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DRAFT FINAL REPORT
PHASE I - BIOREMEDIATION TREATABILITY STUDIES
MONTROSE SITE

Prepared For

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ECOVA

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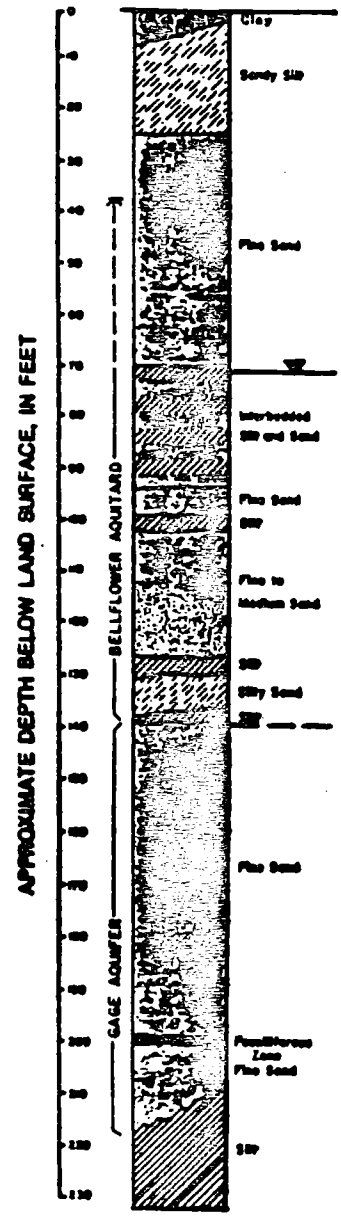
FIGURE 1-1
Stratigraphic Column



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2. SAMPLING AND MATERIALS CHARACTERIZATION

SOIL PREPARATION

Site sampling for the Montrose site in Torrance, California took place on February 26, 1990. Sampling was conducted by Hargis + Associates personnel and was observed by an ECOVA employee. Seven different soil

TABLE 2-1
Description of the Samples Obtained From the Montrose site for Bench-Scale Treatability Testing

Sample Concentration	Previous Designation	Current Designation	Depth (feet)
1000 - 4000	15 D	BR-5	1.5 - 3
1000 - 4000	MW-2	BR-8	11
10 - 100	16-D	BR-4	2.5
10 - 100	S-303	BR-6	18.4
10 - 100	S-301B	BR-7	9.2
< 10	MW-5	BR-2	6.0
< 10	LA18	BR-1	3.0
Aquifer Solids	MW-1	BR-3	66-68
Groundwater	MW-1	MW-1	66-68

samples and one aquifer solids sample were taken, placed in large buckets and shipped to ECOVA corporate headquarters in Redmond, Washington. Table 2-1 provides a summary description of the samples collected . The soil had a firm clay consistency and it was necessary to dry the soil prior to homogenization. Homogenization of site soils proved difficult due to the moisture content of this clayey soil and the presence of chlorobenzene above the analytical detection limits by EPA Method 8240. During the homogenization process the soil dried from an average moisture content of 16.2% to <9.3%. The soil formed hard aggregates averaging 10 mm in diameter which

were not readily friable manually. The homogenization process involved intensive pounding of the dried soil using 20 mm stainless steel ball bearings in a 3/16" mesh standard sieve.

BASELINE CHEMICAL ANALYSES

Following homogenization, the soil was analyzed for DDT and related compounds, total organic carbon (TOC), and inorganic nutrients. The results of these analyses (Tables 2-2 and 2-3) were used to prepare two different soil composites. "Soil A" was a composite of soil samples BR-4 and BR-6 with levels of DDT and metabolites ranging from 14 to 130 ppm. The "Soil B" composite (BR-5 and BR-8) had levels of DDT and metabolites ranging from 930 to 1,700 ppm. These two soil types were tested in both the solid phase treatability study and in the slurry phase treatability study. Prior to initiating the studies, the homogenized field samples were extensively blended to provide uniform distributions of contamination to assure reproducible analytical results. The results of baseline analyses for inorganic nutrients are presented in Table 2-3 and showed that nitrogen and phosphorus levels were low and would likely limit microbiological activity. Analysis was performed on individual composite samples of soil BR-4 and BR-6. The mean of these analyses was used to estimate the concentrations for the Soil A composites. Soil B analysis was performed in triplicate on the final composite of soil BR-5 and BR-8.

TABLE 2-2
Results of Baseline Chemical Characterization of Soils by HPLC

Soil	Concentration of DDT and Metabolites (ppm) Obtained	Expected
BR4	126.7 ± 5.8	10 - 100
BR5	1633 ± 57.7	1000 - 4000
BR6	15.7 ± 1.5	10 - 100
BR7	710 ± 43.6	10 - 100
BR8	993 ± 92.9	1000 - 4000
BR-1	8.2 ± 1.4	

TABLE 2-3
Results of Baseline Inorganic Analysis of Soils (mg/kg)

	Soil A[a]	Soil B
Nitrate	2.15 ± 2.6	2.6 ± 0.1
Phosphate	6.65 ± 10.2	2.4 ± 0.03
Sulfate	4126 ± 4500	4736.7 ± 17
Ammonia	23.63 ± 3.0	27.2 ± 8.5
TOC[b]	3587 ± 1491	6163 ± 610

[a]Represents the mean of analysis of single composite samples of BR4, BR6 and BR7.
[b]Total Organic Carbon

MICROBIOLOGICAL ENUMERATION

Enumeration of microbial populations was conducted as part of the baseline soil characterization and as one of the analyses conducted at each sampling event. Microbial enumerations were performed by counting the number of colonies that grow on PCA (Plate Count Agar) plates containing nutrients and a carbon source. Baseline microbial enumerations were also performed on SEA (soil extract agar) plates. These plates were prepared by extracting a 500 g sample of high level DDT contaminated soil with 1 liter of deionized water and adding purified agar. This media formulation was used to ascertain differences in population diversity that might arise during the enumeration of bacterial populations when plating on a complex rich media such as PCA. The results of these analyses are presented in Table 2-4 and indicate that there appears to be an order of magnitude loss in bacterial population densities in Soil A as measured on PCA as a result of the homogenization process. However there does not appear to be any change in bacterial population diversity as measured by changes in the colony morphological types. Soil B soils show a slight reduction (20 percent) in population densities but no changes in population diversity as a result of the homogenation process.

Baseline characterization of site water involved the following analyses: inorganic nutrients (nitrate, phosphate, sulfate and ammonia), total organic carbon, and chlorobenzene. All analyses were performed in triplicate except chlorobenzene, for which duplicate samples were analyzed. EPA Method 8240 was used for chlorobenzene analysis. The results of these baseline characterizations are presented in Table 2-5.

TABLE 2-4

Results of enumeration of soil microbial population on plate count agar (PCA[a]) and soil extract agar (SEA[b]) before and after homogenization. (CFU)[e]

Soil	PCA Before	PCA After	SEA Before	SEA After
A	3×10^4	2×10^3	ND[c]	ND[c]
B	5×10^6	1×10^6	7×10^5	4×10^5

[a] = Enumeration on plate counting agar.
[b] = Enumeration on soil extract agar.
[c] ND = None detected at the 10^3 dilution.
[e]Colony forming units per gram of soil.

TABLE 2-5
Baseline Analysis of Water
mg/L

Nitrate	nd (.500)[a]
Phosphate	nd (.500)
Sulfate	712 ± 121
Ammonia	0.139 ± 0.037
TOC	53.0 ± 17.5
Chlorobenzene	33.5 ± 0.707

[a]Compound not detected, detection limit in parentheses.

3. CHLOROBENZENE TREATABILITY

3.1 INTRODUCTION

Aerobic shake flask culture techniques were used to assess existing aerobic biodegradative potential for chlorobenzene in the groundwater. Data from the baseline chemical and microbiological analyses were used to identify the parameters which were evaluated in this study. The optimization of inorganic nutrient concentrations and the effects of inoculation were examined.

3.2 MATERIALS AND METHODS

The study was performed in pre-sterilized 125 ml Ehrlenmeyer flasks with teflon-lined septa and screw cap closures. The following treatments were examined: sterile; nutrient amended; nutrient amended and inoculated. Flasks were set up in triplicate for the analysis of chlorobenzene by EPA Method 8240 at the following time points: T_0, T_3, T_7, T_{14}, T_{21} and T_{28} days. In addition, one single flask for each treatment at each time point was set up for microbial studies.

A full-scale in situ bioremediation process preferably makes use of organisms already existing at the site. These microorganisms are best adapted to the existing site conditions, and the need for addition of an inoculum is moderated or eliminated. The flask study was therefore conducted using site water as the "incubation medium" and source of a potentially active microbial population. All amendments were added directly to the site water. On the day prior to initiating the experiment, four liters of groundwater were spiked with chlorobenzene to achieve a final target concentration of 100 ppm. A concentrated nutrient stock solution was added to optimize the C:N:P ratio. The water was then allowed to stir slowly at 4°C to equilibrate. Each flask from the sterile treatment set received 0.25 g of $HgCl_2$. All flasks and necessary glassware were then prechilled overnight at 4°C.

A chlorobenzene-degrading inoculum was developed for use in the study, and two fresh subcultures were inoculated two days prior to initiation. These subcultures were incubated with and without the addition of a supplemental carbon source. An aliquot of both 48 hour cultures was examined and enumerated microscopically, centrifuged and washed with sterile phosphate buffer to remove residual chlorobenzene. The activity of the resulting suspensions was verified through oxygen-uptake measurements in the presence of chlorobenzene. The culture grown in the presence of the supplemental carbon source exhibited an oxygen uptake of 9.6 nmol O_2/min. The culture grown

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solely in the presence of chlorobenzene exhibited a slightly smaller oxygen uptake of 8.6 nmol O_2/min. Aliquots from both subcultures were similarly centrifuged and washed, and resuspended in an amount of fresh sterile buffer which was calculated to provide a final concentration of approximately 10^7 organisms/ml when 1 ml was added to each of the flasks in the inoculated treatment sets. The combined inoculum was kept chilled at 4°C until use.

The groundwater was allowed to continue stirring slowly while 50 ml aliquots were delivered via a siphon system to the Erlenmeyer flasks. The flasks were sealed immediately. This procedure was performed at 4°C to minimize volatile loss. After all flasks had been dispensed, 1 ml of inoculum was added to the appropriate treatment set. All caps were then additionally sealed with parafilm and the flasks were wrapped with aluminum foil. The T_0 flasks were kept chilled until sampling. All other flasks were placed on gyrotary shakers, 25°C, approximately 180 rpm, and the incubation was begun. Subsamples from the T_0 flasks were transferred to prechilled 40 ml VOA vials which contained 4 drops of concentrated HCl. Duplicate samples from each treatment set were submitted for analysis of chlorobenzene by EPA Method 8240. A single sample from each set was submitted to Hargis + Associates for verification. The remaining single T_0 flask from each treatment set was evaluated for total aerobic heterotrophs and aerobic chlorobenzene degrading organisms.

The incubation was continued for a total of 21 days. The same sampling procedure was followed on each sampling date with the exception of submitting analytical samples to Hargis + Associates. All samples subsequent to T_0 were analyzed by Pacific Northwest Environmental Laboratory, Inc. Total aerobic heterotroph enumerations were performed using standard dilution plate count techniques. Aerobic chlorobenzene degrading microorganism enumerations were performed using the same basic technique but modifying the growth medium and incubation conditions. All enumerations except the sterile treatments were performed by triplicate platings of three serial dilutions. Plates were incubated at 25°C and examined after 3 and 7 days of incubation.

3.3 RESULTS

The concentration of chlorobenzene in both active treatments had been reduced to nondetectable levels within 3 days. The slightly lower baseline value in the Time = 0 samples from the inoculated set indicates that biological activity had already begun in these flasks in the short time between inoculation and acidification of the analytical subsamples. The chlorobenzene levels in the sterile flasks remained fairly stable throughout the incubation period, indicating insignificant abiotic loss (Table 3-1).

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TABLE 3-1
Biodegradation of Chlorobenzene in Flask Studies

	CHLOROBENZENE (ppb[1])				
	Time (days)				
Treatment	0	3	7	14	21
Sterile	110,000 ± 0	91,000 ±2,000	88,000 ± 1,000	103,000 ± 6,000	100,000 ± 0
Nutrient Amended	105,000 ± 7,000	U(5)[2]	(1.3 ± 0.6)J[3]	U(5)[2]	U(0.25)[2]
Inoculated	98,000 ± 3,000	U(5)[4]	U(5)[4]	(2.7 ± 1.2)J[3]	U(0.25)[2]

[1]All chlorobenzene concentrations are expressed as the mean ± standard deviation of triplicate assays, with the exception of Time 0 (duplicate assays).
[2]U as a qualifier signifies that compound was assayed for and not detected at the limit in parentheses.
[3]J as a qualifier denotes an estimated value for tentatively identified compounds present at levels less than quantitation limits but greater than zero.
[4]Triplicate assays included two results of U(5) and one result of 1J.

Observation of the chromatograms indicated changes in several compounds in the active treatments. Therefore, analysis were performed outside the required scope of work to determine whether these compounds were also being biodegraded. A complete report for all compounds analyzed by EPA Method 8240 was done at the final sampling for the active treatments. This additional reporting indicated the presence of benzene, methylene chloride, formaldehyde, and tetrachloroethene at comparable concentrations in both treatments (Table 3-2.) Archived raw data from selected T_0 samples was reanalyzed to generate a complete baseline report for these samples. Since the integrity of the sterile controls was validated by the chlorobenzene results presented in Table 3-1, analysis of Day 21 sterile controls for other compounds was not performed.

The data indicate that benzene was degraded from 7,000 ppb to nondetectable levels in both active treatments. There was no significant degradation of chloroform observed in either treatment. Due to differences in detection limits, methylene chloride was only detected in the final set of samples and therefore no conclusions about its biodegradation can be made. There is not enough compelling evidence at this time to preclude that the methylene chloride is a laboratory artifact. This is based on its use as a common laboratory solvent. Tetrachloroethene decreased 30 to 38 percent.

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	Time (days)				
Treatment	0	3	7	14	21
Sterile	110,000 ± 0	91,000 ±2,000	88,000 ± 1,000	103,000 ± 6,000	100,000 ± 0
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TABLE 3-2
Other Compounds Detected by EPA Method 8240

Treatment	Compound, ppb[1]	Flask Studies Time (days) 0	21
Sterile	Chloroform	9200	not done
	Methylene Chloride	U(5000)[2]	not done
	Tetrachloroethene	2100J[3]	not done
	Benzene	6900	not done
Nutrient Amended	Chloroform	9200	8700 ± 500
	Methylene Chloride	U(5000)[2]	617 ± 25
	Tetrachloroethene	2600J[3]	1600 ± 100
	Benzene	7100	U(250)[2]
Inoculated	Chloroform	8400	8500 ± 500
	Methylene Chloride	U(5000)[2]	607 ± 31
	Tetrachloroethene	2300J[3]	1600 ± 100
	Benzene	6500	U(250)[2]

[1]Results are expressed as the mean ± standard deviation of triplicate assays at Time = 21 days.
Regenerated data from a single analysis per treatment is presented for Time = 0 days.
[2]U as a qualifier signifies that compound was assayed for and not detected at the limit in parentheses.
[3]J as a qualifier denotes an estimated value for tentatively identified compounds present at levels less than quantitation limits but greater than zero.

Data from the microbiological examinations showed several trends in the population dynamics (Table 3-3). The sterile treatments did not exhibit any evidence of microbial growth on either growth medium, confirming the sterility of the controls. The nutrient amended treatments showed a steady increase in the numbers of aerobic heterotrophs through the first 14 days of incubation. There were no further increases seen in the number of total heterotrophs during the remainder of the study. The final population density achieved was approximately a one-hundred-fold increase. The numbers of chlorobenzene degrading organisms showed a significantly different trend; from an initial concentration of approximately 10 cfu/ml, the numbers increased to 10^6 after only 7 days of incubation, and remained at approximately these numbers until the termination of the study. The relative percentage of total heterotrophs which were also capable of degrading chlorobenzene showed an apparent increase of 1000% (from 0.1% of the total population at Time = 0 to 100% at Time = 21 days). This suggests that under appropriate conditions, the microbial population can be greatly enhanced, and the increase appears to be due primarily to organisms capable of chlorobenzene degradation.

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TABLE 3-3
Total Heterotrophs and Chlorobenzene Degrading Microorganisms, Flask Study

Treatment	Microbial Enumeration, cfu/ml	Time (days) 0	3	7	14	21
Sterile	Total Heterotrophs	< 10	< 10	< 10	< 10	< 10
	Chlorobenzene Degrading Microorganisms	< 10	< 10	< 10	< 10	< 10
Nutrient Amended	Total Heterotrophs	1.9×10^4	$> 10^5$ [2]	1.4×10^7	6.6×10^6	6.5×10^6
	Chlorobenzene Degrading Microorganisms	≤ 10 [3]	$> 10^5$ [2]	2.1×10^6	5.6×10^5	6.3×10^6
Inoculated	Total Heterotrophs	9.5×10^6	9.8×10^7	9.9×10^7	4.4×10^6	1.8×10^6
	Chlorobenzene Degrading Microorganisms	1.4×10^5	4.9×10^6	4.9×10^6	2.9×10^6	7.2×10^5

[1]cfu/ml = colony forming units/milliliter
[2]Estimated value; all plates had too many colonies to accurately count.
[3]At all dilutions; plates had too few colonies to allow reliable quantitation.

The inoculated treatment showed a predictably larger total heterotroph population at initiation of the study, with approximately 10% of the organisms demonstrating chlorobenzene degradation. An amount of inoculum had been added which was expected to result in a final population density of approximately 10^7 organisms/ml, based on a microscopic enumeration. This type of enumeration is not able to discriminate active from dormant or dead cells. The lack of success in retrieving these organisms via plate count techniques may indicate a large number of dormant or dead cells, or toxic or inhibitory effects of compounds present in the groundwater. The total population exhibited a ten-fold increase by 3 days, and remained stable until day 14, when it was seen to have dropped down to a number approximating starting density. This trend continued through the final time point, at which time the population was approximately 20% of starting density. The chlorobenzene degrading organisms showed the same general trend, although their numbers remained ten-fold elevated through 14 days of incubation. By the final enumeration at 21 days, the population had decreased, but remained at levels exceeding those seen at initiation. Differentiation of microbial types based on colonial morphology indicated a shift in the relative population of microorganisms. The

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added inoculum apparently did not effectively compete with the indigenous microflora, and their numbers decrease as the numbers of indigenous organisms increase. This shift in microbial populations is thought to result from changes in substrate availability and preference as the available chlorobenzene is degraded (Figure 3-1).

Further studies were performed to isolate and identify morphological types which showed evidence of chlorobenzene degradation. Several different morphological colony types were recovered from the nutrient amended treatments and tested. These organisms were identified as numbers of the genus *pseudomonas*. *Pseudomonas stutzeri* was identified in samples taken at initiation of the study and appeared on plates throughout the course of the study. Other members of the same genus were identified, although it was not always possible to discriminate beyond the genus level. The following organisms were isolated:

Psudomonas stutzeri
Pseudomonas acidovorans
Pseudomonas testosteroni/alcaligenes

3.4 CONCLUSIONS

The results of this treatability study demonstrate that the indigenous population of microorganisms could be stimulated to biodegrade chlorobenzene if conditions were optimized. Qualitative and quantitative observations suggest that this approach would be effective and preferable to the addition of an inoculum. There was no apparent increase in the rate of biodegradation of chlorobenzene with the use of an inoculum. Both active treatment sets (nutrient amended only and nutrient amended/inoculated) reduced the concentration of chlorobenzene to nondetectable levels in 3 days. The concentration of benzene was reduced to nondetectable levels by both active treatment sets. The data suggested the degradation of tetrachloroethene by both active treatments although this conclusion is tentative based on these limited results. Conclusions on methylene chloride can not be made at this time due to an insufficient database.

FIGURE 3-1
Chlorobenzene Degradation and Microbial Numbers

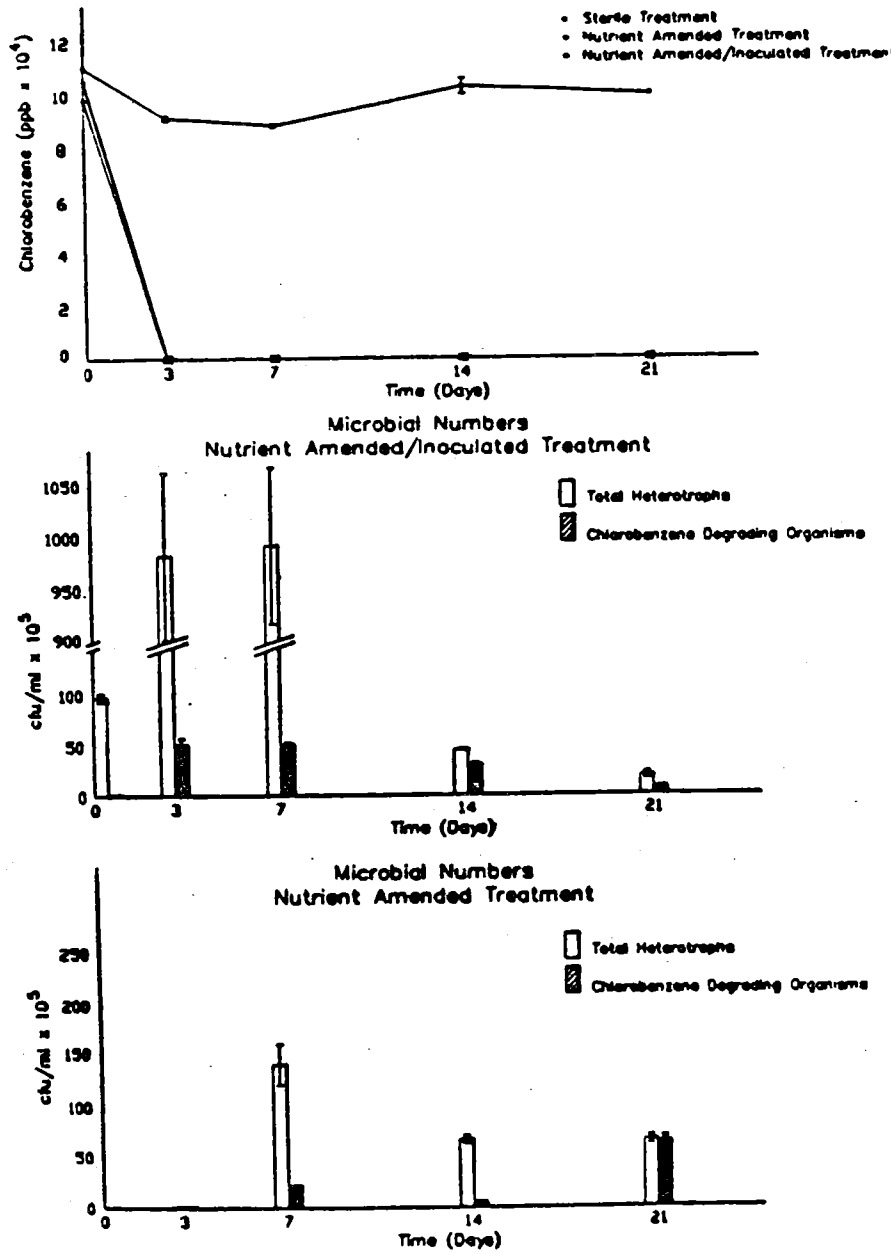

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Plate count results showed a decrease in microbial populations after methylene bromide fumigation of "sterile" pans but a significant number of viable organisms remained. In order to further reduce microbial activity, mercuric chloride was added to all of the sterile pans. The soil was saturated with water to allow the poison to permeate all of the soil particles. The soil was then allowed to dry out to the same moisture content as the "active" pans. This procedure provided complete sterilization as demonstrated by the absence of any colonies on PCA.

Sampling events occurred at 0, 1, 4 and 8 weeks after initiation of the study. A sample was removed from each of three replicate pans (for each condition) for quantitation of DDT and metabolites and for microbial enumerations. At the 0 and 8 week sampling events, one sample from each triplicate set was sent to Hargis + Associates for independent confirmation of analytical results.

Slurry Phase Treatability

The slurry phase treatability study was performed in parallel with the solid phase study. Slurries were prepared with both soil types and the same two treatments (active and sterile) as the solid phase study. Triplicate flasks were set up for each test at each sampling time point.

Nutrients were added to the slurry study by preparing the slurries in Buschnell-Haas medium containing nitrogen in the form of ammonium nitrate and phosphorus in the form of potassium phosphate. Slurries consisted of 15 grams (dry weight basis) of either Soil A or Soil B and 35 ml Bushnell-Haas media. All flasks were prepared identically except sterile flasks received mercuric chloride. Slurries were setup in 125 ml Ehrlenmeyer flasks with a cotton plug to allow adequate air exchange. Sampling events occurred on the same schedule as the solid phase study (0, 1, 4 and 8 weeks). Sampling for the slurry phase study required the sacrifice of the entire flask for analysis. At the 0 and 8 week sampling events, one sample from each triplicate set was sent to an outside analytical laboratory for independent confirmation of analytical results.

