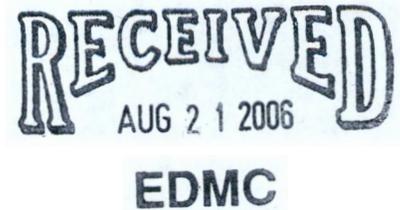


**SAF-RC-051**  
**100 & 300 Area Component of the**  
**RCBRA - Incremental Soil Sampling**  
**FINAL DATA PACKAGE**

**COMPLETE COPY OF DATA PACKAGE TO:**

Jill Thomson	H0-23	<u>KW 7/31/06</u> INITIAL/DATE
Jackie Queen	H0-23	<u>KW 7/31/06</u> INITIAL/DATE
Jeanette Duncan	H9-02	<u>KW 7/31/06</u> INITIAL/DATE



**COMMENTS:**

**SDG F1705      SAF-RC-051**

Rad only    X Chem only    Rad & Chem  
              X Complete            Partial

**Waste Site: Saddle Mountain**



ELR Consulting, Inc.

PROJECT MANAGEMENT, ENGINEERING, & TECHNICAL SERVICES

July 20, 2006



Ms. Joan Kessner  
Subcontract Technical Representative  
Washington Closure Hanford LLC  
3070 George Washington Way  
Richland, WA 99354

Dear Ms. Kessner:

ACUTE SCREENING BIOASSAYS – AMENDED BLUEGRASS REPORTS  
CONTRACT NUMBER 0000X-SC-G0553

Enclosed are amended Bluegrass reports for the following Sample Delivery Groups:

- BG1542-01 thru 09 – Report amended July 18, 2006
- BG1542-01A, -02A, -03A and -08A and BG1566-01 thru 05 –  
Report amended July 19, 2006
- BG1575-01 thru 11 – Report amended July 19, 2006
- ✓ • BG1589-01 thru 09 – Report amended July 19, 2006

An electronic copy of this information is provided for your convenience.

Should you have any questions, please feel free to call me at (509) 531-8774.

Sincerely yours,

Emmett L. Richards  
President

Enclosures

RC-051  
F1705

Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford

E, statistically significant difference from lab control by use of Equal Variance t Two-Sample Test

ns indicates a non statistically significant result; <sup>s</sup>, indicates statistically significant at alpha (p) = 0.05; --, indicates no statistical test performed.

Lab ID:	Sample Number:	Bluegrass 14 day Germination Endpoint (%)	Significantly different compared to Lab Control?	Bluegrass Average Stem Height (mm)	Significantly different compared to Lab Control?	Bluegrass Average Root Length (mm)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Wet) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Dry) (mg)	Significantly different compared to Lab Control?
Tests initiated on May 11, 2006																			
Laboratory Control		84	--	80.3	--	93.1	--	31.9	--	5.25	--	45.4	--	1.76	--	77.3	--	7.01	--
BG1589-01	J11JT0	96	ns	69.6	E <sup>s</sup>	57.5	E <sup>s</sup>	18.0	E <sup>s</sup>	3.63	E <sup>s</sup>	14.2	E <sup>s</sup>	1.21	ns	32.3	E <sup>s</sup>	4.84	E <sup>s</sup>
BG1589-02	J11JV8	88	ns	72.1	E <sup>s</sup>	62.2	E <sup>s</sup>	18.1	E <sup>s</sup>	3.29	E <sup>s</sup>	14.7	E <sup>s</sup>	0.79	E <sup>s</sup>	32.8	E <sup>s</sup>	4.08	E <sup>s</sup>
BG1589-03	J11JY2	84	ns	65.7	E <sup>s</sup>	60.7	E <sup>s</sup>	16.1	E <sup>s</sup>	2.87	E <sup>s</sup>	13.6	E <sup>s</sup>	1.26	ns	29.7	E <sup>s</sup>	4.12	E <sup>s</sup>
BG1589-04	J11JW4	92	ns	88.6	ns	71.0	E <sup>s</sup>	27.5	ns	4.37	ns	24.1	E <sup>s</sup>	1.10	E <sup>s</sup>	51.6	ns	5.48	ns
BG1589-05	J11K46	76	ns	77.0	ns	73.8	ns	30.6	ns	4.46	ns	35.0	ns	1.55	ns	65.7	ns	6.02	ns
BG1589-06	J11K73	88	ns	78.5	ns	69.3	E <sup>s</sup>	24.0	ns	4.22	ns	19.5	E <sup>s</sup>	1.06	E <sup>s</sup>	43.5	E <sup>s</sup>	5.27	ns
BG1589-07	J11K67	100	ns	70.2	E <sup>s</sup>	70.3	E <sup>s</sup>	23.2	E <sup>s</sup>	4.32	ns	25.8	E <sup>s</sup>	1.23	ns	49.0	E <sup>s</sup>	5.55	ns
BG1589-08	J11K55	88	ns	82.2	ns	75.5	E <sup>s</sup>	32.7	ns	5.47	ns	29.6	ns	1.33	ns	62.3	ns	6.80	ns
BG1589-09	J11KC5	88	ns	69.5	ns	67.3	E <sup>s</sup>	22.0	ns	3.71	ns	28.5	ns	1.09	ns	50.5	ns	4.80	ns

**BIOASSAY REPORT**  
**CHRONIC SCREENING BIOASSAYS**  
**Conducted May 11 through June 14, 2006**

**Report Amended July 19, 2006**

Prepared for

**ELR CONSULTING, INC.**  
**WASHINGTON CLOSURE HANFORD**

Prepared by

**CH2M HILL**  
**2300 NW Walnut Boulevard**  
**Corvallis, Oregon 97330**

July 20, 2006  
Lab I.D. Nos. BG1589-01 thru 09  
SDG Number BG1589

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## INTRODUCTION

CH2M HILL conducted chronic screening bioassay tests using the Sandberg bluegrass (*Poa sandbergii*) on soil samples provided by the ELR Consulting for Washington Closure Hanford, Richland, Washington. The tests were conducted from May 11 through June 14, 2006.

Following recommendations of an additional QA review, the statistical analysis for shoot height and root length presented in the original report (July 12, 2006) were recalculated. Subsequently, this document presents the amended results and serves as the final report.

## METHODS AND MATERIALS

### TEST METHODS

The chronic test methods were performed according to: *Standard Guide for Conducting Terrestrial Plant Toxicity Tests*, ASTM E 1963-02 (2002).

### TEST ORGANISMS

The seeds used were obtained from Native Grass Seeds, Cornville, Arizona. All test conditions were maintained during planting, germination, and growth phases of the test as prescribed by the ASTM protocol.

### CONTROL SOIL

The control soil used in the tests was artificial soil comprised of 70 grade silica sand (70 percent by weight), kaolin clay (20 percent), and peat moss (10 percent). Calcium carbonate (0.4 percent of total weight) was added to adjust soil pH to  $7.0 \pm 0.5$ .

### HYDRATION WATER

The water used to initially hydrate the control and test soils was Milli-Q equivalent de-ionized water. After initial hydration, all test chambers were watered with half strength Hoagland's solution on an every other day basis. All hydration was accomplished via subirrigation.

### TEST CONCENTRATIONS

The concentration tested in the bluegrass tests was 100 percent test sample with control soil alone for the control. For the bluegrass tests, 50 seeds per concentration were used with five replicate test chambers per concentration and 10 seeds planted per chamber. Following

germination, test chambers were thinned as needed to a maximum five seedlings per replicate.

### SAMPLE COLLECTION

The soil samples were collected from April 26 through May 9, 2006. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

### SAMPLE CROSS-REFERENCE TABLE

Table 1 provides a cross-reference of the Client ID numbers, sampling dates, sampling locations, Bluegrass test sample identification (SDG) numbers, and Analytical Lab SDG numbers.

Table 1 Sample Cross-Reference				
Client ID	Sample Date	Sample Location	Bluegrass test SDG	Analytical Lab SDG
J11JT0	04/26/2006	100-D-48:2	BG1589-01	F1610
J11JV8	04/30/2006	100-D-49-2	BG1589-02	F1630
J11JY2	05/01/2006	1607-D2:1	BG1589-03	F1636
J11JW4	05/02/2006	116-F-1	BG1589-04	F1645
J11K46	05/02/2006	600-208	BG1589-05	F1648
J11K73	05/07/2006	YAKIMA RIDGE II	BG1589-06	F1690
J11K67	05/08/2006	600-171	BG1589-07	F1691
J11K55	05/08/2006	600--181	BG1589-08	F1700
J11KC5	05/09/2006	SADDLE MOUNTAIN	BG1589-09	F1705

## **SAMPLE PREPARATION**

Test soils and control soil were dried and homogenized prior to use. For each replicate, 90 g dry weight of soil was added to each test chamber. The soils were initially hydrated with Milli-Q equivalent de-ionized water via subirrigation. In addition, a sub sample of the soil was added to a surrogate chamber and hydrated for pH measurements.

