Mr. Mayhew believes that the OEPA wanted water samples pumped at 20 foot intervals in the sandstone aquifer. However, he does not think that additional test drilling is necessary, because the concentration of the contaminant plume has been shown to be decreasing rapidly to the north. Also access for a drilling machine to the north would be difficult because there is a levee adjacent to Newman Creek.

We have authorized Malcolm Pirnie, Inc. to design an air stripper using the following conditions:

1. Influent of 600 gpm with a VOC concentration of 40,000 ug/l consisting primarily of TCE and 1,1,1 Trichloroethane. The south well to be pumped at 400 gpm and the 10" well at 200 gpm.

2. Effluent to have no more than 200 ug/l of VOC's.

3. Air emissions not to exceed 290 pounds per day of total VOC's.

The influent water will be used for non contact manufacturing purposes and the effluent from the air stripper will be discharged to Newman Creek via the present NPDES outfall. Construction will begin on the air stripper as soon as the design has been determined which is approximately two weeks.

February 19, 1985

We are recommending the following courses of action to clean up the ground water subject to your approval:

1. Erect the air stripper as soon as it is constructed.

2. Install a pump in the 10" well and pipe it to the air stripper.

3. Drill two test holes and collect soil samples to determine VOC concentrations at the north tank farm - Repeat this step every six months to determine how quickly the soils are cleaning from leaching.

4. Pump water from the lagoon to the air stripper and monitor VOC concentration of effluent.

5. Test soils in bottom of lagoon to determine if removal is necessary.

6. Collect water samples and have them analyzed for VOC concentrations on the following schedule.
   (a) Sample the south well, the 10" well and the effluent from the air stripper each week for four weeks and then each month.
   (b) Sample test wells R-1, R-2 and R-3 every three months to determine the rate of clean up.

7. Send monthly reports to the Northeast District of the Ohio EPA which will include the following.
   (a) Water levels in each well at time of sample collection.
   (b) Pumping rates.
   (c) Total amount of water pumped to date and total since last report.
   (d) Results from all analyses since last report.
   (e) Total weight of VOC's emitted to atmosphere.

8. If the rate of clean up of the soils is unsatisfactory as described in Step 3 above, experimental work will be done with a vacuum system to accelerate the clean up.

We will await your reply and remain,

Sincerely,

EKCO HOUSEWARES, INC.

Thomas J. Shingleton
Plant Manager

TJS/lm
CC: See Page 4.

February 19, 1985

CC: W. P. Miller II - Ekco Housewares, Inc.
D. P. Barczak " " "
G. Mayhew - Ohio Drilling Co., Inc.
J. Epps - Ekco Housewares, Inc.
L. Hahn " " "

APPENDIX H

ANALYTICAL DATA
WESTON LAGOON SOIL BORING PROGRAM
MARCH/APRIL 1988

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

April 14, 1988

Mr. Harold G. Byer
Roy F. Weston, Inc.
1 Weston Way
West Chester, PA 19380

Dear Mr. Byer:

Please find enclosed the analytical reports for American Home Product samples submitted to Gulf Coast Laboratories for analyses. They were identified as follows:

CLIENT ID	GCL#	SAMPLE DATE	DATE RECEIVED
BSB-1-1R	127015	03/24/88	03/29/88
BSB-1-2R	127016	03/24/88	03/29/88
BSB-1-3R	127017	03/24/88	03/29/88
BSB-1-4R	127018	03/24/88	03/29/88
BSB-1-5R	127019	03/24/88	03/29/88
BSB-1-6R	127020	03/24/88	03/29/88
SSB-1-1R	127021	03/24/88	03/29/88
SSB-1-2R	127022	03/24/88	03/29/88
SSB-1-3R	127023	03/24/88	03/29/88
SSB-2-1R	127024	03/24/88	03/29/88
SSB-2-2R	127025	03/24/88	03/29/88
SSB-2-3R	127026	03/24/88	03/29/88
BSB-2-3R	127027	03/25/88	03/29/88
BSB-2-4R	127028	03/25/88	03/29/88
BSB-2-5R	127029	03/25/88	03/29/88
BSB-2-6R	127030	03/25/88	03/29/88
BSB-2-7R	127031	03/25/88	03/29/88
BSB-2-8R	127032	03/25/88	03/29/88
BSB-3-1R	127033	03/25/88	03/29/88
BSB-3-2R	127034	03/25/88	03/29/88
BSB-3-3R	127035	03/25/88	03/29/88
BSB-3-4R	127036	03/25/88	03/29/88
BSB-3-5R	127037	03/25/88	03/29/88
BSB-3-5D	127038	03/25/88	03/29/88
BSB-3-6R	127039	03/25/88	03/29/88
BSB-3-7R	127040	03/25/88	03/29/88
BSB-3-8R	127041	03/25/88	03/29/88
BSB-X-XT	127042	03/25/88	03/29/88
BSB-4-1R	127043	03/25/88	03/29/88
BSB-4-2R	127044	03/25/88	03/29/88
BSB-4-3R	127045	03/25/88	03/29/88
BSB-4-4R	127046	03/25/88	03/29/88

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

BSB-4-5R	127047	03/25/88	03/29/88
BSB-4-7R	127048	03/25/88	03/29/88
BSB-4-8R	127049	03/25/88	03/29/88
BSB-X-XT	127050	03/25/88	03/29/88
BSB-6-1F	127051	03/25/88	03/29/88
BSB-2-1R	127052	03/25/88	03/29/88
BSB-6-1R	127056	03/25/88	03/29/88
BSB-6-3R	127057	03/25/88	03/29/88
BSB-6-5R	127058	03/25/88	03/29/88
BSB-6-8R	127059	03/25/88	03/29/88
BSB-5-1R	127060	03/26/88	03/29/88
BSB-5-2R	127061	03/26/88	03/29/88
BSB-5-3R	127062	03/26/88	03/29/88
BSB-5-4R	127063	03/26/88	03/29/88
BSB-5-5R	127064	03/26/88	03/29/88
BSB-5-5D	127065	03/26/88	03/29/88
BSB-5-6R	127066	03/26/88	03/29/88
BSB-5-7R	127067	03/26/88	03/29/88
BSB-5-8R	127068	03/26/88	03/29/88
SSB-3-1R	127069	03/26/88	03/29/88
SSB-3-2R	127070	03/26/88	03/29/88
BSB-5-1R	127071	03/26/88	03/29/88
BSB-X-1T	127072	03/26/88	03/29/88
BSB-6-2R	127073	03/26/88	03/29/88
BSB-6-4R	127076	03/25/88	03/29/88
BSB-6-6R	127078	03/25/88	03/29/88
BSB-6-7R	127079	03/25/88	03/29/88
BSB-2-2R	127081	03/25/88	03/29/88

If you have any questions, please contact our laboratories.

Sincerely,

WESTON/GULF COAST LABORATORIES

John Boudreau

John Boudreau
Analytical Director

JB/kl

Enclosures

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

Weston-Gulf Coast
American Home Products, GCL# 127015-127081
VOA GC/MS

CASE NARRATIVE

GENERAL

1. Weston-Gulf Coast uses the following GC/MS systems which can be identified on all raw data by either the Instrument ID or the quantitation file ID:

ID #	Instrument	Quant ID File
GCL#1	Hewlett Packard 5970 MSD	ID_EPA
GCL#2	Hewlett Packard 5996	ID_VOL
GCL#3	Hewlett Packard 5996	ID_AFB
GCL#4	Hewlett Packard 5970 MSD	ID_MGK

2. The Internal Standard and Surrogate peaks in both the VOA and BNA analyses are labeled by name.

3. The quantitation of all detected HSL compounds was conducted using the response factors calculated from the continuing calibration standard.

VOA:

1. All samples have been analyzed initially undiluted and therefore and therefore the low level soil (or low level water) detection limits have been used.

2. The surrogate recoveries for all analyses except for the initial analysis of sample 127057 were within USEPA QC recovery limits. Sample 127057 needed to be diluted and reanalyzed to quantitate the compound acetone which was outside of the calibration range in the initial analysis. The surrogate recoveries on the diluted analysis were within QC limits.

3. Sample 127033 was reanalyzed at a 1:5 dilution to quantitate the compound acetone which was outside of the instrument quantitation range in the initial analysis.

4. Matrix spike analyses were conducted on samples 127015, 127045, and 127065.

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The following is a list of flags that WESTON/GULF COAST Laboratories frequently uses on our analytical reports. All flags may not be applicable for the enclosed reports.

A - Indicates a condensation product.

B - Indicates the compound was found in the blank as well as the sample.

C - Pesticide compound confirmed by GC/MS

d - Result is on a dry weight basis

D - Indicates the compound was identified in an analysis at a secondary dilution factor. If a sample is re-analyzed at a higher dilution, the "DL" suffix is appended to sample numbers.

e - Concentrations exceed calibration range of the instrument for that specific analysis.

E - Severe matrix interference

J - Indicates an estimated value which is below detection limit

P - Peaks present but do not appear to be PCBs

R - Spike recovery not within control limit

S - Indicates value determined by Method of Standard Addition

U - Indicates compound was analyzed for but not detected

W - Result is on an "as is basis" (wet weight)

BDL - Below Detection Limit

NA - Not Applicable

NR - Not Required

* - Duplicate not within control limits

+ - Correlation coefficient for MSA < 0.995

@ - Due to matrix interference, post analytical spike is out of control limits.

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-1-1R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127015

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	30	5	ug/kg	B
Acetone	10	10	ug/kg	B
Carbon Disulfide	4	5	ug/kg	J
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	2	5	ug/kg	J
1,2-Dichloroethene (total)	7	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	4	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-1-1R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127015

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	10	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-1-1R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127015

TENTATIVELY IDENTIFIED COMPOUNDS

No Volatile Compounds greater than 10% of the nearest internal standard were tentatively identified by mass spectral library search. This is exclusive of any priority pollutants, surrogates or internal standards.

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-1-2R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127016

GCL #	PARAMETERS	ANALYST	RESULTS		
127016	Arsenic, Total	prw	23	mg/kg	d
127016	Barium, Total	el	115	mg/kg	d
127016	Cadmium, Total	el	9.13	mg/kg	d
127016	Chromium, Total	el	103	mg/kg	d
127016	Copper, Total	el	133	mg/kg	d
127016	Cyanides, Total	bt	< 5	mg/kg	d
127016	Lead, Total	jfd	72	mg/kg	d
127016	Nickel, Total	el	23.2	mg/kg	dR
127016	Selenium, Total	prw	1.1	mg/kg	d
127016	Solids, Total	ssh	72.3	%	
127016	Zinc, Total	el	256	mg/kg	d*

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-1-3R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127017

GCL #	PARAMETERS	ANALYST	RESULTS		
127017	Arsenic, Total	prw	7.2	mg/kg	d
127017	Barium, Total	el	55.1	mg/kg	d
127017	Cadmium, Total	el	6.73	mg/kg	d
127017	Chromium, Total	el	17.0	mg/kg	d
127017	Copper, Total	el	119	mg/kg	d
127017	Cyanides, Total	bt	< 5	mg/kg	d
127017	Lead, Total	jfd	38	mg/kg	d
127017	Nickel, Total	el	13.4	mg/kg	dR
127017	Selenium, Total	prw	< 0.75	mg/kg	d
127017	Solids, Total	ssh	82.5	%	
127017	Zinc, Total	el	116	mg/kg	d*

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-1-3R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127017

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	14	5	ug/kg	B
Acetone	11	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	2	5	ug/kg	J
1,2-Dichloroethene (total)	3	5	ug/kg	J
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	5	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-1-3R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127017

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	6	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	1	5	ug/kg	J B
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-1-3R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127017

TENTATIVELY IDENTIFIED COMPOUNDS

No Volatile Compounds greater than 10% of the nearest internal standard were tentatively identified by mass spectral library search. This is exclusive of any priority pollutants, surrogates or internal standards.

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-1-4R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127018

GCL #	PARAMETERS	ANALYST	RESULTS		
127018	Arsenic, Total	prw	26	mg/kg	d
127018	Barium, Total	el	163	mg/kg	d
127018	Cadmium, Total	el	215	mg/kg	d
127018	Chromium, Total	el	295	mg/kg	d
127018	Copper, Total	el	3440	mg/kg	d
127018	Cyanides, Total	bt	< 5	mg/kg	d
127018	Lead, Total	jfd	860	mg/kg	d
127018	Nickel, Total	el	47.5	mg/kg	dR
127018	Selenium, Total	prw	8.6	mg/kg	d
127018	Solids, Total	ssh	80.0	%	
127018	Zinc, Total	el	174	mg/kg	d*

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-1-5R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127019

GCL #	PARAMETERS	ANALYST	RESULTS		
127019	Arsenic, Total	prw	21	mg/kg	d
127019	Barium, Total	el	38.0	mg/kg	d
127019	Cadmium, Total	el	16.1	mg/kg	d
127019	Chromium, Total	el	61.5	mg/kg	d
127019	Copper, Total	el	208	mg/kg	d
127019	Cyanides, Total	bt	< 5	mg/kg	d
127019	Lead, Total	jfd	91	mg/kg	d
127019	Nickel, Total	el	21.6	mg/kg	dR
127019	Selenium, Total	prw	< 0.77	mg/kg	d
127019	Solids, Total	ssh	78.3	%	
127019	Zinc, Total	el	172	mg/kg	d*

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-1-5R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127019

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	6	5	ug/kg	B
Acetone	29	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	8	5	ug/kg	
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	10	10	ug/kg	
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-1-5R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127019

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	BDL	5	ug/kg	U
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-1-5R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127019

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-1-6R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127020

GCL #	PARAMETERS	ANALYST	RESULTS		
127020	Arsenic, Total	prw	150	mg/kg	d
127020	Barium, Total	el	24.5	mg/kg	d
127020	Cadmium, Total	el	0.789	mg/kg	d
127020	Chromium, Total	el	4.74	mg/kg	d
127020	Copper, Total	el	37.4	mg/kg	d
127020	Cyanides, Total	bt	< 5	mg/kg	d
127020	Lead, Total	jfd	42	mg/kg	d
127020	Nickel, Total	el	38.6	mg/kg	dR
127020	Selenium, Total	prw	0.93	mg/kg	d
127020	Solids, Total	ssh	87.2	%	
127020	Zinc, Total	el	86.3	mg/kg	d*

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: SSB-1-1R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127021

GCL #	PARAMETERS	ANALYST	RESULTS		
127021	Arsenic, Total	prw	20	mg/kg	d
127021	Barium, Total	el	584	mg/kg	d
127021	Cadmium, Total	el	1680	mg/kg	d
127021	Chromium, Total	el	880	mg/kg	d
127021	Copper, Total	el	18200	mg/kg	d
127021	Cyanides, Total	bt	< 5	mg/kg	d
127021	Lead, Total	jfd	6100	mg/kg	d
127021	Nickel, Total	el	164	mg/kg	dR
127021	Selenium, Total	prw	55	mg/kg	d
127021	Solids, Total	ssh	60.8	%	
127021	Zinc, Total	el	863	mg/kg	d*

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-1-1R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127021

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	10	5	ug/kg	B
Acetone	8	10	ug/kg	J B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	4	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-1-1R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127021

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	BDL	5	ug/kg	U
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-1-1R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127021

TENTATIVELY IDENTIFIED COMPOUNDS

No Volatile Compounds greater than 10% of the nearest internal standard were tentatively identified by mass spectral library search. This is exclusive of any priority pollutants, surrogates or internal standards.

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: SSB-1-2R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127022

GCL #	PARAMETERS	ANALYST	RESULTS		
127022	Arsenic, Total	prw	10	mg/kg	d
127022	Barium, Total	el	152	mg/kg	d
127022	Cadmium, Total	el	3.26	mg/kg	d
127022	Chromium, Total	el	414	mg/kg	d
127022	Copper, Total	el	108	mg/kg	d
127022	Cyanides, Total	bt	< 5	mg/kg	d
127022	Lead, Total	jfd	55	mg/kg	d
127022	Nickel, Total	el	14.3	mg/kg	dR
127022	Selenium, Total	prw	2.0	mg/kg	d
127022	Solids, Total	ssh	74.0	%	
127022	Zinc, Total	el	78.0	mg/kg	d*

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: SSB-1-3R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127023

GCL #	PARAMETERS	ANALYST	RESULTS		
127023	Arsenic, Total	prw	6.0	mg/kg	d
127023	Barium, Total	el	60.6	mg/kg	d
127023	Cadmium, Total	el	2.58	mg/kg	d
127023	Chromium, Total	el	235	mg/kg	d
127023	Copper, Total	el	44.3	mg/kg	d
127023	Cyanides, Total	bt	< 5	mg/kg	d
127023	Lead, Total	jfd	20	mg/kg	d
127023	Nickel, Total	el	8.38	mg/kg	dR
127023	Selenium, Total	prw	1.8	mg/kg	d
127023	Solids, Total	ssh	82.4	%	
127023	Zinc, Total	el	73.3	mg/kg	d*

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-1-3R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127023

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	5	5	ug/kg	B
Acetone	33	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	1	5	ug/kg	J
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	7	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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DATE: April 4, 1988

RE: SSB-1-3R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127023

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	BDL	5	ug/kg	U
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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DATE: April 4, 1988

RE: SSB-1-3R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127023

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: SSB-2-1R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127024

GCL #	PARAMETERS	ANALYST	RESULTS		
127024	Arsenic, Total	prw	12	mg/kg	d
127024	Barium, Total	el	158	mg/kg	d
127024	Cadmium, Total	el	188	mg/kg	d
127024	Chromium, Total	el	121	mg/kg	d
127024	Copper, Total	el	1520	mg/kg	d
127024	Cyanides, Total	dtk	< 5	mg/kg	d
127024	Lead, Total	jfd	1300	mg/kg	d
127024	Nickel, Total	el	25.9	mg/kg	dR
127024	Selenium, Total	prw	8.3	mg/kg	d
127024	Solids, Total	ssh	81.8	%	
127024	Zinc, Total	el	157	mg/kg	d*

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-2-1R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127024

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	18	5	ug/kg	B
Acetone	9	10	ug/kg	J B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	3	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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DATE: April 4, 1988

RE: SSB-2-1R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127024

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	2	5	ug/kg	J
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-2-1R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127024

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: SSB-2-2R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127025

GCL #	PARAMETERS	ANALYST	RESULTS		
127025	Arsenic, Total	prw	17	mg/kg	d
127025	Barium, Total	el	152	mg/kg	dR
127025	Cadmium, Total	el	77.2	mg/kg	d*
127025	Chromium, Total	el	53.8	mg/kg	d
127025	Copper, Total	el	611	mg/kg	d
127025	Cyanides, Total	dtk	< 5	mg/kg	d
127025	Lead, Total	jfd	320	mg/kg	d
127025	Nickel, Total	el	21.2	mg/kg	d
127025	Selenium, Total	prw	2.8	mg/kg	dR
127025	Solids, Total	ssh	80.3	%	
127025	Zinc, Total	el	115	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: SSB-2-3R American Home Product
Proj.# 2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL Number: 127026

GCL #	PARAMETERS	ANALYST	RESULTS		
127026	Arsenic, Total	prw	11	mg/kg	d
127026	Barium, Total	el	134	mg/kg	dR
127026	Cadmium, Total	el	7.78	mg/kg	d*
127026	Chromium, Total	el	23.6	mg/kg	d
127026	Copper, Total	el	191	mg/kg	d
127026	Cyanides, Total	dtk	< 5	mg/kg	d
127026	Lead, Total	jfd	150	mg/kg	d
127026	Nickel, Total	el	14.1	mg/kg	d
127026	Selenium, Total	prw	< 0.78	mg/kg	dR
127026	Solids, Total	ssh	75.1	%	
127026	Zinc, Total	el	123	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-2-3R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127026

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	11	5	ug/kg	B
Acetone	42	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	6	5	ug/kg	
1,2-Dichloroethene (total)	16	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	8	10	ug/kg	J
1,1,1-Trichloroethane	2	5	ug/kg	J
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-2-3R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127026

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	10	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	1	5	ug/kg	J
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-2-3R American Home Product
Project #2994-02-01
Sample Date: 03/24/88
Date Received: 03/29/88
GCL# 127026

TENTATIVELY IDENTIFIED COMPOUNDS

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ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-2-3R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127027

GCL #	PARAMETERS	ANALYST	RESULTS		
127027	Arsenic, Total	prw	29	mg/kg	d
127027	Barium, Total	el	193	mg/kg	dR
127027	Cadmium, Total	el	136	mg/kg	d*
127027	Chromium, Total	el	70.4	mg/kg	d
127027	Copper, Total	el	291	mg/kg	d
127027	Cyanides, Total	dtk	< 5	mg/kg	d
127027	Lead, Total	jfd	670	mg/kg	d
127027	Nickel, Total	el	30.4	mg/kg	d
127027	Selenium, Total	prw	5.2	mg/kg	dR
127027	Solids, Total	ssh	89.6	%	
127027	Zinc, Total	el	204	mg/kg	d

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-2-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127027

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	4	5	ug/kg	J B
Acetone	64	10	ug/kg	B
Carbon Disulfide	2	5	ug/kg	J
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	13	5	ug/kg	
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	16	10	ug/kg	
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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DATE: April 4, 1988

RE: BSB-2-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127027

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	9	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	1	5	ug/kg	J
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	2	5	ug/kg	J
Styrene	BDL	5	ug/kg	U
Xylene	3	5	ug/kg	J

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-2-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127027

TENTATIVELY IDENTIFIED COMPOUNDS

No Volatile Compounds greater than 10% of the nearest internal standard were tentatively identified by mass spectral library search. This is exclusive of any priority pollutants, surrogates or internal standards.

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-2-4R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127028

GCL #	PARAMETERS	ANALYST		RESULTS		
127028	Arsenic, Total	prw		2.4	mg/kg	d
127028	Barium, Total	el		65.3	mg/kg	dR
127028	Cadmium, Total	el	<	0.381	mg/kg	d*
127028	Chromium, Total	el		8.92	mg/kg	d
127028	Copper, Total	el		12.7	mg/kg	d
127028	Cyanides, Total	dtk	<	5	mg/kg	d
127028	Lead, Total	jfd		20	mg/kg	d
127028	Nickel, Total	el		12.1	mg/kg	d
127028	Selenium, Total	prw	<	0.76	mg/kg	dR
127028	Solids, Total	ssh		74.3	%	
127028	Zinc, Total	el		62.6	mg/kg	d

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Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-2-5R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127029

GCL #	PARAMETERS	ANALYST	RESULTS		
127029	Arsenic, Total	prw	7.2	mg/kg	d
127029	Barium, Total	el	44.5	mg/kg	dR
127029	Cadmium, Total	el	84.6	mg/kg	d*
127029	Chromium, Total	el	8.72	mg/kg	d
127029	Copper, Total	el	93.0	mg/kg	d
127029	Cyanides, Total	dtk	< 5	mg/kg	d
127029	Lead, Total	jfd	320	mg/kg	d
127029	Nickel, Total	el	9.22	mg/kg	d
127029	Selenium, Total	prw	1.7	mg/kg	dR
127029	Solids, Total	ssh	89.4	%	
127029	Zinc, Total	el	73.8	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-2-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127029

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	3	5	ug/kg	J B
Acetone	22	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	6	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-2-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127029

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	8	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	1	5	ug/kg	J
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-2-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127029

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-2-6R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127030

GCL #	PARAMETERS	ANALYST	RESULTS			
127030	Arsenic, Total	prw		6.0	mg/kg	d
127030	Barium, Total	el		31.3	mg/kg	dR
127030	Cadmium, Total	el		11.1	mg/kg	d*
127030	Chromium, Total	el		7.15	mg/kg	d
127030	Copper, Total	el		35.5	mg/kg	d
127030	Cyanides, Total	dtk	<	5	mg/kg	d
127030	Lead, Total	jfd		58	mg/kg	d
127030	Nickel, Total	el		12.9	mg/kg	d
127030	Selenium, Total	prw	<	0.76	mg/kg	dR
127030	Solids, Total	ssh		88.9	%	
127030	Zinc, Total	el		58.6	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-2-7R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127031

GCL #	PARAMETERS	ANALYST		RESULTS		
127031	Arsenic, Total	prw		9.0	mg/kg	d
127031	Barium, Total	el		73.6	mg/kg	dR
127031	Cadmium, Total	el		2.70	mg/kg	d*
127031	Chromium, Total	el		7.60	mg/kg	d
127031	Copper, Total	el		34.6	mg/kg	d
127031	Cyanides, Total	dtk	<	5	mg/kg	d
127031	Lead, Total	jfd		33	mg/kg	d
127031	Nickel, Total	el		16.9	mg/kg	d
127031	Selenium, Total	prw	<	0.78	mg/kg	dR
127031	Solids, Total	ssh		83.9	%	
127031	Zinc, Total	el		59.8	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-2-8R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127032

GCL #	PARAMETERS	ANALYST		RESULTS		
127032	Arsenic, Total	prw		8.2	mg/kg	d
127032	Barium, Total	el		61.5	mg/kg	dR
127032	Cadmium, Total	el	<	0.396	mg/kg	d*
127032	Chromium, Total	el		6.81	mg/kg	d
127032	Copper, Total	el		25.8	mg/kg	d
127032	Cyanides, Total	dtk	<	5	mg/kg	d
127032	Lead, Total	jfd		36	mg/kg	d
127032	Nickel, Total	el		16.1	mg/kg	d
127032	Selenium, Total	prw	<	0.79	mg/kg	dR
127032	Solids, Total	ssh		81.6	%	
127032	Zinc, Total	el		65.4	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-2-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127032

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	1	5	ug/kg	J B
Acetone	13	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	10	5	ug/kg	
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	6	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-2-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127032

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	5	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-2-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127032

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-3-1R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127033

GCL #	PARAMETERS	ANALYST	RESULTS		
127033	Arsenic, Total	prw	18	mg/kg	d
127033	Barium, Total	el	235	mg/kg	dR
127033	Cadmium, Total	el	18.9	mg/kg	d*
127033	Chromium, Total	el	152	mg/kg	d
127033	Copper, Total	el	793	mg/kg	d
127033	Cyanides, Total	dtk	< 5	mg/kg	d
127033	Lead, Total	jfd	990	mg/kg	d
127033	Nickel, Total	el	26.5	mg/kg	d
127033	Selenium, Total	prw	1.1	mg/kg	dR
127033	Solids, Total	ssh	66.7	%	
127033	Zinc, Total	el	538	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127033

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	37	10	ug/kg	
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	5	5	ug/kg	B
Acetone	480	10	ug/kg	B e
Carbon Disulfide	4	5	ug/kg	J
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	80	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	82	10	ug/kg	
1,1,1-Trichloroethane	2	5	ug/kg	J
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127033

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	12	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	2	5	ug/kg	J
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127033

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 5, 1988

RE: BSB-3-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127033 DL

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT
Acetone	190	50 ug/kg D B

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WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-3-2R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127034

GCL #	PARAMETERS	ANALYST	RESULTS		
127034	Arsenic, Total	prw	6.8	mg/kg	d
127034	Barium, Total	el	146	mg/kg	dR
127034	Cadmium, Total	el	1.24	mg/kg	d*
127034	Chromium, Total	el	384	mg/kg	d
127034	Copper, Total	el	67.1	mg/kg	d
127034	Cyanides, Total	dtk	< 5	mg/kg	d
127034	Lead, Total	jfd	36	mg/kg	d
127034	Nickel, Total	el	49.8	mg/kg	d
127034	Selenium, Total	prw	< 0.79	mg/kg	dR
127034	Solids, Total	ssh	45.3	%	
127034	Zinc, Total	el	365	mg/kg	d

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Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-3-3R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127035

GCL #	PARAMETERS	ANALYST	RESULTS		
127035	Arsenic, Total	prw	4.5	mg/kg	d
127035	Barium, Total	jes	45.1	mg/kg	d
127035	Cadmium, Total	jes	1.21	mg/kg	d
127035	Chromium, Total	jes	527	mg/kg	d
127035	Copper, Total	jes	78.4	mg/kg	d
127035	Cyanides, Total	dtk	< 5	mg/kg	d
127035	Lead, Total	jfd	43	mg/kg	d
127035	Nickel, Total	jes	20.5	mg/kg	d
127035	Selenium, Total	prw	< 0.77	mg/kg	dR
127035	Solids, Total	ssh	78.8	%	
127035	Zinc, Total	jes	176	mg/kg	d

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127035

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	1	10	ug/kg	J
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	7	5	ug/kg	B
Acetone	44	10	ug/kg	B
Carbon Disulfide	2	5	ug/kg	J
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	10	5	ug/kg	
1,2-Dichloroethene (total)	3	5	ug/kg	J
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	13	10	ug/kg	
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127035

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	15	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	3	5	ug/kg	J
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127035

TENTATIVELY IDENTIFIED COMPOUNDS

No Volatile Compounds greater than 10% of the nearest internal standard were tentatively identified by mass spectral library search. This is exclusive of any priority pollutants, surrogates or internal standards.

