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FINAL REPORT RESULTS OF GROUNDWATER AND SOIL TOXICITY TESTS COMPLETED SAMPLES NAS CECIL FIELD FL

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INCHCAPE TESTING SERVICES

FINAL REPORT
RESULTS OF GROUNDWATER AND SOIL TOXICITY TESTS COMPLETED ON SAMPLES FROM CECIL FIELD NAVAL AIR STATION

ABB-ES SUBCONTRACT SE4-21-027
ABB-ES PURCHASE ORDER SE421027

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EXECUTIVE SUMMARY

Toxicity tests were completed on a series of groundwater and soil samples collected from Naval Air Station Cecil Field. The objective of this study was to evaluate the chronic toxicity of two groundwater samples and nine soil samples received by Inchcape Testing Services Aquatec Laboratories from ABB Environmental Services, Inc. during the month of November 1994. This report details the test methodology and the results of the toxicity tests. All tests were completed by 22 December 1994.

1) NAS Cecil Field Groundwater Chronic Toxicity Tests:

		Chronic Value		
Species	**Sample**	**C-NOEC**	**MATC**	**LOEC**
Ceriodaphnia dubia	CF3MW13S	100	NC	>100
Pimephales promelas	CF3MW13S	50	71	100
Ceriodaphnia dubia	CF3MW28S	<5	NC	5
Pimephales promelas	CF3MW28S	50	71	100

NC - Not calculated.
>100 - Chronic toxicity was not detected.

2) NAS Cecil Field Soil 5-day Lettuce Seed *(Lactuca sativa)* Germination Tests:

Seed germination in soil samples CF3SS17 and CF3SS20 was judged to be lower relative to reference soil sample CF3SS1. Seed germination in the remaining site soil samples was not significantly lower than the reference station.

3) NAS Cecil Field Soil 28-day Earthworm *(Eisenia foetida)* Survival Tests:

Earthworm survival was not adversely affected during a 28-day exposure to the NAS Cecil Field test soils.

1.0 INTRODUCTION

Inchcape Testing Services Aquatec Laboratories (Aquatec) conducted groundwater and soil toxicity tests on samples provided by ABB Environmental Services, Inc. (ABB-ES). According to the Chain-of-Custody documentation, the samples were collected from Site #3 of Naval Air Station (NAS) Cecil Field Operable Unit 2, Jacksonville, Florida. This work was completed under the direction of ABB-ES Subcontract SE4-21-027.

Groundwater sample toxicity was evaluated by completing chronic, daily renewal toxicity tests with the cladoceran, *Ceriodaphnia dubia,* and larval fathead minnow, *Pimephales promelas.* Two groundwater samples were received for testing. Nine soil samples were evaluated by completing the lettuce seed, *Lactuca sativa,* 5-day germination test and the earthworm, *Eisenia foetida,* 28-day survival test. Testing was completed during the period from 22 November to 22 December 1994 at Aquatec's 75 Green Mountain Drive facility located in South Burlington, Vermont.

2.0 SUMMARY OF SAMPLES RECEIVED

Each sample received was logged in and stored in a refrigerator. Each sample was assigned a unique Aquatec laboratory number. Water samples were received in 1-gallon plastic jugs (five per site). Soil samples were also received in 1-gallon plastic jugs (one per site). Correspondence between field identification numbers (from the Chain-of-Custody documentation) and Aquatec sample numbers is:

Field Sample Identification	Sample Matrix	1994 Date Received.	Aquatec Sample No.
CF3SS1	Soil	11/22	241912
CF3SS4	Soil	11/22	241913
CF3SS9	Soil	11/22	241914
CF3SS12	Soil	11/22	241915
CF3SS15	Soil	11/22	241916
CF3SS17	Soil	11/22	241917
CF3SS20	Soil	11/22	241918
CF3SS22	Soil	11/22	241919
CF3SS24	Soil	11/22	241920
CF3MW13S	Water	11/26	Sample not tested
CF3MW28S	Water	11/26	Sample not tested
CF3MW13S	Water	11/29	242570
CF3MW28S	Water	11/29	242571

3.0 METHODS AND MATERIALS

3.1 Sample Preparation

3.1.1 Groundwater Sample Preparation (*Ceriodaphnia dubia and Pimephales promelas*)

Groundwater samples were received on 29 November 1994 and were characterized for temperature, pH, dissolved oxygen, and conductivity. The samples were checked for residual chlorine content and then placed in a locked refrigerator for overnight storage. On 30 November 1994, the samples were removed from storage and decanted to minimize resuspension of particulates which had settled overnight. The settled particulates were removed from the test sample. Samples were warmed to test temperature (25°C) and gently aerated to bring dissolved oxygen into equilibrium. The pH of the samples, as received, was found to be below the recommended range for toxicity testing (sample pH: 4.6-4.9; recommended pH range: 6 - 9), therefore the pH of each sample was adjusted to 7.0 with 1N NaOH solution. The samples were diluted with laboratory reconstituted moderately hard water. Chronic toxicity tests with *Ceriodaphnia dubia* and *Pimephales promelas* were initiated on 30 November 1994 with groundwater samples CF3MW13S and CF3MW28S using a dilution series of 100, 50, 20, 10, and 5 percent sample. Samples were prepared daily for test renewals by removing sufficient volume from the refrigerator to prepare new test dilutions for the water renewals.

3.1.2 Soil Sample Preparation (*Eisenia foetida*)

Soil samples received on 22 November 1994 were homogenized with a stainless steel spatula. Aliquots of the sample were removed for characterization of physical appearance, soil pH, soil moisture content, and total organic carbon. A 1000 g aliquot of each soil sample was removed and hydrated with NanoPure water to the appropriate hydration level, based on an approximation of the soil moisture content (from a 2-hour drying of soil sample aliquots). The target hydration level was 35 - 45 percent of soil dry weight. Although the Artificial Soil Control was hydrated to 40 percent of the soil dry weight, initial preparation of the test soils indicated that 40 percent hydration would have resulted in test soils which were apparently too wet for the earthworm test. Since the soil moisture content was similar between samples, the samples were hydrated to approximately 20 percent of sample dry weight with the exception of Sample CF3SS24 which did not require hydration. Hydrated soils were homogenized and distributed by 200 g aliquots to each of five replicate test chambers for the earthworm toxicity test. A "Bedding

Control", consisting of Magic Worm Bedding was hydrated according to the manufacturer's instructions (1.9 L water per 1000g of bedding) and included as a supplemental treatment in the test array. The soil in each replicate was allowed to sit undisturbed overnight at test temperature, prior to addition of the worms. On 23 November 1994, the earthworm exposures were initiated.

3.1.3 Soil Sample Preparation (*Lactuca sativa*)

On 24 November 1994, 500 g aliquots of each sample (previously homogenized) were transferred to Ziplock bags and the bags containing the soil sample aliquots were returned to cold storage. Soil water-holding-capacity analysis was completed on a previously dried subsample of each sample to determine the 85 percent level of water holding capacity. The calculated volume of NanoPure water was added to each sample and the samples were re-homogenized by massaging the bag containing soil to distribute the water evenly. Hydrated soils were then distributed by adding 100 g to each of three test replicates. The soils were gently compressed to distribute the soils over the test chamber (15 cm petri dish bottom) surface. Samples CF3SS12 and CF3SS24 were not hydrated and were instead allowed to air dry, because the water holding capacity analyses indicated excess water content for these samples. The Artificial Soil Control (sand passed through a 20 mesh sieve) and the cover sand (fraction of sand between 16 and 20 mesh) and a supplemental commercial potting soil control ("StimuPlant") were also hydrated. On 25 November 1994, 40 seeds were distributed to each test and control replicate and covered with 90 g of cover sand.

3.2 Test Organisms

3.2.1 Groundwater Toxicity Test Organisms

Ceriodaphnia dubia neonates were produced by Aquatec's in-house cultures of adult females less than two weeks old which had released at least three documented broods. Neonates used for testing were less than 24 hours old, all released within an eight-hour period, and collected from broods of eight or more neonates. They were distributed singly to each of the test replicates.

Fathead minnow, *Pimephales promelas*, larvae were acquired from Aquatic Resources of Sebastopol, California. The batch used for testing were hatched on 29 November 1994 and shipped by overnight delivery service. Larvae were randomly distributed to the replicate test

chambers. Larvae were approximately 24 hours old when the tests were started on 30 November 1994.

3.2.2 Soil Toxicity Test Organisms

Buttercrunch lettuce seeds, *Lactuca sativa*, were acquired from "The Cook's Garden" of Londonderry, Vermont on 23 November 1994. Seeds from this source are reportedly free of fungicide treatments. Prior to testing, the seeds were sorted under a dissecting microscope to select seeds of similar size and to remove seeds with fractured shells. Groups of 40 seeds were distributed to 1-oz. cups and then the seeds in each cup were distributed to randomly assigned test replicates. The seeds were depressed slightly below the test soil surface with forceps and then 90 g of cover soil was spread evenly over the seeds.

Earthworms, *Eisenia foetida*, were acquired from Carolina Biological Supply Company of Burlington, North Carolina. The batch used for testing were received on 22 November 1994. They were transferred to trays containing worm bedding and held until 23 November 1994 when worms with a clitellum and weighing 0.3 - 0.5 g were randomly distributed, ten to each test replicate.

3.3 Toxicity Test Methods

3.3.1 Groundwater Toxicity Test Methods

Procedures for the groundwater chronic toxicity tests were based upon the guidelines of the U.S.Environmental Protection Agency (EPA) Methods 1002.0 (*Ceriodaphnia dubia*, Table 1) and 1000.0 (*Pimephales promelas*, Table 2) in *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms* (EPA/600/4-89/001).

3.3.2 Soil Toxicity Test Methods

Procedures for the soil toxicity tests were based upon the guidelines outlined in Sections A.8.6 (*Lactuca sativa*, Table 3) and A.8.5 (*Eisenia foetida*, Table 4) of *Protocols for Short Term Toxicity Screening of Hazardous Waste Sites* (EPA/600/3-88/029). The earthworm test exposure was 28 days, followed by a one-day depuration period (by placing worms in petri dishes with moist filter paper without soil). The earthworms were frozen and archived, by test replicate, for possible subsequent tissue residue analyses.

3.4 Statistical Methods

3.4.1 Groundwater Toxicity Test Statistics

Statistical analyses of groundwater samples were completed using TOXSTAT Version 3.4 (West, Inc. and D.D. Gulley, 1994). The proportion of surviving minnow larvae (per replicate) were arc-sine(square-root) transformed prior to statistical analysis.

The Chronic No Observed Effect Concentration (C-NOEC) was defined as the highest test concentration which caused no significant reduction in the measured endpoint (survival, reproduction, or growth) while the Lowest Observed Effect Concentration (LOEC) was defined as the lowest test concentration which caused a significant reduction in the measured endpoint. When a non-dose response was observed, best professional judgment was used to assign measurement endpoints.

3.4.2 Soil Toxicity Test Statistics

Statistical analysis of the lettuce seed tests were completed using the non-parametric Mann-Whitney U Test. Each test soil was statistically compared to Sample CFSS1 which was identified as the reference site on the Chain-of-Custody documentation. Earthworm survival data were evaluated by direct observation due to the high survival rates observed in all test samples.

4.0 RESULTS

4.1 Groundwater Toxicity Tests

Groundwater Sample CF3MW13S demonstrated chronic toxicity to fathead minnow larvae. The C-NOEC for fathead minnow was 50 percent groundwater Sample CF3MW13S (Table 5). Sample CF3MW13S did not result in chronic toxicity to *Ceriodaphnia dubia* (C-NOEC >100 percent). One response in the *Ceriodaphnia dubia* test (50 percent groundwater) was viewed as an anomaly.

Groundwater Sample CFMW28S exhibited chronic toxicity to both test species. The C-NOEC for *Ceriodaphnia dubia* was < 5 percent sample. The C-NOEC for *Pimephales promelas* was 50 percent sample (Table 6). Copies of original data and documentation of environmental conditions and observations associated with the groundwater toxicity tests are located in Appendix D-1 for Sample CF3MW13S and in Appendix D-2 for Sample CF3MW28S.

4.2 Soil Toxicity Tests

4.2.1 Lettuce Seed Germination Tests

Lettuce seed germination in the Artificial Soil Control was 95 percent. Sample CF3SS1 was identified on the Chain-of-Custody documentation as a reference location and all other test soils were compared to the reference soil sample (Table 7). Mean germination for Sample CF3SS1 was 50 percent. Seed germination in Sample CF3SS17 was significantly lower than the reference soil ($P = 0.05$). Seed germination in Sample CF3SS20 also appeared to be lower ($P < 0.1$) than the reference soil, while seed germination in the remaining seven soil samples were not statistically lower than the reference soil sample ($P > 0.10$). Copies of original test data and documentation of test conditions and observations associated with the lettuce seed germination tests are located in Appendix F-1.

4.2.2 Earthworm Survival Tests

Survival in the Artificial Soil Control, "Bedding Control", and in the reference soil of the earthworm toxicity tests after 28 days of soil exposure was 100 percent (Table 8). Earthworm survival in all other NAS Cecil Field site samples was similar to the control and reference soils, ranging from 98 to 100 percent. Earthworm survival was not adversely affected during 28-day exposure to the NAS Cecil Field test soils. Earthworms were frozen and are archived at Aquatec until direction is provided by ABB-ES regarding possible shipment of earthworms for tissue residue analyses. Copies of original data and documentation of test conditions and observations associated with the earthworm survival tests are located in Appendix F-2.

5.0 QUALITY ASSURANCE

5.1 Test Acceptability

All groundwater and soil toxicity tests met the minimum acceptability criteria stipulated in the EPA protocols (See Tables 1 through 4 for test acceptability criteria).

5.2 Reference Toxicant Tests

Standard monthly 48-hour acute *Ceriodaphnia dubia* and *Pimephales promelas* reference toxicant tests were completed using sodium chloride as the reference toxicant. The LC50 values were within the 95 percent confidence limits of Aquatec's Control Charts (Appendix G).

Organisms. EPA/600/4-89/001. Environmental Monitoring and Support Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio.

U.S. Environmental Protection Agency. 1988. (J.C. Greene et al. eds.) Protocols for Short Term Toxicity Screening of Hazardous Waste Sites. EPA/600/3-88/029. Environmental Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Corvallis, Oregon.

West, Inc. and D.D.Gulley. 1994. TOXSTAT 3.4. Western EcoSystems Technology, Inc. Cheyenne, Wyoming.

Table 1. Test conditions for the cladoceran (*Ceriodaphnia dubia*) survival and reproduction test.

ASSOCIATED PROTOCOL: *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms.* (EPA/600/4-89/001).

1. Test Type:	Static, daily renewal
2. Test Temperature:	25 ± 1°C
3. Light Quality:	Ambient laboratory illumination
4. Photoperiod:	16 hr. light, 8 hr. dark
5. Test Chamber Size:	30 mL
6. Test Solution Volume:	15 - 20 mL
7. Renewal of Test Solutions:	Daily (samples cold-stored between renewals)
8. Age of Test Organism:	Less than 24 hr.; and all released within an 8 hr. period of each other
9. Number of Neonates Per Test Chamber:	1
10. Number of Replicate Test Chambers Per Treatment:	10
11. Number of Neonates Per Test Concentration:	10
12. Feeding Regime:	Feed 0.1 ml each of YTC and algal suspension per exposure chamber daily.
13. Aeration:	None
14. Dilution Water:	Moderately hard synthetic water (prepared using NanoPure deionized water and reagent grade chemicals).
15. Test Concentrations:	5 concentrations (100, 50, 20, 10, 5) and a control.
16. Dilution Factor:	Approximately 0.5

Table 1. Test conditions for the cladoceran (*Ceriodaphnia dubia*) survival and reproduction test (continued).

17. Test Duration:	Until 60% of control females have three broods (6 days)
18. Monitoring:	Daily temperature, dissolved oxygen, pH, and conductivity on old and renewal water. Hardness and alkalinity daily on Control and 100% sample. Biological monitoring (survival, number of neonates) daily
19. End Points:	Survival and reproduction
20. Reference Toxicant Test:	Sodium chloride 48-h LC50
21. Test Acceptability:	80% or greater survival and an average of 15 or more young/female in the control solutions. At least 60% of surviving females in controls must have produced third brood
22. Data Interpretation:	Hypothesis test statistics compared to the Laboratory Control

Table 2. Test conditions for the fathead minnow (*Pimephales promelas*) larval survival and growth test.

ASSOCIATED PROTOCOL: *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms.* (EPA/600/4-89/001).

1. Test Type:	Static, daily renewal
2. Test Temperature:	25 ± 1°C
3. Light Quality:	Ambient laboratory illumination
4. Photoperiod:	16 hr. light, 8 hr. dark
5. Test Chamber Size:	600 ml
6. Test Solution Volume:	200 ml/replicate
7. Renewal of Test Concentrations:	Daily (samples cold-stored between renewals)
8. Age of Test Organisms:	Newly hatched larvae, 24 hr. old
9. No. larvae/test chamber and control:	15
10. No. of replicate chambers/concentration:	4
11. No. of larvae/concentration:	60
12. Feeding Regime:	Feed 0.1 ml newly hatched brine shrimp (*Artemia*) nauplii twice daily, 6 hrs. between feedings (at the beginning of the work day prior to renewal, and at the end of the work day following renewal). Not fed on Day 7
13. Cleaning:	Siphon daily, immediately before test solution renewal
14. Aeration:	None
15. Dilution Water:	Moderately hard synthetic water (prepared using NanoPure deionized water and reagent grade chemicals)

Table 2. Test conditions for the fathead minnow (*Pimephales promelas*) larval survival and growth test (continued).

16. Test Concentrations:	5 concentrations (100, 50, 20, 10, 5) and a control
17. Dilution Factor:	Approximately 0.5
18. Test Duration:	7 days
19. Monitoring:	Daily temperature, dissolved oxygen, pH, and conductivity on old and renewal water. Alkalinity and hardness daily on the Control and 100% sample. Biological monitoring daily (survival counts, removal of dead)
19. End Points:	Survival and growth (weight)
20. Test Acceptability:	80% or greater survival in controls: minimum average dry weight of controls is 0.25 mg
21. Reference Toxicant Test:	Sodium chloride 48-h LC50
22. Data interpretation:	Hypothesis test statistics compared to the Laboratory Control

Table 3. Test conditions for the lettuce seed (*Lactuca sativa*) germination test.

ASSOCIATED PROTOCOL: *Short Term Toxicity Screening of Hazardous Waste Sites* (EPA/600/3-88/029)

1. Test Type:	Static
2. Test Duration:	120 hours
3. Light Quality/Intensity	Fluorescent, 4300 ± 430 lux; 16h light: 8h dark
4. Photoperiod:	Initial 48h dark, then 16h light: 8h dark
5. Test Organisms:	
Species	*Lactuca sativa*
Organism Age:	Seeds, size sorted
Source:	Cooks Garden, Londonderry, Vermont
6. Test Chambers:	150mm plastic petri dishes, placed in polyethylene bags
Soil Volume:	100g
Top Cover:	Cover seeds with 90 ± 1g of 16-mesh sand
7. Test Design:	
Organisms per chamber:	40 seeds
Replicates/Dilution:	3 replicates
Control Replication:	3 replicates
Dilution Series:	None
8. Temperature:	24 ± 2 °C
9. Soil Preparation:	Homogenize the soil sample Hydrate soils with deionized water to 85 percent of water hold capacity
10. Control Soil:	20-mesh, washed silica sand
11. Cover Soil:	16 mesh, sand passed through a 20-mesh sieve to remove fines.
12. Beginning Test:	Test start is defined as initiation of soil moisture content analysis
13. Five day measurements:	Count number of seedlings at 120 h (Day 5, end of test)

Table 3. Test conditions for the lettuce seed (*Lactuca sativa*) germination test (continued).

4. Monitoring:	
Light Intensity:	Daily beginning at 48 hours
pH:	Beginning and end of tests
Soil temperature:	Daily, one replicate
15. Endpoints:	Germination
16. Test Acceptability:	
Organism survival:	90% or greater germination in controls
17. Reference Toxicant Test:	None specified
18. Data Interpretation:	Hypothesis test statistics compared to the appropriate Reference Site Control

Table 4. Test conditions for the earthworm *(Eisenia foetida)* survival test.

ASSOCIATED PROTOCOL: *Short Term Toxicity Screening of Hazardous Waste Sites* (EPA/600/3-88/029)

1. Test Type:	Static.
2. Test Duration:	28-days plus one depuration day without soil.
3. Light Quality/Intensity	Continuous low light (540-180 lux).
4. Test Organisms:	
Species	*Eisenia foetida*
Organism Age:	Approximately 2 months (0.3g individual wet weight)
Culture Conditions:	Held in Magic Worm Bedding
Source:	Carolina Biological Supply.
5. Test Chambers:	1 pint glass canning jars with screw-top lids.
Soil Volume:	200g.
6. Test Design:	
Organisms per chamber:	10 earthworms
Replicates/Dilution:	5 replicates
Control Replication:	5 replicates
Dilution Series:	None
Feeding:	Once on Day 23 (Magic Worm Food)
7. Test Conditions:	
Temperature:	20 $\pm$ 2 °C
pH:	4 to 10
8. Soil Preparation:	Homogenize the soil sample Hydrate soils with deionized water to approximately 20% of soil dry weight. If soils are received saturated, air dry.
9. Control Soil:	Artificial soil (10% peat; 20% Kaolinite clay; 70% silica sand).
10. Beginning Test:	Test start is defined as initiation of soil moisture content analysis

Table 4. Test conditions for the earthworm (*Eisenia foetida*) survival test (continued).

11. Measurements:	Days 7, 14, 21 turn out animals, record the number surviving.
12. Monitoring:	
Light Intensity:	Daily
Soil Temperature:	Daily, one replicate
pH:	Beginning and end of test
Organisms:	Daily, remove dead earthworms (if observed)
13. Ending the test:	Day 28, count all surviving animals, measure wet weights (by replicate).
14. Endpoints:	Survival
15. Test Acceptability:	
Organism survival:	90% or greater survival in controls
16. Reference Toxicant Test:	None specified
17. Data Interpretation:	Direct observation.

Table 5. Summary results of NAS Cecil Field ground water sample CF3MW13S chronic toxicity tests *(Ceriodaphnia dubia* and *Pimephales promelas)* completed from 30 November 1994 to 7 December 1994.

Ceriodaphnia dubia

Percent Sample	48-h Survival (%)	End of Test Survival (%)	Average Number of Neonates per Female
Control	100	100	30.9
5	100	100	27.2
10	100	90	27.2
20	100	100	25.7
50	100	100	22.1*
100	100	100	26.2

* Indicates a statistically significant reduction in reproduction relative to the Control (P<0.05). The response in the 50 percent sample was viewed as an anomaly because a reduction in reproduction was not observed in the 100 percent sample concentration.

***Ceriodaphnia dubia* chronic values (percent Sample CF3MW13S):**

C-NOEC 100 MATC NC LOEC >100

NC - Not calculated; >100 - chronic toxicity was not observed.

Pimephales promelas

Percent Sample	48-h Survival (%)	End of Test Survival (%)	Average Dry Weight (mg) per Minnow
Control	100	93	0.33
5	95	77	0.37
10	98	92	0.34
20	100	93	0.35
50	100	95	0.29
100	97	78	0.26*

* Indicates a statistically significant reduction in survival (or growth) relative to the Control (P<0.05).

***Pimephales promelas* chronic values (percent Sample CF3MW13S):**

C-NOEC 50 MATC 71 LOEC 100

Table 6. Summary results of Cecil Field NAS ground water sample CF3MW28S chronic toxicity tests *(Ceriodaphnia dubia* and *Pimephales promelas)* completed from 30 November 1994 to 7 December 1994.

Ceriodaphnia dubia

Percent Sample	48-h Survival (%)	End of Test Survival (%)	Average Number of Neonates per Female
Control	100	100	30.2
5	100	100	25.0*
10	100	60*	-----
20	100	60*	-----
50	100	40*	-----
100	100	90	4.7*

* Indicates a statistically significant reduction in survival or reproduction relative to the Control ($P<0.05$).

----- Data not reported because a significant reduction in survival was observed at this test concentration.

***Ceriodaphnia dubia* chronic values (percent Sample CF3MW28S):**

C-NOEC <5 MATC NC LOEC 5

NC - Not calculated.

Pimephales promelas

Percent Sample	48-h Survival (%)	End of Test Survival (%)	Average Dry Weight (mg) per Minnow
Control	100	97	0.38
5	100	90	0.36
10	100	90	0.38
20	100	93	0.35
50	100	88	0.36
100	100	12*	-----

* Indicates a statistically significant reduction in survival (or growth) relative to the Control ($P<0.05$).

----- Data not reported because a significant reduction in survival was observed at this test concentration.

***Pimephales promelas* chronic values (percent Sample CF3MW28S):**

C-NOEC 50 MATC 71 LOEC 100

TABLE 7. Summary results of 5-day lettuce seed *(Lactuca sativa)* germination soil toxicity tests completed from 25 November 1994 to 30 November 1994.

Sample	Proportion of seeds germinated (40 seeds per replicate planted) Sample Replicate A	B	C	Average	Test germination < Reference germination Mann-Whitney U-statistic	Statistical Significance (P of type 1 error)
Reference Soils						
CF3SS1[r]	0.30	0.35	0.85	0.50	--	--
Test Soils						
CF3SS4	0.75	0.45	0.75	0.65	6	P>0.10
CF3SS9	0.75	0.52	0.78	0.68	6	P>0.10
CF3SS12	0.72	0.75	0.85	0.78	6.5	P>0.10
CF3SS15	0.40	0.50	0.78	0.56	6	P>0.10
CF3SS17	0.20	0.22	0.25	0.22	9	P=0.05
CF3SS20	0.05	0.22	0.30	0.19	8.5	P<0.10
CF3SS22	0.08	0.25	0.40	0.24	7	P>0.10
CF3SS24	0.98	0.95	0.88	0.93	9	P>0.10
Control Soils						
Artificial	0.95	0.95	0.95	0.95	--	--
Potting	0.88	0.85	0.50	0.74	--	--

[r] - Reference station as defined on the Chain-of-Custody.

TABLE 8. Summary results of earthworm *(Eisenia foetida) 28-day* survival tests completed from 23 November 1994 to 22 December 1994.

Sample	Proportion of earthworms surviving (10 worms per replicate) Sample Replicate A	B	C	D	E	Average
Reference Soils						
CF3SS1	1.0	1.0	1.0	1.0	1.0	1.00
Test Soils						
CF3SS4	1.0	1.0	1.0	1.0	0.9	0.98
CF3SS9	1.0	1.0	1.0	1.0	0.9	0.98
CF3SS12	1.0	1.0	1.0	1.0	1.0	1.00
CF3SS15	1.0	1.0	1.0	1.0	1.0	1.00
CF3SS17	1.0	1.0	1.0	1.0	1.0	1.00
CF3SS20	1.0	1.0	1.0	1.0	0.9	0.98
CF3SS22	1.0	1.0	1.0	1.0	1.0	1.00
CF3SS24	1.0	1.0	1.0	1.0	1.0	1.00
Control Soils						
Artificial	1.0	1.0	1.0	1.0	1.0	1.00
Bedding	1.0	1.0	1.0	1.0	1.0	1.00

APPENDIX A
Chain-of-Custody Documentation

CHAIN OF CUSTODY RECORD

PROJECT NO.: 850 .08

PROJECT NAME: SITE #3 — NAS CECIL FIELD OPERABLE UNIT #2

CLIENT NAME: ABB ENVIRONMENTAL SERVICES, INC.
2590 Executive Ctr. Circle East
Berkely Building
Tallahassee, Florida 32301

PROJECT MANAGER: Barry Lester

COPY TO: Charles Donahue

REQUESTED COMP. DATE: 14-DAY TURN AROUND

FIELD OPERATION LEADER: NAME MARIA PUNENBURG
NAS Cecil Field
(904) 866-0425

SAMPLING REQUIREMENTS: SDWA NPDES RCRA OTHER

FOR LAB USE ONLY
Client Code: U26323
Enseco - Wadsworth/ALERT Laboratories
4101 Shuffel Drive N.W.
North Canton, Ohio 44720
Contact: Deb Hula
(216) 497-9396 (Voice)
(216) 497-0772 (Fax)
QUOTE #: 16467

ANALYSES REQUESTED

SITE ID CODE (XX)	SAMPLE MATRIX CODE (XX)	SAMPLE LOCATION CODE (XXX)	SAMPLE SEQUENCE CODE (XX)	DATE	TIME	DEPTH	SAMPLE MATRIX AIR	WTR	SOIL	NO. OF CONTAINERS	CLP-VOC (4oz. gl) ice	CLP-SVOC (4oz. gl) ice	PCB/PEST (4oz. gl) ice	TAL-METALS (16oz. gl) ice	TOC (4oz. gl) ice	TPH (4oz. gl) ice		TOX (5-1GAL) ICE						LAB ID	REMARKS
CF	3M	W13	S	11.28.94	1615			✓		5								✓							
* CF	3M	W28	S	11.28.94	1730			✓		5								✓							

COPY

SAMPLED BY AND TITLE: BRIAN TURCHIARELLI SR. — DATE/TIME: 11.28.94 1615

RELINQUISHED BY: Brian Turchiarelli Sr — DATE/TIME: 11.28.94 1800

RECEIVED BY: — DATE/TIME:

RELINQUISHED BY: — DATE/TIME:

RECEIVED BY: — DATE/TIME:

RELINQUISHED BY: — DATE/TIME:

RECEIVED BY LAB: Maureen [illegible] — DATE/TIME: 11/29/94 @ 1000

SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER

AIR BILL NUMBER:

HAZWRAP/NEESA Y N
QC LEVEL 1 2 3 4 5
COC | ICE
ANA REQ | TEMP
CUST SEAL | Ph
SAMPLE CONDITION

REMARKS: Cooler temp was 6°C (applies to both coolers)

ENTERED INTO LIMS ____ COC REVIEWED ____

* Two jugs are labeled "CF3MW13S" w/date + time of 1730.