## **TEST INITIATION**

Tests were initiated by the planting of 10 seeds in each test chamber. Seeds were planted 1 ½ times the seeds diameter (approx. 2 mm) and covered gently with soil. A small amount of hydration water (10 ml) was sprayed onto the soil surface to ensure seeds received moisture.

## **TEST MONITORING**

According to information provided by the seed supplier, germination should take place between 14 and 28 days. The number of seeds in each test chamber that germinated was recorded on days 14, 16, 20, and 22. Germination was determined to have occurred on day 20.

Observations of the shoot appearance were recorded 7 days after post germination (day 27 after planting). The number of germinated seeds in each test chamber was also recorded. Chambers that had more than five germinated seeds had the smallest seedlings removed until the number of seedlings was reduced to five.

Soil pH was taken at initiation and termination by placing approximately 30 g of soil into a specimen cup, adding 100 ml of hydration water, and mixing.

## **TEST TERMINATION**

Tests were terminated 14 days post germination (day 34 after planting). The number of seedlings, shoot appearance and height (tallest shoot of each plant), and root appearance and length (longest recovered root of each plant) was recorded.

For each test chamber, all of the above ground biomass (i.e. "shoots") from all germinated plants were combined and placed into tared aluminum tins. The shoots were weighed to determine the wet weight immediately following removal from the test chamber. The shoots were then dried in an oven at 60 °C for a minimum of 24 hours. The shoots were then placed into a dessicator for a minimum of 2 hours and weighed to determine dry weight.

The wet and dry weight for the roots were also obtained as described above.

## DATA ANALYSIS

For each test chamber, the following endpoints were calculated:

- 14 Day Post-Germination Survival (%)  
(Calculated as the number of seedlings alive at 14 day post germination divided by 5)
- Average Above Ground Shoot Mass (Wet)  
(Calculated as the total wet weight of the shoots divided by the number of seedlings germinated)
- Average Above Ground Shoot Mass (Dry)  
(Calculated as the total dry weight of the shoots divided by the number of seedlings germinated)
- Average Root Mass (Wet)  
(Calculated as the total wet weight of the roots divided by the number of seedlings germinated)
- Average Root Mass (Dry)  
(Calculated as the total dry weight of the roots divided by the number of seedlings germinated)
- Average Total Mass (Wet)  
(Calculated as the total combined wet weights of the shoots and roots divided by the number of seedlings germinated)
- Average Total Mass (Dry)  
(Calculated as the total combined dry weights of the shoots and roots divided by the number of seedlings germinated)
- Average Shoot Height  
(Calculated as the total combined height of the tallest shoot of each seedling divided by the number of seedlings germinated)
- Average Root Length  
(Calculated as the total combined length of the longest root of each seedling divided by the number of seedlings germinated)

Statistical analysis for each endpoint listed comprised of entering the data obtained from each replicate chamber of a test soil and comparing the result to the data from the replicate chambers of the laboratory control. Comparisons were made as a single tailed t-test, evaluating for statistically significant reductions from the control value, using CETIS version 1.1.2. The Equal Variance t Two-Sample test was used. When the assumptions of equality of variance or normality necessary for Equal Variance t Two-Sample test was not met, the Unequal Variance t Two-Sample test or Wilcoxon Rank Sum Two Sample test was used.

## RESULTS AND DISCUSSION

The endpoint data and the results statistical analysis are summarized in Table 2. The data represents the average value of the replicate chambers used in each test concentration.

The results for sample J11JT0 indicated a statistically significant reduction in average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11JV8 indicated a statistically significant reduction in average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11JY2 indicated a statistically significant reduction in average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11JW4 indicated a statistically significant reduction in average root length, average root mass (wet), and average root mass (dry) when compared to the laboratory control.

The results for sample J11K46 indicated no statistically significant reduction when compared to the laboratory control.

The results for sample J11K73 indicated a statistically significant reduction in average root length, average root mass (wet), average root mass (dry), and average total mass (shoots + roots, wet) when compared to the laboratory control.

The results for sample J11K67 indicated a statistically significant reduction in average stem height, average root length, average above ground shoot mass (wet), average root mass (wet), and average total mass (shoots + roots, wet) when compared to the laboratory control.

The results for samples J11K55 indicated a statistically significant reduction in average root length when compared to the laboratory control.

The results for sample J11KC5 indicated a statistically significant reduction in average root length when compared to the laboratory control.

Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford

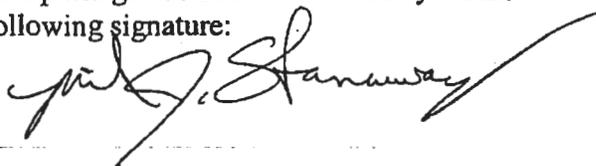
E, statistically significant difference from lab control by use of Equal Variance t Two-Sample Test

ns indicates a non statistically significant result; <sup>s</sup> indicates statistically significant at alpha (p) = 0.05; -- indicates no statistical test performed.

Lab ID:	Sample Number:	Bluegrass 14 day Germination Endpoint (%)	Significantly different compared to Lab Control?	Bluegrass Average Stem Height (mm)	Significantly different compared to Lab Control?	Bluegrass Average Root Length (mm)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Wet) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Dry) (mg)	Significantly different compared to Lab Control?
Tests Initiated on May 11, 2006																			
Laboratory Control		84	--	80.3	--	93.1	--	31.9	--	5.25	--	45.4	--	1.76	--	77.3	--	7.01	--
BG1589-01	J11JT0	96	ns	69.6	E <sup>s</sup>	57.5	E <sup>s</sup>	18.0	E <sup>s</sup>	3.63	E <sup>s</sup>	14.2	E <sup>s</sup>	1.21	ns	32.3	E <sup>s</sup>	4.84	E <sup>s</sup>
BG1589-02	J11JV8	88	ns	72.1	E <sup>s</sup>	62.2	E <sup>s</sup>	18.1	E <sup>s</sup>	3.29	E <sup>s</sup>	14.7	E <sup>s</sup>	0.79	E <sup>s</sup>	32.8	E <sup>s</sup>	4.08	E <sup>s</sup>
BG1589-03	J11JY2	84	ns	65.7	E <sup>s</sup>	60.7	E <sup>s</sup>	16.1	E <sup>s</sup>	2.87	E <sup>s</sup>	13.6	E <sup>s</sup>	1.26	ns	29.7	E <sup>s</sup>	4.12	E <sup>s</sup>
BG1589-04	J11JW4	92	ns	88.6	ns	71.0	E <sup>s</sup>	27.5	ns	4.37	ns	24.1	E <sup>s</sup>	1.10	E <sup>s</sup>	51.6	ns	5.48	ns
BG1589-05	J11K46	76	ns	77.0	ns	73.8	ns	30.6	ns	4.46	ns	35.0	ns	1.55	ns	65.7	ns	6.02	ns
BG1589-06	J11K73	88	ns	78.5	ns	69.3	E <sup>s</sup>	24.0	ns	4.22	ns	19.5	E <sup>s</sup>	1.06	E <sup>s</sup>	43.5	E <sup>s</sup>	5.27	ns
BG1589-07	J11K67	100	ns	70.2	E <sup>s</sup>	70.3	E <sup>s</sup>	23.2	E <sup>s</sup>	4.32	ns	25.8	E <sup>s</sup>	1.23	ns	49.0	E <sup>s</sup>	5.55	ns
BG1589-08	J11K55	88	ns	82.2	ns	75.5	E <sup>s</sup>	32.7	ns	5.47	ns	29.6	ns	1.33	ns	62.3	ns	6.80	ns
BG1589-09	J11KC5	88	ns	69.5	ns	67.3	E <sup>s</sup>	22.0	ns	3.71	ns	28.5	ns	1.09	ns	50.5	ns	4.80	ns

## CERTIFICATION STATEMENT

I certify that this data package is in compliance with the Statement of Work, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature:

A handwritten signature in black ink, appearing to read "J. Stanaway", written in a cursive style. The signature is positioned below the text of the certification statement.