Slurry Extraction Procedure

A method was developed by ECOVA for efficiently extracting DDT and metabolites from the slurries used in this study. The method involved separation of the solid from the aqueous phase, independent extractions of both phases, solvent exchange of the extracts into the same solvent, and finally, recombination of the two extracts. This procedure

4.2 RESULTS OF BENCH SCALE STUDIES

Solid Phase

The solid phase bench scale evaluations were set up as described in Section 4.1 with two composited soil types designated Soil A and Soil B, representing low and intermediate initial DDT concentrations. The mean (μ)

TABLE 4-1

Mean (μ)[a] Starting Concentrations of DDT, DDD, DDE and Metabolites Estimated At a 95% Confidence Interval

	Soil A	Soil B
DDT	32 +/- 13.49	1125 +/- 49.5
DDD	1.58 +/- 0.14	34.25 +/- 9.17
DDE	12.75 +/- 2.02	80.25 +/- 9.07
DDA	12.75 +/- 2.81	ND (10.10 +/- 0.74)[b]
DBP	5.45 +/- 0.17	ND (13.33 +/- 1.31)[b]

[a]Means (μ) were calculated using the analytical values obtained at T = O for both active and sterile samples.
[b]ND = Not detected due to dilution below the calibration level for these samples. Values reported are for the T = 1 week samples.

concentrations of DDT, estimated with 95% confidence, were 32 ± 3.49 mg/kg for Soil A and 1125 ± 49.5 mg/kg for Soil B. Table 4-1 summarizes the mean starting concentrations for DDT, DDD, DDE and metabolites, estimated with a 95% confidence interval. These values were calculated in order to establish the statistical basis upon which significant reductions in concentrations could be ascertained and attributed to treatment effect during the study. Other metabolites analyzed for but not detected include DCBH, DDA, FW-152, DDM and kelthane. The following is a list of the compounds analyzed and their abbreviations used throughout this document.

Compound	Abbreviation
4,4'-Dichlorobenzhydrol	DCBH
2,2-bis(4-chlorophenyl)acetate	DDA
Dichlorobenzophenone	DBP
1,1-bis(4-chlorophenyl)-2,2-dichloroethanol	FW-152
Dichlorodiphenylmethane	DDM
1,1-dichloro-2,2-bis(4-chlorophenyl)ethane	DDD
1,1-bis(4-chlorophenyl)-2,2,2-trichloroethanol	Kelthane
1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane	DDT
2,2-bis(4-chlorophenyl)-1,1-dichloroethylene	DDE

Experimental systems were monitored over an initial eight week time interval. Contaminant concentrations (DDT, DDD, DDE, DDA and DBP) were monitored by an HPLC method discussed in Section 4.1. The means and standard deviations for the HPLC data are tabulated in Appendix A.

There were no significant reductions in DDT, DDD or DDE in the Soil A active treatments (Figure 4.1). Mean DDT concentrations were somewhat higher in the T=8 sterile control. However, the difference was not significant at the 95% confidence interval, 42 ± 9.73 mg/kg as compared to 32 ± 3.49 mg/kg at T = 0. There appeared to be an increase of DDA in the active treatment during the first week of the Soil A study with a subsequent decrease through T = 4 (Figure 4.2). This apparent increase to 15.23 ± 1.42 mg/kg was not significant when compared to the mean value of 12.75 ± 2.81 mg/kg at T = 0 and can not be attributed to a treatment effect. There is however a significant increase in the levels of DBP during the first week. The concentration increases from a mean value of 5.45 ± 0.17 mg/kg at T = 0 to 18.0 at T = 1. There is also a significant reduction of DBP in the sterile control from a mean value of 5.45 ± 0.17 mg/kg to 3.05 ± 0.76 mg/kg during the first week of the study. It must be emphasized that the sterile controls were not completely sterile (10^3 cfu/g soil) until mercuric chloride was added during week 2 of the study. The data are consistent with DBP being biologically degraded in these systems.

There does not appear to be a significant change in the contaminant profile from T = 4 weeks onward. This may be a result of the addition of exogenous organic cosubstrates at T = 4. Supplementation with organic nutrients at T = 4 was predicated on the lack of degradation of DDT, DDD and DDE. This was designed to enhance the total population level, therefore degrader species as well, by the provision of cosubstrates. While no beneficial effects were observed on DDT, DDD and DDE degradation, there may have been a negative effect on DDA and DBP degradation. During the first four weeks microbial heterotrophic populations increased from levels of 2×10^3 colony forming units (cfu) per gram of soil to approximately 1×10^7 cfu/gram (Figure 4-6). After the organic nutrient

supplementation populations increased quite substantially to 1.3 x 10^8 cfu/gram (see also Table 4-2). This increase suggests that there may be expansion of a non-degrader population of organism, which outcompetes the DDA and DBP degraders, since there was no effect on the reduction of contaminants nor the production of metabolites.

Treatability study results for the soil B systems were similar to those achieved with Soil A. Generally, no significant reductions in DDT, DDD or DDE were observed in the active treatments. Variability was observed in the DDT concentrations between the T = 0 mean concentration of 1125 ± 49.5 mg/kg and the T = 8 mean values for the active and sterile treatments of 1400 ± 139 mg/kg and 1500 ± 139 mg/kg respectively (Figures 4.3). However, no significant difference was observed between the active and sterile treatments. In addition, this upward trend seems to be correlated with the addition of supplemental organic carbon which may have an effect by liberating DDT from the soil. The DDD and DDE concentrations were less variable than DDT in both sterile and active treatment systems (Figure 4.4). No discernable losses of DDD or DDE were observed in the active treatment as compared with sterile control.

The results for DDA and DBP concentrations during the soil B treatability study are illustrated graphically in Figure 4.5. Interpretation of these results is confounded by the fact that DDA and DBP could not be accurately calibrated due to the necesssity of diluting the sample extract prior to analysis. This effectively reduced the levels of these compounds below the limit of quantitation. There appear to be significantly higher mean concentrations of DDA (10.10 ± 0.74 mg/kg) in the T = 1 active as compared to the sterile control (6.45 ± 0.35). This observation applies to DBP as well, where it has been observed that the T = 1 mean value in the active treatment is 13.33 ± 1.31 mg/kg, compared with 7.5 ± 0.14 mg/kg in the sterile control. The data suggests that soil B may contain a population of microorganisms capable of producing and degrading these compounds. In addition, it would appear that analogous to soil A, there may be a population of organisms capable of producing DBP from DDT. The low levels produced would not necessarily result in an observable decrease in DDT since they represent concentrations which fall within the range of variability observed for DDT (i.e. 1125 ± 49.5 mg/kg).

Supplementation with an organic nutrient at T=4 showed no stimulatory effect on DDT, DDD or DDE degradation. This is supported by the fact that the total population of heterotrophic microrganisms increased approximately 30-fold between the initial and the T=4 time point (Table 4-2). As can be seen with this data and as presented in Figure 4.6, there was a substantial increase in microbial density, up to 3.3 x 10^8 cfu/gram, subsequent to the addition of supplemental carbon. Such an increase in microbial populations without a significant effect on the contaminants of concern suggests the pesticide-degrading population of microorganisms may have been displaced by nonspecific heterotrophs.

TABLE 4-2
Microbial Enumeration[1] - Solid Phase Study

Soil Type	Time Point	CFU/g[2] Mean	Standard Deviation
A-Active	T = 0	2.0×10^{3}	1.0×10^{3}
	T = 1	1.8×10^{6}	0.36×10^{6}
	T = 4	5.0×10^{6}	0.20×10^{6}
	T = 8	1.3×10^{6}	0.07×10^{6}
A-Sterile	T = 0	1.0×10^{4}	0.42×10^{4}
	T = 1	9.3×10^{3}	0.90×10^{3}
	T = 4	0	0
	T = 8	0	0
B-Active	T = 0	2.4×10^{6}	0.19×10^{6}
	T = 1	5.1×10^{6}	0.40×10^{6}
	T = 4	7.0×10^{7}	0.20×10^{7}
	T = 8	3.3×10^{6}	0.80×10^{6}
B-Sterile	T = 0	4.6×10^{3}	1.0×10^{3}
	T = 1	$2.3\ 10^{5}$	0.44×10^{5}
	T = 4	0	0
	T = 8	0	0

[1]Enumerations were performed on plate count agar (PCA).
[2]Colony forming units per gram of soil.

Slurry Phase

Slurry phase studies were established as described in Section 4.1, employing the two composited soil types designated Soil A and Soil B. Initial mean concentrations of DDT, DDD, DDE and metabolites in slurried soil were estimated by HPLC analysis with 95 % confidence (Table 4-3). There is excellent agreement between these values and those obtained with drier soils from the solid phase study (Table 4-1). This provides a further level of validation of the analytical method and its applicability to slurry samples. As was observed in the solid phase studies, there are no discernable reductions in the levels of DDT, DDD or DDE which could be attributed to biodegradation (Figure 4-7). In a similar fashion DDA and DBP show no indications of biotransformation (Figure 4-8). DDA exhibited a 33% reduction during the first week of the study. The concentrations decreased from a mean value of 11.00 ± 1.39 mg/kg to 7.37 ± 0.36 mg/kg. However these results were not significantly different from the reduction (28%) seen in the sterile control. No subsequent losses were observed through the eight week time point.

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TABLE 4-3

Initial mean[a] slurry concentrations of DDT, DDD, DDE and metabolites estimated with a 95% confidence interval (mg/kg).

	Slurry A	Slurry B
DDT	34.75 ± 1.68	1115 ± 224.69
DDD	1.30 ± 0.20	44.25 ± 6.06
DDE	11.5 ± 1.27	98.25 ± 14.5
DDA	10.10 ± 1.38	7.85 ± 2.29
DBP	3.70 ± 0.56	7.95 ± 0.72

[a]Means (μ) were calculated using the analytical values obtained at T=0 for sterile and active samples.

DBP exhibited substantial losses in both sterile controls and active treatments through week 4. However at T=8 the DBP levels had returned to approximately 46% of the starting concentration. These results suggested an analytical problem such as low extraction efficiency or use of an improper multiplier in calculating the analytical results. However, examination of the analytical data loss indicated satisfactory recovery of surrogates and no evidence of a calculation error. Therefore, the results for DBP at T=4 weeks must be considered a bad data set. Excluding T=4 data, there is no indication of DBP biodegration.

Soil B slurries exhibited the same lack of degradation with repect to DDT (Figure 4-9) and DDD and DDE (Figure 4-10). DDE exhibit a slight downward trend throughout the first eight weeks of the study. This trend was observed in both sterile controls and active treatments. However there was not a statistically significant difference between the mean concentrations in the sterile and active tests after eight weeks (i.e. 69 ± 2.09 versus 65 ± 4 mg/kg respectively). Based on the 95 percent confidence interval, there does not appear to be a significant difference in the DDD concentrations between the sterile and active treatment after eight weeks. The mean concentration in the sterile control was 53.5 = 0.70 mg/kg versus 50 mg/kg.

Figure 4-11 illustrates some rather significant reductions of DDA and DBP in soil B slurries during the first eight weeks of the study. DDA concentrations were reduced from 7.85 ± 2.29 mg/kg initially to 0.55 ± 0.06 mg/kg after

eight weeks, an overall reduction of 93%. The most dramatic reductions occured during the first week of the study, accounting for a 77% reduction of the observed degradation. Sterile controls exhibited only a 7% reduction.

During the first week of the study losses of DBP in sterile and active tests were 45% and 41% respectively. However, through the eight week time point the abiotic losses amounted to no more than a 48% decrease in DBP. DBP in the active treatment was reduced from 7.95 ± 0.72 mg/kg to nondetectable levels during the first four weeks of the study. Thus, DBP also appears to have been rapidly degraded in soil B slurries.

Microbial populations in the soil B slurries at initiation of the study were present at densities of approximately 2.8 x 10^6 cfu/gram of soil (Table 4-4). These populations increased by 71% to 4.8 x 10^6 cfu/gram during the first 4 weeks and declined to baseline levels during the last 4 weeks of the study. The data suggests that there existed a fairly high and well acclimated population of microorganisms capable of degrading DDA and DBP. In contrast, the soil A slurry started with a population density 100 - fold lower than in Soil B. During the first week of slurry testing the microbial populations increased almost 1000 - fold (Figure 4-12). This was followed by a die off to approximately 2 x 10^7cfu/gram. Since the ratio of pesticides to TOC in soil A is much lower than in soil B it is conceivable that there was an increase of the non - degrader population at the expense of the more readily utilizable organic carbon present. The higher concentrations of pesticide in soil B may be exerting a selective pressure on those organisms which are resistant to the higher concentrations and/or are able to utilize certain compounds of the pesticide fractions (e.g. DDA, DBP).

4.3 CONCLUSIONS

The results of treatability studies employing solid phase and slurry phase techniques suggest that there is an indigenous population of microorganisms in both soil A and soil B which have the capability of degrading DDA and DBP. There is no compelling evidence based on the results of these studies which suggests any biodegradation activity towards DDT, DDD or DDE. However, this statement must be qualified by the following facts.

Both DDA and DBP are compounds which possess higher water solubilities than DDT, DDD or DDE. Therefore these compounds by their nature would tend to be more bioavailable to indigenous microorganisms. DDT, DDD and DDE are highly hydrophobic, and exhibit high octanol/water partitioning coefficients. Thus these compounds will adsorb tightly to the high organic content clay, characteristic of some of the soils at this site. Sequestration of these compounds via adsorption will render them less bioavailable for any biodegradative destruction and will at the very least introduce a desorption constant into the microbial rate equation.

TABLE 4-4
Microbial Enumeration[1] - Slurry Study

Soil Type	Time Point	CFU/g[2] Mean	Standard Deviation
A-Active	T = 0	3.1×10^4	0.40×10^4
	T = 1	5×10^7	-
	T = 4	1.7×10^7	0.56×10^7
	T = 8	2.0×10^7	0.76×10^7
A-Sterile	T = 0	0	0
	T = 1	0	0
	T = 4	0	0
	T = 8	0	0
B-Active	T = 0	2.8×10^6	0.76×10^6
	T = 1	4.1×10^6	0.40×10^6
	T = 4	4.8×10^6	1.6×10^6
	T = 8	3.0×10^6	0.50×10^6
B-Sterile	T = 0	0	0
	T = 1	0	0
	T = 4	0	0
	T = 8	0	0

[1]Enumerations were performed on plate count agar (PCA).
[2]Colony forming units per milliliter of slurry.

It is a reasonable assumption that the compounds which are most likely to degrade first will be those that are more water soluble. This is evident in the data obtained for DDA and DBP in the present studies. Another interesting observation is what appears to be the production of DDA and DBP in soil A and B during the solid phase studies only. This may be reflective of a population of microorganisms that are capable of low rates of DDT biotransformation but which do not thrive in a saturated environment such as a slurry. While this preliminary data is not compelling and certainly is not irrefutable it is suggestive of such biopotential. Low levels of metabolite production will not necessarily result in an observable decrease in DDT, DDD or DDE. If these metabolite levels decrease to concentrations which are within the range of the variability of the DDT, DDD and DDE analysis, it would not be possible to discriminate a statistically signigicant difference. It is also apparent from these studies that

the DDA and DBP biodegradative potential is more pronounced in the slurry phase system. Considering the solubility characteristics of these molecules, this is not a surprising result.

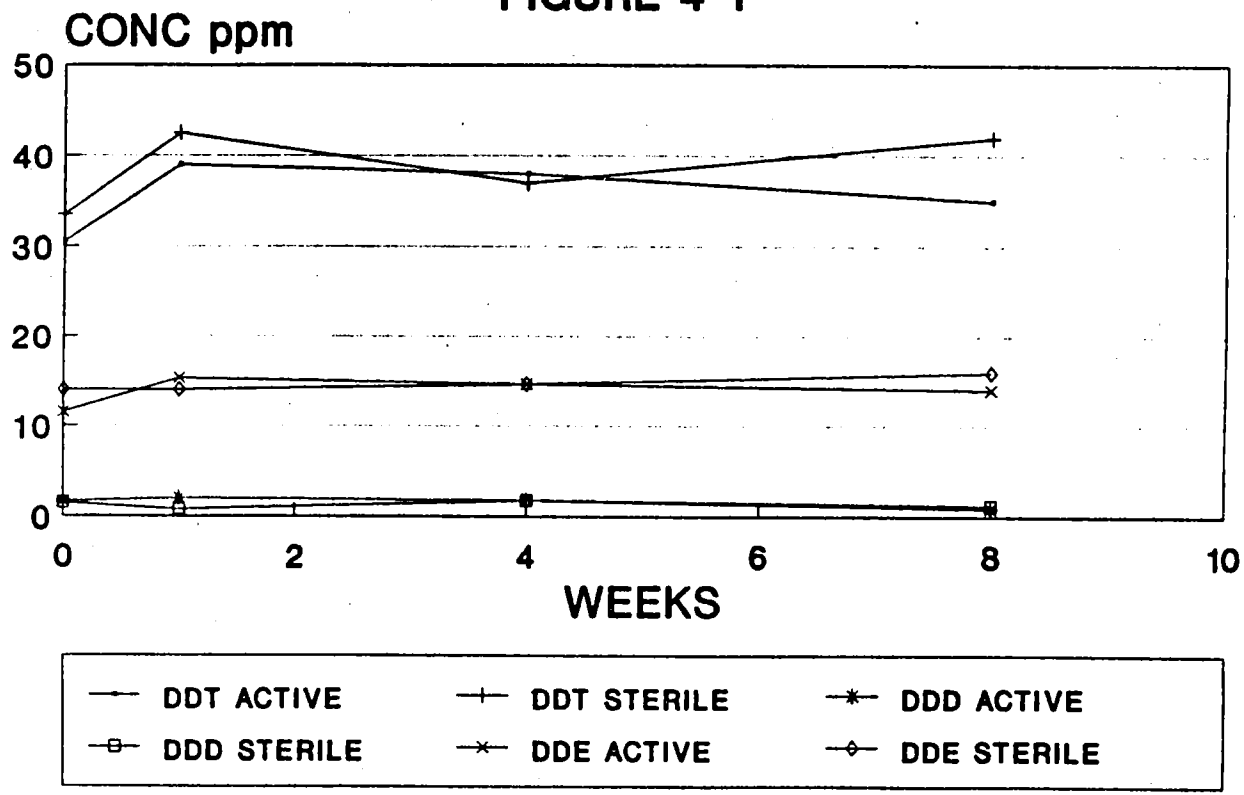
The addition of supplemental organic nutrients appears to have imparted an adverse effect. This judgement was made on the basis of an apparent correlation between the organic nutrient addition and the cessation of an observed degradative activity towards DDA and DBP. A shift in microbial population densities tends to lend credence to the theory that the organic supplement caused the expansion of a non-degrader population of heterotrophic bacteria. This expansion may have resulted in the displacement of the degrader population as a result faster growth rates and competition for essential nutrients. Alternatively, with the increased availability of a readily utilizable carbon source, the degrader population may have repressed the degradative enzyme systems. The experiments being reported on herein were not designed to determine the underlying mechanisms but rather to probe for the existence of any catabolic potential for the DDT isomers and metabolites.

The current results of this testing program do not rule out the posibility that the organisms which are degrading DDA and DBP may also have the capability of cooxidizing DDT, DDD and DDE. Nor do the present study results rule out the possibilty that the rates of degradation of these compounds are so low that they are not yet detectable above experimental background noise. Such low rates may be directly attributable to the limited bioavailabilty of these compounds due to their soil adsorptive characteristics. Hydrophobic compounds such as DDT, DDD and DDE have a low aqueous solubility and therefore tend to partition to soil organic matter. Microoganisms have access only to those molecules which are present within the bound water layer of the soil and therefore have direct access to a small percentage of the total molecules present.

FIGURES 4-1 THROUGH 4-12

ECOVA

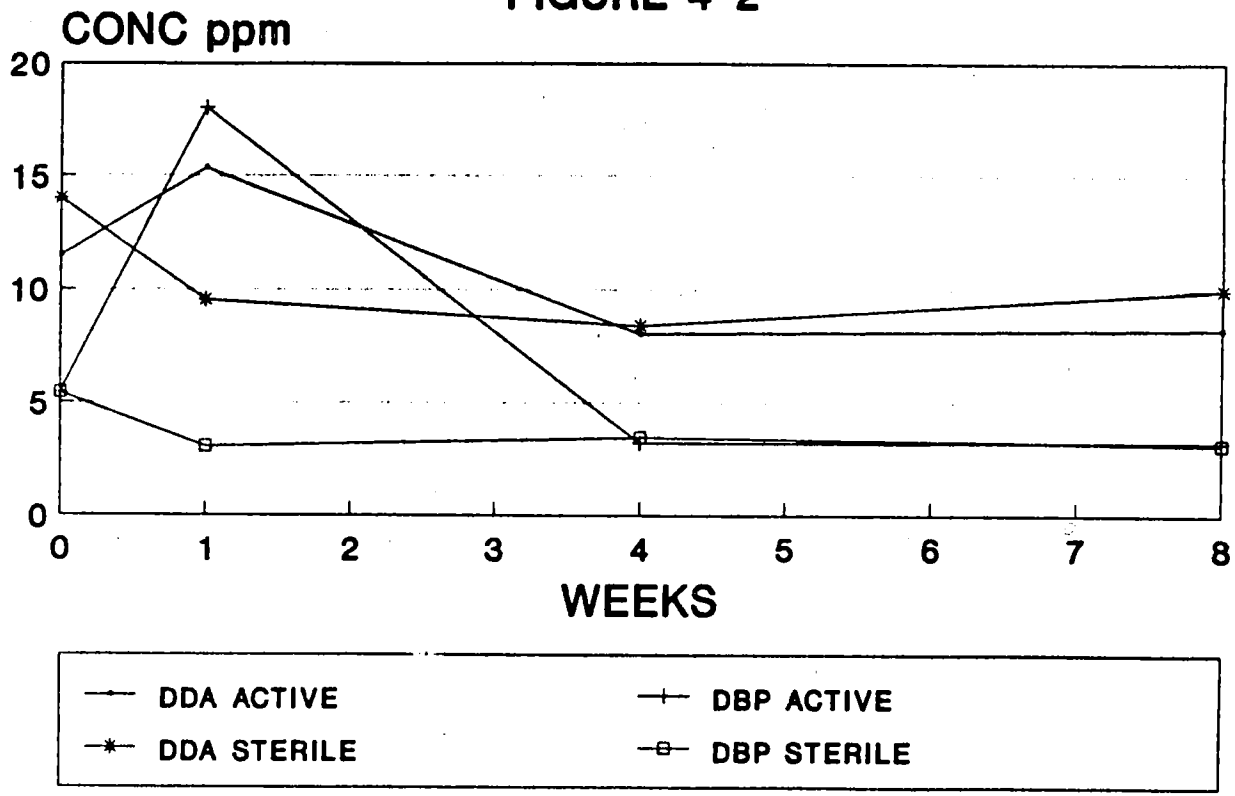
SOLID PHASE STUDY
DDT, DDD, and DDE in SOIL A
FIGURE 4-1



ECOVA

832006/DDTMN

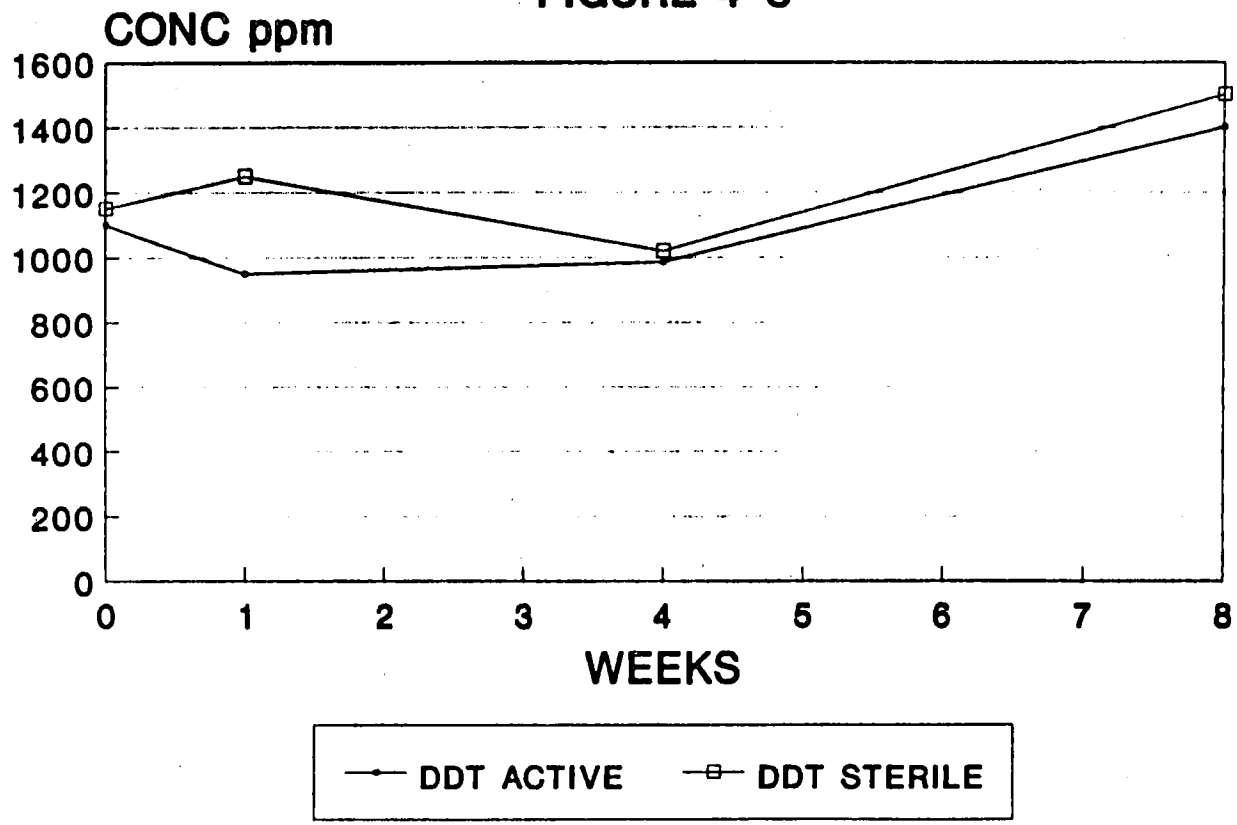
SOLID PHASE STUDY
DDA and DBP in SOIL A
FIGURE 4-2