A000001

CHAIN OF CUSTODY RECORD

PROJECT NO.: 8500.08

PROJECT NAME: SITE #3

NAS CECIL FIELD OPERABLE UNIT: 2

CLIENT NAME:
ABB ENVIRONMENTAL SERVICES, INC.
2590 Executive Ctr. Circle East
Berkely Building
Tallahassee, Florida 32301

PROJECT MANAGER: Barry Lester

COPY TO: Charles Donahue

FIELD OPERATION LEADER: NAME: MARIA PIJNENBUR
NAS Cecil Field
(904) 868-0425

REQUESTED COMP. DATE: 14 DAY TURNAROUND

SAMPLING REQUIREMENTS: SDWA NPDES RCRA OTHER

FOR LAB USE ONY
Client Code: 02 23
Enseco - Wadsworth/ALERT Laboratories
4101 Shuffel Drive N.W.
North Canton, Ohio 44720
Contact: Deb Hula
(216) 497-9396 (Voice)
(216) 497-0772 (Fax)
QUOTE #: 16467

SITE ID CODE xx	SAMPLE MATRIX CODE XX	SAMPLE LOCATION CODE xxx	SAMPLE SEQUENCE CODE xx	DATE	TIME	DEPTH	AIR	WTR	SOIL	NO. OF CONTAINERS	CLP-VOC (4oz. gl) ice	CLP-SVOC (4oz. gl) ice	PCB/PEST (4oz. gl) ice	TAL-METALS (16oz. gl) ice	TOC (4oz. gl) ice	TPH (4oz. gl) ice		EARTHWORM & LETTUCE SEED GERMINATION (1-1GAL) ice					LAB ID	REMARKS
CF	3S	S4		11.18.94	1445	0'-1'			✓	1								✓						
CF	3S	S9		11.19.94	0850	0'-1'			✓	1								✓						
CF	3S	S12		11.19.94	1325	0'-1'			✓	1								✓						
CF	3S	S15		11.19.94	1425	0'-1'			✓	1								✓						
CF	3S	S17		11.19.94	1450	0'-1'			✓	1								✓						
CF	3S	S20		11.20.94	0915	0'-1'			✓	1								✓						
CF	3S	S22		11.20.94	1020	0'-1'			✓	1								✓						
CF	3S	S24		11.20.94	1055	0'-1'			✓	1								✓						
CF	3S	S1		11.20.94	1520	0'-1'			✓	1								✓						Reference Location

Copy

SAMPLED BY AND TITLE	DATE/TIME	RELINQUISHED BY:	DATE/TIME
BRIAN TURCHIARELLI SR	11.18.94 1445		
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME
RECEIVED BY LAB: Michael T. Hewlett	DATE/TIME 11/22/94 0930	SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER	AIR BILL NUMBER

HAZWRAP/NEESA Y N
QC LEVEL 1 2 3 4 5
COC | ICE
ANA REQ | TEMP
CUST SEAL | Ph
SAMPLE CONDITION

REMARKS

ENTERED INTO LMS _____ COC REVIEWED _____

PROJECT NO.: 8500.C

PROJECT NAME: SITE #3

NAS CECIL FIELD OPERABLE UNIT: 2

CLIENT NAME
ABB ENVIRONMENTAL SERVICES, INC.
2590 Executive Ctr. Circle East
Berkely Building
Tallahassee, Florida 32301

PROJECT MANAGER: Barry Lester

COPY TO: Charles Donahue

REQUESTED COMP. DATE:

FIELD OPERATION LEADER
NAME: MARIA PIJNENBURG
NAS Cecil Field
(904) 868-0425

SAMPLING REQUIREMENTS: SDWA NPDES RCRA OTHER

FOR LAB USE ONY
Client Code: 02 3

Enseco - Wadsworth/ALERT Laboratories
4101 Shuffel Drive N.W.
North Canton, Ohio 44720

Contact:
Deb Hula
(216) 497-9396 (Voice)
(216) 497-0772 (Fax)

QUOTE #: 16467

SITE ID CODE XX	SAMPLE MATRIX CODE XX	SAMPLE LOCATION CODE XXX	SAMPLE SEQUENCE CODE XX	DATE	TIME	DEPTH	AIR	WTR	SOIL	NO. OF CONTAINERS	CLP-VOC (4oz. gl) ice	CLP-SVOC (4oz. gl) ice	PCB/PEST (4oz. gl) ice	TAL-METALS (16oz. gl) ice	TOC (4oz. gl) ice	TPH (4oz. gl) ice		TOX (5-1GAL) PLASTIC						LAB ID	REMARKS
CF	3M	W13	S	11.22.94	0905			✓		5								✓							
CF	3M	W28	S	11.22.94	1030			✓		5								✓							

COPY

SAMPLES NOT USED

DELAYED SHIPPING ON

SAMPLED BY AND TITLE	DATE/TIME	RELINQUISHED BY:	DATE/TIME
BRIAN TURCHIARELLI SR	11.22.94 0905	Brian Turchiarelli	11.22.94 1400
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME
RECEIVED BY:	DATE/TIME	RELINQUISHED BY:	DATE/TIME
RECEIVED BY LAB:	DATE/TIME	SAMPLE SHIPPED VIA: UPS BUS FED-EX HAND OTHER	AIR BILL NUMBER

HAZWRAP/NEESA Y N
QC LEVEL 1 2 3 4 5
COC | ICE
ANA REQ | TEMP
CUST SEAL | Ph
SAMPLE CONDITION

REMARKS

ENTERED INTO LIMS _____ COC REVIEWED _____

FEDEX EXPRESS

USE THIS AIRBILL FOR SHIPMENTS within the CONTINENTAL U.S.A., ALASKA AND HAWAII
USE THE INTERNATIONAL AIRBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON-U.S. LOCATIONS
QUESTIONS? CALL 800 238-5355 TOLL FREE.

AIRBILL
PACKAGE TRACKING NUMBER

1644653286

1644653286

SENDER'S FEDERAL EXPRESS ACCOUNT NUMBER: 1051-3421-5

DATE: 11-22-94

Company: Maria Pignenburg
Department/Floor No.: 904 779-7226
Street Address: ABB-ES/NAS Cecil Field
4th ST 2nd Trailer Past Bldg #5
City: Jacksonville
State: FL
ZIP Required: 32215

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.)
8500.08

Company: Sample Receiving
Department/Floor No.: 802 655-1203
Exact Street Address (We Cannot Deliver to P.O. Boxes): Inchcape Testing Services
55 South Park Drive
City: Colchester
State: Vermont
ZIP Required: 05446

SERVICES (Check only one box)

Priority Overnight
11 X OTHER PACKAGING
16 FEDEX LETTER*
17 FEDEX PAK*
18 FEDEX BOX
19 FEDEX TUBE

Standard Overnight
51 OTHER PACKAGING
56 FEDEX LETTER*
57 FEDEX PAK*
58 FEDEX BOX
59 FEDEX TUBE

Economy Two Day
30 ECONOMY*

Government Overnight
46 GOVT LETTER
44 GOVT PACKAGE

Freight Service
70 OVERNIGHT FREIGHT**
80 TWO-DAY FREIGHT**

*Declared Value Limit $500
**Call for delivery schedule

DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
1 HOLD AT FEDEX LOCATION WEEKDAY
2 X DELIVER WEEKDAY

Saturday Service
31 HOLD AT FEDEX LOCATION SATURDAY
3 DELIVER SATURDAY
9 SATURDAY PICK UP

Special Handling
4 DANGEROUS GOODS
6 DRY ICE
12 HOLIDAY DELIVERY

PACKAGES: 2
WEIGHT: 176
Total: 2
Total: 176

DIM SHIPMENT (Chargeable Weight)
lbs.

Drop Box
Release Signature

Log No.
Street Address
City
Received By
X
Date/Time Received

Federal Express Use
Price Changes
Declared Value Change
Other 1
Other 2
Total Charges

REVISION DATE 12/92
158

DESTINATION COPY

Rec'd 11/25/94.

APPENDIX B
Communications

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Sample No. / ETR No. 48042/48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/16/94	JW called Anita Pease & Nancy Goddard (left phone messages w/ both) re: sampling schedule.	JW
11/16/94 ≈ 1400	Anita Pease (ABB) returned call. Did not have information regarding sample schedule. Indicated I should contact Nancy Goddard.	
11/16/94 ≈ 1445	Nancy Goddard called & indicated she will not be responsible for field collections. She provided the name of Maria (phone (904) 779-7226) as a contact person in charge of field operations	
11/16/94 1500	Call to Denver Clark re: signature & sending of subcontract - will it be ok to send tomorrow? (Left message).	JW
11/16/94	Attempted call to Maria, no answer.	JW
11/17/94	Call from Maria Pigneburg (ABB field contact) Getting reading to sample. ABB will provide bottles (1 gal wide mouth, plastic) and coolers. Anticipated schedule will be to collect samples on Monday & ship same day for Tuesday delivery. J John Williams (Aquatec) requested that samples be shipped iced (4°C). and requested 1 gallon for soils and 5 gallons for effluent.	
11/21/94	Attempted to call Maria Pigneburg twice to confirm sample delivery on schedule for Tues 11/22/94 - could not reach.	JEL

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Sample No. — ETR No. 48042/48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/22; 1215	ABB soil samples (delivered in 3 coolers) arrived as scheduled, however ground water samples (2) did not arrive at ITS/Aquatec.	
	IEC called Maria Pignetura - spoke to an associate① (M.P. on vacation). He informed me that ground water samples would not arrive ~~a~~ until Wed 23 November, and he also confirmed that no one was available as a contact person at their office yesterday (21 November) to confirm delivery of samples today.	
	Therefore C. dubia brood boards to be recleaned and recollected 22-23 November and F+M reordered to arrive on 23 November.	
	① associate's name - Eddie Dowdy	IEC

Cecil Field

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Sample No. / ETR No. 48042/48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/23/94 1100	Call to Aquatec Sample Management. Groundwater samples did not arrive.	
	1.) Anticipated sample delivery date was 11/22/94. Samples did not arrive.	
	(Note: larval fathead minnows were delivered on 22 Nov, acquired specifically for test)	
	2.) Anticipated sample delivery date rescheduled for 23 November. Samples did not arrive	
	(Note: larval fathead minnows were delivered on 23 November, acquired specifically for testing on 23 November)	
11/23/94 1600	Call from John Bleiler: Groundwater samples have not been located, however the chemistry lab received split samples, therefore they were probably shipped. Tracking number was not available. John indicated I should call Charlie Donahue on Monday 11/28/94 to indicate whether chemical analyses should proceed. The earliest that samples can arrive by FedEx. is now Friday, 25 November at which time samples will be 72~~24~~ hours old.	
	John indicated we should submit cost overrun memo for minnows acquired (purchased) and not used. This would include one shipment received on 22 November and one shipment received on 23 November 1994	

DOCUMENTATION FORM

ABB-ES

Project No. 94550 Client Cecil Field Sample No. / ETR No. 48042/48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/28/99 0830	Call to Charlie Donahue, ABB. Left message (on voice mail) that Groundwater samples did not arrive as scheduled on 23 November. I requested that chemical analyses be held. Samples were received on 26th November, 1999.	
0835	Mr. Donahue called back. He requested that we store the samples (received on 26 November). He indicated John Bleiler would be arranging re-sampling.	
≈930	Charlie Donahue called & said Groundwater samples would be collected tomorrow (Nov. 29) & shipped for delivery on Wednesday, November 30, 1999. He requested information from FedEx so that reimbursement can be made for shipment not delivered.	JM
1612	Maria Pinjeburg called & said samples are now being collected & will probably arrive tomorrow, 11/29/99.	JM

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES (Cecil Field) Sample No. / ETR No. 48042/48103
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/29/94	Call to John Bleiler re: disposal of groundwater samples collected on 22 November, 1994 (not used for testing due to extended shipping period. John indicated sample disposal was ok.	

B000009

DOCUMENTATION FORM

Project No. 94550 Client Cecil Field ARB-ES Sample No. / ETR No. 48042/48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/29/94		
1415	Called Cecil Field Trailer to inform that two groundwater samples may be mislabeled. Received 7 samples labeled as W13, 3 samples labeled as W28. It appears (by visual appearance) that two of the W13 samples should have been labeled W28. Spoke w/ ~~Earl~~ Kelly at field trailer who will contact Maria Pijenburg.	JW
11/29/94 1520	Call from Kelly (ABB) - Check on times as sample identifiers. W13S samples collected at 1615, W28S samples collected at 1730. The apparently mislabeled samples had a time of 1730, corresponding with the W28S samples. These samples were relabeled as W28S.	JW
11/30/94	Call to John Bleiler re: low pH of samples. John indicated we should follow EPA toxicity testing protocols in regard to adjustment. (If pH is below 6, adjust up w/ NaOH).	JW
12/20/94 1422	Call to John Bleiler re: earthworm exposure. 1.) John provided approval to end the earthworm exposure on Day 28 (12/21/94) rather than on Day 30 as specified in the Statement of Work. 2.) We discussed depuration of earthworms and John agreed that depuration for 24 hours	JWW

DOCUMENTATION FORM

Project No. 94550 Client ARB-ES (Cecil Field) Sample No. — ETR No. 48042/48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
12/20/94 1422	(Continued)	
	should occur.	
	3/ we agreed that the methodology should follow ASTM guidance whereby earthworms are removed from sediments and placed in petri dishes on damp filter paper for 24 hours.	
		JW

APPENDIX C
Documentation of Water Sample Preparations

Initial Sample

Project No.: 94550

Toxiciy Test Sample Preparation

CF3MW13S

Client: ABB - 13

Sample No.: 242570

ETR No.: 48100

Test Facility: ITS - Aquatec, 75 Green Mountain Dr., SO. Burlington, VT 05403

Initials/Date: LMD 11/29

ecies: C. dubia / P. promelas

Test Description: modified acute/chronic

A. Toxicity Lab, Sample Log-in

	Sample	Dilution Water
1. Sample Identification No.	242570	= MHW
2. Time Chain-of-Custody Seals Broken	1300	see initial chem forms
3. Collection Date	11-28-94	
4. No. Containers / Volume	5 gal.	gal.
5. Samples Labeled as	CF3MW13S	

B. Sample Characterization

1. Temperature (°C)	11.0	
2. Dissolved Oxygen (mg/L)	9.2	
3. pH	4.9	pH adjusted on 11/30/94 to 7.0 w/ NaOH.
4. Conductivity (µmhos/cm)	70	
5. Salinity (o/oo)	—	
6. Other:	Clear / Heavy layer of sediment on bottom	

Samples allowed to settle overnight and decanted w/o sediment strong odor like diesel fuel

C. Sample Preparation

1. 60 µm Filtration (Nitex mesh)	NO	
2. Total Chlorine Check / Dechlorination *	ND	
Vol. Thiosulfate (0.025 N) reqiured to Dechlorinate 100 ml	/ ml	ml
Vol. Thiosulfate (0.25 N) added per gallon	/ ml	ml
3. Salinity Adjustment ___ grams Salts per Volume	N/A	
4. Warm to Test Temperature (25 °C)	✓	
5. Aeration for D.O. Equilibration	✓	

D. Dilution Plan:

	Treatment (% Sample)	Vol. Diluent	Vol. Sample	Total Vol. (mL)	Additional Information
	Lab. Ctrl.	1100	0	1100	
5%	~~6.25~~ mD	1044	56	1100	
10%	~~12.5~~ mD	987	113	1100	
20%	~~25~~ mD	875	225	1100	
	50	550	550	1100	
	100	0	1100	1100	

* ND = Chlorine not detected / D = Chlorine detected

DOCUMENTATION FORM

Project No. 94550 Client ABB-13 Sample No. 242570 ETR No. 48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/2 ~~930~~ CMB	Samples settled over night in ref	
	Decanted to leave sediment behind	
	Strong "Diesel fuel" Odor	CMB
11/30	Sample Adjusted to pH 7 w 1N NaOH	
	pH Start 5.2 pH finish 7.0 ~ ~~5.5 ml~~ CMB 1N NaOH/	
	55 drops	/gal
		CMB

Initial Sample

CF3MW28S

Project No.: 94550

Toxicity Test Sample Preparation

Client: ABB - 28

Sample No.: 242571

ETR No.: 48100

Test Facility: ITS - Aquatec, 75 Green Mountain Dr., SO. Burlington, VT 05403

Initials/Date: LMD 11/29

Species: C. dubia / P. promelas

Test Description: modified acute/chronic

A. Toxicity Lab, Sample Log-in

	Sample	Dilution Water
1. Sample Identification No.	242571	= MHW
2. Time Chain-of-Custody Seals Broken	1300	see initial chem forms
3. Collection Date	11.28.94	
4. No. Containers / Volume	5 * gal.	gal.
5. Samples Labeled as	CF3MW28S	

B. Sample Characterization

1. Temperature (°C)	9.6	
2. Dissolved Oxygen (mg/L)	8.6	
3. pH	4.6	pH adjusted on 11/30/94 to 7.0 w/ NaOH
4. Conductivity (µmhos/cm)	40	
5. Salinity (o/oo)	—	
6. Other:	Brown/Particels	

Samples allowed to settle overnight and Decanted w/o sediment through all Sediment layer on bottom

C. Sample Preparation

1. 60 µm Filtration (Nitex mesh)		
2. Total Chlorine Check / Dechlorination *	ND	
Vol. Thiosulfate (0.025 N) reqiured to Dechlorinate 100 ml	/ ml	ml
Vol. Thiosulfate (0.25 N) added per gallon	ml	ml
3. Salinity Adjustment / grams Salts per Volume	N/A	
4. Warm to Test Temperature (25 °C)		
5. Aeration for D.O. Equilibration		

D. Dilution Plan:

	Treatment (% Sample)	Vol. Diluent	Vol. Sample	Total Vol. (mL)
	Lab. Ctrl.	1100	0	1100
5%	6/2 Lmd	1044	56	1100
10%	12/5 Lmd	987	113	1100
20%	2/5 Lmd	875	225	1100
	50	550	550	1100
	100	0	1100	1100

Additional Information: *Relabeled two bottles (received labeled as W13 (collected at 1730) - relabeled as W28 after contacting ABB-ES. Apparent mislabeling corrected. JW 11/6/94

* ND = Chlorine not detected / D = Chlorine detected

* 3 gal labeled 28S - 2 labeled 13S but same appearance and sample time as

DOCUMENTATION FORM

Project No. 94550 Client ABB-28 Sample No. 242571 ETR No. 48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/30	Samples were allowed to settle overnight in ref and decanted to avoid sediment. Lots of suspended particles. Strong Diesel fuel like Odor	LMD
4/30	pH ajustment of sample w/ 1N NaOH	
	pH Start 4.7 pH finish 7.0 ~ 2.8 ml 1N NaOH/gal 28 drops	LMD

Alkalinity Worksheet

Project Number: 94550 ETR Number: 48100 Analyst: LMD
Sample Number: 242570 - 1 Species: C.dubia/P.promelas
Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403
Sample Description: ABB 13 / ABB 28 Analysis Date: 12/07/94

Date	Sample Type	Sample ml	Initial ml	Final ml	Final-Initial(ml)	Factor 1000/Sample	Alkalinity (mg/L)
11/30/94	Lab Control	25	0.0	1.5	1.5	40	60
12/01/94	Lab Control	25	1.5	3.0	1.5	40	60
12/02/94	Lab Control	25	3.0	4.4	1.4	40	56
12/03/94	Lab Control	25	4.4	5.7	1.3	40	52
12/04/94	Lab Control	25	5.7	7.1	1.4	40	56
12/05/94	Lab Control	25	7.1	8.6	1.5	40	60
12/06/94	Lab Control	25	8.6	10.0	1.4	40	56
11/30/94	ABB 13	25	14.3	15.1	0.8	40	32
12/01/94	ABB 13	25	15.1	16.8	1.7	40	68
12/02/94	ABB 13	25	16.8	18.0	1.2	40	48
12/03/94	ABB 13	25	19.0	19.9	0.9	40	36
12/04/94	ABB 13	25	19.9	22.1	2.2	40	88
12/05/94	ABB 13	25	22.1	23.4	1.3	40	52
12/06/94	ABB 13	25	23.4	25.0	1.6	40	64
11/30/94	ABB 28	25	25.0	25.5	0.5	40	20
12/01/94	ABB 28	25	25.5	26.0	0.5	40	20
12/02/94	ABB 28	25	26.0	26.5	0.5	40	20
12/03/94	ABB 28	25	26.5	27.2	0.7	40	28
12/04/94	ABB 28	25	27.2	28.2	1.0	40	40
12/05/94	ABB 28	25	28.2	28.9	0.7	40	28
12/06/94	ABB 28	✓ 25	✓ 28.9	✓ 29.7	0.8	40	32

QC: IRC 12/19/94

QC: DRP 1/6/95

6

Hardness Worksheet

Project Number: 94550 ETR Number: 48100 Analyst: LMD
Sample Number: 242570 Species: C.dubia/P.promelas
Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403
Sample Description: ABB 13 / ABB 28 Analysis Date: 12/07/94

Date	Sample Type	Sample ml	Initial ml	Final ml	Final-Initial(ml)	Factor 1000/Sample	Hardness (MG/L)
11/30/94	Lab Control	25	0.0	2.2	2.2	40	88
12/01/94	Lab Control	25	2.2	4.4	2.2	40	88
12/02/94	Lab Control	25	4.4	6.5	2.1	40	84
12/03/94	Lab Control	25	6.5	8.7	2.2	40	88
12/04/94	Lab Control	25	8.7	11.0	2.3	40	92
12/05/94	Lab Control	25	11.0	13.3	2.3	40	92
12/06/94	Lab Control	25	13.3	15.5	2.2	40	88
11/30/94	ABB 13	25	15.5	16.0	0.5	40	20
12/01/94	ABB 13	25	16.0	16.3	0.3	40	12
12/02/94	ABB 13	25	16.3	16.7	0.4	40	16
12/03/94	ABB 13	50	16.7	17.3	0.6	20	12
12/04/94	ABB 13	50	17.3	18.1	0.8	20	16
12/05/94	ABB 13	50	18.1	18.9	0.8	20	16
12/06/94	ABB 13	50	18.9	19.7	0.8	20	16
11/30/94	ABB 28	50	19.9	20.2	0.3	20	6
12/01/94	ABB 28	50	20.2	20.6	0.4	20	8
12/02/94	ABB 28	50	20.6	20.9	0.3	20	6
12/03/94	ABB 28	50	20.9	21.3	0.4	20	8
12/04/94	ABB 28	50	21.3	21.8	0.5	20	10
12/05/94	ABB 28	50	21.8	22.3	0.5	20	10
12/06/94	ABB 28	50	22.3	22.7	0.4	20	8

C00001

QC: IRC 12/22/94
QC: DRP 1/6/95

ALKALINITY and HARDNESS DATA SHEET

Project Number: 94550 ETR Number(s): 48100

Sample Number(s): 242570 Species: C. dubia / P. promelas

Test Facility: Aquatec, Inc. 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB - 13

Alkalinity: Analyst: LMD Analysis Date: 12/7					Hardness: Analyst: LMD Analysis Date: 12/7				
Sample Date	Sample Type	Sample Vol. (ml)	Initial Vol. (ml)	Final Vol. (ml)	Sample Date	Sample Type	Sample Vol. (ml)	Initial Vol. (ml)	Final Vol. (ml)
11/30	Lab/Dil Control	25	0.0	1.5		Lab/Dil Control	25	0.0	2.2
12/1	Lab/Dil Control	25	1.5	3.0		Lab/Dil Control	25	2.2	4.4
12/2	Lab/Dil Control	25	3.0	4.4		Lab/Dil Control	25	4.4	6.5
12/3	Lab/Dil Control	25	4.4	5.7		Lab/Dil Control	25	6.5	8.7
12/4	Lab/Dil Control	25	5.7	7.1		Lab/Dil Control	25	8.7	11.0
12/5	Lab/Dil Control	25	7.1	8.6		Lab/Dil Control	25	11.0	13.3
12/6	Lab/Dil Control	25	8.6	10.0		Lab/Dil Control	25	13.3	15.5
11/30	100%	25	14.3	15.1		100%	25	15.5	16.0
12/1	100%	25	15.1	16.8		100%	25	16.0	16.3
12/2	100%	25	16.8	18.0		100%	25	16.3	16.7
12/3	100%	25	LMD ~~18.0~~ 19.0	19.9		100%	50	16.7	17.3
12/4	100%	25	19.9	22.1		100%	50	17.3	18.1
12/5	100%	25	22.1	23.4		100%	50	18.1	18.9
12/6	100%	25	23.4	25.0		100%	50	18.9	19.7

Comments:

(May 1992)

ALKALINITY and HARDNESS DATA SHEET

Project Number: 94550 ETR Number(s): 48100

Sample Number(s): 242571 Species: C. dubia / P. promelas

Test Facility: Aquatec, Inc. 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-28

Alkalinity: Analyst: LMD			Analysis Date: 12/7/94		Hardness: Analyst: LMD			Analysis Date: 12/7/94	
Sample Date	Sample Type	Sample Vol. (ml)	Initial Vol. (ml)	Final Vol. (ml)	Sample Date	Sample Type	Sample Vol. (ml)	Initial Vol. (ml)	Final Vol. (ml)
11/30	Lab/Dil Control	~~25~~ LMD	~~25.0~~ LMD	~~25.8~~ LMD		Lab/Dil Control	~~25.0~~ LMD LMD	~~19.9~~ LMD	~~20.2~~ LMD
12/1	Lab/Dil Control	~~25~~	~~25.5~~			Lab/Dil Control	~~50~~	~~20.~~	
12/2	Lab/Dil Control					Lab/Dil Control			
12/3	Lab/Dil Control		See Sample 242570			Lab/Dil Control		See Sample 242570	
12/4	Lab/Dil Control					Lab/Dil Control			
12/5	Lab/Dil Control	See				Lab/Dil Control	See		
12/6	Lab/Dil Control					Lab/Dil Control			
11/30	100%	25	25.0	25.5		100%	50	19.9	20.2
12/1	100%	25	25.5	26.0		100%	50	20.2	20.6
12/2	100%	25	26.0	26.5		100%	50	20.6	20.9
12/3	100%	25	26.5	27.2		100%	50	20.9	21.3
12/4	100%	25	27.2	28.2		100%	50	21.3	21.8
12/5	100%	25	28.2	28.9		100%	50	21.8	22.3
12/6	100%	25	28.9	29.7		100%	50	22.3	22.7

Comments:

(May 1992)

C000019

APPENDIX D
Documentation of Results of Groundwater Toxicity Tests

APPENDIX D-1
Groundwater Sample CF3MW13S

Raw Data Sheet Ceriodaphnia Young and Survival Data Sheet

EPA Method 1002.0

Project No.: 94550 Sample No.: 242570 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13 Organism Age: <24 h

Date/Time Started: 12/30/94 1130 CJO Date/Time Completed: 12/6/94, 1010 CJO

Day 0 Fed ✓ USED NEONATES FROM 1122 B bb, 0000 COLLECTION

Units: % Conc.	Day	1	2	3	4	5	6	7	8	9	10	Remarks / Initials
AB Control	1	0	0	0	0	0	0	0	0	0	0	Sample #: 242570
~~6.25~~		0	0	0	0	0	0	0	0	0	0	Renewed: 1150-1215
~~12.5~~ 10		0	0	0	0	0	0	0	0	0	0	Fed: ✓
~~25~~ 20		0	0	0	0	0	0	0	0	0	0	
50		0	0	0	0	0	0	0	0	0	0	CJO 12/1
100		0	0	0	0	0	0	0	0	0	0	
AB Control	2	0	0	0	0	0	0	0	0	0	0	Sample #: 242570
~~6.25~~		0	0	0	0	0	0	0	0	0	0	Renewed: 1355-1420
~~12.5~~ 10		0	0	0	0	0	0	0	0	0	0	Fed: ✓
~~25~~ 20		0	0	0	0	0	0	0	0	0	0	
50		0	0	0	0	0	0	0	0	0	0	CJO 12/2
100		0	0	0	0	0	0	0	0	0	0	
AB Control	3	6	6	6	5	4	5	6	4	5	6	Sample #: 242570
~~6.25~~		6	3	5	5	6	7	6	5	6	5	Renewed: 1505-1540
~~12.5~~ 10		5	5	2	7	3	5	6	4	4	6	Fed: ✓
~~25~~ 20		7	5	5	5	4	5	5	3	6	6	
50		6	5	5	5	0	~~4~~ 5 D	~~0~~ 5 D	~~0~~ 5 D	~~0~~ 6 D	~~0~~ 2 D	CJO 12/3
100		6	5	2	5	3	5	6	5	5	5	① WRONG CUPS COUNTED CJO 12/3
AB Control	4	11	11	10	9	0	9	9	0	0	10	Sample #: 242570
~~6.25~~		10	0	0	12	0	0	9	8	0	9	Renewed: 12/6 1720-1750
~~12.5~~ 10		9	0	4	11	5	9	11	0	10	10	Fed: ✓
~~25~~ 20		10	12	0	0	0	10	8	0	0	12	
50		10	0	0	10	6	0	0	0	0	11	
100		11	0	0	9	0	9	8	0	0	11	

0 = no young D = dead M = missing numbers = neonates released in prior 24h

(Biotox-01 // 4/93)

Raw Data Sheet Ceriodaphnia Young and Survival Data Sheet

EPA Method 1002.0

Project No.: 94550 Sample No.: 242570 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13 Organism Age: <24 h

Date/Time Started: 11/30/94 1130 CJD Date/Time Completed: 12/6/94 1010 CJD

	Units: % Conc.	Day	1	2	3	4	5	6	7	8	9	10	Remarks / Initials
LAB	Control	5	0	0	0	0	13	0	0	10	11	0	Sample #: 242570
	~~6.25~~		0	11	9	0	11	13	0	0	11	0	Renewed: 12/5 1340-1400
	~~12.5~~ 10		0	12	12	0	0	D	0	13	2	0	Fed: ✓ IRR
	~~25~~ 20		0	2	9	9	2	0	0	6	13	0	
	50		0	11	7	0	11	1	0	9	9	0	
	100		0	9	9	0	11	0	0	11	7	0	
LAB	Control	6	14	18	14	18	17	14	15	14	13	16	Sample #: ———
	~~6.25~~		14	13	8	10	12	14	9	9	11	15	Renewed: ———
	~~12.5~~ 10		13	14	8	14	10	D	11	17	14	16	Fed: ———
	~~25~~ 20		12	8	13	5	10	8	13	6	16	12	Test terminated
	50		15	9	11	9	0	5	7	5	20	11	12/6 1010 CJD
	100		19	5	13	15	14	11	8	14	9	12	
LAB	Control	7											Sample #:
	~~6.25~~												Renewed:
	~~12.5~~ 10												Fed:
	~~25~~ 20												
	50												
	100												
	Control	8											Sample #:
													Renewed:
													Fed:

0 = no young D = dead M = missing numbers = neonates released in prior 24h

(Biotox-01 // 4/93)

Raw Data Sheet Ceriodaphnia Young and Survival Data Sheet
EPA Method 1002 0

Project #: 94550 ETR #: 48100
Sample #: 242570 Sample Desc.: ABB - 13
Start Date: 11/30/94 Start Time: 11:30 End Date: 12/06/94 End Time: 10:10