---

**APPENDIX A**  
**RAW DATA SHEETS**

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: May 11, 2006

34

Day 0 17 Day 12 NT Day 14 NT Day 18 NT Day 20 DW Day 22 17 Day 23 - Day 27 34 Day 31 34

Sample ID: Lab Control (70% 70 grade silica sand, 20% clay, 10% peat)										
CONC.	REPLICATE	# seeds germinated					pH			
		5-23 12 days after planting	5-25 14 days after planting	5-27 16 days after planting	5-31 20 days after planting	6-2 22 days after planting	6-7-06 7-DAYS POST-EMERGENCE (27 days after planting)	6-14-06 14-DAYS POST-EMERGENCE (34 days after planting)	INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	7	7	7	7	7	7-75	5	6.8	7.4
	B	5	5	6	6	7	7-75	5		
	C	7	7	7	7	7	7-75	5		
	D	5	5	5	5	5	3	3		
	E	4	4	4	4	4	3	3		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate	Shoot Appearance	Removed
Replicate A	2 Lg G, 3 med G	removed: 2 med G
Replicate B	5 med G	removed: 2 Sm B
Replicate C	5 med G	removed: 1 med G, 1 Sm B
Replicate D	3 med G	removed: 2 dead Sm
Replicate E	3 med G	removed: 1 dead Sm

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest 6+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate	Shoot Appearance
Replicate A	1 Lg G, 1 Lg G w/ 1 B shoot, 2 med G, 1 med G w/ 2 D shoots
Replicate B	1 Lg G, 4 med G
Replicate C	3 Lg G, 2 med G
Replicate D	2 Lg G, 1 med G
Replicate E	2 med G, 1 med G w/ 1 B shoot

Measure Shoot Height:

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	46 mm	66 mm	84 mm	85 mm	62 mm
Replicate B	105 mm	82 mm	71 mm	76 mm	59 mm
Replicate C	86 mm	107 mm	71 mm	70 mm	76 mm
Replicate D	57 mm	93 mm	106 mm	mm	mm
Replicate E	86 mm	57 mm	58 mm	mm	mm

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1243.29	1365.8	1265.98
Replicate B	1237.50	1354.8	1256.25
Replicate C	1251.54	1455.2	1283.83
Replicate D	1237.52	1352.3	1255.66
Replicate E	1238.88	1337.2	1255.91

Describe root appearance:

Replicate	Root Appearance
Replicate A	
Replicate B	
Replicate C	
Replicate D	
Replicate E	

Measure Root Length:

Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	51 mm	80 mm	127 mm	110 mm	84 mm
Replicate B	81 mm	96 mm	72 mm	58 mm	90 mm
Replicate C	80 mm	56 mm	177 mm	106 mm	124 mm
Replicate D	139 mm	55 mm	128 mm	mm	mm
Replicate E	101 mm	60 mm	78 mm	mm	mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1258.26	1373.6	1264.82
Replicate B	1247.921	1411.7	1253.33
Replicate C	1253.79	1592.9	1266.27
Replicate D	1254.23	1458.1	1261.57
Replicate E	1254.07	1360.1	1258.71

Comments:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

6-2-06

Test Start Date: May 11, 2006

Day 0 TP Day 12 NT Day 14 NT Day 16 NT Day 18 DW Day 21 TP Day 23 - Day 27 B Day 31 2

		Bioassay Lab ID: BG 1589-01						Sample No: 01570		pH	
CONC.	REPLICATE	# seeds germinated						7-DAYS POST-EMERGENCE (27 days after planting)	14-DAYS POST-EMERGENCE (34 days after planting)	INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
		12 days after planting	14 days after planting	16 days after planting	20 days after planting	22 days after planting	23 days after planting				
Control	A	7	8	8	8	8	8-75	5	8.9	8.0	
	B	7	7	7	7	7	7-5	5			
	C	4	5	5	5	6	6-75	5			
	D	7	7	7	7	7	8-75	5			
	E	3	4	4	4	4	4	4			

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 3 Lg G, 2 med G removed: 2 med G, 1 Sm B  
 Replicate B: 2 Lg G, 3 med G removed: 2 med G  
 Replicate C: 2 Lg G, 2 med G, 1 Sm B removed: 1 Sm B  
 Replicate D: 4 med G, 1 Sm G removed: 1 med G w/ B shoot, 2 Sm G  
 Replicate E: 3 med G, 1 Sm G

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest 6+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 2 Lg G, 2 Lg G w/ B shoot, 1 med G  
 Replicate B: 5 Lg G all with some browning on 1 shoot  
 Replicate C: 2 Lg G, 3 med G  
 Replicate D: 4 med G, 1 Sm G  
 Replicate E: 1 med G, 1 med w/ 2 B shoots, 2 Sm G

Measure Shoot Height

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	73 mm	83 mm	73 mm	81 mm	70 mm
Replicate B	81 mm	88 mm	85 mm	69 mm	88 mm
Replicate C	37 mm	99 mm	59 mm	72 mm	70 mm
Replicate D	73 mm	75 mm	82 mm	32 mm	57 mm
Replicate E	40 mm	71 mm	69 mm	55 mm	mm

Measure Shoot Weight

Total mass of all seedlings (above ground)

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1249.00	1364.1	1270.53
Replicate B	1249.01	1377.8	1276.07
Replicate C	1263.89	1340.8	1279.53
Replicate D	1236.18	1317.6	1252.57
Replicate E	1241.17	1280.2	1249.20

Describe root appearance:

Replicate A: \_\_\_\_\_  
 Replicate B: \_\_\_\_\_  
 Replicate C: \_\_\_\_\_  
 Replicate D: \_\_\_\_\_  
 Replicate E: \_\_\_\_\_

Measure Root Length:

Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	66 mm	99 mm	86 mm	58 mm	69 mm
Replicate B	59 mm	109 mm	58 mm	83 mm	67 mm
Replicate C	26 mm	50 mm	43 mm	34 mm	55 mm
Replicate D	89 mm	95 mm	62 mm	53 mm	8 mm
Replicate E	24 mm	39 mm	32 mm	40 mm	mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1252.74	1346.3	1262.77
Replicate B	1251.41	1358.8	1259.57
Replicate C	1238.44	1290.8	1242.76
Replicate D	1243.82	1317.5	1248.74
Replicate E	1234.74	1257.6	1236.99

Comments:

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## CETIS Test Summary

Report Date: 19 Jul-06 1:07 PM  
 Test Link: 17-8751-3308/B158901psB

Plant Bioassay - Chronic		CH2M Hill				
Test No:	02-6257-1800	Test Type:	Plant Chronic	Duration:	N/A	
Start Date:	11 May-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii	
Ending Date:		Dil Water:		Source:		
Setup Date:	11 May-06	Brine:				
Comments:	recalculated Height and Length data July 19, 2006					
Sample No:	12-8157-6918	Code:	B1589-01	Client:		
Sample Date:	26 Apr-06 03:00 PM	Material:	Soil	Project:		
Receive Date:		Source:	Hanford			
Sample Age:	14d 9h	Station:				
Comments:	J11JT0					
Comparison Summary						
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-9301-7385	% Germination	100	> 100	N/A	22.99%	Equal Variance t Two-Sample
09-1193-3949	Average Height (mm)	< 100	100	N/A	12.68%	Equal Variance t Two-Sample
13-7203-7834	Average Length (mm)	< 100	100	N/A	21.36%	Equal Variance t Two-Sample
10-9036-6337	Average AG Wt (Wet, mg)	< 100	100	N/A	26.30%	Equal Variance t Two-Sample
06-6445-8715	Average AG Wt (Dry, mg)	< 100	100	N/A	26.72%	Equal Variance t Two-Sample
08-2540-9244	Average Root Wt. (Wet, mg)	< 100	100	N/A	40.32%	Equal Variance t Two-Sample
02-3883-0849	Average Root Wt. (Dry, mg)	100	> 100	N/A	42.45%	Equal Variance t Two-Sample
06-7704-3860	Average Total Wt (Wet, mg)	< 100	100	N/A	33.46%	Equal Variance t Two-Sample
06-5196-0793	Average Total Wt (Dry, mg)	< 100	100	N/A	29.67%	Equal Variance t Two-Sample

## CETIS Test Summary

Report Date:

19 Jul-06 1:07 PM

Test Link:

17-8751-3308/B158901psB

% Germination Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%	
100		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%	
Average Height (mm) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%	
100		5	69.64	58.8	82.2	4.2121	9.4185	13.52%	
Average Length (mm) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%	
100		5	57.52	33.8	75.6	8.575	19.174	33.33%	
Average AG Wt (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%	
100		5	18.040	9.7575	25.758	2.8558	6.3859	35.40%	
Average AG Wt (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%	
100		5	3.62629	2.00748	5.41199	0.57623	1.28850	35.53%	
Average Root Wt. (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%	
100		5	14.223	5.715	21.478	2.8241	6.3148	44.40%	
Average Root Wt. (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%	
100		5	1.20970	0.56250	2.00601	0.26474	0.59197	48.94%	
Average Total Wt (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%	
100		5	32.263	15.472	47.236	5.8498	12.633	39.16%	
Average Total Wt (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%	
100		5	4.83599	2.56998	7.04397	0.81334	1.81868	37.61%	

## CETIS Test Summary

Report Date:

19 Jul-06 1:07 PM

Test Link:

17-8751-3308/B158901psB

% Germination Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	1.00000	0.60000	0.60000
100		1.00000	1.00000	1.00000	1.00000	0.80000
Average Height (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		76	82.2	67.4000	63.8	58.8
Average Length (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		75.6	75.2	41.6	61.4000	33.8
Average AG Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		23.02	25.7580	15.3820	16.284	9.75748
Average AG Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		4.30601	5.41199	3.12800	3.27798	2.00748
Average Root Wt. (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		18.7120	21.4780	10.4720	14.7360	5.715
Average Root Wt. (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		2.00601	1.63198	0.86401	0.98401	0.56250
Average Total Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		41.7320	47.2360	25.8540	31.02	15.4725
Average Total Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		6.31201	7.04397	3.99202	4.26199	2.56998