ECOVA

832006/PANDDA

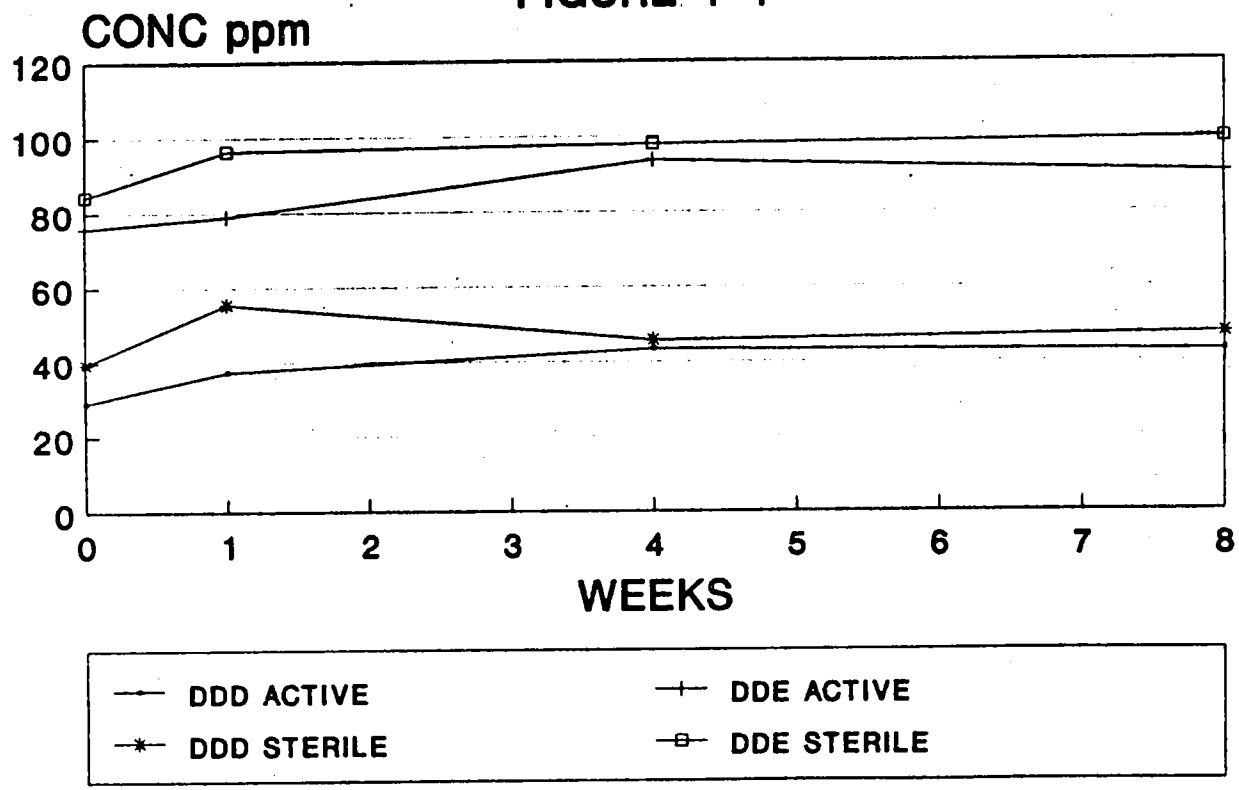
SOLID PHASE STUDY
DDT in SOIL B
FIGURE 4-3



ECOVA

838006/PANDDTB

SOLID PHASE STUDY
DDD and DDE in SOIL B
FIGURE 4-4



632006/PANDDDB

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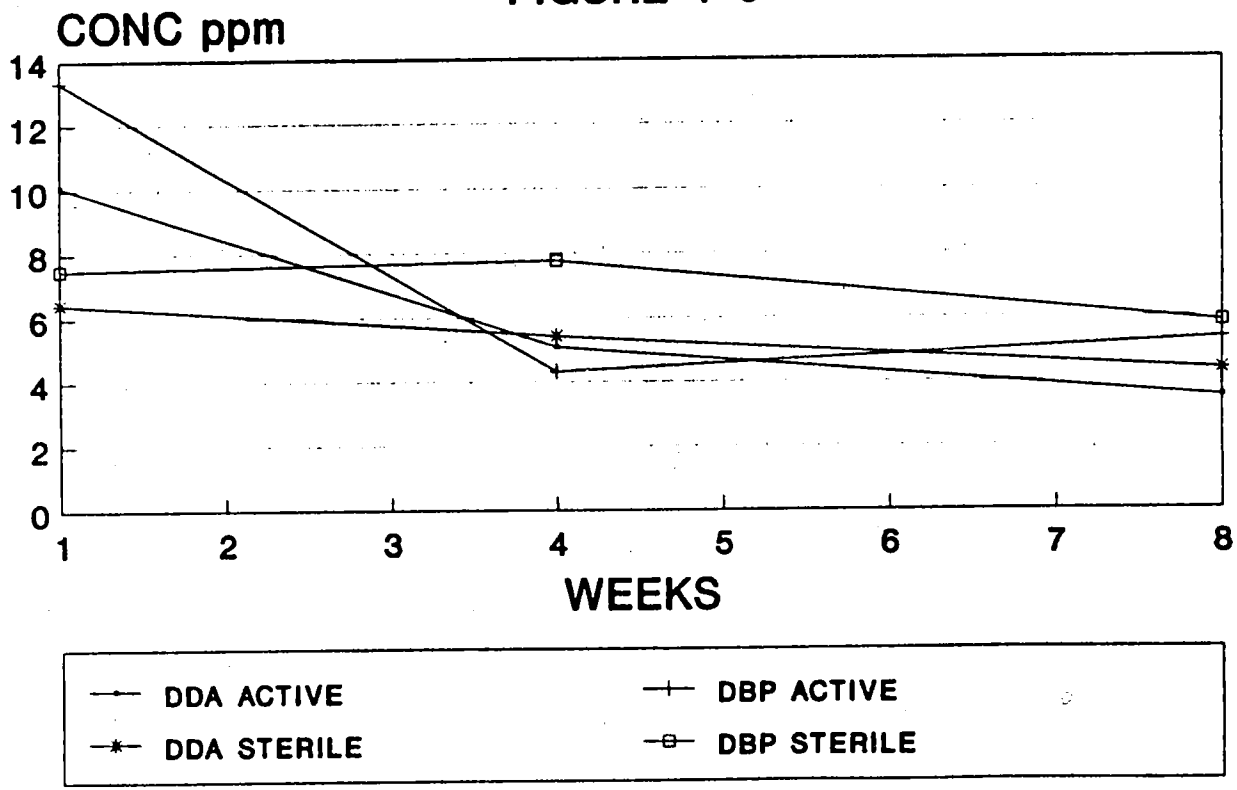
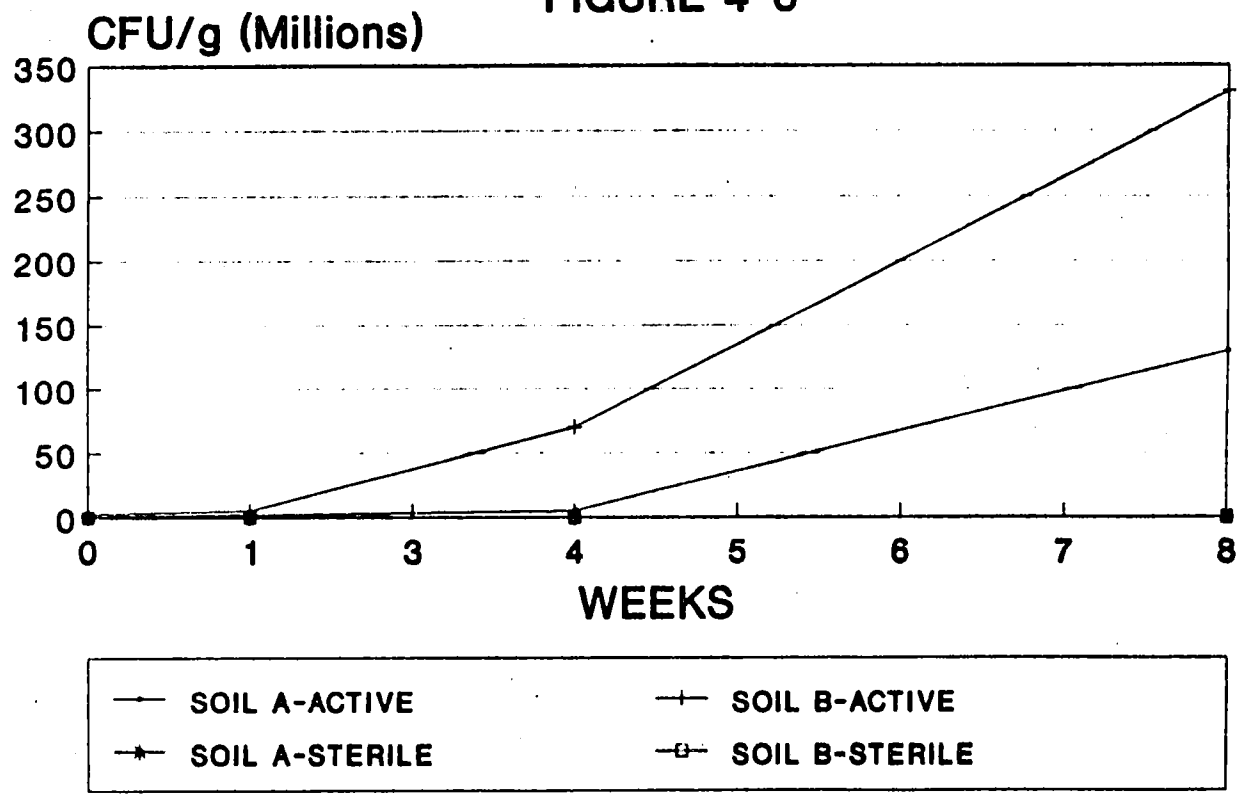
SOLID PHASE STUDY
DDA and DBP in SOIL B
FIGURE 4-5



832006/PANDBPB

ECOVA

MICROBIAL ENUMERATION
SOLID PHASE STUDY
FIGURE 4-6

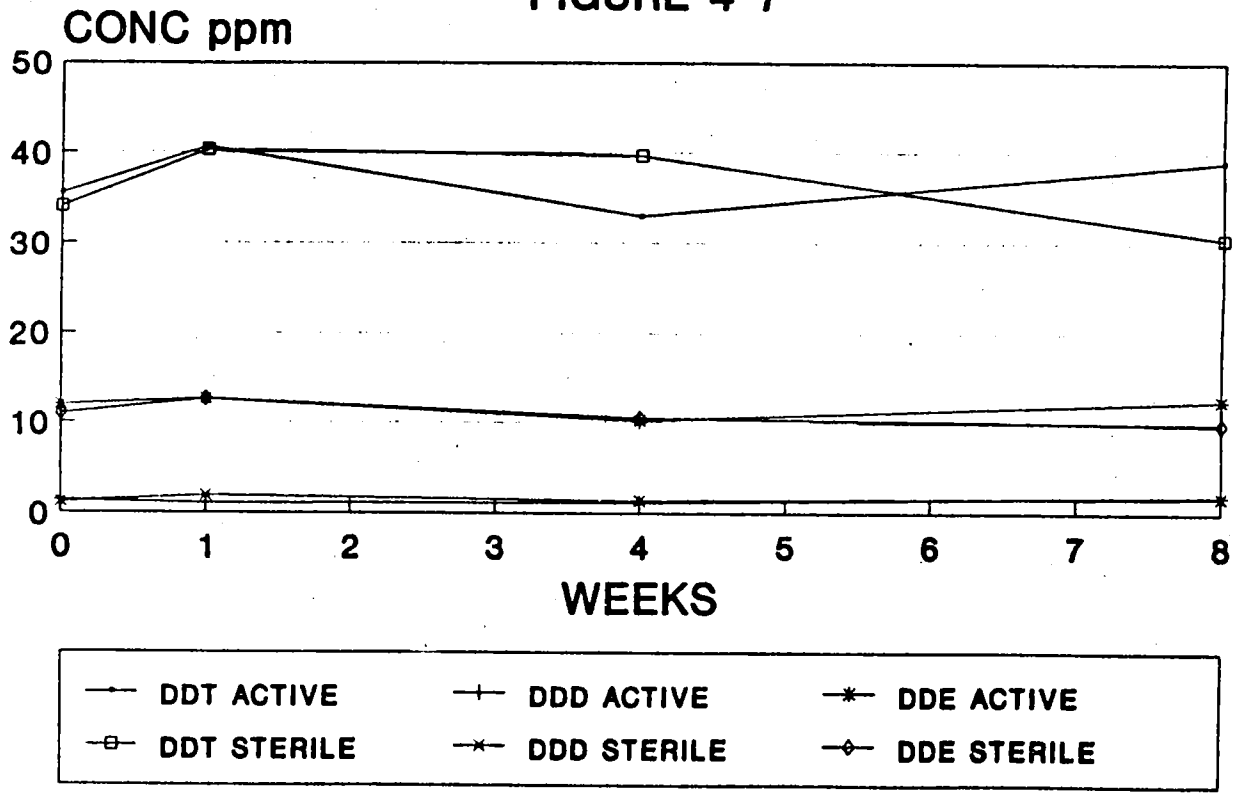


ECOVA

632006/PANMICRO

BOE-C6-0186131

SLURRY STUDY
DDT, DDD, and DDE in SOIL A
FIGURE 4-7



ECOVA

SS2006/SLURDDT

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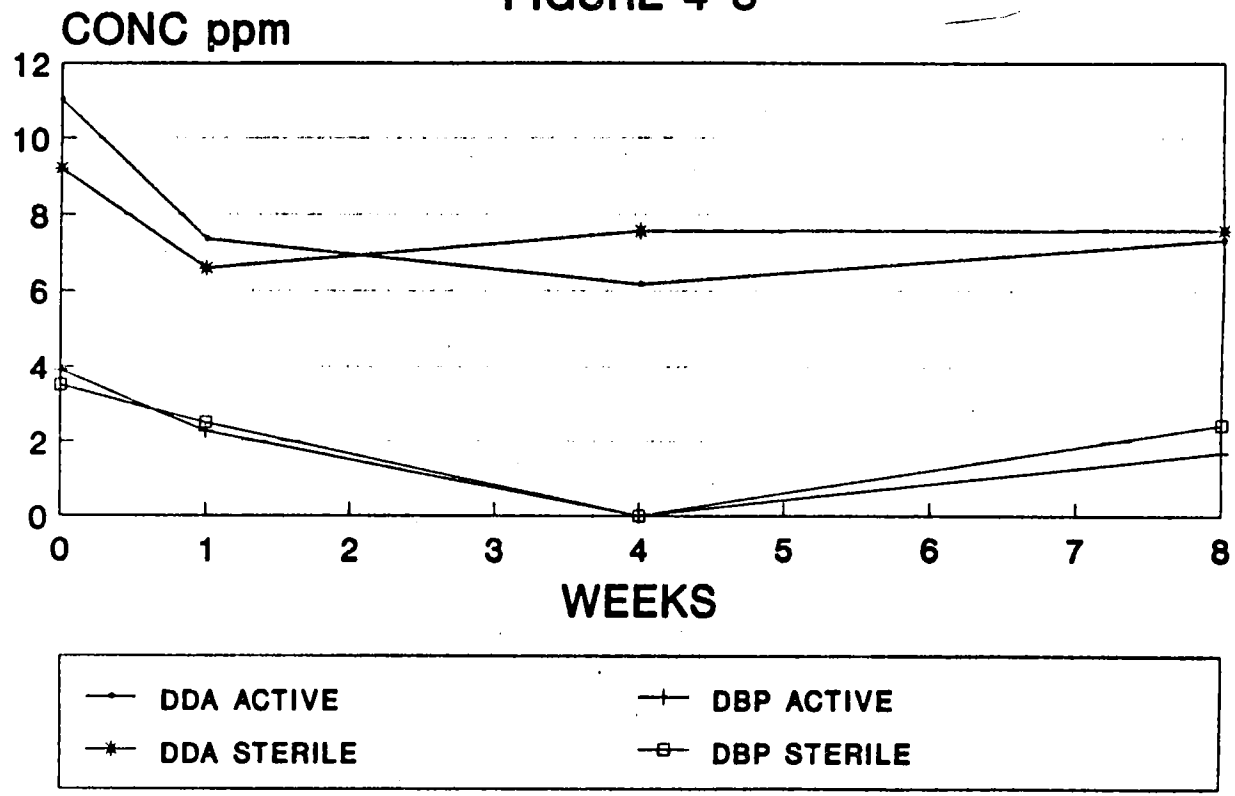
SLURRY STUDY
DDA and DBP in SOIL A
FIGURE 4-8

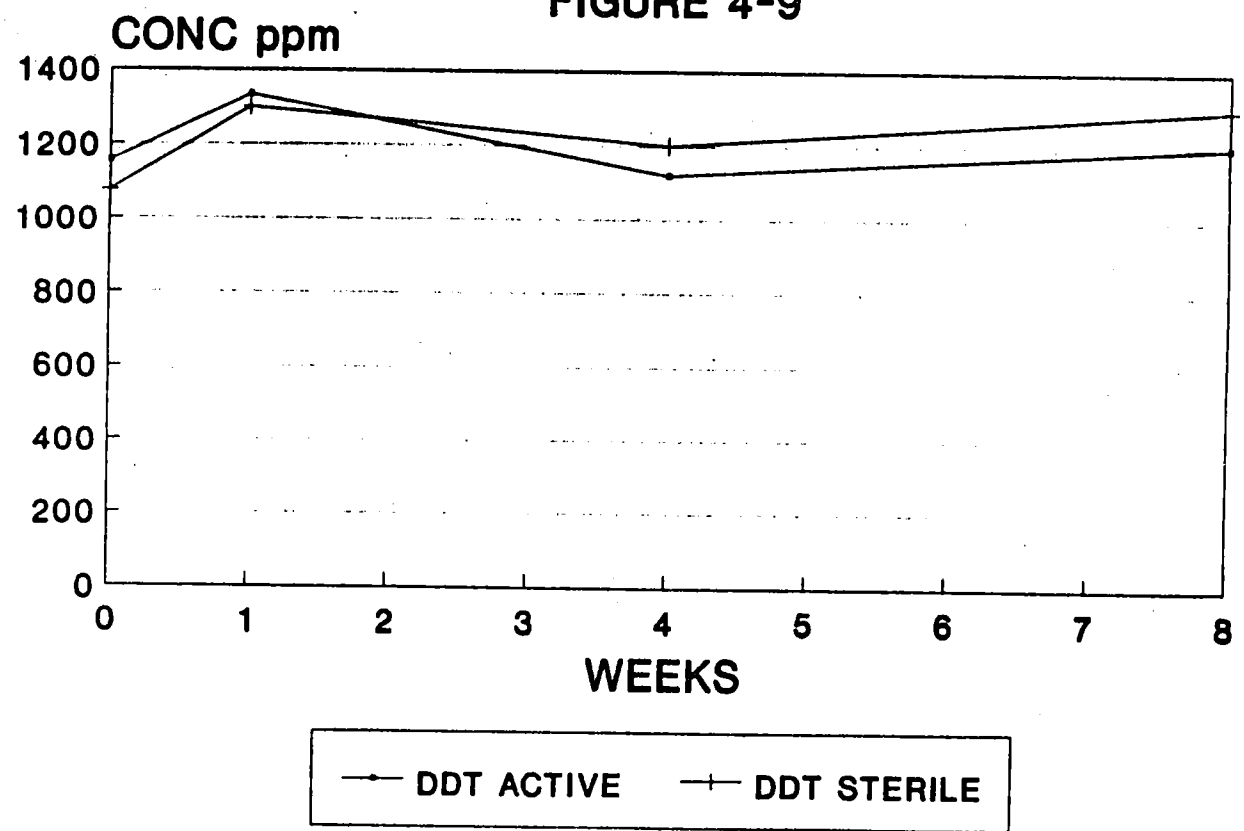


ECOVA

832008/SLURDDA

BOE-C6-0186133

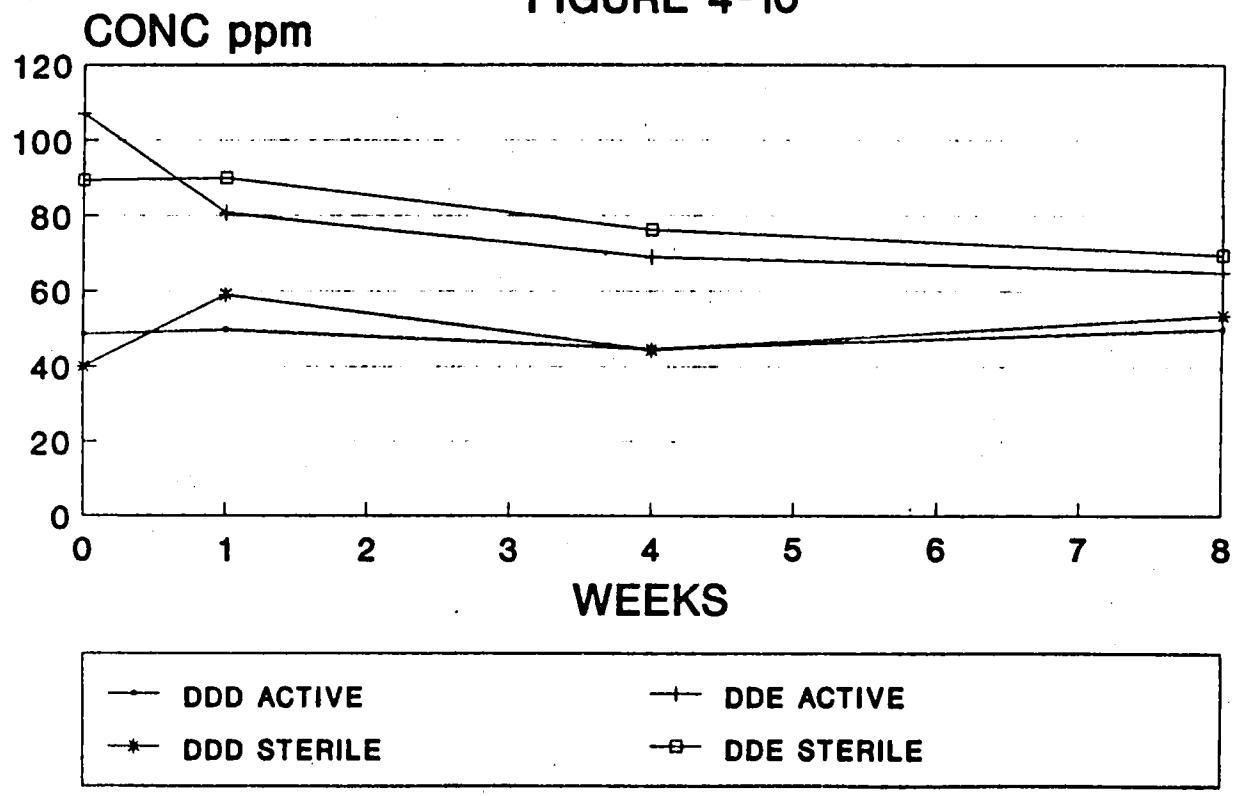
SLURRY STUDY
DDT in SOIL B
FIGURE 4-9



ECOVA

033006/SLURDTB

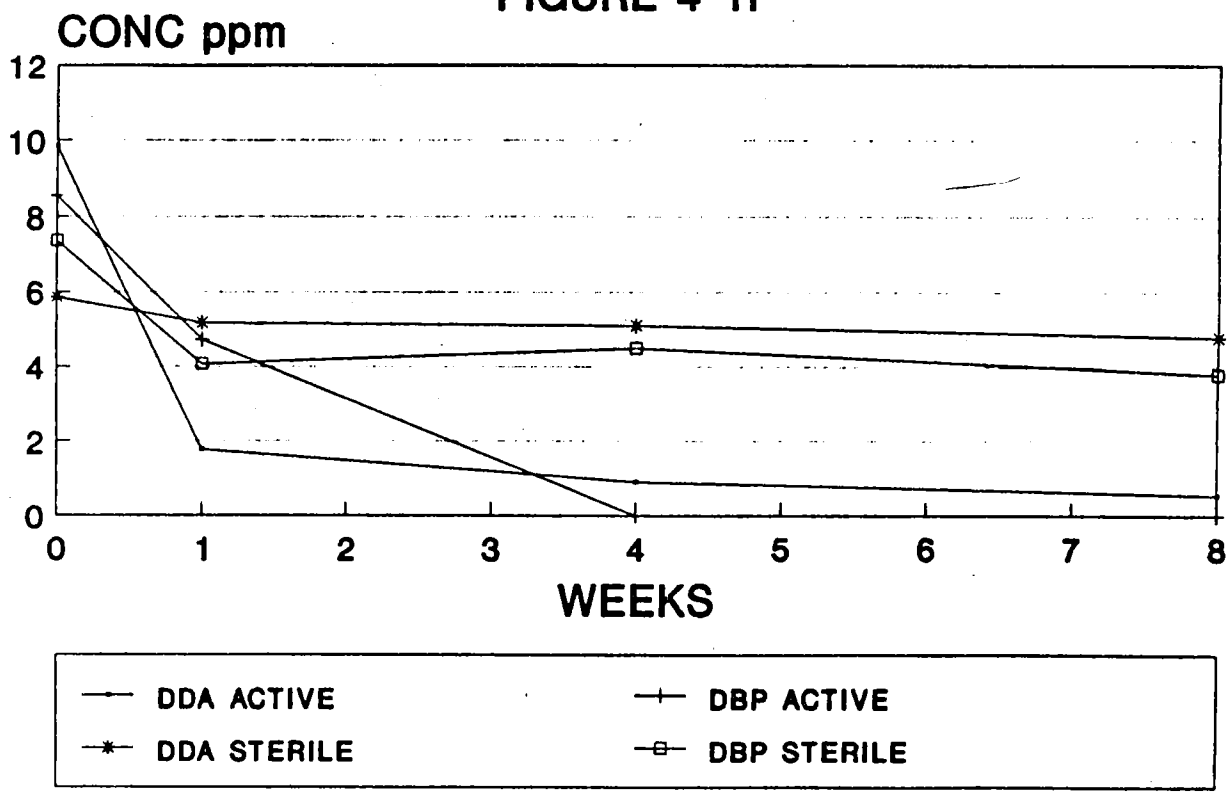
SLURRY STUDY
DDD and DDE in SOIL B
FIGURE 4-10