Conc.	Day	1	2	3	4	5	6	7	8	9	10
Lab Control	1	0	0	0	0	0	0	0	0	0	0
5		0	0	0	0	0	0	0	0	0	0
10		0	0	0	0	0	0	0	0	0	0
20		0	0	0	0	0	0	0	0	0	0
50		0	0	0	0	0	0	0	0	0	0
100		0	0	0	0	0	0	0	0	0	0
Lab Control	2	0	0	0	0	0	0	0	0	0	0
5		0	0	0	0	0	0	0	0	0	0
10		0	0	0	0	0	0	0	0	0	0
20		0	0	0	0	0	0	0	0	0	0
50		0	0	0	0	0	0	0	0	0	0
100		0	0	0	0	0	0	0	0	0	0
Lab Control	3	6	6	6	5	4	5	6	4	5	6
5		6	3	5	5	6	7	6	5	6	5
10		5	5	2	7	3	5	6	4	4	6
20		7	5	5	5	4	5	5	3	6	6
50		6	5	5	5	0	5	5	5	6	2
100		6	5	2	5	3	5	6	5	5	5
Lab Control	4	11	11	10	9	0	9	9	0	0	10
5		10	0	0	12	0	0	9	8	0	9
10		9	0	4	11	5	9	11	0	10	10
20		10	12	0	0	0	10	8	0	0	12
50		10	0	0	10	6	0	0	0	0	11
100		11	0	0	9	0	9	8	0	0	11
Lab Control	5	0	0	0	0	13	0	0	10	11	0
5		0	11	9	0	11	13	0	0	11	0
10		0	12	12	0	0	D	0	13	2	0
20		0	2	9	9	2	0	0	6	13	0
50		0	11	7	0	11	1	0	9	9	0
100		0	9	9	0	11	0	0	11	7	0
Lab Control	6	14	18	14	8	17	14	15	14	13	16
5		14	13	8	10	12	14	9	9	11	15
10		13	14	8	14	10	D	11	17	14	16
20		12	18	13	5	10	8	13	6	16	12
50		15	9	11	9	0	5	7	5	20	11
100		19	5	13	15	14	11	8	14	9	12

****** If female mortality occurs D = effluent induced mortality and * = laboratory induced mortality ******

QC IEC 12/22/94
D000022

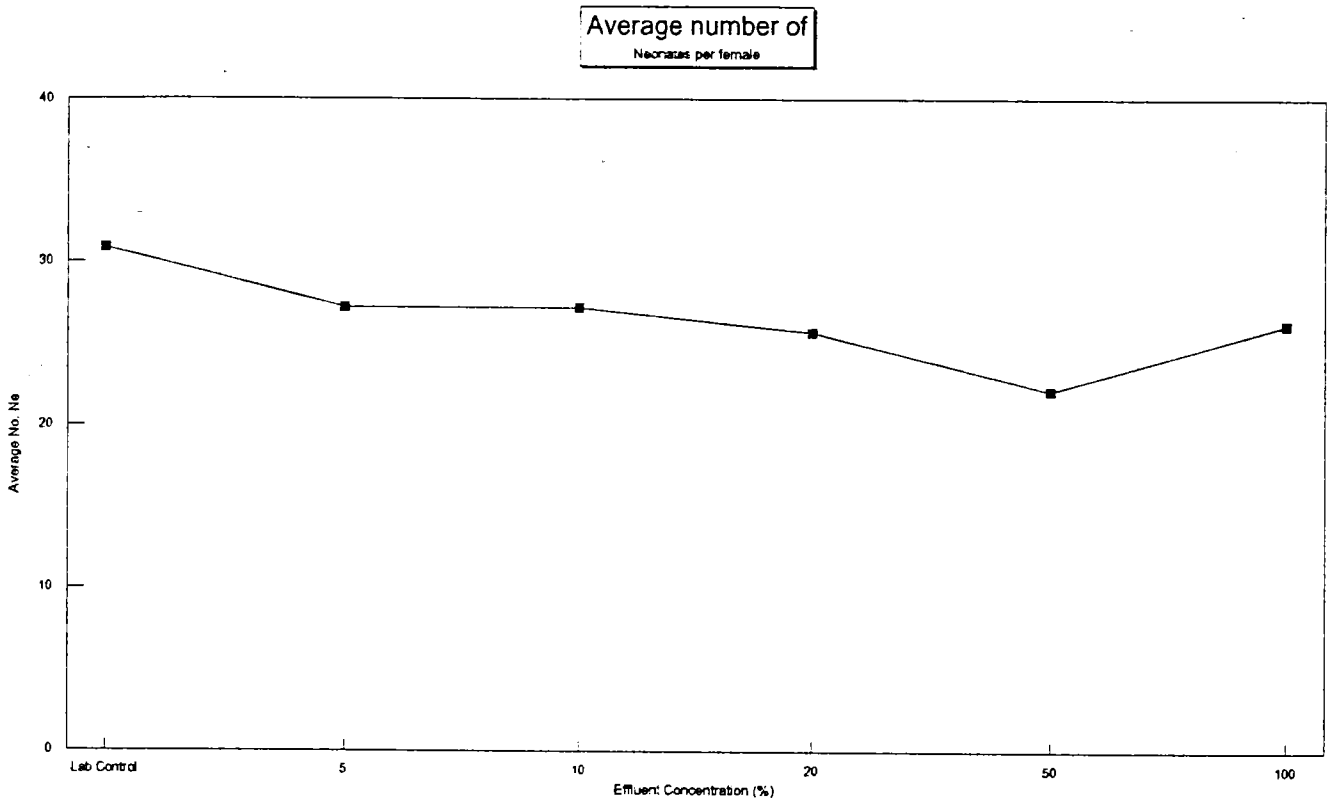
Tabulation of total Neonates released per female during the test:

Project #:	94550		ETR #:	48100						
Sample #:	242570		Sample Desc.:	ABB - 13						
Start Date:	11/30/94	Start Time:	11:30	End Date:	12/06/94	End Time:	10:10			

	Replicates 1	2	3	4	5	6	7	8	9	10
Lab Control	31	35	30	32	34	28	30	28	29	32
5	30	27	22	27	29	34	24	22	28	29
10	27	31	26	32	18	14	28	34	30	32
20	29	37	27	19	16	23	26	15	35	30
50	31	25	23	24	17	11	12	19	35	24
100	36	19	24	29	28	25	22	30	21	28

Summary tabulation of test data:

Conc.	Number Females	48 Hrs. Survival	48 Hrs. % Survival	End of Test Survival	End of Test % Survival	Total Neonate	Average Neonate
Lab Control	10	10	100	10	100	309	30.9
5	10	10	100	10	100	272	27.2
10	10	10	100	9	90	272	27.2
20	10	10	100	10	100	257	25.7
50	10	10	100	10	100	221	22.1
100	10	10	100	10	100	262	26.2



****** If female mortality occurs D = effluent induced mortality and * = laboratory induced mortality ******

QC. IEC 12/22/94

D000023

[illegible]

FILE: [illegible]

[illegible]

[illegible]	IDENTIFICATION	REF	VALUE	TRANS VALUE
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

D 000024

6

QC: IRC 12/22/94

D000025

[illegible]

[illegible] TRANSFORMATION

[illegible] test for normality [illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible] goodness of fit test statistic = [illegible]
[illegible]

[illegible] normality test [illegible] ✓

[illegible] TRANSFORMATION

[illegible] TRANSFORMATION

[illegible] test for normality

[illegible] ✓

[illegible]

[illegible] = [illegible]

[illegible] TRANSFORMATION

[illegible] TRANSFORMATION

Bartlett's test for homogeneity of variance
[illegible]

[illegible] = [illegible] [illegible] = [illegible] [illegible] = [illegible]
[illegible]

[illegible] ✓

QC: IEC 12/22/94

D000026

Raw Data Sheet
Toxicity Test Initial Chemistries

Project No.: 94550 Sample No.: 242570 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB -13 Species: C. dubia / P. promelas

Test Description: modified acute/chronic

Units: % LAB Concentration: CONT	0 (12/30 CWD)	1 (12/1 CWD)	2 (12/2 CWD)	3 (12/3 CWD)	4 (12/4 CWD)	5 (12/5 CWD)	6 (12/6 CWD)	Remarks
pH	7.9	8.2	8.0	7.9	8.0	8.0	8.0	
DO (mg/L)	8.2	8.2	8.2	8.1	8.2	8.1	8.2	
Temp °C	25.0	25.5	25.4	25.5	25.4	25.2	25.6	
Cond (umho/cm)	270	265	270	265	270	270	270	

Comments:

Concentration: ~~6.2~~ 5.0 (CWD)	0	1	2	3	4	5	6	Remarks
pH	8.0	8.1	8.0	7.9	8.0	8.0	8.0	
DO (mg/L)	8.3	8.2	8.2	8.1	8.3	8.0	8.2	
Temp °C	24.9	25.6	25.4	25.6	25.1	25.2	25.3	
Cond (umho/cm)	270	260	275	250	250	270	270	

Comments:

Concentration: ~~12.5~~ 10 (CWD)	0	1	2	3	4	5	6	Remarks
pH	7.9	8.1	7.9	7.9	8.0	8.0	8.0	
DO (mg/L)	8.2	8.2	8.2	8.1	8.3	8.0	8.2	
Temp °C	24.7	25.0	25.7	25.7	25.1	25.2	25.2	
Cond (umho/cm)	265	270	270	265	260	270	260	

Comments:

Concentration: ~~25~~ 20 (CWD)	0	1	2	3	4	5	6	Remarks
pH	7.9	8.1	7.9	7.9	8.0	8.0	8.0	
DO (mg/L)	8.2	8.2	8.2	8.1	8.2	8.0	8.2	
Temp °C	24.7	25.3	25.7	25.6	25.2	25.3	25.2	
Cond (umho/cm)	250	260	255	255	250	250	250	

Comments:

Raw Data Sheet
Toxicity Test Initial Chemistries

Project No.: 94550 Sample No.: 242570 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13 Species: C. dubia / P. promelas

Test Description: modified acute/chronic

Units: % Concentration: 50	0 (11/30 cmb)	1 (12/1 cmb)	2 (12/2 cmb)	3 (12/3 cmb)	4 (12/4 12e)	5 (12/5 cmb)	6 (12/6 cmb)	Remarks
pH	7.6	8.0	7.9	7.8	8.0	8.0	8.0	
DO (mg/L)	8.1	8.2	8.3	8.2	8.2	8.0	8.2	
Temp °C	24.8	25.4	25.2	25.5	25.4	25.6	25.1	
Cond (umho/cm)	210	225	215	210	230	215	220	
Comments:								

Concentration: 100	0	1	2	3	4	5	6	Remarks
pH	7.2	7.8	7.9	7.8	8.0	8.0	8.1	
DO (mg/L)	8.0	8.2	8.2	8.2	8.2	cmb 7.8	8.1	
Temp °C	25.3	25.7	25.5	25.8	25.6	25.8	25.6	
Cond (umho/cm)	125	170	145	135	220	145	170	
Comments:								

Concentration:	0	1	2	3	4	5	6	Remarks
pH								
DO (mg/L)								
Temp °C								
Cond (umho/cm)								
Comments:								

Concentration:	0	1	2	3	4	5	6	Remarks
pH								
DO (mg/L)								
Temp °C								
Cond (umho/cm)								
Comments:								

D00000

Raw Data Sheet

Toxicity Test Final Chemistries

Project No.: 94550

Sample No.: 242570

ETR No.: 48100

Test Description: modif. acute/chronic surv. + reprod.

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13

Species: C. dubia

Initials/Date/Time:		12/1 CJD	12/2 CJD	12/3 CJD	12/4 RE	12/5 RE	12/6 CJD			
Units: % LAB CONT Concentration:	0	1	2	3	4	5	6	7	Remarks
pH	/	7.9	7.9	7.9	8.1	8.0	7.9		
DO (mg/L)	/	8.1	8.2	8.1	8.2	7.8	8.1		
Temp °C	/	25.1	24.5	24.5	24.8	25.0	25.2		
Conductivity (umhos/cm)	/	280	270	275	270	270	300		

Concentration: ~~6.2~~ 5 ug/L	0	1	2	3	4	5	6	7	Remarks
pH	/	8.0	8.0	8.0	8.1	8.0	8.0		
DO (mg/L)	/	8.2	8.2	8.2	8.3	7.9	8.2		
Temp °C	/	25.6	24.9	25.0	24.9	25.2	25.3		
Conductivity (umhos/cm)	/	280	280	280	270	280	300		

Concentration: ~~12.5~~ 10 ug/L	0	1	2	3	4	5	6	7	Remarks
pH	/	8.0	8.0	8.1	8.0	8.0	8.0		
DO (mg/L)	/	8.2	8.2	8.3	8.3	7.8	8.3		
Temp °C	/	25.5	24.7	25.0	25.0	25.3	25.4		
Conductivity (umhos/cm)	/	280	270	270	250	270	285		

Concentration: ~~25~~ 20 ug/L	0	1	2	3	4	5	6	7	Remarks
pH	/	8.0	8.0	8.1	8.0	7.9	8.0		
DO (mg/L)	/	8.2	8.3	8.3	8.3	8.0	8.3		
Temp °C	/	25.1	24.8	24.8	25.1	25.2	25.3		
Conductivity (umhos/cm)	/	260	270	265	240	270	285		

Comments:

Raw Data Sheet

Toxicity Test Final Chemistries

Project No.: 94550 Sample No.: 242570

ETR No.: 48100 Test Description: modif. acute/chronic surv. + reprod.

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13 Species: C. dubia

Initials/Date/Time:		12/1 CJD	12/2 CJD	12/3 CJD	12/4 RL	12/5 RL	12/6 CJD		
Units: % Concentration: 50	0	1	2	3	4	5	6	7	Remarks
pH		7.9	8.1	8.0	7.9	8.0	7.9		
DO (mg/L)		8.3	8.3	8.3	8.3	8.2	8.3		
Temp °C		25.0	24.4	24.7	25.1	25.2	25.0		
Conductivity (umhos/cm)		220	240	230	200	250	240		

Concentration: 100	0	1	2	3	4	5	6	7	Remarks
pH		7.8	8.1	8.0	7.9	8.1	7.8		
DO (mg/L)		8.3	8.3	8.3	8.3	7.9	8.2		
Temp °C		25.4	25.1	24.9	25.0	25.2	25.3		
Conductivity (umhos/cm)		135	190	160	130	220	180		

Concentration:	0	1	2	3	4	5	6	7	Remarks
pH									
DO (mg/L)									
Temp °C									
Conductivity (umhos/cm)									

Concentration:	0	1	2	3	4	5	6	7	Remarks
pH									
DO (mg/L)									
Temp °C									
Conductivity (umhos/cm)									

Comments:

REV: 7/1/92

DOCUMENTATION FORM

Project No. 94550 Client ABB-13 Sample No. 242570 ETR No. 48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/29	1600-1615 11/22 A + B brood boards cleared in anticipation of 0000, 0800 collections for chronic toxicity tests. All adults and neonates appear healthy and normal.	
11/30	0000-0020 collections:	
	11/22 A bb: 6 cups of 8+ neon. coll./fed w/ adults	
	11/22 B bb: 22 " " " " " "	
	All adults and neonates appear healthy and normal. Neonates are valid to use to initiate chronic toxicity tests until 1600 11/30.	
		IPC
11/30	0805-0820 COLLECTIONS:	
	11/22 A bb: 2 CUPS OF 8+ NEON. COLL/FED W/ ADULTS	
	11/22 B bb: 12 CUPS " " " " " " "	
	ALL ADULTS AND NEONATES APPEAR HEALTHY AND NORMAL. NEONATES ARE VALID TO USE TO INITIATE CHRONIC TOXICITY TESTS UNTIL 0000 12/1	CJD
11/30	1600-1615 COLLECTIONS:	
	11/22 A bb: 8 CUPS OF 8+ NEON. COLL/FED W/ ADULTS	
	11/22 B bb: 3 CUPS OF 8+ NEON. COLL/FED W/ ADULTS	
	ALL ADULTS AND NEONATES APPEAR HEALTHY AND NORMAL. NEONATES ARE VALID TO USE TO INITIATE CHRONIC TOXICITY TESTS UNTIL 0805 12/1	
		CJD

6

Minnow 7 Day Survival and Growth Test, Survival Data

Species: *Pimephales promelas*

Project No.: 94550 Sample No.: 242570

ETR No.: 48100 Sample Description: ABB-13

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Date/Time Started: 11/30/94 1510 CJD day 0 feeding: 11/30 1630 CJD Date/Time Completed: 12/7 0830 CJD

No. Organisms per Chamber: 15 Organism Source / Age: AR hatch 11/29 Test Chamber / Volume: 600/200 ml

Dilution Water: MHW Aeration: N Food: Y Artemia 2x daily

Treatment (Units)		NUMBER SURVIVING ON DAY 1	2	3	4	5	6	7	Prop. Surviving	Remarks
LAB	A	15	15	15	15	15	16	14	0.93	
CONT	B	15	15	15	15	15	15	15	1.00	
	C	15	15	14	13	13	12	12	0.80	
UWD	D	15	15	15	15	15	15	15	1.00	
~~8.2~~ 5	A	15	15	13	13	13	13	13	0.87	
	B	14	14	13	12	9	8	7	0.47	
	C	14	14	14	14	14	14	14	0.93	
UWD	D	14	14	14	13	13	13	12	0.80	
~~12.5~~ 10	A	15	~~14~~ 15 (1)	13	12	12	12	12	0.80	(1) Correction CJD 12/2
	B	15	15	15	14	14	14	14	0.93	
	C	15	~~15~~ 14 (1)	14	14	14	14	14	0.93	
UWD	D	15	15	15	15	15	15	15	1.00	
~~25~~ 20	A	15	15	14	14	13	13	13	0.87	
	B	15	15	15	15	14	14	14	0.93	
	C	15	15	15	15	15	15	15	1.00	
	D	15	15	15	15	15	15	14	0.93	
50	A	15	15	15	15	15	15	15	1.00	
	B	15	15	14	14	14	13	13	0.87	
	C	15	15	15	15	15	15	15	1.00	
	D	15	15	15	15	15	15	14	0.93	
100	A	15	15	15	15	15	14	14	0.93	
	B	15	14	12	12	12	9	9	0.60	
	C	15	15	14	14	14	13	13	0.87	
	D	15	14	14	14	14	11	11	0.73	
	A									
	B									
	C									
	D									
Sample No.		242570	242570	242570	242570	242570	242570	—	calculations	
Initial/Date/Time		CJD 12/1 1051	CJD 12/2 1235	CJD 12/3 1605	RC 12/4 1210	RC 12/5 1235	RC 12/6 [illegible]	CJD 12/7 0830	IRC 12/19	
Feed AM		12/1 UWD 0630	12/2 UWD 0620	CJD 12/3 0830	RC 12/4 0800	12/5 UWD 0625	12/6 UWD 0625	NOT		
(Time) PM		[illegible]	12/2 [illegible]	CJD 12/3 1650	RC 12/4 1710	12/5 [illegible]	12/6 CJD 1645	FED		

Comments: Feeding: 0.1ml Artemia 2X daily, with 6 or more hours between feeding. Do Not Feed on Day 7.

D.O. - must be maintained above 3.5 mg/L (40% saturation).

D 000033

(February '92)

CJD

TITLE: [illegible]
FILE: [illegible]
TRANSFORM: [illegible] SQUARE ROOT(X) NUMBER OF GROUPS: [illegible]

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	LAB CONTROL	1	0.9300	1.3036
1	LAB CONTROL	2	1.0000	[illegible]
1	LAB CONTROL	3	0.8000	[illegible]
1	LAB CONTROL	4	1.0000 ✓	[illegible]
2	5%	1	0.8700	1.2219
2	5%	2	0.4700	0.7554
2	5%	3	[illegible]	[illegible]
2	5%	4	[illegible] ✓	[illegible]
3	10%	1	0.8000	1.1477
3	10%	2	[illegible]	[illegible]
3	10%	3	0.8200	[illegible]
3	10%	4	1.0000 ✓	1.4410
4	20%	1	[illegible]	[illegible]
4	20%	2	0.9300	[illegible]
4	20%	3	1.0000	1.4412
4	20%	4	0.9300 ✓	1.3036
5	50%	1	1.0000	1.4413
5	50%	2	[illegible]	[illegible]
5	50%	3	1.0000	1.4413
5	50%	4	[illegible] ✓	[illegible]
6	100%	1	[illegible]	[illegible]
6	100%	2	[illegible]	[illegible]
6	100%	3	[illegible]	[illegible]
6	100%	4	[illegible] ✓	[illegible]

QC: IRC 12/22/94

D 000034

(JD

[illegible]

[illegible]

D = 0.475

K = [illegible] 0.069

[illegible] = 0.05 (10 = 24) = 0.526
[illegible] = [illegible] = 24) = [illegible]

[illegible] test at [illegible] level, [illegible]

[illegible] SURVIVAL [illegible] 7
[illegible] Transformed [illegible] SQUARE ROOT(Y)

Bartlett's test for homogeneity of variance
[illegible] = [illegible]

[illegible] value = [illegible] [illegible] = [illegible] [illegible] = [illegible]
[illegible] value = 11.17 [illegible] = [illegible] [illegible] = [illegible]

[illegible] test at [illegible] level [illegible]

QC: IRC 12/22/94

D 000035

[illegible] (GROUNDWATER) P. promelas SURVIVAL Nov 30-Dec 7
File: [illegible] Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.265	0.053	2.011
Within (Error)	18	0.475	0.026	
Total	22	0.740		

Critical F value = 2.77 (0.05,5,18)
Since F < Critical F FAIL TO REJECT Ho: All equal

[illegible] (GROUNDWATER) P. promelas SURVIVAL Nov 30-Dec 7
File: [illegible] Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN MINUS CONTROL ORIGINAL UNIT	T STAT	[illegible]
1	[illegible]	[illegible]	[illegible]		
2	[illegible]	[illegible]	[illegible]	[illegible]	
3	[illegible]	[illegible]	[illegible]	[illegible]	
4	[illegible]	[illegible]	[illegible]	[illegible]	
5	[illegible]	[illegible]	[illegible]	[illegible]	
6	[illegible]	1.347	0.950	-0.238	
6	[illegible]	1.124	0.783	1.910	

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

ABC-13 (GROUNDWATER) P. promelas SURVIVAL Nov 30-Dec 7
File: [illegible] Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (MSD) ORIG. UNITS	% of CONTROL	DIFFERENCE FROM CONTROL
1	[illegible]	4			
2	[illegible]	4	[illegible]	[illegible]	[illegible]
3	[illegible]	4	[illegible]	[illegible]	[illegible]
4	[illegible]	4	[illegible]	[illegible]	[illegible]
5	[illegible]	4	[illegible]	[illegible]	[illegible]
6	[illegible]	4	[illegible]	[illegible]	[illegible]

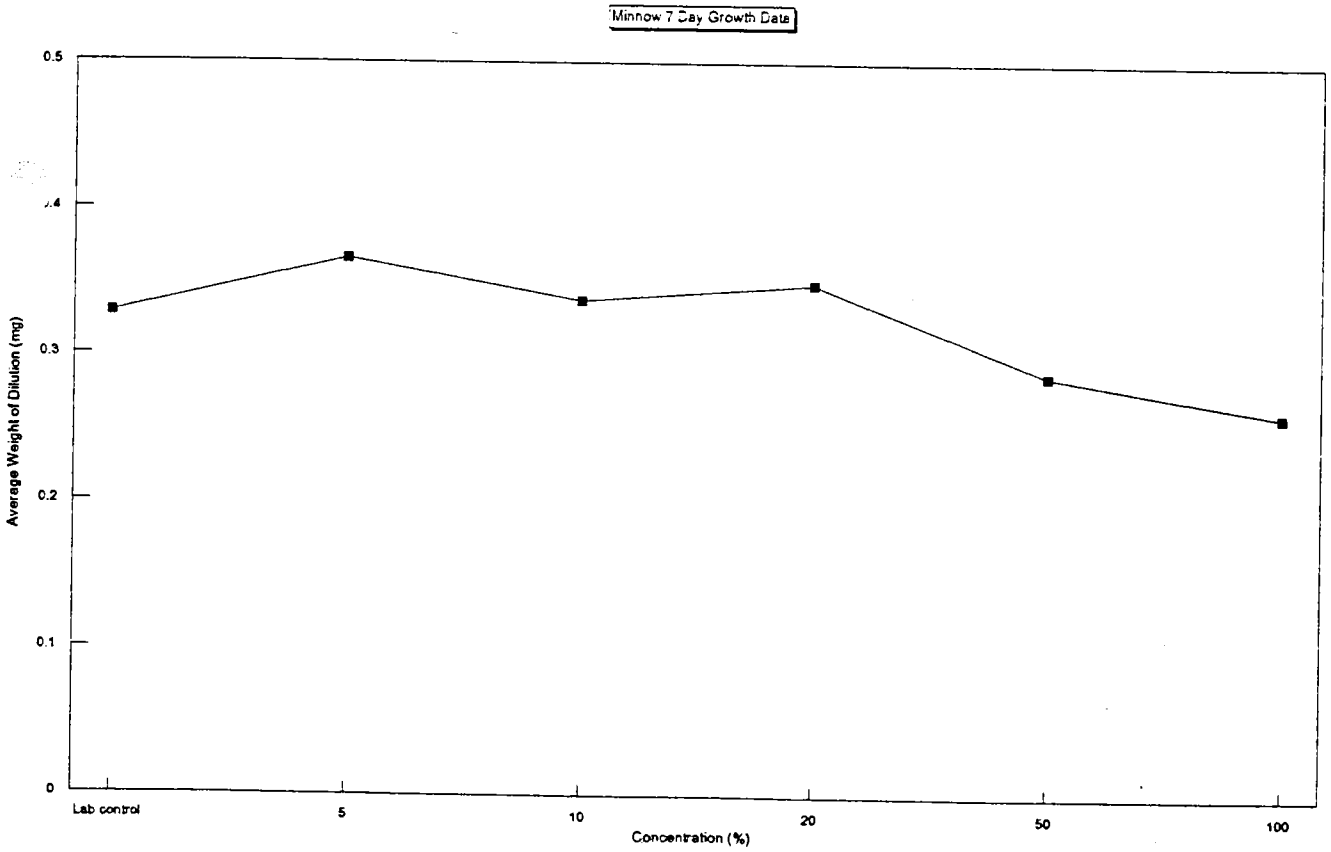
QC IEC 12/22/94

D000036

Minnow 7 Day Survival and Growth Test. Growth Data

Project Number: 94550 ETR Number: 48100
Sample Number: 242570 Species: Pimephales promelas
Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO Burlington, VT 05403
Sample Description: ABB - 13 Test Date: 11/30/94 - 12/7/94

Concentration	Units	Rep	Intital Boat Wt.(mg)	Total Dry Wt. (mg)	No. Minnows Weighed	Total - Initial Wt. (mg)	Average Dry Wt. (mg)	Average Wt. of Dilution (mg)
Lab control	%	A	30.21	34.74	14	4.53	0.32	
Lab control	%	B	28.79	33.64	15	4.85	0.32	
Lab control	%	C	30.11	34.54	12	4.43	0.37	
Lab control	%	D	26.44	31.02	15	4.58	0.31	0.33
5	%	A	23.53	28.39	13	4.86	0.37	
5	%	B	23.85	26.36	7	2.51	0.36	
5	%	C	25.74	30.87	14	5.13	0.37	
5	%	D	25.58	29.91	12	4.33	0.36	0.37
10	%	A	21.82	26.82	12	5.00	0.42	
10	%	B	23.60	28.33	14	4.73	0.34	
10	%	C	26.05	30.22	14	4.17	0.30	
10	%	D	24.69	29.35	15	4.66	0.31	0.34
20	%	A	20.70	25.76	13	5.06	0.39	
20	%	B	25.79	30.67	14	4.88	0.35	
20	%	C	25.85	31.06	15	5.21	0.35	
20	%	D	25.88	30.28	14	4.40	0.31	0.35
50	%	A	24.20	28.74	15	4.54	0.30	
50	%	B	25.68	30.10	13	4.42	0.34	
50	%	C	23.85	27.42	15	3.57	0.24	
50	%	D	24.04	27.87	14	3.83	0.27	0.29
100	%	A	22.40	26.28	14	3.88	0.28	
100	%	B	20.31	23.07	9	2.76	0.31	
100	%	C	23.84	26.68	13	2.84	0.22	
100	%	D	23.90 ✓	26.68 ✓	11 ✓	2.78	0.25	0.26



QC: CJO 1/6/95

D000037

Minnow 7 Day Survival and Growth Test, Growth Data

Species: Pimephales promelas

ject No.: 94550 Sample No.: 242570 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13 Test Dates: Start: 11/30/94 End: 12/7/94

Procedure:

1. Rinse minnows by replicate with D.I. water and transfer to preweighed weighing boats.
2. Dry in oven 3 hours at 105 °C. Transfer to dessicator.
3. Time in oven 0950 Time out of oven 1250
4. Weigh to nearest 0.01 mg.