# CETIS Analysis Detail

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 1:07 PM  
 Analysis: 08-9301-7385/B158901psB

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

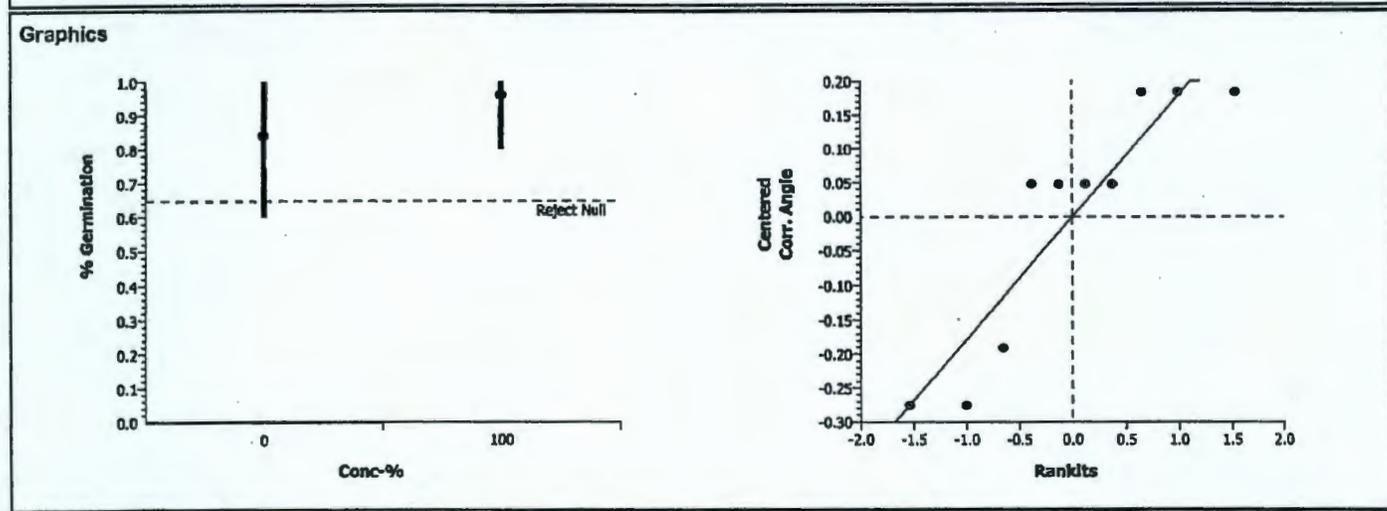
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	22.99%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedl		100	-1.1138	1.85955	0.8512	0.22714	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0462777	0.046278	1	1.24	0.29769	Non-Significant Effect
Error	0.2984103	0.037301	8			
Total	0.344688	0.0835790	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	5.57779	23.15450	0.12462	Equal Variances	
Distribution	Shapiro-Wilk W	0.82019		0.02548	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.21909	1.16160	0.88608	1.34528	0.25152
100		5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M HILL

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

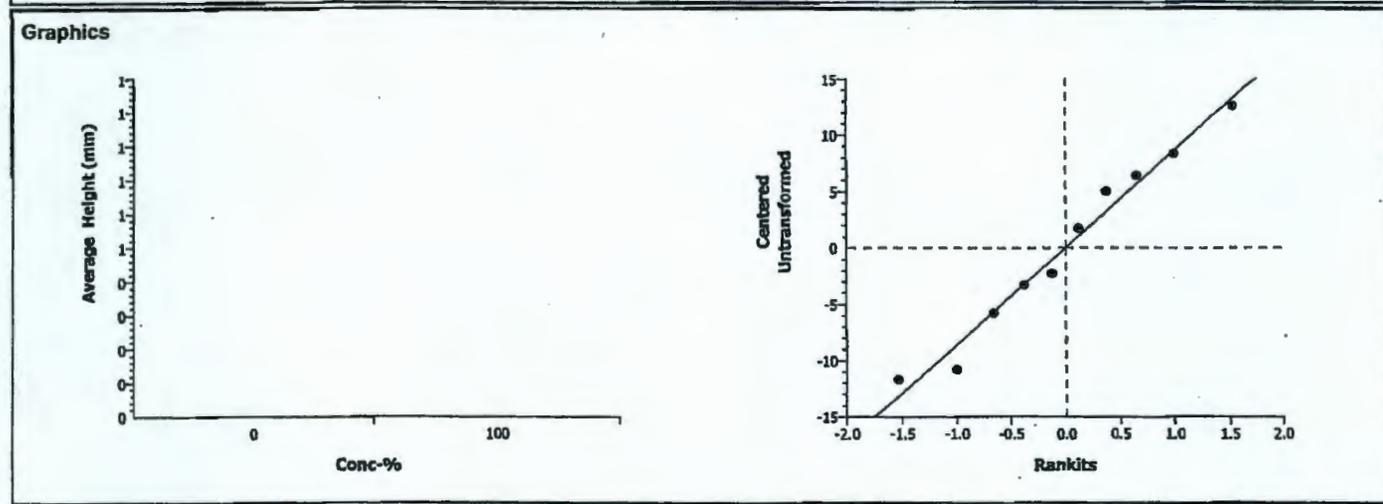
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	12.68%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.94723	1.85955	0.0437	10.18	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	284.089	284.089	1	3.79	0.08737	Non-Significant Effect
Error	599.392	74.924	8			
Total	883.480988	359.01302	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.45090	23.15450	0.72715	Equal Variances	
Distribution	Shapiro-Wilk W	0.96153		0.80320	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	69.64	58.8	82.2	9.4185				



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

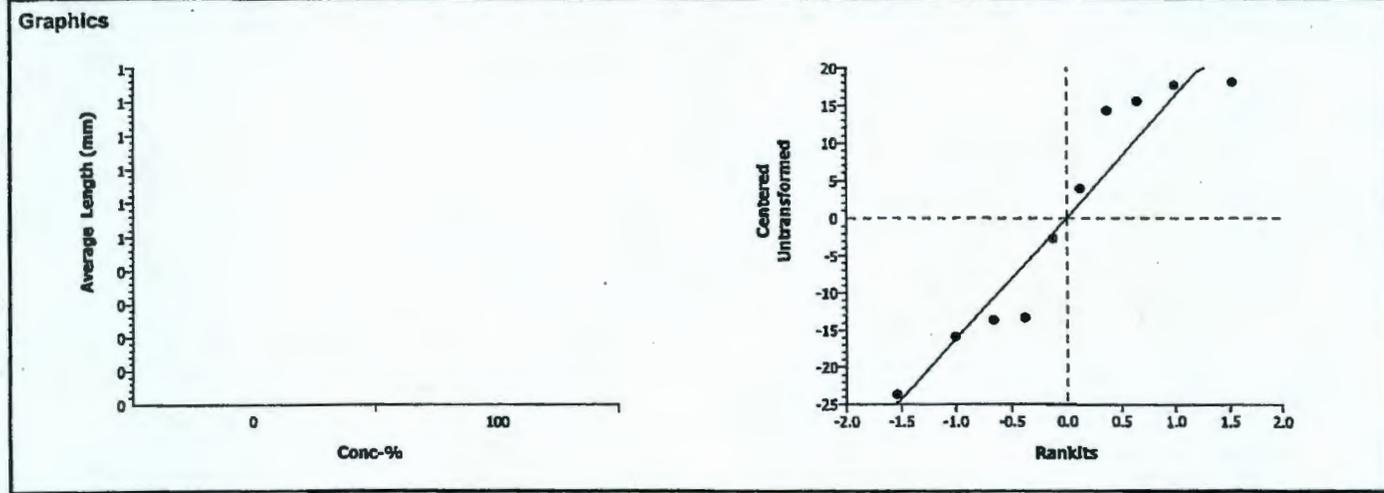
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	21.36%

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.32537	1.85955	0.0052	19.8852	Significant Effect

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3161.284	3161.284	1	11.06	0.01046	Significant Effect
Error	2287.036	285.8795	8			
Total	5448.32007	3447.1637	9			

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.80127	23.15450	0.58264	Equal Variances
Distribution	Shapiro-Wilk W	0.88329		0.14231	Normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	57.52	33.8	75.6	19.174				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