ECOVA

033006/BLURDEB

SLURRY STUDY
DDA and DBP in SOIL B
FIGURE 4-11



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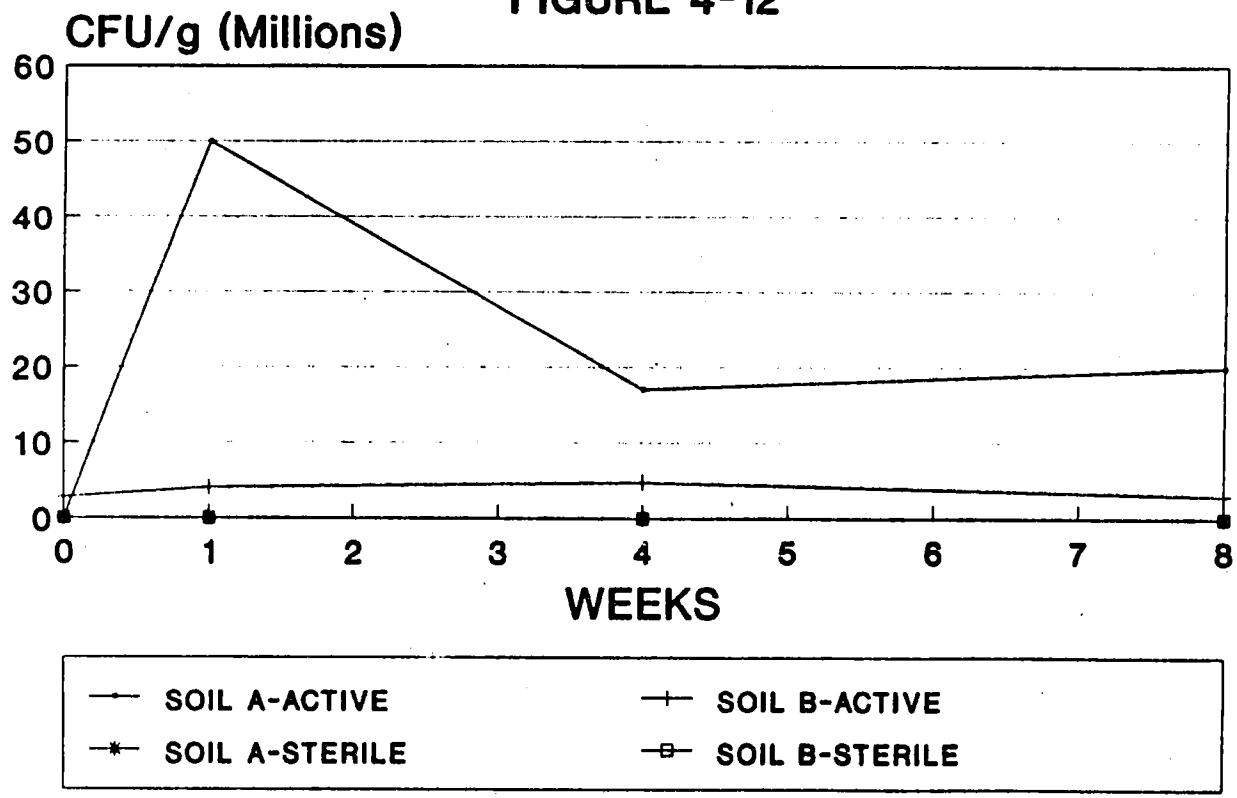
MICROBIAL ENUMERATION
SLURRY STUDY
FIGURE 4-12



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BOE-C6-0186137

5. RECOMMENDATIONS

Chlorobenzene is the major groundwater contaminant at the Montrose site. Of particular concern is that the presence of chlorobenzene and other solvents in the groundwater presents a situation for the enhanced mobilization of DDT, DDD, and DDE. Thus, it may be advantageous to develop a strategy for remediating the chlorobenzene and other volatile organics present in the vadose zone, in order to decrease mobilization of DDT, DDD and DDE.

As a result of the data obtained in the chlorobenzene treatability study, Ecova recommends proceeding to a Phase II pilot demonstration program for the in situ bioremediation of the chlorobenzene and other volatile organics present in groundwater. In situ vadose zone remediation has potential since it has already been demonstrated there are indigenous microorganisms capable of remediating the chlorobenzene and benzene waste components. In situ biotreatment of chlorobenzene and other volatile organics can significantly reduce the treatment time and capital costs for the overall site remediation. Biological treatment has the added advantage of being a destructive process with minimal associated disposal costs.

Several issues must be addressed prior to a field demonstration. During the bench scale studies it was determined that other volatile organics such as benzene, tetrachloroethene and chloroform were present in groundwater collected at the site. Before proceeding with development of an in situ program it may be useful to confirm the biodegradability of these compounds by the indigenous microorganisms. We therefore recommend performing a second laboratory treatability evaluation which specifically addresses the remediation of the other volatile organic compounds found in the groundwater. This study could be performed according to the same procedures and schedule as the chlorobenzene study described in Section 3 of this document. Prior to a field pilot it will also be necessary for ECOVA to perform a laboratory column study to evaluate the affects of enhanced nutrient and oxygen delivery on the aquifer matrix. Specifically, this should be performed to identify any adverse affects on permeability and solute transport. Procedures must be developed and implemented to control and optimize the process in a manner which ensures that the compounds of concern are not mobilized as a result of treatment activities. Development of an above ground bioreactor for the remediation of the groundwater may also be advantageous should in situ not be technically feasible.

APPENDIX A

CHLOROBENZENE TREATABILITY DATA

BOE-C6-0186139

TABLE A-1
Sample Identification
Chlorobenzene Treatability Study
Chlorobenzene by EPA Method 8240

EMS No. (replicates)	Sample Identification
4329 4330	Sterile, Time = 0 days
4331 4332	Nutrient Amended, Time = 0 days
4333 4334	Inoculated, Time = 0 days
4405 4406 4407	Inoculated, Time = 3 days
4408 4409 4410	Nutrient Amended, Time = 3 days
4411 4412 4413	Sterile, Time = 3 days
4415 4416 4417	Sterile, Time = 7 days
4418 4419 4420	Nutrient Amended, Time = 7 days
4421 4422 4423	Inoculated, Time = 7 days
4454 4455 4456	Sterile, Time = 14 days
4457 4458 4459	Nutrient Amended, Time = 14 days
4460 4461 4462	Inoculated, Time = 14 days
4489 4490 4491	Sterile, Time = 21 days

TABLE A-1
Sample Identification
Chlorobenzene Treatability Study
Chlorobenzene by EPA Method 8240

EMS No. (replicates)	Sample Identification
4492 4493 4494	Nutrient Amended, Time = 21 days
4495 4496 4497	Inoculated, Time = 21 days

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

April 27, 1990

Bill Mahaffey
ECOVA

NARRATIVE FOR PNEL 2377
Submission from Pacific Northwest Environmental Laboratory

Enclosed are data summary sheets and supporting documentation for the six samples received on April 17, 1990 of the Hargis/Montrose project. The field identification numbers, corresponding lab identification numbers, and dates collected are listed below.

FIELD ID	LAB ID	DATE COLLECTED
EMS 4329	2377-01	04-17-90
EMS 4330	2377-02	04-17-90
EMS 4331	2377-03	04-17-90
EMS 4332	2377-04	04-17-90
EMS 4333	2377-05	04-17-90
EMS 4334	2377-06	04-17-90

Listed below are anomalies and narratives associated with the receipt and/or analysis of these samples.

No problems were encountered during the analysis of these samples and their associated QC.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

\NAR-0306.377
Enclosures

3820 159th Avenue NE Redmond, WA 98052 (206) 885-0083 FAX (206) 867-2214

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

METHOD REFERENCE

Gas Chromatograph/Mass Spectrometry for Volatile Organics	Method 8240, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, SW-846, 3rd Ed., 1986.

\MTH-0306.377

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

DATA REPORTING QUALIFIERS

Some of these qualifiers may appear in this analytical data report. Soil samples are analyzed and reported on a dry weight basis unless otherwise noted.

ORGANICS QUALIFIERS

A - This flag indicates that a TIC is a suspected aldol-condensation product.

B - Indicates compound was found in the associated blank as well as in the sample.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a target compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

M - Indicates value is taken from a medium level analysis.

ND- Not detected. Detection limit shown in parentheses.

NQ- Not quantitated as...

U - Indicates compound was analyzed for but not detected at the given detection limit. The sample quantitation limit was corrected for dilution and for percent moisture, when applicable.

X - Other specific flags and footnotes may be required to properly define the results. If more than two qualifiers are required for a sample result, the "X" flag combines several flags, as needed. For instance, the "X" flag might combine the "A," "B," and "D" flags for some sample.

* - Indicates spiked compounds used for MS/MSD analysis.

INORGANICS QUALIFIERS

NA- Relative percent difference calculation is not applicable to analytes when not detected.

NC- Not calculated when analyte is not detected.

NS- Not calculated when sample concentration of analyte exceeds spike level by a factor of four or more.

U - Indicates that analyte was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

INORGANICS METHOD QUALIFIERS

CV- Manual Cold Vapor AA

F - FURNACE AA

P - ICP

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

WATER VOLATILE SURROGATE RECOVERY REPORT

	LAB SAMPLE NO.	S1 (TOL)*	S2 (BFB)*	S3 (DCE)*		TOT OUT
01	VBLKB1	100	101	101		0
02	2377-01	101	103	109		0
03	2377-02	101	103	111		0
04	VBLKB2	103	103	103		0
05	2377-03	102	104	106		0
06	2377-04	104	106	110		0
07	2377-05	103	107	109		0
08	2377-06	102	105	109		0
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28						
29						
30						

	QC LIMITS
S1 (TOL) = Toluene-d8	(88-110)
S2 (BFB) = Bromofluorobenzene	(86-115)
S3 (DCE) = 1,2-Dichloroethane-d4	(76-114)

* Column to be used to flag recovery values

D Surrogates diluted out

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY REPORT

Matrix Spike - LAB Sample No.: 2380-02A

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC *	QC LIMITS REC.
1,1-Dichloroethene	50	0	46	92	61-145
Trichloroethene	50	0	46	92	71-120
Benzene	50	0	49	98	76-127
Toluene	50	0	50	100	76-125
Chlorobenzene	50	0	51	102	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC *	% RPD *	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50	46	92	0	14	61-145
Trichloroethene	50	46	92	0	14	71-120
Benzene	50	49	98	0	11	76-127
Toluene	50	50	100	0	13	76-125
Chlorobenzene	50	51	102	0	13	75-130

* Column to be used to flag recovery and RPD values with an asterisk

* Values outside of qc limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS: _____

F32380

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: VBLKB1
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/18/90
Instrument ID: VOA #2

Customer Sample No: NA
Sample Description: METHOD BLANK
Date Collected: NA
Time Collected: NA
Date Received: NA
Date Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	5	U

* See footnote page for data qualifiers (Q)

<GB4182>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2377-01
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/18/90
Instrument ID: VOA #2

Customer Sample No: EMS4329
Sample Description: WATER
Date Collected: 4/17/90
Time Collected: NA
Date Received: 4/17/90
Date Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	110000	

* See footnote page for data qualifiers (Q)

<FB4187>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: VBLKB4
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/25/90
Instrument ID: VOA #2

Customer Sample No: NA
Sample Description: METHOD BLANK
Date Collected: NA
Time Collected: NA
Date Received: NA
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	3	J

* See footnote page for data qualifiers (Q)

FB42225

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2386-07
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/25/90
Instrument ID: VOA #2

Customer Sample No: 4411
Sample Description: WATER
Date Collected: 4/20/90
Time Collected: NA
Date Received: 4/20/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	89000	

* See footnote page for data qualifiers (Q)

<FB4227>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2386-08
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/25/90
Instrument ID: VOA #2

Customer Sample No: 4412
Sample Description: WATER
Date Collected: 4/20/90
Time Collected: NA
Date Received: 4/20/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	93000	

* See footnote page for data qualifiers (Q)

<FB4228>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: I386-09
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/25/90
Instrument ID: VOA #2

Customer Sample No: 4413
Sample Description: WATER
Date Collected: 4/20/90
Time Collected: NA
Date Received: 4/20/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	51000	

* See footnote page for data qualifiers (Q)

<FB4229>

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

WATER VOLATILE SURROGATE RECOVERY REPORT

	LAB SAMPLE NO.	S1 (TOL)*	S2 (BFB)*	S3 (DCE)*		TOT OUT
01	VBLKB2	103	103	103		0
02	2386-01	101	109	104		0
03	2386-02	103	110	107		0
04	VBLKB3	101	103	103		0
05	2386-03	103	108	99		0
06	2386-04	102	106	101		0
07	2386-05	102	109	102		0
08	2386-06	102	109	102		0
09	VBLKB4	99	97	94		0
10	2386-07	101	101	100		0
11	2386-08	99	99	99		0
12	2386-09	101	101	107		0
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

	QC LIMITS
S1 (TOL) = Toluene-d8	(88-110)
S2 (BFB) = Bromofluorobenzene	(86-115)
S3 (DCE) = 1,2-Dichloroethane-d4	(76-114)

* Column to be used to flag recovery values

D Surrogates diluted out

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY REPORT

Matrix Spike - LAB Sample No.: 2390-02A

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	50	0	46	92	61-145
Trichloroethene	50	0	46	92	71-120
Benzene	50	0	49	98	76-127
Toluene	50	0	50	100	76-125
Chlorobenzene	50	0	51	102	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50	46	92	0	14	61-145
Trichloroethene	50	46	92	0	14	71-120
Benzene	50	49	98	0	11	76-127
Toluene	50	50	100	0	13	76-125
Chlorobenzene	50	51	102	0	13	75-130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of qc limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS: _____

F32380

ECOVA

CHAIN-OF-CUSTODY RECORD/REQUEST FOR ANALYSIS

CONTROL NO. M 1224

PROJECT NAME/NUMBER Hargis/Montrose 832005

PHASE 035 TASK 130 SUB TASK 1005

SUBMITTED BY # Krauskopf PROJECT MANAGER MAHAFFEY

LAB DESTINATION PNEL

SEND LAB REPORT TO MAHAFFEY

DATE REPORT REQUIRED 5-11-90

PNEL 2386

Date of Collection 4/20/90 as per Chris Kraskoff of ECOVA

	Sample Number	Sample Type/ Description	Lab Notebook Page	Sample Volume/Weight	Requested Testing Program	Special Instructions	Storage Conditions
01	4405	water		40 mL	8240	report Chlorobenzene only	4°C, 4 Drops
02	4406						conc HCl
03	4407						
04	4408						
05	4409						
06	4410						
07	4411						
08	4412						
09	4413						

Sample

TURNAROUND TIME: (Rush must be approved by the Project Manager) ☑ Normal ☐ Rush

POSSIBLE HAZARD IDENTIFICATION (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)

NON HAZARDOUS ☐ FLAMMABLE ☐ SKIN IRRITANT ☐ HIGHLY TOXIC ☑ OTHER (Specify) EMS #'s 4411, 4412, 4413 HAVE mercuric chloride in them

SIGNATURES:

NAME	DATE	TIME	NAME	DATE	TIME	NAME	DATE	TIME
1. Chris Kraskoff	4/20/90	16:00 hr.	2.			3.		
Relinquished By			Relinquished By			Relinquished By		
[illegible] PNEL	4/20/90	1600						
Received By			Received By			Received By		

4525

BOE-C6-0186155

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

May 10, 1990

Bill Mahaffey
ECOVA

NARRATIVE FOR PNEL 2391
Submission from Pacific Northwest Environmental Laboratory

Enclosed are data summary sheets and supporting documentation for the nine samples received on April 24, 1990 of the 832005-035-130-1002 Hargis Montrose project. The field identification numbers, corresponding lab identification numbers, and dates collected are listed below.

FIELD ID	LAB ID	DATE COLLECTED
EMS-4415	2391-01	04-24-90
EMS-4416	2391-02	04-24-90
EMS-4417	2391-03	04-24-90
EMS-4418	2391-04	04-24-90
EMS-4419	2391-05	04-24-90
EMS-4420	2391-06	04-24-90
EMS-4421	2391-07	04-24-90
EMS-4422	2391-08	04-24-90
EMS-4423	2391-09	04-24-90

Listed below are anomalies and narratives associated with the receipt and/or analysis of these samples.

Volatile

There were no analytical problems associated with the volatile analysis of these samples.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

David A. Wunderlich

\NAR-0306.391
Enclosures

3820 159th Avenue NE Redmond, WA 98052 (206) 885-0083 FAX (206) 867-2214

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

METHOD REFERENCE

Gas Chromatograph/Mass Spectrometry for Volatile Organics	Method 8240, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, SW-846, 3rd Ed., 1986.

\MTH-0306.391

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

DATA REPORTING QUALIFIERS

Some of these qualifiers may appear in this analytical data report. Soil samples are analyzed and reported on a dry weight basis unless otherwise noted.

ORGANICS QUALIFIERS

A - This flag indicates that a TIC is a suspected aldol-condensation product.

B - Indicates compound was found in the associated blank as well as in the sample.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a target compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

M - Indicates value is taken from a medium level analysis.

ND- Not detected. Detection limit shown in parentheses.

NQ- Not quantitated as...

U - Indicates compound was analyzed for but not detected at the given detection limit. The sample quantitation limit was corrected for dilution and for percent moisture, when applicable.

X - Other specific flags and footnotes may be required to properly define the results. If more than two qualifiers are required for a sample result, the "X" flag combines several flags, as needed. For instance, the "X" flag might combine the "A," "B," and "D" flags for some sample.

* - Indicates spiked compounds used for MS/MSD analysis.

INORGANICS QUALIFIERS

NA- Relative percent difference calculation is not applicable to analytes when not detected.

NC- Not calculated when analyte is not detected.

NS- Not calculated when sample concentration of analyte exceeds spike level by a factor of four or more.

U - Indicates that analyte was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

INORGANICS METHOD QUALIFIERS

CV- Manual Cold Vapor AA

F - FURNACE AA

P - ICP

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

WATER VOLATILE SURROGATE RECOVERY REPORT

	LAB SAMPLE NO.	S1 (TOL)*	S2 (BFB)*	S3 (DCE)*		TOT OUT
01	VBLKB4	99	97	94		0
02	2391-01	101	103	107		0
03	2391-02	100	102	105		0
04	2391-03	105	106	111		0
05	2391-04	99	105	103		0
06	VBLKB5	99	99	98		0
07	2391-05	98	107	104		0
08	2391-06	98	106	104		0
09	2391-07	97	105	102		0
10	2391-08	98	105	101		0
11	2391-09	99	103	99		0
12						
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26						
27						
28						
29						
30						

	QC LIMITS
S1 (TOL) = Toluene-d8	(88-110)
S2 (BFB) = Bromofluorobenzene	(95-115)
S3 (DCE) = 1,2-Dichloroethane-d4	(76-114)

* Column to be used to flag recovery values

D Surrogates diluted out

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: PNELI

Matrix Spike Sample No.: X3007

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC *	QC LIMITS REC.
1,1-Dichloroethene	50	0	42	84	61-145
Trichloroethene	50	0	46	92	71-120
Benzene	50	0	47	94	76-127
Toluene	50	0	48	96	76-125
Chlorobenzene	50	0	48	96	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC *	% RPD *	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50	43	86	2	14	61-145
Trichloroethene	50	46	92	0	14	71-120
Benzene	50	48	96	2	11	76-127
Toluene	50	49	98	2	13	76-125
Chlorobenzene	50	49	98	2	13	75-130

* Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS: _____

FORM3A

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: VBLKB4
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/25/90
Instrument ID: VOA #2

Customer Sample No: NA
Sample Description: METHOD BLANK
Date Collected: NA
Time Collected: NA
Date Received: NA
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	3	J

* See footnote page for data qualifiers (Q)

<FB4226>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2391-01
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/25/90
Instrument ID: VOA #2

Customer Sample No: EMS4415
Sample Description: T7-S
Date Collected: 4/24/90
Time Collected: NA
Date Received: 4/24/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	88000	B

* See footnote page for data qualifiers (Q)

<FB4230>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 8391-02
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/25/90
Instrument ID: VOA #2

Customer Sample No: EMS4416
Sample Description: T7-S
Date Collected: 4/24/90
Time Collected: NA
Date Received: 4/24/90
Date Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	88000	B

* See footnote page for data qualifiers (Q)

(FB4231)

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2391-03
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/25/90
Instrument ID: VOA #2

Customer Sample No: EMS4417
Sample Description: T7-S
Date Collected: 4/24/90
Time Collected: NA
Date Received: 4/24/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	89000	B

* See footnote page for data qualifiers (Q)

<FB4232>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2391-04
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mLs
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 4/25/90
Instrument ID: VOA #2

Customer Sample No: EMS4418
Sample Description: T7-N
Date Collected: 4/24/90
Time Collected: NA
Date Received: 4/24/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	2	JB

* See footnote page for data qualifiers (Q)

<FB4233>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: VBLK85
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/03/90
Instrument ID: VOA #2

Customer Sample No: NA
Sample Description: METHOD BLANK
Date Collected: NA
Time Collected: NA
Date Received: NA
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	5	U

* See footnote page for data qualifiers (Q)

<FB4273>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2391-05
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/03/90
Instrument ID: VOA #2

Customer Sample No: EMS4419
Sample Description: T7-N
Date Collected: 4/24/90
Time Collected: NA
Date Received: 4/24/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene*	1	J

* See footnote page for data qualifiers (Q)

<FB4278>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2391-06
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/03/90
Instrument ID: VOA #2

Customer Sample No: EMS4420
Sample Description: T7-N
Date Collected: 4/24/90
Time Collected: NA
Date Received: 4/24/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	1	J

* See footnote page for data qualifiers (Q)

<FB4277>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2391-07
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/03/90
Instrument ID: VOA #2

Customer Sample No: EMS4421
Sample Description: T7-I
Date Collected: 4/24/90
Time Collected: NA
Date Received: 4/24/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	5	U

* See footnote page for data qualifiers (Q)

<FB4276>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2391-09
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/03/90
Instrument ID: VOA #2

Customer Sample No: EMS4422
Sample Description: T7-I
Date Collected: 4/24/90
Time Collected: NA
Date Received: 4/24/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	5	U

* See footnote page for data qualifiers (Q)

<FB4275>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2391-09
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/03/90
Instrument ID: VOA #2

Customer Sample No: EMS4423
Sample Description: T7-I
Date Collected: 4/24/90
Time Collected: NA
Date Received: 4/24/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	1	J

* See footnote page for data qualifiers (Q)

<FB4274>

ECOVA

CHAIN-OF-CUSTODY RECORD/REQUEST FOR ANALYSIS

CONTROL NO. M 1225

PROJECT NAME/NUMBER Hargis/montrose # 832005

PHASE 935 TASK 130 SUB TASK 1003

SUBMITTED BY Hill PROJECT MANAGER Mahaffey

LAB DESTINATION PNEL

SEND LAB REPORT TO Hill/Mahaffey

DATE REPORT REQUIRED 5/15/90

PNEL 2391

Date of Collection: 04/24/90 as per K. Hill of ECOVA

	Sample Number	Sample Type/ Description	Lab Note-book Page	Sample Volume/Weight	Requested Testing Program	Special Instructions	Storage Conditions
01	EMS-4415	water - T7 - S		40ml VOA	method 8240	report chlorobenzene	4°C,
02	- 4416	- S				only	+ 4 drops
03	- 4417	- S					conc HCl
04	- 4418	- N					
05	- 4419	- N					
06	- 4420	- N					
07	- 4421	- I					
08	- 4422	- I					
09	- 4423	- I					

Sample OK

TURNAROUND TIME: (Rush must be approved by the Project Manager) ☒ Normal ☐ Rush

POSSIBLE HAZARD IDENTIFICATION (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances) volatiles

NON-HAZARDOUS ☐ FLAMMABLE ☐ SKIN IRRITANT ☐ HIGHLY TOXIC ☒ OTHER (Specify) 0.5% W/N HgCl2 in # 4415, 4416, 4417

SIGNATURES:

NAME	DATE	TIME	NAME	DATE	TIME	NAME	DATE	TIME
1. Kathy Hill (ECOVA) Relinquished By	4/24/90	3:01 pm	2. Relinquished By			3. Relinquished By		
Received By	04/24/90		Received By			Received By		

BOE-C6-0186172

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

METHOD REFERENCE

Gas Chromatograph/Mass Spectrometry for Volatile Organics	Method 8240, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, SW-846, 3rd Ed., 1986.