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-3-4R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127036

GCL #	PARAMETERS	ANALYST	RESULTS		
127036	Arsenic, Total	prw	8.3	mg/kg	d
127036	Barium, Total	jes	1840	mg/kg	d
127036	Cadmium, Total	jes	3790	mg/kg	d
127036	Chromium, Total	jes	264	mg/kg	d
127036	Copper, Total	jes	12500	mg/kg	d
127036	Cyanides, Total	dtk	< 5	mg/kg	d
127036	Lead, Total	jfd	13000	mg/kg	d
127036	Nickel, Total	jes	25.9	mg/kg	d
127036	Selenium, Total	prw	99	mg/kg	dR
127036	Solids, Total	ssh	28.1	%	
127036	Zinc, Total	jes	522	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-3-5R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127037

GCL #	PARAMETERS	ANALYST		RESULTS		
127037	Arsenic, Total	prw		14	mg/kg	d
127037	Barium, Total	jes		31.0	mg/kg	d
127037	Cadmium, Total	jes	<	0.369	mg/kg	d
127037	Chromium, Total	jes		6.55	mg/kg	d
127037	Copper, Total	jes		34.5	mg/kg	d
127037	Cyanides, Total	dtk	<	5	mg/kg	d
127037	Lead, Total	jfd		36	mg/kg	d
127037	Nickel, Total	jes		14.8	mg/kg	d
127037	Selenium, Total	prw	<	0.74	mg/kg	dR
127037	Solids, Total	ssh		91.9	%	
127037	Zinc, Total	jes		49.6	mg/kg	d

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127037

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	9	10	ug/kg	J
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	9	5	ug/kg	
Acetone	12	10	ug/kg	B
Carbon Disulfide	5	5	ug/kg	
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	5	5	ug/kg	
1,2-Dichloroethene (total)	140	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	5	10	ug/kg	J B
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127037

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	13	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127037

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-3-5D American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127038

GCL #	PARAMETERS	ANALYST	RESULTS			
127038	Arsenic, Total	prw		14	mg/kg	d
127038	Barium, Total	jes		34.4	mg/kg	d
127038	Cadmium, Total	jes		5.62	mg/kg	d
127038	Chromium, Total	jes		11.3	mg/kg	d
127038	Copper, Total	jes		53.3	mg/kg	d
127038	Cyanides, Total	dtk	<	5	mg/kg	d
127038	Lead, Total	jfd		52	mg/kg	d
127038	Nickel, Total	jes		15.1	mg/kg	d
127038	Selenium, Total	prw	<	0.77	mg/kg	dR
127038	Solids, Total	ssh		86.9	%	
127038	Zinc, Total	jes		65.7	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-5D American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127038

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	3	5	ug/kg	J
Acetone	34	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	3	5	ug/kg	J
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	7	10	ug/kg	J B
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-5D American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127038

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	5	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-5D American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127038

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-3-6R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127039

GCL #	PARAMETERS	ANALYST		RESULTS		
127039	Arsenic, Total	prw		11	mg/kg	d
127039	Barium, Total	jes		27.1	mg/kg	d
127039	Cadmium, Total	jes		5.23	mg/kg	d
127039	Chromium, Total	jes		11.6	mg/kg	d
127039	Copper, Total	jes		41.1	mg/kg	d
127039	Cyanides, Total	dtk	<	5	mg/kg	d
127039	Lead, Total	jfd		39	mg/kg	d
127039	Nickel, Total	jes		15.0	mg/kg	d
127039	Selenium, Total	prw	<	0.76	mg/kg	dR
127039	Solids, Total	ssh		83.5	%	
127039	Zinc, Total	jes		69.1	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-3-7R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127040

GCL #	PARAMETERS	ANALYST		RESULTS		
127040	Arsenic, Total	prw		18	mg/kg	d
127040	Barium, Total	jes		42.1	mg/kg	d
127040	Cadmium, Total	jes		8.06	mg/kg	d
127040	Chromium, Total	jes		15.2	mg/kg	d
127040	Copper, Total	jes		56.0	mg/kg	d
127040	Cyanides, Total	dtk	<	5	mg/kg	d
127040	Lead, Total	jfd		56	mg/kg	d
127040	Nickel, Total	jes		21.3	mg/kg	d
127040	Selenium, Total	prw	<	0.77	mg/kg	dR
127040	Solids, Total	ssh		82.8	%	
127040	Zinc, Total	jes		91.4	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-3-8R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127041

GCL #	PARAMETERS	ANALYST		RESULTS		
127041	Arsenic, Total	prw		3.2	mg/kg	d
127041	Barium, Total	jes		14.6	mg/kg	d
127041	Cadmium, Total	jes		2.27	mg/kg	dR*
127041	Chromium, Total	jes		4.44	mg/kg	d
127041	Copper, Total	jes		13.1	mg/kg	d
127041	Cyanides, Total	km	<	5	mg/kg	d
127041	Lead, Total	jfd		16	mg/kg	d
127041	Nickel, Total	jes		9.38	mg/kg	d
127041	Selenium, Total	prw	<	0.730	mg/kg	dR
127041	Solids, Total	ssh		86.3	%	
127041	Zinc, Total	jes		30.3	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127041

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	6	5	ug/kg	
Acetone	23	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	6	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	8	10	ug/kg	J B
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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TO: Roy F. Weston, Incorporated
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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127041

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	12	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	3	5	ug/kg	J
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-3-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127041

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 5, 1988

RE: BSB-X-XT American Home Product
Project #2994-02-01 Trip Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127042

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	BDL	5	ug/kg	U
Acetone	BDL	10	ug/kg	U
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	BDL	10	ug/kg	U
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-X-XT American Home Product
Project #2994-02-01 Trip Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127042

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	BDL	5	ug/kg	U
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-X-XT American Home Product
Project #2994-02-01 Trip Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127042

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-4-1R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127043

GCL #	PARAMETERS	ANALYST	RESULTS		
127043	Arsenic, Total	prw	24	mg/kg	d
127043	Barium, Total	jes	297	mg/kg	d
127043	Cadmium, Total	jes	369	mg/kg	dR*
127043	Chromium, Total	jes	169	mg/kg	d
127043	Copper, Total	jes	3560	mg/kg	d
127043	Cyanides, Total	km	< 5	mg/kg	d
127043	Lead, Total	jfd	1400	mg/kg	d
127043	Nickel, Total	jes	32.3	mg/kg	d
127043	Selenium, Total	prw	20	mg/kg	dR
127043	Solids, Total	ssh	62.3	%	
127043	Zinc, Total	jes	686	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127043

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	11	5	ug/kg	
Acetone	86	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	5	5	ug/kg	
1,2-Dichloroethene (total)	22	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	20	10	ug/kg	
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127043

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	10	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	2	5	ug/kg	J
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127043

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-4-2R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127044

GCL #	PARAMETERS	ANALYST	RESULTS			
127044	Arsenic, Total	prw		28	mg/kg	d
127044	Barium, Total	jes		283	mg/kg	d
127044	Cadmium, Total	jes	<	0.371	mg/kg	dR*
127044	Chromium, Total	jes		4.52	mg/kg	d
127044	Copper, Total	jes		41.8	mg/kg	d
127044	Cyanides, Total	km	<	5	mg/kg	d
127044	Lead, Total	jfd		22	mg/kg	d
127044	Nickel, Total	jes		22.3	mg/kg	d
127044	Selenium, Total	prw	<	0.74	mg/kg	dR
127044	Solids, Total	ssh		78.2	%	
127044	Zinc, Total	jes		101	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-4-3R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127045

GCL #	PARAMETERS	ANALYST	RESULTS		
127045	Arsenic, Total	prw	14	mg/kg	d
127045	Barium, Total	jes	117	mg/kg	d
127045	Cadmium, Total	jes	51.8	mg/kg	dR*
127045	Chromium, Total	jes	54.5	mg/kg	d
127045	Copper, Total	jes	490	mg/kg	d
127045	Cyanides, Total	km	< 5	mg/kg	d
127045	Lead, Total	jfd	570	mg/kg	d
127045	Nickel, Total	jes	19.3	mg/kg	d
127045	Selenium, Total	prw	1.3	mg/kg	dR
127045	Solids, Total	ssh	75.3	%	
127045	Zinc, Total	jes	328	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127045

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	1	5	ug/kg	J
Acetone	48	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	10	5	ug/kg	
1,2-Dichloroethene (total)	6	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	12	10	ug/kg	B
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127045

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	3	5	ug/kg	J
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127045

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-4-4R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127046

GCL #	PARAMETERS	ANALYST	RESULTS		
127046	Arsenic, Total	prw	16	mg/kg	d
127046	Barium, Total	jes	666	mg/kg	d
127046	Cadmium, Total	jes	1560	mg/kg	dR*
127046	Chromium, Total	jes	354	mg/kg	d
127046	Copper, Total	jes	6640	mg/kg	d
127046	Cyanides, Total	km	< 5	mg/kg	d
127046	Lead, Total	jfd	93	mg/kg	d
127046	Nickel, Total	jes	27.8	mg/kg	d
127046	Selenium, Total	prw	40	mg/kg	dR
127046	Solids, Total	ssh	67.0	%	
127046	Zinc, Total	jes	754	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-4-5R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127047

GCL #	PARAMETERS	ANALYST	RESULTS		
127047	Arsenic, Total	prw	23	mg/kg	d
127047	Barium, Total	jes	125	mg/kg	d
127047	Cadmium, Total	jes	13.4	mg/kg	dR*
127047	Chromium, Total	jes	16.0	mg/kg	d
127047	Copper, Total	jes	171	mg/kg	d
127047	Cyanides, Total	km	< 5	mg/kg	d
127047	Lead, Total	jfd	93	mg/kg	d
127047	Nickel, Total	jes	21.7	mg/kg	d
127047	Selenium, Total	prw	< 0.77	mg/kg	dR
127047	Solids, Total	ssh	78.1	%	
127047	Zinc, Total	jes	148	mg/kg	d

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TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127047

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	8	10	ug/kg	J
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	2	5	ug/kg	J
Acetone	8	10	ug/kg	J B
Carbon Disulfide	1	5	ug/kg	J
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	130	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	4	10	ug/kg	J B
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

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1 Weston Way
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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127047

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127047

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	3	5	ug/kg	J
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-4-7R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127048

GCL #	PARAMETERS	ANALYST		RESULTS		
127048	Arsenic, Total	prw		4.2	mg/kg	d
127048	Barium, Total	jes		52.2	mg/kg	d
127048	Cadmium, Total	jes	<	0.375	mg/kg	dR*
127048	Chromium, Total	jes		10.2	mg/kg	d
127048	Copper, Total	jes		39.0	mg/kg	d
127048	Cyanides, Total	km	<	5	mg/kg	d
127048	Lead, Total	jfd		39	mg/kg	d
127048	Nickel, Total	jes		12.4	mg/kg	d
127048	Selenium, Total	prw	<	0.75	mg/kg	dR
127048	Solids, Total	ssh		85.5	%	
127048	Zinc, Total	jes		65.9	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-4-8R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127049

GCL #	PARAMETERS	ANALYST		RESULTS		
127049	Arsenic, Total	prw		2.9	mg/kg	d
127049	Barium, Total	jes		30.0	mg/kg	d
127049	Cadmium, Total	jes		8.52	mg/kg	dR*
127049	Chromium, Total	jes		11.4	mg/kg	d
127049	Copper, Total	jes		47.7	mg/kg	d
127049	Cyanides, Total	km	<	5	mg/kg	d
127049	Lead, Total	jfd		36	mg/kg	d
127049	Nickel, Total	jes		17.0	mg/kg	d
127049	Selenium, Total	prw	<	0.74	mg/kg	dR
127049	Solids, Total	ssh		87.9	%	
127049	Zinc, Total	jes		59.1	mg/kg	d

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WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127049

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	8	5	ug/kg	
Acetone	22	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	4	5	ug/kg	J
1,2-Dichloroethene (total)	120	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	6	10	ug/kg	J B
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

WESTON
MANAGERS DESIGNERS/CONSULTANTS

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127049

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	140	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	1	5	ug/kg	J
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-4-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127049

TENTATIVELY IDENTIFIED COMPOUNDS

No Volatile Compounds greater than 10% of the nearest internal standard were tentatively identified by mass spectral library search. This is exclusive of any priority pollutants, surrogates or internal standards.

WESTON-GULF COAST LABORATORIES, INC.
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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-X-XT American Home Product
Project #2994-02-01 Trip Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127050

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	5	5	ug/kg	
Acetone	26	10	ug/kg	
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	BDL	10	ug/kg	U
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-X-XT American Home Product
Project #2994-02-01 Trip Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127050

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	BDL	5	ug/kg	U
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-X-XT American Home Product
Project #2994-02-01 Trip Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127050

TENTATIVELY IDENTIFIED COMPOUNDS

One (1) Volatile Compound greater than 10% of the nearest internal standard was tentatively identified by mass spectral library search. This is exclusive of any priority pollutants, surrogates or internal standards.

VOLATILE COMPOUND	RETENTION TIME	ESTIMATED CONCENTRATION
Hexane	19.45	5 ug/l J

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-6-1F American Home Product
Proj.# 2994-02-01 Field Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127051

GCL #	PARAMETERS	ANALYST		RESULTS		
127051	Arsenic, Total	prw	<	0.016	mg/l	
127051	Barium, Total	jes	<	0.050	mg/l	
127051	Cadmium, Total	jes		0.008	mg/l	
127051	Chromium, Total	jes	<	0.020	mg/l	
127051	Copper, Total	jes	<	0.020	mg/l	
127051	Cyanides, Total	km	<	0.02	mg/l	
127051	Lead, Total	jfd		0.05	mg/l	
127051	Nickel, Total	jes		0.020	mg/l	
127051	Selenium, Total	prw	<	0.008	mg/l	
127051	Zinc, Total	jes		0.024	mg/l	B

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-1F American Home Product
Project #2994-02-01 Field Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127051

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	16	5	ug/kg	
Acetone	BDL	10	ug/kg	U
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	BDL	10	ug/kg	U
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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DATE: April 4, 1988

RE: BSB-6-1F American Home Product
Project #2994-02-01 Field Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127051

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	BDL	5	ug/kg	U
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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DATE: April 4, 1988

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Project #2994-02-01 Field Blank
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127051

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-2-1R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127052

GCL #	PARAMETERS	ANALYST	RESULTS		
127052	Arsenic, Total	prw	11	mg/kg	d
127052	Barium, Total	jes	608	mg/kg	d
127052	Cadmium, Total	jes	1370	mg/kg	dR*
127052	Chromium, Total	jes	405	mg/kg	d
127052	Copper, Total	jes	1810	mg/kg	d
127052	Cyanides, Total	km	< 5	mg/kg	d
127052	Lead, Total	jfd	5100	mg/kg	d
127052	Nickel, Total	jes	29.8	mg/kg	d
127052	Selenium, Total	prw	31	mg/kg	dR
127052	Solids, Total	ssh	68.5	%	
127052	Zinc, Total	jes	520	mg/kg	d

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-2-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127052

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	30	5	ug/kg	B
Acetone	37	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	44	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	11	10	ug/kg	
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127052

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	64	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127052

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-6-1R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127056

GCL #	PARAMETERS	ANALYST	RESULTS		
127056	Arsenic, Total	prw	21	mg/kg	d
127056	Barium, Total	jes	370	mg/kg	d
127056	Cadmium, Total	jes	517	mg/kg	dR*
127056	Chromium, Total	jes	188	mg/kg	d
127056	Copper, Total	jes	1580	mg/kg	d
127056	Cyanides, Total	km	< 5	mg/kg	d
127056	Lead, Total	jfd	2400	mg/kg	d
127056	Nickel, Total	jes	35.2	mg/kg	d
127056	Selenium, Total	prw	11	mg/kg	dR
127056	Solids, Total	ssh	58.9	%	
127056	Zinc, Total	jes	457	mg/kg	d

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127056

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	24	5	ug/kg	B
Acetone	23	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	44	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	10	10	ug/kg	
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127056

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	13	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-1R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127056

TENTATIVELY IDENTIFIED COMPOUNDS

No Volatile Compounds greater than 10% of the nearest internal standard were tentatively identified by mass spectral library search. This is exclusive of any priority pollutants, surrogates or internal standards.

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-6-3R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127057

GCL #	PARAMETERS	ANALYST	RESULTS		
127057	Arsenic, Total	prw	13	mg/kg	dR
127057	Barium, Total	wac	151	mg/kg	d
127057	Cadmium, Total	wac	13.4	mg/kg	d
127057	Chromium, Total	wac	14.1	mg/kg	d
127057	Copper, Total	wac	44.0	mg/kg	d
127057	Cyanides, Total	km	< 5	mg/kg	d
127057	Lead, Total	jfd	71	mg/kg	d
127057	Nickel, Total	wac	27.9	mg/kg	d
127057	Selenium, Total	prw	< 0.79	mg/kg	d
127057	Solids, Total	ssh	73.9	%	
127057	Zinc, Total	wac	159	mg/kg	d

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Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127057

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	20	5	ug/kg	B
Acetone	370	10	ug/kg	B e
Carbon Disulfide	4	5	ug/kg	J
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	70	5	ug/kg	
1,2-Dichloroethene (total)	8	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	110	10	ug/kg	
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
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West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127057

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	12	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	3	5	ug/kg	J
Chlorobenzene	6	5	ug/kg	
Ethylbenzene	2	5	ug/kg	J
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127057

TENTATIVELY IDENTIFIED COMPOUNDS

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-3R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127057 DL

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT
Acetone	370	50 ug/kg D B

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-6-5R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127058

GCL #	PARAMETERS	ANALYST	RESULTS		
127058	Arsenic, Total	prw	29	mg/kg	dR
127058	Barium, Total	wac	43.2	mg/kg	d
127058	Cadmium, Total	wac	53.4	mg/kg	d
127058	Chromium, Total	wac	12.6	mg/kg	d
127058	Copper, Total	wac	69.1	mg/kg	d
127058	Cyanides, Total	km	< 5	mg/kg	d
127058	Lead, Total	jfd	180	mg/kg	d
127058	Nickel, Total	wac	20.1	mg/kg	d
127058	Selenium, Total	prw	0.84	mg/kg	d
127058	Solids, Total	ssh	75.7	%	
127058	Zinc, Total	wac	86.9	mg/kg	d

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ANALYTICAL REPORT

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West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-5R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127058

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	6	5	ug/kg	B
Acetone	21	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	10	5	ug/kg	
1,2-Dichloroethene (total)	2	5	ug/kg	J
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	6	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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DATE: April 4, 1988

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Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127058

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	3	5	ug/kg	J
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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Project #2994-02-01
Sample Date: 03/25/88
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GCL# 127058

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-6-8R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127059

GCL #	PARAMETERS	ANALYST		RESULTS		
127059	Arsenic, Total	prw		16	mg/kg	dR
127059	Barium, Total	wac		76.2	mg/kg	d
127059	Cadmium, Total	wac		5.23	mg/kg	d
127059	Chromium, Total	wac		8.57	mg/kg	d
127059	Copper, Total	wac		25.5	mg/kg	d
127059	Cyanides, Total	km	<	5	mg/kg	d
127059	Lead, Total	jfd		42	mg/kg	d
127059	Nickel, Total	wac		19.0	mg/kg	d
127059	Selenium, Total	prw	<	0.76	mg/kg	d
127059	Solids, Total	ssh		87.0	%	
127059	Zinc, Total	wac		76.5	mg/kg	d

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-6-8R American Home Product
Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127059

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	8	5	ug/kg	B
Acetone	18	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	5	5	ug/kg	
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	4	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127059

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	3	5	ug/kg	J
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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DATE: April 4, 1988

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Project #2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL# 127059

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-1R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127060

GCL #	PARAMETERS	ANALYST	RESULTS		
127060	Arsenic, Total	prw	12	mg/kg	dR
127060	Barium, Total	wac	1200	mg/kg	d
127060	Cadmium, Total	wac	8320	mg/kg	d
127060	Chromium, Total	wac	400	mg/kg	d
127060	Copper, Total	wac	22900	mg/kg	d
127060	Cyanides, Total	km	< 5	mg/kg	d
127060	Lead, Total	jfd	19000	mg/kg	d
127060	Nickel, Total	wac	231	mg/kg	d
127060	Selenium, Total	prw	430	mg/kg	d
127060	Solids, Total	ssh	40.8	%	
127060	Zinc, Total	wac	1750	mg/kg	d

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-1R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127060

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	18	5	ug/kg	B
Acetone	28	10	ug/kg	B
Carbon Disulfide	3	5	ug/kg	J
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	40	5	ug/kg	
1,2-Dichloroethene (total)	20	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	BDL	10	ug/kg	U
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-1R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127060

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	29	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	5	5	ug/kg	
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-1R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127060

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ANALYTICAL REPORT

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ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-2R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127061

GCL #	PARAMETERS	ANALYST	RESULTS		
127061	Arsenic, Total	prw	6.9	mg/kg	dR
127061	Barium, Total	wac	2390	mg/kg	d
127061	Cadmium, Total	wac	7000	mg/kg	d
127061	Chromium, Total	wac	233	mg/kg	d
127061	Copper, Total	wac	10500	mg/kg	d
127061	Cyanides, Total	km	< 5	mg/kg	d
127061	Lead, Total	jfd	23000	mg/kg	d
127061	Nickel, Total	wac	97.8	mg/kg	d
127061	Selenium, Total	prw	200	mg/kg	d
127061	Solids, Total	ssh	18.5	%	
127061	Zinc, Total	wac	842	mg/kg	d

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ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-3R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127062

GCL #	PARAMETERS	ANALYST	RESULTS		
127062	Arsenic, Total	prw	12	mg/kg	dR
127062	Barium, Total	wac	136	mg/kg	d
127062	Cadmium, Total	wac	282	mg/kg	d
127062	Chromium, Total	wac	923	mg/kg	d
127062	Copper, Total	wac	120	mg/kg	d
127062	Cyanides, Total	km	< 5	mg/kg	d
127062	Lead, Total	jfd	1100	mg/kg	d
127062	Nickel, Total	wac	296	mg/kg	d
127062	Selenium, Total	prw	11	mg/kg	d
127062	Solids, Total	ssh	64.4	%	
127062	Zinc, Total	wac	725	mg/kg	d

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-3R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127062

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	7	10	ug/kg	J
Chloroethane	4	10	ug/kg	J
Methylene Chloride	10	5	ug/kg	B
Acetone	45	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	25	5	ug/kg	
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	11	10	ug/kg	
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-3R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127062

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	5	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

WESTON
MANAGERS DESIGNERS/CONSULTANTS

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-3R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127062

TENTATIVELY IDENTIFIED COMPOUNDS

No Volatile Compounds greater than 10% of the nearest internal standard were tentatively identified by mass spectral library search. This is exclusive of any priority pollutants, surrogates or internal standards.

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-4R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127063

GCL #	PARAMETERS	ANALYST	RESULTS		
127063	Arsenic, Total	prw	23	mg/kg	dR
127063	Barium, Total	wac	1272	mg/kg	d
127063	Cadmium, Total	wac	725	mg/kg	d
127063	Chromium, Total	wac	482	mg/kg	d
127063	Copper, Total	wac	18800	mg/kg	d
127063	Cyanides, Total	km	< 5	mg/kg	d
127063	Lead, Total	jfd	6100	mg/kg	d
127063	Nickel, Total	wac	225	mg/kg	d
127063	Selenium, Total	prw	10	mg/kg	d
127063	Solids, Total	ssh	55.4	%	
127063	Zinc, Total	wac	745	mg/kg	d

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Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-5R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127064

GCL #	PARAMETERS	ANALYST		RESULTS		
127064	Arsenic, Total	prw		1.9	mg/kg	dR
127064	Barium, Total	wac		9.08	mg/kg	d
127064	Cadmium, Total	wac		0.460	mg/kg	d
127064	Chromium, Total	wac		8.43	mg/kg	d
127064	Copper, Total	wac		90.5	mg/kg	d
127064	Cyanides, Total	km	<	5	mg/kg	d
127064	Lead, Total	jfd		22	mg/kg	d
127064	Nickel, Total	wac		38.1	mg/kg	d
127064	Selenium, Total	prw	<	0.79	mg/kg	d
127064	Solids, Total	ssh		91.4	%	
127064	Zinc, Total	wac		76.8	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 5, 1988

RE: BSB-5-5R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127064

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	7	5	ug/kg	B
Acetone	47	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	4	5	ug/kg	J
1,2-Dichloroethene (total)	7	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	BDL	10	ug/kg	U
1,1,1-Trichloroethane	2	5	ug/kg	J
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-5R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127064

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	7	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	1	5	ug/kg	J
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-5R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127064

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-5D American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127065

GCL #	PARAMETERS	ANALYST	RESULTS		
127065	Arsenic, Total	prw	2.2	mg/kg	dR
127065	Barium, Total	wac	7.55	mg/kg	d
127065	Cadmium, Total	wac	1.14	mg/kg	d
127065	Chromium, Total	wac	19.6	mg/kg	d
127065	Copper, Total	wac	108	mg/kg	d
127065	Cyanides, Total	km	< 5	mg/kg	d
127065	Lead, Total	jfd	18	mg/kg	d
127065	Nickel, Total	wac	28.3	mg/kg	d
127065	Selenium, Total	prw	< 0.76	mg/kg	d
127065	Solids, Total	ssh	88.8	%	
127065	Zinc, Total	wac	79.0	mg/kg	d

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Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-5D American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127065

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	7	5	ug/kg	B
Acetone	67	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	11	10	ug/kg	
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-5D American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127065

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	BDL	5	ug/kg	U
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-5D American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127065

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-6R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127066

GCL #	PARAMETERS	ANALYST	RESULTS		
127066	Arsenic, Total	prw	3.0	mg/kg	dR
127066	Barium, Total	wac	22.7	mg/kg	d
127066	Cadmium, Total	wac	0.941	mg/kg	d
127066	Chromium, Total	wac	8.70	mg/kg	d
127066	Copper, Total	wac	211	mg/kg	d
127066	Cyanides, Total	dtk	< 5	mg/kg	d
127066	Lead, Total	jfd	22	mg/kg	d
127066	Nickel, Total	wac	95.0	mg/kg	d
127066	Selenium, Total	prw	< 0.76	mg/kg	d
127066	Solids, Total	ssh	92.9	%	
127066	Zinc, Total	wac	283	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-7R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127067

GCL #	PARAMETERS	ANALYST	RESULTS		
127067	Arsenic, Total	prw	8.2	mg/kg	d
127067	Barium, Total	wac	19.1	mg/kg	d
127067	Cadmium, Total	wac	3.80	mg/kg	d
127067	Chromium, Total	wac	24.0	mg/kg	d
127067	Copper, Total	wac	118	mg/kg	d
127067	Cyanides, Total	dtk	< 5	mg/kg	d
127067	Lead, Total	jfd	40	mg/kg	d
127067	Nickel, Total	wac	83.4	mg/kg	d
127067	Selenium, Total	prw	< 0.75	mg/kg	dR
127067	Solids, Total	ssh	86.5	%	
127067	Zinc, Total	wac	322	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-8R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127068

GCL #	PARAMETERS	ANALYST		RESULTS		
127068	Arsenic, Total	prw		15	mg/kg	d
127068	Barium, Total	wac		25.8	mg/kg	d
127068	Cadmium, Total	wac		14.3	mg/kg	d
127068	Chromium, Total	wac		20.9	mg/kg	d
127068	Copper, Total	wac		126	mg/kg	d
127068	Cyanides, Total	dtk	<	5	mg/kg	d
127068	Lead, Total	jfd		70	mg/kg	d
127068	Nickel, Total	wac		14.8	mg/kg	d
127068	Selenium, Total	prw	<	0.77	mg/kg	dR
127068	Solids, Total	ssh		94.2	%	
127068	Zinc, Total	wac		40.9	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-8R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127068

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	5	5	ug/kg	B
Acetone	13	10	ug/kg	B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	13	5	ug/kg	
1,2-Dichloroethene (total)	24	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	4	10	ug/kg	J
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-8R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127068

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	85	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-8R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127068

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: SSB-3-1R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127069

GCL #	PARAMETERS	ANALYST	RESULTS		
127069	Arsenic, Total	prw	14	mg/kg	d
127069	Barium, Total	wac	2240	mg/kg	d
127069	Cadmium, Total	wac	1550	mg/kg	d
127069	Chromium, Total	wac	354	mg/kg	d
127069	Copper, Total	wac	3820	mg/kg	d
127069	Cyanides, Total	dtk	< 5	mg/kg	d
127069	Lead, Total	jfd	8600	mg/kg	d
127069	Nickel, Total	wac	92.7	mg/kg	d
127069	Selenium, Total	prw	61	mg/kg	dR
127069	Solids, Total	ssh	51.6	%	
127069	Zinc, Total	wac	564	mg/kg	d

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ANALYTICAL REPORT

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-3-1R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127069

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	15	5	ug/kg	B
Acetone	7	10	ug/kg	J B
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	17	5	ug/kg	
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	5	10	ug/kg	
1,1,1-Trichloroethane	4	5	ug/kg	J
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

WESTON-GULF COAST LABORATORIES, INC.
2417 Bond St., University Park, Illinois 60466
Phones: (312) 534-5200 (219) 885-7077 (815) 723-7533

ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: SSB-3-1R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127069

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	12	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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DATE: April 4, 1988

RE: SSB-3-1R American Home Product
Project #2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127069

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: SSB-3-2R American Home Product
Proj.# 2994-02-01
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127070

GCL #	PARAMETERS	ANALYST	RESULTS		
127070	Arsenic, Total	prw	14	mg/kg	d
127070	Barium, Total	wac	97.8	mg/kg	d
127070	Cadmium, Total	wac	2.29	mg/kg	d
127070	Chromium, Total	wac	93.0	mg/kg	d
127070	Copper, Total	wac	1540	mg/kg	d
127070	Cyanides, Total	dtk	< 5	mg/kg	d
127070	Lead, Total	jfd	170	mg/kg	d
127070	Nickel, Total	wac	77.0	mg/kg	d
127070	Selenium, Total	prw	< 0.79	mg/kg	dR
127070	Solids, Total	ssh	73.7	%	
127070	Zinc, Total	wac	436	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-5-1F American Home Product
Proj.# 2994-02-01 Field Blank
Sample Date: 03/26/88
Date Received: 03/29/88
GCL Number: 127071

GCL #	PARAMETERS	ANALYST		RESULTS	
127071	Arsenic, Total	prw	<	0.016	mg/l
127071	Barium, Total	jes	<	0.050	mg/l
127071	Cadmium, Total	jes		0.006	mg/l
127071	Chromium, Total	jes	<	0.020	mg/l
127071	Copper, Total	jes		0.029	mg/l
127071	Cyanides, Total	km	<	0.02	mg/l
127071	Lead, Total	jfd		0.06	mg/l
127071	Nickel, Total	jes		0.020	mg/l
127071	Selenium, Total	prw	<	0.008	mg/l
127071	Zinc, Total	jes	<	0.010	mg/l

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ANALYTICAL REPORT

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1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-1F American Home Product
Project #2994-02-01 Field Blank
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127071

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	5	5	ug/kg	
Acetone	BDL	10	ug/kg	U
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	BDL	10	ug/kg	U
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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DATE: April 4, 1988

RE: BSB-5-1F American Home Product
Project #2994-02-01 Field Blank
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127071

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	6	5	ug/kg	
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-5-1F American Home Product
Project #2994-02-01 Field Blank
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127071

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 4, 1988

RE: BSB-X-1T American Home Product
Project #2994-02-01 Trip Blank
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127072

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
Chloromethane	BDL	10	ug/kg	U
Bromomethane	BDL	10	ug/kg	U
Vinyl Chloride	BDL	10	ug/kg	U
Chloroethane	BDL	10	ug/kg	U
Methylene Chloride	4	5	ug/kg	J
Acetone	13	10	ug/kg	
Carbon Disulfide	BDL	5	ug/kg	U
1,1-Dichloroethene	BDL	5	ug/kg	U
1,1-Dichloroethane	BDL	5	ug/kg	U
1,2-Dichloroethene (total)	BDL	5	ug/kg	U
Chloroform	BDL	5	ug/kg	U
1,2-Dichloroethane	BDL	5	ug/kg	U
2-Butanone	BDL	10	ug/kg	U
1,1,1-Trichloroethane	BDL	5	ug/kg	U
Carbon Tetrachloride	BDL	5	ug/kg	U
Vinyl Acetate	BDL	10	ug/kg	U
Bromodichloromethane	BDL	5	ug/kg	U

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester, PA 19380

ATTN: Mr. Harold G. Byer

DATE: April 5, 1988

RE: BSB-X-1T American Home Product
Project #2994-02-01 Trip Blank
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127072

VOLATILE COMPOUNDS	RESULT	DETECTION LIMIT		
1,2-Dichloropropane	BDL	5	ug/kg	U
Cis-1,3-Dichloropropene	BDL	5	ug/kg	U
Trichloroethene	BDL	5	ug/kg	U
Dibromochloromethane	BDL	5	ug/kg	U
1,1,2-Trichloroethane	BDL	5	ug/kg	U
Benzene	BDL	5	ug/kg	U
Trans-1,3-Dichloropropene	BDL	5	ug/kg	U
Bromoform	BDL	5	ug/kg	U
4-Methyl-2-Pentanone	BDL	10	ug/kg	U
2-Hexanone	BDL	10	ug/kg	U
Tetrachloroethene	BDL	5	ug/kg	U
1,1,2,2-Tetrachloroethane	BDL	5	ug/kg	U
Toluene	BDL	5	ug/kg	U
Chlorobenzene	BDL	5	ug/kg	U
Ethylbenzene	BDL	5	ug/kg	U
Styrene	BDL	5	ug/kg	U
Xylene	BDL	5	ug/kg	U

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ATTN: Mr. Harold G. Byer

DATE: April 5, 1988

RE: BSB-X-1T American Home Product
Project #2994-02-01 Trip Blank
Sample Date: 03/26/88
Date Received: 03/29/88
GCL# 127072

TENTATIVELY IDENTIFIED COMPOUNDS

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-6-2R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127074

GCL #	PARAMETERS	ANALYST		RESULTS		
127074	Arsenic, Total	prw		3.2	mg/kg	d
127074	Barium, Total	wac		87.0	mg/kg	d
127074	Cadmium, Total	jes		3.52	mg/l	
127074	Chromium, Total	wac		8.43	mg/kg	d
127074	Copper, Total	wac		39.0	mg/kg	d
127074	Cyanides, Total	dtk	<	5	mg/kg	d
127074	Lead, Total	jfd		29	mg/kg	d
127074	Nickel, Total	wac		11.7	mg/kg	d
127074	Selenium, Total	prw	<	0.77	mg/kg	dR
127074	Solids, Total	ssh		51.5	%	
127074	Zinc, Total	wac		92.2	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-6-4R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127076