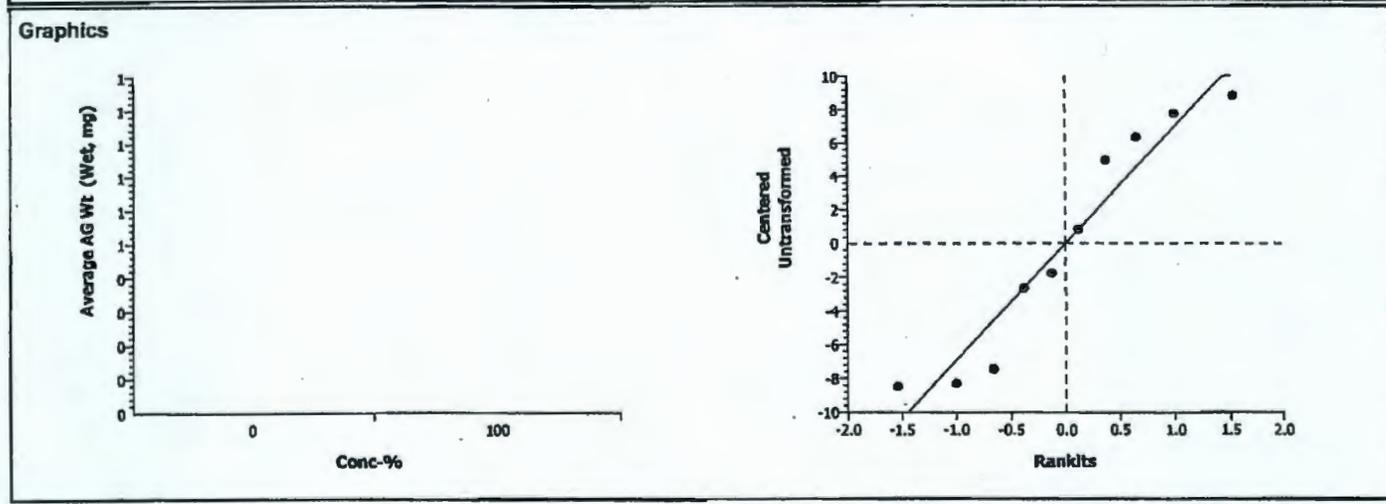
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	26.30%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.07758	1.85955	0.0076	8.40185	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	483.3844	483.3844	1	9.47	0.01517	Significant Effect
Error	408.2865	51.03581	8			
Total	891.670868	534.42021	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.50303	23.15450	0.70260	Equal Variances
Distribution	Shapiro-Wilk W	0.89945		0.21609	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	31.945	23.460	40.732	7.8289				
100		5	18.040	9.7575	25.758	6.3859				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 1:07 PM  
 Analysis: 06-6445-8715/B158901psB

Plant Bioassay - Chronic	CH2M HILL
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

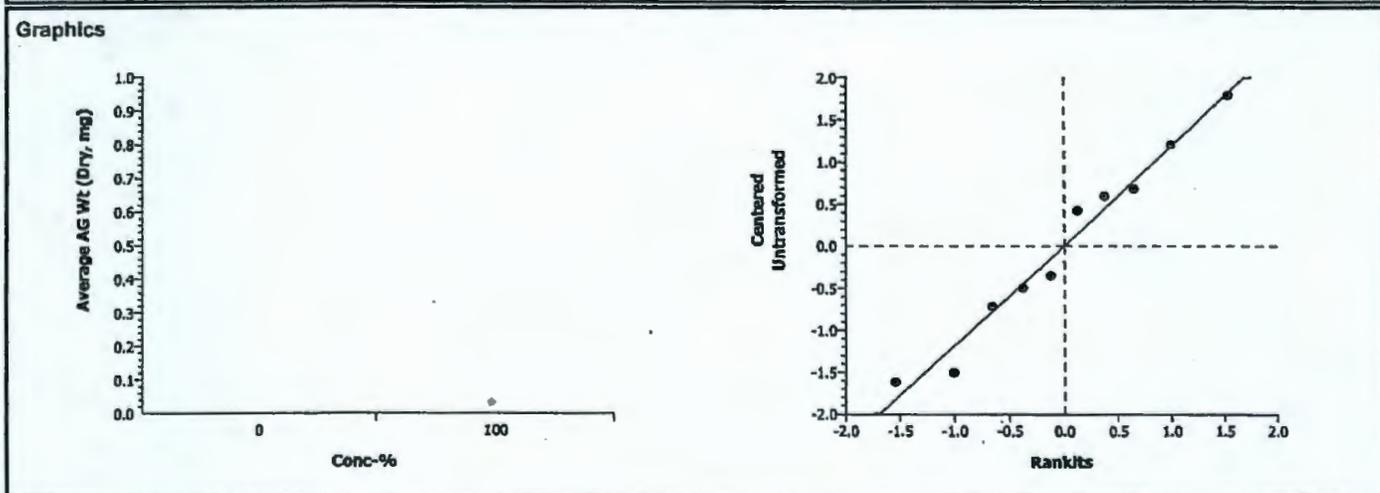
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	26.72%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.15624	1.85955	0.0316	1.40363	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	6.622503	6.622503	1	4.65	0.06316	Non-Significant Effect
Error	11.39509	1.424386	8			
Total	18.0175881	8.0468885	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.39685	23.15450	0.75391	Equal Variances	
Distribution	Shapiro-Wilk W	0.96037		0.79009	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	3.62629	2.00748	5.41199	1.28850				

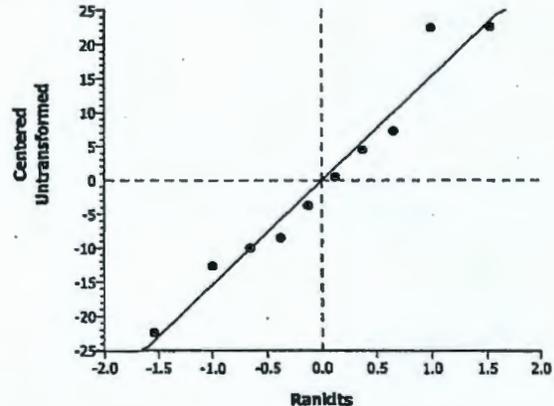
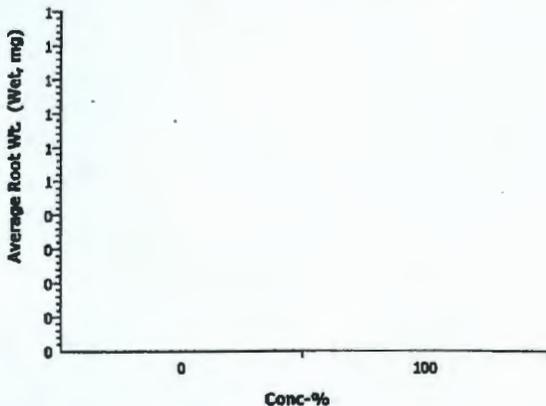


# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 1:07 PM  
 Analysis: 08-2540-9244/B158901psB

Plant Bioassay - Chronic							CH2M Hill			
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version					
Average Root Wt. (Wet, mg)	Comparison	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2					
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	40.32%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	3.16642	1.85955	0.0066	18.2918	Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	2425.337	2425.337	1	10.03	0.01327	Significant Effect				
Error	1935.202	241.9002	8							
Total	4360.53906	2667.2374	9							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Variance Ratio F	11.13251	23.15450	0.03852	Equal Variances					
Distribution	Shapiro-Wilk W	0.94733		0.63707	Normal Distribution					
Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	14.223	5.715	21.478	6.3148				

## Graphics



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 1:07 PM  
 Analysis: 02-3883-0849/B158901psB

Plant Bioassay - Chronic							CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

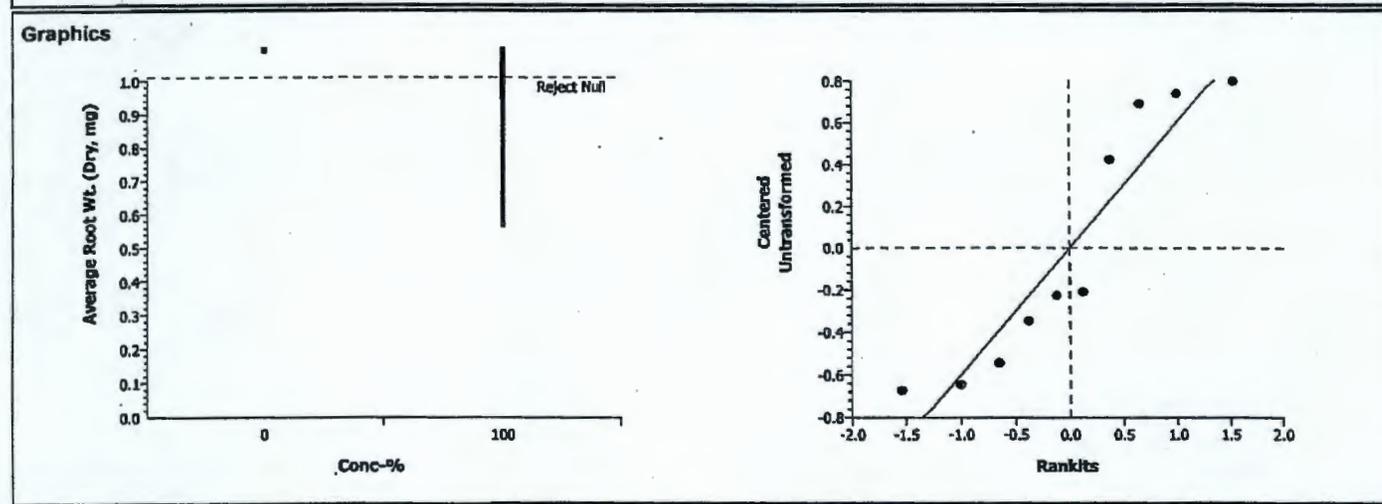
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	42.45%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.36462	1.85955	0.1048	0.74587	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.7489985	0.748999	1	1.86	0.20952	Non-Significant Effect
Error	3.217695	0.402212	8			
Total	3.96669376	1.1512104	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.29552	23.15450	0.80796	Equal Variances	
Distribution	Shapiro-Wilk W	0.85491		0.06643	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.20970	0.56250	2.00601	0.59197				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 1:07 PM  
 Analysis: 06-7704-3860/B158901psB