\MTH-0306.399

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

DATA REPORTING QUALIFIERS

Some of these qualifiers may appear in this analytical data report. Soil samples are analyzed and reported on a dry weight basis unless otherwise noted.

ORGANICS QUALIFIERS

A - This flag indicates that a TIC is a suspected aldol-condensation product.

B - Indicates compound was found in the associated blank as well as in the sample.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor.

E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a target compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

M - Indicates value is taken from a medium level analysis.

ND- Not detected. Detection limit shown in parentheses.

NQ- Not quantitated as...

U - Indicates compound was analyzed for but not detected at the given detection limit. The sample quantitation limit was corrected for dilution and for percent moisture, when applicable.

X - Other specific flags and footnotes may be required to properly define the results. If more than two qualifiers are required for a sample result, the "X" flag combines several flags, as needed. For instance, the "X" flag might combine the "A," "B," and "D" flags for some sample.

* - Indicates spiked compounds used for MS/MSD analysis.

INORGANICS QUALIFIERS

NA- Relative percent difference calculation is not applicable to analytes when not detected.

NC- Not calculated when analyte is not detected.

NS- Not calculated when sample concentration of analyte exceeds spike level by a factor of four or more.

U - Indicates that analyte was analyzed for but not detected. The number is the minimum attainable detection limit for the sample.

INORGANICS METHOD QUALIFIERS

CV- Manual Cold Vapor AA

F - FURNACE AA

P - ICP

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

WATER VOLATILE SURROGATE RECOVERY REPORT

	LAB SAMPLE NO.	S1 (TOL)*	S2 (BFB)*	S3 (DCE)*		TOT OUT
01	VBLKB1	100	99	98		0
02	2399-01	103	103	103		0
03	2399-02	101	103	105		0
04	2399-03	102	105	105		0
05	2399-04	101	107	106		0
06	VBLKA1	100	98	92		0
07	2399-05	104	102	109		0
08	2399-06	100	101	107		0
09	2399-07	107	108	109		0
10	2399-08	97	95	102		0
11	2399-09	104	106	111		0
12						
13						
14						
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27						
28						
29						
30						

	QC LIMITS
S1 (TOL) = Toluene-d8	(88-110)
S2 (BFB) = Bromofluorobenzene	(96-115)
S3 (DCE) = 1,2-Dichloroethane-d4	(76-114)

* Column to be used to flag recovery values

D Surrogates diluted out

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY REPORT

Matrix Spike - LAB Sample No.: 2408-01

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC *	QC LIMITS REC.
1,1-Dichloroethene	50	0	40	80	61-145
Trichloroethene	50	0	46	92	71-120
Benzene	50	0	48	96	76-127
Toluene	50	0	49	98	76-125
Chlorobenzene	50	0	50	100	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC *	% RPD *	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50	40	80	0	14	61-145
Trichloroethene	50	45	90	2	14	71-120
Benzene	50	48	96	0	11	76-127
Toluene	50	49	98	0	13	76-125
Chlorobenzene	50	50	100	0	13	75-130

* Column to be used to flag recovery and RPD values with an asterisk

• Values outside of qc limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS: _____

F32408

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: VBLKB1
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/08/90
Instrument ID: VOA #2

Customer Sample No: NA
Sample Description: METHOD BLANK
Date Collected: NA
Time Collected: NA
Date Received: NA
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	5	U

* See footnote page for data qualifiers (Q)

<FB4286>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2399-01
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/08/90
Instrument ID: VOA #2

Customer Sample No: EMS4454
Sample Description: T14-S
Date Collected: 5/01/90
Time Collected: NA
Date Received: 5/01/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	110000	

* See footnote page for data qualifiers (Q)

<FB4257>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2399-02
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/08/90
Instrument ID: VOA #2

Customer Sample No: EM54455
Sample Description: T14-S
Date Collected: 5/01/90
Time Collected: NA
Date Received: 5/01/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	100000	

* See footnote page for data qualifiers (Q)

<FB4238>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2399-03
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/08/90
Instrument ID: VOA #2

Customer Sample No: EMS4456
Sample Description: T14-S
Date Collected: 5/01/90
Time Collected: NA
Date Received: 5/01/90
Date Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	100000	

* See footnote page for data qualifiers (Q)

<FB4289>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2399-04
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/08/90
Instrument ID: VOA #2

Customer Sample No: EMS44S7
Sample Description: T14-N
Date Collected: 5/01/90
Time Collected: NA
Date Received: 5/01/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	5	U

* See footnote page for data qualifiers (Q)

<FB4290>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: VBLKA1
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/09/90
Instrument ID: VOA #1

Customer Sample No: NA
Sample Description: METHOD BLANK
Date Collected: NA
Time Collected: NA
Date Received: NA
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	5	U

* See footnote page for data qualifiers (Q)

(FA4346)

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2399-05
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/09/90
Instrument ID: VOA #1

Customer Sample No: EMS4458
Sample Description: T14-N
Date Collected: 5/01/90
Time Collected: NA
Date Received: 5/01/90
Date Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	5	U

* See footnote page for data qualifiers (Q)

<FA4348>

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2399-06
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/09/90
Instrument ID: VOA #1

Customer Sample No: EMS4459
Sample Description: T14-N
Date Collected: 5/01/90
Time Collected: NA
Date Received: 5/01/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	5	U

* See footnote page for data qualifiers (Q)

(FA4349)

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2399-07
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/09/90
Instrument ID: VOA #1

Customer Sample No: EMS4460
Sample Description: T14-I
Date Collected: 5/01/90
Time Collected: NA
Date Received: 5/01/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	2	J

* See footnote page for data qualifiers (Q)

(FA4350)

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2399-08
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/09/90
Instrument ID: VOA #1

Customer Sample No: EM54461
Sample Description: T14-I
Date Collected: 5/01/90
Time Collected: NA
Date Received: 5/01/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	2	J

* See footnote page for data qualifiers (Q)

(FA4351)

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2399-09
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/09/90
Instrument ID: VOA #1

Customer Sample No: EMS4462
Sample Description: T14-I
Date Collected: 5/01/90
Time Collected: NA
Date Received: 5/01/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	4	J

* See footnote page for data qualifiers (Q)

<FA4352>

4559

ECOVA

CHAIN-OF-CUSTODY RECORD/REQUEST FOR ANALYSIS

CONTROL NO M 1232

PROJECT NAME/NUMBER thrifgis/montrose 832005

PHASE 035 TASK 130 SUB TASK 1150 S

SUBMITTED BY Hill PROJECT MANAGER Mathiffey

LAB DESTINATION PNEL

SEND LAB REPORT TO Hill/Mathiffey

DATE REPORT REQUIRED 09/11/90

PNEL 2399

Date collected is 05/01/90 as per Kathy Hillor ECOVA

	Sample Number	Sample Type/ Description	Lab Note-book Page	Sample Volume/Weight	Requested Testing Program	Special Instructions	Storage Conditions
01	EMS-4454	water T14 S	213/151	40ml VOA	method 8240		4°C, dark
02	4455	S			report chlorobenzene		4 degrees cor
03	4456	S			only		4°C
04	4457	N					
05	4458	N					
06	4459	N					
07	4460	I					
08	4461	I					
09	4462	I					

sample

small air bubble

sample OK 5/1/90

TURNAROUND TIME: (Rush must be approved by the Project Manager) ☑ Normal ☐ Rush

POSSIBLE HAZARD IDENTIFICATION (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances)

NON-HAZARDOUS ☐ FLAMMABLE ☐ SKIN IRRITANT ☐ HIGHLY TOXIC ☒ OTHER (Specify) 0.5% Methylene Cl2 in # 4454-4456.

SIGNATURES:

NAME	DATE	TIME	NAME	DATE	TIME	NAME	DATE	TIME
1. Kathy Hill / ECOVA	05-01-90	11:45	2.			3.		
Relinquished By			Relinquished By			Relinquished By		
[illegible]	05/01/90	11:45						
Received By			Received By			Received By		

CCDDA 7M7

BOE-C6-0186188

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY
3820 159th Avenue NE Redmond, WA 98052 (206) 885-0083 FAX (206) 867-2214

May 29, 1990

Bill Mahaffey
ECOVA

NARRATIVE FOR PNEL 2412
Submission from Pacific Northwest Environmental Laboratory

Enclosed are data summary sheets and supporting documentation for the nine samples received on May 8, 1990 of the 832005 Hargis/Montrose project. The field identification numbers, corresponding lab identification numbers, and dates collected are listed below.

FIELD ID	LAB ID	DATE COLLECTED
4489	2412-01	05-08-90
4490	2412-02	05-08-90
4491	2412-03	05-08-90
4492	2412-04	05-08-90
4493	2412-05	05-08-90
4494	2412-06	05-08-90
4495	2412-07	05-08-90
4496	2412-08	05-08-90
4497	2412-09	05-08-90

Listed below are anomalies and narratives associated with the receipt and/or analysis of these samples.

There were no analytical problems associated with the volatile analysis of these samples. Project specific quality control (ie. MS/MSD) was not performed on the samples as requested.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Sincerely,

\NAR-2412
Enclosures

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

METHOD REFERENCE

Gas Chromatograph/Mass Spectrometry for Volatile Organics	Method 8240, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, SW-846, 3rd Ed., 1986.

\MTH-2412

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

WATER VOLATILE SURROGATE RECOVERY REPORT

	LAB SAMPLE NO.	S1 (TOL)*	S2 (BFB)*	S3 (DCE)*		TOT OUT
01	VSLKB1	102	103	103		0
02	2412-01	102	104	103		0
03	2412-02	99	101	104		0
04	2412-03	95	97	101		0
05	2412-04	101	103	107		0
06	2412-05	100	104	108		0
07	2412-06	98	103	107		0
08	2412-07	99	103	108		0
09	2412-08	98	104	110		0
10	2412-09	98	104	109		0
11						
12						
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22						
23						
24						
25						
26						
27						
28						
29						
30						

	QC LIMITS
S1 (TOL) = Toluene-d8	(68-110)
S2 (BFB) = Bromofluorobenzene	(86-115)
S3 (DCE) = 1,2-Dichloroethane-d4	(76-114)

* Column to be used to flag recovery values

D Surrogates diluted out

PACIFIC NORTHWEST ENVIRONMENTAL LABORATORY

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY REPORT

Matrix Spike - LAB Sample No.: 2411-04A

COMPOUND	SPIKE ADDED ug/L	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC *	QC LIMITS REC.
1,1-Dichloroethene	50	0	40	80	61-145
Trichloroethene	50	0	45	90	71-120
Benzene	50	0	47	94	76-127
Toluene	50	0	48	96	76-125
Chlorobenzene	50	0	50	100	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC *	% RPD *	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50	40	80	0	14	61-145
Trichloroethene	50	44	88	2	14	71-120
Benzene	50	47	94	0	11	76-127
Toluene	50	49	98	2	13	76-125
Chlorobenzene	50	50	100	0	13	75-130

* Column to be used to flag recovery and RPD values with an asterisk

* Values outside of qc limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS: _____

F32411

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: VBLKB1
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 5.0mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: NA
Sample Description: METHOD BLANK
Date Collected: NA
Time Collected: NA
Date Received: NA
Date Release Authorized:

C.A.S. Number	Compound	ug/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-69-4	Trichlorofluoromethane	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	trans-1,3-Dichloropropene	5	U
110-75-8	2-Chloroethylvinyl Ether	10	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

* See footer page for data qualifiers

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2412-01
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: 4489
Sample Description: T21-S
Date Collected: 5/08/90
Time Collected: NA
Date Received: 5/08/90
Date Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	100000	

* See footnote page for data qualifiers (Q)

FB4347

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC MS PURGE AND TRAP)

Lab Sample ID: 2412-02
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: 4490
Sample Description: T21-5
Date Collected: 5/08/90
Time Collected: NA
Date Received: 5/08/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	102000	

* See footnote page for data qualifiers (Q)

FB4348.

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2412-03
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.005mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: 4491
Sample Description: T21-S
Date Collected: 5/09/90
Time Collected: NA
Date Received: 5/09/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
108-90-7	Chlorobenzene	100000	

* See footnote page for data qualifiers (Q)

(FB4349)

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC-MS PURGE AND TRAP)

Lab Sample ID: 2412-04
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.10mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: 4492
Sample Description: TC1-N
Date Collected: 5/08/90
Time Collected: NA
Date Received: 5/08/90
Date Release Authorized:

C.A.S. Number	Compound	ug/L	Q
74-87-3	Chloromethane	500	U
74-83-9	Bromomethane	500	U
75-01-4	Vinyl Chloride	500	U
75-00-3	Chloroethane	500	U
75-09-2	Methylene Chloride	620	
67-64-1	Acetone	500	U
75-15-0	Carbon Disulfide	250	U
75-69-4	Trichlorofluoromethane	250	U
75-35-4	1,1-Dichloroethene	250	U
75-34-3	1,1-Dichloroethane	250	U
540-59-0	1,2-Dichloroethene (total)	250	U
67-66-3	Chloroform	9000	
107-06-2	1,2-Dichloroethane	250	U
78-93-3	2-Butanone	500	U
71-55-6	1,1,1-Trichloroethane	250	U
56-23-5	Carbon Tetrachloride	250	U
108-05-4	Vinyl Acetate	500	U
75-27-4	Bromodichloromethane	250	U
78-87-5	1,2-Dichloropropane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	250	U
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	250	U
71-43-2	Benzene	250	U
10061-02-6	trans-1,3-Dichloropropene	250	U
110-75-8	2-Chloroethylvinyl Ether	500	U
75-25-2	Bromoform	250	U
108-10-1	4-Methyl-2-Pentanone	500	U
591-78-6	2-Hexanone	500	U
127-18-4	Tetrachloroethene	1700	
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	250	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
100-42-5	Styrene	250	U
1330-20-7	Xylene (total)	250	U

* See footer page for data qualifiers

F84250

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2412-05
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.10mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: 4453
Sample Description: T21-N
Date Collected: 5/05/90
Time Collected: NA
Date Received: 5/08/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
74-87-3	Chloromethane	500	U
74-83-9	Bromomethane	500	U
75-01-4	Vinyl Chloride	500	U
75-00-3	Chloroethane	500	U
75-09-2	Methylene Chloride	640	
67-64-1	Acetone	500	U
75-15-0	Carbon Disulfide	250	U
75-69-4	Trichlorofluoromethane	250	U
75-35-4	1,1-Dichloroethene	250	U
75-34-3	1,1-Dichloroethane	250	U
540-59-0	1,2-Dichloroethene (total)	250	U
67-66-3	Chloroform	8500	
107-06-2	1,2-Dichloroethane	250	U
78-93-3	2-Butanone	500	U
71-55-6	1,1,1-Trichloroethane	250	U
56-23-5	Carbon Tetrachloride	250	U
108-05-4	Vinyl Acetate	500	U
75-27-4	Bromodichloromethane	250	U
78-87-5	1,2-Dichloropropane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	250	U
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	250	U
71-43-2	Benzene	250	U
10061-02-6	trans-1,3-Dichloropropene	250	U
110-75-8	2-Chloroethylvinyl Ether	500	U
75-25-2	Bromoform	250	U
108-10-1	4-Methyl-2-Pentanone	500	U
591-78-6	2-Hexanone	500	U
127-18-4	Tetrachloroethene	600	
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	250	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
100-42-5	Styrene	250	U
1330-02-7	Xylene (total)	250	U

* See footnote page for data qualifiers

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2412-06
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.10mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: 4494
Sample Description: T21-N
Date Collected: 5/08/90
Time Collected: NA
Date Received: 5/08/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
74-87-3	Chloromethane	500	U
74-83-9	Bromomethane	500	U
75-01-4	Vinyl Chloride	500	U
75-00-3	Chloroethane	500	U
75-09-2	Methylene Chloride	590	
67-64-1	Acetone	500	U
75-15-0	Carbon Disulfide	250	U
75-69-4	Trichlorofluoromethane	250	U
75-35-4	1,1-Dichloroethene	250	U
75-34-3	1,1-Dichloroethane	250	U
540-59-0	1,2-Dichloroethene (total)	250	U
67-66-3	Chloroform	8100	
107-06-2	1,2-Dichloroethane	250	U
78-93-3	2-Butanone	500	U
71-55-6	1,1,1-Trichloroethane	250	U
56-23-5	Carbon Tetrachloride	250	U
108-05-4	Vinyl Acetate	500	U
75-27-4	Bromodichloromethane	250	U
78-87-5	1,2-Dichloropropane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	250	U
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	250	U
71-43-2	Benzene	250	U
10061-02-6	trans-1,3-Dichloropropene	250	U
110-75-8	2-Chloroethylvinyl Ether	500	U
75-25-2	Bromoform	250	U
108-10-1	4-Methyl-2-Pentanone	500	U
591-78-6	2-Hexanone	500	U
127-18-4	Tetrachloroethene	1500	
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	250	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
100-42-5	Styrene	250	U
133-02-7	Xylene (total)	250	U

* See footnote page for data qualifiers Q

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2412-07
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.10mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: 4455
Sample Description: TC1-I
Date Collected: 5/08/90
Time Collected: NA
Date Received: 5/08/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
74-87-3	Chloromethane	500	U
74-83-9	Bromomethane	500	U
75-01-4	Vinyl Chloride	500	U
75-00-3	Chloroethane	500	U
75-09-2	Methylene Chloride	600	
67-64-1	Acetone	500	U
75-15-0	Carbon Disulfide	250	U
75-69-4	Trichlorofluoromethane	250	U
75-35-4	1,1-Dichloroethene	250	U
75-34-3	1,1-Dichloroethane	250	U
540-59-0	1,2-Dichloroethene (total)	250	U
67-66-3	Chloroform	8100	
107-06-2	1,2-Dichloroethane	250	U
78-93-3	2-Butanone	500	U
71-55-6	1,1,1-Trichloroethane	250	U
56-23-5	Carbon Tetrachloride	250	U
108-05-4	Vinyl Acetate	500	U
75-27-4	Bromodichloromethane	250	U
78-87-5	1,2-Dichloropropane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	250	U
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	250	U
71-43-2	Benzene	250	U
10061-02-6	trans-1,3-Dichloropropene	250	U
110-75-8	2-Chloroethylvinyl Ether	500	U
75-25-2	Bromoform	250	U
108-10-1	4-Methyl-2-Pentanone	500	U
591-78-6	2-Hexanone	500	U
127-18-4	Tetrachloroethene	1500	
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	250	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
100-42-5	Styrene	250	U
133-02-7	Xylene (total)	250	U

* See footnote page for data qualifiers

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2412-05
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.10mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: 4456
Sample Description: T21-I
Date Collected: 5/08/90
Time Collected: NA
Date Received: 5/08/90
Data Release Authorized:

C.A.S. Number	Compound	ug/L	Q
74-87-3	Chloromethane	500	U
74-83-9	Bromomethane	500	U
75-01-4	Vinyl Chloride	500	U
75-00-3	Chloroethane	500	U
75-09-2	Methylene Chloride	530	
67-64-1	Acetone	500	U
75-15-0	Carbon Disulfide	250	U
75-69-4	Trichlorofluoromethane	250	U
75-35-4	1,1-Dichloroethene	250	U
75-34-3	1,1-Dichloroethane	250	U
540-59-0	1,2-Dichloroethene (total)	250	U
67-66-3	Chloroform	8300	
107-06-2	1,2-Dichloroethane	250	U
78-93-3	2-Butanone	500	U
71-55-6	1,1,1-Trichloroethane	250	U
56-23-5	Carbon Tetrachloride	250	U
108-05-4	Vinyl Acetate	500	U
75-27-4	Bromodichloromethane	250	U
78-87-5	1,2-Dichloropropane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	250	U
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	250	U
71-43-2	Benzene	250	U
10061-02-6	trans-1,3-Dichloropropene	250	U
110-75-8	2-Chloroethylvinyl Ether	500	U
75-25-2	Bromoform	250	U
108-10-1	4-Methyl-2-Pentanone	500	U
591-78-6	2-Hexanone	500	U
127-18-4	Tetrachloroethene	1600	
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	250	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
100-42-5	Styrene	250	U
1330-20-7	Xylene (total)	250	U

* See footer page for data qualifiers

Pacific Northwest Environmental Laboratory

VOLATILE ORGANICS ANALYSIS DATA SHEET
(GC/MS PURGE AND TRAP)

Lab Sample ID: 2412-09
Sample Matrix: WATER
Concentration: LOW
Sample Volume: 0.10mL
Percent Moisture: NA
Date Extracted: NA
Date Analyzed: 5/17/90
Instrument ID: VOA #2

Customer Sample No: 4497
Sample Description: T21-I
Date Collected: 5/08/90
Time Collected: NA
Date Received: 5/06/90
Date Release Authorized:

C.A.S. Number	Compound	ug/L	Q
74-97-3	Chloromethane	500	U
74-83-9	Bromomethane	500	U
75-01-4	Vinyl Chloride	500	U
75-00-3	Chloroethane	500	U
75-09-2	Methylene Chloride	540	
67-64-1	Acetone	500	U
75-15-0	Carbon Disulfide	250	U
75-69-4	Trichlorofluoromethane	250	U
75-35-4	1,1-Dichloroethene	250	U
75-34-3	1,1-Dichloroethane	250	U
540-59-0	1,2-Dichloroethene (total)	250	U
67-66-3	Chloroform	9000	
107-06-2	1,2-Dichloroethane	250	U
78-93-3	2-Butanone	500	U
71-55-6	1,1,1-Trichloroethane	250	U
56-23-5	Carbon Tetrachloride	250	U
108-05-4	Vinyl Acetate	500	U
75-27-4	Bromodichloromethane	250	U
78-87-5	1,2-Dichloropropane	250	U
10061-01-5	cis-1,3-Dichloropropene	250	U
79-01-6	Trichloroethene	250	U
124-48-1	Dibromochloromethane	250	U
79-00-5	1,1,2-Trichloroethane	250	U
71-43-2	Benzene	250	U
10061-02-6	trans-1,3-Dichloropropene	250	U
110-75-8	2-Chloroethylvinyl Ether	500	U
75-25-2	Bromoform	250	U
108-10-1	4-Methyl-2-Pentanone	500	U
591-78-6	2-Hexanone	500	U
127-18-4	Tetrachloroethene	1800	
79-34-5	1,1,2,2-Tetrachloroethane	250	U
108-88-3	Toluene	250	U
108-90-7	Chlorobenzene	250	U
100-41-4	Ethylbenzene	250	U
100-42-5	Styrene	250	U
1330-02-7	Xylene (total)	250	U

* See footnote page for data qualifiers (Q)

APPENDIX B

COMPILED ANALYTICAL DATA FOR DDT TRETABILITY

BOE-C6-0186203

PAN STUDY T=0
SOIL A ACTIVE

ANALYTE	EMS#4180 REPLICATE 1	EMS#4181 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	11.00	12.00
4-4'-DBP	5.60	5.30
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	1.80	1.50
KELTHANE	0.00	0.00
4-4'-DDT	34.00	27.00
4-4'-DDE	13.00	10.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	11.50	4.00	0.50
4-4'-DBP	5.45	3.00	0.15
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.65	9.00	0.15
KELTHANE	0.00		0.00
4-4'-DDT	30.50	11.00	3.50
4-4'-DDE	11.50	13.00	1.50

PAN STUDY T=0
SOIL A STERILE

ANALYTE	EMS#4185 REPLICATE 1	EMS#4186 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	17.00	11.00
4-4'-DBP	5.60	5.30
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	1.40	1.60
KELTHANE	0.00	0.00
4-4'-DDT	32.00	35.00
4-4'-DDE	13.00	15.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	14.00	21.00	3.00
4-4'-DBP	5.45	3.00	0.15
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.50	7.00	0.10
KELTHANE	0.00		0.00
4-4'-DDT	33.50	4.00	1.50
4-4'-DDE	14.00	7.00	1.00

PAN STUDY T=1
SOIL A ACTIVE

ANALYTE	EMS#4259 REPLICATE 1	EMS#4260 REPLICATE 2	EMS#4261 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	14.00	15.00	17.00
4-4'-DBP	17.00	17.00	20.00
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	2.80	1.40	1.90
KELTHANE	0.00	0.00	0.00
4-4'-DDT	34.00	35.00	48.00
4-4'-DDE	14.00	14.00	18.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	15.33	8.00	1.25
4-4'-DBP	18.00	8.00	1.41
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	2.03	28.00	0.58
KELTHANE	0.00		0.00
4-4'-DDT	39.00	16.00	6.38
4-4'-DDE	15.33	12.00	1.89

PAN STUDY T=1
SOIL A STERILE

ANALYTE	EMS #4265 REPLICATE 1	EMS #4267 REPLICATE 3
4-4'-DCBH	0.00	0.00
4,4'-DDA	9.60	9.50
4-4'-DBP	3.60	2.50
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	1.30	1.20
KELTHANE	0.00	0.00
4-4'-DDT	52.00	33.00
4-4'-DDE	16.00	12.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	9.55	1.00	0.05
4-4'-DBP	3.05	18.00	0.55
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.25	4.00	0.05
KELTHANE	0.00		0.00
4-4'-DDT	42.50	22.00	9.50
4-4'-DDE	14.00	14.00	2.00