Balance Calibration Check:

Balance Asset #: 00708 (use 20 mg weight)

Start: 19.993 / 19.999 Middle: 19.994 / 20.006 Finish: 19.989 / 20.006

Concentration Units ____	Rep.	Initial Boat Wt.(mg)	Total dry Wt. (mg)	No. Minnows Weighed	Concentration Units ____	Rep.	Initial Boat Wt.(mg)	Total dry Wt. (mg)	No. Minnows Weighed
LAB	A	30.21	34.74	14	50	A	24.20	28.74	15
CONTROL	B	28.79	33.64	15		B	25.68	30.10	13
	C	30.11	34.54	12		C	23.85	27.42	15
	D	26.44	31.02	15		D	24.04	27.87	14
5	A	23.53	28.39	13	100	A	22.40	26.28	14
	B	23.85	26.36	7		B	20.31	23.07	9
	C	25.74	30.87	14		C	23.84	26.68	13
	D	25.58	29.91	12		D	23.90	26.68	11
10	A	21.82	26.82	12		A			
	B	23.60	28.33	14		B			
	C	26.05	30.22	14		C			
	D	24.69	29.35	15		D			
20	A	20.70	25.76	13		A			
	B	25.79	30.67	14		B			
	C	25.85	31.06	15		C			
	D	25.88	30.28	14		D			

Comments: _____

Completed by: CJD Date: 12/7/94 (March '91)

D000038

TLE ABB-13 (GROUNDWATER) P. promelas GROWTH Nov 30-Dec 7
LE: ABB13FHG
ANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

P	IDENTIFICATION	REP	VALUE	TRANS VALUE
	LAB CONTROL	1	0.3200	0.3200
	LAB CONTROL	2	0.3200	0.3200
	LAB CONTROL	3	0.3700	0.3700
	LAB CONTROL	4	0.3100	0.3100
	5%	1	0.3700	0.3700
	5%	2	0.3600	0.3600
	5%	3	0.3700	0.3700
	5%	4	0.3600	0.3600
	10%	1	0.4200	0.4200
	10%	2	0.3400	0.3400
	10%	3	0.3000	0.3000
	10%	4	0.3100	0.3100
	20%	1	0.3900	0.3900
	20%	2	0.3500	0.3500
	20%	3	0.3500	0.3500
	20%	4	0.3100	0.3100
	50%	1	0.3000	0.3000
	50%	2	0.3400	0.3400
	50%	3	0.2400	0.2400
	50%	4	0.2700	0.2700
	100%	1	0.2800	0.2800
	100%	2	0.3100	0.3100
	100%	3	0.2200	0.2200
	100%	4	0.2500	0.2500

QC: CJD 1/6/95

```
3-13 (GROUNDWATER) P. promelas GROWTH Nov 30-Dec 7
.e:   ,B13FHG        Transform: NO TRANSFORMATION

.piro - Wilk's test for normality
-----------------------------------------------------------------------------

=    0.024

=    0.947

.tical W (P = 0.05) (n = 24) = 0.916
.tical W (P = 0.01) (n = 24) = 0.884
-----------------------------------------------------------------------------

:a PASS normality test at P=0.01 level. Continue analysis.


3-13 (GROUNDWATER) P. promelas GROWTH Nov 30-Dec 7
.e: ABB13FHG         Transform: NO TRANSFORMATION

-----------------------------------------------------------------------------
'tlett's test for homogeneity of variance
:culated Bl statistic =    8.94

-----------------------------------------------------------------------------
)le  hi-square value =   15.09  (alpha = 0.01, df =   5)
)le  ni-square value =   11.07  (alpha = 0.05, df =   5)

:a PASS Bl homogeneity test at 0.01 level. Continue analysis.
```

:-13 (GROUNDWATER) P. promelas GROWTH Nov 30-Dec 7
.e: B13FHG Transform: NO TRANSFORMATION

ANOVA TABLE

:RCE	DF	SS	MS	F
ween	5	0.030	0.006	4.462
:hin (Error)	18	0.024	0.001	
:al	23	0.055		

:ritical F value = 2.77 (0.05,5,18)
;ince F > Critical F REJECT Ho: All equal

3-13 (GROUNDWATER) P. promelas GROWTH Nov 30-Dec 7
.e: ABB13FHG Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

)UP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	LAB CONTROL	0.330	0.330		
2	5%	0.365	0.365	-1.346	
3	10%	0.343	0.343	-0.481	
4	20%	0.350	0.350	-0.769	
5	50%	0.287	0.287	1.634	
6	100%	0.265	0.265	2.499	*

:nnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

3-13 (GROUNDWATER) P. promelas GROWTH Nov 30-Dec 7
le: ABB13FHG Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

)UP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	LAB CONTROL	4			
2	5%	4	0.063	19.0	-0.035
3	10%	4	0.063	19.0	-0.013
4	20%	4	0.063	19.0	-0.020
5	50%	4	0.063	19.0	0.043
6	100%	4	0.063	19.0	0.065

D 000041

Raw Data Sheet

Toxicity Test Initial Chemistries

Project No.: 94550 Sample No.: 242570 ETR No.: 43100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13 Species: C. dubia / P. promelas

Test Description: modified acute/chronic

Units: % LAB Concentration: CONT	0 (11/30)	1 (12/1)	2 (12/2)	3 (12/3)	4 (12/4)	5 (12/5)	6 (12/6)	Remarks
pH	7.9	8.2	8.0	7.9	8.0	8.0	8.0	
DO (mg/L)	8.2	8.2	8.2	8.1	8.2	8.1	8.2	
Temp °C	25.0	25.5	25.4	25.5	25.4	25.2	25.6	
Cond (umho/cm)	270	265	270	265	270	270	270	
Comments:								

Concentration: ~~6.2~~ 5.0	0	1	2	3	4	5	6	Remarks
pH	8.0	8.1	8.0	7.9	8.0	8.0	8.0	
DO (mg/L)	8.3	8.2	8.2	8.1	8.3	8.0	8.2	
Temp °C	24.9	25.6	25.4	25.6	25.1	25.2	25.3	
Cond (umho/cm)	270	260	275	250	250	270	270	
Comments:								

Concentration: ~~12.5~~ 10	0	1	2	3	4	5	6	Remarks
pH	7.9	8.1	7.9	7.9	8.0	8.0	8.0	
DO (mg/L)	8.2	8.2	8.2	8.1	8.3	8.0	8.2	
Temp °C	24.7	25.0	25.2	25.7	25.1	25.2	25.2	
Cond (umho/cm)	265	270	270	265	260	270	260	
Comments:								

Concentration: ~~25~~ 20	0	1	2	3	4	5	6	Remarks
pH	7.9	8.1	7.9	7.9	8.0	8.0	8.0	
DO (mg/L)	8.2	8.2	8.2	8.1	8.2	8.0	8.2	
Temp °C	24.7	25.3	25.2	25.6	25.2	25.3	25.2	
Cond (umho/cm)	250	260	255	255	250	250	250	
Comments:								

Raw Data Sheet
Toxicity Test Initial Chemistries

Project No.: 94550 Sample No.: 242570 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13 Species: C. dubia / P. promelas

Test Description: modified acute/chronic

Units: % Concentration: 50	0 (11/30)	1 (12/1)	2 (12/2)	3 (12/3)	4 (12/4)	5 (12/5)	6 (12/6)	Remarks
pH	7.6	8.0	7.9	7.8	8.0	8.0	8.0	
DO (mg/L)	8.1	8.2	8.3	8.2	8.2	8.0	8.2	
Temp °C	24.8	25.4	25.2	25.5	25.4	25.6	25.1	
Cond (umho/cm)	210	225	215	210	230	215	220	
Comments:								

Concentration: 100	0	1	2	3	4	5	6	Remarks
pH	7.2	7.8	7.9	7.8	8.0	8.0	8.1	
DO (mg/L)	8.0	8.2	8.2	8.2	8.2	7.8	8.1	
Temp °C	25.3	25.7	25.5	25.8	25.6	25.8	25.6	
Cond (umho/cm)	125	170	145	135	220	145	170	
Comments:								

Concentration:	0	1	2	3	4	5	6	Remarks
pH								
DO (mg/L)								
Temp °C								
Cond (umho/cm)								
Comments:								

Concentration:	0	1	2	3	4	5	6	Remarks
pH								
DO (mg/L)								
Temp °C								
Cond (umho/cm)								
Comments:								

Raw Data Sheet
Toxicity Test Final Chemistries

Project No.: 94550 Sample No.: 242570

ETR No.: 48100 Test Description: modif. acute/chronic surv. + growth

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13 Species: P. promelas

Initials/Date/Time:		12/1 CJD	12/2 CJD	12/3 CJD	12/4 RG	12/5 RG	12/6 DJP	12/7 CJD	
Units: % LAB Concentration: CONT	0	1	2	3	4	5	6	7	Remarks
pH	/	①	7.5	7.6	7.6	7.6	7.4	7.6	
DO (mg/L)	/	①	7.5	7.5	7.8	7.6	5.8	7.4	
Temp °C	/	25.2	25.5	25.7	26.0	25.7	25.2	25.2	
Conductivity (umhos/cm)	/	①	260	260	270	260	300	260	

Concentration: ~~6.2~~ 5 ug/l	0	1	2	3	4	5	6	7	Remarks
pH	/	7.7	7.6	7.6	7.6	7.6	7.3	7.6	
DO (mg/L)	/	7.8	7.2	7.5	7.6	7.6	5.6	7.4	
Temp °C	/	25.6	25.8	25.8	26.4	26.9	25.8	25.4	
Conductivity (umhos/cm)	/	250	270	275	260	280	310	250	

Concentration: ~~12.5~~ 10 ug/l	0	1	2	3	4	5	6	7	Remarks
pH	/	7.7	7.5	7.6	7.6	7.7	7.2	7.6	
DO (mg/L)	/	7.8	7.0	7.1	7.5	7.3	5.3	7.4	
Temp °C	/	26.1	26.2	26.3	25.8	26.3	26.5	26.1	
Conductivity (umhos/cm)	/	260	275	280	240	260	290	265	

Concentration: ~~25~~ 20 ug/l	0	1	2	3	4	5	6	7	Remarks
pH	/	7.7	7.6	7.6	7.5	7.7	7.3	7.6	
DO (mg/L)	/	7.8	6.9	7.1	7.6	6.9	5.5	7.4	
Temp °C	/	24.9	25.6	25.6	24.4	25.0	25.2	25.3	
Conductivity (umhos/cm)	/	250	270	270	230	240	290	265	

Comments: ① Not taken CJD 12/1

REV: 7/1/92

Raw Data Sheet
Toxicity Test Final Chemistries

Project No.: 91550 Sample No.: 242570

ETR No.: 48100 Test Description: modif. acute/chronic surv. + growth

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-13 Species: P. promelas

Initials/Date/Time:		12/1 CJD	12/2 CJD	12/3 CJD	12/4 RR	12/5 RR	12/6 DJP	12/7 CJD	
Units: % Concentration: 50	0	1	2	3	4	5	6	7	Remarks
pH		7.6	7.6	7.6	7.5	7.7	7.3	7.6	
DO (mg/L)		7.5	6.9	7.1	7.5	6.7	5.4	7.0	
Temp °C		25.1	26.3	25.9	25.8	26.0	25.7	25.7	
Conductivity (umhos/cm)		210	240	235	190	230	260	235	

Concentration: 100	0	1	2	3	4	5	6	7	Remarks
pH		7.5	7.6	7.5	7.5	7.7	7.2	7.6	
DO (mg/L)		7.5	6.7	7.0	7.1	6.6	5.3	6.7	
Temp °C		26.5	26.5	26.1	24.6	27.1	26.8	26.3	
Conductivity (umhos/cm)		185	185	170	150	220	190	190	

Concentration:	0	1	2	3	4	5	6	7	Remarks
pH									
DO (mg/L)									
Temp °C									
Conductivity (umhos/cm)									

Concentration:	0	1	2	3	4	5	6	7	Remarks
pH									
DO (mg/L)									
Temp °C									
Conductivity (umhos/cm)									

Comments:

PO #27725

Rec'd 11/30 CJO
T = 18.5°C
pH = 7.3
DO = >20mg/L
Cond = 130

AQUATIC RESOURCES
SEBASTOPOL, CA.

2610 Meier Rd., Sebastopol, CA 95472
(707) 829-1194

ORGANISM INFORMATION

PECIES: Fathheads, P. promelas AGE: <24 Hrs

REQUESTED _____ DATE SHIPPED 11-29 I.D.: KWB

H: _____ TEMPERATURE: 21 HARDNESS: ≥100 mg/1 $CaCO_3$

ALINITY (if applicable); _____ ppt.

Thank you for your order. If you have any questions please don't hesitate to call.

D000046

APPENDIX D-2
Groundwater Sample CF3MW28S

Raw Data Sheet Ceriodaphnia Young and Survival Data Sheet

EPA Method 1002.0

Project No.: 94550 Sample No.: 242571 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB - 28 Organism Age: <24 h

Date/Time Started: 11/30/94 1300 CSD Day 0 Fed ✓ Date/Time Completed: 12/6, 1125 IRC

USED NEONATES FROM 11/22 B bb, 0000 COLLECTION

Units: % Conc.	Day	1	2	3	4	5	6	7	8	9	10	Remarks / Initials
LAB Control	1	0	0	0	0	0	0	0	0	0	0	Sample #: 242571
6.25		0	0	0	0	0	0	0	0	0	0	Renewed: 12/1/94 1600 1630
12.5 10		0	0	0	0	0	0	0	0	0	0	Fed: ✓ IRC
25 20		0	0	0	0	0	0	0	0	0	0	
50		0	0	0	0	0	0	0	0	0	0	
100		0	0	0	0	0	0	0	0	0	0	
LAB Control	2	0	0	0	0	0	0	0	0	0	0	Sample #: 242571
6.25		0	0	0	0	0	0	0	0	0	0	Renewed: 12/2/94 1050
12.5 10		0	0	0	0	0	0	0	0	0	0	Fed: ✓ IRC
25 20		0	0	0	0	0	0	0	0	0	0	
50		0	0	0	0	0	0	0	0	0	0	
100		0	0	0	0	0	0	0	0	0	0	
LAB Control	3	7	6	6	6	5	6	5	7	6	6	Sample #: 242571
6.25		4	4	6	6	6	6	6	7	6	6	Renewed: 1310-1355
12.5 10		6	3	5	4	5	4	4	3	5	6	Fed: ✓
25 20		4	4	5	6	6	1	0	4	5	6	DP 12/3/94
50		4.~~3~~*	0	0	0	3	0	0	0	2	6	*reflection, DP 12/3
100		0	0	0	0	0	0	0	0	0	0	
LAB Control	4	9	10	12	10	10	0	0	0	10	12	Sample #: 242571
6.25		0	0	0	0	0	0	0	0	1	7	Renewed: 12/4 1755-1820
12.5 10		0	0	D	D	5	0	D	D	0	10	Fed: ✓ IRC
25 20		0	0	D	4	0	D	4/D	D	0	0	
50		D	0	D	0	D	D	0	5/D	0	D	
100		4	6	3	1	0	4	0	4	2	1	

0 = no young D = dead M = missing numbers = neonates released in prior 24h

(Biotox-01 // 4/93)

Raw Data Sheet Ceriodaphnia Young and Survival Data Sheet

EPA Method 1002.0

Project No.: 94550 Sample No.: 242571 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-28 Organism Age: <24 h

Date/Time Started: 11/30/94 1300 Date/Time Completed: 12/6; 1125 12/8

	Units: % Conc.	Day	1	2	3	4	5	6	7	8	9	10	Remarks / Initials
AB	Control	5	0	0	0	0	0	9	10	10	0	0	Sample #: 242571
	6.25		8	9	9	7	6	16	9	8	0	0	Renewed: 12/5 1405-1440
	12.5 10		12	7	D	D	0	5	D	D	4	0	Fed: ✓ 12C
	25 20		8	2	D	0	2	D	D	D	5	6	
	50		D	3	D	4	D	D	3	D	4	D	
	100		2	3	0	1	3	0	0	0	3	3	⊙ miscount 12C 12/5
AB	Control	6	11	15	13	14	14	11	16	16	14	16	~~Sample #:~~
	6.25		11	9	12	12	10	13	16	9	9	12	~~Renewed:~~ test terminated
	12.5 10		10	8	D	D	11	5	D	D	12	10	~~Fed:~~ 12/6 1125-1145
	25 20		6	8	D	6	3	D	D	D	7	4	12C
	50		D	8	D	0	D	D	0	D	0	D	
	100		D	0	0	0	0	0	4	3	0	0	
AB	Control	7											Sample #:
	6.25												Renewed:
	12.5 10												Fed:
	25 20												
	50												
	100												
	Control	8											Sample #:
													Renewed:
													Fed:

0 = no young D = dead M = missing numbers = neonates released in prior 24h (Biotox-01 // 4/93)

D 000018

Raw Data Sheet Ceriodaphnia Young and Survival Data Sheet
EPA Method 1002 0

Project #: 94550 ETR #: 48100
Sample #: 242571 Sample Desc. ABB - 28
Start Date: 11/30/94 Start Time: 11:30 End Date: 12/06/94 End Time: 11:25

Conc.	Day	1	2	3	4	5	6	7	8	9	10
Lab C	1	0	0	0	0	0	0	0	0	0	0
5		0	0	0	0	0	0	0	0	0	0
10		0	0	0	0	0	0	0	0	0	0
20		0	0	0	0	0	0	0	0	0	0
50		0	0	0	0	0	0	0	0	0	0
100		0	0	0	0	0	0	0	0	0	0
Lab Control	2	0	0	0	0	0	0	0	0	0	0
5		0	0	0	0	0	0	0	0	0	0
10		0	0	0	0	0	0	0	0	0	0
20		0	0	0	0	0	0	0	0	0	0
50		0	0	0	0	0	0	0	0	0	0
100		0	0	0	0	0	0	0	0	0	0
Lab Control	3	7	6	6	6	5	6	5	7	6	6
5		4	4	6	6	6	6	6	7	6	6
10		6	3	5	4	5	4	4	3	5	6
20		4	4	5	6	6	1	0	4	5	6
50		4	0	0	0	3	0	0	0	2	6
100		0	0	0	0	0	0	0	0	0	0
Lab Control	4	9	10	12	10	10	0	0	0	10	12
5		0	0	0	0	0	0	0	0	1	7
10		0	0	D	D	5	0	D	D	0	10
20		0	0	D	4	0	D	4	D	0	0
50		D	0	D	0	D	D	0	5	0	D
100		4	6	3	1	0	4	0	4	2	1
Lab Control	5	0	0	0	0	0	9	10	10	0	0
5		8	9	9	7	6	16	9	8	0	0
10		12	7	D	D	0	5	D	D	4	0
20		8	2	D	0	2	D	D	D	5	6
50		D	3	D	4	D	D	3	D	4	D
100		2	3	0	1	3	0	0	0	3	3
Lab Control	6	11	15	13	14	14	11	16	16	14	16
5		11	9	12	12	10	13	16	9	9	12
10		10	8	D	D	11	5	D	D	12	10
20		6	8	D	6	3	D	D	D	7	4
50		D	8	D	0	D	D	0	D	0	D
100		D	0	0	0	0	0	4	3	0	0

****** If female mortality occurs D = effluent induced mortality and * = laboratory induced mortality ******

D 000049

QC IEC 12/22/94

DRP 1/6/95

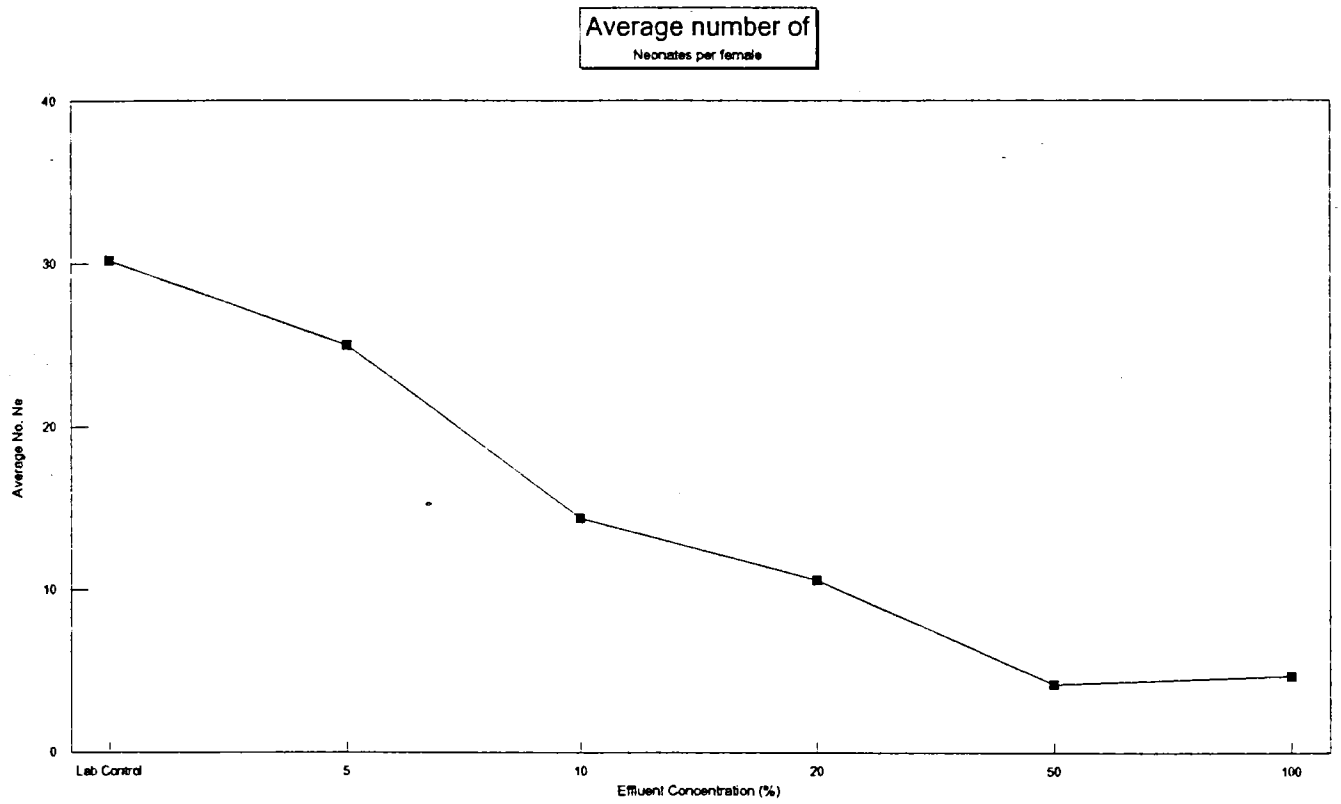
Tabulation of total Neonates released per female during the test

Project #:	94550		ETR #:	48100						
Sample #:	242571		Sample Desc.:	ABB - 28						
Start Date:	11/30/94	Start Time:	11 30	End Date:	12/06/94	End Time:	11 25			

	Replicates									
	1	2	3	4	5	6	7	8	9	10
Lab Control	27	31	31	30	29	26	31	33	30	34
5	23	22	27	25	22	35	31	24	16	25
10	28	18	5	4	21	14	4	3	21	26
20	18	14	5	16	11	1	4	4	17	16
50	4	11	0	4	3	0	3	5	6	6
100	6	9	3	2	3	4	4	7	5	4

Summary tabulation of test data:

Conc.	Number Females	48 Hrs. Survival	48 Hrs. % Survival	End of Test Survival	End of Test % Survival	Total Neonate	Average Neonate
Lab Control	10	10	100	10	100	302	30.2
5	10	10	100	10	100	250	25.0
10	10	10	100	6	60	144	14.4
20	10	10	100	6	60	106	10.6
50	10	10	100	4	40	42	4.2
100	10	10	100	9	90	47	4.7



****** If female mortality occurs D = effluent induced mortality, and * = laboratory induced mortality ******

D 000050

QC: EC 12/22/94

RC PRP 1/6/95

ABB-28
C. dubia SURVIVAL
11/30-12/6/94

FISHER'S EXACT TEST

	NUMBER OF		
IDENTIFICATION	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
10%	6	4	10
TOTAL	16	4	20

CRITICAL FISHER'S VALUE (10,10,10) (a=0.05, 2T) 1. a VALUE IS 6.
Since a is less than or equal to 6 there is a significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHER'S EXACT TEST

	NUMBER OF		
IDENTIFICATION	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
20%	6	4	10
TOTAL	16	4	20

CRITICAL FISHER'S VALUE (10,10,10) (a=0.05, 2T) 1. a VALUE IS 6.
Since a is less than or equal to 6 there is a significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHER'S EXACT TEST

	NUMBER OF		
IDENTIFICATION	ALIVE	DEAD	TOTAL ANIMALS

D 000051

RC DRP 11/95

[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

FISHER EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	20	0	10
10%	9	1	10
TOTAL	29	1	20

CRITICAL FISHER'S VALUE (10,10,10) (N=1.05) IS 6. [illegible] VALUE IS 9.
Since [illegible] is greater than 6 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

SUMMARY OF FISHER'S EXACT TESTS

GROUP	IDENTIFICATION	NUMBER DOSED	NUMBER DEAD	SIG. (P<.05)
	CONTROL	10	0	
1	10%	10	4	*
2	20%	10	4	*
3	50%	10	6	*
4	100%	10	1	

QC: IEC 12/22/94

D 000052

QC DEP 1/4/95

TITLE: ABB-28 (GROUNDWATER) C. dubia REPRODUCTION Nov 30-Dec 6
FILE: abb28dub.alt
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 3

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	LAB CONTROL	1	27.0000	27.0000
1	LAB CONTROL	2	31.0000	31.0000
1	LAB CONTROL	3	31.0000	31.0000
1	LAB CONTROL	4	30.0000	30.0000
1	LAB CONTROL	5	29.0000	29.0000
1	LAB CONTROL	6	26.0000	26.0000
1	LAB CONTROL	7	31.0000	31.0000
1	LAB CONTROL	8	33.0000	33.0000
1	LAB CONTROL	9	30.0000	30.0000
1	LAB CONTROL	10	34.0000	34.0000
2	5%	1	23.0000	23.0000
2	5%	2	22.0000	22.0000
2	5%	3	27.0000	27.0000
2	5%	4	25.0000	25.0000
2	5%	5	22.0000	22.0000
2	5%	6	35.0000	35.0000
2	5%	7	31.0000	31.0000
2	5%	8	24.0000	24.0000
2	5%	9	16.0000	16.0000
2	5%	10	25.0000	25.0000
3	100%	1	6.0000	6.0000
3	100%	2	9.0000	9.0000
3	100%	3	3.0000	3.0000
3	100%	4	2.0000	2.0000
3	100%	5	3.0000	3.0000
3	100%	6	4.0000	4.0000
3	100%	7	4.0000	4.0000
3	100%	8	7.0000	7.0000
3	100%	9	5.0000	5.0000
3	100%	10	4.0000	4.0000

QC: IEC 1/8/95

ABB-28 (GROUNDWATER) C. dubia REPRODUCTION Nov 30-Dec 6
le: abb28dub.alt Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 337.700

W = 0.948

Critical W (P = 0.05) (n = 30) = 0.927
Critical W (P = 0.01) (n = 30) = 0.900

Data PASS normality test at P=0.01 level. Continue analysis. ✓

ABB-28 (GROUNDWATER) C. dubia REPRODUCTION Nov 30-Dec 6
File: abb28dub.alt Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated Bl statistic = 8.58

---

ble Chi-square value = 9.21 (alpha = 0.01, df = 2)
able Chi-square value = 5.99 (alpha = 0.05, df = 2)

Data PASS Bl homogeneity test at 0.01 level. Continue analysis. ✓

QC: IEC 1/8/95

ABB-28 (GROUNDWATER) C. dubia REPRODUCTION Nov 30-Dec 6
le: abb28dub.alt Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	2	3631.267	1815.633	145.165
Within (Error)	27	337.700	12.507	
Total	29	3968.967		

Critical F value = 3.35 (0.05,2,27)
Since F > Critical F REJECT Ho: All equal

ABB-28 (GROUNDWATER) C. dubia REPRODUCTION Nov 30-Dec 6
File: abb28dub.alt Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	LAB CONTROL	30.200	30.200		
2	5%	25.000	25.000	3.288	*
3	100%	4.700	4.700	16.123	*

Dunnett table value = 2.01 (1 Tailed Value, P=0.05, df=24,2)

ABB-28 (GROUNDWATER) C. dubia REPRODUCTION Nov 30-Dec 6
File: abb28dub.alt Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	LAB CONTROL	10			
2	5%	10	3.179	10.5	5.200
3	100%	10	3.179	10.5	25.500

cc: IEC 1/8/95
D 000055

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Raw Data Sheet
Toxicity Test Initial Chemistries

Project No.: 94550 Sample No.: 242571 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB - 28 Species: C. dubia / P. promelas

Test Description: modified acute/chronic

Units: % LAB Concentration: CONT	0 (1/30)	1 (12/1)	2 (12/2)	3 (12/3)	4 (12/4)	5 (12/5)	6 (12/6)	Remarks
pH	7.9	8.2	8.0	7.9	8.0	8.0	8.0	
DO (mg/L)	8.2	8.2	8.2	8.1	8.2	8.1	8.2	
Temp °C	25.4	25.0	25.5	25.5	25.4	25.3	25.5	
Cond (umho/cm)	270	265	270	265	270	270	270	

Comments:

Concentration: ~~8.2~~ 5%	0	1	2	3	4	5	6	Remarks
pH	7.9	7.9	7.9	8.0	8.0	7.9	8.0	
DO (mg/L)	8.2	8.3	8.2	8.1	8.2	8.0	8.2	
Temp °C	25.1	24.8	25.2	25.4	25.3	25.1	25.3	
Cond (umho/cm)	270	250	270	250	260	270	260	

Comments:

Concentration: ~~12.5~~ 10%	0	1	2	3	4	5	6	Remarks
pH	7.9	7.9	7.9	8.0	7.9	7.9	8.0	
DO (mg/L)	8.2	8.3	8.2	8.1	8.3	8.1	8.2	
Temp °C	25.1	24.7	25.1	25.3	25.0	25.0	25.2	
Cond (umho/cm)	260	260	260	260	260	260	255	

Comments:

Concentration: ~~25~~ 20%	0	1	2	3	4	5	6	Remarks
pH	7.8	7.9	7.8	7.9	7.9	7.9	8.0	
DO (mg/L)	8.2	8.3	8.2	8.1	8.2	8.0	8.2	
Temp °C	25.0	24.7	25.1	25.2	24.9	24.8	25.1	
Cond (umho/cm)	230	230	230	240	230	235	235	

Comments:

D 000057

Raw Data Sheet

Toxicity Test Initial Chemistries

Project No.: 94550 Sample No.: 242571 ETR No.: 4810C

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-28 Species: C. dubia / P. promelas

Test Description: modified acute/chronic

Units: % Concentration: 50	0 (11/30 cmb)	1 (12/1 cmb)	2 (12/2 cmb)	3 (12/3 cmb)	4 (12/4 cmb)	5 (12/5 cmb)	6 (12/6 cmb)	Remarks
pH	7.6	7.7	7.7	7.8	7.8	7.8	7.9	
DO (mg/L)	8.2	8.23 cmb	8.2	8.2	8.2	8.0	8.2	
Temp °C	25.0	24.7	25.2	25.3	25.0	25.0	25.2	
Cond (umho/cm)	1270	170	170	190	210	170	180	
	(mb)							

Comments:

Concentration: 100	0	1	2	3	4	5	6	Remarks
pH	7.2	7.5	7.4	7.7	7.7	7.6	7.8	
DO (mg/L)	8.2	8.3	8.2	8.2	8.2	8.78 cmb	8.1	
Temp °C	25.2	25.3	25.8	25.8	25.2	25.5	25.5	
Cond (umho/cm)	55	60	60	90	100	70	80	

Comments:

Concentration:	0	1	2	3	4	5	6	Remarks
pH								
DO (mg/L)								
Temp °C								
Cond (umho/cm)								

Comments:

Concentration:	0	1	2	3	4	5	6	Remarks
pH								
DO (mg/L)								
Temp °C								
Cond (umho/cm)								

Comments:

D000058

Raw Data Sheet

Toxicity Test Final Chemistries

Project No.: 94550 Sample No.: 242571

ETR No.: 48100 Test Description: modif. acute/chronic surv. + reprod.