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

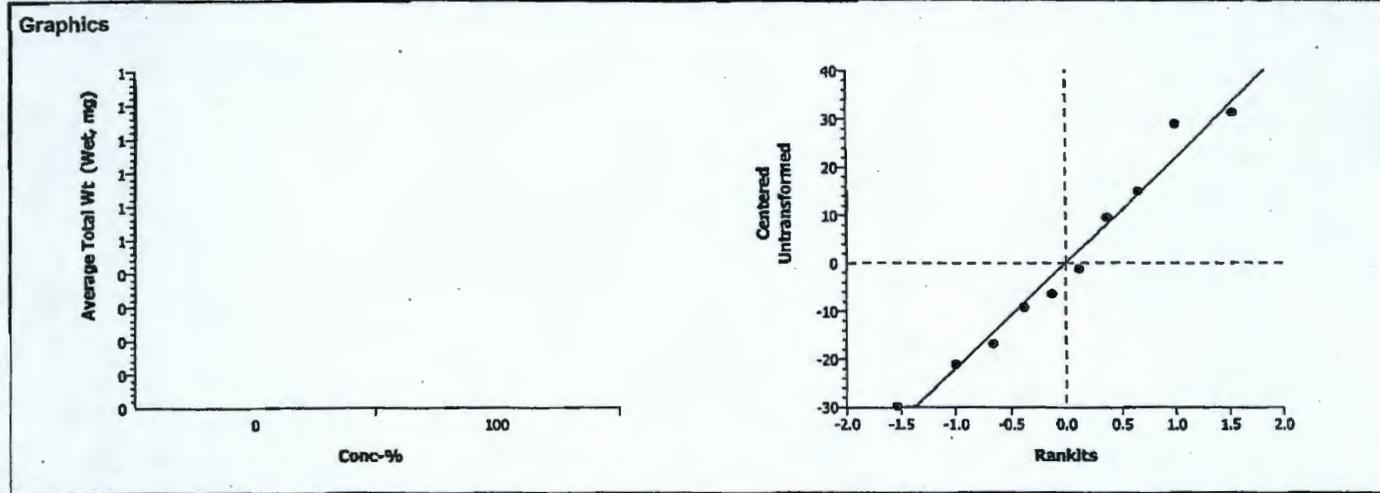
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	33.46%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.23874	1.85955	0.0060	25.8671	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5074.242	5074.242	1	10.49	0.01190	Significant Effect
Error	3869.993	483.7491	8			
Total	8944.23511	5557.9913	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	5.06207	23.15450	0.14532	Equal Variances	
Distribution	Shapiro-Wilk W	0.95523		0.73036	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	32.263	15.472	47.236	12.633				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

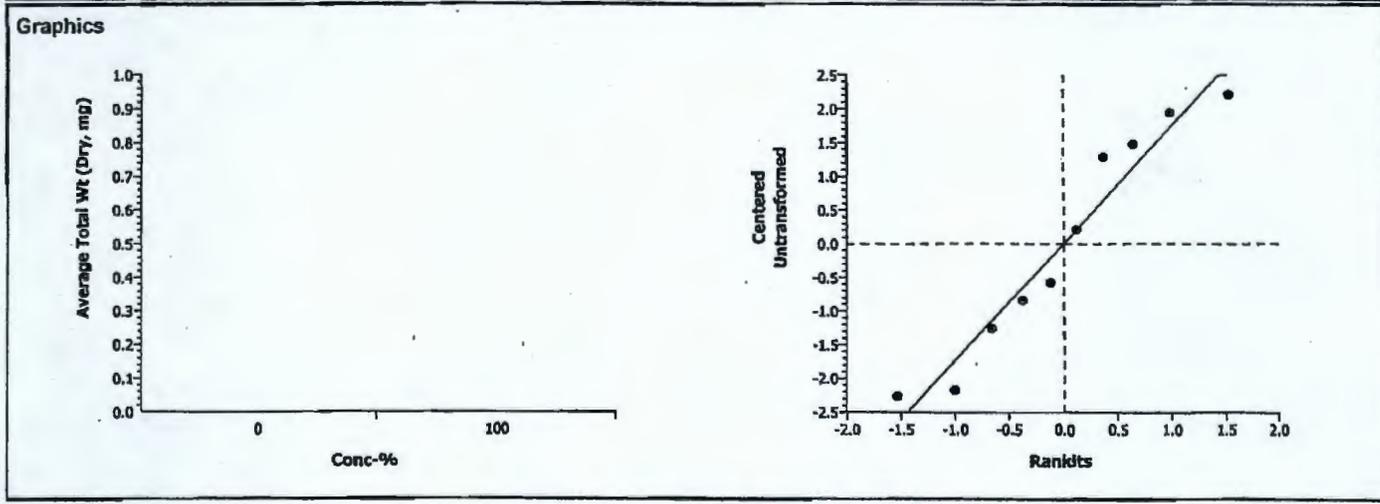
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.67%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.94436	1.85955	0.0439	2.08006	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	11.82582	11.82582	1	3.78	0.08775	Non-Significant Effect
Error	25.02462	3.128078	8			
Total	36.8504486	14.953903	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.12177	23.15450	0.91401	Equal Variances
Distribution	Shapiro-Wilk W	0.92125		0.36748	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	1.71714				
100		5	4.83599	2.56998	7.04397	1.81868				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: May 11, 2006

Initial: Day 0 (TP) Day 12 NJ Day 14 NJ Day 16 NJ Day 20 DW Day 22 (TP) Day 23 - Day 27 SW Day 28 B

Bioassay Lab ID: BG 1689-02 Sample No: J115V8

CONC.	REPLICATE	# seeds germinated							pH		
		12 days after planting	14 days after planting	16 days after planting	20 days after planting	22 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting)	14-DAYS POST-EMERGENCE (34 days after planting)	INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	6	7	7	9	9		8 → 6.5	5	8.7	7.7
	B	5	5	6	6	6		6 → 5	5		
	C	4	5	5	5	6		6 → 5	5		
	D	1	1	3	4	4		3	2		
	E	6	6	6	7	6		6 → 5	5		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 5 med G removed: 2 Sm G, 1 med G, 1 dead Sm  
 Replicate B: 3 med G, 2 Sm G removed: 1 Sm G  
 Replicate C: 4 med G, 1 med G w/ B tip removed: 1 Sm G  
 Replicate D: 2 med G, 1 Sm w/ 1 shoot 1/2 G 1/2 B removed: 1 dead Sm  
 Replicate E: 5 med G removed: 1 med G

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted. # Lg = # of large plants (tallest, 6+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 Lg, 2 med G w/ 1 B shoot  
 Replicate B: 3 med G, 2 Sm G  
 Replicate C: 3 med G, 1 Sm G, 1 med G w/ 1 B tip  
 Replicate D: 2 med G removed: 1 Sm dead  
 Replicate E: 3 med G, 2 med G w/ B shoots

Measure Shoot Height:

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	61 mm	67 mm	21 mm	84 mm	71 mm
Replicate B	85 mm	45 mm	92 mm	68 mm	46 mm
Replicate C	73 mm	78 mm	61 mm	62 mm	70 mm
Replicate D	70 mm	78 mm	mm	mm	mm
Replicate E	67 mm	78 mm	66 mm	85 mm	84 mm

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1251.88	1352.1	1272.46
Replicate B	1236.82	1316.4	1250.14
Replicate C	1241.21	1319.9	1254.08
Replicate D	1253.81	1297.2	1259.18
Replicate E	1248.61	1360.3	1270.77

Describe root appearance:

Replicate A: \_\_\_\_\_  
 Replicate B: \_\_\_\_\_  
 Replicate C: \_\_\_\_\_  
 Replicate D: \_\_\_\_\_  
 Replicate E: \_\_\_\_\_