PAN STUDY T=4
SOIL A ACTIVE

ANALYTE	EMS#4532 REPLICATE 1	EMS#4533 REPLICATE 2	EMS#4534 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	8.30	7.70	8.10
4-4'-DBP	3.50	3.20	3.00
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	1.80	1.80	1.70
KELTHANE	0.00	0.00	0.00
4-4'-DDT	36.00	42.00	36.00
4-4'-DDE	14.00	16.00	14.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	8.03	3.00	0.25
4-4'-DBP	3.23	6.00	0.21
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.77	3.00	0.05
KELTHANE	0.00		0.00
4-4'-DDT	38.00	7.00	2.83
4-4'-DDE	14.67	6.00	0.94

PAN STUDY T=4
SOIL A STERILE

ANALYTE	EMS#4535 REPLICATE 1	EMS#4536 REPLICATE 2	EMS#4537 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	9.40	7.40	8.40
4-4'-DBP	3.90	3.30	3.20
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	2.20	1.80	1.50
KELTHANE	0.00	0.00	0.00
4-4'-DDT	46.00	34.00	30.00
4-4'-DDE	19.00	14.00	11.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	8.40	10.00	0.82
4-4'-DBP	3.47	9.00	0.31
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.83	16.00	0.29
KELTHANE	0.00		0.00
4-4'-DDT	36.67	19.00	6.80
4-4'-DDE	14.67	22.00	3.30

PAN STUDY T=8
SOIL A ACTIVE

ANALYTE	EMS#4562 REPLICATE 1	EMS#4563 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	10.00	7.70
4-4'-DBP	4.00	2.50
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	1.00	0.80
KELTHANE	0.00	0.00
4-4'-DDT	36.00	34.00
4-4'-DDE	15.00	13.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	8.85	13.00	1.15
4-4'-DBP	3.25	23.00	0.75
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	0.90	11.00	0.10
KELTHANE	0.00		0.00
4-4'-DDT	35.00	3.00	1.00
4-4'-DDE	14.00	7.00	1.00

PAN STUDY T=8
SOIL A STERILE

ANALYTE	EMS#4565 REPLICATE 1	EMS#4566 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	10.00	10.00
4-4'-DBP	3.50	2.80
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	1.50	0.90
KELTHANE	0.00	0.00
4-4'-DDT	49.00	35.00
4-4'-DDE	19.00	13.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	10.00	0.00	0.00
4-4'-DBP	3.15	11.00	0.35
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.20	25.00	0.30
KELTHANE	0.00		0.00
4-4'-DDT	42.00	17.00	7.00
4-4'-DDE	16.00	19.00	3.00

PAN STUDY T=0
SOIL B ACTIVE

ANALYTE	EMS#4190 REPLICATE 1	EMS#4191 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	0.00	0.00
4-4'-DBP	0.00	0.00
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	27.00	31.00
KELTHANE	0.00	0.00
4-4'-DDT	1100.00	1100.00
4-4'-DDE	70.00	82.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	0.00		0.00
4-4'-DBP	0.00		0.00
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	29.00	7.00	2.00
KELTHANE	0.00		0.00
4-4'-DDT	1100.00	0.00	0.00
4-4'-DDE	76.00	8.00	6.00

PAN STUDY T=0
SOIL B STERILE

ANALYTE	EMS#4195 REPLICATE 1	EMS#4196 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	0.00	0.00
4-4'-DBP	0.00	0.00
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	31.00	48.00
KELTHANE	0.00	0.00
4-4'-DDT	1100.00	1200.00
4-4'-DDE	77.00	92.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	0.00		0.00
4-4'-DBP	0.00		0.00
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	39.50	22.00	8.50
KELTHANE	0.00		0.00
4-4'-DDT	1150.00	4.00	50.00
4-4'-DDE	84.50	9.00	7.50

PAN STUDY T=1
SOIL B ACTIVE

ANALYTE	EMS #4262 REPLICATE 1	EMS #4263 REPLICATE 2	EMS #4264 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	11.00	9.80	9.50
4-4'-DBP	14.00	14.00	12.00
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	1.40	1.00
4-4'-DDD	39.00	34.00	39.00
KELTHANE	0.00	0.00	0.00
4-4'-DDT	1000.00	850.00	1000.00
4-4'-DDE	77.00	79.00	81.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	10.10	6.00	0.65
4-4'-DBP	13.33	7.00	0.94
FW-152	0.00		0.00
4-4'-DDM	0.80		0.59
4-4'-DDD	37.33	6.00	2.36
KELTHANE	0.00		0.00
4-4'-DDT	950.00	7.00	70.71
4-4'-DDE	79.00	2.00	1.63

PAN STUDY T=1
SOIL B STERILE

ANALYTE	EMS #4268 REPLICATE 1	EMS #4269 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	6.70	6.20
4-4'-DBP	7.60	7.40
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	63.00	48.00
KELTHANE	0.00	0.00
4-4'-DDT	1500.00	1000.00
4-4'-DDE	97.00	96.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	6.45	4.00	0.25
4-4'-DBP	7.50	1.00	0.10
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	55.50	14.00	7.50
KELTHANE	0.00		0.00
4-4'-DDT	1250.00	20.00	250.00
4-4'-DDE	96.50	1 00	0.50

PAN STUDY T=4
SOIL B ACTIVE

ANALYTE	EMS#4538 REPLICATE 1	EMS#4539 REPLICATE 2	EMS#454C REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	4.60	5.40	5.30
4-4'-DBP	2.60	5.40	5.00
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	1.40	1.00
4-4'-DDD	45.00	42.00	43.00
KELTHANE	0.00	0.00	0.00
4-4'-DDT	1000.00	1000.00	960.00
4-4'-DDE	95.00	92.00	94.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	5.10	7.00	0.36
4-4'-DBP	4.33	29.00	1.24
FW-152	0.00		0.00
4-4'-DDM	0.80	74.00	0.59
4-4'-DDD	43.33	3.00	1.25
KELTHANE	0.00		0.00
4-4'-DDT	986.67	2.00	18.86
4-4'-DDE	93.67	1.00	1.25

PAN STUDY T=4
SOIL B STERILE

ANALYTE	EMS#4541 REPLICATE 1	EMS#4542 REPLICATE 2	EMS#4543 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	5.20	5.50	5.60
4-4'-DBP	7.80	7.70	7.80
FW-152	0.00	0.00	0.00
4-4'-DDM	1.10	1.10	1.10
4-4'-DDD	45.00	45.00	47.00
KELTHANE	0.00	0.00	0.00
4-4'-DDT	860.00	1100.00	1100.00
4-4'-DDE	95.00	100.00	99.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	5.43	3.00	0.17
4-4'-DBP	7.77	1.00	0.05
FW-152	0.00		0.00
4-4'-DDM	1.10	0.00	0.00
4-4'-DDD	45.67	2.00	0.94
KELTHANE	0.00		0.00
4-4'-DDT	1020.00	11.00	113.14
4-4'-DDE	98.00	2.00	2.16

PAN STUDY T=8
SOIL B ACTIVE

ANALYTE	EMS#4568 REPLICATE 1	EMS#4569 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	4.10	2.90
4-4'-DBP	5.50	5.20
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	41.00	45.00
KELTHANE	0.00	0.00
4-4'-DDT	1500.00	1300.00
4-4'-DDE	90.00	91.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	3.50	17.00	0.60
4-4'-DBP	5.35	3.00	0.15
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	43.00	5.00	2.00
KELTHANE	0.00		0.00
4-4'-DDT	1400.00	7.00	100.00
4-4'-DDE	90.50	1.00	0.50

PAN STUDY T=8
SOIL B STERILE

ANALYTE	EMS#4571 REPLICATE 1	EMS#4572 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	4.20	4.50
4-4'-DBP	5.50	6.20
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	47.00	48.00
KELTHANE	0.00	0.00
4-4'-DDT	1600.00	1400.00
4-4'-DDE	99.00	100.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	4.35	3.00	0.15
4-4'-DBP	5.85	6.00	0.35
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	47.50	1.00	0.50
KELTHANE	0.00		0.00
4-4'-DDT	1500.00	7.00	100.00
4-4'-DDE	99.50	1.00	0.50

SLURRY STUDY T=0
SOIL A ACTIVE

ANALYTE	EMS#4231 REPLICATE 1	EMS#4232 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	10.00	12.00
4-4'-DBP	3.50	4.30
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	1.40	1.40
KELTHANE	0.00	0.00
4-4'-DDT	37.00	34.00
4-4'-DDE	13.00	11.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	11.00	9.00	1.00
4-4'-DBP	3.90	10.00	0.40
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.40	0.00	0.00
KELTHANE	0.00		0.00
4-4'-DDT	35.50	4.00	1.50
4-4'-DDE	12.00	8.00	1.00

SLURRY STUDY T=0
SOIL A STERILE

ANALYTE	EMS#4234 REPLICATE 1	EMS#4235 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	8.60	9.80
4-4'-DBP	3.00	4.00
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	1.00	1.40
KELTHANE	0.00	0.00
4-4'-DDT	33.00	35.00
4-4'-DDE	10.00	12.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	9.20	7.00	0.60
4-4'-DBP	3.50	14.00	0.50
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.20	17.00	0.20
KELTHANE	0.00		0.00
4-4'-DDT	34.00	3.00	1.00
4-4'-DDE	11.00	9.00	1.00

SLURRY STUDY T=1
SOIL A ACTIVE

ANALYTE	EMS#4285 REPLICATE 1	EMS#4286 REPLICATE 2	EMS#4287 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	7.50	7.00	7.60
4-4'-DBP	2.40	2.60	1.80
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	1.00	0.90	1.30
KELTHANE	0.00	0.00	0.00
4-4'-DDT	40.00	38.00	44.00
4-4'-DDE	12.00	12.00	14.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	7.37	4.00	0.26
4-4'-DBP	2.27	15.00	0.34
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.07	16.00	0.17
KELTHANE	0.00		0.00
4-4'-DDT	40.67	6.00	2.49
4-4'-DDE	12.67	7.00	0.94

SLURRY STUDY T=1
SOIL A STERILE

ANALYTE	EMS#4288 REPLICATE 1	EMS#4289 REPLICATE 2	EMS#4290 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	5.70	7.30	6.80
4-4'-DBP	2.20	2.60	2.70
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	1.00	2.30	2.50
KELTHANE	0.00	0.00	0.00
4-4'-DDT	39.00	36.00	46.00
4-4'-DDE	12.00	10.00	16.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	6.60	10.00	0.67
4-4'-DBP	2.50	9.00	0.22
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.93	34.00	0.66
KELTHANE	0.00		0.00
4-4'-DDT	40.33	10.00	4.19
4-4'-DDE	12.67	20.00	2.49

SLURRY STUDY T=4
SOIL A ACTIVE

ANALYTE	EMS#4544 REPLICATE 1	EMS#4545 REPLICATE 2	EMS#4546 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	5.50	7.00	6.00
4-4'-DBP	0.00	0.00	0.00
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	1.10	1.20	1.20
KELTHANE	0.00	0.00	0.00
4-4'-DDT	30.00	34.00	35.00
4-4'-DDE	9.70	10.00	11.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	6.17	10.00	0.62
4-4'-DBP	0.00		0.00
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.17	4.00	0.05
KELTHANE	0.00		0.00
4-4'-DDT	33.00	7.00	2.16
4-4'-DDE	10.23	5.00	0.56

SLURRY STUDY T=4
SOIL A STERILE

ANALYTE	EMS#4547 REPLICATE 1	EMS#4548 REPLICATE 2	EMS#4549 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	7.20	8.00	7.50
4-4'-DBP	0.00	0.00	0.00
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	1.30	1.50	1.40
KELTHANE	0.00	0.00	0.00
4-4'-DDT	33.00	46.00	40.00
4-4'-DDE	10.00	12.00	9.60

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	7.57	4.00	0.33
4-4'-DBP	0.00		0.00
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.40	6.00	0.08
KELTHANE	0.00		0.00
4-4'-DDT	39.67	13.00	5.31
4-4'-DDE	10.53	10.00	1.05

SLURRY STUDY T=8
SOIL A ACTIVE

ANALYTE	EMS#4577 REPLICATE 1	EMS#4578 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	7.80	6.90
4-4'-DBP	1.00	2.40
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	2.00	1.80
KELTHANE	0.00	0.00
4-4'-DDT	40.00	38.00
4-4'-DDE	14.00	11.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	7.35	6.00	0.45
4-4'-DBP	1.70	41.00	0.70
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.90	5.00	0.10
KELTHANE	0.00		0.00
4-4'-DDT	39.00	3.00	1.00
4-4'-DDE	12.50	12.00	1.50

SLURRY STUDY T=8
SOIL A STERILE

ANALYTE	EMS#4580 REPLICATE 1	EMS#4581 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	7.60	7.60
4-4'-DBP	2.50	2.40
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	1.80	1.80
KELTHANE	0.00	0.00
4-4'-DDT	29.00	32.00
4-4'-DDE	8.70	11.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	7.60	0.00	0.00
4-4'-DBP	2.45	2.00	0.05
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	1.80	0.00	0.00
KELTHANE	0.00		0.00
4-4'-DDT	30.50	5.00	1.50
4-4'-DDE	9.85	12.00	1.15

SLURRY STUDY T=0
SOIL B ACTIVE

ANALYTE	EMS#4237 REPLICATE 1	EMS#4238 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	9.70	10.00
4-4'-DBP	8.30	8.80
FW-152	0.00	0.00
4-4'-DDM	1.50	1.60
4-4'-DDD	53.00	44.00
KELTHANE	0.00	0.00
4-4'-DDT	1400.00	910.00
4-4'-DDE	120.00	94.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	9.85	2.00	0.15
4-4'-DBP	8.55	3.00	0.25
FW-152	0.00		0.00
4-4'-DDM	1.55	3.00	0.05
4-4'-DDD	48.50	9.00	4.50
KELTHANE	0.00		0.00
4-4'-DDT	1155.00	21.00	245.00
4-4'-DDE	107.00	12.00	13.00

SLURRY STUDY T=0
SOIL B STERILE

ANALYTE	EMS#4240 REPLICATE 1	EMS#4241 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	6.30	5.40
4-4'-DBP	7.50	7.20
FW-152	0.00	0.00
4-4'-DDM	1.30	1.30
4-4'-DDD	41.00	39.00
KELTHANE	0.00	0.00
4-4'-DDT	1200.00	950.00
4-4'-DDE	92.00	87.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	5.85	8.00	0.45
4-4'-DBP	7.35	2.00	0.15
FW-152	0.00		0.00
4-4'-DDM	1.30	0.00	0.00
4-4'-DDD	40.00	3.00	1.00
KELTHANE	0.00		0.00
4-4'-DDT	1075.00	12.00	125.00
4-4'-DDE	89.50	3.00	2.50

SLURRY STUDY T=1
SOIL B ACTIVE

ANALYTE	EMS#4291 REPLICATE 1	EMS#4292 REPLICATE 2	EMS#4293 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	3.70	0.90	0.70
4-4'-DBP	5.20	4.50	4.50
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	47.00	58.00	44.00
KELTHANE	0.00	0.00	0.00
4-4'-DDT	1300.00	1300.00	1400.00
4-4'-DDE	86.00	76.00	80.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	1.77	78.00	1.37
4-4'-DBP	4.73	7.00	0.33
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	49.67	12.00	6.02
KELTHANE	0.00		0.00
4-4'-DDT	1333.33	4.00	47.14
4-4'-DDE	80.67	5.00	4.11

SLURRY STUDY T=1
SOIL B STERILE

ANALYTE	EMS#4294 REPLICATE 1	EMS#4295 REPLICATE 2	EMS#4296 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	5.10	5.20	5.20
4-4'-DBP	4.10	3.90	4.20
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	59.00	59.00	59.00
KELTHANE	0.00	0.00	0.00
4-4'-DDT	1300.00	1300.00	1300.00
4-4'-DDE	93.00	81.00	96.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	5.17	1.00	0.05
4-4'-DBP	4.07	3.00	0.12
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	59.00	0.00	0.00
KELTHANE	0.00		0.00
4-4'-DDT	1300.00	0.00	0.00
4-4'-DDE	90.00	7.00	6.48

SLURRY STUDY T=4
SOIL B ACTIVE

ANALYTE	EMS#4550 REPLICATE 1	EMS#4551 REPLICATE 2	EMS#4552 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	1.00	0.80	0.90
4-4'-DBP	0.00	0.00	0.00
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	43.00	42.00	49.00
KELTHANE	0.00	0.00	0.00
4-4'-DDT	1100.00	960.00	1300.00
4-4'-DDE	64.00	66.00	77.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	0.90	9.00	0.08
4-4'-DBP	0.00		0.00
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	44.67	7.00	3.09
KELTHANE	0.00		0.00
4-4'-DDT	1120.00	12.00	139.52
4-4'-DDE	69.00	8.00	5.72

SLURRY STUDY T=4
SOIL B STERILE

ANALYTE	EMS#4553 REPLICATE 1	EMS#4554 REPLICATE 2	EMS#4555 REPLICATE 3
4-4'-DCBH	0.00	0.00	0.00
4,4'-DDA	5.10	5.00	5.20
4-4'-DBP	4.80	4.40	4.30
FW-152	0.00	0.00	0.00
4-4'-DDM	0.00	0.00	0.00
4-4'-DDD	32.00	51.00	50.00
KELTHANE	0.00	0.00	0.00
4-4'-DDT	1200.00	1300.00	1100.00
4-4'-DDE	75.00	80.00	74.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	5.10	2.00	0.08
4-4'-DBP	4.50	5.00	0.22
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	44.33	20.00	8.73
KELTHANE	0.00		0.00
4-4'-DDT	1200.00	7.00	81.65
4-4'-DDE	76.33	3.00	2.62

SLURRY STUDY T=8
SOIL B ACTIVE

ANALYTE	EMS#4583 REPLICATE 1	EMS#4584 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	0.50	0.60
4-4'-DBP	0.00	0.00
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	50.00	50.00
KELTHANE	0.00	0.00
4-4'-DDT	1200.00	1200.00
4-4'-DDE	62.00	68.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	0.55	9.00	0.05
4-4'-DBP	0.00		0.00
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	50.00	0.00	0.00
KELTHANE	0.00		0.00
4-4'-DDT	1200.00	0.00	0.00
4-4'-DDE	65.00	5.00	3.00

SLURRY STUDY T=8
SOIL B STERILE

ANALYTE	EMS#4586 REPLICATE 1	EMS#4587 REPLICATE 2
4-4'-DCBH	0.00	0.00
4,4'-DDA	4.90	4.70
4-4'-DBP	3.90	3.70
FW-152	0.00	0.00
4-4'-DDM	0.00	0.00
4-4'-DDD	53.00	54.00
KELTHANE	0.00	0.00
4-4'-DDT	1300.00	1300.00
4-4'-DDE	71.00	68.00

	MEAN	%C.V.	STD DEV
4-4'-DCBH	0.00		0.00
4,4'-DDA	4.80	2.00	0.10
4-4'-DBP	3.80	3.00	0.10
FW-152	0.00		0.00
4-4'-DDM	0.00		0.00
4-4'-DDD	53.50	1.00	0.50
KELTHANE	0.00		0.00
4-4'-DDT	1300.00	0.00	0.00
4-4'-DDE	69.50	2.00	1.50

NUTRIENTS BASELINE
SOIL A

	BR-4	BR-6	BR-7
NITRATE	5 16	< 594	0.71
PHOSPHATE	<.548	18 40	0.96
SULPHATE	598.00	9140 00	2640.00
AMMONIA	<21.5	27 20	<22.2
TOC	5040.00	2060.00	3660.00

NUTRIENTS BASELINE
SOIL B

	REPLICATE 1	REPLICATE 2	REPLICATE 3
NITRATE	2 58	2 73	2 49
PHOSPHATE	2.35	2 42	2.37
SULPHATE	4720.00	4730.00	4760.00
AMMONIA	37.00	<22.3	<22.3
TOC	5310.00	6700 00	6480.00

	MEAN	%C.V.	STD DEV
NITRATE	2.60	4.00	0 10
PHOSPHATE	2.38	1.00	0.03
SULPHATE	4736.67	0 00	17.00
AMMONIA	12.33	141.00	17.44
TOC	6163 33	10 00	610.05

APPENDIX C

HPLC METHOD

BOE-C6-0186221

STANDARD OPERATING PROCEDURE SSC-3

Revision 1 Date Prepared: 10/06/89

Approved By: W Mahaffey Date: 11/01/89
William Mahaffey Ph.D.

Prepared By: Ennis Date: 10/06/89
John M. Ennis

TITLE: Pesticides by HPLC

PURPOSE: This procedure outlines the activities involved in the analysis for:

1-) DDD (2,2-Bis(4-chlorophenyl)-1,1-dichloroethane
2-) DDE (2,2-Bis(4-chlorophenyl)-1,1-dichloroethylene
3-) DDT (2,2-Bis(4-chlorophenyl)-2,2,2-trichloroethane
4-) DCBH (Dichlorobenzhydrol)
5-) 4,4-FW-152
6-) 4,4'-DDA
7-) 4,4'-DBP
8-) Kelthane (Difocol)
9-) 4,4'-DDM

by high performance liquid chromotography (HPLC).

1.0 MATERIALS

1.1 40 mL VOA vials (I-Chem or ESS)
1.2 HPLC Grade Acetonitrile
1.3 HPLC Grade Methanol
1.4 Filtered D.I. Water
1.5 85% Phosphoric acid
1.6 Pasteur pipets
1.7 Pipet bulb
1.8 0.45u 13 mm disk syringe filters
1.9 Hewlett-Packard autosampler vials
1.10 Aldrich 4,4'-dichlorobenzhydrol (11-313-1) 98%
1.11 Aldrich DDT (1,1-Bis(4-chlorophenyl)-2,2,2-trichloroethane) (10,002-1)
1.12 Aldrich DDD (2,2-Bis(4-chlorophenyl)-1,1-dichloroethane) 99+% (B3-959-3)
1.13 Riedel-deHaen 4,4'-DDM Pestenal Grade
1.14 Rohm and Haas 4,4'-FW-152 98.5%
1.15 Aldrich DDE (2,2-Bis(4-chlorophenyl)-1,1-dichloroethylene) 99% (12,389-7)
1.16 Riedel-deHaen 4,4'-DBP
1.17 Riedel-deHaen 4,4'-DDA
1.18 Chem Service Kelthane (Difocol) 97%

2.0 EQUIPMENT

2.1 Hewlett-Packard Model 1090 HPLC equipped with a diode array detector.
2.2 Heat Systems Model W-385 Sonicator Equipped with a microtip.
2.3 IEC Model HNS-11 Centrifuge.
2.4 American Scientific or comparable balance (3 point capability).
2.5 Organamation nitrogen evaporator.
2.6 Concentrator tubes.
2.7 Crimping tool for autosampler vials.

3.0 CALIBRATION

3.1 Calibration of the instrument is performed by a within run standard curve performed every time that a sample group is analyzed. The standard curve will consist of five standards and a blank. The standard curve will be created in the report generator system of the HPLC software and will utilize a linear curve type driven inclusive of origin.

3.2 The five standards run will be approximately:
1-) Approx 50 ppm all compounds
2-) Approx 25 ppm all compounds
3-) Approx 12 ppm all compounds
4-) Approx 6 ppm all compounds
5-) Approx 3 ppm all compounds

3.3 Acceptable linearity of curve will be 0.98 or greater.

4.0 QUALITY ASSURANCE/QUALITY CONTROL

4.1 **Level I:**
All samples analyzed for pesticides will have included in the sample run at minimum 1 negative control soil and one positive control soil. The negative and positive controls will be soil taken from known negative samples available from prior sample groups. Inclusive in level I QA/QC will be the daily standard curve and the daily reagent blank.

4.2 **Level II:**
Samples run as level II QA/QC will include all requirements listed in level I and will include a matrix spike/matrix spike duplicate (MS/MSD) within the sample group run.

5.0 INSTRUMENTAL CONDITIONS

5.1 Mobile Phase
Channel A: HPLC Grade methanol
Channel B: Off

Channel C: 0.1% Phosphoric Acid

5.2 Flow Rate
2.0 mL/min

5.3 Flow program
Initial conditions = 35% MeOH/65% 0.1% Phosphoric Acid
ramp to 100% MeOH at 16 minutes
4 minute hold at 100% MeOH
Return to initial condition until end of run.

5.4 Column
Supelco LC-8, 3 cm column length, 4.6 mm I.D, 3 u pore size.

5.5 Detectors
Sample wavelength 235, 254, and 270 nM
Sample bandwidth 4 nM
Reference wavelength 550 nM
Reference bandwidth 100 nM
Peak controlled spectrum storage
Sampling interval 640 ms
Spectrum range 210 through 400 nM
Peakwidth for spectrum storage 0.100 min
Threshold for peak storage 5.0 mAU

5.6 Injector parameters
25 uL injection
slowdown = 2

6.0 EXTRACTION PROCEDURES

6.1 Five grams of soil or sample are placed into a pre-tared 40 mL VOA vial and the exact weight recorded onto the sample group worksheet form. 15 mL of Acetonitrile/15% 0.1% Phosphoric acid is added to the VOA vial and the vial is then capped and shaken vigorously.

6.2 The vial is then sonicated for 1 minute with a Heat Systems model W-385 sonicator equipped with a microtip. The sonication cycle is at continuous power at the microtip setting of 5.