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-28 Species: C. dubia

Initials/Date/Time:		12/1/94	12/2/94 12/3		12/4 12	12/5 12	12/6 12		
Units: % LAB CONT Concentration:	0	1 CCD	2 CCD	3	4	5	6 final	7	Remarks
pH		8.0	7.8	7.9	8.1	7.9	7.9		
DO (mg/L)		8.2	8.3	8.0	8.2	8.0	8.1		
Temp °C		24.8	25.2	24.9	24.6	25.0	25.0		
Conductivity (umhos/cm)		275	270	270	270	270	280		

Concentration: 5% ~~6.2~~ umhos	0	1	2	3	4	5	6	7	Remarks
pH		8.1	7.8	7.8	8.0	7.9	7.9		
DO (mg/L)		8.2	8.2	8.0	8.3	8.0	8.3		
Temp °C		24.5	25.4	24.8	24.9	25.1	25.3		
Conductivity (umhos/cm)		280	280	275	270	270	280		

Concentration: 10% ~~12.5~~ umhos	0	1	2	3	4	5	6	7	Remarks
pH		8.1	7.8	7.9	8.0	7.8	7.9		
DO (mg/L)		8.3	8.3	8.0	8.3	7.9	8.2		
Temp °C		25.2	25.4	24.9	25.0	25.2	25.4		
Conductivity (umhos/cm)		270	260	265	260	270	260		

Concentration: 20 ~~25~~ umhos	0	1	2	3	4	5	6	7	Remarks
pH		8.0	7.8	7.8	7.9	7.8	7.8		
DO (mg/L)		8.3	8.3	7.9	8.2	7.9	8.1		
Temp °C		25.3	25.1	25.2	25.1	25.4	25.3		
Conductivity (umhos/cm)		250	240	240	230	250	260		

Comments:

REV: 7/1/92

Raw Data Sheet
Toxicity Test Final Chemistries

Project No.: 94550 Sample No.: 242571

ETR No.: 48100 Test Description: modif. acute/chronic surv. + reprod.

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-28 Species: C. dubia

Initials/Date/Time: 12/1/94 12/2/94 12/3 DPP 12/4 12:0 12/5 12:0 12/6 12:0

Units: % Concentration: 50	0	1 (CSD)	2 (CSD)	3	4	5	6 (renew)	7	Remarks
pH		7.9	7.7	7.7	7.8	7.8	7.6		
DO (mg/L)		8.3	8.3	8.0	8.3	7.9	8.1		
Temp °C		25.1	25.2	25.4	25.0	25.3	25.3		
Conductivity (umhos/cm)		~~25~~ 190	155	185	170	200	180		

Concentration: 100	0	1	2	3	4	5	6	7	Remarks
pH		7.4	7.4	7.4	7.7	7.7	7.4		
DO (mg/L)		8.3	8.1	8.0	8.4	7.9	8.1		
Temp °C		25.1	25.0	25.4	24.9	25.3	25.3		
Conductivity (umhos/cm)		80	80	75	90	120	90		

Concentration:	0	1	2	3	4	5	6	7	Remarks
pH									
DO (mg/L)									
Temp °C									
Conductivity (umhos/cm)									

Concentration:	0	1	2	3	4	5	6	7	Remarks
pH									
DO (mg/L)									
Temp °C									
Conductivity (umhos/cm)									

Comments:

REV: 7/1/92

DOCUMENTATION FORM

Project No. 94550 Client ABB-28 Sample No. 242571 ETR No. 48100
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/29, 1600-1615	11/22 A + B brood boards cleared in anticipation of 0000, 0800, collections for chronic toxicity tests. All adults and neonates appear healthy and normal.	
11/30, 0000-0020	collections:	
	11/22 A bb: 6 cups of 8+ neon. coll./fed w/ adults 11/22 B bb: 22 " " " " " "	
	All adults and neonates appear healthy and normal. Neonates are valid to use to initiate chronic toxicity tests until 1600 11/30.	
		IPC
11/30	0805-0820 COLLECTIONS:	
	11/22 A bb: 2 CUPS OF 8+ NEON. COLL/FED W/ ADULTS 11/22 B bb: 12 CUPS " " " " " " "	
	ALL ADULTS AND NEONATES APPEAR HEALTHY AND NORMAL. NEONATES ARE VALID TO USE TO INITIATE CHRONIC TOXICITY TESTS UNTIL 0000 12/1	
		CJO
11/30	1600-1615 COLLECTIONS:	
	11/22 A bb: 8 CUPS OF 8+ NEON. COLL/FED W/ ADULTS 11/22 B bb: 3 CUPS OF 8+ NEON. COLL/FED W/ ADULTS	
	ALL ADULTS AND NEONATES APPEAR HEALTHY AND NORMAL. NEONATES ARE VALID TO USE TO INITIATE CHRONIC TOXICITY TESTS UNTIL 0805 12/1	
		CJO

Minnow 7 Day Survival and Growth Test, Survival Data

Species: *Pimephales promelas*

Project No.: 94550 Sample No.: 242571

ETR No.: 48100 Sample Description: ABB - 28

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Date/Time Started: 11/30/94 1530 CJD day 0 feeding: 11/30 1530 CJD AR Date/Time Completed: 12/7/94 1010 CJD

No. Organisms per Chamber: 15 Organism Source / Age: hatch 11/29 Test Chamber / Volume: 600/200 mL

Dilution Water: MHW Aeration: N Food: Y Artemia 2x daily

Treatment (Units) %		NUMBER SURVIVING ON DAY 1	2	3	4	5	6	7	Prop. Surviving	Remarks
LAB	A	15	15	15	15	15	15	15	1.00	
CONT	B	15	15	15	15	14	14	14	0.93	
	C	15	15	15	15	15	15	15	1.00	
	D	15	15	15	15	14	14	14	0.93	
CWD 6.2	A	15	15	15	15	14	13	11	0.73	
5%	B	15	15	15	15	14	14	14	0.93	
	C	15	15	15	15	15	15	15	1.00	
	D	15	15	15	14	14	14	14	0.93	
CWD 12.5	A	15	15	15	15	15	15	14	0.93	
10%	B	15	15	15	15	15	15	15	1.00	
	C	15	15	14	13	13	11	10	0.67	
	D	15	15	15	15	15	15	15	1.00	
CWD 25	A	15	15	15	15	15	15	15	1.00	
20%	B	15	15	15	12	11	11	11	0.73	
	C	15	15	15	15	15	15	15	1.00	
	D	15	15	15	15	15	15	15	1.00	
SO	A	15	15	15	15	13	13	13	0.87	
	B	15	15	15	14	14	14	13	0.87	
	C	15	15	15	14	14	14	13	0.87	
	D	15	15	15	15	14	14	14	0.93	
100	A	15	15	15	9①	6	6	4	0.27	① D.O. = 6.8 IRC 12/4
	B	15	15	15	7②	4	4	0	0.00	② D.O. = 6.7 IRC 12/4
	C	15	15	15	8③	4	2	2	0.13	③ D.O. = 6.8 IRC 12/4
	D	15	15	15	6④	2	2	1	0.07	④ D.O. = 6.4 IRC 12/4
	A									
	B									
	C									
	D									
Sample No.		242571	242571	242571	242571	242571	242571	—	calculations:	
Date/Time		CJD 12/1 1230	CJD 12/4 1145	DRP 12/3 1530	IRC 12/4 1305	IRC 12/5 1330	DRP 12/6 1145	CJD 12/7 1010	IRC 12/19	
Feed AM		12/1 CWD 0630	12/2 CWD 0620	CJD 12/3 0830	IRC 0800 12/4	12/5 CWD 0615	12/6 CWD 0625	NOT		
(Time) PM		12/1 1700	12/2 DRP 1100	DRP 12/3 1630	IRC 12/4 1710	12/5 1645 IRC	12/6 CJD 1645	FED		

Comments: Feeding: 0.1ml Artemia 2X daily, with 6 or more hours between feeding. Do Not Feed on Day 7.

D.O. - must be maintainen above 3.5 mg/L (40% saturation). 11/30/94, 2030 D.O. check in 100% = 7.7 mg/L

D000062

(February '92)

QC: DRP 1/6/95

TITLE: [illegible]
FILE: [illegible]
TRANSFORM: [illegible] ARE ROOTED [illegible] NUMBER OF DECIMALS: [illegible]

GRP	IDENTIFICATION	REP	VALUE		TRANS VALUE
1	LAB CONTROL	1	1.0000		1.4412
1	LAB CONTROL	2	0.8300		1.3030
1	LAB CONTROL	3	1.0000		1.4412
1	LAB CONTROL	4	0.8300 ✓		1.3030
2	FB	1	0.7300		1.0244
2	FB	2	[illegible]		[illegible]
2	FB	3	1.0000		1.4412
2	FB	4	1.0000 ✓		[illegible]
3	[illegible]	1	0.8300		1.3030
3	[illegible]	2	1.0000		1.4412
3	[illegible]	3	[illegible]		[illegible]
3	[illegible]	4	1.0000 ✓		1.4412
4	[illegible]	1	1.0000		1.4412
4	[illegible]	2	0.7300		1.0244
4	[illegible]	3	[illegible]		[illegible]
4	[illegible]	4	1.0000 ✓		1.4412
5	[illegible]	1	0.8700		1.2019
5	[illegible]	2	[illegible]		[illegible]
5	[illegible]	3	0.8700		1.2019
5	[illegible]	4	[illegible] ✓		[illegible]
6	[illegible]	1	[illegible]		[illegible]
6	[illegible]	2	[illegible]		[illegible]
6	[illegible]	3	[illegible]		[illegible]
6	[illegible]	4	[illegible] ✓		[illegible]

QC: IEC 12/22/94

D 000063

QC DRP 1/6/95

[illegible] (GROUNDWATER) [illegible]
[illegible]

Shapiro - Wilk's test for normality

P = 0.497

W = 0.918

Critical W (P = 0.05) (n = 24) = 0.916
Critical W (P = 0.01) (n = 24) = 0.884

Data PASS normality test at P=0.01 level. Continue analysis. ✓

ASB-20 (GROUNDWATER) [illegible]
[illegible]

Bartlett's test for homogeneity of variance
[illegible]

Critical Chi-square value = [illegible] [illegible] = [illegible] df = [illegible]
Calc Chi-square value = [illegible] [illegible] = [illegible] df = [illegible]

Data PASS [illegible] homogeneity test at [illegible] level. [illegible] analysis. ✓

QC: IEC 12/22/94

D 000064

QC DRP 11/14/95

[illegible] (GROUNDWATER) P. promelas SURVIVAL Nov 30-Dec 7
File: [illegible] Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	3.199	0.639	28.067 *
Within (Error)	18	0.457	0.023	
Total	23	3.656		

Critical F value = 2.77 (0.05,5,18)
[illegible] F [illegible] F [illegible] [illegible] F [illegible]

ABB-28 (GROUNDWATER) P. promelas SURVIVAL Nov 30-Dec 7
File: ABB28fns Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST - TABLE 1 OF 1 — Significant Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	Sig
1	LAB CONTROL	1.372	1.045		
2	5%	1.307	1.000	0.667	
3	10%	1.261	0.951	0.756	
4	25%	1.117	0.832	2.299	
5	50%	1.227	0.925	1.214	
6	100%	1.128	0.825	3.566	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

ABB-28 (GROUNDWATER) P. promelas SURVIVAL Nov 30-Dec 7
File: abb28fns Transform: ARC SINE(SQUARE ROOT(Y))

DUNNETT'S TEST - TABLE 1 OF 1 — Significant Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% OF CONTROL	DIFFERENCE FROM CONTROL
1	LAB CONTROL	4			
2	5%	4	[illegible]	[illegible]	[illegible]
3	10%	4	[illegible]	[illegible]	[illegible]
4	25%	4	[illegible]	[illegible]	[illegible]
5	50%	4	[illegible]	[illegible]	[illegible]
6	100%	4	[illegible]	[illegible]	[illegible]

QC: IEC 12/22/[illegible]

D000065

QC.DOC 10/95

Minnow 7 Day Survival and Growth Test, Growth Data

Species: Pimephales promelas

Project No.: 74550 Sample No.: 242571 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-28 Test Dates: Start: 11/30/94 End: 12/7/94

Procedure:

1. Rinse minnows by replicate with D.I. water and transfer to preweighed weighing boats.
2. Dry in oven 3 hours at 105 °C. Transfer to dessicator.
3. Time in oven 1130 Time out of oven 1430
4. Weigh to nearest 0.01 mg.

Balance Calibration Check:

Balance Asset #: 00708 (use 20 mg weight)

Start: 19.989 / 19.992 Middle: 19.982 / 19.990 Finish: 19.984 / 20.000

Concentration Units %	Rep.	Initial Boat Wt.(mg)	Total dry Wt. (mg)	No. Minnows Weighed	Concentration Units %	Rep.	Initial Boat Wt.(mg)	Total dry Wt. (mg)	No. Minnows Weighed
LAB	A	20.76	26.84	15	50	A	18.17	23.00	13
CONTROL	B	20.53	26.04	14		B	17.97	23.59	13
	C	24.41	29.30	15		C	23.80	28.31	13
	D	25.13	30.88	14		D	21.82	26.01	14
5	A	24.62	27.97	11	100	A	25.68	26.94	4
	B	22.71	28.51	14		B	21.53	—	—
	C	21.72	27.24	15		C	21.50	22.30	2
	D	22.45	27.09	14		D	25.32	25.81	1
10	A	24.38	30.08	14		A			
	B	22.48	28.70	15		B			
	C	17.42	21.78	10		C			
	D	22.43	26.71	15		D			
20	A	20.66	25.73	15		A			
	B	18.27	22.09	11		B			
	C	18.42	23.83	15		C			
	D	20.85	26.11	15		D			

Comments:

Completed by: CJD Date: 12/7/94

(March '91)

D000066

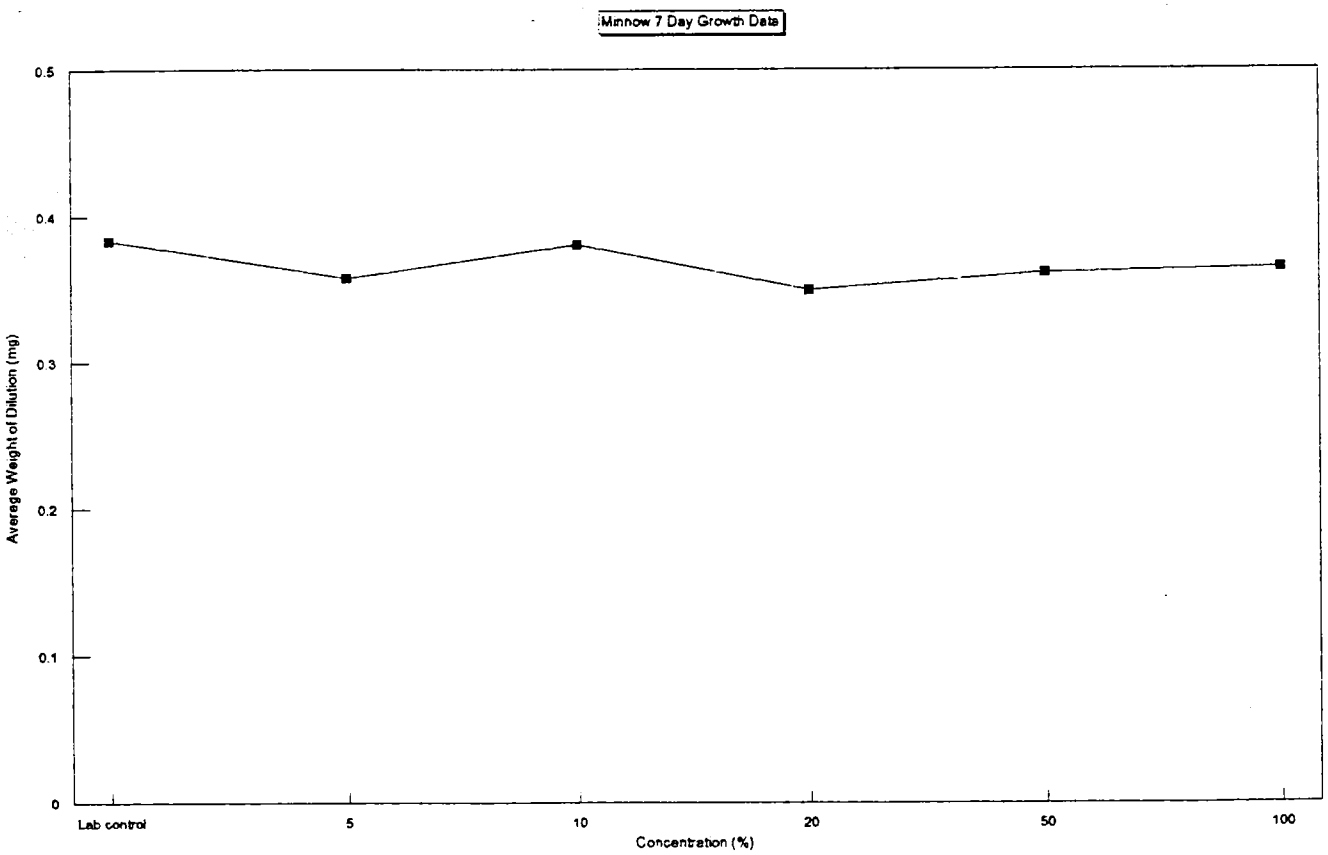
J

A.C. 12/16/95

Minnow 7 Day Survival and Growth Test, Growth Data

Project Number: 94550 ETR Number: 48100
Sample Number: 242571 Species: Pimephales promelas
Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403
Sample Description: ABB - 28 Test Date: 11/30/94 - 12/7/94

Concentration	Units	Rep	Initial Boat Wt (mg)	Total Dry Wt. (mg)	No. Minnows Weighed	Total - Initial Wt. (mg)	Average Dry Wt. (mg)	Average Wt. of Dilution (mg)
Lab control	%	A	20.76	26.84	15	6.08	0.41	
Lab control	%	B	20.53	26.04	14	5.51	0.39	
Lab control	%	C	24.41	29.30	15	4.89	0.33	
Lab control	%	D	25.13	30.88	14	5.75	0.41	0.38
5	%	A	24.62	27.97	11	3.35	0.30	
5	%	B	22.71	28.51	14	5.80	0.41	
5	%	C	21.72	27.24	15	5.52	0.37	
5	%	D	22.45	27.09	14	4.64	0.33	0.36
10	%	A	24.38	30.08	14	5.70	0.41	
10	%	B	22.48	28.70	15	6.22	0.41	
10	%	C	17.42	21.78	10	4.36	0.44	
10	%	D	22.43	26.71	15	4.28	0.29	0.38
20	%	A	20.66	25.73	15	5.07	0.34	
20	%	B	18.27	22.09	11	3.82	0.35	
20	%	C	18.42	23.83	15	5.41	0.36	
20	%	D	20.85	26.11	15	5.26	0.35	0.35
50	%	A	18.17	23.00	13	4.83	0.37	
50	%	B	17.97	23.59	13	5.62	0.43	
50	%	C	23.60	26.31	13	4.51	0.35	
50	%	D	21.82	26.01	14	4.19	0.30	0.36
100	%	A	25.68	26.94	4	1.26	0.32	
100	%	C	21.50	22.30	2	0.80	0.40	
100	%	D	25.32	25.81	1	0.49	0.49	0.36



QC: REC 12/19/94

D000067 6

QC: DRP 1/6/95

TITLE: [illegible]

LAB:

SUMMARY: NO TRANSFORMATION NUMBER OF GROUP [illegible]

GRP	IDENTIFICATION	REF	VALUE	TRANS VALUE
1	LAB CONTROL	1	0.4200	0.4200
1	LAB CONTROL	1	[illegible]	[illegible]
1	LAB CONTROL	1	[illegible]	[illegible]
1	LAB CONTROL	1	[illegible]	[illegible]
1	LAB CONTROL	4	[illegible] ✓	0.4500
2	FP	1	0.3100	0.3000
2	FP	1	0.4200	0.4200
2	FP	1	0.3700	[illegible]
2	FP	1	[illegible]	[illegible]
3	[illegible]	1	[illegible] ✓	[illegible]
3	[illegible]	1	[illegible]	[illegible]
3	[illegible]	1	0.4400	0.4400
3	[illegible]	4	0.2900 ✓	0.2900
4	[illegible]	1	[illegible]	[illegible]
4	[illegible]	1	[illegible]	[illegible]
4	[illegible]	1	[illegible]	[illegible]
4	[illegible]	4	[illegible] ✓	[illegible]
5	[illegible]	1	0.3700	0.3700
[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	[illegible]	1	[illegible]	[illegible]
[illegible]	[illegible]	1	[illegible] ✓	[illegible]

QC: IEC 12/22/94

D 000068 6

QC: DRP 1/6/95

[illegible]

[illegible]

D = 0.065

W = 0.961

Critical W (P = [illegible]) (n = [illegible]) = [illegible]
Critical W (P = [illegible]) (n = [illegible]) = [illegible]

Data PASS normality test at P=0.01 level. Continue analysis. ✓

ABB-08 (GROUNDWATER) [illegible] Nov [illegible]
File: abb08fnc Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 7.94

[illegible] Chi-square value = [illegible] (Crit = [illegible], df = [illegible])
[illegible] Chi-square value = [illegible] (Crit = [illegible], df = [illegible])

Data FAIL B1 [illegible] test at [illegible] level. [illegible] analysis. ✓

QC: IEC 12/22/94

D000069

QC: DRP 11/1/95

[illegible]

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	4	[illegible]	0.001	0.568
Within (Error)	15	[illegible]	[illegible]	
Total	19	[illegible]		

Critical F value = [illegible]
Since F [illegible] Ho: [illegible]

488-28 (GROW/CWATER) P. [illegible] GROWTH Nov 30-Dec 7
File: [illegible] Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 1 — Horizontal Treatments

GROUP	IDENTIFICATION	TRANSFORMED DATA	MEAN CALCULATED IN ORIGINAL DATA	[illegible]	[illegible]
1	LAB CONTROL	[illegible]	[illegible]		
2	[illegible]	[illegible]	[illegible]	[illegible]	
3	[illegible]	[illegible]	[illegible]	[illegible]	
4	[illegible]	[illegible]	[illegible]	[illegible]	
5	[illegible]	[illegible]	[illegible]	[illegible]	

Dunnett table value = [illegible] (1 Tailed Value, P=0.05, df=15,4)

488-28 (GROW/CWATER) P. [illegible] GROWTH Nov 30-Dec 7
File: [illegible] Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 1 — Horizontal Treatments

GROUP	IDENTIFICATION	NUM OF REPS	MINIMUM SIG DIFF IN ORIG. UNITS	% OF CONTROL	DIFFERENCE FROM CONTROL
1	LAB CONTROL	[illegible]			
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]		[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]			[illegible]	

QC: IEC 12/22/94

D 000070

QC: DRP 1/6/95

Raw Data Sheet
Toxicity Test Initial Chemistries

Project No.: 94550 Sample No.: 242571 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB - 28 Species: C. dubia / P. promelas

Test Description: modified acute/chronic

Units: % LAB Concentration: CONT	0 (12/30)	1 (12/1)	2 (12/2)	3 (12/3)	4 (12/4)	5 (12/5)	6 (12/6)	Remarks
pH	7.9	8.2	8.0	7.9	8.0	8.0	8.0	
DO (mg/L)	8.2	8.2	8.2	8.1	8.2	8.1	8.2	
Temp °C	25.4	25.0	25.5	25.5	25.4	25.3	25.5	
Cond (umho/cm)	270	265	270	265	270	270	270	

Comments:

Concentration: ~~5.2~~ 5%	0	1	2	3	4	5	6	Remarks
pH	7.9	7.9	7.9	8.0	8.0	7.9	8.0	
DO (mg/L)	8.2	8.3	8.2	8.1	8.2	8.0	8.2	
Temp °C	25.1	24.8	25.2	25.4	25.3	25.1	25.3	
Cond (umho/cm)	270	250	270	250	260	270	260	

Comments:

Concentration: ~~12.5~~ 10%	0	1	2	3	4	5	6	Remarks
pH	7.9	7.9	7.9	8.0	7.9	7.9	8.0	
DO (mg/L)	8.2	8.3	8.2	8.1	8.3	8.1	8.2	
Temp °C	25.1	24.7	25.1	25.3	25.0	25.0	25.2	
Cond (umho/cm)	260	260	260	260	260	260	255	

Comments:

Concentration: ~~25~~ 20%	0	1	2	3	4	5	6	Remarks
pH	7.8	7.9	7.8	7.9	7.9	7.9	8.0	
DO (mg/L)	8.2	8.3	8.2	8.1	8.2	8.0	8.2	
Temp °C	25.0	24.7	25.1	25.2	24.9	24.8	25.1	
Cond (umho/cm)	230	230	230	240	230	235	235	

Comments:

D000071

Raw Data Sheet

Toxicity Test Initial Chemistries

Project No.: 94550 Sample No.: 242571 ETR No.: 48100

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB-28 Species: C. dubia / P. promelas

Test Description: modified acute/chronic

Units: % Concentration: 50	0 (11/30 cmp)	1 (12/1 cmp)	2 (12/2 cmp)	3 (12/3 cso)	4 (12/4 cmp)	5 (12/5 cmp)	6 (12/6 cmp)	Remarks
pH	7.6	7.7	7.7	7.8	7.8	7.8	7.9	
DO (mg/L)	8.2	8.23 cmp	8.2	8.2	8.2	8.0	8.2	
Temp °C	25.0	24.7	25.2	25.3	25.0	25.0	25.2	
Cond (umho/cm)	1270	170	170	190	210	170	180	
	cmp							

Comments:

Concentration: 100	0	1	2	3	4	5	6	Remarks
pH	7.2	7.5	7.4	7.7	7.7	7.6	7.8	
DO (mg/L)	8.2	8.3	8.2	8.2	8.2	cmp 8.78	8.1	
Temp °C	25.2	25.3	25.8	25.8	25.2	25.5	25.5	
Cond (umho/cm)	55	60	60	90	100	70	80	

Comments:

Concentration:	0	1	2	3	4	5	6	Remarks
pH								
DO (mg/L)								
Temp °C								
Cond (umho/cm)								

Comments:

Concentration:	0	1	2	3	4	5	6	Remarks
pH								
DO (mg/L)								
Temp °C								
Cond (umho/cm)								

Comments:

Raw Data Sheet
Toxicity Test Final Chemistries

Project No.: 94550 Sample No.: 242571

ETR No.: 48100 Test Description: modif. acute/chronic surv. + growth

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB - 28 Species: P promelas

Initials/Date/Time:		12/1 CJD	12/2 CJD	12/3 [illegible]	12/4 [illegible]	12/5 [illegible]	12/6 DRP	12/7 CJD	
Units: % LAB Concentration: CONT	0	1	2	3	4	5	6	7	Remarks
pH	/	7.6	7.5	7.8	7.8	7.5	7.4	7.5	
DO (mg/L)	/	7.8	7.6	7.2	6.9	6.9	6.0	7.5	
Temp °C	/	24.9	25.0	24.9	24.9	25.5	25.3	25.0	
Conductivity (umhos/cm)	/	255	250	270	270	265	260	250	

Concentration: ~~6.2~~ 5% UND	0	1	2	3	4	5	6	7	Remarks
pH	/	7.6	7.5	7.5	7.7	7.5	7.3	7.5	
DO (mg/L)	/	7.6	7.2	7.1	6.9	7.2	5.6	7.4	
Temp °C	/	25.0	25.0	25.0	25.2	25.5	25.9	25.2	
Conductivity (umhos/cm)	/	260	260	265	270	240	270	255	

Concentration: ~~12.5~~ 10% UND	0	1	2	3	4	5	6	7	Remarks
pH	/	7.7	7.5	7.4	7.7	7.5	7.3	7.5	
DO (mg/L)	/	7.7	7.0	7.0	6.7	7.2	5.4	7.3	
Temp °C	/	24.7	25.0	25.2	25.2	25.6	25.4	25.1	
Conductivity (umhos/cm)	/	260	255	260	250	255	270	250	

Concentration: ~~25~~ 20% UND	0	1	2	3	4	5	6	7	Remarks
pH	/	7.7	7.5	7.4	7.6	7.5	7.3	7.5	
DO (mg/L)	/	7.7	7.0	6.9	6.8	7.0	5.2	7.3	
Temp °C	/	24.4	24.8	25.1	25.0	25.7	25.4	25.1	
Conductivity (umhos/cm)	/	240	240	250	240	240	250	235	

Comments:

REV: 7/1/92

D 000073

Raw Data Sheet
Toxicity Test Final Chemistries

Project No.: 94550 Sample No.: 242571

ETR No.: 48100 Test Description: modif. acute/chronic surv. + growth

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: ABB - 28 Species: P. promelas

Initials/Date/Time:		12/1 CJD	12/2 CJD	12/3 DAP	12/4 12/4	12/5 12/4 LMB	12/6 DAP	12/7 CJD	
Units: % Concentration: 50	0	1	2	3	4	5	6	7	Remarks
pH		7.6	7.3	7.4	7.3	7.4	7.2	7.4	
DO (mg/L)		7.7	6.7	6.3	6.6	6.9	5.0	7.3	
Temp °C		24.8	24.8	24.8	25.2	25.7	25.5	25.3	
Conductivity (umhos/cm)		180	185	190	170	200	190	185	

Concentration: 100	0	1	2	3	4	5	6	7	Remarks
pH		7.2	7.1	7.0	7.1	7.3	7.3	7.2	
DO (mg/L)		7.2	6.5	6.3	6.5	6.2	5.2	6.6	
Temp °C		24.9	24.9	24.8	25.0	25.9	25.3	25.4	
Conductivity (umhos/cm)		80	80	90	90	110	90	100	

Concentration:	0	1	2	3	4	5	6	7	Remarks
pH									
DO (mg/L)									
Temp °C									
Conductivity (umhos/cm)									

Concentration:	0	1	2	3	4	5	6	7	Remarks
pH									
DO (mg/L)									
Temp °C									
Conductivity (umhos/cm)									

Comments:

REV: 7/1/92

PO #27725

Rec'd 11/30 CJO
T = 18.5°C
pH = 7.3
DO = >20mg/L
Cond = 130

AQUATIC RESOURCES
SEBASTOPOL, CA.