GCL #	PARAMETERS	ANALYST	RESULTS		
127076	Arsenic, Total	prw	16	mg/kg	d
127076	Barium, Total	wac	1400	mg/kg	d
127076	Cadmium, Total	wac	5400	mg/kg	d
127076	Chromium, Total	wac	743	mg/kg	d
127076	Copper, Total	wac	18600	mg/kg	d
127076	Cyanides, Total	km	< 5	mg/kg	d
127076	Lead, Total	jfd	18000	mg/kg	d
127076	Nickel, Total	wac	81.2	mg/kg	d
127076	Selenium, Total	prw	120	mg/kg	dR
127076	Solids, Total	ssh	47.0	%	
127076	Zinc, Total	wac	727	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-6-6R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127078

GCL #	PARAMETERS	ANALYST		RESULTS		
127078	Arsenic, Total	prw		11	mg/kg	d
127078	Barium, Total	wac		27.1	mg/kg	d
127078	Cadmium, Total	wac		8.43	mg/kg	d
127078	Chromium, Total	wac		6.10	mg/kg	d
127078	Copper, Total	wac		34.7	mg/kg	d
127078	Cyanides, Total	dtk	<	5	mg/kg	d
127078	Lead, Total	jfd		52	mg/kg	d
127078	Nickel, Total	wac		10.0	mg/kg	d
127078	Selenium, Total	prw	<	0.76	mg/kg	dR
127078	Solids, Total	ssh		89.9	%	
127078	Zinc, Total	wac		45.8	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-6-7R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127079

GCL #	PARAMETERS	ANALYST		RESULTS		
127079	Arsenic, Total	prw		12	mg/kg	d
127079	Barium, Total	wac		93.9	mg/kg	d
127079	Cadmium, Total	wac		19.5	mg/kg	d
127079	Chromium, Total	wac		12.3	mg/kg	d
127079	Copper, Total	wac		59.3	mg/kg	d
127079	Cyanides, Total	km	<	5	mg/kg	d
127079	Lead, Total	jfd		79	mg/kg	d
127079	Nickel, Total	wac		21.4	mg/kg	d
127079	Selenium, Total	prw	<	0.74	mg/kg	dR
127079	Solids, Total	ssh		88.0	%	
127079	Zinc, Total	wac		69.0	mg/kg	d

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ANALYTICAL REPORT

TO: Roy F. Weston, Incorporated
1 Weston Way
West Chester PA 19380

ATTN: Mr. Harold G. Byer

DATE: 04/14/88

RE: BSB-2-2R American Home Product
Proj.# 2994-02-01
Sample Date: 03/25/88
Date Received: 03/29/88
GCL Number: 127081

GCL #	PARAMETERS	ANALYST	RESULTS		
127081	Arsenic, Total	prw	9.4	mg/kg	d
127081	Barium, Total	wac	172	mg/kg	d
127081	Cadmium, Total	wac	6.10	mg/kg	d
127081	Chromium, Total	wac	11.8	mg/kg	d
127081	Copper, Total	wac	37.1	mg/kg	d
127081	Cyanides, Total	dtk	< 5	mg/kg	d
127081	Lead, Total	jfd	42	mg/kg	d
127081	Nickel, Total	wac	28.6	mg/kg	d
127081	Selenium, Total	prw	< 0.78	mg/kg	dR
127081	Solids, Total	ssh	70.0	%	
127081	Zinc, Total	wac	206	mg/kg	d

APPENDIX H

WESTON's PROPOSED GRADING PLAN FOR LAGOON CLOSURE

Date: December 1988

Revision No. 0

EPA ID No. OHD 015205424

APPENDIX H-1

RCRA EXPOSURE INFORMATION REPORT

1349E

Date: December 1988

Revision No. 0

EPA ID No. OHD 015205424

APPENDIX H-1

RCRA EXPOSURE INFORMATION REPORT

1349E

Date: December 1988
Revision No. 0
EPA ID No. OHD 015205424

RCRA EXPOSURE INFORMATION REPORT

FOR THE EKCO HOUSEWARES SITE, MASSILLON, OHIO

Prepared By:

ROY F. WESTON, INC.
Weston Way
West Chester, Pennsylvania 19380

1349E

Date: December 1988
Revision No. 0
EPA ID No. OHD 015205424

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SECTION 1

INTRODUCTION

1.1 PURPOSE

The purpose of this document is to evaluate the exposure potential of employees and the surrounding population to chemical constituents associated with the ECKO Housewares site in Massillon, Ohio. This evaluation is not intended to be quantitative in nature. Rather, it will qualitatively assess possible contaminant sources and/or migration pathways, likely receptor populations, potential contaminant/receptor contact locations, and pertinent routes or mechanisms of exposure (e.g., oral, dermal, or inhalation). Possible health risks will be discussed, but again, only in qualitative terms of relative likelihood. Such risks will not be quantified in terms of a hazard index for noncarcinogenic risks or excess lifetime risks of cancer as this is beyond the scope of an Exposure Information Requirements report.

Much of the information for this exposure assessment was taken directly from the Draft RCRA Closure Plan for EKCO Housewares, Inc., Massillon, Ohio, Volume I, August 1988 (Closure Plan, 1988). Other information was obtained from the Draft Ground Water Assessment Plan (1988) and the Interim Measures Report (1987). These reports contain more detailed information concerning many of the subjects discussed herein.

1.2 SITE LOCATION

The ECKO Housewares manufacturing facility is located at 359 State Avenue Extension N.W., Massillon, Ohio, 44648 on approximately 13 acres of land in an urban, industrialized area (Closure Plan, 1988). The site is 500 feet north of State Avenue Extension and 1,500 feet west of the Tuscarawas River in Northeast Massillon, Stark County, Ohio. Further details are available in the Closure Plan (1988). Figure 1 provides a map of the plant site in relation to local Massillon geography.

1.3 SITE HISTORY

At the site production of aluminum cookware began in 1945 and stainless ware in 1946. For a brief time during the Korean War, 90 and 105 mm shell casings were manufactured for the government. Currently, metal cooking utensils are produced 24 hours a day, 5 days a week, by a crew of 350 people resulting in an annual production of approximately 26 million utensils per year.

Due to the military production in the early 1950s, two production wells were installed (W-1 and W-2). In 1953, a sewer was constructed to discharge waste streams directly into Newman Creek. Concurrently, an evaporation lagoon was constructed to receive sludge from waste streams resulting from military production. In 1954, electroplating operations began that permitted the copper coating of utensils produced at the facility. This resulted in the use of trichloroethylene (TCE) and trichloroethane (TCA) in order to clean utensiles prior to coating. TCE was used until the mid-1960s.

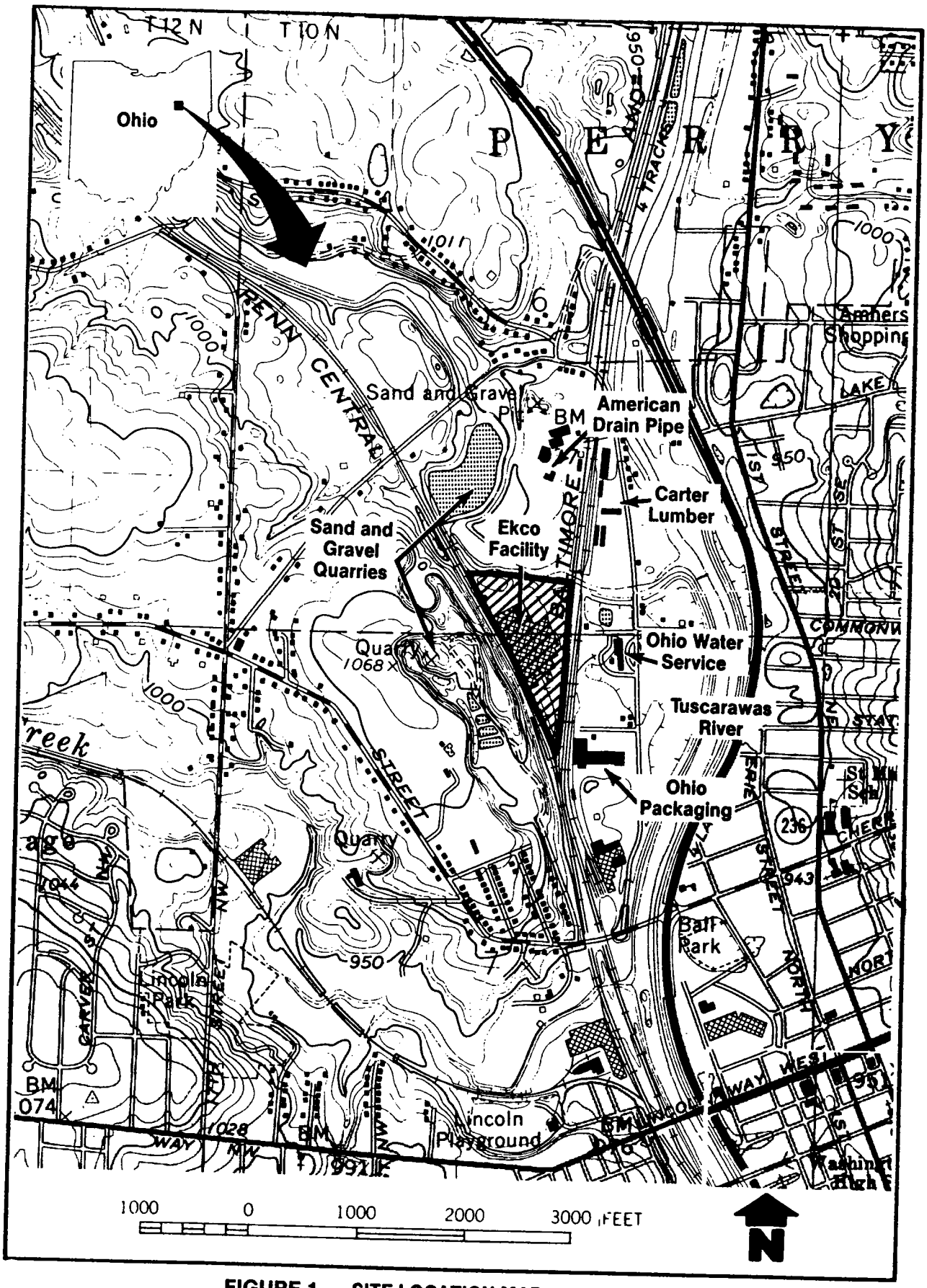


FIGURE 1 SITE LOCATION MAP
EKCO HOUSEWARES, INC., MASSILLON, OHIO
(Ref. 7.5 Minute Massillon Quad, Ohio, 1978)

In 1967, porcelain and teflon coating units were installed at the facility, and discharge of resulting wastestreams into the evaporation lagoon was approved by Ohio permit in 1969. Wastes included hydrochloric acid and sodium hydroxide from deionization units and copper platting operations; aluminum, coloring inorganics, lead, cadmium, selenium, cobalt, and toluene from porcelain-teflon coated aluminum ware; and alkaline washer fluids to clean aluminum products.

Production of aluminum and porcelain cookware was discontinued during the 1970s, and lagoon use ceased in 1977. Copper plating operations ended in 1978 at which time the primary utensils produced at the site were pressed and coated nonstick bakeware. In 1979/80, correspondence from EKCO to the Ohio EPA reported the occurrence of a solvent spill. The precise location and extent of the spill is unknown, but the spill was generally within the vicinity of process water well W-10.

Use of the lagoon was resumed in 1980. It received housing degreaser filter water until mid-1984, and the lagoon was finally decommissioned in December 1985.

Monitoring was undertaken in 1984 as part of an NPDES permitting process. These analyses revealed the presence of TCE and TCA in groundwater under the plant site.

1.4 GEOLOGY

A geological description of the site is contained in the Draft RCRA Closure Plan (1988). Briefly, the site resides on glacial drifts, ranging in depth from 25 to 100 feet, which overlies sands and gravels that comprised the pre-glacial surface. In

the immediate vicinity, these drifts reach depths exceeding 250 feet, covering an ancient, pre-glacial valley. Newman Creek, located to the northeast of the site, runs over the valley. Sandstone and shale form the bedrock beneath the site. The reader is referred to the Closure Plan for further detail.

1.5 WASTE STREAMS

Waste streams and production chemicals are described in the Closure Plan (1988). In the past, waste streams consisting of trichloroethylenes and trichloroethanes, among others, were used to wash aluminum and stainless steel cookware prior to electroplating. Metals, contained in largely aqueous streams, include cadmium, chromium, and lead. Other wastes include silicone wastes and used oils. Hydrochloric acid and alkali wastestreams were also discharged. All streams were discharged into an evaporation lagoon except for noncontact cooling water, which is discharged directly into Newman Creek.

Currently, all hazardous wastes are placed in 55-gallon containers and transported offsite for proper disposal.

1.6 CLOSURE PLAN

The procedure for lagoon closure is described in the Closure Plan (1988). Briefly, stabilization consists of solidifying the wastes (sludges) that results in lower water permeability and, consequently, lower contaminant mobility. The lagoon will also be graded and capped with clay and synthetic liners, further reducing contaminant mobility. Grading will facilitate runoff while maintaining vegetative cover, and the cover system barriers will minimize infiltration from precipitation.

SECTION 2

GENERAL INFORMATION

2.1 GROUNDWATER HYDROGEOLOGY

Groundwater exists in both the glacial drifts and bedrock with a head difference of 15 to 25 feet on the site. The bedrock wells produce yields ranging from 25 to 100 gallons per minute (gpm), while the municipal alluvial wells have yielded as much as 2,000 gpm. The alluvial aquifer flows in a direction parallel to Newman Creek, in a east-southeasterly direction toward the Tuscarawas River, less than 1 mile east.

Further hydrogeological details are available in the Closure Plan (1988).

2.2 SURFACE HYDROLOGY

Newman Creek flows over the pre-glacial valley in a easterly direction just north of the plant site toward the Tascarawas River, which flows south less than 2,000 feet east of the plant. A lagoon that was used for wastewater streams in the past exists on the site. The lagoon is located approximately 250 feet north of the plant (just west of the buried pre-glacial valley) and is 260 by 95 feet in dimension with a surface area of approximately 20,000 square feet. The longitudinal axis of the lagoon parallels Newman Creek, and a berm surrounds the lower elevation of the lagoon preventing runoff into the creek.

In the past, the lagoon received waste streams from the plant that contained heavy metals, chlorinated solvents, and nonhalogenated solvents. The lagoon dissipated excess water via evaporation with no direct discharge to local surface water bodies. The lagoon is no longer used for discharges. EPA Region V has declared the lagoon a hazardous waste surface impoundment. No waste streams are currently discharged into the lagoon, and existing water, if present, is the result of rainfall.

Currently, waste streams are placed in barrels and transported offsite by truck to a hazardous materials waste site. Noncontact cooling water is discharged directly to Newman Creek. This water is derived from the two onsite groundwater production wells equipped with scrubbers to remove volatile organics that are initially present at concentrations ranging between 0.02 and 0.86 parts per million (ppm). Discharged cooling water is periodically monitored and contains negligible volatile organics.

2.3 REGIONAL WATER USES

Regional water uses in the vicinity of the EKCO facility include recreational uses for surface water and potable water uses from groundwaters. The surface water body near the site is Newman Creek. The surface impoundment is located adjacent to Newman Creek, which flows approximately 1,500 feet east to the Tuscarawas River. The Tuscarawas River is used for recreational purposes. The City of Massillon relies on groundwater for a potable water supply. The Ohio Water Service Company supplies the majority of potable water to area residents. However, as noted in the Interim Measures Report (Revised February 1988),

some areas west and northwest of the facility may have private water wells. Also, several production wells are located within 1 mile of the EKCO site. The Ohio Water Service water wells are located in the unconsolidated formation in the Tuscarawas River Valley. The depths and locations of the privately owned water wells are not known.

2.4 METEOROLOGY

Annual precipitation in the area is 35.90 inches/year based on 30 years of recordings by the Akron Canton Weather Service Office. Class A pan evaporation is approximately 40 inches/year as interpreted from a map in the Weather Bureau Technical Paper No. 37. A major rainfall event (25 year/24 hour), is 4 inches as listed in the Weather Bureau Technical Paper No. 40 for Stark County, Ohio.

SECTION 3

CONTAMINANTS OF CONCERN

Contaminants of concern have been identified in the Closure Plan (1988) and include halogenated hydrocarbons, heavy metals, and a nonhalogenated solvent. The contaminants of concern are listed below.

Heavy Metals
- cadmium
- chromium
- lead

Chlorinated Organics
- trichloroethylene (TCA)
- trichloroethane (TCA)
- dichloroethylene
- dichloroethane
- dichlorobenzene
- vinyl chloride
- methylene chloride

Nonhalogenated Solvents
- 2-butanone
  (methyl ethyl ketone or MEK)

SECTION 4

PATHWAY-SPECIFIC INFORMATION

4.1 GROUNDWATER

Approximately 50 domestic and 5 commercial wells tap the bedrock aquifer within a 1-mile radius of the site. Two of the production wells exist on the site with an approximate depth of 225 feet. Six municipal wells tap the deep drift (approximately 150 feet) of the pre-glacial valley located 2,500 feet east and northeast of the site. The alluvial aquifer in which the municipal wells are located travels parallel to Newman Creek. The direction of the deeper bedrock aquifer is obscured because of the pumping of onsite production wells, which affects the gradient direction in the vicinity of the plant. How this may affect the migration of contaminants that may have leached from the lagoon area into the shallower, alluvial aquifer is unknown at present. Volatiles that occur in the lagoon have been found in water from the onsite production wells. The production wells are equipped with strippers that remove volatile organics prior to the water's use in the plant and subsequent discharge to Newman Creek.

4.1.1 Current Analytical Monitoring Information

As mentioned previously, volatile organic compounds including TCE and TCA were found in groundwater beneath the plant site in wells D1, D2, D3, D4, and W-10. (See RCRA Closure Plan for well locations.) Elevated levels of benzene, dichloroethenes, and

vinyl chloride were also found in several wells. The locations of these wells do not permit adequate delineation of the contaminant plume. Therefore, further monitoring is planned.

The sludge and soil sampling also has indicated cadmium, chromium, and lead occur at elevated concentrations at locations at the facility. Because these contaminants occur at marked concentrations in the lagoon sludges, it may be inferred that groundwater may carry them downgradient. However, groundwater quality analytical results have not indicated the metals above their maximum concentration limits specified by the Safe Drinking Water Act.

4.1.2 Planned Analytical Monitoring Information

In order to more precisely define the directions and dimensions of the groundwater contaminant plume, further groundwater monitoring is planned. Future monitoring and evaluation is detailed in the Groundwater Assessment Plan (1987).

4.1.3 Likely and Unlikely Groundwater Pathways

Drinking of contaminated groundwater by downgradient well users represents a potential contaminant pathway of concern. Other domestic uses of contaminated groundwater, such as bathing and laundering clothes, may represent other relevant mechanisms of exposure. In addition, groundwater may be used for irrigating crops and watering livestock; however, these uses are not considered likely due to the urban/industrialized location of the site.

Recharge of groundwater-borne contaminants into Newman Creek is a concern. Information to date indicates that the hydraulic gradient flows away from Newman Creek toward the plant production well. Additional information will be acquired during the Groundwater Quality Assessment, which will better clarify whether recharge is occurring and whether this is influenced by the pumping from the production well (W-10).

Once the lagoon is stabilized and capped, leaching of contaminants to groundwater will be minimized since rainfall will not percolate through lagoon sludges and subsequently mobilize contaminants.

4.1.4 Potential Critical Groundwater Receptors

The receptors that may be exposed to lagoon-associated contaminants via the groundwater are downgradient potable water well users. These may consist of local residents with wells. Users of the municipal well supply are not considered at risk because periodic monitoring has not revealed the presence of the contaminants of concern above standards in the municipal wells.

4.2 SURFACE WATER

The lagoon is no longer in operation but still contains excessive levels of the contaminants of concern (i.e., metals). Of current concern via the surface water pathway is whether contaminants may be mobilized from the lagoon sludges by surface water runoff (perhaps after catastrophic failure of the berm). Once the lagoon is capped, this pathway will no longer pose a significant health threat.

Because a berm prevents runoff from the evaporation lagoon to Newman Creek, neither this creek nor the Tascarawas River will receive contaminants from runnoff in the immediate future. Therefore, no potential downstream receptors, such as swimmers and fish consumers, will be threatened by the surface water pathway. Moreover, the planned lagoon stabilization and capping procedures will significantly reduce the possibility of contaminant runoff in the future.

There may be potential for migration of constituents to Newman Creek and the Tuscarawas River via recharge of groundwater to these surface water bodies. Information will be collected to address this concern in the Ground Water Assessment Plan (1987).

4.3 AIR

Currently, only exposure from volatile organic compounds (VOCs) is likely since metals lack sufficient vapor pressure to volatilize. Potential VOC emissions from the sludges in the lagoon prior to closure would be expected to be very low and several orders of magnitude below the Threshold Limit Value (TLV) established by the American Council for Governmental Industrial Hygienists (ACGIH) for the specific chlorinated hydrocarbon solvents. Thus, it is not anticipated that the proximate population, the site workers, would be exposed to unacceptable VOC concentrations. It is possible that particulates from lagoon sludges might become airborne; however, currently the 10-foot berm that surrounds the lagoon inhibits such an exposure mechanism.

It is possible that downwind receptors might breath contaminated sludge particles blown by the wind. Suspension may occur only during construction activities in and around the lagoon area. During such construction, exposure would be of a limited duration and could be minimized by wetting the soil before closure activities.

The planned stabilization and capping would completely prevent contaminant migration via the air pathway during the post-closure period since the waste material would be beneath a multilayer cap that will be more than 5 feet thick.

4.4 SUBSURFACE GAS

The potential for buildup of subsurface gases is considered negligible. This is because the concentrations of organics in soil borings were very low. Thus, soil microorganisms would not have sufficient carbon source for the buildup of significant metabolic products, such as methane.

4.5 SOIL

Currently, only select employees have direct contact with lagoon sludges since the fence surrounding the lagoon is secure. The public is excluded from access by a secured fence around the property. Thus, trespassers are not likely.

Regarding employees specifically, the planned solidification and capping of the lagoon will preclude direct contact of employees with contaminated sludges. Therefore, incidental oral ingestion, dermal absorption from skin contact, and breathing

of resuspended contaminated sludge particles (see previous subsection) will not occur except perhaps during construction. Protective measures for workers during construction is described in the Health and Safety Plan.

For these reasons, direct contact with soils is not considered a likely contaminant exposure pathway.

SECTION 5

POTENTIAL EXPOSURE PATHWAYS

As a result of the analysis presented in this report, it is concluded that the major migration pathway for contaminants within the ECKO lagoon is via the groundwater. The reasons for eliminating other migration pathways have already been given in the preceeding subsections.

SECTION 6

POTENTIAL CRITICAL RECEPTORS

From the previous analysis, downgradient well users constitute potentially affected receptors. No other receptors appear to incur an exposure hazard at this time.

SECTION 7

EXPOSURE POTENTIAL OF THE UNIT

7.1 POTENTIAL FOR HUMAN EXPOSURE VIA THE GROUNDWATER PATHWAY

As previously stated, groundwater is a pathway of concern, and downgradient well users constitute a population that may be at risk from contaminants leaching into groundwater from the EKCO site.

7.2 POTENTIAL FOR HUMAN EXPOSURE VIA THE SURFACE WATER PATHWAY

The surface water pathway does not appear to pose a significant threat to downstream water users.

7.3 POTENTIAL FOR HUMAN EXPOSURE VIA THE AIR PATHWAY

The air pathway does not appear to pose a significant threat to downstream water users.

7.4 POTENTIAL FOR HUMAN EXPOSURE VIA SUBSURFACE GAS RELEASES

The threat of explosion could occur only from the solvent and not from metals. The chlorinated solvents used on the site may present a combustion hazard in pure form (and prior to use in their commercial application). After entering the environment, however, the concentrations are sufficiently low that an imminent explosion hazard probably does not exist. Moreover, halogenated hydrocarbons usually only support combustion (i.e., are combustible but not flammable, according to the Department

of Transportation). As to the possibility of methane buildup, contaminants do not appear to exist in sufficient concentrations to support a bacterial population that might result in the significant conversion to methane (i.e., there is not an adequate carbon source for methane buildup).

SECTION 8

PATHWAYS OF CONCERN

The single pathway of concern is the groundwater, and the critical receptors are downgradient well users.

SECTION 9

QUALITATIVE EXPOSURE ESTIMATES

The contaminants of concern that may affect downgradient users include not just the VOCs but also the metals that have shown some marginal ability to migrate from the lagoon via groundwater.

SECTION 10

RISK POTENTIAL

It is estimated that, currently, the risk potential is low and that the stabilization and capping procedures planned for the lagoon would further reduce risks. This classification has been chosen because well monitoring reveals negligible, if any, contamination of residential or municipal well water.

Even though the site is old and contaminant migration has had ample time to have occurred, the potential for further contaminant migration via groundwater cannot be ruled out at this time.

SECTION 11

DISCUSSION

Because the potential exists for further contaminant migration and because the beneficial influence of current pump and treat operations may revert if ever discontinued, the further planned groundwater quality assessment is appropriate. More precise delineation of the contaminant plume will support a more extensive evaluation of the possible health hazards posed by contaminants associated with the EKCO site.

SECTION 12

RECOMMENDATIONS

It is recommended that the currently planned groundwater quality assessment proceed. After the results become available, possible health hazards should be re-examined with more certainty. Evaluation of sediments (as described in the Ground Water Assessment Plan, 1988) will also help to characterize whether contaminants might be present and pose a possible threat to downstream water users.

SECTION 13

REFERENCES

Roy F. Weston, Inc., "Draft RCRA Closure Plan for ECKO Housewares, Inc., Massillon, Ohio, Volume I," August 1988.

Roy F. Weston, Inc., "Ground Water Assessment Plan for EKCO Housewares, Inc., Massillon, Ohio," December 1987.

Roy F. Weston, Inc., "Interim Measure Report for EKCO Massillon, Ohio, Site," Revised February 1988.

Office of Solid Waste and Emergency Response, "Permit Applicants' Guidance Manual for Exposure Information Requirements under RCRA Section 3019," Directive Number: 9523.00-1A. July 5, 1986.

Date: December 1988

Revision No. 0

EPA ID No. OHD 015205424

APPENDIX J

CERTIFICATION LETTER

EKCO®
HOUSEWARES, INC.

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

THOMAS J. SHINGLETON
Plant Manager

December 19, 1988

P.O. Box 560 • Massillon, Ohio 44648-0560 • Telephone 216/832-5026

APPENDIX I

INFORMATION SUPPORTING CLEAN CLOSURE LEVELS FOR SOILS

The statistical procedure outlined in OEPA's Closure Plan Review Guidance (May, 1991) was performed to determine a clean level for lead, chromium, and cadmium contamination in the soil. The procedure requires that the two populations being compared (closure area versus background) are normally distributed. The closure area population consisted of 42 lagoon soil sampling points, while the background population consisted of 28 fill soil sampling points. Lead, chromium, and cadmium populations were analyzed individually. Each soil data population was evaluated for normality using the following procedure as discussed in Lindgren (1978):

- Order the data from smallest to largest.
- Determine the sample distribution function (DF) for each data point.
- Calculate the mean, standard deviation, and variance of the data.
- Calculate the standard normal deviate (SND) for each data point.
- From a table of the standard normal distribution function, look up the normal cumulative distribution function (CDF) corresponding to the SND of each data point.
- Calculate the Kolmogorov-Smirnov (KS) statistic for goodness of fit, and compare the KS statistic of each data point to the corresponding Lilliefors critical value for the population. If the KS statistic is larger than the Lilliefors critical value, the population is not considered to be normally distributed. In evaluating the KS statistic, it is important to compare the normal CDF with the sample DF at that data point as well as with the sample DF at the preceding data point.

The Lilliefors critical values for a 95 percent confidence interval of populations of 28 (fill population) and 42 (closure area population) data points were calculated as 0.1674 and 0.1367, respectively. After comparing these critical values to the KS statistics of the six populations, it was determined that none of the untransformed populations were normally distributed. However, repeating the above procedure on the lognormal distribution (y=

ln(x)) of the data adequately transformed all the populations to normality. The above calculations are summarized in Tables 1 through 6 of this Appendix.

Probability plots (Figures 1 through 6 of this Appendix) were then constructed for the transformed populations using the following procedure as outlined in Subsection 13.1.3 of Gilbert (1987):

- Order the n untransformed data from smallest to largest to obtain the order statistics x_1, x_2, ... x_n.
- Plot x_i versus (i - 0.5)*100/n on log-probability paper and fit a straight line to the plotted points.
- Read the 0.16, 0.50, and 0.84 quantiles from the plot and use them to estimate the mean and standard deviation of the distribution.

The means and standard deviations estimated from the probability plots are summarized in Table 7 of this Appendix. Table 7 also lists the upper 95 percent confidence interval for each population as determined from the probability plots. The upper 95 percent confidence intervals for the fill populations were presented as the clean levels for lead, chromium, and cadmium contamination in the soil.

Probability plots were also constructed for the untransformed populations (Figures 7 through 12 of this Appendix) for comparison purposes. The plotted points of each untransformed population do not lie on a straight line, reconfirming the non-normality of the untransformed populations.

The sample calculation outline presented in this appendix shows the specific equations that were used throughout these calculations.

REFERENCES:

Gilbert, R.O. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold Co., 1987. pp 164-175.

Lindgren, B.W., McElrath, G.W., and Berry, D.A. Introduction to Probability and Statistics, 4th Edition. Macmillan Publishing Co., 1978. pp. 193-196.

Sample Calculation: Normality Evaluation

- For a given population, order the data from smallest to largest. Then determine the sample distribution function (DF) for each data point.

- Given a population (X_1, X_2, ..., X_n), the sample DF simply assigns a weight of 1/n to each X_i. It increases by 1/n at each data point, and is equal to 1 at the largest X_i. (Sample DF = F_n (x))

- The mean, standard diviation, and variance are then calculated as follows.

$$mean;\ \bar{x} = \frac{\sum X_i}{n}$$

$$Variance;\ s^2 = \frac{\sum (X_i - X)^2}{n-1}$$

$$Standard\ Deviation;\ s = \sqrt{Variance} = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}}$$

- Calculate the Standard Normal Deviate (SND) for each X_i of the population.

$$SND_i = \frac{X_i - \bar{x}}{S}$$

The SND has the standard normal distribution.

The SND value is then located on standard normal distribution table, and the corresponding normal cumulative DF is read off.

(Normal Cumulative DF = $F_0(x)$)

- The Kolmogorov - Smirnov statistic for each X_i is then calculated as.

$$KS = F_n(x) - F_o(x)$$

- This value for each X_i is then compared to the Lilliefors critical value of the population. For a 95% confidence interval and a population of n>25, the Lilliefors critical value is given as:

$$0.886/\sqrt{n} = LCV$$

- The LCV is then compared to the KS values for each X_i. If KS > LCV, the population may not be considered normally distributed.