6.3 The vial is the centrifuged using a IEC Model HNS-II centrifuge at full speed for 10 minutes.

6.4 10 mL of the extract from 6.3 will be taken using a clean 10 mL serological pipet and will be placed into a 10 mL concentrator tube. The extract will be concentrated under desiccated air or nitrigen to a final volume of 3 mL

6.5 The concentrated Acetonitrile/phosphic supernatent is

taken with a Pasteur pipet and filtered using a 13mm 0.45 u syringe filter. The filtrate is placed directly into an autosample vial. The autosampler vial is capped and placed into the autosampler.

7.0 QUANTITATION

7.1 Quantitation is performed using the software of the H.P. 1090 HPLC. Analytical value will be recorded on the sample group worksheet and sample concentration will then be determined.

APPENDIX D
ANALYTICAL QA/QC DATA

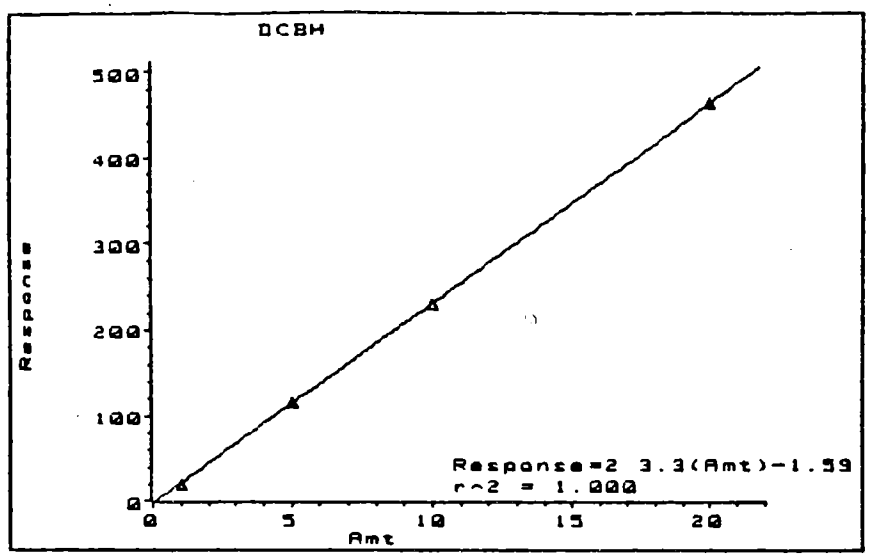
BOE-C6-0186226

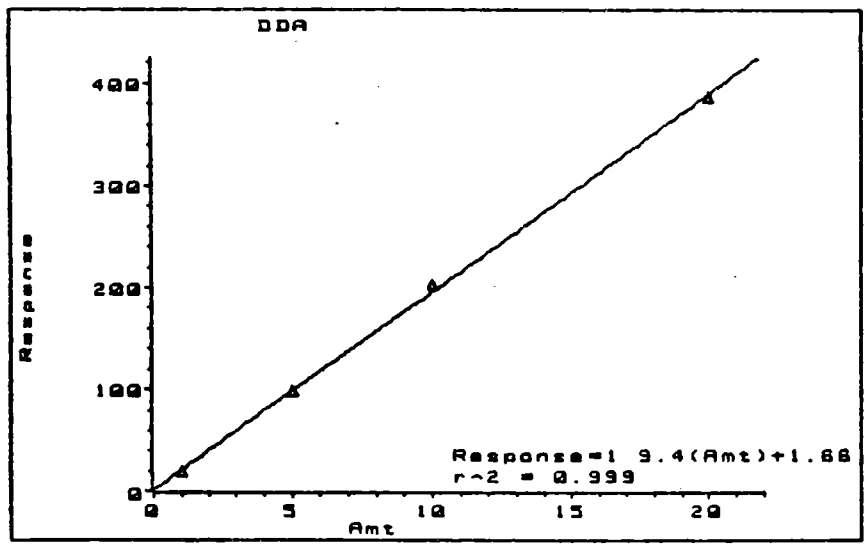
*** Calibration Table ***

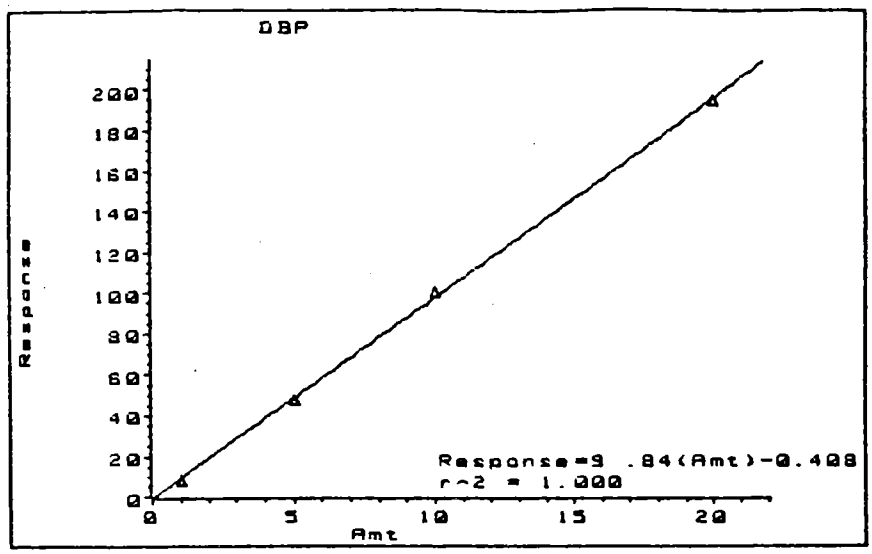
PESTICIDES AND METABOLITES BY HPLC

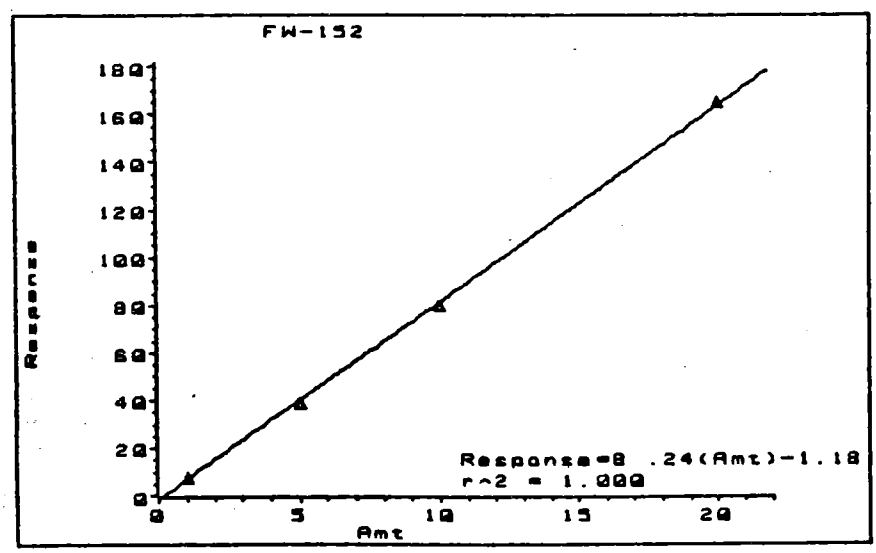
Calibration file: DATA:0561.Q Last Update: 17 May 90 10:20 am
Reference Peak Window: 5.00 % of Retention Time
Non-Reference Peak Window: 5.00 % of Retention Time
Sample Amount: 0.000 Uncalibrated Peak RF: 0.000 Multiplier: 1.000

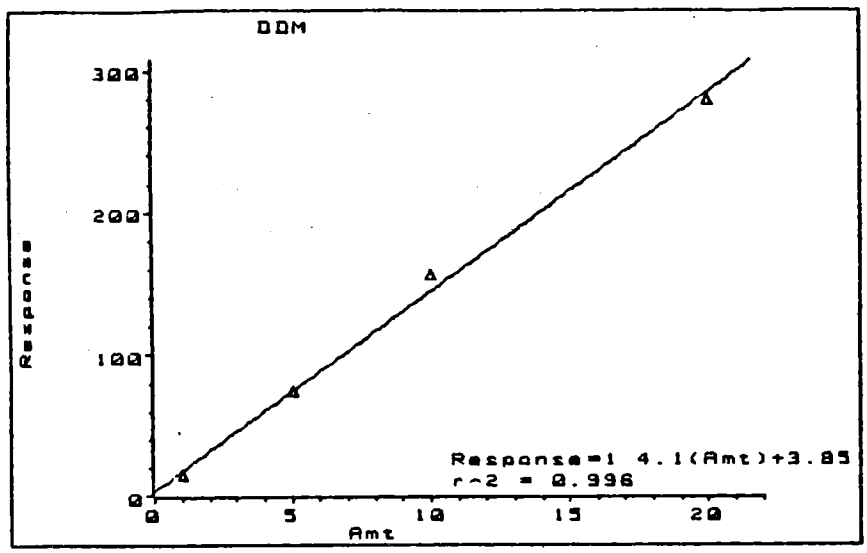
Ret Time	Pk#	Signal	Descr	Amt ppm	Lvl	[Area]	Pk-Type	Partial Name
16.976	1	A 235,4	550,100	1.0000	4	19.188	1	DCBH
				5.0000	3	116.47		
				10.000	2	231.24		
				20.000	1	464.98		
17.260	2	A 235,4	550,100	1.0000	4	18.890	1	DDA
				5.0000	3	98.939		
				10.000	2	202.86		
				20.000	1	386.32		
17.474	3	A 235,4	550,100	1.0000	4	8.1997	1	DBP
				5.0000	3	47.826		
				10.000	2	100.87		
				20.000	1	195.13		
17.878	4	A 235,4	550,100	1.0000	4	7.9440	1	FW-152
				5.0000	3	38.465		
				10.000	2	79.574		
				20.000	1	164.85		
19.751	5	A 235,4	550,100	1.0000	4	15.441	1	DDM
				5.0000	3	74.658		
				10.000	2	156.73		
				20.000	1	279.78		
19.928	6	A 235,4	550,100	1.0000	4	30.613	1	DDD
				5.0000	3	157.71		
				10.000	2	312.31		
				20.000	1	600.30		
20.510	7	A 235,4	550,100	1.0000	4	18.923	1	KELTHANE
				5.0000	3	98.107		
				10.000	2	194.26		
				20.000	1	386.75		
21.191	8	A 235,4	550,100	1.0000	4	41.650	1	DDT
				5.0000	3	153.84		
				10.000	2	297.38		
				20.000	1	585.74		
21.480	9	A 235,4	550,100	1.0000	4	31.277	1	DDE
				5.0000	3	157.59		
				10.000	2	317.10		
				20.000	1	625.98		

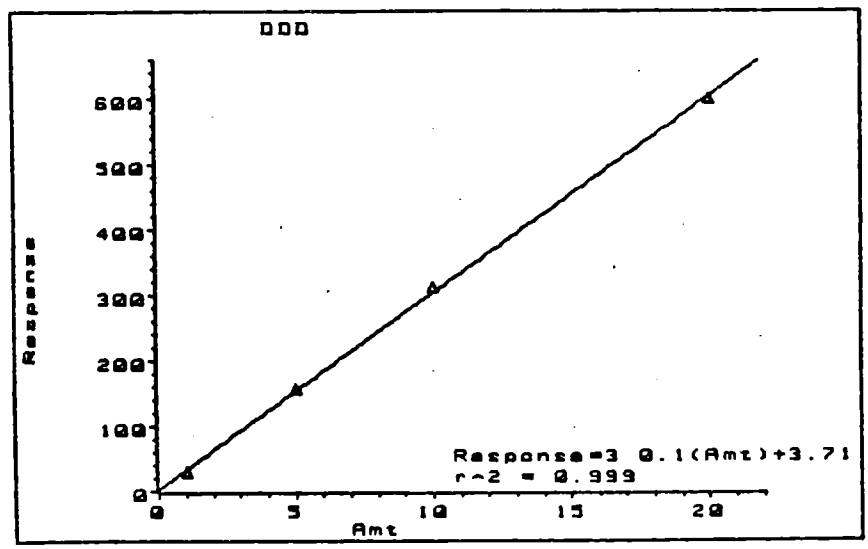

DCBH
500
400
300
200
100
0
Response
0
5
10
15
20
Amt
Response=2 3.3(Amt)-1.59
r^2 = 1.000

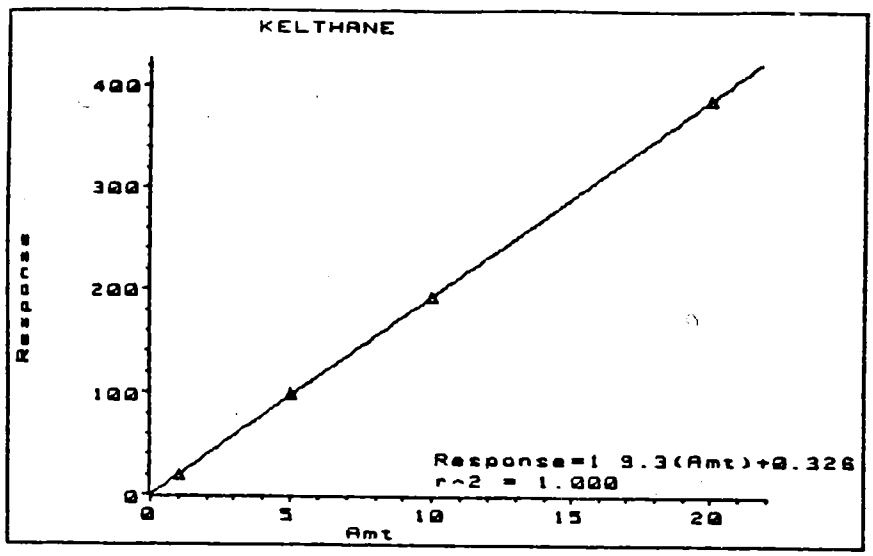

DDA
400
300
200
100
0
Response
0
5
10
15
20
Amt
Response=1 9.4(Amt)+1.68
r^2 = 0.999

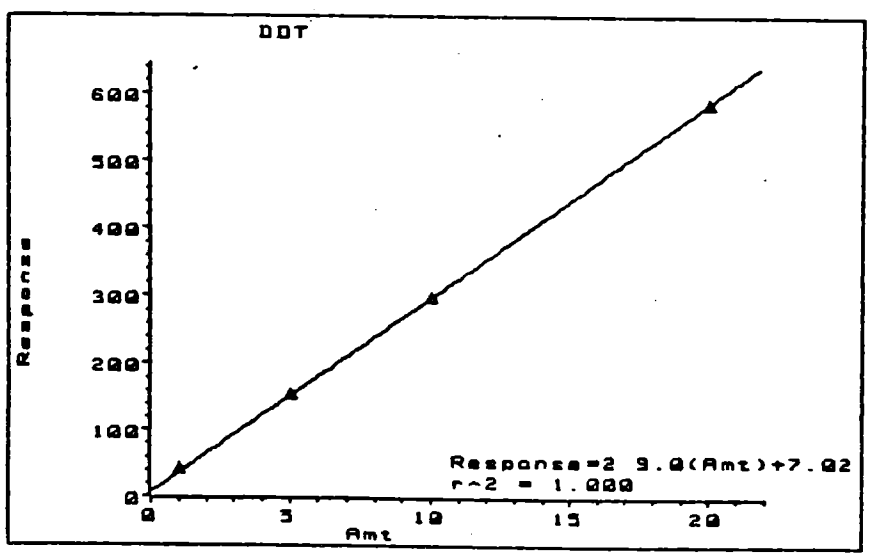

DBP
Response
Amt
Response=9 .84(Amt)-0.408
r^2 = 1.000

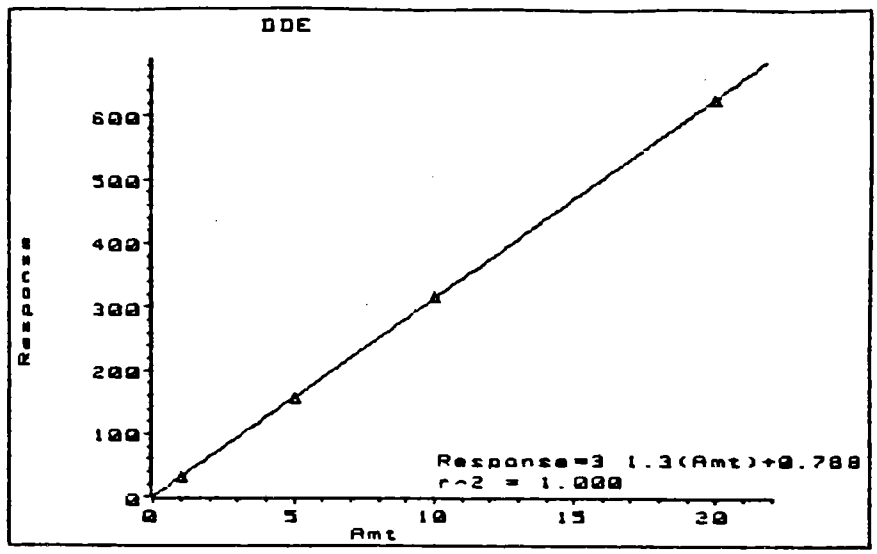

FW-152
Response
Amt
Response=8 .24(Amt)-1.18
r^2 = 1.000


DDM
300
200
100
0
Response
Response=1 4.1(Amt)+3.85
r^2 = 0.996
0
5
10
15
20
Amt


DDD
600
500
400
300
200
100
0
Response
Response=3 0.1(Amt)+3.71
r^2 = 0.999
0
5
10
15
20
Amt


KELTHANE
Response
400
300
200
100
0
0
5
10
15
20
Amt
Response=1 9.3(Amt)+0.326
r^2 = 1.000


DDT
Response
600
500
400
300
200
100
0
0
5
10
15
20
Amt
Response=2 9.0(Amt)+7.02
r^2 = 1.000


DDE
Response
600
500
400
300
200
100
0
0
5
10
15
20
Amt
Response=3 1.3(Amt)+0.788
r^2 = 1.000

QC CHECKLIST
ECOVA SITE SUPPORT CHEMISTRY LABORATORY

SAMPLE GROUP NUMBER: 200-102 T=0 Pan

PROJECT NUMBER: 832005

QUALITY CONTROL

LEVEL 1

		Analytical Value	Anticipated Value	Technician
1)	Standard Curve Results	>0.98	>0.98	R
2)	Spike Results (Positive Control)	See Attached		
3)	Reagent Blank (Negative Control)	<LOD	<LOD	
4)	Duplicate Results	/	%RPD	

LEVEL II

		Analytical Results	Technician
4)	Matrix Spike Results (%RPD)		
5)	Percentage Recovery		

LEVEL III

6) See Narrative

OC Check Acceptable

Technician: [signature]

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: 200-102 T=0 Pan
DATE: 4-23-90
TECHNICIAN: Ennis
PROJECT NUMBER: 832005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 OCBH	—	Raw 4.5754	Raw 4.3007	Expected 5.00	6.19%
		Corr 4.5754	Corr 4.3007	% 88.80	
2 DDA	—	Raw 3.9026	Raw 4.3828	Expected 4.80	11.60%
		Corr 3.9026	Corr 4.3828	% 86.50	
3 DDM	—	Raw 8.166	Raw 7.995	Expected 9.06	2.116%
		Corr 8.166	Corr 7.995	% 89.2	
4 DDT	—	Raw 6.0069	Raw 6.3806	Expected 6.67	1.51%
		Corr 6.0069	Corr 6.3806	% 93.00	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: 200143 T=4 fa.. study (Matrix Spikes)
DATE: 6-7-90
TECHNICIAN: Mike Paulsen
PROJECT NUMBER: 232005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH	—	Raw 5.4996	Raw 5.5790	Expected 4.76	1.44
		Corr 5.4996	Corr 5.5790	% 116	
2 DDA	—	Raw 5.2520	Raw 5.3219	Expected 4.57	1.33
		Corr 5.2520	Corr 5.3219	% 116	
3 DDD	—	Raw 10.0	Raw 9.76	Expected 8.62	2.50
		Corr 9.7210	Corr 9.7810	% 111	
4 DDT	—	Raw 8.9976	Raw 8.3855	Expected 6.29	1.54
		Corr 7.3476	Corr 7.2355	% 116	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: 200-143 T=4 Pan Study (Method Blank Spike)
DATE: 6-7-90
TECHNICIAN: Mike Paulsen
PROJECT NUMBER: 832005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH	—	Raw 5.3516	Raw	Expected 4.76	
		Corr 5.3516	Corr	% 112	
2 DDA	—	Raw 4.2500	Raw	Expected 4.57	
		Corr 4.2500	Corr	% 93	
3 DDD	—	Raw 9.48	Raw	Expected 8.67	
		Corr 9.48	Corr	% 110	
4 DDT	—	Raw 6.2339	Raw	Expected 6.29	
		Corr 6.2339	Corr	% 99	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6	Not Used	Raw	Raw	Expected	
		Corr	Corr	%	

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SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: 200-156 T-8 Pan Study (Matrix Spikes)
DATE: 6/7/90
TECHNICIAN: Mike Paulsen
PROJECT NUMBER: 832005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH	–	Raw 5.2067	Raw 5.1637	Expected 4.76	0.82
		Corr 5.2067	Corr 5.1637	% 109	
2 DDA	–	Raw 4.7138	Raw 4.7293	Expected 4.57	0.33
		Corr 4.7138	Corr 4.7293	% 103	
3 DDD	–	Raw 9.0586	Raw 9.2621	Expected 8.62	2.22
		Corr 9.0586	Corr 9.2621	% 106	
4 DDT	–	Raw 8.6285	Raw 8.2797	Expected 6.29	5.57
		Corr 6.4406	Corr 6.0918	% 100	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

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SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: 200-156 T-8 Pin (Method Blank Spike)
DATE: 6/7/90
TECHNICIAN: Mike Paulsen
PROJECT NUMBER: 832005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH	–	Raw 4.9501	Raw	Expected 4.76	
		Corr	Corr	% 104	
2 DDA	–	Raw 3.6267	Raw	Expected 4.57	
		Corr	Corr	% 79	
3 DDD	–	Raw 9.0619	Raw	Expected 8.62	
		Corr	Corr	% 105	
4 DDT	–	Raw 5.8105	Raw	Expected 6.29	
		Corr	Corr	% 92	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: 200-115-B I-O Slurry
DATE: 5-3-90
TECHNICIAN: Mike Aulsen
PROJECT NUMBER: 832005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 OCBH	—	Raw 2.7961	Raw	Expected 6.667	
		Corr 2.7961	Corr	% 42	
2 DDA	—	Raw 8.0172	Raw	Expected 6.400	
		Corr 8.0172	Corr	% 125	
3 DDD	—	Raw 13.1184	Raw	Expected 12.067	
		Corr 13.1184	Corr	% 109	
4 DDT	—	Raw 8.6905	Raw	Expected 8.800	
		Corr 8.6905	Corr	% 99	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: T-1 Slurry
DATE: 6-8-90
TECHNICIAN: Mike Parker
PROJECT NUMBER: 832005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH	—	Raw 7.0629	Raw 6.6184	Expected 6.667	6.50
		Corr 7.0629	Corr 6.6184	% 103	
2 DDA	—	Raw 7.3073	Raw 7.1773	Expected 6.400	1.80
		Corr 7.3073	Corr 7.1773	% 113	
3 DDD	—	Raw 12.8775	Raw 12.5763	Expected 12.067	2.37
		Corr 12.8775	Corr 12.5763	% 105	
4 DDT	—	Raw 13.4333	Raw 13.2670	Expected 8.800	2.00
		Corr 8.8741	Corr 8.658	% 100 ~~101/99~~	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

Method Blank Spike

SAMPLE GROUP #: TFI Slurry
DATE: 6-8-90
TECHNICIAN: Mike Paulsen
PROJECT NUMBER: 832005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH		Raw 7.3535	Raw	Expected 6.667	
		Corr 7.3535	Corr	% 110	
2 DDA		Raw 8.0837	Raw	Expected 6.400	
		Corr 8.0837	Corr	% 126	
3 DDD		Raw 12.9779	Raw	Expected 12.067	
		Corr 12.9779	Corr	% 108	
4 DDT		Raw 8.6285	Raw	Expected 8.800	
		Corr 8.6285	Corr	% 98	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: I-4 Slurry 200-144 (Matrix spikes)
DATE: 6-11-90
TECHNICIAN: Mike Paulsen
PROJECT NUMBER:

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH		Raw 1.8828	Raw	Expected 6.667	
		Corr 1.8828	Corr	% 28	
2 DDA		Raw 6.1132	Raw	Expected 6.400	
		Corr 6.1132	Corr	% 96	
3 DDD		Raw 13.9144	Raw	Expected 12.067	
		Corr 13.9144	Corr	% 115	
4 DDT		Raw 13.6480	Raw	Expected 8.800	
		Corr 8.86	Corr	% 101	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: T-4 Slurry 200-144 (Method Blanks) Spike
DATE: 6-11-90
TECHNICIAN: Mike Parlsen
PROJECT NUMBER:

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH		Raw 1.9340	Raw	Expected 6.667	
		Corr 1.9340	Corr	% 29	
2 DDA		Raw 4.4769	Raw	Expected 6.400	
		Corr 4.4769	Corr	% 70	
3 DDD		Raw 13.1776	Raw	Expected 12.067	
		Corr 13.1776	Corr	% 109	
4 DDT		Raw 9.3854	Raw	Expected 8.800	
		Corr 9.3854	Corr	% 107	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: T-8 slurry Matrix Spikes
DATE: 6-8-90
TECHNICIAN: M.K. Paulsen
PROJECT NUMBER: 832005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH		Raw 4.9928	Raw 5.2919	Expected 6667	5.82
		Corr 4.9928	Corr 5.2919	% 77	
2 DDA		Raw 6.8640	Raw 6.4239	Expected 6.400	6.62
		Corr 6.8640	Corr 6.4239	% 104	
3 DDD		Raw 11.6057	Raw 10.8208	Expected 12.067	7.00
		Corr 11.6057	Corr 10.8208	% 93	
4 DDT		Raw 12.3522	Raw 10.9621	Expected 8.800	19.0
		Corr 8.2475	Corr 7.8124	% 86	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

Not used

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SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: T-8 Slurry Method Blank Spike
DATE: 1-8-90
TECHNICIAN: Mike Pankey
PROJECT NUMBER: 832005

Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1 DCBH		Raw 5.1637	Raw	Expected 6.667	
		Corr 5.1637	Corr	% 77	
2 DDA		Raw 6.6828	Raw	Expected 6.400	
		Corr 6.6828	Corr	% 104	
3 DDD		Raw 11.5622	Raw	Expected 12.067	
		Corr 11.5622	Corr	% 96	
4 DDT		Raw 7.4074	Raw	Expected 8.800	
		Corr 7.4074	Corr	% 84	
5		Raw	Raw	Expected	
		Corr	Corr	%	
6		Raw	Raw	Expected	
		Corr	Corr	%	

NOT USED

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QC CHECKLIST
ECOVA SITE SUPPORT CHEMISTRY LABORATORY

SAMPLE GROUP NUMBER: 200-79 Baseline Analyses

PROJECT NUMBER: 932005

QUALITY CONTROL

LEVEL 1

		Analytical Value	Anticipated Value	Technician
1)	Standard Curve Results	>0.999	>0.998	Jam
2)	Spike Results (Positive Control)	OK	OK	Jam
3)	Reagent Blank (Negative Control)	< LOD	< LOD	Jam
4)	Duplicate Results	N/A	%RPD	

LEVEL II

		Analytical Results	Technician
4)	Matrix Spike Results (%RPD)	OK	Jm
5)	Percentage Recovery	~ 90.0 %	

LEVEL III

6) See Narrative

OC Check Acceptable

Technician: _____

ECOVA

SITE SUPPORT CHEMISTRY
SPIKE RESULTS WORKSHEET

SAMPLE GROUP #: 200-79 Baseline Analyses
DATE: 3/19/90
TECHNICIAN: Jam
PROJECT NUMBER: 832005

	Compound	Sample Amount	MS Quant	MSD Quant	% Recovery	% RPD
1	DCBH	N/D	Raw 4.7413	Raw 4.6855	Expected 5.00	1.184 %
			Corr —	Corr —	% 94.27	
2	DDA	N/D	Raw 4.5289	Raw 4.4041	Expected 4.80	2.794 %
			Corr —	Corr —	% 93.05	
3	DDD		Raw 8.4736 ~~8.1940~~	Raw 8.5039 ~~8.2521~~	Expected 9.06	.701 %
			Corr —	Corr —	% 90.76	
4	DDT	1.9633	Raw 7.8969	Raw 7.9764	Expected 6.67	1.33 %
			Corr 5.9336	Corr 6.0131	% 89.55	
5			Raw	Raw	Expected	
			Corr	Corr	%	
6		NOT USED	Raw	Raw	Expected	
			Corr	Corr	%	

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699999-A-061

GC and LC Standards Tracking Using Area Count
ECOVA Site Support Chemistry
Test Type: _____

DATE	SAMPLE GROUP	HIGH 20ppm DDT	MIDDLE 10ppm DDT	LOW	TECH
04/10/90	200-102	595	—	—	TR
03/15/90	200-79	564	—	—	TR
05/16/90	200-119	585	—	—	TR
05/21/90	200-143	584	—	—	TR
05/11/90	200-113	610	—	—	TR
05/30/90	200-156	663	—	—	MP
06/01/90	200-118	~~t~~ mr	340	—	MP
06/06/90	200-144	640	—	—	MP
06/01/90	200-157	665	—	—	MP
					Forms'90/A

APPENDIX E

HPLC ANALYTICAL REPORTS FOR DDT TRETABILITY STUDY

BOE-C6-0186249

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=0 SLURRY LABORATORY NUMBER: 200-119-1

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	10 PPM	
DBP	1.12	3.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.4 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	37 PPM	
DDE	14.4	13 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-0 SLURRY **LABORATORY NUMBER:** 200-119-2

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	12 PPM	
DBP	1.12	4.3 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.4 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	34 PPM	
DDE	14.4	11 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=0 SLURRY LABORATORY NUMBER: 200-119-3

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	8.6 PPM	
DBP	1.12	3.0 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.0 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	33 PPM	
DDE	14.4	10 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832805
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=0 SLURRY **LABORATORY NUMBER:** 200-119-4

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	9.8 PPM	
DBP	1.12	4.0 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.4 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	35 PPM	
DDE	14.4	12 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=0 SLURRY LABORATORY NUMBER: 200-119-5

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	9.7 PPM	
DBP	1.12	8.3 PPM	
FW-152	1.86	N/D	U
DDM	4.68	1.5 PPM	
DDD	11.4	53 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	1400 PPM	
DDE	14.4	120 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=0 SLURRY **LABORATORY NUMBER:** 200-119-6

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	10 PPM	
DBP	1.12	8.8 PPM	
FW-152	1.86	N/D	U
DDM	4.68	1.6 PPM	
DDD	11.4	44 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	912 PPM	
DDE	14.4	94 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=0 SLURRY LABORATORY NUMBER: 200-119-7

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	6.3 PPM	
DBP	1.12	7.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	1.3 PPM	
DDD	11.4	41 PPM	
KEL/THANE	2.54	N/D	U
DDT	21.2	1150 PPM	
DDE	14.4	92 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=0 SLURRY LABORATORY NUMBER: 200-119-8

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.4 PPM	
DBP	1.12	7.2 PPM	
FW-152	1.86	N/D	U
DDM	4.68	1.3 PPM	
DDD	11.4	39 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	950 PPM	
DDE	14.4	87 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-1 SLURRY LABORATORY NUMBER: 200-118-1

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.5 PPM	
DBP	1.12	2.4 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.0 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	40 PPM	
DDE	14.4	12 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-1 SLURRY LABORATORY NUMBER: 200-118-2

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.0 PPM	
DBP	1.12	2.6 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	0.9 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	38 PPM	
DDE	14.4	12 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-3-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-1 SLURRY LABORATORY NUMBER: 200-118-3

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.6 PPM	
DBP	1.12	1.8 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.3 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	44 PPM	
DDE	1.44	14 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-1 SLURRY LABORATORY NUMBER: 200-118-4

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.7 PPM	
DBP	1.12	2.2 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.0 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	39 PPM	
DDE	1.44	12 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=1 SLURRY **LABORATORY NUMBER:** 200-118-5

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.3 PPM	
DBP	1.12	2.6 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	2.3 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	36 PPM	
DDE	1.44	10 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=1 SLURRY **LABORATORY NUMBER:** 200-118-6

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	6.8 PPM	
DBP	1.12	2.7 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	2.5 PPM	
KEL/THANE	2.54	N/D	U
DDT	2.12	46 PPM	
DDE	1.44	16 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=1 SLURRY LABORATORY NUMBER: 200-118-7

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	3.7 PPM	
DBP	1.12	5.2 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	47 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1300 PPM	
DDE	1.44	86 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=1 SLURRY LABORATORY NUMBER: 200-118-8

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	0.9 PPM	
DBP	1.12	4.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	58 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1300 PPM	
DDE	1.44	76 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=1 SLURRY LABORATORY NUMBER: 200-118-9

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	0.7 PPM	
DEP	1.12	4.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	44 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1400 PPM	
DDE	1.44	80 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=1 SLURRY LABORATORY NUMBER: 200-118-10

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.1 PPM	
DBP	1.12	4.1 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	59 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1300 PPM	
DDE	1.44	93 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-1 SLURRY LABORATORY NUMBER: 200-118-11

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.2 PPM	
DBP	1.12	3.9 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	59 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1300 PPM	
DDE	1.44	81 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-1 SLURRY **LABORATORY NUMBER:** 200-118-12

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.2 PPM	
DBP	1.12	4.2 PPM	
PW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	59 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1300 PPM	
DDE	1.44	96 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 SLURRY LABORATORY NUMBER: 200-144-1

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.0 PPM	
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.2 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	34 PPM	
DDE	1.44	10 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 SLURRY LABORATORY NUMBER: 200-144-2

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBN	1.60	N/D	U
DDA	1.20	5.5 PPM	
DEP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.1 PPM	
METAMARK	2.54	N/D	U
DDT	2.12	30 PPM	
DDE	1.44	9.7 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 SLURRY **LABORATORY NUMBER:** 200-144-3

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	6.0 PPM	
DBP	1.12	N/D	U
FM-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.2 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	35 PPM	
DDE	1.44	11 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=4 SLURRY LABORATORY NUMBER: 200-144-4

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	8.0 PPM	
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.5 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	46 PPM	
DDE	1.44	12 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 SLURRY LABORATORY NUMBER: 200-144-5

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.5 PPM	
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.4 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	40 PPM	
DDE	1.44	9.6 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 SLURRY LABORATORY NUMBER: 200-144-6

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.2 PPM	
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.3 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	33 PPM	
DDE	1.44	10 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 SLURRY LABORATORY NUMBER: 200-144-7

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	1.0 PPM	
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	43 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1100 PPM	
DDE	1.44	64 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=4 SLURRY LABORATORY NUMBER: 200-144-8

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	0.8 PPM	
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	42 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	960 PPM	
DDE	1.44	66 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 SLURRY **LABORATORY NUMBER:** 200-144-9

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	0.9 PPM	
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	49 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1300 PPM	
DDE	1.44	77 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=4 SLURRY **LABORATORY NUMBER:** 200-144-10

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.1 PPM	
DBP	1.12	4.8	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	32 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1200 PPM	
DDE	1.44	75 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=4 SLURRY LABORATORY NUMBER: 200-144-11

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.0 PPM	
DBP	1.12	4.4 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	51 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1300 PPM	
DDE	1.44	80 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-15-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 SLURRY **LABORATORY NUMBER:** 200-144-12

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.2 PPM	
DBP	1.12	4.3 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	50 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1100 PPM	
DDE	1.44	74 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 SLURRY LABORATORY NUMBER: 200-157-1

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.8 PPM	
DBP	1.12	1.0 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	2.0	
KELTHANE	2.54	N/D	U
DDT	21.2	40 PPM	
DDE	14.4	14 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 SLURRY LABORATORY NUMBER: 200-157-2

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	6.9 PPM	
DBP	1.12	2.4 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.8	
KELTHANE	2.54	N/D	U
DDT	21.2	38 PPM	
DDE	14.4	11 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 SLURRY LABORATORY NUMBER: 200-157-3

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.6 PPM	
DBP	1.12	2.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.8	
KELTHANE	2.54	N/D	U
DDT	21.2	29 PPM	
DDE	14.4	8.7 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 SLURRY LABORATORY NUMBER: 200-157-4

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.6 PPM	
DBP	1.12	2.4 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.8	
KELTHANE	2.54	N/D	U
DDT	21.2	32 PPM	
DDE	14.4	11 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 SLURRY LABORATORY NUMBER: 200-157-5

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	0.5 PPM	J
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	50	
KELTHANE	2.54	N/D	U
DDT	21.2	1200 PPM	
DDE	14.4	62 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=8 SLURRY LABORATORY NUMBER: 200-157-6

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	0.6 PPM	J
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	50	
KELTHANE	2.54	N/D	U
DDT	21.2	1200 PPM	
DDE	14.4	68 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 SLURRY LABORATORY NUMBER: 200-157-7

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	4.9 PPM	
DBP	1.12	3.9 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	53	
KELTHANE	2.54	N/D	U
DDT	21.2	1300 PPM	
DDE	14.4	71 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 SLURRY LABORATORY NUMBER: 200-157-8

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	4.7 PPM	
DBP	1.12	3.7 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	54	
KELTHANE	2.54	N/D	U
DDT	21.2	1300 PPM	
DDE	14.4	68 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-2-90
REPORT DATE: 4-23-90

SAMPLE NAME: EMS-4180 LABORATORY NUMBER: 200-102-1

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	11 PPM	
DBP	1.12	5.6 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.8 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	34 PPM	
DDE	14.4	13 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-2-90
REPORT DATE: 4-23-90

SAMPLE NAME: EMS-4181 LABORATORY NUMBER: 200-102-2

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	12 PPM	
DBP	1.12	5.3 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.5 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	27 PPM	
DDE	14.4	10 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-2-90
REPORT DATE: 4-23-90

SAMPLE NAME: EMS-4185 LABORATORY NUMBER: 200-102-3

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	17 PPM	
DBP	1.12	5.6 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.4 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	32 PPM	
DDE	14.4	13 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-2-90
REPORT DATE: 4-23-90

SAMPLE NAME: EMS-4186 LABORATORY NUMBER: 200-102-4

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	11 PPM	
DBP	1.12	5.3 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.6 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	35 PPM	
DDE	14.4	15 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 04-02-90
REPORT DATE: 04-23-90

SAMPLE NAME: EMS-4190 LABORATORY NUMBER: 200-103-5

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	27 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1100 PPM	
DDE	1.44	70 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 04-02-90
REPORT DATE: 04-23-90

SAMPLE NAME: EMS-4191 LABORATORY NUMBER: [illegible]

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	31 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1100 PPM	
DDE	1.44	82 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 04-02-90
REPORT DATE: 04-23-90

SAMPLE NAME: EMS-4105 **LABORATORY NUMBER:** [illegible]

COMPOUND	LOQ (PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	31 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1100 PPM	
DDE	1.44	77 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 04-02-90
REPORT DATE: 04-23-90

SAMPLE NAME: EMS-4196 LABORATORY NUMBER: [illegible]

COMPOUND	RT (MIN)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	48 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1200 PPM	
DDE	1.44	92 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4259 LABORATORY NUMBER: 200-113-1

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	14 PPM	
DBP	1.12	17 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	2.8 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	34 PPM	
DDE	14.4	14 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4260 LABORATORY NUMBER: 200-113-2

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	15 PPM	
DBP	1.12	17 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.4 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	35 PPM	
DDE	14.4	14 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4261 LABORATORY NUMBER: 200-113-3

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	17 PPM	
DBP	1.12	20 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.9 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	48 PPM	
DDE	14.4	18 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4262 LABORATORY NUMBER: 200-113-4

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	11 PPM	
DBP	1.12	14 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	39 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	1000 PPM	
DDE	14.4	77 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4263 LABORATORY NUMBER: 200-113-5

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	9.8 PPM	
DBP	1.12	14 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	34 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	850 PPM	
DDE	14.4	79 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4264 LABORATORY NUMBER: 200-113-6

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	9.5 PPM	
DBP	1.12	12 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	39 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	1000 PPM	
DDE	14.4	81 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4265 LABORATORY NUMBER: 200-113-7

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	9.6 PPM	
DBP	1.12	3.6 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.3 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	52 PPM	
DDE	14.4	16 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4267 LABORATORY NUMBER: 200-113-9

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	9.5 PPM	
DBP	1.12	2.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.2 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	33 PPM	
DDE	14.4	12 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4268 LABORATORY NUMBER: 200-113-10

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	6.7 PPM	
DBP	1.12	7.6 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	63 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	1500 PPM	
DDE	14.4	97 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 835002
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 4-10-90
REPORT DATE: 5-8-90

SAMPLE NAME: EMS-4269 LABORATORY NUMBER: 200-113-12

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	6.2 PPM	
DBP	1.12	7.4 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	48 PPM	
KELTHANE	2.54	N/D	U
DDT	21.2	1000 PPM	
DDE	14.4	96 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=4 Pan Aa **LABORATORY NUMBER:** 200-?43-1

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	8.3 PPM	
DBP	1.12	3.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.8	J
KELTHANE	2.54	N/D	U
DDT	21.2	36 PPM	
DDE	14.4	14 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832035
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=4 Pan Aa LABORATORY NUMBER: 200-143-2

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DOA	1.20	7.7 PPM	
DBP	1.12	3.2 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.8	J
KELTHANE	2.54	N/D	U
DDT	21.2	42 PPM	
DDE	14.4	16 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 Pan Aa LABORATORY NUMBER: 200-143-3

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	8.1 PPM	
DBP	1.12	3.0 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.7	J
KELTHANE	2.54	N/D	U
DDT	21.2	36 PPM	
DDE	14.4	14 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=4 Pan As **LABORATORY NUMBER:** 200-143-4

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	9.4 PPM	
DBP	1.12	3.9 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	2.2	J
KELTHANE	2.54	N/D	U
DDT	21.2	46 PPM	
DDE	14.4	19 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 Pan As LABORATORY NUMBER: 200-143-5

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.4 PPM	
DBP	1.12	3.3 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.8	J
KELTHANE	2.54	N/D	U
DDT	21.2	34 PPM	
DDE	14.4	14 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=4 Pan As LABORATORY NUMBER: 200-143-6

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	8.4 PPM	
DBP	1.12	3.2 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.5	J
KELTHANE	2.54	N/D	U
DDT	21.2	30 PPM	
DDE	14.4	11 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 Pan Ba LABORATORY NUMBER: 200-143-7

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	4.6 PPM	
DBP	1.12	2.6 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	45	
KEL/THANE	2.54	N/D	U
DDT	21.2	1000 PPM	
DDE	14.4	95 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 Pan Ba LABORATORY NUMBER: 200-143-8

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.4 PPM	
DBP	1.12	5.4 PPM	
FW-152	1.86	N/D	U
DDM	4.68	1.4	J
DDD	11.4	42	
KELTHANE	2.54	N/D	U
DDT	21.2	1000 PPM	
DDE	14.4	92 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=4 Pan Ba LABORATORY NUMBER: 200-143-9

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.3 PPM	
DBP	1.12	5.0 PPM	
FW-152	1.86	N/D	U
DDM	4.68	1.0	J
DDD	11.4	43	
KELTHANE	2.54	N/D	U
DDT	21.2	960 PPM	
DDE	14.4	94 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 Pan Bs **LABORATORY NUMBER:** 200-143-10

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.2 PPM	
DBP	1.12	7.8 PPM	
FW-152	1.86	N/D	U
DDM	4.68	1.1	J
DDD	11.4	45	
KELTHANE	2.54	N/D	U
DDT	21.2	860 PPM	
DDE	14.4	95 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 Pan Bs LABORATORY NUMBER: 200-143-11

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.5 PPM	
DBP	1.12	7.7 PPM	
FW-152	1.86	N/D	U
DDM	4.68	1.1	J
DDD	11.4	45	
KELTHANE	2.54	N/D	U
DDT	21.2	1100 PPM	
DDE	14.4	100 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-4 Pan Bs LABORATORY NUMBER: 200-143-12

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	5.6 PPM	
DBP	1.12	7.8 PPM	
FW-152	1.86	N/D	U
DDM	4.68	1.1	J
DDD	11.4	47	
KELTHANE	2.54	N/D	U
DDT	21.2	1100 PPM	
DDE	14.4	99 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 Pan Aa LABORATORY NUMBER: 200-156-1

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	10 PPM	
DBP	1.12	4.0 PPM	
FW-152.	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.0	J
KELTHANE	2.54	N/D	U
DDT	21.2	36 PPM	
DDE	14.4	15 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 Pan Aa LABORATORY NUMBER: 200-156-2

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	7.7 PPM	
DBP	1.12	2.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	0.8	J
KELTHANE	2.54	N/D	U
DDT	21.2	34 PPM	
DDE	14.4	13 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 Pan As LABORATORY NUMBER: 200-156-3

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	10 PPM	
DBP	1.12	3.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	1.5	J
KELTHANE	2.54	N/D	U
DDT	21.2	49 PPM	
DDE	14.4	19 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=8 Pan As LABORATORY NUMBER: 200-156-4

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	10 PPM	
DBP	1.12	2.8 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	0.9	J
KELTHANE	2.54	N/D	U
DDT	21.2	35 PPM	
DDE	14.4	13 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T=8 Pan Ba **LABORATORY NUMBER:** 200-156-5

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	4.1 PPM	
DBP	1.12	5.5 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	41	
KELTHANE	2.54	N/D	U
DDT	21.2	1500 PPM	
DDE	14.4	90 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 Pan Ba **LABORATORY NUMBER:** 200-156-6

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	2.9 PPM	
DBP	1.12	5.2 PPM	
FM-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	45	
KELTHANE	2.54	N/D	U
DDT	21.2	1300 PPM	
DDE	14.4	91 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 Pan Bs **LABORATORY NUMBER:** 200-156-7

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	4.2 PPM	
DBP	1.12	5.5 PPM	
PW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	47	
KELTHANE	2.54	N/D	U
DDT	21.2	1600 PPM	
DDE	14.4	99 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: W. Mahaffey
DATE SUBMITTED: 5-17-90
REPORT DATE: 6-11-90

SAMPLE NAME: T-8 Pan Bs LABORATORY NUMBER: 200-156-8

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	4.5 PPM	
DBP	1.12	6.2 PPM	
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	11.4	48	
KELTHANE	2.54	N/D	U
DDT	21.2	1400 PPM	
DDE	14.4	100 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

BR-4

SAMPLE NAME: EMS # 3457 LABORATORY NUMBER: 200-79-1

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	2.0 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	81 PPM	K
DDE	1.44	38 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

BR-4

SAMPLE NAME: EMS # 3457 **LABORATORY NUMBER:** 200-79-2

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.9 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	85 PPM	K
DDE	1.44	38 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

SAMPLE NAME: EMS # 3457 BR-4 LABORATORY NUMBER: 200-79-3

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	1.8 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	85 PPM	K
DDE	1.44	40 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

BR-6

SAMPLE NAME: EMS # 3458 LABORATORY NUMBER: 200-79-4

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	2.4 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	11 PPM	
DDE	1.44	2.1 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

SAMPLE NAME: EMS # BR-6 3458 **LABORATORY NUMBER:** 200-79-5

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	2.3 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	12 PPM	
DDE	1.44	2.3 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

BR6

SAMPLE NAME: EMS # 3458 **LABORATORY NUMBER:** 200-79-6

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	2.3 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	9.7 PPM	
DDE	1.44	1.8 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

SAMPLE NAME: EMS # 3459 BR-7 **LABORATORY NUMBER:** 200-79-7

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	60 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	650 PPM	K
DDE	1.44	32 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

SAMPLE NAME: EMS # 3459 BR-7 LABORATORY NUMBER: 200-79-8

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	71 PPM	K
KELTHANE	2.54	N/D	U
DDT	2.12	630 PPM	K
DDE	1.44	28 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

BR-7

SAMPLE NAME: EMS # 3459 LABORATORY NUMBER: 200-79-9

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	25 PPM	K
KELTHANE	2.54	N/D	U
DDT	2.12	611 PPM	K
DDE	1.44	26 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

BR-5

SAMPLE NAME: EMS # 3460 **LABORATORY NUMBER:** 200-79-10

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	59 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1400 PPM	
DDE	1.44	140 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

SAMPLE NAME: EMS # 3460 BR-5 **LABORATORY NUMBER:** 200-79-11

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	61 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1400 PPM	
DDE	1.44	130 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

BR-5

SAMPLE NAME: EMS # 3460 **LABORATORY NUMBER:** 200-79-12

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	62 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	1500 PPM	
DDE	1.44	150 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

BR-8

SAMPLE NAME: EMS # 3461 LABORATORY NUMBER: 200-79-13

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	37 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	870 PPM	
DDE	1.44	40 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

SAMPLE NAME: EMS # BR-8 3461 **LABORATORY NUMBER:** 200-79-14

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	36 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	850 PPM	
DDE	1.44	41 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

BR-8

SAMPLE NAME: EMS # 3461 LABORATORY NUMBER: 200-79-15

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
PM-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	170 PPM	
KELTHANE	2.54	N/D	U
DDT	2.12	930 PPM	
DDE	1.44	42 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

Background Soil

SAMPLE NAME: EMS # 3462 **LABORATORY NUMBER:** 200-79-16

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	N/D	U
KELTHANE	2.54	N/D	U
DDT	2.12	4.1 PPM	
DDE	1.44	2.5 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

SAMPLE NAME: EMS # 3462 Background Soil **LABORATORY NUMBER:** 200-79-17

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBN	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	N/D	U
KELTHANE	2.54	N/D	U
DDT	2.12	5.8 PPM	
DDE	1.44	3.6 PPM	

PESTICIDES ANALYSIS
HPLC/GC-ECD

PROJECT NUMBER: 832005
PROJECT MANAGER: Bill Mahaffey
DATE SUBMITTED: 03-13-90
REPORT DATE: 03-20-90

Background Soil

SAMPLE NAME: EMS # 3462 LABORATORY NUMBER: 200-79-28

COMPOUND	LOQ(PPM)	RESULTS	CODE
DCBH	1.60	N/D	U
DDA	1.20	N/D	U
DBP	1.12	N/D	U
FW-152	1.86	N/D	U
DDM	4.68	N/D	U
DDD	1.14	N/D	U
KELTHANE	2.54	N/D	U
DDT	2.12	4.7 PPM	
DDE	1.44	3.9 PPM	

SMU

Montrose Chemical Corp.,

Section C

BOE-C6-0186346