2610 Meier Rd., Sebastopol, CA 95472
(707) 829-1194

ORGANISM INFORMATION

PECIES: Fatheads, P. promelas AGE: <24 HRS

REQUESTED _____ DATE SHIPPED 11-29 I.D.: KWB

H: _____ TEMPERATURE: 21 HARDNESS: ≥100 mg/1 $CaCO_3$

ALINITY (if applicable); _____ ppt.

Thank you for your order. If you have any questions please don't hesitate to call.

D 000075

APPENDIX E
Documentation of Soil Sample Preparations

APPENDIX E-1
Soil Preparation for Lettuce Seed Germination Tests

Soil Qualitative and Physical Characteristics

LETTUCE
INITIAL pH
+ SMC
PRIOR TO Hydration

Test ID Number: ETR 48092 **Sample Number:** See Below

Test Facility: 75 Green Mountain Dr., S. Burlington, VT

Sample Description/Client: Soil / ABB - ES **Test Species:** *Lactuca sativa / Eisenia foetida*

INITIAL
24 - Hr Soil Moisture Content (SMC %)

Field Sample Number	Lab Sample Number	Color	Consis-tency	pH	A Subsample Wt. (g)	B Initial Wt. (g)	C Dry Wt. (g)	(B-C/A)*~~100~~ SMC (%)
CF 3551	241912	dark brown	sandy	5.5	126.15	193.25	169.92	0.185
CF 3554	241913	dark brown	sandy	8.2	125.83	193.00	171.10	0.174
CF 3559	241914	dark brown	sandy	7.3	125.43	193.30	171.04	0.178
CF 35512	241915	very dark almost black	sandy	7.2	125.49	197.52	158.82	0.308
CF 35515	241916	dark brown to black	sandy	7.9	124.79	194.73	168.09	0.213
CF 5517	241917	dark brown	sandy	7.3	125.20	191.90	170.40	0.172
CF 35520	241918	dark brown	sandy/silt	8.3	125.02	201.87	183.41	0.148
CF 35522	241919	dark brown	sandy	5.9	125.24	196.07	171.68	0.145
CF 35524	241920	dark brown	sandy	6.1	126.20	193.64	143.33	DRP ~~0.400~~ 0.399

Analyst Initals / Date: DRP 11/22/94

SMC samples in oven @ 105C, Time in: ① 11/22 1345 - 1425 **Time out:** 11/23 1345 - 1425

SMC calculations by: DRP 11/23/94

① Not all subsamples in oven at the same time DRP 11/22

E000076

QC: DRP 1/6/95

LETTUCE
FINAL MOISTURE CONTENT & pH

Soil Qualitative and Physical Characteristics

Tes Number: ETR 48042 Sample Number: See Below

Test Facility: 75 Green Mountain Dr., S. Burlington, VT

Sample Description/Client: Soil / ABB - ES Test Species: *Lactuca sativa* / ~~*Eisenia foetida*~~

END OF TEST

24 - Hr Soil Moisture Content (SMC %)

Field Sample Number	Lab Sample Number	Color	Consis-tency	pH	A Subsample Wt. (g)	B Initial Wt. (g)	C Dry Wt. (g)	(B-C/A)*100 SMC (%)
CF3551	241912			5.1	38.87	39.85	32.92	0.178
CF3554	241913			8.1	33.01	33.99	30.70	0.10
CF3559	241914			7.3	30.07	31.04	28.51	0.084
CF3551~~4~~3	241915			7.6	35.39	36.26	27.23	0.255
CF3551~~5~~5	241916			8.0	33.82	34.78	28.67	0.181
CF3551~~7~~7	241917			7.0	34.23	35.21	29.72	0.160
CF3551~~8~~20	241918			8.2	41.44	42.42	34.25	0.197
CF3551~~9~~22	241919			5.5	32.24	33.24	26.14	0.22
CF3551~~0~~24	241920			5.9	27.93	28.91	20.10	0.315
—	100			7.0	32.01	32.98	16.43	0.517
—	101			5.5	35.69	36.66	33.73	0.082

Analyst Initals / Date: [illegible]

SMC samples in oven @ 105C, Time in: 2249 11/30 Time out: 1415 11/31/95

SMC calculations by: DRP 1/6/95

* Data scribed from project documentation form

E000077 DRP 1/6/95

Lettuce

1 jmw 1/6/95

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Cecil F. Sample No. / ETR No. 48042

Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/24/94 ~~1002~~ 2220	Removed all soil samples from locked refrigerator for preparation for lettuce seed germination test.	JMW
	Transferred 500g of soil sample (for each sample) into 7in x 8in Ziplock Bag. Soil samples were previously homogenized.	
	Removed ~~sil~~ soil aliquots w/ 100 mL glass beaker to transfer to Ziplock bags. JMW 11/20/94	
11/24/94 2325	Returned remaining samples in original containers to locked sample storage in refrigerator	JMW
11/25/94 0120	Completed WHC analysis. Transferred test soil aliquots in Ziplock Bags to locked refrigerator.	JMW
11/25/94 0820	Removed ziploc bags of soils from locked refrigerator to prepare for lettuce seed test.	JMW

E000078

LETTUCE

4
B JW 1/6/95

DOCUMENTATION FORM

CECIL FIELD SOILS

Project No. 94550 Client ABB - ES Sample No. _____ ETR No. 48042

Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.

WATER HOLDING CAPACITY DETERMINATION (WHC)

(A) Soil (B) Add (C) Funnel + (D) Initial wt. (E) Final

Sample #	Dry WT (g)	✓ 10 mL DI H_2O	wet filter weight (g)	(A+C) g	wt. (g)	WHC per sample	(E-D)
101 (Control)	10.4	✓	80.5	90.9	93.0	2.1 mL / 10.4g dry soil	
912	8.0	✓	80.7	88.7	91.6	2.9 mL / 8 g dry soil	
913	8.3	✓	80.8	89.1	92.0	2.9 mL / 8.3g dry soil	
914	8.7	✓	81.1	89.8	92.1	2.3 mL / 8.7g dry soil	
915 (pebble ~~rock~~ removed)	6.3	✓	81.1	87.4	90.3	2.9 mL / 6.3g dry soil	
916	7.9	✓	81.1	89.0	91.4	2.4 mL / 7.9g dry soil	
917	8.4	✓	80.7	89.1	91.5	2.4 mL / 8.4g dry soil	
918 (pebble removed)	8.6	✓	80.5	89.1	91.6	2.5 mL / 8.6g dry soil	
919	8.4	✓	81.0	89.4	92.7	3.3 mL / 8.4g dry soil	
920	6.4	✓	81.0	87.4	91.3	3.9 mL / 6.4g dry soil.	

WHC Drain Time Start: 2150, 11/29/94 Finish 0100, 11/25/94

Summary of Method: Used dried soil remaining from 2h SMC determination. Weighed dry soil then added 10 mL DI water to create a slurry. Weighed wetted filter paper + funnel. Added dry wt. of soil to filter + funnel wt (Initial wt.). Added soil slurry to funnel / filter. Allowed to drain 3 hours. Weighed filter / funnel / & dried soil (Final weight. WHC = Final - Initial = water weight per sample.

JWJ 11/29 & 11/25/95

F000070

LETTUCE

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES (Cecil F) Sample No. ____ ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time Sample #	WHC per 100g Sample (dry)	Description: Sample SMC (mL/100g)	Sample Size (wet weight)	mL water present in 500g wet sample	dry soil	To fully hydrate (100%)	mL water for 100% hydration	85% hydration (85% WHC)	Init.
101 (Control	20.2 mL	0	~~2293~~ (dry)	0	2997 ~~2293~~	605 ~~463~~ mL	605	515 ~~394~~ mL per 2293g dry soil.	Add to 500g wet soil
912	36.2 mL	18	500	90 (18 x 5)	410	36/100 = #/410 = 148 x 0.85 = 125		125 - 90 mL (present) = 35 mL	
913	34.9 mL	17	500	85 (17 x 5)	415	35/100 = #/415 = 145 x .85 = 123 -		123 - 85 = 38 mL	
914	26.4 mL	18	500	90	410	26/100 = #/410 = 107 x .85 = 91		91 - 90 = 1 mL	dry soil wt = 538
915	46.0 mL	31	500	155 (31 x 5)	345	46/100 = #/345 = 159 mL x .85 =		135 mL - 155 = 20 mL	
916	30.4 mL	21	500	105	395	30/100 = #/395 = 118 x 0.85		= 101 - 105 = -4 (Negative hydration)	
917	28.6 mL	17	500	85	415	29/100 = #/415 = 120 x .85 = 102		102 - 85 = 17 mL	
918	29.1 mL	15	500	75 (15 x 5)	425	29/100 = #/425 = 123 x 0.85 = 105		105 - 75 = 30 mL	
919	39.3 mL	20	500	100	400	39.3/100 = #/400 = 156 x .85 = 133		133 - 100 = 33 mL	
920	60.9 mL	40	500	200	300	61/100 = #/300 = 183 = 156		156 - 200 = Negative hydration	

11/25/94

LETTUCE

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Cecil R. Sample No. _____ ETR No. 46042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/25/94	Soil Hydration: 1250 - 1445	
	Added hydration water directly to 500 g soil sample in ziplock bag. Sealed bag & massaged to distribute water evenly through sample.	
	Measured out 100 g of hydrated soil to 15 cm petri dish bottoms & pressed soils gently w/ gloved hands (gloves pre-washed) to distribute soil evenly over the petridish bottom.	
	Placed petridish cover on.	JW
	~~Control~~ Cover Soil hydration:	
	Cover Soil = "Earthgro's Best" all purpose sand (Earthgro, Inc., Lebanon, CT 06249. Sieved sand through 16 mesh sieve to remove material >16 mesh then sieved through 20 mesh to remove material < 20 mesh. Control soil = fraction between 20 & 16 mesh grain size	
	Hydrated 2997 g of dry sand with 515 mL hydration water to achieve 85% hydration (85% WHC).	JW
	Artificial Control Soil = Sand passed through 20 mesh sieve	
	300 g sand sample hydrated w/ 52 g water.	
	Potting Soil Control = Simuplant all purpose potting soil 309 g soil hydrated w/ 100 g water - to visually assessed hydration level. Designated as Sample 100 A, B, C.	

E000081 JW 1/6/94

LETTUCE

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Cecil F. Sample No. / ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
Sample #	Calculated Water Vol to add to 500 g wet sample (as received)	
	Hydration water = Nanopure water added at 1250 - 1445 11/25/94	
101 (Control)	to 500 g soil as received	
	~~Homogenized~~	
912	35 mL Added to 500 g ~~wet~~ soil sample (as received)	Looks moist. Allowed to air dry ≈ 1 h
913	38 mL Added to 500 g soil sample (as received)	Looks OK
914	1 mL " " " " "	
915	Negative, 20 g. Allow to air dry to lose 20 g. Target final wt = 480 g	Removed 20 g water by ventilation
Cont. Bowl + soil 1770.3 - 20 ⇒ 1750	Transferred to Control Bowl in ventilation hood	
916	Negative, 4 g. Use as is.	Removed at 1751 g
917	17 mL Added to 500 g soil as received	
918	30 mL " " " " " "	
919	33 mL " " " " " "	
920	Negative 44 g - allow to air dry to lose 44 g. Target final wt = 456 g	
Cont. Bowl + soil = 1794.11 ⇒ 1750	Dried to wt of 1768	26 g

Transferred to Control Bowl in ventilation hood. Appears sufficiently moist. Further drying would result in soil too dry. water removed

E000082

LETTUCE

JW 1/6/95

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Cecil F. Sample No. / ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
	Butercrunch Lettuce seeds obtained from "The Crane Garden, Londonderry, VT 05148 Received on 27 November 1994.	
11/25/94	Sorted seeds under dissecting microscope to obtain seeds of similar size & discard damaged seeds (broken shells). Transferred 40 seeds to each of 33 1-oz cups.	
	1730-1945 Planted 40 seeds per petri dish using forceps to transfer & depress seeds below soil surface.	
	1945-2035 Covered all seeds in petri dishes & ~~test~~ soils w/ 90 g (hydrated) coarse sand.	
	2100 Transferred all petri dishes w/ soils & seeds to 1 gal labeled zip lock bags. Removed petridish covers, sealed bags w/ air space & placed in 23°C incubator without lighting.	JW
	Exposure initiation time = 2000, 11/25/94	

Date	Time	Temperature	~~Dark~~ Lighting	
11/25/94	2140	21.0°C	DARK (No lighting)	
		Increased temperature setting 2°C		JW
11/26	1100	24.0	None	DRP
11/27	1340	24.0	none	IRC
11/28	1600	—	Initiated lighting cycle.	

Note: lighting cycle runs from ≈ 4:00 p.m. until 8:00 a.m. (16h on) and "off" cycle runs from ≈ 8:00 a.m. to 4:00 p.m. for days 3, 4, & 5 of the test. 4.0 ft C. IRC

E000083

LETTUCE

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES (Cecil Field) Sample No. / ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
	MONITORING RECORD- continued	
	1994	
	DATE TIME TEMPERATURE (°C) LIGHTING (ft-c)	INIT
	11/28 1730 23.7°C 310	IRC
	11/29 0945 (24.0°C) → (dark cycle)	OSP
	11/29 1820 24.5°C 320	JW
	recorded positions of test chambers	
	11/30/94 0807 23.8°C 32.0	
	recorded positions of test chambers	JW
	OE40 - Confirmed lights all (dark cycle)	
	11/30/94 2050 23.1°C	JW
11/30/94	2000-2200	
	Completed germination counts	JW
	Petridish A Replicates:	

Sample No.	End of Test pH	Subsample Wt. (g)	Initial Wt. (g)	Soil+pan Dry wt. (g) (2)	SMC	
		Soil only	Soil+pan	Soil+pan		
912	5.1	38.87	39.85	32.92	~~0.710~~ 0.178	*
913	8.1	33.01	33.99	30.70	0.19	
914	7.3	30.07	31.04	28.51	0.084	
915	7.6	35.39	36.26	27.23	0.2155	
916	8.0	33.82	34.78	28.67	0.1181	
917	7.0	34.23 ~~35.39~~ (1)	35.21	29.72	0.1160	
918	8.2	41.44 ~~30.07~~	~~31.04~~ 42.42	34.25	0.1197	
919	5.8	32.24 ~~33.01~~	~~33.99~~ 33.24	26.14	0.220	
920	5.9	27.93 ~~38.89~~	~~37.85~~ 28.91	20.10	0.315	
100	7.0	32.01	32.98	16.43	0.5117	CC DRD 6/6/95
101	5.5	35.69	36.66	33.73	0.0182	
	JW 11/30/94	In oven 2T				
		2249, 11/30/94	104°C JW			

(1) Corrected wts. (wrote in wrong place initially) JW 11/30/94

(2) Dry weight at 14:15 WID

E 000001

APPENDIX E-2
Soil Preparation for Earthworm Survival Tests

Inchcape Testing Services
Aquatec Laboratories

Laboratory Locations
55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

ABB Environmental Services,Inc
2590 Executive Center
Circle East
Tallahassee, FL 32301

Attention : Mr. Denver Clark

Date : 12/28/94
ETR Number : 48042
Project No.: 94550
No. Samples: 10
Arrived : 11/22/94
P.O. Number: SE4-21-027

Job:8500.08

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater.
All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/	Parameter	Result
241912	CF3SS1:11/20/94 @1520(Soil)		
	IN847	TOC by Lloyd Kahn	3500 f
	IN623	Solids, Total	82.5 c
241913	CF3SS4:11/18/94 @1445(Soil)		
	IN847	TOC by Lloyd Kahn	2200 f
	IN623	Solids, Total	83.8 c
241914	CF3SS9:11/19/94 @0850(Soil)		
	IN847	TOC by Lloyd Kahn	6600 f
	IN623	Solids, Total	82.6 c
241915	CF3SS12:11/19/94 @1325(Soil)		
	IN847	TOC by Lloyd Kahn	19100 f
	IN623	Solids, Total	72.6 c
241916	CF3SS15:11/19/94 @1425(Soil)		
	IN847	TOC by Lloyd Kahn	5400 f
	IN623	Solids, Total	78.8 c
241917	CF3SS17:11/19/94 @1450(Soil)		
	IN847	TOC by Lloyd Kahn	4500 f
	IN623	Solids, Total	83.5 c

Comments/Notes

f = mg/Kg dry weight
c = %W/W as received

< Cont. Next Page >

Inchcape Testing Services
Aquatec Laboratories

Laboratory Locations
55 South Park Drive
Colchester, VT 05446

75 Green Mountain Drive
South Burlington, VT 05403

150 Herman Melville Boulevard
New Bedford, MA 02740

Analytical Report

ABB Environmental Services,Inc
2590 Executive Center
Circle East
Tallahassee, FL 32301

Attention : Mr. Denver Clark

Date : 12/28/94
ETR Number : 48042
Project No.: 94550
No. Samples: 10
Arrived : 11/22/94
P.O. Number: SE4-21-027

Job:8500.08

Standard analyses were performed in accordance with Methods for Analysis of Water and Wastes, EPA-600/4/79-020, Test Methods for Evaluating Solid Waste, SW-846, or Standard Methods for the Examination of Water and Wastewater. All results are in mg/l unless otherwise noted.

Lab No./ Method No.	Sample Description/ Parameter	Result
241918	CF3SS20:11/20/94 @0915(Soil)	
IN847	TOC by Lloyd Kahn	6900 f
IN623	Solids, Total	85.1 c
241919	CF3SS22:11/20/94 @1020(Soil)	
IN847	TOC by Lloyd Kahn	11400 f
IN623	Solids, Total	81.2 c
241920	CF3SS24:11/20/94 @1055(Soil)	
IN847	TOC by Lloyd Kahn	34000 f
IN623	Solids, Total	63.5 c

Comments/Notes

f = mg/Kg dry weight
c = %W/W as received

<- Last Page > Submitted By : R. Mason McAfee Aquatec Inc.

E000086

Soil Qualitative and Physical Characteristics

EARTHWORM & INITIAL Lettuce pH & SMC Prior to hydration

Test ID Number: ETR 48092 Sample Number: See Below

Test Facility: 75 Green Mountain Dr., S. Burlington, VT

Sample Description/Client: Soil / ABB - ES Test Species: *Lactuca sativa / Eisenia foetida*

INITIAL
24 - Hr Soil Moisture Content (SMC %)

Field Sample Number	Lab Sample Number	Color	Consis-tency	pH	A Subsample Wt. (g)	B Initial Wt. (g)	C Dry Wt. (g)	(B-C/A)*~~100~~ SMC (%)
CF 3551	241912	dark brown	sandy	5.5	126.15	193.25	169.92	0.185
CF 3554	241913	dark brown	sandy	8.2	125.83	193.00	171.10	0.174
CF 3559	241914	dark brown	sandy	7.3	125.43	193.30	171.04	0.178
CF 35512	241915	very dark almost black	sandy	7.2	125.49	197.52	158.82	0.308
CF 35515	241916	dark brown to black	sandy	7.9	124.79	194.73	168.09	0.213
C. 35517	241917	dark brown	sandy	7.3	125.20	191.90	170.40	0.172
CF 35520	241918	dark brown	sandy/silt	8.3	125.02	201.87	183.41	0.148
CF 35522	241919	dark brown	sandy	5.9	125.24	196.07	171.68	0.195
CF 35524	241920	dark brown	sandy	6.1	126.20	193.64	143.33	DRP ~~0.40~~ 0.399

Analyst Initals / Date: DRP 11/22/94

SMC samples in oven @ 105C, Time in: ① 11/22 1345 - 1425 Time out: 11/23 1345 - 1425

SMC calculations by: DRP 11/23/94

① Not all subsamples in oven at the same time. DRP 11/22

E000087

C

DRP 1/6/95

Soil Qualitative and Physical Characteristics

Earthworm FINAL pH/SMC (END OF TEST)

Test ID Number: ETR

Sample Number: See Below

Test Facility: 75 Green Mountain Dr., S. Burlington, VT

Sample Description/Client: Soil / ABB - ES

Test Species: ~~Lactuca sativa~~ / Eisenia foetida (JW) End of Test.

FINAL 24 - Hr Soil Moisture Content (SMC %)

Field Sample Number	Lab Sample Number	Color	Consis-tency	pH	A Subsample Wt. (g)	B Initial Wt. (g)	C Dry Wt. (g)	(B-C/A)*100 SMC (%)
—	100	BROWN	Fiberous	7.3	~~121.07~~ 114.03 DRP 12/22	~~201.72~~ 184.83	99.71	DRP 12/22 ~~35~~ 74.65
—	101	BROWN/GREY	SANDY	7.8	121.07	201.72	168.24	27.65
CF3 S51 ~~CF 35 54~~	912	BROWN	SANDY	6.3	125.58	193.00	167.18	20.56
CF 35 ~~S9~~ 54	913	Brown	Sandy	8.2	125.69	193.14	166.78	20.97
CF 35 ~~S12~~ 59	914	Brown	Sandy	7.6	124.95	192.67	167.20	20.38
CF 35 ~~S15~~ 512	915	DARKER, brown, black	Slightly sandy, soil-like	7.3	126.22	195.97	160.95	27.75
CF 35 ~~S17~~ 515	916	brown/black	Sandy	7.8	125.79	192.56	166.71	20.55
CF 35 ~~S20~~ 517	917	grey/brown	Slightly Sandy	7.5	125.24	192.42	166.39	20.78
CF35 ~~S22~~ 520	918	grey/brown	silty/ sandy	8.6	125.49	201.93	177.70	19.31
CF 35 ~~S24~~ 522	919	Black	Sandy	5.7	125.24	197.32	168.94	22.66
CF 35 ~~S1~~ 524	920	Black/ dark brown	Soil like	6.2	125.44	197.73	146.09	41.17

Analyst Initals / Date: DRP 12/22/94

SMC samples in oven @ 105C, Time in: (*)

Time out: (*) Not all subsamples to and out of oven at same time; see proj. doc. sheet. 12/21/94; DRP

SMC calculations by: DRP ; 12/22/94

DCC ACTION, DRP 1/95

E000088

DOCUMENTATION FORM

Project No. 94550 Client ABBES (Cecil F) Sample No. ✓ ETR No. 43042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/19/94 1500	Sieved ~2000 g of sand (0.3 mm mesh) for use in mixing control sediment.	
	Using 70% sieved sand, 20% Kaolin clay and 10% peat (Sphagnum), a total of 2000 grams of artificial soil was prepared and stored in capped mason jars.	DRP DRP
	Appropriate amount of calcium carbonate added to artificial soil according to protocol (85.8 g) to 2145 g control soil.	DRP
11/22 0800	Preparation of Worm Bedding for alternate control and pre-test initiation storage of earthworms. 4 lbs. "Magic Worm Bedding" (culture bedding) and one gallon nanopure water.	
0900	Hydration of Artificial Control Soil (ASC); to 40% of its dry weight. 85.8 g calcium carbonate + 2145 g of ASC = 2230.8 g total. + 892 ~~853~~ mL of Nanopure water → homogenized and added to test chambers.	
1030	Received shipment of earthworms. All organisms distributed to clean trays containing pre-hydrated worm bedding. Apparent Condition: good, healthy, though small. Temp (°C): 20.1. # containers: 10, each containing 100 worms. FED: ✓	DRP

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES (Cecil F) Sample No. ____ ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/22	Received shipment of soil samples 9 3gallon containers.	
	Sample labels checked against C-of-C and	
1200-	work sheets; No discrepancies.	
1340	Aquatec	
	Sample # — Homogenized (✓)	
	241912 ✓	
	241913 ✓	
	241914 ✓	
	241916 ✓	
	241917 ✓	
	241918 ✓	
	241919 ✓	
	241920 ✓	
	AQUATEC Sample # — physical characteristics (color/consistency)	
	241912 sandy, dark brown, quite dry	
	241913 sandy, dark brown quite dry	
	241914 sandy, dark brown slightly wet	
	241915 sandy, very dark (black), very wet	
	241916 sand, dark brown to black, wet	
	241917 sand, dark brown, slightly wet	
	241918 sand/silt, dark brown/black	
	241919 sandy, dark brown, slightly wet	
	241920 sandy, dark brown/black, wet	
		DRP

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Sample No. (ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/22 1000	SOIL pH Determination (Initial)	
	SOIL SAMPLE # — pH	
	100 — 7.4	
	101 — 7.3	
	sample 101 re-mixed vigorously; pH = 7.1	DRP
1700-1800	912 — 5.5	
	913 — 8.2	
	914 — 7.3	
	915 — 7.2	
	916 — 7.9	
	917 — 7.3	
	918 — 8.3	
	919 — 5.9	
	920 — 6.1	
		DRP
	all pH values gathered by using ~10g aliquot and 25 ml of NanoPure slurry	

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Sample No. ____ ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/22/94 1200-1500	① 2-h SOIL MOISTURE CONTENT ESTIMATION	

Smpl. #	(A) Sub-sample wt.	(B) Initial wt.	(over 2-h) time in	timeout	(C) Dry wt.
912	10.08	11.05	1200	1400	18.98
913	10.08	11.06	1203	1404	19.30
914	10.50	11.48	1206	1407	19.66
915	10.74	11.77	1210	1410	19.29
916	10.28	11.26	1210	1410	18.92
917	9.99	10.97	1213	1413	19.41
918	10.51	11.47	1215	1415	10.03
919	10.33	11.32	1216	1416	19.38
920	10.15	11.09	1217	1417	17.49

$$SMC = \frac{\text{initial wt.}^{(B)} - \text{Dry wt.}^{(C)}}{\text{subsample wt.}^{(A)}} \times 100$$

(C) ← (A) 11/22/94

Sample # Calculation of SMC for each sample:

(912) $\frac{11.05 - 8.98}{10.08} \times 100 = 20.51$

(913) $\frac{11.06 - 9.30}{10.08} \times 100 = 17.46$

① (914) $\frac{11.48 - 9.66}{10.50} \times 100 = 17.33$

(915) $\frac{11.77 - 9.29}{10.74} \times 100 = 23.09$

(916) $\frac{11.26 - 8.92}{10.28} \times 100 = 22.76$

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Sample No. (ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/22/94	2-h SOIL MOISTURE CONTENT ESTIMATION CONT'D	
(917)	$\frac{10.97 - 9.41}{9.99} \times 100 = 15.62$	
(918)	$\frac{11.47 - 10.03}{10.51} \times 100 = 13.70$	
(919)	$\frac{11.32 - 9.38}{10.33} \times 100 = 18.78$	
(920)	$\frac{11.09 - 7.49}{10.15} \times 100 = 35.47$	CALC.
		DRP 11/22

DOCUMENTATION FORM

Project No. 94550 Client ABB-CS Sample No. / ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/22 1510-	(2) Hydration of soil samples based on SMC (12-h drying) data, using 1000 g soil / sample, to hydrate to 40% SMC	
Sample # (912)	1000 X 0.21 = 790 g soil + 210 g H_2O	
	0.4 X 790 = 316 ; 316 − 210 = 106 ml H_2O to add. (~~0.35~~)	
(913)	1000 X 0.175 = 825 g soil + 175 g H_2O	
	0.4 X 825 = 330 ; 330 − 175 = 155 ml H_2O to add.	
(914)	1000 X 0.17 = 830 g soil + 170 g H_2O	
	0.4 x 830 = 332 ; 332 − 170 = 162 ml. H_2O to sample	
(915)	1000 X 0.231 = 769 soil + 231 H_2O	
	0.4 X 769 = 307.6 ; ~~231~~ 307.6 − 231 = 76.6 ml H_2O	
(916)	1000 X 0.2276 = 772.4 + 227.6 H_2O	
	0.4 X 772.4 = 308.96 ; ~~308~~ 309 − 228 = 81 ml H_2O	

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES Sample No. ____ ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description		Init.
11/22	(2) Soil Hydration calculations cont'd		
(917)	1000 X 0.156	337.6	
	844g soil + 156 g H_2O	156	
	0.4 X 844 = 337.6	(182) g H_2O to add.	
(918)	1000 X 0.137		
	863 X 137	345	
	863 X 0.4 = 345	137	
		(208)	
(919)	1000 X 18.78	325	
	812 X 188	188	
	812 X 0.4 = 325	(136.8)	
(920)	1000 X 0.36	256	
	640 + 360	-	add no H_2O
	640 X 0.4 = 256	sufficient hydration	
1800-1900	* Before hydrating soils, a visual assessment was made to determine whether or not the full amount of water need be added to each sample		
912	- full amount added, appears very wet; sample re-hydrated w/ 1/2 previous amount		
913	- 1/2 calculated amount added, appears appropriate		
914	- 1/2 DRP " " " " "		
915	- 1/2 water added, appears appropriate as T.S.		
916	- 1/2 water added " " "		
917	- 1/2 calculated amount added and appears appropriate		
918	- 1/2 " " " " "		
919	1/2 " " " " "		
920	+ 1/2 water added - already at 35%		DRP 11/22

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DOCUMENTATION FORM

Project No. 94550 Client ABB-ES (Cecil F.) Sample No. / ETR No. 48042

Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.