Measure Root Length:

Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	96 mm	85 mm	72 mm	87 mm	40 mm
Replicate B	84 mm	77 mm	47 mm	22 mm	90 mm
Replicate C	26 mm	72 mm	37 mm	81 mm	56 mm
Replicate D	28 mm	82 mm	mm	mm	mm
Replicate E	48 mm	98 mm	80 mm	61 mm	31 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1221.47	1291.9	1226.00
Replicate B	1225.43	1296.1	1289.09
Replicate C	1251.03	1323.1	1254.24
Replicate D	1232.83	1261.6	1234.14
Replicate E	1226.20	1318.4	1231.17

Comments:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## CETIS Test Summary

 Report Date: 19 Jul-06 1:10 PM  
 Test Link: 10-2605-3685/B158902psB

 Plant Bioassay - Chronic CH2M Hill

Test No:	08-1019-1955	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	11 May-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	11 May-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	01-2020-4009	Code:	B1589-02	Client:	
Sample Date:	30 Apr-06 02:20 PM	Material:	Soll.	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	10d 9h	Station:			

Comments: J11JV8

## Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
05-7646-4911	% Germination	100	> 100	N/A	34.11%	Wilcoxon Rank Sum Two-Sample
04-8716-7852	Average Height (mm)	< 100	100	N/A	8.88%	Equal Variance t Two-Sample
09-1715-2217	Average Length (mm)	< 100	100	N/A	14.97%	Equal Variance t Two-Sample
09-1688-2850	Average AG Wt (Wet, mg)	< 100	100	N/A	21.75%	Equal Variance t Two-Sample
05-7539-7382	Average AG Wt (Dry, mg)	< 100	100	N/A	22.40%	Equal Variance t Two-Sample
09-0207-2083	Average Root Wt. (Wet, mg)	< 100	100	N/A	38.85%	Equal Variance t Two-Sample
01-6077-2769	Average Root Wt. (Dry, mg)	< 100	100	N/A	32.74%	Equal Variance t Two-Sample
16-2675-7737	Average Total Wt (Wet, mg)	< 100	100	N/A	31.03%	Equal Variance t Two-Sample
04-1777-4908	Average Total Wt (Dry, mg)	< 100	100	N/A	23.91%	Equal Variance t Two-Sample

## CETIS Test Summary

Report Date:

19 Jul-06 1:10 PM

Test Link:

10-2605-3685/B158902psB

% Germination Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
Average Height (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	72.080	67.2	76	1.5781	3.5287	4.90%
Average Length (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	62.2	54.400	76	3.9161	8.7567	14.08%
Average AG Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	18.146	15.738	22.338	1.3048	2.9177	16.08%
Average AG Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	3.29420	2.57400	4.43201	0.40354	0.90234	27.39%
Average Root Wt. (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	14.692	12.134	18.440	1.0279	2.2984	15.64%
Average Root Wt. (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	0.78581	0.64199	0.99402	0.07017	0.15691	19.97%
Average Total Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	32.838	28.05	40.778	2.213	4.9483	15.07%
Average Total Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	4.08001	3.21599	5.42603	0.47229	1.05606	25.88%

## CETIS Test Summary

Report Date:

19 Jul-06 1:10 PM

Test Link:

10-2605-3685/B158902psB

% Germination Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	1.00000	0.60000	0.60000
100		1.00000	1.00000	1.00000	0.40000	1.00000
Average Height (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		73.4000	67.2	69.8000	74	76
Average Length (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		76	64	54.4000	55	61.6
Average AG Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		20.044	15.9160	15.7380	16.6949	22.3380
Average AG Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		4.11599	2.66401	2.57400	2.68500	4.43201
Average Root Wt. (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		14.0860	12.134	14.414	14.3850	18.4400
Average Root Wt. (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		0.90601	0.73198	0.64199	0.65503	0.99402
Average Total Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		34.1300	28.05	30.1520	31.08	40.7780
Average Total Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		5.02200	3.39600	3.21599	3.34003	5.42603

# CETIS Analysis Detail

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 1:10 PM  
 Analysis: 05-7646-4911/B158902psB

Plant Bioassay - Chronic					CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	10-2605-3685	10-2605-3685	19 Jul-06 1:10 PM	CETISv1.1.2

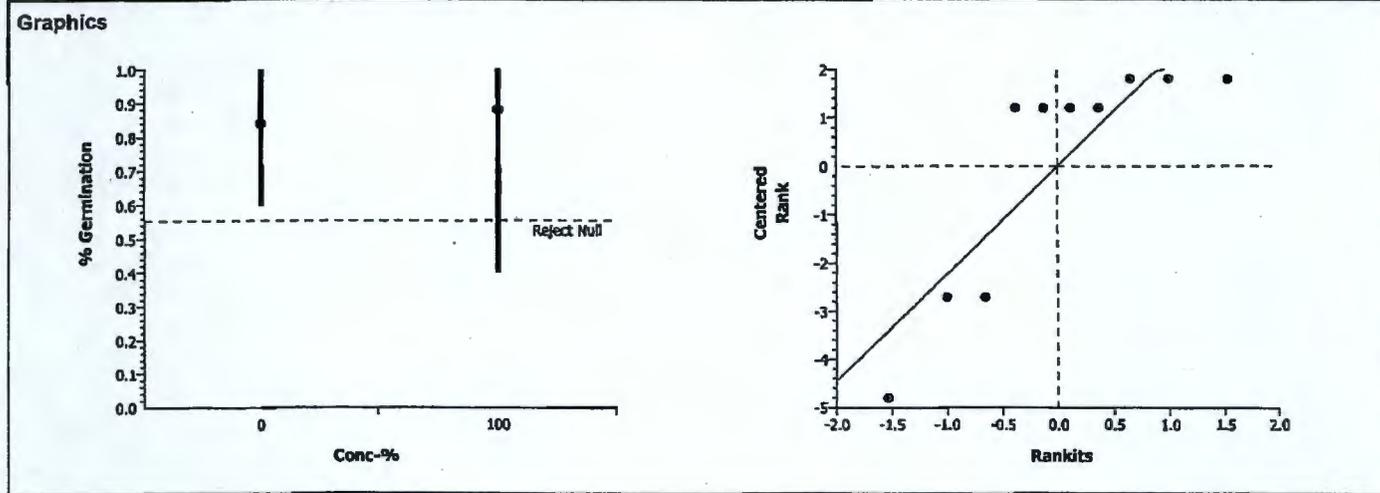
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	34.11%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	29		0.5794	3	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0066486	0.006649	1	0.09	0.77388	Non-Significant Effect
Error	0.6021195	0.075265	8			
Total	0.60876806	0.0819135	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.37951	23.15450	0.76279	Equal Variances	
Distribution	Shapiro-Wilk W	0.71919		0.00151	Non-normal Distribution	

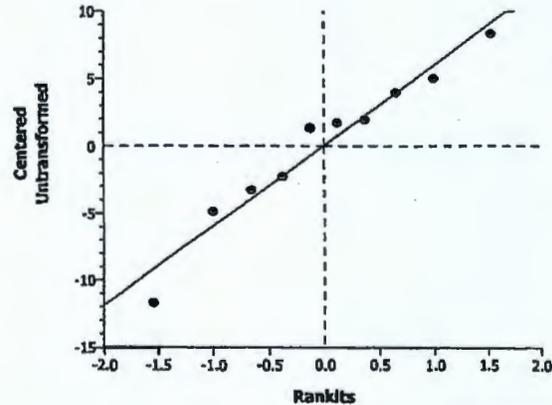
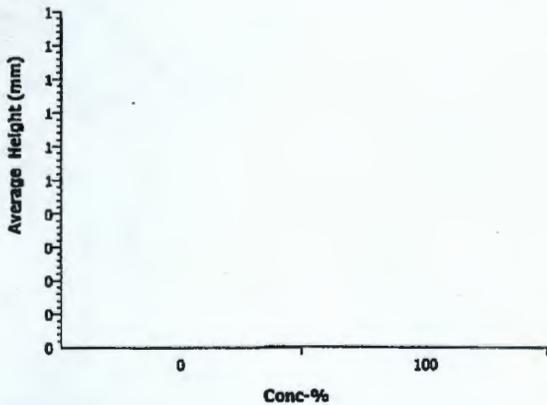
Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.84000	0.50000	1.00000	0.21909	5.20000	2.50000	7.00000	2.46475
100		5	0.88000	0.40000	1.00000	0.26833	5.80000	1.00000	7.00000	2.68328



# CETIS Analysis Detail

Plant Bioassay - Chronic							CH2M Hill			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Average Height (mm)	Comparison		10-2605-3685	10-2605-3685	19 Jul-06 1:10 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	8.88%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	2.14260	1.85955	0.0323	7.13408	Significant Effect			
ANOVA Table										
Source	Sum of Squares		Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	168.921		168.921	1	4.59	0.06451	Non-Significant Effect			
Error	294.3681		36.79601	8						
Total	463.289063		205.717	9						
ANOVA Assumptions										
Attribute	Test		Statistic	Critical	P-Value	Decision(0.01)				
Variances	Variance Ratio F		4.91005	23.15450	0.15240	Equal Variances				
Distribution	Shapiro-Wilk W		0.95915		0.77614	Normal Distribution				
Data Summary										
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	72.080	67.2	76	3.5287				