  (From Chapter 11, Lindgren (1978))

Sample Calculation: Probability Plot Interpretation

(from chapter 12, Gilbert (1987))

- Once the Log-probability plot of the transformed data has been constructed and a straight line has been fitted to the plotted points, the 0.16, 0.50, and 0.84 quantities are read from the plot. For example, the log-probability plot of the cadmium fill population has

$$X_{0.16} = 0.9$$
$$X_{0.50} = 1.6$$
$$X_{0.84} = 2.65$$

- With these values, the following quantities are estimated:

$$u_y = \ln X_{0.50} = u(y)$$

$$\sigma_y = (\ln [\frac{1}{2}(X_{0.50}/X_{0.16} + X_{0.84}/X_{0.50})])^2$$

→ The mean and standard deviation are estimated with $\hat{\mu}_y$ and $\hat{\sigma}_y^2$ as:

$$\bar{x} = EXP(\hat{u}_y + \frac{\hat{\sigma}_y^2}{2}) = mean$$

$$S = \bar{x}[EXP(\hat{\sigma}_y^2) - 1]^{1/2} = standard\ deviation$$

Then the upper 95 percent confidence interval is read from the probability plot as $X_{0.95}$

TABLE 1: STATISTICAL ANALYSIS OF FILL SOIL DATA FOR CADMIUM

SAMPLE ID		DATA Y (mg/kg)	TRANSFORMED DATA LN(Y)	SND Y	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	SND LN(Y)	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	SAMPLE DF Fn(x)
FSB-7	5R	0.652	-0.4277	-0.6884	0.2451	0.2094	-1.3803	0.0838	0.0481	0.0357
FSB-1	5R	0.837	-0.1779	-0.5667	0.2843	0.2129	-0.9249	0.1788	0.1074	0.0714
FSB-4	5R	0.841	-0.1732	-0.5641	0.2877	0.1806	-0.9162	0.1788	0.0717	0.1071
FSB-6	7R	0.859	-0.1520	-0.5523	0.2912	0.1483	-0.8776	0.1894	0.0465	0.1429
FSB-6	6R	0.866	-0.1439	-0.5477	0.2912	0.1126	-0.8628	0.1949	0.0163	0.1786
FSB-9	3R	0.871	-0.1381	-0.5444	0.2946	0.0803	-0.8523	0.1977	0.0166	0.2143
FSB-8	1R	0.886	-0.1210	-0.5345	0.2981	0.0481	-0.8212	0.2061	0.0439	0.2500
FSB-4	6R	0.927	-0.0758	-0.5076	0.3050	0.0193	-0.7387	0.2297	0.0560	0.2857
FSB-7	6R	0.976	-0.0243	-0.4753	0.3156	0.0058	-0.6448	0.2611	0.0603	0.3214
FSB-6	3R	0.986	-0.0141	-0.4688	0.3192	0.0379	-0.6262	0.2676	0.0895	0.3571
FSB-7	7R	1.17	0.1570	-0.3478	0.3632	0.0297	-0.3142	0.3783	0.0146	0.3929
FSB-5	1R	1.21	0.1906	-0.3215	0.3745	0.0541	-0.2529	0.4013	0.0273	0.4286
FSB-6	5R	1.22	0.1989	-0.3149	0.3783	0.0860	-0.2379	0.4052	0.0591	0.4643
FSB-1	1R	1.25	0.2231	-0.2952	0.3821	0.1179	-0.1936	0.4247	0.0753	0.5000
FSB-7	1R	1.25	0.2231	-0.2952	0.3821	0.1536	-0.1936	0.4247	0.1110	0.5357
FSB-5	9R	1.26	0.2311	-0.2886	0.3859	0.1855	-0.1791	0.4286	0.1428	0.5714
FSB-6	8R	1.32	0.2776	-0.2492	0.4013	0.2058	-0.0943	0.4641	0.1430	0.6071
FSB-6	10R	1.41	0.3436	-0.1900	0.4247	0.2182	0.0260	0.5120	0.1309	0.6429
FSB-7	4R	1.48	0.3920	-0.1440	0.4443	0.2343	0.1143	0.5438	0.1348	0.6786
FSB-9	6R	1.53	0.4253	-0.1111	0.4562	0.2581	0.1749	0.5675	0.1468	0.7143
FSB-4	2R	1.6	0.4700	-0.0651	0.4721	0.2779	0.2564	0.6026	0.1474	0.7500
FSB-8	3R	1.71	0.5365	0.0072	0.5040	0.2817	0.3777	0.6480	0.1377	0.7857
FSB-6	1R	1.84	0.6098	0.0927	0.5359	0.2855	0.5113	0.6950	0.1264	0.8214
FSB-7	2R	2.15	0.7655	0.2965	0.6179	0.2392	0.7952	0.7881	0.0690	0.8571
FSB-5	5R	2.26	0.8154	0.3688	0.6443	0.2486	0.8861	0.8133	0.0796	0.8929
FSB-8	5R	3.06	1.1184	0.8948	0.8133	0.1153	1.4387	0.9251	0.0035	0.9286
FSB-1	3R	4.81	1.5707	2.0454	0.9798	0.0155	2.2633	0.9881	0.0238	0.9643
FSB-9	1R	8.34	2.1211	4.3662	0.9999	0.0001	3.2667	0.9995	0.0005	1.0000

AVERAGE	1.6990	0.3293
STANDARD DEVIATION	1.5489	0.5585
VARIANCE	2.3992	0.3120

TABLE 2: STATISTICAL ANALYSIS OF FILL SOIL DATA FOR CHROMIUM

SAMPLE ID		DATA Y (mg/kg)	TRANSFORMED DATA LN(Y)	SND Y	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	SND LN(Y)	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	SAMPLE DF Fn(x)
FSB-7	2R	2.15	0.7655	-0.8694	0.1922	0.1565	-2.2420	0.0125	0.0232	0.0357
FSB-6	10R	2.34	0.8502	-0.8644	0.1949	0.1235	-2.1599	0.0154	0.0560	0.0714
FSB-1	3R	8.08	2.0894	-0.7149	0.2389	0.1318	-0.9586	0.1685	0.0614	0.1071
FSB-6	6R	8.81	2.1759	-0.6959	0.2420	0.0991	-0.8747	0.1922	0.0493	0.1429
FSB-5	5R	10.4	2.3418	-0.6545	0.2578	0.0792	-0.7139	0.2389	0.0603	0.1786
FSB-6	7R	10.8	2.3795	-0.6441	0.2611	0.0468	-0.6773	0.2483	0.0340	0.2143
FSB-7	4R	12.5	2.5257	-0.5998	0.2743	0.0243	-0.5356	0.2946	0.0446	0.2500
FSB-7	5R	12.6	2.5337	-0.5972	0.2743	0.0114	-0.5278	0.2981	0.0124	0.2857
FSB-4	5R	12.8	2.5494	-0.5920	0.2776	0.0438	-0.5126	0.3050	0.0164	0.3214
FSB-4	6R	13.1	2.5726	-0.5842	0.2810	0.0761	-0.4901	0.3121	0.0450	0.3571
FSB-5	9R	13.4	2.5953	-0.5764	0.2810	0.1119	-0.4682	0.3192	0.0737	0.3929
FSB-6	8R	14.2	2.6532	-0.5556	0.2877	0.1409	-0.4120	0.3409	0.0877	0.4286
FSB-6	1R	15	2.7081	-0.5347	0.2981	0.1662	-0.3588	0.3594	0.1049	0.4643
FSB-1	5R	15.4	2.7344	-0.5243	0.3015	0.1985	-0.3333	0.3707	0.1293	0.5000
FSB-6	5R	16.7	2.8154	-0.4905	0.3121	0.2236	-0.2548	0.4013	0.1344	0.5357
FSB-6	3R	17.5	2.8622	-0.4696	0.3192	0.2522	-0.2094	0.4168	0.1546	0.5714
FSB-8	3R	32.6	3.4843	-0.0764	0.4681	0.1390	0.3937	0.6517	0.0446	0.6071
FSB-5	1R	39.6	3.6788	0.1059	0.5438	0.0991	0.5823	0.7190	0.0761	0.6429
FSB-8	5R	41.8	3.7329	0.1631	0.5636	0.1150	0.6347	0.7357	0.0571	0.6786
FSB-7	6R	42.6	3.7519	0.1840	0.5714	0.1429	0.6530	0.7422	0.0279	0.7143
FSB-9	1R	47.8	3.8670	0.3194	0.6255	0.1245	0.7647	0.7764	0.0264	0.7500
FSB-9	3R	55.6	4.0182	0.5225	0.6985	0.0872	0.9112	0.8186	0.0329	0.7857
FSB-4	2R	59.4	4.0843	0.6215	0.7324	0.0890	0.9753	0.8365	0.0151	0.8214
FSB-1	1R	61	4.1109	0.6631	0.7454	0.1117	1.0011	0.8413	0.0158	0.8571
FSB-9	6R	63.6	4.1526	0.7308	0.7673	0.1256	1.0415	0.8508	0.0421	0.8929
FSB-7	1R	66.2	4.1927	0.7985	0.7881	0.1405	1.0804	0.8599	0.0687	0.9286
FSB-8	1R	116	4.7536	2.0954	0.9821	0.0178	1.6241	0.9474	0.0169	0.9643
FSB-7	7R	183	5.2095	3.8401	0.9999	0.0001	2.0661	0.9808	0.0192	1.0000

AVERAGE	35.5350	3.0782
STANDARD DEVIATION	39.1062	1.0505
VARIANCE	1529.2973	1.1035

TABLE 3: STATISTICAL ANALYSIS OF FILL SOIL DATA FOR LEAD

SAMPLE ID		DATA Y (mg/kg)	TRANSFORMED DATA LN(Y)	SND Y	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	SND LN(Y)	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	SAMPLE DF Fn(x)
FSB-6	10R	6.2	1.8245	-0.5896	0.2776	0.2419	-1.9040	0.0287	0.0070	0.0357
FSB-5	9R	6.24	1.8310	-0.5895	0.2776	0.2062	-1.8993	0.0287	0.0427	0.0714
FSB-6	8R	12.8	2.5494	-0.5687	0.2843	0.1772	-1.3664	0.0853	0.0218	0.1071
FSB-7	4R	13.1	2.5726	-0.5677	0.2843	0.1414	-1.3492	0.0885	0.0544	0.1429
FSB-5	1R	24.5	3.1987	-0.5315	0.2981	0.1195	-0.8849	0.1894	0.0108	0.1786
FSB-6	7R	27.4	3.3105	-0.5223	0.3015	0.0872	-0.8019	0.2119	0.0024	0.2143
FSB-1	5R	29.8	3.3945	-0.5147	0.3050	0.0550	-0.7396	0.2297	0.0203	0.2500
FSB-7	5R	30.6	3.4210	-0.5122	0.3050	0.0193	-0.7200	0.2358	0.0499	0.2857
FSB-6	6R	31.7	3.4563	-0.5087	0.3050	0.0164	-0.6938	0.2451	0.0763	0.3214
FSB-6	5R	41.4	3.7233	-0.4779	0.3156	0.0415	-0.4958	0.3085	0.0486	0.3571
FSB-6	3R	54	3.9890	-0.4379	0.3300	0.0629	-0.2988	0.3821	0.0108	0.3929
FSB-9	6R	63.6	4.1526	-0.4074	0.3409	0.0877	-0.1774	0.4286	0.0000	0.4286
FSB-4	2R	73.3	4.2946	-0.3766	0.3520	0.1123	-0.0721	0.4721	0.0078	0.4643
FSB-1	1R	78.4	4.3618	-0.3604	0.3594	0.1406	-0.0222	0.4920	0.0080	0.5000
FSB-4	5R	90.5	4.5053	-0.3220	0.3745	0.1612	0.0842	0.5319	0.0038	0.5357
FSB-5	5R	116	4.7536	-0.2410	0.4052	0.1662	0.2683	0.6064	0.0350	0.5714
FSB-7	2R	118	4.7707	-0.2347	0.4090	0.1981	0.2810	0.6103	0.0032	0.6071
FSB-4	6R	135	4.9053	-0.1807	0.4286	0.2143	0.3808	0.6480	0.0051	0.6429
FSB-6	1R	152	5.0239	-0.1267	0.4483	0.2303	0.4688	0.6808	0.0022	0.6786
FSB-9	1R	189	5.2417	-0.0092	0.4960	0.2183	0.6304	0.7657	0.0514	0.7143
FSB-7	7R	221	5.3982	0.0924	0.5359	0.2141	0.7464	0.7422	0.0078	0.7500
FSB-8	5R	250	5.5215	0.1844	0.5714	0.2143	0.8378	0.7995	0.0138	0.7857
FSB-7	6R	260	5.5607	0.2162	0.5871	0.2343	0.8669	0.8078	0.0136	0.8214
FSB-8	1R	261	5.5645	0.2194	0.5871	0.2700	0.8698	0.8078	0.0493	0.8571
FSB-1	3R	292	5.6768	0.3178	0.6255	0.2674	0.9530	0.8289	0.0640	0.8929
FSB-8	3R	329	5.7961	0.4353	0.6700	0.2586	1.0415	0.8508	0.0778	0.9286
FSB-7	1R	927	6.8320	2.3339	0.9901	0.0258	1.8098	0.9649	0.0006	0.9643
FSB-9	3R	1540	7.3395	4.2801	0.9999	0.0001	2.1862	0.9857	0.0143	1.0000

AVERAGE	191.9121	4.3918
STANDARD DEVIATION	320.7431	1.3731
VARIANCE	102876.154	1.8853

TABLE 4: STATISTICAL ANALYSIS OF LAGOON SOIL DATA FOR CADMIUM

SAMPLE ID		DATA Y (mg/kg)	TRANSFORMED DATA LN(Y)	SND Y	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	SND LN(Y)	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	Fn(x)
BSB-3	5R	0.369	-0.9970	-0.4621	0.3228	0.2990	-1.5544	0.0606	0.0368	0.0238
BSB-4	2R	0.371	-0.9916	-0.4621	0.3228	0.2752	-1.5527	0.0606	0.0130	0.0476
BSB-2	4R	0.381	-0.9650	-0.4621	0.3228	0.2514	-1.5439	0.0618	0.0096	0.0714
BSB-5	5R	0.46	-0.7765	-0.4620	0.3228	0.2276	-1.4817	0.0694	0.0258	0.0952
BSB-5	5RD	1.14	0.1310	-0.4617	0.3228	0.2038	-1.1822	0.1190	0.0000	0.1190
BSB-3	3R	1.21	0.1906	-0.4617	0.3228	0.1799	-1.1625	0.1230	0.0199	0.1429
BSB-3	2R	1.24	0.2151	-0.4616	0.3228	0.1561	-1.1544	0.1251	0.0416	0.1667
SSB-3	2R	2.29	0.8286	-0.4611	0.3228	0.1323	-0.9520	0.1711	0.0194	0.1905
SSB-1	3R	2.58	0.9478	-0.4610	0.3228	0.1085	-0.9126	0.1814	0.0329	0.2143
SSB-1	2R	3.26	1.1817	-0.4607	0.3228	0.0847	-0.8354	0.2005	0.0376	0.2381
BSB-6	2R	3.52	1.2585	-0.4606	0.3228	0.0609	-0.8101	0.2090	0.0529	0.2619
BSB-3	5RD	5.62	1.7263	-0.4596	0.3228	0.0371	-0.6557	0.2546	0.0311	0.2857
BSB-2	2RD	6.04	1.7984	-0.4594	0.3228	0.0133	-0.6319	0.2643	0.0452	0.3095
BSB-2	2R	6.1	1.8083	-0.4593	0.3228	0.0105	-0.6286	0.2643	0.0690	0.3333
BSB-1	3R	6.73	1.9066	-0.4590	0.3228	0.0343	-0.5962	0.2743	0.0828	0.3571
SSB-2	3R	7.78	2.0516	-0.4585	0.3228	0.0582	-0.5483	0.2912	0.0898	0.3810
BSB-1	2R	9.13	2.2116	-0.4579	0.3228	0.0820	-0.4955	0.3085	0.0963	0.4048
BSB-4	5R	13.4	2.5953	-0.4558	0.3228	0.1058	-0.3689	0.3557	0.0729	0.4286
BSB-6	3R	13.4	2.5953	-0.4558	0.3228	0.1296	-0.3689	0.3557	0.0967	0.4524
BSB-1	5R	16.1	2.7788	-0.4546	0.3264	0.1498	-0.3083	0.3783	0.0979	0.4762
BSB-3	1R	18.9	2.9392	-0.4532	0.3264	0.1736	-0.2554	0.3974	0.1026	0.5000
BSB-1	1R	19.2	2.9549	-0.4531	0.3264	0.1974	-0.2502	0.4013	0.1225	0.5238
BSB-4	3R	51.8	3.9474	-0.4375	0.3300	0.2176	0.0774	0.5319	0.0157	0.5476
BSB-6	5R	53.4	3.9778	-0.4367	0.3300	0.2414	0.0874	0.5359	0.0355	0.5714
SSB-2	2R	77.2	4.3464	-0.4254	0.3336	0.2616	0.2090	0.5832	0.0120	0.5952
BSB-2	5R	84.6	4.4379	-0.4219	0.3372	0.2818	0.2393	0.5948	0.0242	0.6190
BSB-2	3R	136	4.9127	-0.3973	0.3446	0.2983	0.3959	0.6554	0.0125	0.6429
SSB-2	1R	188	5.2364	-0.3725	0.3557	0.3110	0.5028	0.6915	0.0248	0.6667
BSB-1	4R	215	5.3706	-0.3596	0.3594	0.3311	0.5471	0.7088	0.0183	0.6905
BSB-5	3R	282	5.6419	-0.3276	0.3707	0.3436	0.6366	0.7389	0.0246	0.7143
BSB-4	1R	369	5.9108	-0.2861	0.3859	0.3522	0.7253	0.7673	0.0292	0.7381
BSB-6	1R	517	6.2480	-0.2155	0.4129	0.3490	0.8366	0.7995	0.0376	0.7619
BSB-5	4R	725	6.5862	-0.1162	0.4522	0.3335	0.9482	0.8289	0.0432	0.7857
BSB-2	1R	1370	7.2226	0.1917	0.5753	0.2342	1.1583	0.8770	0.0675	0.8095
SSB-3	1R	1550	7.3460	0.2776	0.6103	0.2230	1.1990	0.8849	0.0516	0.8333
BSB-4	4R	1560	7.3524	0.2824	0.6103	0.2468	1.2011	0.8849	0.0278	0.8571
SSB-1	1R	1680	7.4265	0.3397	0.6331	0.2479	1.2256	0.8907	0.0097	0.8810
BSB-3	4R	3790	8.2401	1.3468	0.9115	0.0067	1.4941	0.9319	0.0271	0.9048
BSB-6	4R	5400	8.5942	2.1153	0.9830	0.0544	1.6109	0.9463	0.0177	0.9286
BSB-5	2R	7055	8.8615	2.9052	0.9982	0.0458	1.6992	0.9554	0.0030	0.9524
BSB-5	2RD	7110	8.8693	2.9315	0.9983	0.0221	1.7017	0.9554	0.0208	0.9762
BSB-5	1R	8320	9.0264	3.5090	0.9998	0.0002	1.7536	0.9599	0.0401	1.0000

AVERAGE	968.4100	3.7130
STANDARD DEVIATION	2120.4444	3.0655
VARIANCE	4496284.5	9.3971

T. ___ 5: S . STICA ALYS LAG SOIL . FOF OMII

SAMPLE ID		DATA Y (mg/kg)	TRANSFORMED DATA LN(Y)	SND Y	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	SND LN(Y)	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	Fn(x)
BSB-4	2R	4.52	1.5085	-0.8528	0.1977	0.1739	-1.7825	0.0375	0.0137	0.0238
BSB-3	5R	6.55	1.8795	-0.8442	0.2005	0.1529	-1.5517	0.0606	0.0130	0.0476
BSB-5	5R	8.43	2.1318	-0.8362	0.2005	0.1291	-1.3947	0.0823	0.0109	0.0714
BSB-6	2R	8.43	2.1318	-0.8362	0.2005	0.1053	-1.3947	0.0823	0.0129	0.0952
BSB-2	5R	8.72	2.1656	-0.8350	0.2033	0.0843	-1.3736	0.0853	0.0337	0.1190
BSB-2	4R	8.92	2.1883	-0.8341	0.2033	0.0604	-1.3595	0.0869	0.0560	0.1429
BSB-3	5RD	11.3	2.4248	-0.8240	0.2061	0.0394	-1.2123	0.1131	0.0536	0.1667
BSB-2	2R	11.8	2.4681	-0.8219	0.2061	0.0156	-1.1854	0.1170	0.0735	0.1905
BSB-6	5R	12.6	2.5337	-0.8185	0.2061	0.0082	-1.1446	0.1271	0.0872	0.2143
BSB-2	2RD	13.5	2.6027	-0.8147	0.2090	0.0291	-1.1016	0.1357	0.1024	0.2381
BSB-6	3R	14.1	2.6462	-0.8122	0.2090	0.0529	-1.0746	0.1423	0.1196	0.2619
BSB-4	5R	16	2.7726	-0.8041	0.2119	0.0738	-0.9959	0.1587	0.1270	0.2857
BSB-1	3R	17	2.8332	-0.7998	0.2119	0.0976	-0.9582	0.1685	0.1410	0.3095
BSB-5	5RD	19.6	2.9755	-0.7888	0.2148	0.1185	-0.8696	0.1922	0.1411	0.3333
SSB-2	3R	23.6	3.1612	-0.7718	0.2206	0.1365	-0.7540	0.2266	0.1305	0.3571
SSB-2	2R	53.8	3.9853	-0.6437	0.2611	0.1199	-0.2413	0.4052	0.0242	0.3810
BSB-4	3R	54.5	3.9982	-0.6407	0.2611	0.1437	-0.2332	0.4090	0.0042	0.4048
BSB-1	5R	61.5	4.1190	-0.6110	0.2709	0.1577	-0.1580	0.4364	0.0078	0.4286
BSB-2	3R	70.4	4.2542	-0.5732	0.2843	0.1681	-0.0739	0.4721	0.0197	0.4524
SSB-3	2R	93	4.5326	-0.4773	0.3156	0.1606	0.0993	0.5398	0.0636	0.4762
BSB-1	2R	103	4.6347	-0.4349	0.3336	0.1664	0.1629	0.5636	0.0636	0.5000
SSB-2	1R	121	4.7958	-0.3585	0.3594	0.1644	0.2631	0.6026	0.0788	0.5238
BSB-3	1R	152	5.0239	-0.2269	0.4090	0.1386	0.4050	0.6591	0.1115	0.5476
BSB-4	1R	169	5.1299	-0.1547	0.4404	0.1310	0.4710	0.6808	0.1094	0.5714
BSB-6	1R	188	5.2364	-0.0741	0.4721	0.1231	0.5373	0.7054	0.1102	0.5952
BSB-5	2RD	226	5.4205	0.0872	0.5359	0.0831	0.6519	0.7422	0.1232	0.6190
BSB-5	2R	230	5.4381	0.1042	0.5398	0.1031	0.6628	0.7454	0.1025	0.6429
SSB-1	3R	235	5.4596	0.1254	0.5517	0.1150	0.6762	0.7517	0.0850	0.6667
BSB-1	1R	262	5.5683	0.2400	0.5948	0.0957	0.7438	0.7703	0.0798	0.6905
BSB-3	4R	264	5.5759	0.2485	0.5987	0.1156	0.7486	0.7734	0.0591	0.7143
BSB-1	4R	295	5.6870	0.3800	0.6480	0.0901	0.8177	0.7939	0.0558	0.7381
SSB-3	1R	354	5.8693	0.6304	0.7357	0.0262	0.9311	0.8238	0.0619	0.7619
BSB-4	4R	354	5.8693	0.6304	0.7357	0.0500	0.9311	0.8238	0.0381	0.7857
BSB-3	2R	384	5.9506	0.7577	0.7764	0.0331	0.9817	0.8365	0.0270	0.8095
BSB-5	1R	400	5.9915	0.8257	0.7967	0.0366	1.0071	0.8438	0.0105	0.8333
BSB-2	1R	405	6.0039	0.8469	0.8289	0.0282	1.0149	0.8438	0.0133	0.8571
SSB-1	2R	414	6.0259	0.8851	0.8389	0.0421	1.0285	0.8485	0.0325	0.8810
BSB-5	4R	482	6.1779	1.1737	0.8790	0.0258	1.1232	0.8665	0.0383	0.9048
BSB-3	3R	527	6.2672	1.3647	0.9131	0.0155	1.1787	0.8810	0.0476	0.9286
BSB-6	4R	743	6.6107	2.2814	0.9887	0.0363	1.3925	0.9177	0.0347	0.9524
SSB-1	1R	880	6.7799	2.8628	0.9979	0.0217	1.4978	0.9332	0.0430	0.9762
BSB-5	3R	923	6.8276	3.0453	0.9989	0.0011	1.5275	0.9370	0.0630	1.0000

AVERAGE	205.4588	4.3728
STANDARD DEVIATION	238.4764	1.6263
VARIANCE	56871.0121	2.6449

TABLE 6: STATISTICAL ANALYSIS OF LAGOON SOIL DATA FOR LEAD

SAMPLE ID		DATA Y (mg/kg)	TRANSFORMED DATA LN(Y)	SND Y	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	SND LN(Y)	NORMAL CDF Fo(x)	KS Fn(x)-Fo(x)	Fn(x)
BSB-5	5RD	18	2.8904	-0.4969	0.3085	0.2847	-1.2771	0.1003	0.0765	0.0238
SSB-1	3R	20	2.9957	-0.4966	0.3085	0.2609	-1.2312	0.1093	0.0617	0.0476
BSB-2	4R	20	2.9957	-0.4966	0.3085	0.2371	-1.2312	0.1093	0.0379	0.0714
BSB-4	2R	22	3.0910	-0.4963	0.3085	0.2133	-1.1896	0.1170	0.0218	0.0952
BSB-5	5R	22	3.0910	-0.4963	0.3085	0.1895	-1.1896	0.1170	0.0020	0.1190
BSB-6	2R	29	3.3673	-0.4952	0.3085	0.1656	-1.0692	0.1423	0.0006	0.1429
BSB-3	2R	36	3.5835	-0.4942	0.3121	0.1454	-0.9749	0.1660	0.0007	0.1667
BSB-3	5R	36	3.5835	-0.4942	0.3121	0.1216	-0.9749	0.1660	0.0245	0.1905
BSB-1	3R	38	3.6376	-0.4939	0.3121	0.0978	-0.9514	0.1711	0.0432	0.2143
BSB-2	2R	42	3.7377	-0.4933	0.3121	0.0740	-0.9077	0.1814	0.0567	0.2381
BSB-2	2RD	43	3.7612	-0.4931	0.3121	0.0502	-0.8975	0.1841	0.0778	0.2619
BSB-3	3R	43	3.7612	-0.4931	0.3121	0.0264	-0.8975	0.1841	0.1016	0.2857
BSB-3	5RD	52	3.9512	-0.4917	0.3121	0.0026	-0.8146	0.2090	0.1005	0.3095
SSB-1	2R	55	4.0073	-0.4913	0.3121	0.0212	-0.7902	0.2148	0.1185	0.3333
BSB-6	3R	71	4.2627	-0.4888	0.3121	0.0450	-0.6789	0.2483	0.1088	0.3571
BSB-1	2R	72	4.2767	-0.4887	0.3121	0.0689	-0.6728	0.2514	0.1296	0.3810
BSB-1	5R	91	4.5109	-0.4858	0.3121	0.0927	-0.5707	0.2843	0.1205	0.4048
BSB-4	4R	93	4.5326	-0.4855	0.3121	0.1165	-0.5612	0.2877	0.1409	0.4286
BSB-4	5R	93	4.5326	-0.4855	0.3121	0.1403	-0.5612	0.2877	0.1647	0.4524
SSB-2	3R	150	5.0106	-0.4767	0.3156	0.1606	-0.3528	0.3632	0.1130	0.4762
SSB-3	2R	170	5.1358	-0.4737	0.3192	0.1808	-0.2983	0.3921	0.1079	0.5000
BSB-6	5R	180	5.1930	-0.4721	0.3192	0.2046	-0.2733	0.3936	0.1302	0.5238
SSB-2	2R	320	5.7683	-0.4507	0.3264	0.2212	-0.0225	0.4920	0.0556	0.5476
BSB-2	5R	320	5.7683	-0.4507	0.3264	0.2450	-0.0225	0.4920	0.0794	0.5714
BSB-4	3R	570	6.3456	-0.4125	0.3409	0.2543	0.2291	0.5910	0.0042	0.5952
BSB-2	3R	760	6.6333	-0.3834	0.3520	0.2670	0.3545	0.6368	0.0178	0.6190
BSB-1	4R	860	6.7569	-0.3681	0.3557	0.2872	0.4084	0.6591	0.0162	0.6429
BSB-1	1R	900	6.8024	-0.3620	0.3594	0.3073	0.4282	0.6664	0.0003	0.6667
BSB-3	1R	990	6.8977	-0.3483	0.3632	0.3273	0.4698	0.6808	0.0097	0.6905
BSB-5	3R	1100	7.0031	-0.3314	0.3707	0.3436	0.5157	0.6985	0.0158	0.7143
SSB-2	1R	1300	7.1701	-0.3009	0.3821	0.3560	0.5885	0.7224	0.0157	0.7381
BSB-4	1R	1400	7.2442	-0.2856	0.3859	0.3760	0.6208	0.7324	0.0295	0.7619
BSB-6	1R	2400	7.7832	-0.1326	0.4483	0.3374	0.8558	0.8051	0.0194	0.7857
BSB-2	1R	5100	8.5370	0.2803	0.6103	0.1992	1.1844	0.8810	0.0715	0.8095
SSB-1	1R	6100	8.7160	0.4333	0.6664	0.1669	1.2624	0.8962	0.0629	0.8333
BSB-5	4R	6100	8.7160	0.4333	0.6664	0.1907	1.2624	0.8962	0.0391	0.8571
SSB-3	1R	8600	9.0595	0.8156	0.7910	0.0900	1.4122	0.9207	0.0397	0.8810
BSB-3	4R	13000	9.4727	1.4886	0.9319	0.0271	1.5923	0.9441	0.0393	0.9048
BSB-6	4R	18000	9.7981	2.2533	0.9878	0.0592	1.7341	0.9582	0.0296	0.9286
BSB-5	1R	19000	9.8522	2.4063	0.9920	0.0396	1.7577	0.9608	0.0084	0.9524
BSB-5	2R	24000	10.0858	3.1710	0.9992	0.0230	1.8596	0.9686	0.0076	0.9762
BSB-5	2RD	25000	10.1266	3.3239	0.9995	0.0005	1.8773	0.9699	0.0301	1.0000

AVERAGE	3267.0476	5.8202
STANDARD DEVIATION	6617.5921	2.3218
VARIANCE	43792525.8	5.3910

TABLE 7: LOG-PROBABILITY PLOT ESTIMATIONS

POPULATION	CONSTITUENT	X(0.16)	X(0.50)	X(0.84)	u(y)	var(y)	mean	standard deviation	95% confidence interval
FILL	CADMIUM	0.9	1.6	2.65	0.47	0.29	1.85	1.08	3.7
	CHROMIUM	7.7	19.5	51	2.97	0.89	30.49	36.64	91.0
	LEAD	20.8	77.5	292	4.35	1.74	185.43	403.07	700.0
LAGOON	CADMIUM	1.55	36.5	910	3.60	10.16	5878.11	946616.73	6900.0
	CHROMIUM	18.5	82	370	4.41	2.24	251.79	730.98	940.0
	LEAD	37	350	3250	5.86	5.01	4280.32	52170.84	14400.0