24 h SOIL MOISTURE CONTENT

#	(A) Sub-sample wt.	(B) Initial wt.	(OVEN - 24-h) (11/22-11/23) time in 11/22	time out	(C) Dry wt. after 24h
12	126.15	193.25	1345	1345	169.92
13	125.83	193.00	1347	1345	171.10
14	125.43	193.30	1349	1350	171.04
15	125.49	192.52	1351	1350	158.82
16	124.79	194.73	1352	1350	168.09
17	125.20	191.90	1403	1400	170.40
18	125.02	201.87	1416	1415	183.41
19	125.24	196.07	1420	1420	171.68
20	126.20	193.64	1423	1425	143.33

11/22/94
1900 - Soil samples distributed to respective pre-labelled wide mouth mason jars (200g soil / replicate) and allowed to sit for 24-h. DRP 11/22

11/30/94 Day 7 of Soil Toxicity test: Earthworm
0800- turn-out. Each replicate contents gently
1220 dumped into large glass Carolina Bowls, worms counted and documented and contents put back into respective test chambers (see monitoring form). DRP 11/30

12/7 Day 14 of Soil Toxicity test, Earthworm turnout. All earthworms in all samples appear healthy and normal; same technique used as above DRP 12/7/94

12/21 During earthworm depuration, waste products of organisms visible on filter paper. All organisms very active and appear normal (In all test replicates). DRP

E [illegible]

APPENDIX F
Documentation of Results of Soil Toxicity Tests

APPENDIX F-1
Lactuca sativa Soil Toxicity Tests

LETTUCE SEED GERMINATION AND GROWTH TEST

Species: *Lactuca sativa*

Cecil Field

Project No.: 94550 **Client:** ABB-ES **Sample No.:** See below **ETR No.:** 48042

Test Facility: Inchcape Testing Services - Aquatec Laboratories, Colchester, Vermont

Date / Time Test Started: 11/25/94 - 2000 **Date / Time of Germination Count:** 11/~~27~~ 30/94 2000 - 2200

Aquatec # / Field #

Sample Number	Replicate Number	Seeds Planted	Seeds Germinated (120h)	Proportion Germinated (120h)	
241912 CF3551	A	40	12	0.30	
	B	40	14	0.35	
	C	40	34	0.85	
241913 CF3554	A	40	30	0.75	
	B	40	18	0.45	
	C	40	30	0.75	
241914 CF3559	A	40	30	0.75	Some
	B	40	21	0.525	stems wilting -
	C	40	31	0.775	hydration appears ok.
					leaves ok. (not wilted)
241915 CF3562	A	40	29	0.725	
	B	40	30	0.75	
	C	40	34	0.85	
				1/6/95	
				CJD	

Analyst Initials/Date Jhw 11/30/94 Approval Initials/Date 12/27/94

LETTUCE SEED GERMINATION AND GROWTH TEST

Species: *Lactuca sativa*

Project No.: 94530 Client: Cecil Field ABB-ES Sample No.: See below ETR No.: 48042

Test Facility: Inchcape Testing Services - Aquatec Laboratories, Colchester, Vermont

Date / Time Test Started: 11/25/94 - 2000 Date / Time of Germination Count: 11/30/94 2000 - 2200

Aquatec # / Field # Sample Number	Replicate Number	Seeds Planted	Seeds Germinated (120h)	Proportion Germinated (120h)	
241916 CF35515	A	40	16	0.40	
	B	40	20	0.50	2 dead or dying
	C	40	31	0.775	1 dead
241917 CF35517	A	40	8	0.20	brown spots on leaves
	B	40	9	0.225	Some stems dead.
	C	40	10	0.25	
241918 CF35520	A	40	2	0.05	
	B	40	9	0.225	
	C	40	12	0.30	
241919 CF35522	A	40	3	0.075	
	B	40	10	0.25	
	JW ~~B~~ C	40	16	0.40	
				JW	
				1/6/95	
				CJD	

Analyst Initials / Date JW 11/30/94 Approval Initials / Date 12/27/94

LETTUCE SEED GERMINATION AND GROWTH TEST

Species: *Lactuca sativa*

Project No.: 94550 Client: Cecil Field ABB-ES Sample No.: See Below ETR No.: 43042

Test Facility: Inchcape Testing Services - Aquatec Laboratories, Colchester, Vermont

Date / Time Test Started: 11/25/94 - 2000 Date / Time of Germination Count: 11/30/94 2000 - 2200

Aquatec # / Field # Sample Number	Replicate Number	Seeds Planted	Seeds Germinated (120h)	Proportion Germinated (120h)	
241920 CF35524	A	40	39	0.975	
	B	40	38	0.95	
	C	40	35	0.875	
101	A	40	38	0.95	
	B	40	38	0.95	
	C	40	38	0.95	
100	A	40	35	0.875	
	B	40	34	0.85	
	C	40	20	0.50	
				JW 1/6/95 CJD	

Analyst Initials/Date JW 11/30/94 Approval Initials/Date 12/27/94

F000099

TITLE: CONTROL VS. 241912 (CF3SS1), LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	241912	1	0.3000	0.5796
2	241912	2	0.3500	0.6331
2	241912	3	0.8500	1.1731

QC: CJD 1/6/95

TROL VS. 241912 (CF3SS1), LETTUCE GERMINATION
rile: 4BBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.216

W = 0.846

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis. ✓

QC: IEC 1/8/95

TROL VS. 241912 (CF3SS1), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	0.454	0.454	8.420
Within (Error)	4	0.216	0.054	
Total	5	0.669		

Critical F value = 7.71 (0.05,1,4)
Since F > Critical F REJECT Ho: All equal

QC: IRC 1/8/95

F000102

TITLE: CONTROL VS. 241913 (CF3SS4), LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	241913	1	0.7500	1.0472
2	241913	2	0.4500	0.7353
2	241913	3	0.7500	1.0472

QC: CJO 1/6/95

CONTROL VS. 241913 (CF3SS4), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.065

W = 0.814

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis.

QC: RC 1/8/95

TROL VS. 241913 (CF3SS4), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	0.242	0.242	14.956
Within (Error)	4	0.065	0.016	
Total	5	0.307		

Critical F value = 7.71 (0.05,1,4)
Since F > Critical F REJECT Ho: All equal ✓

QC. IEC 1/3/95

TITLE: CONTROL VS. 241914 (CF3SS9), LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	241914	1	0.7500	1.0472
2	241914	2	0.5250	0.8104
2	241914	3	0.7750	1.0766

QC: CJO 1/6/95

CONTROL VS. 241914 (CF3SS9), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.043

W = 0.853

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis. ✓

ac: ice 1/8/95

CONTROL VS. 241914 (CF3SS9), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	0.202	0.202	18.996
Within (Error)	4	0.043	0.011	
Total	5	0.245		

Critical F value = 7.71 (0.05,1,4)
Since F > Critical F REJECT Ho: All equal

QC: IRC 1/8/15

F000108

TITLE: CONTROL VS. 241915 (CF3SS12), LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	241915	1	0.7250	1.0188
2	241915	2	0.7500	1.0472
2	241915	3	0.8500	1.1731

QC: CJO 1/6/95

CONTROL VS. 241915 (CF3SS12), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.013

W = 0.870

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis. ✓

QC: IRC 1/8/95

ROL VS. 241915 (CF3SS12), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	0.106	0.106	31.373
Within (Error)	4	0.013	0.003	
Total	5	0.119		

Critical F value = 7.71 (0.05,1,4)
Since F > Critical F REJECT Ho: All equal ✓

QC: IRC 1/8/95

TITLE: CONTROL VS. 241916 (CF3SS15), LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	241916	1	0.4000	0.6847
2	241916	2	0.5000	0.7854
2	241916	3	0.7750	1.0766

QC: CJD 1/6/95

CONTROL VS. 241916 (CF3SS15), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.083

W = 0.879

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis. ✓

QC: IRC 1/8/95

F000113

CONTROL VS. 241916 (CF3SS15), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	0.370	0.370	17.849
Within (Error)	4	0.083	0.021	
Total	5	0.452		

Critical F value = 7.71 (0.05,1,4)
Since F > Critical F REJECT Ho: All equal ✓

QC: IEC 1/3/95

TITLE: CONTROL VS. 241917 (CF3SS17), LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	241917	1	0.2000	0.4636
2	241917	2	0.2250	0.4942
2	241917	3	0.2500	0.5236

QC: CJD 1/6/95

CONTROL VS. 241917 (CF3SS17), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.002

W = 0.832

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis.

QC: IEC 1/8/95

F000110

CONTROL VS. 241917 (CF3SS17), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	1.087	1.087	2420.249
Within (Error)	4	0.002	0.000	
Total	5	1.089		

Critical F value = 7.71 (0.05,1,4)
Since F > Critical F REJECT Ho: All equal ✓

QC: IEC 1/8/95

F000117

TITLE: CONTROL VS. 241918 (CF3SS20), LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	241918	1	0.0500	0.2255
2	241918	2	0.2250	0.4942
2	241918	3	0.3000	0.5796

QC: CJD 1/6/95

CONTROL VS. 241918 (CF3SS2D), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.068

W = 0.878

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis. ✓

QC: IEC 1/8/95

CONTROL VS. 241918 (CF3SS20), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	1.248	1.248	73.091
Within (Error)	4	0.068	0.017	
Total	5	1.316		

Critical F value = 7.71 (0.05,1,4)
Since F > Critical F REJECT Ho: All equal ✓

QC: IRC 1/8/95

F000120

TITLE: CONTROL VS. 241919 (CF3SS22), LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	241920	1	0.0750	0.2774
2	241920	2	0.2500	0.5236
2	241920	3	0.4000	0.6847

QC: CJD 1/6/95

CONTROL VS. 241919 (CF3SS22), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.084

W = 0.866

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis. ✓

QC: IRC 1/8/95

CONTROL VS. 241919 (CF3SS22), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	1.084	1.084	51.515
Within (Error)	4	0.084	0.021	
Total	5	1.168		

Critical F value = 7.71 (0.05,1,4)
Since F > Critical F REJECT Ho: All equal ✓

QC: IEC 1/8/95

F000123

TITLE: CONTROL VS. 241920 (CF3SS24), LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	241920	1	0.9750	1.4120
2	241920	2	0.9500	1.3453
2	241920	3	0.8750	1.2094

QC: CJO 1/6/95

CONTROL VS. 241920 (CF3SS24), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.021

W = 0.877

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis. ✓

QC: IEC 1/8/95

F000125

CONTROL VS. 241920 (CF3SS24), LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	0.001	0.001	0.149
Within (Error)	4	0.021	0.005	
Total	5	0.022		

Critical F value = 7.71 (0.05,1,4)
Since F < Critical F FAIL TO REJECT Ho: All equal ✓

QC: IEC 1/8/95

F000120

TITLE: CONTROL VS. 100, LETTUCE GERMINATION
FILE: ABBLET
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 2

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	101 (CONTROL)	1	0.9500	1.3453
1	101 (CONTROL)	2	0.9500	1.3453
1	101 (CONTROL)	3	0.9500	1.3453
2	100	1	0.8750	1.2094
2	100	2	0.8500	1.1731
2	100	3	0.5000	0.7854

QC: CJO 1/6/95

CONTROL VS. 100, LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.110

W = 0.845

Critical W (P = 0.05) (n = 6) = 0.788
Critical W (P = 0.01) (n = 6) = 0.713

Data PASS normality test at P=0.01 level. Continue analysis. ✓

QC: IEC 1/8/95

F000128

CONTROL VS. 100, LETTUCE GERMINATION
File: ABBLET Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	1	0.126	0.126	4.546
Within (Error)	4	0.110	0.028	
Total	5	0.236		

Critical F value = 7.71 (0.05,1,4)
Since F < Critical F FAIL TO REJECT Ho: All equal ✓

QC: RC 1/8/95

THE COOK'S GARDEN

Seeds for the New Kitchen Garden

110 Lettuce Rec. 11/23/94

Buttercrunch

2 gr Origin: U.S.A.

PO Box 535 Londonderry, VT 05148

F000130

APPENDIX F-2
Eisenia foetida Soil Toxicity Tests

Bedding Control, 100

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field / Soil Sample Number 100

Test Facility: Inchcape Testing Services. Aquatec Laboratories. Colchester. Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
0	A	19.8	36						CJD 11/23/94
1	B	18.6	36	AB	AB	AB	AB	AB	DRP 11/24/94
2	C	21.5	54	AB	AB	AB	AB	AB	JW 11/25/94
3	D	20.9	68	AB	AB	AB	AB	AB	DRP 11/26/94
4	E	19.5	61	AB	AB	AB	AB	AB	IRC 11/27
5	A	20.3	35	AB	AB	AB	AB	AB	IRC 11/28
6	B	20.7	62	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.2	57	S=10 AB	S=10 AB	AB S=10	S=~~9~~ 10 AB	AB S=10	DRP 11/30
8	D	19.5	63	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.3	78	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.4	62	AB	AB	AB	AB	AB	DRP 12/3
11	B	20.1	57	AB	→				JW 12/4/94
12	C	20.8	38	AB	→				IRC 12/5/94
13	D	20.3	41	AB	→				DRP 12/6/94
14	E	20.3	59	S=10	S=10	S=10	S=~~9~~ 10	S=10	DRP 12/7
15	A	19.9	61	AB	AB	AB	AB	AB	DRP 12/8

Comments: DAY 7 (11/30/94) worm turn out. DP 11/30
0 CORRECTION - DRP

Review / Approval: JW Date: 12/27/94

F000131

Bedding Control: 100

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 100

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	20.4	63	AB	→	→	→	→	DRP 12/8/94
17	C	19.1	60	AB	→	→	→	→	DRP 12/10
18	D	19.8	60	AB	→	→	→	→	LMD 12/11
19	E	20.1	58	AB	→	→	→	→	IEC 12/12
20	A	20.0	60	AB	→	→	→	→	DRP 12/13
21	B	21.4	72	S=10	S=10	S=10	S=~~9~~ 10 DP	S=10	DRP 12/14
22	C	20.6	58	AB	→	→	→	→	DRP 12/15
23	D	20.2	49	AB	AB	→	→	→	DRP 12/16
24	E	20.4	52	AB	→	→	→	→	DRP 12/17
25	A	20.3	37	AB	→	→	→	→	IEC 12/18
26	B	19.7	62	AB	→	→	→	→	LMD 12/19
27	C	20.3	46	AB	→	→	→	→	DRP 12/20
28	D	21.1	47	S=10	S=10	S=10	S=10	S=10	CJD 12/21
29	Dry weights after depuration			2.57	2.63	2.21	3.24	3.02	CJD 12/22

Comments:

Review / Approval: [signature] Date: 12/27/94

F000132

Artificial Soil 101

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 101

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date 1994
0	A	19.9	36						CJO 11/23/94
1	B	18.5	36	AB	AB	AB	AB	AB	DRP 11/24
2	C	20.5	58	AB	AB	AB	AB	AB	JW 11/25/94
3	D	19.9	69	AB	AB	AB	AB	AB	DRP 11/26
4	E	19.4	51	AB	AB	AB	AB	AB	IEC 11/27
5	A	20.4	62	AB	AB	AB	AB	AB	IEC 11/28
6	B	20.5	65	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.4	66	S=10 AB	S=10 AB	S=10 AB	S=10 AB	S=10 AB	DRP 11/30
8	D	20.3	59	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.4	63	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.4	69	AB	AB	AB	AB	AB	DRP 12/3
11	B	19.5	78	AB	→				JW 12/4/94
12	C	20.8	39	AB	→				IEC 12/5/94
13	D	20.4	49	AB	→				DRP 12/6/94
14	E	20.4	61	S=10	S=10	S=10	S=10	S=10	DRP 12/7
15	A	19.9	54	AB	AB	AB	AB	AB	DRP 12/8

Comments:

@ 10:12/1/100 DRP 11/30

Review / Approval: JW Date: 12/27/94

6

F000133

Artificial Soil 101

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 101

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/99 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	20.1	61	AB					DRP 12/9
17	C	19.4	59	AB					DRP 12/10
18	D	19.4	60	AB					LMD 12/11
19	E	20.0	62	AB					IEC 12/12
20	A	20.3	60	AB					DRP 12/13
21	B	21.4	76	S=10	S=10	S=10	S=10	S=10	DRP 12/14
22	C	21.1	54	AB					DRP 12/15
23	D	20.4	52	AB					DRP 12/16
24	E	20.6	55	AB					DRP 12/17
25	A	20.4	64	AB					IEC 12/18
26	B ①	19.1	62	AB					LMD 12/19
27	C	20.2	70	AB					DRP 12/20
28	D	20.7	49	S=10	S=10	S=10	S=10	S=10	CJO 12/21
Dry weights upon depuration;				2.71	~~2.71~~ 2.63 DRP 2/22	3.19	2.47	2.86	DRP 12/22

Comments: ① Mold growing on top of soil

Review / Approval: [illegible] Date: 12/27/99

F000136

SITE CF3 SS1

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 912

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date 1994
0	A	19.9	36						CJO 11/23/94
1	B	20.4	36	AB	AB	AB	AB	AB	DRP 11/24
2	C	21.5	58	AB	AB	AB	AB	AB	JW 11/25/94
3	D	20.3	72	AB	AB	AB	AB	AB	DRP 11/26
4	E	20.2	64	AB	AB	AB	AB	AB	IRC 11/27
5	A	20.5	67	AB	AB	AB	AB	AB	IRC 11/28
6	B	20.5	66	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.6	63	S=10 (AB)	S=10, AB	S=10, AB	S=10, AB	S=10, AB	DRP 11/30
8	D	19.9	67	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.1	75	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.6	57	AB	AB	AB	AB	AB	DRP 12/3
11	B	20.6	71	AB	→	→	→	→	JW 12/4/94
12	C	21.0	45	AB	→	→	→	→	IRC 12/5/94
13	D	19.8	61	AB	→	→	→	→	DRP 12/6/94
14	E	19.9	54	S=10	S=10	S=10	S=10	S=10	DRP 12/7/94
15	A	20.3	55	AB	AB	AB	AB	AB	DRP 12/8

Comments:

Review / Approval: JW Date: 12/27/94

F000135

CF 3551

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 912

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	18.8	64	AB					DRP 12/9
17	C	19.4	69	AB					DRP 12/10
18	D	20.1	79	AB					LMD 12/11
19	E	20.4	75	AB					
20	A	20.5	61	AB					DRP 12/13
21	B	20.6	80	S=10	S=10	S=10	S=10	S=10	DRP 12/14
22	C	20.9	61	AB					DRP 12/15
23	D	20.5	48	AB					DRP 12/16
24	E	20.9	61	AB					DRP 12/17
25	A	20.7	58	AB					LCL 12/18
26	B	19.6	61	AB					LMD 12/19
27	C	20.2	72	AB					DRP 12/20
28	D	20.9	71	S=10	S=10	S=10	S=10	S=10	DRP/CJD 12/21
29	WEIGHTS UPON DEPURATION			3.30	2.54	~~2.13~~ 3.16 CJD	2.57	2.91	CJD 12/22

Comments:

Review / Approval: 12/27/94 Date: 12/27/94

F000136

SITE CF 3 SS4

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 913

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date 1994
0	A	19.8	36						CJO 11/23/94
1	B	18.4	36	AB	AB	AB	AB	AB	DRP 11/24
2	C	20.5	65	AB	AB	AB	AB	AB	JW 11/25/94
3	D	20.1	83	AB	AB	AB	AB	AB	DRP 11/26
4	E	19.7	53	AB	AB	AB	AB	AB	IRC 11/27
5	A	20.5	47	AB	AB	AB	AB	AB	IRC 11/28
6	B	20.6	66	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.4	67	S=10 AB	S=10 AB	S=10 AB	S=10 AB	S=10 AB	DRP 11/30
8	D	20.4	69	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.0	69	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.3	64	AB	AB	AB	AB	AB	DRP 12/3
11	B	20.8	69	AB	→	→	→	→	JW 12/4/94
12	C	21.1	~~306~~ IRC 12/5	AB	→	→	→	→	IRC 12/5/94
13	D	19.9	53	AB	→	→	→	→	DRP 12/6
14	E	20.3	64	S=10	S=9	S=10	S=9	S=10	DRP 12/7
15	A	20.2	59	AB	AB	AB	AB	AB	DRP 12/8

Comments:

Review / Approval: JW Date: 12/22/94

6

F000137

CF 3554

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 913

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	18.5	58	AB					DRP 12/9
17	C	19.6	66	AB					DRP 12/10
18	D	19.8	54	AB					[illegible] 12/11
19	E	20.4	71	AB					RRR 12/12
20	A	19.8	69	AB					DRP 12/13
21	B	21.4	72	S=10	S=9	S=10	S=9	S=10	DRP 12/14
22	C	21.1	63	AB					DRP 12/15
23	D	20.6	52	AB					DRP 12/16
24	E	20.3	58	AB					DRP 12/17
25	A	19.9	42	AB					RRR 12/18
26	B	19.9	60	AB					LMD 12/19
27	C	20.2	63	AB					DRP 12/20
28	D	21.0	60	S=10	S=10	S=10	S=10	S=9	[illegible] 12/21 DRP ①
Final Weights post-depuration;				2.83	2.40	2.39	2.52	2.01	DRP 12/22

Comments: ① Worms appear very active upon day 28. DRP 12/20

Review / Approval: [illegible] Date: 12/27/94

F000138

SITE CF 3559

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 914

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. / Date 1999
0	A	19.3	36						CJO 11/23/94
1	B	18.3	36	AB	AB	AB	AB	AB	DRP 11/24
2	C	21.4	70	AB	AB	AB	AB	AB	JW 11/25/94
3	D	20.7	78	AB	AB	AB	AB	AB	DRP 11/26
4	E	19.5	39	AB	AB	AB	AB	AB	IRC 11/27
5	A	20.4	65	AB	AB	AB	AB	AB	IRC 11/28
6	B	20.6	66	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.3	68	S=10, AB	S=10, AB	S=10, AB	S=10, AB	S=9, AB	DRP 11/30
8	D	20.4	59	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.5	70	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.2	72	AB	AB	AB	AB	AB	DRP 12/3
11	B	20.2	50	AB	→	→	→	→	JW 12/4/94
12	C	21.4	76	AB	→	→	→	→	IRC 12/5/94
13	D	19.9	68	AB	→	→	→	→	DRP 12/6
14	E	20.3	67	S=10	S=10	S=10	S=10	S=10	DRP 12/7
15	A	20.2	57	AB	AB	AB	AB	AB	DRP 12/8

Comments:

Review / Approval: JW Date: 12/27/94

F000139

CF 3559

EARTHWORM (*Eiscnia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 914

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	18.3	62	AB	→	→	→	→	DZP 12/9
17	C	19.6	64	AB	→	→	→	→	DZP 12/10
18	D	20.1	59	AB	→	→	→	→	LMD 12/11
19	E	19.8	40	AB	→	→	→	→	IRC 12/12
20	A	20.1	54	AB	→	→	→	→	DZP 12/13
21	B	21.9	71	S=10	S=10	S=10	S=10	S=10	DZP 12/14
22	C	20.6	75	AB	→	→	→	→	DZP 12/15
23	D	20.3	61	AB	→	→	→	→	DZP 12/16
24	E	21.0	68	AB	→	→	→	→	DZP 12/17
25	A	20.5	63	AB	→	→	→	→	IRC 12/18
26	B	19.8	61	AB	→	→	→	→	LMD 12/19
27	C	20.1	58	AB	→	→	→	→	DZP 12/20
28	D	21.0	60	S=10	S=10	S=10	S=10	S=9	CJO 12/21
29	WEIGHTS AFTER DEPURATION			3.35	2.54	3.12	~~2.27~~ 3.58 CJO 3.04	2.14	CJO 12/22

Comments:

Review / Approval: 12/27/94 Date: 12/27/94

F000140

SITE CF3SS12

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 915

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. / Date 1994
0	A	19.9	36						CJD 11/23/94
1	B	18.4	36	AB	AB	AB	AB	AB	DRP 11/24
2	C	21.1	68	AB	AB	AB	AB	AB	[illegible] 11/25/94
3	D	20.6	73	AB	AB	AB	AB	AB	DRP 11/26
4	E	19.8	41	AB	AB	AB	AB	AB	IRC 11/27
5	A	20.4	34	AB	AB	AB	AB	AB	IRC 11/28
6	B	20.7	64	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.5	62	S=10, AB	S=10, AB	S=10, AB	S=10, AB	S=10, AB	DRP 11/30
8	D	19.8	60	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.2	65	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.5	77	AB	AB	AB	AB	AB	DRP 12/3
11	B	20.0	51	AB	→				[illegible] 12/4/94
12	C	20.9	42	AB	→				IRC 12/5/94
13	D	20.2	63	AB	→				DRP 12/6
14	E	19.9	71	S=10	S=10	S=10	S=10	S=10	DRP 12/7
15	A	20.2	62.	AB	AB	AB	AB	AB	DRP 12/8

Comments:

Review / Approval: [illegible] Date: 12/21/94

F000141

CF 35512

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 915

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	18.6	54	AB	→	→	→	→	DRP 12/9
17	C	19.3	59	AB	→	→	→	→	DRP 12/10
18	D	19.7	60	AB	→	→	→	→	LMD 12/4
19	E	20.0	58	AB	→	→	→	→	RCR 12/12
20	A	20.4	62	AB	→	→	→	→	DRP 12/13
21	B	22.1	74	S=10	S=10	S=10	S=10	S=10	DRP 12/14
22	C	20.7	66	AB	→	→	→	→	DRP 12/15
23	D	20.5	53	AB	→	→	→	→	DRP 12/16
24	E	20.5	60	AB	→	→	→	→	DRP 12/16
25	A	20.3	36	AB	→	→	→	→	RCR 12/18
26	B	19.9	61	AB	→	→	→	→	LMD 12/19
27	C	20.4	62	AB	→	→	→	→	DRP 12/20
28	D	21.1	67	S=10	S=10	S=10	S=10	S=10	DRP 12/21 CJO 12/21
29	WEIGHT	AFTER	DEPURATION	2.47	2.62	3.18	2.95	2.83	CJO 12/22

Comments:

Review / Approval: 12/27/94 Date: 12/27/94

F000142

SITE CF35515

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 916

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. / Date 1994
0	A	19.8	36						CJD 11/23/94
1	B	18.5	36	AB	AB	AB	AB	AB	DRP 11/24
2	C	22.0	81	AB	AB	AB	AB	AB	[illegible] 11/24/94
3	D	20.7	83	AB	AB	AB	AB	AB	DRP 11/26
4	E	20.2	42	AB	AB	AB	AB	AB	IRC 11/27
5	A	20.3	55	AB	AB	AB	AB	AB	IRC 11/28
6	B	20.6	66	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.3	65	S=10, AB	S=10, AB	S=10, AB	S=10, AB	S=10, AB	DRP 11/30
8	D	20.4	61	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.3	72	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.6	71	AB	AB	AB	AB	AB	DRP 12/3
11	B	20.7	63	AB	→				[illegible] 12/4/94
12	C	21.5	77	AB					IRC 12/5/94
13	D	20.3	74	AB					DRP 12/6
14	E	20.0	64	S=10	S=10	S=10	S=10	S=10	DRP 12/7
15	A	20.1	55	AB	AB	AB	AB	AB	DRP 12/8

Comments: Light readings taken near top/outside of covered test chambers.

Review / Approval: [illegible] Date: 12/27/94

F00014

CF 35515

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client AGB-ES Sample Description Cecil Field Sample Number 916

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	18.5	60	AB	→	→	→	→	DRP 12/9
17	C	19.8	61	AB	→	→	→	→	DRP 12/10
18	D	20.0	67	AB	→	→	→	→	LMD 12/11
19	E	19.9	63	AB	→	→	→	→	IEC 12/12
20	A	20.8	64	AB	→	→	→	→	DRP 12/13
21	B	22.4	75	S=10	S=10	S=10	S=10	S=10	DRP 12/14
22	C	20.8	72	AB	→	→	→	→	DRP 12/15
23	D	20	53	AB	→	→	→	→	DRP 12/16
24	E	20.2	63	AB	→	→	→	→	DRP 12/17
25	A	20.4	54	AB	→	→	→	→	IEC 12/18
26	B	19.4	67	AB	→	→	→	→	LMD 12/19
27	C	20.3	58	AB	→	→	→	→	DRP 12/20
28	D	20.0	53	S=10	S=10	S=10	S=10	S=10	DRP 12/21 CJO 12/21
29	weight	con deprat	ion:	3.32	2.36	2.78	2.91	2.71	DRP 12/22

Comments:

Review / Approval: JW Date: 12/27/94

F000111

SITE CF 35517

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 917

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. / Date 1994
0	A	19.8	36						CJD 11/23/94
1	B	18.3	36	AB	AB	AB	AB	AB	DRP 11/24
2	C	21.2	77	AB	AB	AB	AB	AB	JWW 11/25/94
3	D	20.4	79	AB	AB	AB	AB	AB	DRP 11/26
4	E	20.2	50	AB	AB	AB	AB	AB	IRC 11/27
5	A	20.7	67	AB	AB	AB	AB	AB	IRC 11/28
6	B	20.4	69	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.4	66	S=10 AB	S=10 AB	S=10 AB	S=10 AB	S=10 AB	DRP 11/30
8	D	20.0	63	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.2	60	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.0	77	AB	AB	AB	AB	AB	DRP 12/3
11	B	20.3	80	AB	→	→	→	→	JWW 12/4/94
12	C	21.2	40	AB	→	→	→	→	IRC 12/5/94
13	D	20.4	49	AB	→	→	→	→	DRP 12/6
14	E	20.3	59	S=10	S=10	S=10	S=10	S=10	DRP 12/7
15	A	20.2	60	AB	AB	AB	AB	AB	DRP 12/8

Comments:

Review / Approval: JWW Date: 12/27/94

CF3 5517

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 917

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	18.6	54	AB					DRP 12/9
17	C	19.6	63	AB					DRP 12/10
18	D	20.0	74	AB					LMD 12/11
19	E	20.1	67	AB					RLR 12/12
20	A	20.1	66	AB					DRP 12/13
21	B	22.3	74	S=10	S=10	S=10	S=10	S=10	DRP 12/14
22	C	20.6	66	AB					DRP 12/15
23	D	20.6	55	AB					DRP 12/16
24	E	20.5	67	AB					DRP 12/17
25	A	20.6	68	AB					RLR 12/18
26	B	19.8	60	AB					LMD 12/19
27	C	20.1	50	AB					DRP 12/20
28	D	19.7	54	S=10	S=10	S=10	S=10	S=10	DRP 12/21 CJO 12/21
29	WEIGHTS AFTER DEPURATION			2.51	2.66	2.59	3.06	2.42	CJO 12/22

Comments:

Review / Approval: 12/27/94 Date: 12/27/94

6

F000146

SITE CF3SS20

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 918

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. / Date 1994
0	A	19.4	36						CJD 11/23/94
1	B	18.4	36	AB	AB	AB	AB	AB	DAP 11/24
2	C	21.0	69	AB	AB	AB	AB	AB	[illegible] 11/25/94
3	D	20.6	76	AB	AB	AB	AB	AB	DAP 11/26
4	E	20.2	48	AB	AB	AB	AB	AB	IRC 11/27
5	A	20.3	69	AB	AB	AB	AB	AB	IRC 11/28
6	B	20.6	65	AB	AB	AB	AB	AB	DAP 11/29
7	C	20.1	60	S=10, AB	S=10, AB	S=10, AB	S=10, AB	S=10, AB	DAP 11/30
8	D	20.3	58	AB	AB	AB	AB	AB	DAP 12/1
9	E	20.2	55	AB	AB	AB	AB	AB	DAP 12/2
10	A	20.1	64	AB	AB	AB	AB	AB	DAP 12/3
11	B	20.2	73	AB	→	→	→	→	[illegible] 12/4/94
12	C	21.2	42	AB	→	→	→	→	IRC 12/5/94
13	D	20.4	70	AB	→	→	→	→	DAP 12/6
14	E	20.0	68	S=10	S=10	S=10	S=10	S=10	DAP 12/7
15	A	20.2	53	AB	→	→	→	→	DAP 12/8

Comments:

Review / Approval: [illegible] Date: 12/27/94

F000146

CF 355 20

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 918

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	18.7	65	AB	→	→	→	→	DRP 12/19
17	C	19.7	68	AB	→	→	→	→	DRP 12/20
18	D	19.9	62	AB	→	→	→	→	LWD 12/21
19	E	20.3	70	AB	→	→	→	→	IEC 12/22
20	A	20.4	68	AB	→	→	→	→	DRP 12/23
21	B	22.03	73	S=10	S=10	S=10	S=10	S=10	DRP 12/24
22	C	21.1	67	AB	→	→	→	→	DRP 12/25
23	D	20.4	50	AB	→	→	→	→	DRP 12/26
24	E	20.1	53	AB	→	→	→	→	DRP 12/27
25	A	20.2	69	AB	→	→	→	→	IEC 12/28
26	B	19.9	70	AB	→	→	→	→	LWD 12/29
27	C	20.2	61	AB	→	→	→	→	DRP 12/30
28	D	19.8	68	S=10	S=10	S=10	S=10	S=9	CJO/DRP 12/31
29	weight w/on 24-h deviation			2.50	2.38	2.63	2.91	1.83	DRP 12/22

Comments:

Review / Approval: [signature] Date: 12/23/94

F000148

SITE CF3SS22

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 919

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date 1994
0	A	19.7	36						CJD 11/23/94
1	B	18.3	36	AB	AB	AB	AB	AB	DRP 11/24
2	C	20.6	79	AB	AB	AB	AB	AB	[illegible] 11/25/94
3	D	20.7	75	AB	AB	AB	AB	AB	DRP 11/26
4	E	20.1	40	AB	AB	AB	AB	AB	IRC 11/27
5	A	20.7	74	AB	AB	AB	AB	AB	IRC 11/28
6	B	20.6	67	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.3	69	S=10, AB	S=10, AB	S=10, AB	S=10, AB	S=10, AB	DRP 11/30
8	D	20.2	77	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.3	79	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.1	64	AB	AB	AB	AB	AB	DRP 12/3
11	B	20.6	64	AB	→	→	→	→	[illegible] 12/4/94
12	C	21.0	37	AB	→	→	→	→	IRC 12/5/94
13	D	19.9	42	AB	→	→	→	→	DRP 12/6
14	E	20.3	61	S=10	S=10	S=10	S=10	S=10	DRP 12/7
15	A	20.2	65	AB	→	→	→	→	DRP 12/8

Comments: Replicates of Sample 919 appear moist [illegible] 12/9/94

Review / Approval: [illegible] Date: 12/27/94

F0001A0

CF 3 SS 22

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 919

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	19.0	51	AB					DRP 12/9
17	C	19.6	50	AB					DRP 12/10
18	D	12.0	80	AB					LMD 12/11
19	E	20.1	62	AB					RC 12/12
20	A	20.7	60	AB					DRP 12/13
21	B	22.1	71	S=10	S=10	S=10	S=10	S=10	DRP 12/14
22	C	20.8	65	AB					DRP 12/15
23	D	20.3	50	AB					DRP 12/16
24	E	19.9	44	AB					DRP 12/17
25	A	20.6	58	AD					RC 12/18
26	B	20.0	71	AB					LMD 12/19
27	C	20.2	46	AB					DRP 12/20
28	D	19.6	49	S=10	S=10	S=10	S=10	S=10	CJO/DRP 12/21
29	WEIGHT UPON DEPURATION			2.36	2.45	3.03	2.29	2.40	CJO 12/22

Comments:

Review / Approval: [signature] Date: 12/27/94

F0001-0

SITE CF35S24

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 920

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. / Date 1994
0	A	20.0	36						CJD 11/23/94
1	B	18.2	36	AB	AB	AB	AB	AB	DRP 11/24
2	C	21.0	73	AB	AB	AB	AB	AB	[illegible] 11/25/94
3	D	20.3	70	AB	AB	AB	AB	AB	DRP 11/26
4	E	19.6	39	AB	AB	AB	AB	AB	RBC 11/27
5	A	20.6	54	AB	AB	AB	AB	AB	RBC 11/28
6	B	20.6	59	AB	AB	AB	AB	AB	DRP 11/29
7	C	20.3	60	S=10, AB	S=10, AB	S=10, AB	S=10, AB	S=10, AB	DRP 11/30
8	D	20.1	62	AB	AB	AB	AB	AB	DRP 12/1
9	E	20.3	66	AB	AB	AB	AB	AB	DRP 12/2
10	A	20.3	66	AB	AB	AB	AB	AB	DRP 12/3
11	B	20.3	56	AB	→	→	→	→	[illegible] 12/4/94
12	C	21.3	42	AB	→	→	→	→	RBC 12/5/94
13	D	20.5	61	AB	→	→	→	→	DRP 12/6
14	E	20.5	66	S=10	S=10	S=10	S=10	S=10	DRP 12/7
15	A	20.3	65	AB	→	→	→	→	DRP 12/8

Comments:

Review / Approval: [illegible] Date: 12/29/94

F 0001-1

CF 3 5524

EARTHWORM (*Eisenia foetida*) SOIL TOXICITY TEST
TEST MONITORING DATA

Client ABB-ES Sample Description Cecil Field Sample Number 920

Test Facility: Inchcape Testing Services, Aquatec Laboratories, Colchester, Vermont

Organism exposure initiation date: 11/23/94 Number of worms per replicate: 10

Organism monitoring codes: AB = all burrowed; #OS = # on surface; #D = # dead
#S = # surviving

Day	Test Repl.	Temp. °C	Lighting (ft.-c)	Organism Observations / Replicate A	B	C	D	E	Init. /Date
16	B	18.3	62	AB					DRP 12/9
17	C	19.8	60	AB					DRP 12/10
18	D	19.9	74	AB					LWD 12/11
19	E	20.3	72	AB					EC 12/12
20	A	20.8	60	AB					DRP 12/13
21	B	22.5	74	S=10	S=10	S=10	S=10	S=10	DRP 12/14
22	C	20.9	69	AB					DRP 12/15
23	D	20.4	49	AB					DRP 12/16
24	E	20.3	66	AB					DRP 12/17
25	A	20.4	55	AB					RE 12/18
26	B	20.3	74	AB					LWD 12/19
27	C	20.2	55	AB					DRP 12/20
28	D	19.7	63	S=10	S=10	S=10	S=10	S=10	DRP/CJD 12/21
29	WEIGHT	AFTER O	EXPURGATION	2.45	2.68	2.28	2.45	~~1.69~~ 2.57	CJD 12/22

Comments:

Review / Approval: 12/27/94 Date: 12/27/94

F000152

DOCUMENTATION FORM

ABB ES

Project No. 94550 Client Cecil F. Sample No. / ETR No. 48042

Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
11/23, 1600	DAY 0: 20 representative worms	
	Initial weight = 7.63 g	
	Seperated into two batches of 10 and transferred to 250 ml amber glass bottles and frozen.	DRP
1400-1615.	Began counting out batches of 10 worms for each replicate test chambers. Worms added to each replicate randomly for a total of 550 worms.	DRP
12/16/94 1630	All test replicates fed ~0.3 g of "Magic" Worm Food (DAY 23).	DRP
12/21/94;	FINAL 24-h MOISTURE CONTENT	

SAMPLE #	time in oven (105°C) (12/21)	time out (105°C) (12/22)	INIT.
100	1050	1100	DRP
101	1035	1040	
912	1110	1115	
913	1130	1130	
914	1140	1150	
915	1430	1430	DRP
916	1450	1450	
917	1500	1500	
918	1515	1515	
919	1530	1530	
920	1540		

One Subsample taken from Replicate D of all samples, then transferred to oven (105°C) for 24-h drying period. DRP

F000153

9 DW 1/5/95

DOCUMENTATION FORM

Project No. 94550 Client ABB-ES (Cecil F) Sample No. / ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.

24-h SOIL MOISTURE CONTENT

Vial #	(A) Sub-sample wt.	(B) Initial wt.	(OVEN - 24-h) (11/22-11/23) time in 11/22	time out	(C) DRY wt. after 24-h
912	126.15	193.25	1345	1345	169.92
913	125.83	193.00	1347	1345	171.10
914	125.43	193.30	1349	1350	171.04
915	125.49	192.52	1351	1350	158.82
916	124.79	194.73	1352	1350	168.09
917	125.20	191.90	1403	1400	170.40
918	125.02	201.87	1416	1415	183.41
919	125.24	196.07	1420	1420	171.68
920	126.20	193.64	1423	1425	143.33

11/22/94
1900 - Soil samples distributed to respective pre-labelled wide mouth mason jars (200g soil / replicate) and allowed to sit for 24-h. DRP 11/22

11/30/94 Day 7 of Soil Toxicity test. Earthworm
0800- turn-out. Each replicate contents gently
1220 dumped into large glass Carolina Bowls, worms counted and documented and contents put back into respective test chambers (see monitoring form). DRP 11/30

12/7 Day 14 of Soil Toxicity test, Earthworm turnout. All earthworms in all samples appear healthy and normal; same technique used as above. DRP 12/7/94

12/21 During earthworm depuration, waste products of organisms visible on filter paper. All organisms very active and appear normal (In all test replicates). DRP

DOCUMENTATION FORM

Project No. 94550 Client ABB - 25 Sample No. ✓ ETR No. 48042
Test Facility Inchcape Testing Services Aquatec Laboratories, Colchester, VT

Date/Time	Description	Init.
12/22 1000-1200,	WORMS WEIGHED BY REPLICATE AND TRANSFERRED TO VIALS. ALL VIALS PLACED IN FREEZER FOR STORAGE AT 1600 12/22.	
1400-1600		CJD

F 000157

Earthworm Depuration

1.) Measure final temperature

2.) Final pH - one replicate.

10 g soil + 25 mL Nanopure water.
Mix slurry 5 min.; measure.

3.) Transfer worms by replicate to tray or Carolina bowl & extract from soil.

4.) Transfer worms by replicate to bowl containing Nanopure water. Rinse to remove attached soil.

5.) Transfer worms by replicate to paper towel to remove excess moisture.

6.) Transfer worms by replicate to tared pan, record total wet weight.

7.) Record no. surviving on monitoring sheet. Record general observations regarding condition.

8.) Transfer worms to petri dish w/ moist filter paper. Label sample no./replicate.

9.) Store in dark at 20°C (Approx 20°C).

12/21/94

F000156

te	11/21/94
me	12:27:40
ge	1

PACKING LIST

FROM: CAROLINA BIOLOGICAL SUPPLY COMPANY
2700 YORK ROAD
BURLINGTON, NC 27215-3398

Tel: 910-584-0381
Fax: 910-584-3399

TO: 10000000

JOHN W WILLIAMS
1645 MAIN ST
FAIRFAX VT 05454

SHIP TO: 4467 JOHN WILLIAMS

AQUATECH LABORATORIES
55 SOUTH PARK DR

COLCHESTER VT 05446

t 3767

ote No.	Customer Purchase Order No.	Requested Delivery Date	Ship Date	Ship Method	Our Order No.	Pick List No.
	CASH SALE	0/00/00	11/21/94	FEP	104328	11

e	Ordered	Shipped	B/O	Catalog No.	Description	Unit	Price	Extension
	1	1		L399B	MAGIC WORM FOOD	EACH		
	10	10		L409	REDWORMS	EACH		
					O:MUST BE HEALTHY SPECIMENS PACK WORMS LOOSELY NOT ALL IN ONE CONTAINER PLEASE SEND ADULTS MUST BE AT LEAST 2 MONTHS TELE#(802)655-1203			

FEDERAL EXPRESS

(O: IS AN ORDER COMMENT)

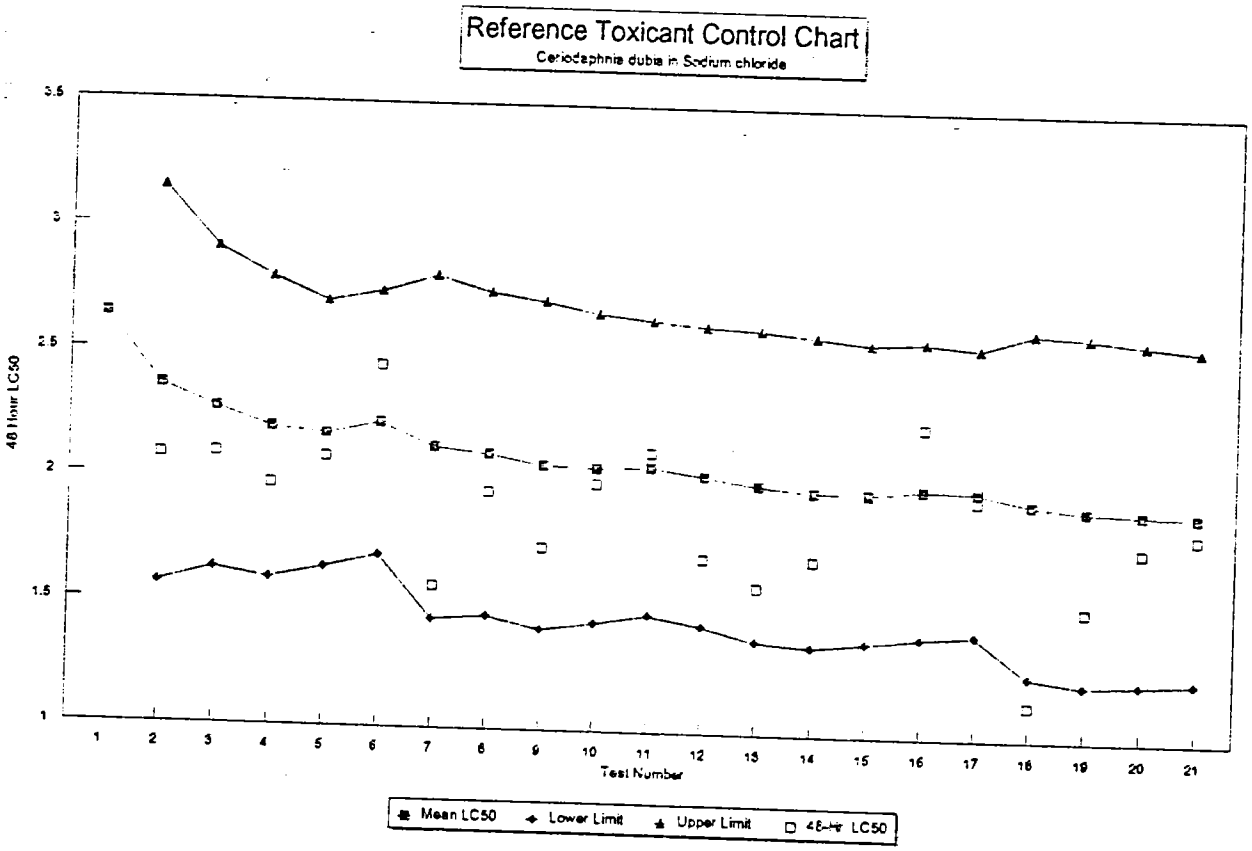
F 000157

APPENDIX G
Quality Assurance, Results of Standard Reference Toxicant Tests

Reference Control Toxicant Chart

Species: Ceriodaphnia dubia Toxicant: Sodium Chloride Units: g/L

TEST NUMBER	TEST DATE	ORGANISM AGI (DAYS)	48-Hr. LC50	Mean LC50	SD	2SD	Lower Limit Plot Val.	Calculated Upper Limit	Calculated Lower Limit
1	07/06/93	1	2.640	2.640	ERR	ERR			
2	08/29/93	1	2.080	2.360	0.396	0.792	1.568	3.152	1.568
3	08/29/93	1	2.090	2.270	0.320	0.641	1.629	2.911	1.629
4	08/29/93	1	1.970	2.195	0.302	0.603	1.592	2.798	1.592
5	08/29/93	1	2.060	2.172	0.266	0.532	1.640	2.704	1.640
6	09/13/93	1	2.450	2.216	0.264	0.528	1.691	2.746	1.691
7	10/12/93	1	1.570	2.126	0.344	0.687	1.439	2.813	1.439
8	11/21/93	1	1.950	2.104	0.324	0.648	1.456	2.752	1.456
9	12/21/93	1	1.730	2.062	0.328	0.655	1.407	2.718	1.407
10	01/06/94	1	1.990	2.055	0.310	0.620	1.435	2.675	1.435
11	02/12/94	1	2.120	2.061	0.295	0.589	1.472	2.650	1.472
12	03/10/94	1	1.700	2.031	0.300	0.599	1.432	2.630	1.432
13	04/20/94	1	1.590	1.997	0.312	0.624	1.373	2.621	1.373
14	05/16/94	1	1.700	1.976	0.310	0.620	1.356	2.596	1.356
15	06/07/94	1	1.970	1.975	0.299	0.597	1.378	2.573	1.378
16	07/12/94	1	2.24	1.992	0.296	0.592	1.400	2.564	1.400
17	08/09/94	1	1.95	1.989	0.287	0.574	1.416	2.563	1.416
18	09/09/94	1	1.14	1.942	0.343	0.686	1.257	2.628	1.257
19	10/18/94	1	1.52	1.920	0.347	0.694	1.226	2.614	1.226
20	11/17/94	1	1.76	1.912	0.340	0.679	1.233	2.591	1.233
21	12/06/94	1	1.82	1.908	0.332	0.663	1.245	2.571	1.245



QC. IEC 12/12/94

G000158

[illegible]

[illegible]
[illegible] 1978.
[illegible] METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.
[illegible] 714-719.
[illegible] 1978.

DATA: [illegible] TEST NUMBER: 84902 DURATION: 48 HOURS
CHEMICAL: [illegible] CHLORIDE (AI) SPECIES: Ceriodaphnia dubia

RAW DATA:

CONCENTRATION g/L	1.00	1.50	1.80	2.50	3.00
NUMBER EXPOSED:	10	10	10	10	10
MORTALITIES:	0	1	5	10	10

SPEARMAN-KARBER TOL 0.002

SPEARMAN-KARBER ESTIMATE (LC50): 1.93
95% LOWER CONFIDENCE: 1.71
95% UPPER CONFIDENCE: 1.94

QC: IEC 12/8/94

G000150

Toxicity Test Biological Monitoring

Project No.: 94902 Sample No.: — ETR No.: —

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Species: Ceriodaphnia dubia Test Description: 48h non-renewal RT

Sample Description: NaCl in MHW

Date/Time Started: 12/6, 1500 RC Date/Time Completed: 12/8, 1530

No. Organisms per Chamber: 5 (2 reps) Organism Source/Age: Aquatec ≤ 24h

Test Chamber/Volume: 300/250 mL Aeration (Y/N): N Food (Y/N): N

initiated - w - 11/29A neon cell .0800 12/6

Test Day: 0		Test Day: 1			Test Day: 2		
Feed Times: /		Feed Times: /			Feed Times: /		
Food Batch:		Food Batch:			Food Batch:		
g/L Treatment (Units)	Replicate	No. Alive	No. * Dead	Behavior **	No. Alive	No. * Dead	Behavior **
LAB CONTROL	A	5	0		5	0	
	B	5	0		5	0	
1.0	A	5	0		5	0	
	B	5	0		5	0	
1.5	A	5	0		5	0	
	B	5	0		5	0	
2.0	A	5	0	S	1	4	
	B	5	0	"	1	4	
2.5	A	2	3	S	0	5	
	B	0	5		0	5	
3.0	A	0	5		0	5	
	B	0	5		0	5	
Initials / Date / Time:		RC 12/7 1655			RC 12/8 1530		

No. Dead = Cumulative Dead

* Behavior: N = normal E = erratic swimming S = sluggish I = immobile M = missing

Comments:

(1/10/91)

G000160

Raw Data Sheet

Toxicity Test Chemistries

Project No.: 94902 Sample No.: —

ETR No.: — Test Description: RT - 48h non-renewa

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: NaCl in MHW Species: C. dubia

Initials/Date/Time:	12/6 12e	12/7 12e	12/8 12e
Units: g/L LAB Concentration: CONT	0	1	2
pH	8.0	/	8.0
DO (mg/L)	8.0	/	8.3
Temp °C	25.2	25.3	24.8
Conductivity (umhos/cm)	280	—	—

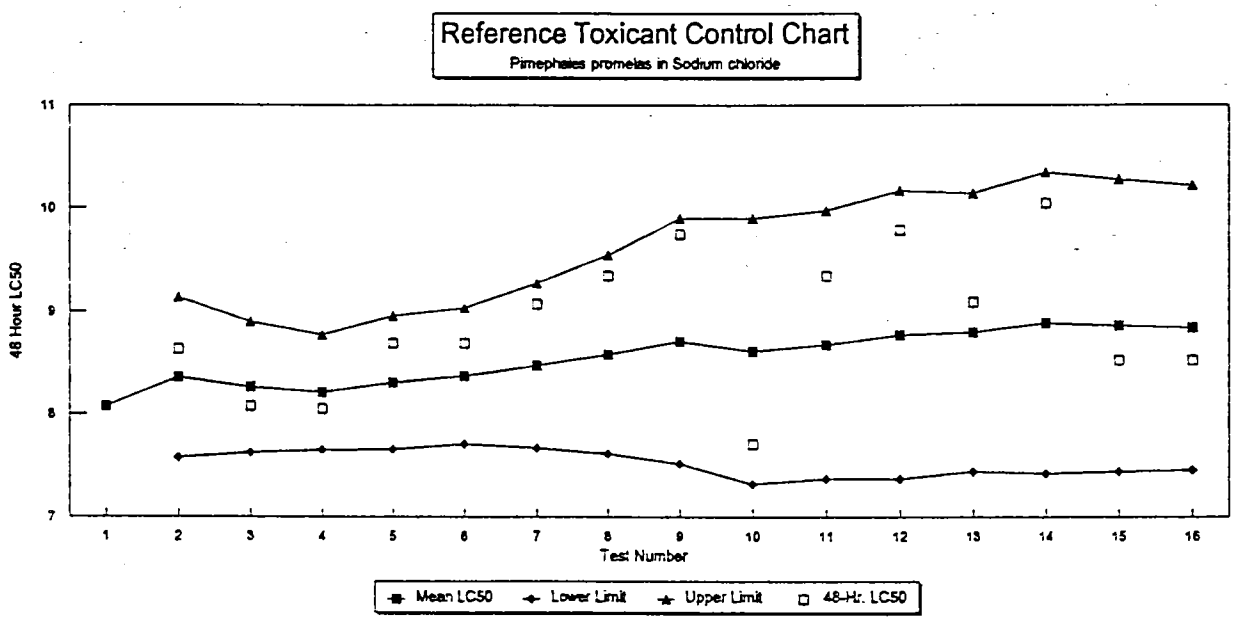
g/L	(3.0)	(3.0)	(2.5)
Concentration: *	0	1	2
pH	7.8	/	8.0
DO (mg/L)	8.3	/	8.2
Temp °C	24.6	25.3	24.8
Conductivity (umhos/cm)	6000	—	—

* highest surviving concentration.

Reference Control Toxicant Chart

Species: Pimephales promelas Toxicant: Sodium Chloride Units: g/L

TEST NUMBER	TEST DATE	ORGANISM AG (DAYS)	48-Hr. LC50	Mean LC50	SD	2SD	Lower Limit Plot Val.	Calculated Upper Limit	Calculated Lower Limit
1	11/24/93	2	8.080	8.080	ERR	ERR			
2	11/24/93	2	8.630	8.355	0.389	0.778	7.577	9.133	7.577
3	11/24/93	2	8.080	8.263	0.318	0.635	7.628	8.898	7.628
4	11/24/93	2	8.050	8.210	0.280	0.561	7.649	8.771	7.649
5	12/04/93	3	8.690	8.306	0.324	0.648	7.658	8.954	7.658
6	01/14/94	2	8.690	8.370	0.330	0.659	7.711	9.029	7.711
7	02/12/94		9.070	8.470	0.401	0.801	7.669	9.271	7.669
8	03/09/94	2	9.340	8.579	0.482	0.964	7.615	9.542	7.615
9	04/20/94	2	9.750	8.709	0.596	1.193	7.516	9.902	7.516
10	06/15/94	2	7.710	8.609	0.645	1.290	7.319	9.899	7.319
11	07/12/94	2	9.34	8.675	0.650	1.301	7.375	9.976	7.375
12	08/16/94	1	9.79	8.768	0.699	1.397	7.371	10.165	7.371
13	09/08/94	2	9.09	8.793	0.675	1.349	7.444	10.142	7.444
14	10/18/94	1	10.05	8.883	0.730	1.460	7.423	10.343	7.423
15	11/16/94	1	8.52	8.859	0.710	1.420	7.439	10.278	7.439
16	12/07/94	1	8.52	8.838	0.691	1.382	7.456	10.219	7.456



QC: IEC 12/13/94

G000102

Toxicity Test Biological Monitoring

Project No.: 94902 Sample No.: — ETR No.: —

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

..ies: Pimephales promelas Test Description: 48h non-renewal RT

Sample Description: NaCl in MHW

Date/Time Started: 12/7, 1640 RC Date/Time Completed: 12/9 1625 CJD AR

No. Organisms per Chamber: 5 (2 reps) Organism Source/Age: hatch 12/5 (2 old)

Test Chamber/Volume: 600/200 mL Aeration (Y/N): N Food (Y/N): N

Test Day: 0		Test Day: 1			Test Day: 2		
Feed Times: /		Feed Times: /			Feed Times: /		
Food Batch:		Food Batch:			Food Batch:		
3/L Treatment (Units)	Replicate	No. Alive	No. * Dead	Behavior **	No. Alive	No. * Dead	Behavior **
LAB CONTROL	A	5	0		5	0	
	B	5	0		5	0	
6.0	A	5	0		5	0	
	B	5	0		5	0	
8.0	A	5	0		3	2	
	B	5	0		5	0	
9.0	A	4	1	S/I	2	3	
	B	3	2	"	2	3	
10.0	A	2	3	I	0	5	
	B	1	4	"	0	5	
12.0	A	0	5		0	5	
	B	0	5		0	5	

Initials / Date / Time: RC 12/8, 1540 CJD 12/9 1625

* No. Dead = Cumulative Dead

** Behavior: N = normal E = erratic swimming S = sluggish I = immobile M = missing

Comments:

(1/10/91)

G000163

TRIMMED SPEARMAN-KARBER METHOD. MONTANA STATE UNIV

FOR REFERENCE, CITE:
HAMILTON, M.A., R.C. RUSSO, AND R.V. THURSTON, 1977.
TRIMMED SPEARMAN-KARBER METHOD FOR ESTIMATING MEDIAN
LETHAL CONCENTRATIONS IN TOXICITY BIOASSAYS.
ENVIRON. SCI. TECHNOL. 11(7): 714-719;
CORRECTION 12(4):417 (1978).

DATE: Dec 7 TEST NUMBER: 94902 DURATION: 48 HOURS
CHEMICAL: SODIUM CHLORIDE (RT) SPECIES: Pimephales promelas

RAW DATA:

CONCENTRATION(g/L)	6.00	8.00	9.00	10.00	12.00
NUMBER EXPOSED:	10	10	10	10	10
MORTALITIES:	0	2	5	10	10
SPEARMAN-KARBER TRIM:		0.00%			

SPEARMAN-KARBER ESTIMATES: LC50: 8.52
95% LOWER CONFIDENCE: 8.01
95% UPPER CONFIDENCE: 9.06

QC: IEC 12/13/94

G000164

Raw Data Sheet

Toxicity Test Chemistries

Sheet ___ of ___

Project No.: 94902 Sample No.: —

ETR No.: — Test Description: 48h non-renewal RT.

Test Facility: Aquatec, Inc., 75 Green Mountain Dr., SO. Burlington, VT 05403

Sample Description: NaCl in MHW Species: P. promelas

Initials/Date/Time:	12/7 12e	12/8 12e	12/9 CSD
Units: g/L LAB Concentration: CONT	0	1	2
pH	8.0	/	7.8
DO (mg/L)	8.0	/	7.7
Temp °C	25.2	25.0	25.3
Conductivity (umhos/cm)	270	—	260

g/L	(12.0)	(12.0)	(8.0)
Concentration: *	0	1	2
pH	7.8	/	7.8
DO (mg/L)	8.4	/	7.6
Temp °C	24.6	25.2	25.2
Conductivity (umhos/cm)	18000	—	12,000

* highest surviving concentration

6

G000107

APPENDIX H
Copy of ABB Environmental Services
Scope of Services for Subcontract SE4-21-027

SECTION C - SCOPE OF SERVICES

C.1 INTRODUCTION

Contractor requires Subcontractor to perform toxicity testing of soil and groundwater samples from a hazardous waste site at Naval Air Station Cecil Field, Jacksonville, Florida. The results of the toxicity testing will be used to support the assessment of ecological risks at the waste sites and remedial decision making.

C.2 SCOPE OF SERVICES

C.2.1 Soil Toxicity Testing

Subcontractor will complete toxicity testing of ten soil samples with a 30-day earthworm (*Eisenia foetida*) survival test (USEPA, 1989a) and a 120 hour lettuce seed germ (*Sativa latuca*) germination test (USEPA, 1989a). Testing will be completed with 100% of the soil samples with no dilution. Soils may be amended as necessary to ensure survival of the earthworms.

At the termination of the earthworm testing Subcontractor will retain the surviving earthworms for each sample, freeze and store them. Contractor will inform Subcontractor as to which samples to ship to a separate laboratory for chemical analyses.

C.2.2 Groundwater Toxicity Testing

Groundwater samples from two monitoring wells at Site 3 will be submitted to Subcontractor for toxicity testing according to EPA protocol for the water flea (*Ceriodaphnia dubia*) 7-day Survival and Reproduction Test (EPA Method 1002.0, USEPA, 1989b) and fathead minnow (*Pimephales promelas*) 7-day Larval Survival and Growth Test (EPA Method 1000.0, USEPA, 1989b). Testing, statistical analyses of results and reporting will be completed according to the standard EPA protocol with a dilution series (USEPA, 1989b). Contractor will be responsible for collection and transportation of the samples to the laboratory.

C.3 DELIVERABLES

Subcontractor will provide a draft report that at a minimum follows the recommendations of the EPA methodology. The report will be delivered to Contractor within thirty days of completion of the testing.

Subcontractor will documentation of completion of the testing summarizing the source, culture and maintenance of test organisms, test procedures, handling and storage of samples, and acceptability criteria for the test results.

C.4 TECHNICAL REFERENCES

U.S. Environmental Protection Agency (USEPA), 1989.
"Protocols for Short Term Toxicity Screening of Hazardous Waste Sites"; Environmental Research Laboratory, Corvallis, Oregon; EPA/600/3-88/029; February, 1989.

U.S. Environmental Protection Agency (USEPA), 1989.
"Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", Second Edition, Environmental Monitoring Systems Laboratory, Cincinnati, OH, March, EPA/600/4-89/001.

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