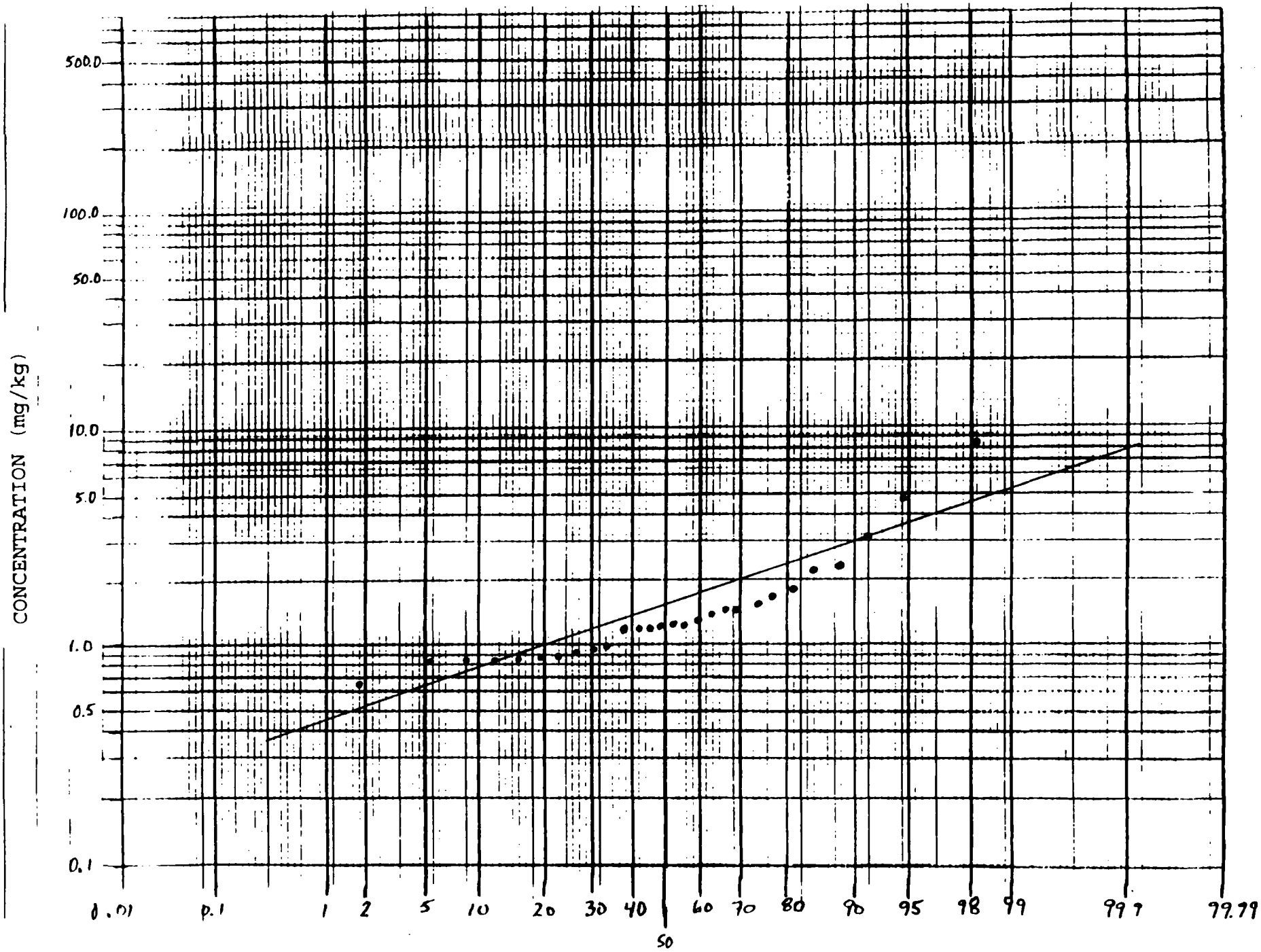


FIGURE 1: LOG-PROBABILITY PLOT OF CADMIUM FILL SOIL DATA

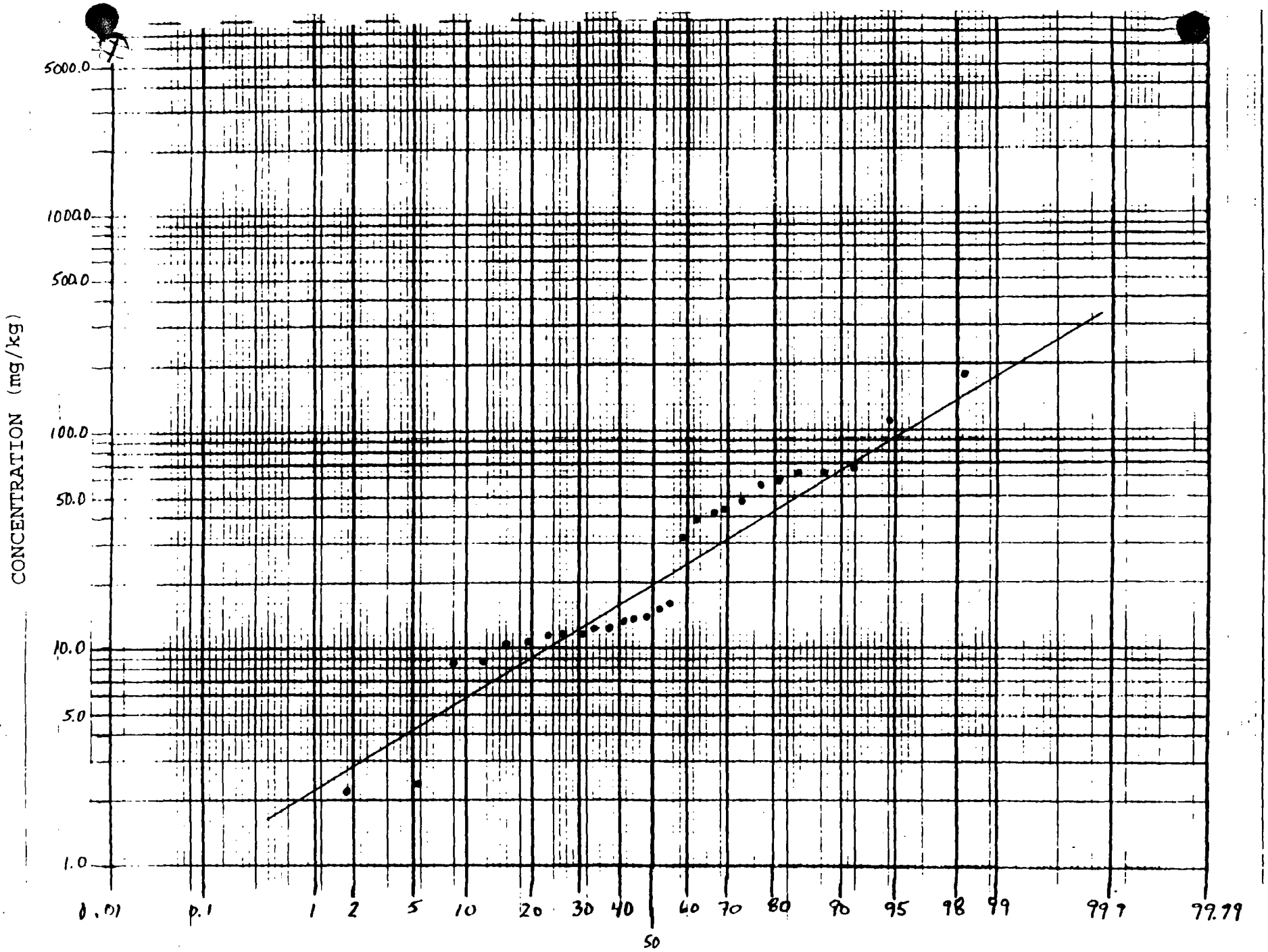


FIGURE 2: LOG-PROBABILITY PLOT OF CHROMIUM FILL SOIL DATA

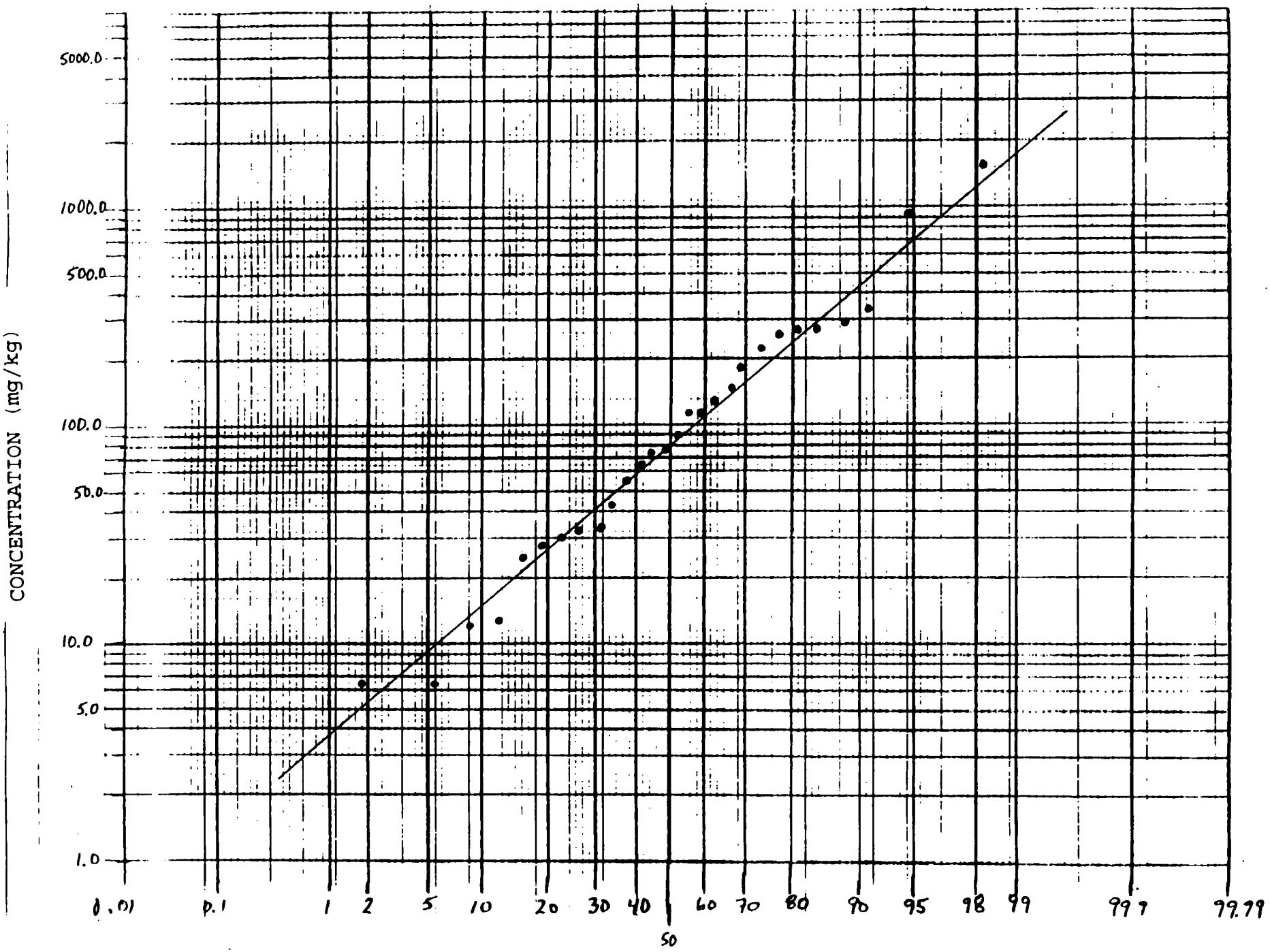


FIGURE 3: LOG-PROBABILITY PLOT OF LEAD FILL SOIL DATA

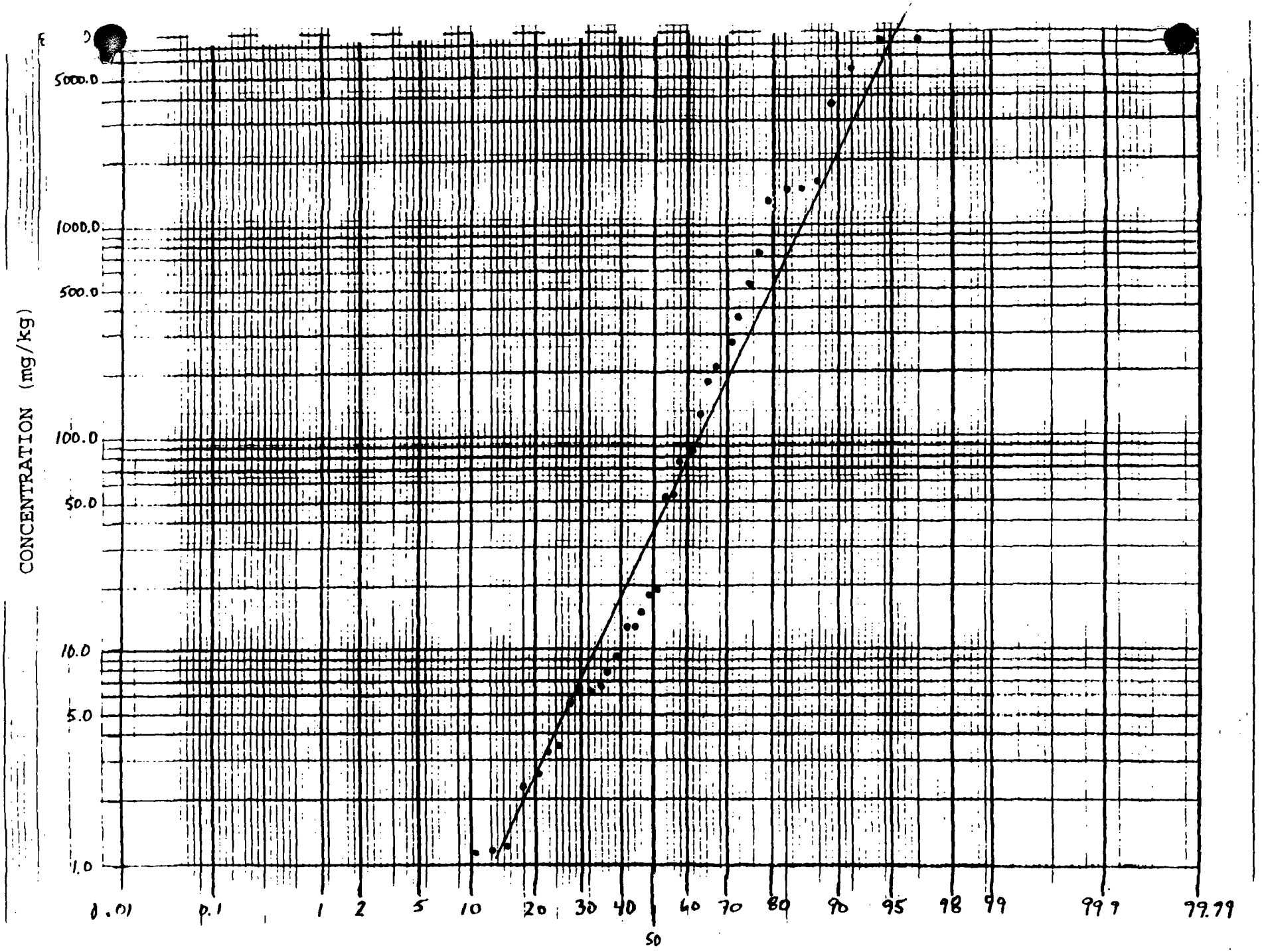


FIGURE 4: LOG-PROBABILITY PLOT OF CADMIUM LAGOON SOIL DATA

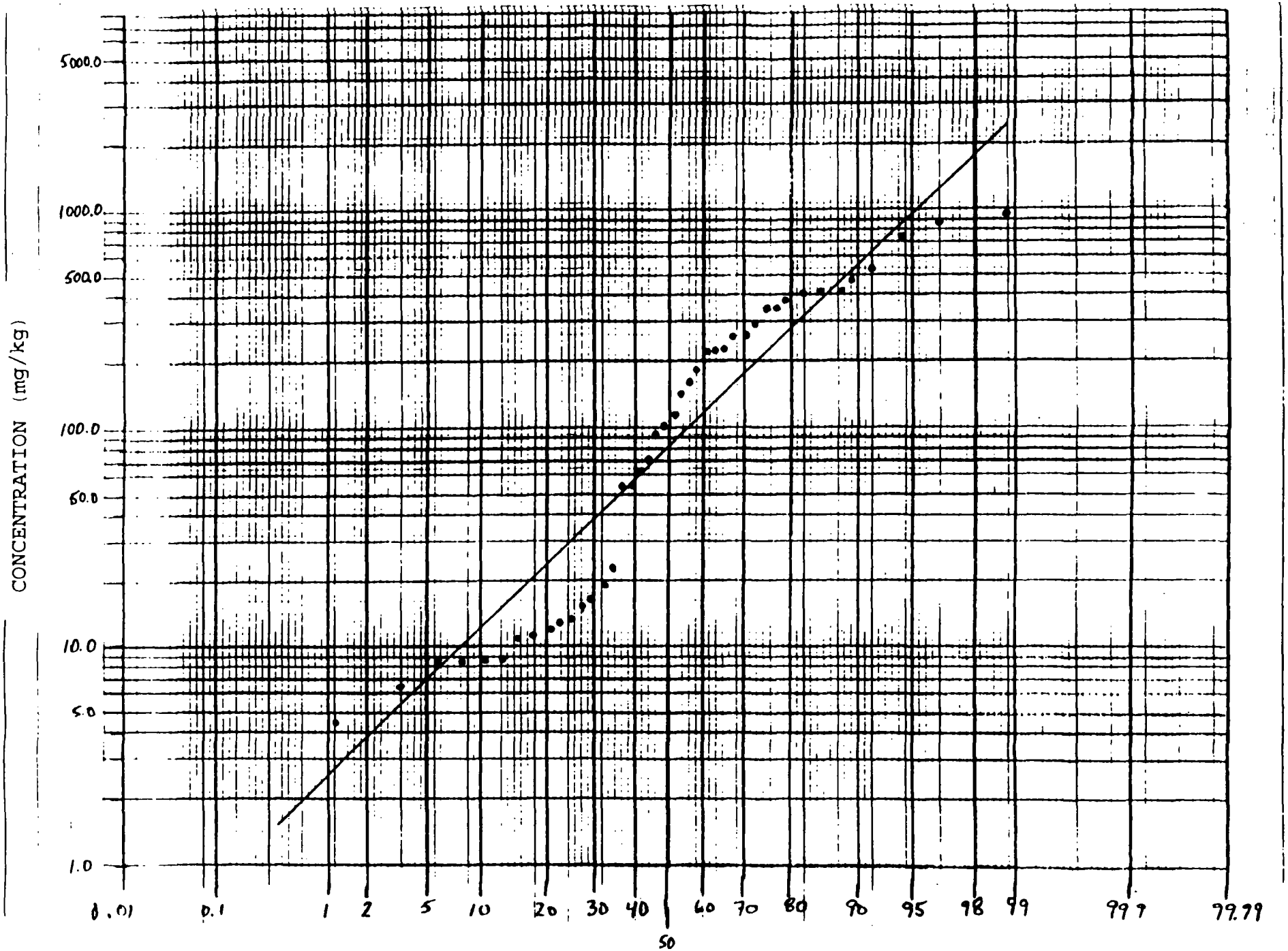


FIGURE 5: LOG-PROBABILITY PLOT OF CHROMIUM LAGOON SOIL DATA

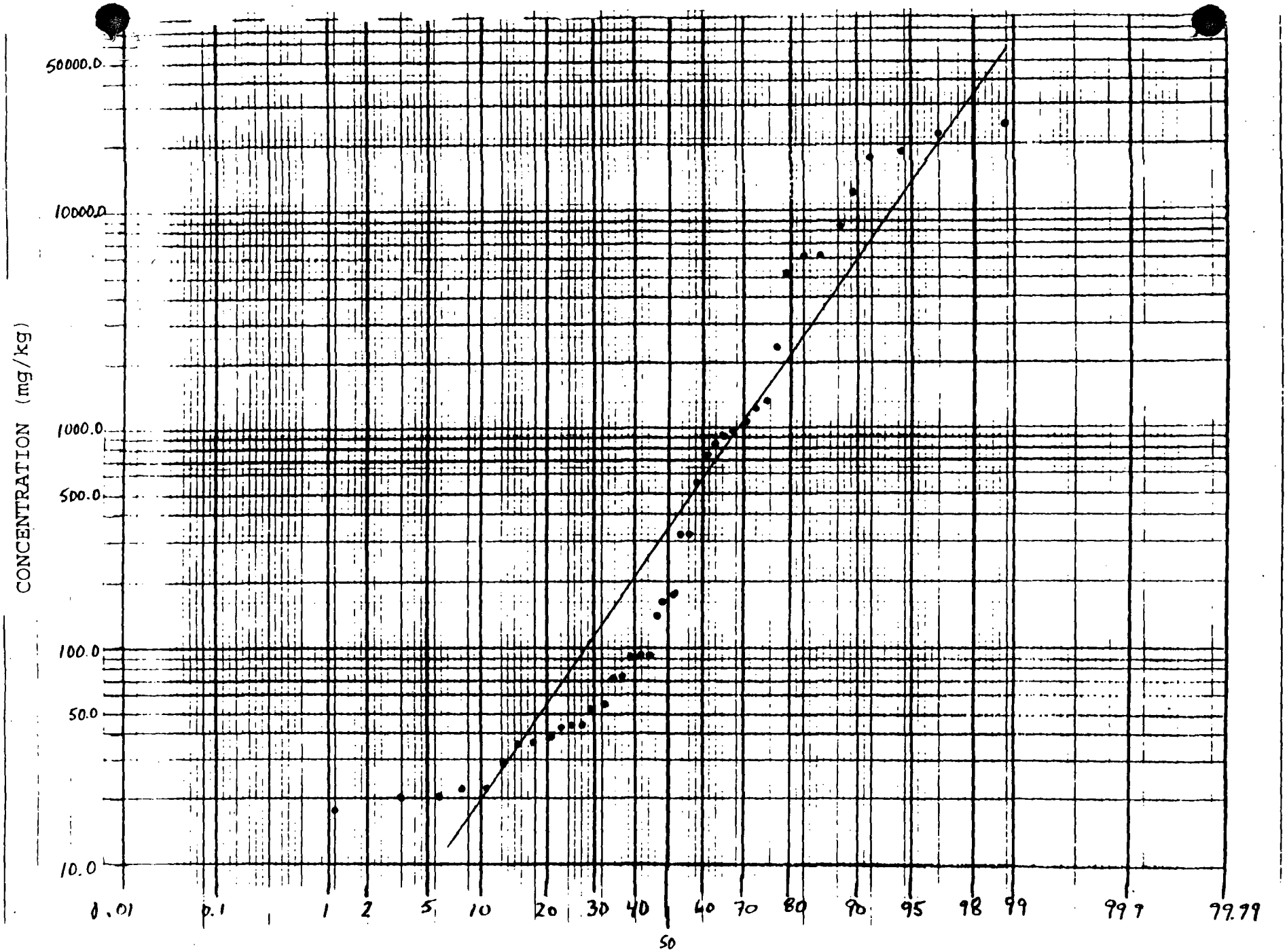
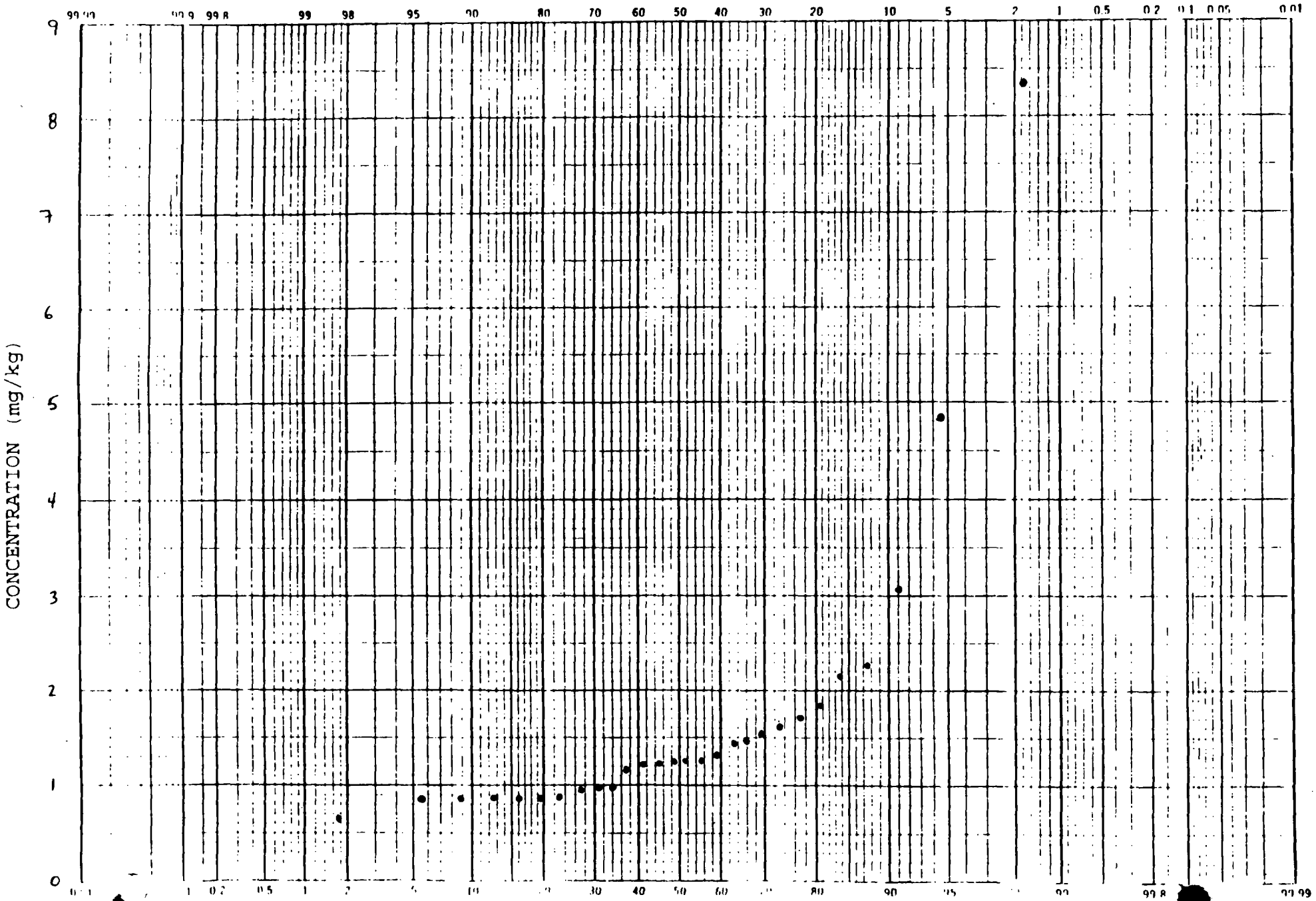


FIGURE 6: LOG-PROBABILITY PLOT OF LEAD LAGOON SOIL DATA



F[illegible]RE PI[illegible]ABI[illegible] Y [illegible] O. ADM[illegible] 4 F[illegible] SC[illegible] DA

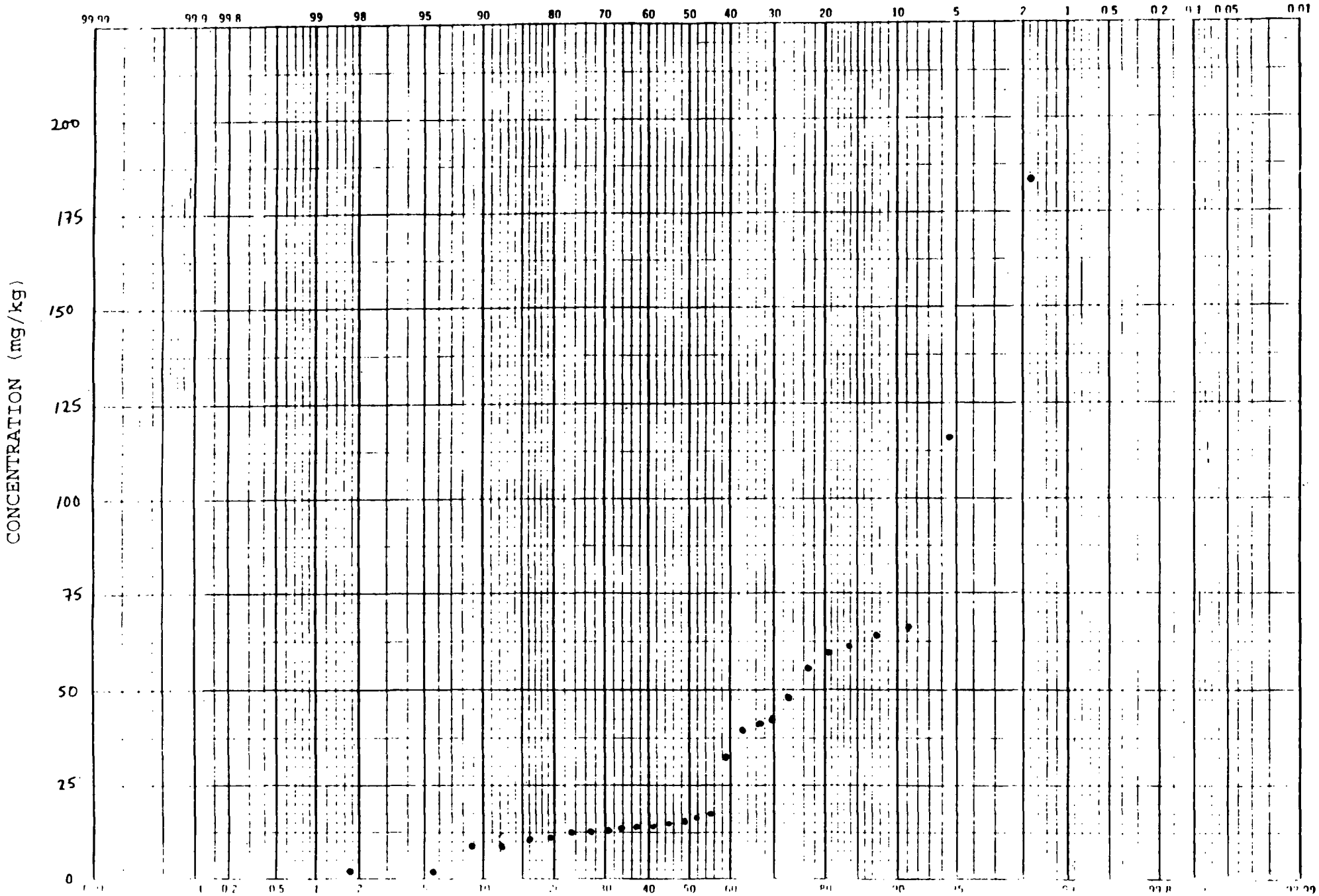
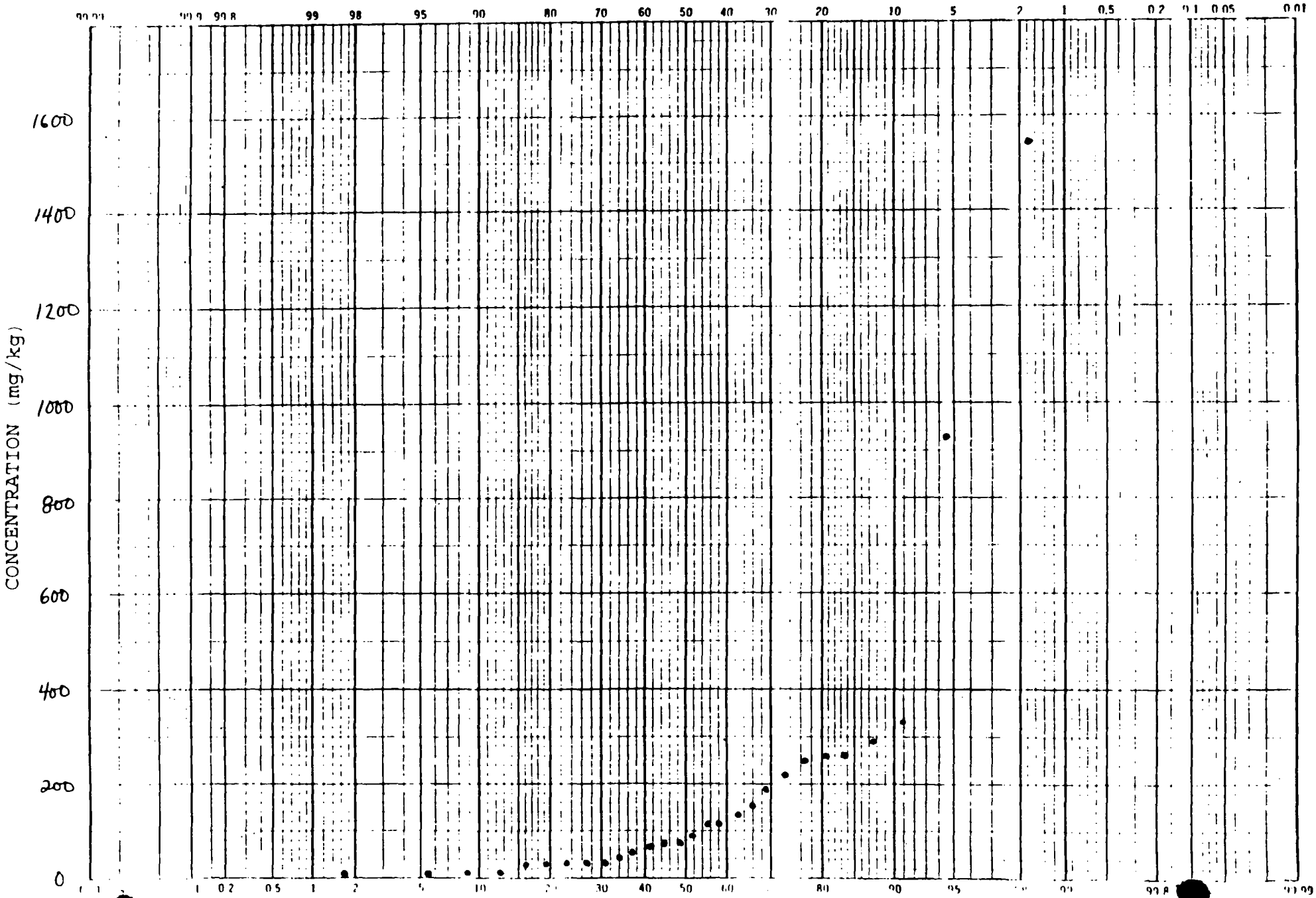


FIGURE 8: PROBABILITY PLOT OF CHROMIUM FILL SOIL DATA



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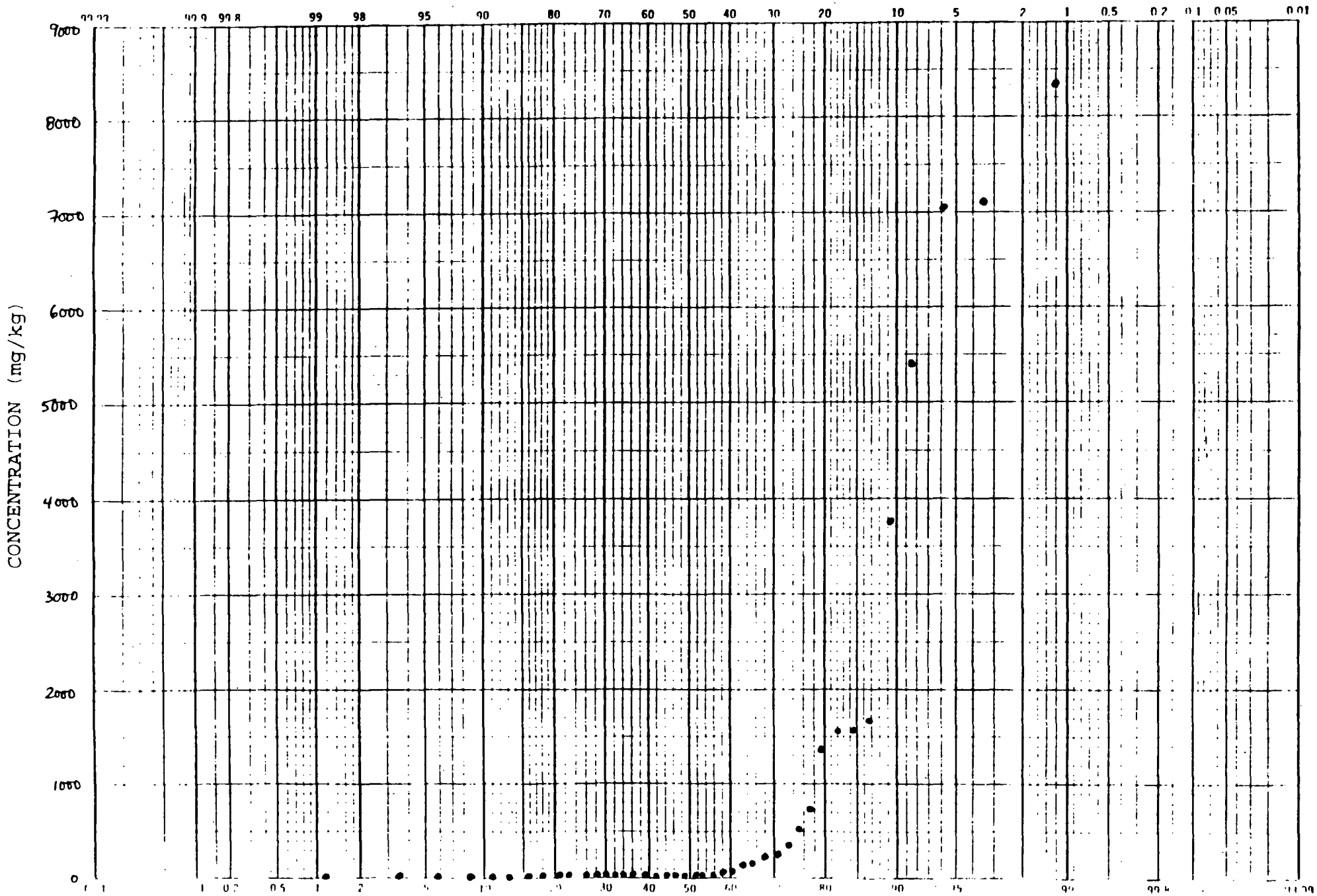
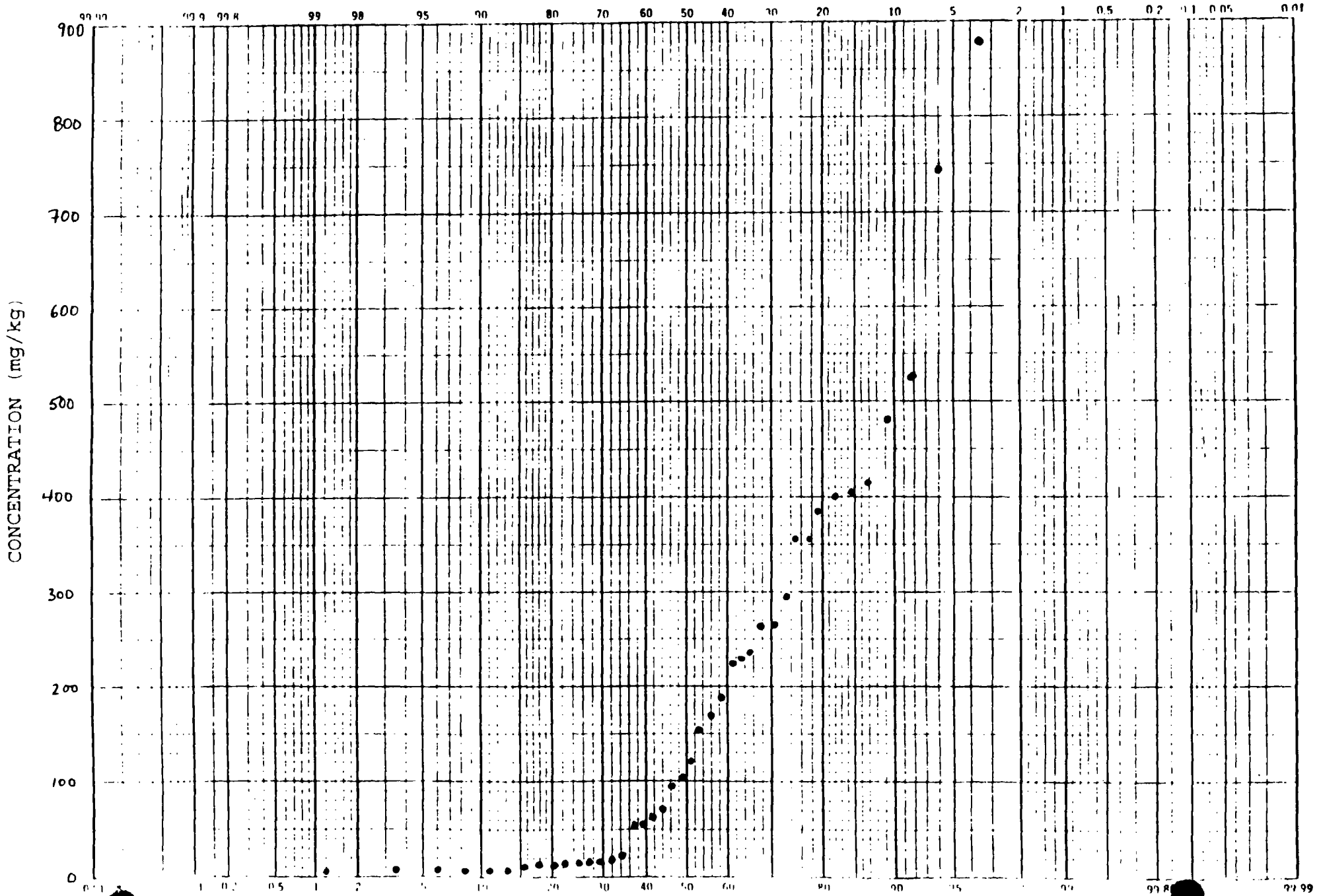


FIGURE 10: PROBABILITY PLOT OF CADMIUM LAGOON SOIL DATA


CONCENTRATION (mg/kg)
900
800
700
600
500
400
300
200
100
0
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01

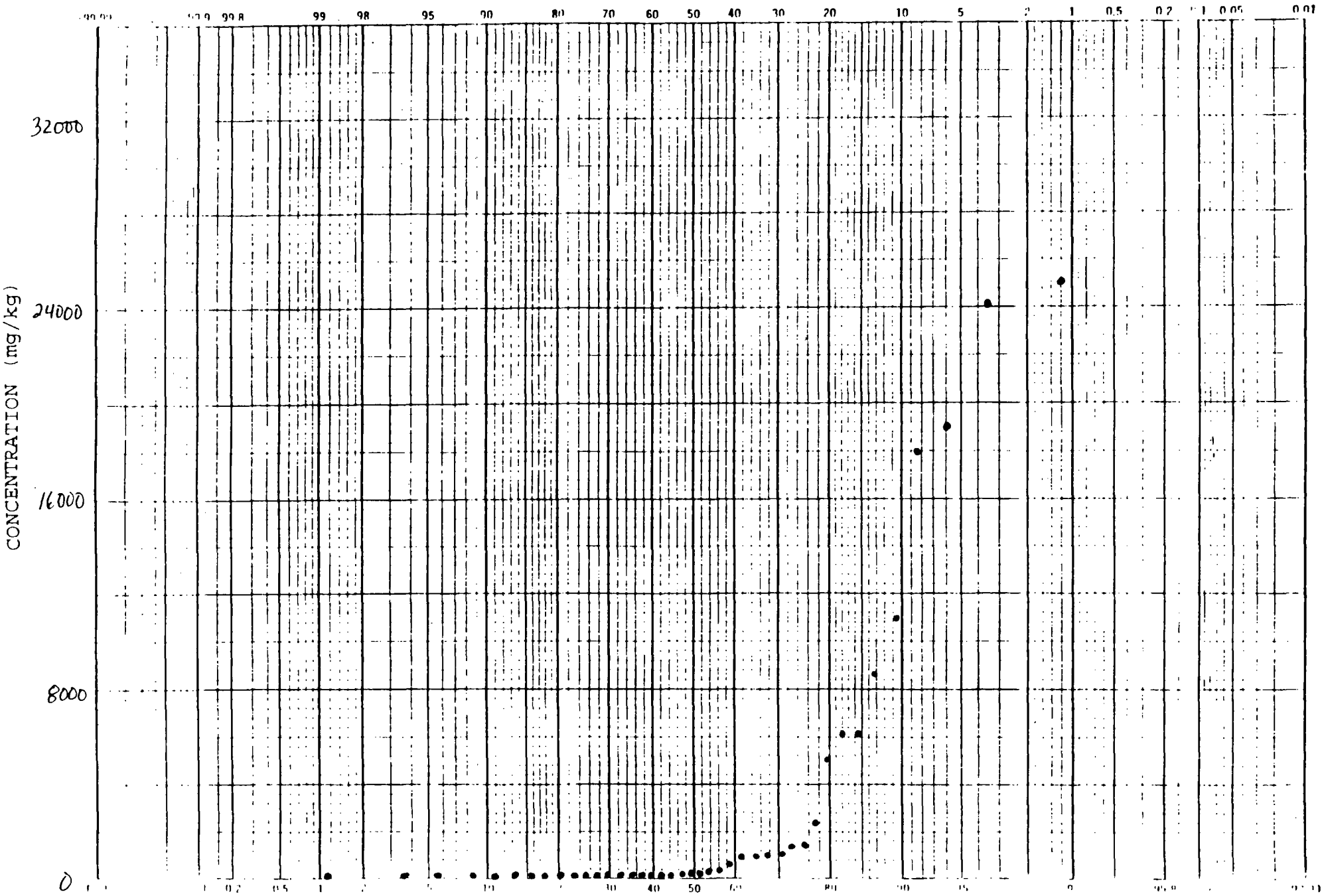


FIGURE 12: PROBABILITY PLOT OF LEAD LAGOON SOIL DATA

GROUNDWATER QUALITY ASSESSMENT REPORT

FOR EKCO HOUSEWARES, INC.

MASSILLON, OHIO

MAY 1989

Prepared By:

ROY F. WESTON, INC.
Weston Way
West Chester, Pennsylvania 19380

6277B1

to be limited; however, the soil-gas survey was not extended to the outer limits of these smaller areas.

Shallow soil VOC contamination at the northern end of the plant may have occurred as a result of activities at the tank farm in the vicinity of soil gas sample point SG-24. Further investigation may be warranted to define the extent of contamination in this area.

Again as seen on Figure 3-2, several areas of relatively minor soil VOC contamination exist on-site. These areas may represent small spills, or perhaps reworking or relocation of soils from contaminated areas. The presence of 1,1-dichloroethene (1,1-DCE) in a number of soil gas samples from these more limited areas, as well as in several samples from the relatively large impacted area to the north of the plant, suggests soil contamination in these areas to be at least in part a result of activities having occurred in the past, allowing time for dehalogenation of TCE and/or 1,1,1-TCA. More recent solvent losses may also have occurred, as the concentrations of 1,1-DCE are low, relative to the concentrations of TCE and 1,1,1-TCA.

3.5 SOIL BORING RESULTS

3.5.1 Soil Borings Volatile Organic Compounds

Soil borings were performed in areas where soil gas results indicated potential VOC contamination as a means of pinpointing potential source areas, of quantifying levels of organic and inorganic soil contamination, and of developing a vertical profile of soil contamination. Soil boring locations are shown on Figure 3-3. Results of analysis of soil samples from the soil borings are summarized in Appendix D. Soil sampling protocols followed are presented in Appendix C. Soil boring logs are presented in Appendix F.

Results of VOC analysis of soil samples suggests overall concurrence with soil gas sampling results. Based upon the soil boring samples, the three major areas containing elevated VOCs in soil are: 1) the southern corner of the building near the solvent storage tank, 2) north of the building and south of the lagoon, and 3) the area around SB-9. Although TCE and 1,1,1-TCA were the primary VOCs detected, as was the finding in the soil gas analysis, two additional compounds, toluene and 1,2-dichloroethene (1,2-DCE), were detected in soil boring samples.

Results of VOC analysis of soil samples are listed as total VOC concentration versus depth in Table 3-2. This table illustrates, based upon the soil boring results, the vertical distribution of VOCs with depth in each of the areas of concern around the site.

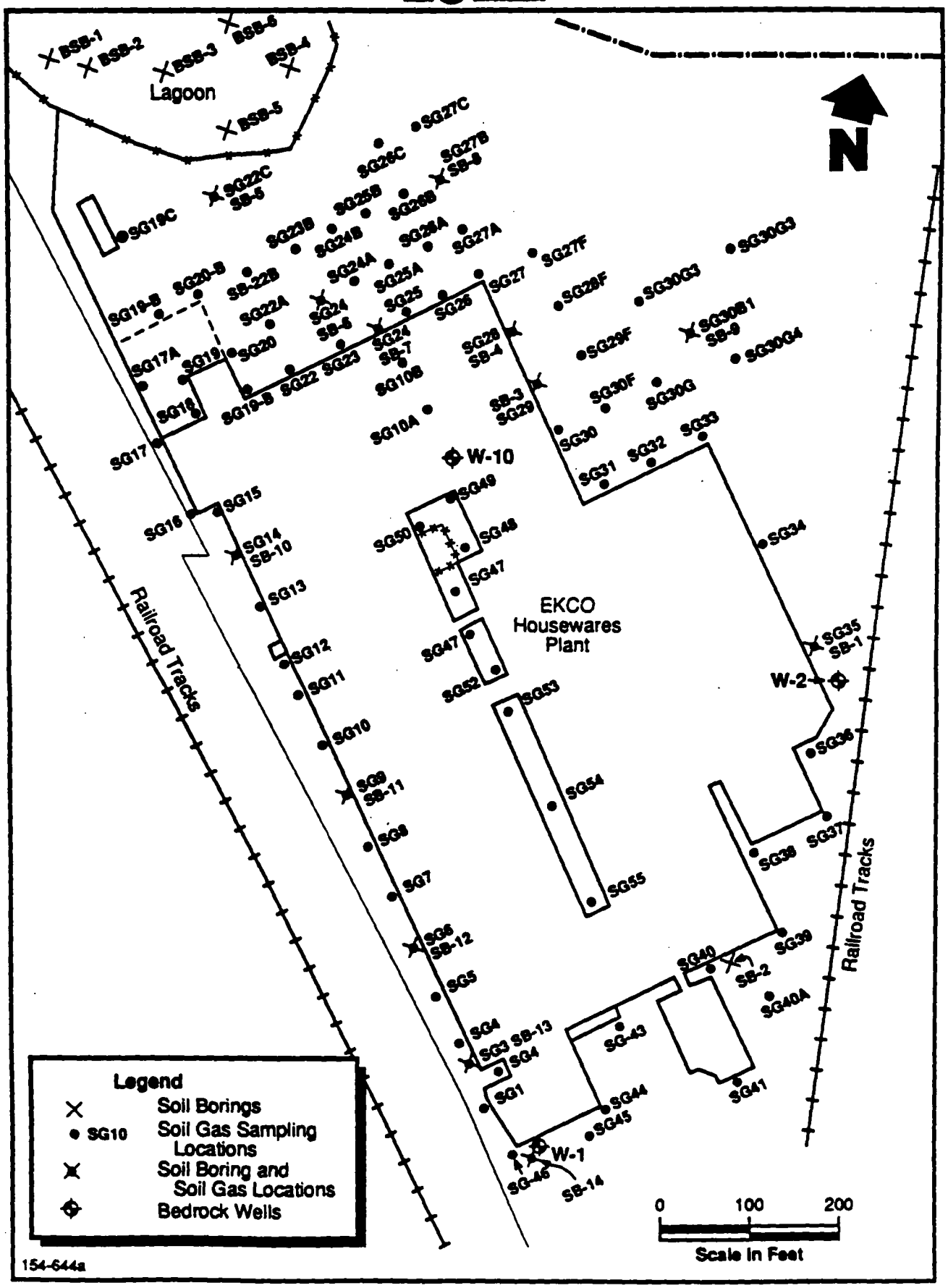


FIGURE 3-3 SOIL BORING AND SOIL GAS SAMPLING LOCATION MAP

Table 3-2

Soil Boring, Total Volatile Organic Compounds (PPB)

Depth Feet	Northern Borings								Southern Borings					
	SB-3	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9	SB-10	SB-1	SB-2	SB-11	SB-12	SB-13	SB-14
0-2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-4	60	-	326	220	964	228	1338	227	298	65	No Samples		140628	123
4-6	-	53	-	-	3183	-	-	-	-	-			-	-
6-8	137	-	-	655	-	753	-	-	118	-			267	199
8-10	-	-	-	-	430	-	-		-	104			-	232
10-12	245	84	51	122	251	1096	-		83	146			706	-
12-14	-	307	-	80	539	-	281		-	-			-	
14-16		-	-	637	2268		-							
16-18			-	219	-									
18-20			84	-										
20-22			-	-										
22-24				-										
24-26				97										

Several trends are apparent based upon the soil VOC analysis. Near the southern corner of the building, and near SB-9, relatively high, near-surface VOC concentrations suggest surface spills as possible sources; the lack of high concentrations in deeper samples suggest relatively recent occurrences and/or a lack of mobility in the soil. On the other hand, significant contamination of soils to depths of at least 14 to 16 feet in the area north of the building and south of the lagoon, combined with relatively high VOC concentrations at depths of four to six feet in the same area, suggests a more complex history than that indicated in the other areas, perhaps involving numerous sources or spill/loss events.

3.5.2 Soil Boring Inorganic Results - Cadmium, Chromium, and Lead

Results of soil boring sample analyses for cadmium, chromium and lead are listed in Table 3-3 through Table 3-5 and are discussed separately from the other inorganics because of their reportedly toxic nature and their separate treatment in point 10 of the closure plan review guidance (10 December 1985.) WESTON soil boring metal results for cadmium, chromium and lead were analyzed to determine if distinct populations of the metals could be differentiated among the site subsurface materials, (fill, lagoon, and natural). To accomplish this, the extent of the fill was determined through examination of the boring logs to evaluate whether a boring was installed in a fill area, natural or lagoonal material and whether the soil samples were analyzed for metals in that boring (Tables 3-3 through 3-5). All of the samples for each sample group (natural, fill or lagoon) were then summed, averaged and standard deviations were calculated. Calculated values were then compared between the groups. Results are discussed below.

The mean values for cadmium in the natural material and in the fill material were very similar, suggesting no significant difference between the two groups. When comparing these mean values and associated ranges to the maximum Ohio Farm soil value of 2.9 mg/kg, a large portion (the upper two standard deviations) of each population is above this value. The average cadmium concentrations for the lagoon material is three orders of magnitude greater than the other average values. The lagoon material has higher concentrations of cadmium than the surrounding fill or natural material and can be distinguished from the other materials.

The chromium population consists of two groups. Native materials had the lowest mean, 58 mg/kg, more than two times higher than the Ohio Farm soil highest value of 23 mg/kg. The fill material and lagoon material both have means an order of magnitude above the mean value for the natural materials, but the range of the lagoon material has a higher standard deviation and a wider range. These results suggest that the natural

background level is above the Ohio Farm soils limit. Also, the site background (fill material) is elevated and the lagoon material is not readily distinguishable from the fill material.

The lead population consists of three groups. The mean of the natural material is 39 mg/kg, which corresponds with the upper limit of the Ohio Farm soils limit. This suggests that native materials have a background range at the site that extends above the Ohio Farm soil limit. The mean concentration of lead in the fill materials, 192 mg/kg, is an order of magnitude higher than the natural material mean value. The lagoon material mean, 2,110 mg/kg, is an order of magnitude above the fill material mean. The ranges for the groups also increase by an order of magnitude as one moves from the natural to fill to lagoon material.

The lagoon deposits typically show the highest concentrations of cadmium, chromium and lead. If these metals were detected in the groundwater, particularly in the groundwater in the vicinity of the lagoon, the lagoon would be the suspected source. However, the site groundwater samples did not have any cadmium, chromium or lead values above the drinking water limits. The groundwater metal results are discussed in Subsection 3.6.1.2.

3.5.3 Soil Boring Results - Other Metals

Three other heavy metals discussed in the Ohio Farm soils report besides cadmium, chromium and lead are copper, nickel, and zinc. The distribution of copper, nickel and zinc is similar to the distribution of the other heavy metals (Cd, Cr, Pb). Concentrations of copper, nickel and zinc however, are not above the Ohio Farm soil limit as often. In comparing the distribution of heavy metals in soils with the distribution of VOCs in soils, the areas of elevated metals concentrations appears to coincide with the area of elevated VOC concentrations in the soil borings. As elevated heavy metals concentrations are obviously typical of the fill materials present to depths of greater than 10 feet across much of the site, the significance of the metals should be determined based upon concentrations detected in groundwater samples.

3.6 WATER AND SEDIMENT SAMPLING RESULTS

3.6.1 Groundwater

3.6.1.1 Groundwater VOC Results

The results of the groundwater sampling are tabulated in Appendix D and are displayed in Figure 3-3. The VOCs commonly detected were TCE, 1,1,1-TCA, 1,2-DCE, 1,1-DCA, 1,1-DCE, total BTXE compounds and vinyl chloride. TCE and 1,1,1-TCA were the most most common VOCs and were typically at the highest concentrations.

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Table 3-3

Natural Soil Borings
Cadmium, Chromium and Lead Concentrations

Depth (Feet)	"Natural" Soil Borings (mg/Kg) SB-2	SB-3	SB-10	SB-13	SB-14
2					
	.851	1.79	2.75	.903	1.82
	11	60.9	14.3	5.44	21.0
	21.6	44.6	44.3	30.2	35.9
4					
6					
		1.19		.761	10.5
		13.7		8.77	7.86
		22		12	162
8					
	1.44				1.88
	7.67				9.71
	10.4				55.7
10					
	1.40	1.46		2.72	
	8.88	15.3		13.	
	7.98	37.8		22.5	
12					

Note: Metals concentrations are listed in the following order:

Cadmium
Chromium
Lead

Ohio Farm Soil Concentration limits are:

Cadmium = 2.9 ppm
Chromium = 23 ppm
Lead = 39 ppm

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Table 3-4

Lagoon Soil Borings
Cadmium, Chromium and Lead Concentration

Depth (Feet)	Lagoon Soil Borings (mg/kg) BSB-1	BSB-2	BSB-3	BSB-4	BSB-5	BSB-6
	19.2	1370	18.9	369	8320	517
	262	405	152	169	400	188
	900	5100	990	1400	19000	2400
2						
	9.13	6.1	1.24	<.371	7000	3.52
	103	11.8	384	4.52	233	843
	72	42	36	22	23000	29
4						
	6.73	136	1.21	51.8	282	13.4
	17	70.4	527	54.5	923	14.1
	38	670	43	570	1100	71
6						
	215	<.381	3790	1560	725	5400
	295	8.92	264	354	482	743
	860	20	13000	93	6100	18000
8						
	1611	84.6	<.369	13.4	.46	53.4
	61.5	8.72	6.55	16.0	8.43	12.6
	91	320	36	93	22	180
10						
	.789	11.1	5.23		.941	8.43
	4.74	7.15	11.6		8.7	6.1
	42	58	39		22	52
12						
		2.7	8.06	<.375	3.8	19.5
		7.6	15.2	10.2	24	12.3
		33	56	39	40	79
14		<.396	2.27	8.52	14.3	5.23
		6.81	4.44	11.4	20.9	8.57
		36	16	36	70	42
16						

Note: Metals concentrations are listed in the following order:
Cadmium
Chromium
Lead

Ohio Farm Soil Concentration limits are:
Cadmium = 2.9 ppm
Chromium = 23 ppm
Lead = 39 ppm

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Table 3-5

Fill Soil Borings Cd, Cr, Pb Concentrations (mg/Kg)

Depth (Feet)	"Fill" Soil Borings SB-1	SB-4	SB-5	SB-6	SB-7	SB-8	SB-9
2	1.25		1.21	1.84	1.25	.886	8.34
	61		39.6	15	66.2	116	47.8
4	78.4		24.5	152	927	261	189
		1.60			2.15		
		59.4			2.15		
		73.3			118		
6	4.81			.986		1.71	.871
	8.08			17.5		32.6	55.6
8	292			54		329	1540
					1.48		
					12.5		
					13.1		
10	.837	.841	2.26	1.22	.652	3.06	
	15.4	12.8	10.4	16.7	12.6	41.8	
~~12~~ 12	29.8	90.5	116	41.4	30.6	250	
		.927		.866	.976		1.53
		13.1		8.81	42.6		63.6
~~14~~		135		31.7	260		63.6
14				.859	1.17		
				10.8	183		
~~16~~				27.4	221		
16				1.32			
				14.2			
~~18~~				12.8			
18			1.26				
			13.4				
~~20~~			6.24				
20 ~~22~~							
~~24~~				1.41			
24				2.34			
~~26~~				6.20			
26							

Note: Metals concentrations are listed in the following order:
Cadmium
Chromium
Lead

Ohio Farm Soil Concentration limits are:
Cadmium = 2.9 ppm
Chromium = 23 ppm
Lead = 39 ppm

APPENDIX D

ANALYTICAL RESULTS

SUMMARY TABLES

SOIL BORING ANALYTICAL DATA
INORGANIC COMPOUNDS
DECEMBER 1988

ANALYTE	UNITS	SB-001-001	SB-001-002	SB-001-003	SB-002-001	SB-002-002	SB-002-003	SB-003-001	SB-003-002
Aluminum	mg/l	8000	8830	5270	6290	7250	7080	14400	9360
Antimony	mg/l	*	*	*	*	*	*	*	*
Arsenic	mg/l	13.8	9.77	164	24.4	18.0	16.6	10.7	19.4
Barium	mg/l	126	129	78.9	101	60.7	66.9	292	55.2
Beryllium	mg/l	3.19	1.34	1.33	0.632 B	0.999 B	1.0 B	1.10	1.0 B
Cadmium	mg/l	1.25	4.81	*	0.851 B	1.44	1.40	1.79	1.19
Calcium	mg/l	14600	3890	9290	25200	1220	1480	70100	1940
Chromium	mg/l	61.0	8.08	15.4	11.0	7.67	8.88	60.9	13.7
Cobalt	mg/l	9.04 B	6.86 B	6.55 B	6.44 B	9.98 B	10.3 B	6.76 B	8.13 B
Copper	mg/l	48.6	57.9	58.8	24.0	19.7	24.6	141	28.8
Cyanides	mg/l	*	*	*	*	*	1.0	*	*
Iron	mg/l	34300	22900	18700	21500	25200	26700	21600	23000
Lead	mg/l	78.4	292	29.8	21.6	10.4	7.98	446	22
Magnesium	mg/l	3510	1260	2340	5470	2340	2620	15600	2060
Manganese	mg/l	1230	1050	584	1055	369	396	1980	408
Mercury	mg/l	*	*	0.11	*	*	*	*	*
Nickel	mg/l	31.1	19.7	19.5	14.4	24.8	27.4	34.3	16.2
Potassium	mg/l	689 B	739 B	509 B	658 B	1250	1300	1120	820 B
Selenium	mg/l	*	*	*	*	*	*	*	0.93
Silver	mg/l	*	*	*	*	*	*	*	2.38
Sodium	mg/l	172	362 B	278 B	330 B	293 B	314	472 B	271 B
Solids	%	85.9	82.7	88.8	89.6	80.1	80.0	83.4	83.3
Thallium	mg/l	0.88	*	*	*	*	*	0.99	*
Vanadium	mg/l	26.2	18.8	13.2	11.5	19.8	20.1	12.2	22.6
Zinc	mg/l	213	1450	149	59.1	79.1	88.0	168	95.1

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SOIL BORING ANALYTICAL DATA
INORGANIC COMPOUNDS
DECEMBER 1988

ANALYTE	UNITS	SB-003-003	SB-004-001	SB-004-002	SB-004-003	SB-005-001	SB-005-001 DUP	SB-005-002	SB-005-003
Aluminum	mg/l	4770	7240	6900	7560	14600	12300	4430	3250
Antimony	mg/l	*	*	*	*	*	*	*	*
Arsenic	mg/l	15.2	26.4	64.2	36.7	20.8	24.2	55.1	15.3
Barium	mg/l	50.5	83.4	82.7	95.9	95.9	97.8	70.7	15.8 B
Beryllium	mg/l	0.841 B	0.916 B	0.887 B	0.978 B	0.995 B	0.968 B	0.638 B	0.609 B
Cadmium	mg/l	1.46	1.60	*	*	1.21	1.66	2.26	1.26
Calcium	mg/l	1410	3460	1210	1460	1640	1160	680 B	9390
Chromium	mg/l	15.3	59.4	12.8	13.1	39.6	69.9	10.4	13.4
Cobalt	mg/l	5.79 B	11.5 B	16.5 B	11.3 B	10.5 B	8.18 B	7.08 B	7.16 B
Copper	mg/l	23.9	57.8	33.6	37.0	764	1920	271	22.0
Cyanides	mg/l	*	*	*	*	*	*	*	*
Iron	mg/l	27200	36200	50900	43200	26200	31300	27100	19000
Lead	mg/l	37.8	73.3	90.5	135	24.5	47.8	116	6.24
Magnesium	mg/l	980 B	2230	1480	2100	2310	2090	1140	3730
Manganese	mg/l	332	1010	862	1020	474	303	480	346
Mercury	mg/l	*	*	0.19	0.18	*	*	*	*
Nickel	mg/l	16.3	42.3	36.2	28.0	42.6	76.6	33.0	17.1
Potassium	mg/l	560 B	681 B	652 B	729 B	1160 B	1020 B	714 B	822 B
Selenium	mg/l	*	0.90	0.87	*	*	*	*	*
Silver	mg/l	*	2.17	*	*	*	*	*	*
Sodium	mg/l	44.0 B	55.4	78.6 B	58.9 B	89.9 B	78.0 B	61.0 B	88.6 B
Solids	%	83.4	86.8	87.8	78.8	81.5	84.1	88.4	90.1
Thallium	mg/l	*	*	*	*	*	*	*	*
Vanadium	mg/l	18.9	18.4	21.1	20.7	28.5	24.8	15.3	10.0 B
Zinc	mg/l	89.6	123	121	117	94.5	182	93.3	63.6

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SOIL BORING ANALYTICAL DATA
INORGANIC COMPOUNDS
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ANALYTE	UNITS	SB-006-001	SB-006-002	SB-006-003	SB-006-004	SB-006-005	SB-006-006	SB-006-007	SB-007-001
Aluminum	mg/l	6730	12100	14900	10200	6710	5760	2320	8190
Antimony	mg/l	*	*	*	*	*	*	*	*
Arsenic	mg/l	35.0	19.7	15.6	17.9	72.8	26.1	4.97	21.2
Barium	mg/l	119	93.0	178	65.9	100	38.3 B	19.7 B	134
Beryllium	mg/l	0.942 B	1.04 B	1.30	0.913 B	0.792 B	0.558 B	*	0.930 B
Cadmium	mg/l	1.84	0.986 B	1.22 B	*	*	1.32	1.41	1.25
Calcium	mg/l	3750	2230	3410	2240	8850	1290	442 B	7550
Chromium	mg/l	15.0	17.5	16.7	8.81	10.8	14.2	2.34	66.2
Cobalt	mg/l	12.8	20.1	12.4	9.50 B	7.81 B	7.49 B	*	11.9
Copper	mg/l	63.7	29.8	157	31.5	10.3	21.1	6.17	5250
Cyanides	mg/l	*	*	*	*	*	*	*	*
Iron	mg/l	23800	28100	36700	27500	43700	21800	7100	31800
Lead	mg/l	152	54	41.4	31.7	27.4	12.8	6.20	927
Magnesium	mg/l	1510	2660	2690	2120	2050	1760	534 B	1370
Manganese	mg/l	1340	634	1150	384	717	284	95.0	1200
Mercury	mg/l	*	*	*	*	*	*	*	0.14
Nickel	mg/l	23.3	25.8	43.6	21.2	20.9	17.9	6.18 B	103
Potassium	mg/l	959 B	1020 B	1140	835 B	936	691	383 B	826
Selenium	mg/l	*	*	*	*	*	*	*	*
Silver	mg/l	*	*	*	*	*	*	*	*
Sodium	mg/l	71.5 B	72.4 B	70.2 B	65.0 B	109 B	61.5 B	51.8 B	93.2 B
Solids	%	86.6	78.7	79.6	90.5	88.1	92.1	91.4	86.3
Thallium	mg/l	*	*	*	*	*	*	*	*
Vanadium	mg/l	16.8	29.3	31.6	23.2	18.6	13.2	5.29	17.4
Zinc	mg/l	81.8	86.6	125	98.3	74.1	64.6	23.3	239

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SOIL BORING ANALYTICAL DATA
INORGANIC COMPOUNDS
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ANALYTE	UNITS	SB-007-002	SB-007-003	SB-007-004	SB-007-005	SB-007-006	SB-008-001	SB-008-002	SB-008-003
Aluminum	mg/l	8020	6790	9320	11700	9220	6520	7710	8040
Antimony	mg/l	*	*	*	*	*	*	*	*
Arsenic	mg/l	18.6	8.18	13.7	16.8	50.0	25.0	21.0	6.93
Barium	mg/l	96.7	78.8	86.6	97.4	168	88.7	92.1	122
Beryllium	mg/l	0.953 B	0.698 B	0.967 B	0.949 B	0.956 B	0.934 B	0.996 B	1.60 B
Cadmium	mg/l	2.15	1.48	0.652	0.976 B	1.17 B	*	1.71	3.06
Calcium	mg/l	1160	487 B	732 B	2530	1960	2020	1680	2120
Chromium	mg/l	213	12.5	12.6	42.3	183	116	32.6	41.8
Cobalt	mg/l	9.40 B	5.28 B	8.67 B	11.8 B	10.9 B	9.66 B	9.57 B	*
Copper	mg/l	506	37.8	22.0	1260	1700	656	1380	119
Cyanides	mg/l	*	*	*	*	*	*	*	*
Iron	mg/l	31500	10800	41200	38200	38800	34000	23000	121000
Lead	mg/l	118	13.1	30.6	260	221	261	329	250
Magnesium	mg/l	1540	1160 B	2030	2060	1650	1240	1460	845 B
Manganese	mg/l	793	130	563	1070	1230	557	431	416
Mercury	mg/l	0.15	*	*	*	0.15	*	0.14	0.28
Nickel	mg/l	86.1	14.3	22.1	90.8	109	92.3	24.5	30.9
Potassium	mg/l	815	568 B	725 B	970 B	815 B	749 B	819 B	809 B
Selenium	mg/l	*	*	*	*	*	*	*	*
Silver	mg/l	*	*	*	*	2.27	*	*	*
Sodium	mg/l	77.0 B	69.8 B	60.2 B	82.7 B	86.4	110	81.5 B	195 B
Solids	%	83.6	81.4	80.6	81.2	84.0	83.5	79.7	52.1
Thallium	mg/l	*	*	*	*	*	*	*	*
Vanadium	mg/l	21.2	13.2	25.2	30.0	23.9	17.8	19.4	33.0
Zinc	mg/l	95.3	56.1	64.6	186	111	423	819	391

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SOIL BORING ANALYTICAL DATA
INORGANIC COMPOUNDS
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ANALYTE	UNITS	SB-008-003 DUP	SB-09-001	SB-09-002	SB-09-003	SB-10-001	SB-10-002	SB-10-003	SB-11-001
Aluminum	mg/l	4600	11600	4840	5590	3340	2990	5480	8610
Antimony	mg/l	*	*	*	*	*	*	*	*
Arsenic	mg/l	3.92	18.2	33.3	28.4	3.75	2.75	8.14	12.5
Barium	mg/l	101	163	116	131	38.1 B	32.4	28.3	130
Beryllium	mg/l	0.996 B	0.996 B	0.918	0.992 B	0.895 B	0.825	0.838	0.895
Cadmium	mg/l	1.39	8.34	*	1.53	2.75	1.84	*	11.0
Calcium	mg/l	2300	75600	9630	2500	1080	826	1760	8120
Chromium	mg/l	22.0	47.8	55.6	5.92	14.3	12.1	19.9	29.4
Cobalt	mg/l	6.65 B	7.22	6.63	6.31 B	11.0	8.80	25.3	21.6
Copper	mg/l	76.6	125	52.3	30.7	43.6	24.9	18.8	61.0
Cyanides	mg/l	*	*	*	*	*	*	*	*
Iron	mg/l	44400	71900	46200	36200	13000	6430	19500	33700
Lead	mg/l	85.0	199	1540	63.6	44.3	15.7	9.46	154
Magnesium	mg/l	580 B	8170	2730	1210	912 B	607	2220	3390
Manganese	mg/l	353	1680	1060	618	616	114	478	467
Mercury	mg/l	*	0.28	0.22	*	*	*	*	0.25
Nickel	mg/l	29.8	29.4	29.9	17.6	26.8	21.4	56.4	67.8
Potassium	mg/l	480 B	833 B	577	593	1100	1280	1190	1810
Selenium	mg/l	*	*	0.90	*	*	*	*	*
Silver	mg/l	*	*	*	*	*	*	*	*
Sodium	mg/l	130 B	263 B	94.1	66.4	77.3	87.6	97.1	103
Solids	%	81.8	82.0	86.4	82.8	91.5	93.7	96.0	87.8
Thallium	mg/l	*	*	*	*	*	*	*	*
Vanadium	mg/l	16.0	30.6	11.4	18.1	9.17	8.13	11.4	17.4
Zinc	mg/l	250	178	162	87.6	84.6	42.3	133	194

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SOIL BORING ANALYTICAL DATA
INORGANIC COMPOUNDS
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ANALYTE	UNITS	SB-11-002	SB-11-003	SB-12-001	SB-12-002	SB-12-003	SB-13-001	SB-13-002	SB-13-003
Aluminum	mg/l	12500	11100	4660	7240	3170	2610	3390	6110
Antimony	mg/l	*	*	*	*	*	*	*	*
Arsenic	mg/l	18.5	11.9	13.4	11.6	7.30	8.96	2.10	5.25
Barium	mg/l	131	66.5	153	69.7	32.4	39.1	28.6 B	36.7 B
Beryllium	mg/l	1.11	0.879	0.856	0.686	*	*	*	0.773 B
Cadmium	mg/l	*	*	49.4	9.66	2.94	*	*	2.72
Calcium	mg/l	2030	1980	10000	74800	1500	29700	692	2050
Chromium	mg/l	23.8	20.8	58.4	17.7	10.7	5.44	8.77	13.0
Cobalt	mg/l	18.4	17.6	8.86	10.5	6.79	6.50	4.73 B	12.9
Copper	mg/l	26.4	22.5	246	56.4	20.4	17.7	14.7	17.5
Cyanides	mg/l	*	*	*	*	*	*	*	*
Iron	mg/l	23000	17800	32300	21700	28200	24500	13400	39500
Lead	mg/l	27.8	25	288	102	25.8	30.2	12	22.5
Magnesium	mg/l	4220	3510	3530	4230	1650	4720	729	3170
Manganese	mg/l	692	495	341	428	810	628	95.4	1520
Mercury	mg/l	*	*	0.17	*	*	0.12	*	*
Nickel	mg/l	57.1	52.6	43.9	30.2	23.6	14.1	13.0	35.4
otassium	mg/l	2340	2010	707	1420	983	515 B	1130	1620
Selenium	mg/l	*	*	*	*	*	*	*	*
Silver	mg/l	*	*	*	*	*	*	*	*
Sodium	mg/l	161	160	172	154	68.1	75.4 B	60.2 B	102 B
Solids	%	92.8	94.6	79.6	86.1	93.4	87.0	91.8	88.9
Thallium	mg/l	*	*	*	*	*	*	*	*
Vanadium	mg/l	19.1	15.6	17.8	12.0	14.5	11.0 B	9.10 B	19.1
Zinc	mg/l	120	101	258	110	193	86.8	32.7	71.1

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ANALYTE	UNITS	SB-14-001	SB-14-002	SB-14-003
Aluminum	mg/l	15700	5870	6680
Antimony	mg/l	*	*	*
Arsenic	mg/l	15.6	95.4	49.2
Barium	mg/l	150	91.5	80.5
Beryllium	mg/l	1.12 B	0.707 B	*
Cadmium	mg/l	1.82	10.5	1.88
Calcium	mg/l	15500	3040	828
Chromium	mg/l	21.0	7.86	9.71
Cobalt	mg/l	11.5 B	19.2	12.2
Copper	mg/l	27.6	29.5	17.2
Cyanides	mg/l	*	*	*
Iron	mg/l	29200	94900	36800
Lead	mg/l	35.9	162	55.7
Magnesium	mg/l	5880	2020	1440
Manganese	mg/l	1170	1460	586
Mercury	mg/l	*	0.14	*
Nickel	mg/l	23.8	64.6	23.0
Potassium	mg/l	1080 B	728 B	655
Selenium	mg/l	*	*	*
Silver	mg/l	*	*	*
Sodium	mg/l	148 B	83.3 B	59.5
Solids	%	81.2	89.4	87.8
Thallium	mg/l	*	*	*
Vanadium	mg/l	31.4	29.1	24.1
Zinc	mg/l	89.2	113	83.4

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SITE HEALTH AND SAFETY PLAN (HASP) FORM

Prepared By Greg Flasinski Date 4/3/91 W.O. # 2994-02-03

I. General Information

A. Project Identification

1. Division E530 2. Department/Office ECON

4. Site Name EKCO HOUSEWARES 5. Client AMERICAN HOME PRODUCT

6. Work Location Address 359 State St. Ext. Massillon Ohio 44648
(Street Address) (City) (State) (Zip)

B. Site History

1. Describe briefly 1945 began making cookware, 1967 used porcelain & teflon coating, currently plant makes bakeware coated from purchased tin-p iron material

C. Scope of Work

1. Describe briefly Monitoring well installation, Soil borings + sampling, pump, slug + packer tests, Surface + GW sampling + elevation survey.

( ) Site Visit only, Site HASP not necessary, list personnel here & sign-off below:

_____, _____, _____, _____

D. Hazard Assessment and Regulatory Status

1. Indicate Yes (Y)/No (N) to types of hazards anticipated. (Y) Physio-chemical; Toxic Chemical - Levels (Y) >TLV-TWA, (N) >TLV-STEL, (N) >IDLH; (N) Bio-Hazards; (N) Radiation; (Y) Physical; (N) Construction type; (Y) Industrial type; (N) Nuclear Industry type

2. Site Regulatory Status: CERCLA/SARA - (N) U.S. EPA, (Y) State, (N) NPL Site; RCRA - (N) U.S. EPA, (N) State; OSHA - (N) 1910, (N) 1926, (N) State; NRC - (N) 10 CFR 20; Other Fed. Agency - (N) DOE, (N) USATHAMA, (N) Air Force;

Based on the Hazard Assessment and Regulatory Status, determine the Standard HASP(s) applicable to this project. Indicate below which Standard Hasp will be used and append the appropriate pages of this Form along with the Standard Plan.

3. Standard Plan to be used: ( ) Stack Test ( ) Air Emissions ( ) Asbestos ( ) Industrial Hygiene ( ) Life Systems ( ) Hazardous Mat. ( ) Construction ( ) NRC/DOE ( ) USATHAMA ( ) Air Force

D. Review and Approval Documentation

1. Reviewed By: a. P.M. H. G. Byer Date 4/12/91
b. P.D. _____ Date _____
c. DSO/RSO _____ Date _____
d. SHSC [signature] Date 4-3-91

2. Approved BY: [signature] for GMC Date 4/3/91
( ) a. Corporate Health and Safety Director (CHSD)
(✓) b. DSO/RSO (Only with specific delegation by CHSD)

Project Start Date 6/87 ;End Date Ongoing. This Site HASP must be Reissued/Reapproved for any activities conducted after: Date _____
Amendment Date(s) 1. 5/31/92 2. _____ 3. _____ 4. _____ 5. _____

1.0 Key Personnel (Continued)

WESTON Representatives

Organization/Branch	Name/Title	Address	Telephone
Econ / E530	Tom Cornuet	W.C. 5-2	430-7360
	Greg Flasinski	W.C 5-2	430-7293
	Dave Cairns	W.C 5-2	430-7255
	Paul Landry	W.C. 5-2	430-7273

Roles and Responsibilities: All onsite field work, groundwater, soil & surface water sampling, soil boring, drilling, soil gas etc.

(WESTON Subcontractors)

Organization/Branch	Name/Title	Address	Telephone

Roles and Responsibilities: _____

2.2 Site Specific Health and Safety Personnel

The SHSC for activities to be conducted at this Site is Tom Cornuet

The Site Health and Safety Coordinator (SHSC) has total responsibility for ensuring that the provisions of this Site HASP are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection programs. Therefore, the personnel assigned as SHSC's are experienced and meet the additional training requirements specified by OSHA in 29 CFR 1910.120

Qualifications: _____

Designated alternatives include: _____ and _____.

II. Health and Safety Evaluation

A. Hazard Assessment

1. Background Review: ( ) Complete ( ) Partial (Y) If partial, why? RI/FS project

2. Activities Covered Under this Plan

No.	Task/Subtask	Description	Schedule
1	Soil boring		4-91
2	Well installation		
3	Stream Sampling		
4	GW Sampling		
5	Soil Sampling		

3. Types of Hazards: (Place a Y/N in each ( ) to indicate presence/absence of hazard)

a. PhysioChemical (N) Flammable (N) Explosive (N) Corrosive (N) Reactive
(N) O_2 Rich (N) O_2 Deficient [1]*

Chemically Toxic (Y) Inhal. (Y) Ingest. (Y) Cont. (Y) Absorb.
(Y) Carcin. (N) Mutagen (N) Terat.
(N) OSHA 1910.1000 Substance
(N) OSHA Specific Hazard. Sub. Standard, Describe _____

b. Biological (N) Etiol. Agent (~~N~~) Y Other - Plant, insect, animal, [2]*

c. Radiation Ionizing - (N) Internal Exposure (N) External exposure [3]*
Non-ionizing - (N) UV; (N) IR; (N) RF; (N) MicroW; (N) LASER

d. Physical Hazards (Y) [4]* e. Construction Activities Y(~~N~~) [5]* well installation

* The number in the [ ] refers to one of the following hazard evaluation forms. Complete hazard evaluation forms for each appropriate Hazard Class.

B. Source/Location of Contaminants and Hazardous Substances

1. Directly Related to Tasks

(Y) Air Well Installation, boring, GW Sampling (Y) Soil Sampling & drilling;
(N) Other Surface _____; (Y) S. Water Sampling;
(Y) G. Water Well Installation, GW Sampling ( ) Other _____.

2. Indirectly Related to Work - Nearby Process(s) which could affect team members:

(✓) Client Facility; ( ) Nearby Non-client Facility. Describe _____

( ) Client briefing arranged.

[1] Chemical Hazards

[a] Identify and attach Material Safety Data Sheets for all reagent type chemicals, solutions or other materials identified as or which in normal use could produce hazardous substances used in performing tasks related to tasks related to this project. ( ) N/A

[b] Chemical Contaminants of Concern ( ) N/A If present, provide following data.

Hazardous Substance/ Tasks	Physical Properties and Characteristics*	Exposure Limits PEL/TLV**	Route(s) of Exposure***/ Symptoms	Monitoring Instruments/IP+ % Response IP	Rel Res
GW/SoiLS methy chloroform	(* TCA) State liq/Sol pH — FP [illegible] LEL 7.5 UEL 12.5 Auto.Ig — BP 165°F MP -23°F Incompatible with - strong caustics, strong oxidizers, chemically active metals Sp.Gr 1.34 Vap.D >1.0 Vap.P 100 mmHg H20 Sol. — Oth. colorless liquid, with a mild chloroform like odor	TLV = 350 IDLH = ? 1000	INH, INJ CONTACT Drowsiness, unconsciousness, dizziness, eye irratant, dermatiti headache	~~105~~ % HNU ~~102~~ ~~[illegible]~~ 11.7 e 95 %	
GW/Soils	(* TCE) State liq/Sol pH — FP 90°F LEL 8% UEL 10.5 Auto.Ig — BP 189 MP -99 Incompatible with - caustics, alkalis, chemically active metals Sp.Gr 1.46 Vap.D >1.0 Vap.P 58 H20 Sol. -1% Oth. colorless liquid with ch	TLV = 50 I.D.LH - 1.000 Ca	INH INJ Contact headache, vertigo, nausea, vomiting, eye irritant dermatitis	IP 9.5 HNU 10.[illegible] OVA HN 10.2 8	Rel Res 70

* E = Explosive, F = Flammable, C = Corrosive, R = Reactive, W = Water reactive, O = Oxic
Ra = Radioactive. State = Normal physical state at site/proj. temp.

** Use lowest of two, if no TLV/PEL, use Toxicity data in following order: Lowest Toxic Co humans (LTC-HMN), Lowest Lethal Conc. in humans (LLC-HMN), Lowest Toxic Dose in humans (I Lowest Lethal Dose in humans (LLD-HMN), LC_{50} or LD_{50} in humans, the Lowest Toxic Concentr Lowest Toxic Dose in animals, the lowest LC_{50} or LD_{50} in animals.

*** I = Inhalation, G = Ingestion, S = Skin Absorption, C= Contact, D - Direct Penetrati

\+ IP = Ionization Potential

[1] Chemical Hazards

[a] Identify and attach Material Safety Data Sheets for all reagent type chemicals, solutions or other materials identified as or which in normal use could produce hazardous substances used in performing tasks related to tasks related to this project. ( ) N/A

[b] Chemical Contaminants of Concern ( ) N/A If present, provide following data.

Hazardous Substance/ Tasks	Physical Properties and Characteristics*	Exposure Limits PEL/TLV**	Route(s) of Exposure***/ Symptoms	Monitoring Instruments/IP+ % Response
1 Dichlorethane GW/Soils	(*) State Sol/liq pH ___ FP 22°F LEL 5.6 UEL - Auto.Ig - BP 135 MP 143 Incompatible with - oxidizers, caustics Sp.Gr 1.18 Vap.D ~~0.6%~~ >1 Vap.P 230mm H20 Sol. .6% Oth. colorless oily liquid with chloroform like odor	TLV = 100 IDLH = 4000	INH INJ CON Drowsiness, unconciousness, skin irr, Kidney	? / 80 HNU 10.2 OVA 11.7 HNU 105%
1 Dichlorethene GW/Soils	(*) State Sol/liq pH ___ FP 122 LEL 7.3 UEL 16 Auto.Ig 1058 BP 31.6 MP ___ Incompatible with - caustics, oxidizers Sp.Gr 1.21 Vap.D >1.0 Vap.P ___ H20 Sol. ___ Oth. ___, ___	TLV = ~~200~~ 10 ppm IDLH = 4000 ppm	INH INJ CON Irrit eyes, resp system, injestion, depression	9.65/50 HNU 10.2 OVA

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(1) Chemical Hazards

(a) Identify and attach Material Safety Data Sheets for all reagent type chemicals, solutions or other materials identified as or which in normal use could produce hazardous substances used in performing tasks related to tasks related to this project. ( ) N/A

(b) Chemical Contaminants of Concern ( ) N/A If present, provide following data.

Hazardous Substance/ Tasks	Physical Properties and Characteristics*	Exposure Limits PEL/TLV**	Route(s) of Exposure***/ Symptoms	Monitoring Instruments/IP+ & Response
1,2 Dichlorobenzene / Soils	(*) State liq/sol pH ___ FP 30° LEL 5.6 UEL 12.8 Auto.Ig ___ BP 120 MP ~-75°F Incompatible with - oxidizers, alkalis Sp.Gr 1.27 Vap.D >1.0 Vap.P 400 H2O Sol. .4 Oth. colorless liquid with slightly acrid chlorofrom like odor	TLV 200 I.D.L.H. 4000	INJ INH CON irritant-eyes Dizziness, nausea	8.96/50 ~~HNU 10.2~~ OVA 50-OVA
Benzene	(*) State liq/sol pH ___ FP 55 LEL 1.0 UEL 6.7 Auto.Ig ___ BP 277 MP -139 Incompatible with - strong oxidizers Sp.Gr 0.87 Vap.D >1.0 Vap.P 10mm H2O Sol. .01 Oth. colorless liquid with aromatic odor	TLV = 10c IDLH = 2000	INJ INH CON Coma, resp. mucous membrane irrit., eye irrit., skin discolo.	8.76/100 HNU 10.2 OVA

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[1] Chemical Hazards

[a] Identify and attach Material Safety Data Sheets for all reagent type chemicals, solutions or other materials identified as or which in normal use could produce hazardous substances used in performing tasks related to tasks related to this project. ( ) N/A

[b] Chemical Contaminants of Concern ( ) N/A If present, provide following data.

Hazardous Substance/ Tasks	Physical Properties and Characteristics*	Exposure Limits PEL/TLV**	Route(s) of Exposure***/ Symptoms	Monitoring Instruments/IP+ % Response
Toulene w/Soils	(*) State Sol/liq pH ___ FP 40 LEL 1.2 UEL ~~9.5~~ 7.1 Auto.Ig ___ BP 232 MP -139 Incompatible with - strong oxidizers Sp.Gr .87 Vap.D 71 Vap.P 20 mm H20 Sol. .05% Oth. Colorless liquid	TLV = 100 ppm IDLH = 2000	INH INJ CON weakness, headache, drowsiness, coma	8.86 / 100 HNU 10.2 OVA
Xylenes GW/Soils	(*) State liq/sol pH ___ FP 81 LEL 1.1 UEL 7.0 Auto.Ig ___ BP 281 MP -56 Incompatible with - strong oxidizers Sp.Gr .86 Vap.D >1.0 Vap.P 9 mm H20 Sol. Insoluble Oth. color liquid with an aromatic odor	TLV = 100 ppm IDLH = 10000 ppm	INH INJ CON Dizziness, excitement, staggering gait, irrit. of eyes, nose throat, vomit, abdominal pain	8.56 / 116 HNU 10.2 OVA 10.2 HNU 114

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+ IP = Ionization Potential

[1] Chemical Hazards

[a] Identify and attach Material Safety Data Sheets for all reagent type chemicals, solutions or other materials identified as or which in normal use could produce hazardous substances used in performing tasks related to tasks related to this project. ( ) N/A

[b] Chemical Contaminants of Concern ( ) N/A If present, provide following data.

Hazardous Substance/ Tasks	Physical Properties and Characteristics*	Exposure Limits PEL/TLV**	Route(s) of Exposure***/ Symptoms	Monitoring Instruments/IP+ % Response
Vinyl Chloride GW/Soils	(*) State lig/Sol pH__ FP — LEL 3.6 UEL 33 Auto.Ig____ BP 70F MP -256 Incompatible with - oxidizers Sp.Gr_____ Vap.D_____ Vap.P > 760 H20 Sol._____ Oth._____,_____	TLV - 1ppm IDLH - 5ppm 15min Ca weak abdom pain, El Bleed... [CARC]	[illegible] [illegible] [illegible]	9.995/40 H.UV 10.2 OVA
	(*) State_____ pH__ FP____ LEL____ UEL____ Auto.Ig____ BP ____ MP____ Incompatible with - Sp.Gr_____ Vap.D_____ Vap.P_____ H20 Sol._____ Oth._____,_____			

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Ra = Radioactive. State = Normal physical state at site/proj. temp.

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*** I = Inhalation, G = Ingestion, S = Skin Absorption, C= Contact, D - Direct Penetratio

+ IP = Ionization Potential

[2] Biological Hazards Of Concern

No.	Hazard	(Y/N)	Task No.(s)*	Location/ Source (K,S)**	Route of Exposure (I,G,C,D)+	Team Member(s) Allergic?	Immunization Required?
1.	Poisonous Plants	(Y)			C		No
2.	Insects	~~(Y)~~	all tasks	treat if	possible;	observe	
3.	Snakes, Reptiles	(N)					
4.	Animals	(N)					
5.	Sewage	(N)					
6.	Etiologic Agents	(N) (List)					

afflicted person for allergic reaction

* List all task Nos. which would involve potential exposure to these hazard(s).
** K = Known, S = Suspect. + I = Inhalation, G = Ingestion, C = Contact, D = Direct Penetration (Bite, Inject., Open wound or sore)

[3] Radiation Hazards of Concern

TYPE

1. Ionizing

	Location/ Source	TYPE EMITTER	TASK NO.(S)	EXPOSURE LIMITS	Protection Protocol REFERENCE
RadioNuclide		N/A			

2. Non-ionizing

	Location/ Source	TASK NO.(S)	EXPOSURE LIMITS	Protection Protocol REFERENCE
Ultra violet		N/A		
Infra Red				
Microwave				
Radio-Freq.				
LASER				

[4] Physical Hazards of Concern

		Hazard (Y/N)	TASK No(s).	Protection OP(s) Attached
1.	Noise	(Y)	1-2	FLD 01
2.	Heat - ambient air	(Y)	1-5	~~FLD 02, 05 + 07~~
	- Hot Process - Steam	(Y)	1-2	
	- Hot Process - LT³	(N)		
	- Hot Process - Incin.	(N)		
3.	Cold	(Y)	1-5	FLD 02, 06 + 07
4.	Rain	(Y)	1-5	FLD 02 + 07
5.	Snow	(Y)	~~1-5~~	
6.	Electric Storms	(Y)	1-5	FLD 02
7.	Confined Space Entry	(N)		
8.	"Hot Work"	(N)		
9.	Heavy Manual Lifting/Moving	(Y)	4	FLD 10
10.	Rough Terrain	(Y)	1-5	caution awareness
11.	Housekeeping	(Y)	1-5	"
12.	Structural Integrety	(N)		
13.	Neighborhood	(N)		
14.	Remote Area	(N)		
15.	Compressed Gases	(N)		
16.	Diving	(N)		
17.	Using Boats	(N)		
18.	Working over Water	(N)		
19.	Traffic	(N)		
20.	Explosives	(N)		
21.	Heavy Equipment Operation	(Y)	1-2	FLD 22A, 22B-1
22.	Lifting Equipment Operation. - Cranes,	(N)		
	- Manlifts	(N)		
23.	Working at Elevation	(N)		
24.	Using Ladders	(N)		
25.	Using Scaffolding	(N)		
26.	Excavating/Trenching	(N)		
27.	Materials Handling	(N)		
28.	Haz. Mat. Use/Storage - flam.liq./gases	(N)		
	- oxidizers	(N)		
	- corrosives	(N)		
29.	Fire Prevent/Reponse plan required	(Y)	1-5	FLD 31
30.	Fire Extinguishers required	(Y)	1-5	FLD 32
31.	Demolition	(N)		
32.	Utilities - Underground	(Y)	1-2	FLD 34
	- Overhead	(Y)	1-2	FLD 34
33.	Electrical - General	(Y)	1-2	FLD 35a
	- High Voltage	(N)		
34.	Welding/cutting/burning	(N)		
35.	Hand tools	(Y)	1-5	FLD 37
36.	Power Hand Tools	(Y)	1-2	FLD 37
37.	High Pressure Water	(Y)	1-2	FLD 35
38.	Other _____	( )		
39.	Other _____	( )		
40.	Other _____	( )		

TASK BY TASK RISK ANALYSIS

The preceding Tables identify the hazards known or suspected to be present in accomplishing the tasks involved in this project.

Section II A. 2. of this HASP describes the background of this site/project and identifies the tasks involved.

Below briefly describe each task and the likelihood of exposure to the hazards identified and the protective protocols to be used.

1. Chemical hazards associated with this project are of primary concern. Three potential human carcinogens as well as compounds with low permissible exposure levels ~~[illegible]~~ are potential contaminants. Personnel will continously monitor with direct reading instruments and depending on levels will wear the appropriate PPE.

Physical hazards are those associated with basic field activities. Appropriate Safety OPs are attach addressing these hazards. ~~Special~~ Hazards Unique to drill rigs will be overseen by the SHSC and will incorporate the drill rig SOP.

Biological hazards will ~~pr~~ be protected against by PPE and common sense and awareness

III. Personnel Protection Plan

A. Engineering Controls

1. Describe Engineering Controls used as part of Personnel Protection Plan:

Task(s)

B. Administrative Controls

1. Describe Administrative controls used as part of Personnel Protection Plan:

Task(s)

C. Personnel Protective Equipment *

1. Action Levels for Changing Levels of Protection

(1) Task No.(s) Define Action Levels for up or down grade for each task

All: dif ≥ .5 units above background withdraw/ventilate with

c. Description of Levels

Task(s)	1-5			
	Level D		Level D	
Head	(X) hard hat	( )	( )	( )
Eye & Face	(X) safety glasses	)	( )	( )
Hearing	(X) 1-2	( )	( )	( )
Arms & Legs only	( )	( )	( )	( )
Whole Body	( )	( )	( )	( )
Apron	(X) 4	( )	( )	( )
Hand - gloves	(X) Nitrile	( )	( )	( )
- gloves	(X) Surgical	( )	( )	( )
- gloves	( )	( )	( )	( )
Foot - Boots	(X) Latex	( )	( )	( )
- Boots	( )	( )	( )	( )
- Boots	( )	( )	( )	( )

c. Description of Levels of Protection. (Cont.) Levels C and B

Task(s)	1-5		_____	
	Level C		Level _	
Head	(X) hardhat	( )	( )	( )
Eye & Face	(X)	( )	( )	( )
Hearing	(X) Task 1-2	( )	( )	( )
Arms & Legs only	( )	( )	( )	( )
Whole Body	(X) Saranex	( )	( )	( )
Apron	(X) Apron	( )	( )	( )
Hand - gloves	(X) Nitrile	( )	( )	( )
- gloves	(X) Surgics	( )	( )	( )
- gloves	( )	( )	( )	( )
Foot - Boots	(X) Latex	( )	( )	( )
- Boots	( )	( )	( )	( )
- Boots	( )	( )	( )	( )
APR - Neg. Pres. Half Face	( )	( )	( )	( )
Cart./Canister	( )	( )	( )	( )
Full Face	(X) MSA	( )	( )	( )
Cart./Canister	(X) GMC-H	( )	( )	( )
PAPR	( )	( )	( )	( )
Cart./Canister Type C	( )	( )	( )	( )
SAR - Airline	( )	( )	( )	( )
SCBA	( )	( )	( )	( )
Comb.Airline/SCBA	( )	( )	( )	( )
Cascade Syst.	( )	( )	( )	( )
Compressor	( )	( )	( )	( )
Fall Protection	( )	( )	( )	( )
Floatation	( )	( )	( )	( )
_____	( )	( )	( )	( )

IV. Site or Project Hazard Monitoring Program

A. Direct Reading Air Monitoring Instruments

1. Instrument Selection & Initial Check Record

	No.	Task No.(s)	Instrument checked upon receipt	Initials
CGI-	( )		( )	
O_2 -	( )		( )	
CGI/O_2-	( )		( )	
CGI/O_2/tox-PPM, H_2S, H_2S/CO	( )		( )	
RAD-GM,	( )		( )	
-NaI	( )		( )	
-ZnS	( )		( )	
-OTHER	( )		( )	
PID -HNU 10.2	( )		( )	
-HNU 11.7	(X)	1, 2, ~~3~~/4 for "D" wells	( )	
-HNU 9.5,	( )		( )	
-PHOTOVAC, TMA, OTHER	( )		( )	
FID -FOX-128	(X)	Drilling/Boring	( )	
-FOX 128GC	( )		( )	
-HEATH, AID, OTHER	( )		( )	
RAM, Mini-RAM, Other	( )		( )	
MONITOX-HCN	( )		( )	
H_2S	( )		( )	
COCL,	( )		( )	
SO_2,	( )		( )	
OTHER	( )		( )	
Bio-Aerosol Monitor	( )		( )	
Detector Tubes				
Pump - MSA, Draeger, Sensidyne	( )		( )	
- Tubes(No.)/type	( )		( )	( )
- Tubes(No.)/type	( )		( )	( )

Reporting Format ✓ 1.Field notebook. ✓ 2.Field data sheets. ___ 3.Air monitoring log. ✓ 4.Trip report. ___ 5.Other:

2. Direct Reading Air Monitoring Instruments Calibration Record

Instrument, Mfg., Model, Eqp.ID. No.	Date	Time	Calib, Material	Calib. Method Mfg.'s	Other	Initial Setting& Reading	Final Setting& Reading	Calibs. Initials

Air Monitoring Instrument _____

Air Monitoring Frequency	Tasks
____ 1. Periodically _____	_____
____ 2. Periodically _____	_____
____ 3. Continuous	
____ 4. Other: _____	

Monitoring Locations	Tasks
____ 1. Upwind/downwind of site activities.	_____
____ 2. Near residents, etc.	_____
____ 3. Key site activity locations:	
____ decon area	_____
____ staging area	_____
____ excavation area	_____
____ field lab area	_____
____ storage tanks	_____
____ lagoons	_____
____ drums	_____
____ 4. Fixed stations	_____
____ 5. Other: _____	

Air Monitoring Instrument _____

Air Monitoring Frequency	Tasks
____ 1. Periodically _____	_____
____ 2. Periodically _____	_____
____ 3. Continuous	
____ 4. Other: _____	

Monitoring Locations	Tasks
____ 1. Upwind/downwind of site activities.	_____
____ 2. Near residents, etc.	_____
____ 3. Key site activity locations:	
____ decon area	_____
____ staging area	_____
____ excavation area	_____
____ field lab area	_____
____ storage tanks	_____
____ lagoons	_____
____ Drums	_____
____ 4. Fixed stations	_____
____ 5. Other: _____	

D. Action Levels

N 1. Explosive atmosphere: Tasks _____

Action Level	Action
<10% LEL	Continue investigation
10%-25% LEL	Continue on-site monitoring with extreme caution as higher levels are encountered.
>25% LEL	Explosion hazard. **Withdraw from area immediately.**

N 2. Oxygen: Tasks _____

Action Level	Action
<19.5%	Monitor wearing SCBA. NOTE: Combustible gas readings may not be valid in atmospheres with <19.5% oxygen.
19.5%-25%	Continue investigation with caution, as Oxygen levels > 21% require extreme caution. Other than normal level may be due to presence of other substances.
>25%	Fire hazard potential. Stop work and Consult a fire safety specialist.

N 3. Radiation: Tasks _____

Action Level	Action
3 x Bkg - <2 mR/hr	Radiation above background levels (normally 0.01-0.02 mR/hr)9 signifies possible source(s) radiation present. Continue investigation with caution. Perform thorough monitoring. **Consult with a health physicist.**
> 2 mrem/hr	Potential radiation hazard. Evacuate site. Continue investigation only upon the advice of a health physicist.

N 4. Organic gases and vapors: See page 9

N 5. Inorganic gases and vapors:

Action Level	Action
Depends on chemical	Consult standard reference manuals for air concentration/ toxicity data. Action level depends on PEL/REL/TLV.

These Action Levels, if not defined by regulation, is some percent (usually 50%) of the applicable PEL/REL/TLV. That number must also be adjusted to account for instrument response factors.

Ambient Air Sampling - Decision Logic and action levels to institute Air Sampling

N No air sampling is required on this site.

N An air sampling plan is incorporated in this HASP.

Check situations which will require or action levels which will apply to deciding to institute or increase scope of planned air sampling.

Meteorological conditions:

___ a. Dry weather for ____ days. ___ b. ambient temperature above ___ F°.

___ c. Wind increasing potential of more contaminant dispersion in or migration out of controlled area.

Activities which will require instituting or increasing scope of air sampling:

___ a. major spills

___ b. new site activity resulting in potential presence of new chemical hazards.

___ c. site activity increases airborne contaminants possibilities.

___ d. Air sampling documentation required for:
___ Downgrading from stipulated level of protection.
___ Documenting no migration of contaminants off site through air

Applicable Action Levels for instituting Air Sampling: (Check as Appropriate)

____ a. Visible vapor/gas clouds or vapors levels, or ____ b. Visible dust or particulate levels measured with Direct Reading Instrument, two - three times background or above action level, sustained over 10-15 minute period.

1) Sampling Matrix/
air interface - Monitor matrix/air interface and breathing zone periodically with DRI, if Vapor levels > 2-3 times background, monitor continuously, follow No. 4.

2) Container opening - Monitor opening and breathing zone periodically with DRI, if Vapor levels > 2-3 times background, monitor opening and breathing zone continuously, follow No. 4.

3) Excavation/Drilling/
Intrusive work - Monitor at ground level and breathing zone periodically with DRI, if Vapor levels > 2-3 times background, monitor opening and breathing zone continuously, follow No. 4.

4) Breathing zone - Ensure level of protection specified in HASP is being used. Consult HASP or Corporate Health and Safety relative to instituting personnel, area or perimeter Sampling.

Other: _____

B. Sample Location

____ 1. Ambient background - Locations: Substances Sampled for

a. _____ _____
b. _____ _____

____ 2. Personal samples, onsite - Locations

a. _____ _____
b. _____ _____
c. _____ _____
d. _____ _____
e. _____ _____
f. _____ _____

____ 3. Personal samples, offsite - Locations

a. _____ _____
b. _____ _____
c. _____ _____
d. _____ _____

____ 4. Fixed onsite samples - Locations:

a. _____ _____
b. _____ _____
c. _____ _____
d. _____ _____
e. _____ _____
f. _____ _____

____ 5. Fixed offsite samples - Locations:

a. _____ _____
b. _____ _____
c. _____ _____
d. _____ _____
e. _____ _____

____ 6. Mobile offsite samples - Locations:

a. _____ _____
b. _____ _____
c. _____ _____

____ 7. Mobile onsite samples - Locations:

a. _____ _____
b. _____ _____
c. _____ _____

____ 8. Background sample stations - Locations

a. _____ _____
b. _____ _____
c. _____ _____

B. Air Sampling

1. Personal Sampling Pumps - Gilian;SKC,MSA No. ( ) _____

Sampling Media - Sorbent Tubes

Task(s)	Location	Duration	Frequency	Type	Anal.	Meth

Sampling Media - Filter

Task(s)	Location	Duration	Frequency	Type	Anal.	Meth

Sampling Media - Impinger

Task(s)	Location	Duration	Frequency	Type	Anal.	Meth

Sampling Media - Air Bag

Task(s)	Location	Duration	Frequency	Type	Anal.	Meth

B. Air Sampling

2. Hi-Volume Pumps

Sampling Media - Filter

Task(s)	Location	Duration	Frequency	Type	Anal. Meth

3. PORTABLE GAS CHROMATOGRAPH Task(S) _____ Type _____

Portable GC Analytical Plan: _____

4. Passive Dosimeters

		TASK(S)	TYPE	LOCATION	FREQUENCY	DURATION
Organic Vapor	( )					
Mercury Vapor	( )					
Paper Color Change	( )					
TLD	( )					
Film Badge	( )					
Liquid Media	( )					

5. WIPE SAMPLING

1. Wipe Sampling Plan _____

C. Physical Hazard and Miscellanous Monitors and Detectors

		TASK(S)	CALIBRATION RQD?	METHOD	Location	Frequency
SOUND LEVEL METER	( )		( )			
NOISE DOSIMETER(s)	( )		( )			
OCTAVE BAND ANALYER	( )		( )			
LIGHT METER	( )		( )			
ELECTRIC CIRC. DETECTOR	( )		( )			
Thermometer	( )		( )			
Wind Speed Indic.	( )		( )			
Barometer	( )		( )			
Psychrometer	( )		( )			
Infra Red Thermom.	( )		( )			
Micro Wave Detector	( )		( )			
pH METER	(X)	3-4	( )			

D. Indicator Kits

		TASK(S)	LOCATION	FREQUENCY
pH PAPER	( )			
PEROXIDE PAPER	( )			
CHLOR-N-OIL KIT	( )			
HAZARD CATAGORIZING KIT	( )			
ASBESTOS TEST KIT	( )			

G. Work Location Instrument Readings

Location Onsite wells/except production wells + Piezometers

% LEL ____,____,____,____; % O_2 ____,____,____,____; PID ppm N/D ____,____

FID ppm N/D ____ ____ ____ Aerosol Monitor mg/M^3 ____,____,____

GM: Shield Probe/Thin Window - mR/hr____,____,____;cpm____,____,____

NaI____,____,____,____uR/hr; ZnS____,____,____,____cpm

(Monitox)ppm: ( )____,____,____,____; ( )____,____,____,____,____;

( )____,____,____,____,____; ( )____,____,____,____,____;

(Detector Tube)(s): ( )____,____,____,____; ( )____,____,____,____;

( )____,____,____,____; ( )____,____,____,____; ( )____,____,____

Sound Levels ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA;

Illumination ____ pH ____ Other____ ____ Other____ ____ Other ____

Location W-1/W-10/D-4-30/D-1-84

% LEL ____,____,____,____; % O_2 ____,____,____,____; PID ppm ____,____,____

* 10-50 ppm
** 0-3
\+ 0 ppm

FID ppm ____ ____ ____ Aerosol Monitor mg/M^3 ____,____,____

GM: Shield Probe/Thin Window - mR/hr____,____,____;cpm____,____,____

NaI____,____,____,____uR/hr; ZnS____,____,____,____cpm

(Monitox)ppm: ( )____,____,____,____; ( )____,____,____,____,____;

( )____,____,____,____,____; ( )____,____,____,____,____;

(Detector Tube)(s): ( )____,____,____,____; ( )____,____,____,____;

( )____,____,____,____; ( )____,____,____,____; ( )____,____,____

Sound Levels ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA; ____dBA;

Illumination ____ pH ____ Other____ ____ Other____ ____ Other ____

* - inside casing when 1st open
** - in breathing zone when open
\+ - inside casing 2 min after open

IV. DECONTAMINATION PLAN

1. Personnel Decontamination

Section III C. lists the tasks and specific levels of protection required for each. Consistent with the levels of protection required, step by step procedures for personnel decontamination for each Level of Protection are attached.

2. Levels of Protection Required for Decontamination Personnel

The levels of protection required for personnel assisting with decontamination will be [___ Level B, ___ Level C, ___ Level D].
(CHECK) Modifications include: _____

_____

_____

4. Equipment Decontamination

A procedure for decontamination steps required for non-sampling equipment and heavy machinery folllows: _____

_____

_____

5. Sampling Equipment Decontamination

Sampling equipment will be decontaminated in accordance with the following procedure:

_____

_____

_____

3. Disposition of Decontamination Wastes

(Provide a description of waste disposition including identification of storage area, hauler, and final disposal site if applicable.)

_____

_____

_____

V. Contingencies

A. Emergency Contacts and Phone Numbers

Agency	Contact	Phone Number
Local Medical Emergency Facility		832-8761
WESTON Medical Emergency Contact	AGATHA	(513) 421-3063
WESTON Health and Safety		(215) 430-7406
Fire Department		833-1051
Police Department		830-1735
On Site Coordinator		
Site Telephone		
Nearest Telephone	(Location)	

B. LOCAL MEDICAL EMERGENCY FACILITY(S)

1. Primary

Name of Hospital Massillon Community Hospital

Address: 875 8th St. NE Phone No. 832-8761

Name of Contact _____ Phone No. _____

Type of Service - Physical Trauma only ( ) Chemical Exposure only( )
Physical Trauma & Chemical Exposure ( ) Available 24 Hours ( )

Route to Hospital: (Attach Map) Take (R) out of site onto 3rd St. (L) onto CHERRY St, to 8th St. - take (L) GO 2 blocks & Hospital is on (L).

Travel Time From Site (Minutes) 5 Distance to Hospital (Miles) 1.5 Name/No. of 24 Hr. Ambulance Service 833-1051

2. Secondary or Specialty Services Provider Same as Fire

Name of Hospital _____

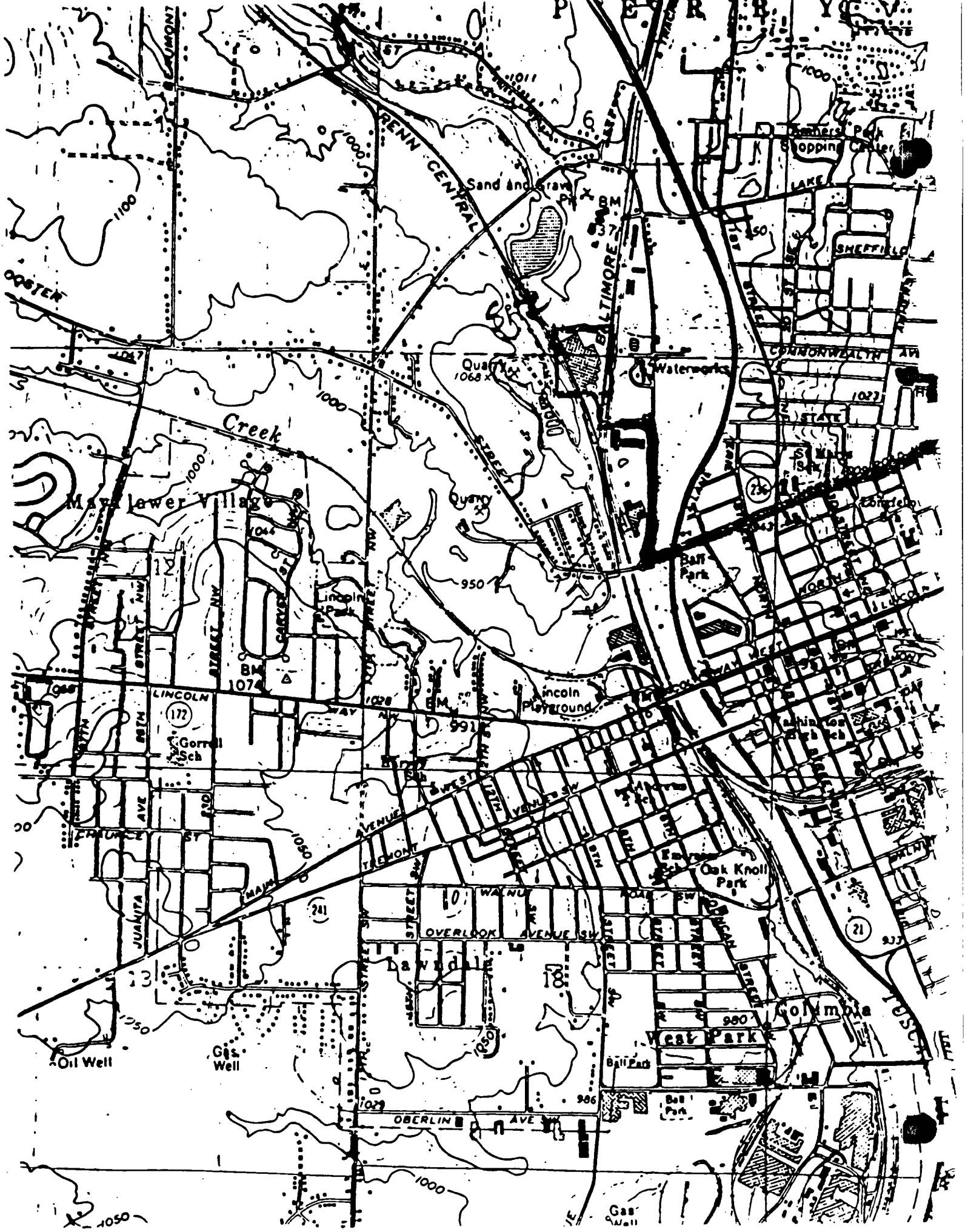
Address: _____ Phone No. _____

Name of Contact _____ Phone No. _____

Type of Service - Physical Trauma only ( ) Chemical Exposure only( )
Physical Trauma & Chemical Exposure ( ) Available 24 Hours ( )

Route to Hospital: (Attach Map) _____

Travel Time From Site (Minutes) _____ Distance to Hospital (Miles) _____ Name/No. of 24 Hr. Ambulance Service _____



PENN CENTRAL
Sand and Gravel Pit
BM 837
BALTIMORE
Amherst Park Shopping Center
LAKE
SHEFFIELD
COMMONWEALTH AVE
Waterworks
Quarry
1068
Creek
Mayflower Village
Quarry
950
Ball Park
Lincoln Park
BM 1074
LINCOLN
172
Gorrell Sch
Lincoln Playground
BM 991
WEST
AVENUE
TREMONT
MAIN
241
Oak Knoll Park
WALNUT
OVERLOOK AVENUE SW
Lawndale
Columbia
West Park
Ball Park
Oil Well
Gas Well
OBERLIN AVE SW
Gas Well
1000
1050
1100

V. Contingencies (Continued)

C. Response Plans

1. Medical - General

a. First Aid Kit - Type Location

b. Eyewash required ( )Y/N

Location Location

c. Safety Shower

Location Location

2. Special First Aid Procedures

Hydrofluide on site ( )Y/N

a. Attach HF procedure and ensure solution is on site.

Cyanides on site ( )Y/N

b. Confirm that Local Med. Emerg. Facility has antidote kit.

c.

3. Plan for Response to Fire/Explosion

4. Fire extinguisher

a. Type b. Location

5. Plan for Response to Spill/Release

6. Spill Response Gear

Description Location

6. Plan for Response to Security Problems

VI. Site Personnel and Certification Status

A. WESTON

Name	Title	Task(s)	Medical Current a.	Fit Test Current Qual. b.	Fit Test Current Quant. b.	Training Current c.	Certification Level or Description
1. Tom Cornuet	Geologist	1-5	✓			✓	C-S
2. Greg Flasinski	Technician	1-5	✓			✓	B-T
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
Site Health and Safety Coordinator (SHSC)							
14. Tom Cornuet	Geologist	1-5	✓			✓	C-S

(a) Training - All personnel, including visitors, entering the exclusion or contamination reduction zones must have certifications of completion of training in accordance with OSHA 29 CFR 1910 29, CFR 1926/1910 or 29 CFR 1910.120.

(b) Respirator Fit Testing - All persons, including visitors, entering any area requiring the use or potential use of any negative pressure respirator must have had as a minimum, a qualitative fit test, administered in accordance with OSHA 29 CFR 1910.134 or ANSI within the last 12 months. If site conditions require the use of a full face negative pressure, air purifying respirator for protection from Asbestos or lead, employees must have had a Quantitative fit test, administered according to OSHA 29 CFR 1910.1002 or 1025 within the last 6 months.

(c) Medical Monitoring Requirements - All personnel, including visitors, entering the exclusion or contamination reduction zones must be certified as medically fit to work, and to wear a respirator, if appropriate, in accordance with 29 CFR 1910, 29 CFR 1926/1910 or 29 CFR 1910.120.

The Site Health and Safety Coordinator is responsible for verifying all certifications and fit tests.

B. Subcontractor's Health and Safety Program Evaluation

Name and address of subcontractor: _____

_____

Activities to be conducted by subcontractor: _____

_____

EVALUATION CRITERIA

Item	Acceptable	Unacceptable	Comments
Medical Program meets OSHA/WESTON Criteria	( )	( )	_____
Personal Protective Equipment Available:			
a. meets OSHA criteria,	( )	( )	_____
b. is as specified in WLHASP	( )	( )	_____
On-Site Monitoring Equipment Available, Calibrated and Operated Properly	( )	( )	_____
Safe Working Procedures Clearly Specified	( )	( )	_____
Training meets OSHA/WESTON Criteria	( )	( )	_____
Emergency Procedures	( )	( )	_____
Decontamination Procedures	( )	( )	_____
General Health and Safety Program Evaluation	( )	( )	_____

Additional Comments: _____

_____

Evaluation conducted by: _____ Date: _____

C. Subcontractor

Name	Title	Task(s)	Medical Current	Fit Test Current		Training Current	Certification Level or Description
				Qual.	Quant.		
			a.	b.	b.	c.	
1.			( )	( )	( )	( )	( )
2.			( )	( )	( )	( )	( )
3.			( )	( )	( )	( )	( )
4			( )	( )	( )	( )	( )
5.			( )	( )	( )	( )	( )
6			( )	( )	( )	( )	( )
7.			( )	( )	( )	( )	( )

VII. HEALTH AND SAFETY PLAN APPROVAL/SIGN OFF FORMAT

1. Site Name EKCO HOUSEWARES 2. WO# 2994-02-03

Work Location Address State St N Massillon OH 44648
(Street Address) (City) (State) (Zip)

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

Site Safety Co-ordinator	Signature	Date
Tom Cornett		4-15-91
Name	Signature	Date
JAMES P. STRAYTON		4-16-91
Name	Signature	Date
JOHN H. ELSTNER		4-16-91
Name	Signature	Date
TED S. TRUMBULL		4-16-91
Name	Signature	Date
H. G. BYER		6/18/91
Name	Signature	Date
PATRICK DORAN		6/18/91
Name	Signature	Date
Dave Schrecengost		6/18/91
Name	Signature	Date
Bill Kessler		6/18/91
Name	Signature	Date
Dave Cairns		7/8/91
Name	Signature	Date
ANDY WESTERBAAN		9/17/91
Name	Signature	Date
Bill Young		9-17-91
Name	Signature	Date
Allen Ay		9-17-91
Name	Signature	Date
H. G. Byer		9-17-91
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date

VIII. Training and Briefing Topics

The following items will be covered at the site specific training meeting, daily or periodically.

Site Specific Training Meeting	Daily	Periodically	
		✓	Site characterization and analysis, Sec. 3.0; 29 CFR 1910.120 i.
		✓	Physical hazards, Table 3.2.
		✓	Chemical hazards, Table 3.1.
			Animal bites, stings and poisonous plants.
			Etiologic (Infectious) Agents.
			Site control, Sec. 8.0; 29 CFR 1910.120 d.
			Engineering controls and work practices, Sec. 8.5; 29 CFR 1910.120 g.
			Heavy Machinery.
			Forklift
			Backhoe
			Equipment
			Tools
			Ladder 29 CFR 1910.27 d.
			Overhead and Underground Utilities
			Scaffolds
			Structural Integrity
			Unguarded Openings-wall, Floor, Ceilings (?).
			Pressurized Air Cyclinders
			Personnel Protective Equipment, Sec. 5.0; 29 CFR 1910.120 g; 29 CFR 1910.134

Site Specific Training Meeting	Daily	Periodically	
			Respiratory Protection Sec. 5.8; 29 CFR 1910.120g; Z88.2-1980.
			Level A
			Level B
		✓	Level C
		✓	Level D
		✓	Monitoring, Sec. 7.0; 29 CFR 1910.120 h.
		✓	Decontamination, Sec. 9.0; 29 CFR 1910.120 k.
		✓	Emergency Response, Sec. 10.0; 29 CFR 1910.120 l.
			Elements of an Emergency Response, Sec. 100; 29 CFR 1910.120 l.
			Procedures for Handling Site Emergency Incidents, Sec. 10.0; 29 CFR 1910.120 l.
			Off Site Emergency Response, 29 CFR 1910.120 l.
			Handling Drums and Containers, 29 CFR 1910.120 j.
			Opening Drums and Containers
			Electrical Material Handling Equipment.
			Radioactive Waste.
			Shock Sensitive Waste.
			Laboratory Waste Packs.
			Sampling Drums and Containers.
			Shipping and Transport, 49 CFR 172.101
			Tank and Vault Procedures.
			Illumination, 29 CFR 1910.120 m.
			Sanitation, 29 CFR 1910.120 n.

Attachment 1. Level D/Modified Level D Decontamination
[Check indicated Functions or add steps as necessary]

STEP	FUNCTION	DESCRIPTION OF PROCESS, SOLUTION AND CONTAINER
( )	Segregated equipment drop	_____
( )	Boot cover and glove wash	
( )	Boot cover and glove rinse	_____
( )	Tape removal - outer glove and boot	_____
( )	Boot cover removal	_____
( )	Outer glove removal	_____
	HOT-LINE	
( )	Suit/safety boot wash	_____
( )	Suit/boot/glove rinse	_____
( )	Safety boot removal	_____
( )	Suit Removal	_____
( )	Inner glove wash	_____
( )	Inner glove rinse	_____
( )	Inner glove removal	_____
( )	Inner clothing removal	_____
	CRC/SAFE ZONE BOUNDARY	
( )	Field wash	_____
( )	Redress	_____

DISPOSAL PLAN:
END OF DAY: _____

END OF WEEK: _____

END OF PROJECT: _____

Attachment 2. LEVEL C DECONTAMINATION
[Check indicated Functions or add steps as necessary]

STEP	FUNCTION	DESCRIPTION OF PROCESS, SOLUTION AND CONTAINER
( )	Segregated equipment drop	_____
( )	Boot cover and glove wash	
( )	Boot cover and glove rinse	_____
( )	Tape removal - outer glove/boot	_____
( )	Boot cover removal	_____
( )	Outer glove removal	_____
	HOT-LINE	
( )	Suit/safety boot wash	_____
( )	Suit/boot/glove rinse	_____
( )	Safety boot removal	_____
( )	Suit Removal	_____
( )	Inner glove wash	_____
( )	Inner glove rinse	_____
( )	Face piece removal	_____
( )	Inner glove removal	_____
( )	Inner clothing removal	_____
	CRC/SAFE ZONE BOUNDARY	
( )	Field wash	_____
( )	Redress	_____

DISPOSAL PLAN:
END OF DAY: _____

END OF WEEK: _____

END OF PROJECT: _____

Attachment 3. LEVEL B DECONTAMINATION
[Check indicated Functions or add steps as necessary]

STEP	FUNCTION	DESCRIPTION OF PROCESS, SOLUTION AND CONTAINER
( )	Segregated equipment drop	_____
( )	Boot cover and glove wash	
(✓)	Boot cover and glove rinse	_____
(✓)	Tape removal - outer glove/boot	_____
(✓)	Boot cover removal	_____
(✓)	Outer glove removal	_____
	HOT-LINE	
( )	Suit/safety boot wash	_____
( )	Suit/SCBA/boot/glove rinse	_____
( )	Safety boot removal	_____
( )	Remove SCBA backpack w/o disconnecting	_____
(✓)	Splash suit removal	_____
( )	Inner glove wash	_____
(✓)	Inner glove rinse	_____
( )	SCBA Disconnect & Face piece removal	_____
(✓)	Inner glove removal	_____
( )	Inner clothing removal	_____
	CRC/SAFE ZONE BOUNDARY	
( )	Field wash	_____
( )	Redress	_____

DISPOSAL PLAN:
END OF DAY: _____

END OF WEEK: _____

END OF PROJECT: _____