## Graphics



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 1:10 PM  
 Analysis: 09-1715-2217/B158902psB

Plant Bloassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	10-2605-3685	10-2605-3685	19 Jul-06 1:10 PM	CETISv1.1.2

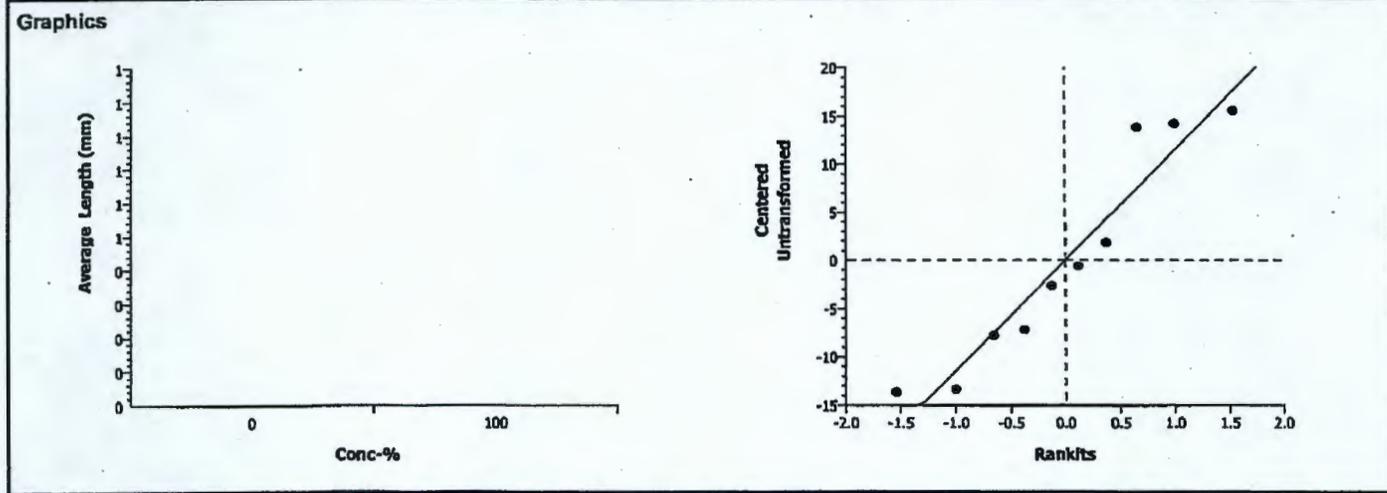
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	14.97%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.12073	1.85955	0.0017	13.9351	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2383.936	2383.936	1	16.98	0.00334	Significant Effect
Error	1123.148	140.3935	8			
Total	3507.08411	2524.3295	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	2.66180	23.15450	0.36600	Equal Variances	
Distribution	Shapiro-Wilk W	0.89192		0.17819	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	62.2	54.4	76	8.7567				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 1:10 PM  
 Analysis: 09-1688-2850/B158902psB

Plant Bioassay - Chronic							CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	10-2605-3685	10-2605-3685	19 Jul-06 1:10 PM	CETISv1.1.2

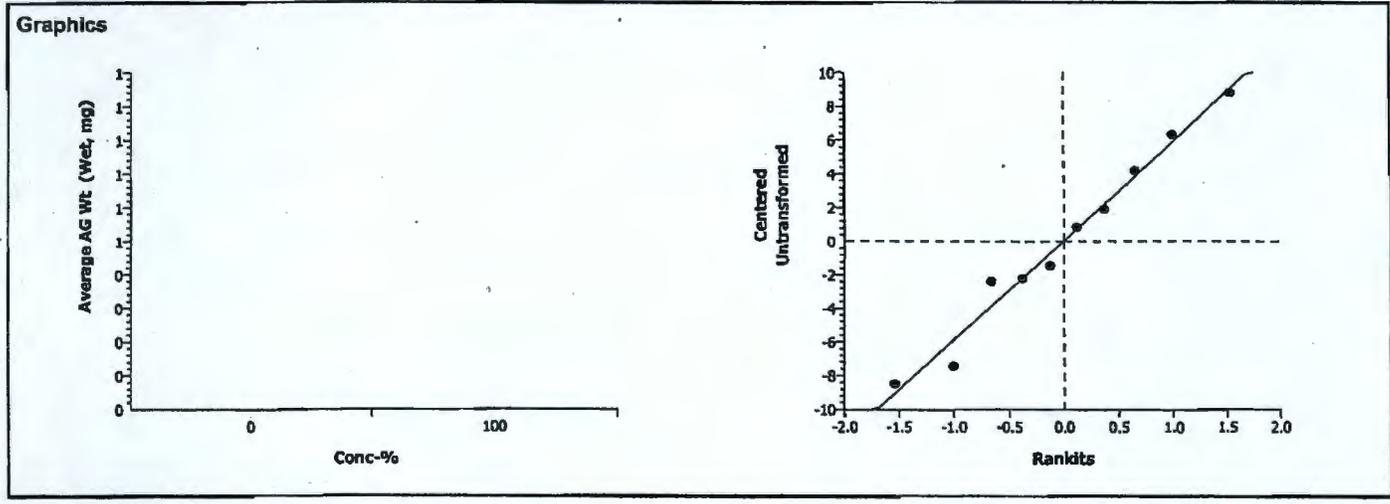
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	21.75%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.69314	1.85955	0.0031	6.94812	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	476.0495	476.0495	1	13.64	0.00610	Significant Effect
Error	279.2219	34.90274	8			
Total	755.271423	510.95224	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.19983	23.15450	0.08198	Equal Variances
Distribution	Shapiro-Wilk W	0.96891		0.88053	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	31.945	23.460	40.732	7.8289				
100		5	18.146	15.738	22.338	2.9177				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 1:10 PM  
 Analysis: 05-7539-7382/B158902psB

Plant Bioassay - Chronic							CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Data Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	10-2605-3685	10-2605-3685	19 Jul-06 1:10 PM	CETISv1.1.2

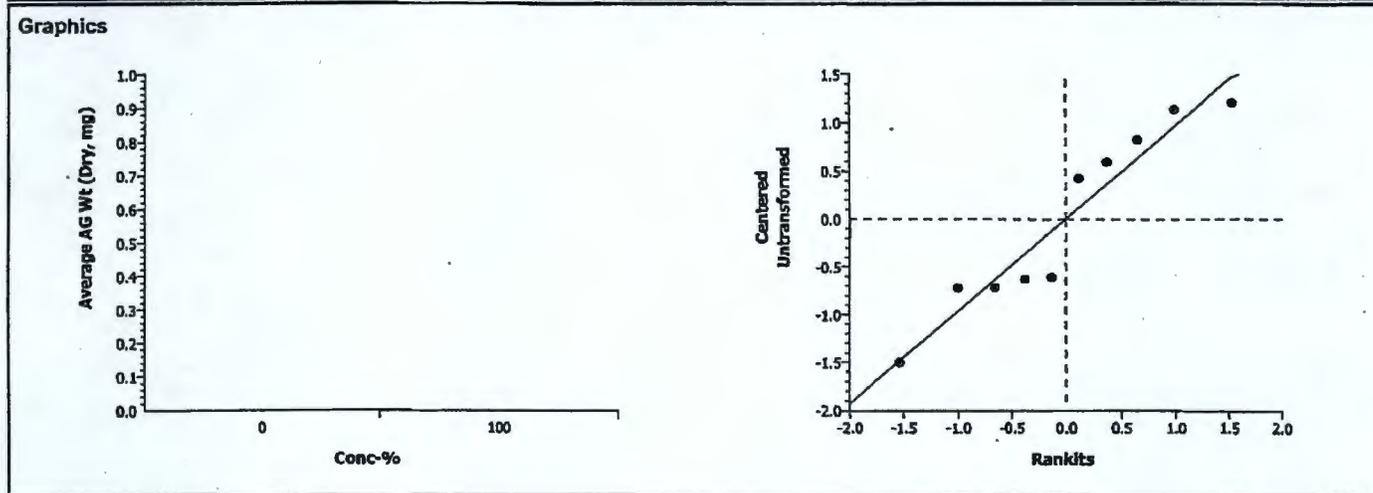
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	22.40%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.09636	1.85955	0.0074	1.1769	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	9.600707	9.600707	1	9.59	0.01475	Significant Effect
Error	8.011086	1.001386	8			
Total	17.6117935	10.602093	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.45973	23.15450	0.72291	Equal Variances	
Distribution	Shapiro-Wilk W	0.90056		0.22224	Normal Distribution	

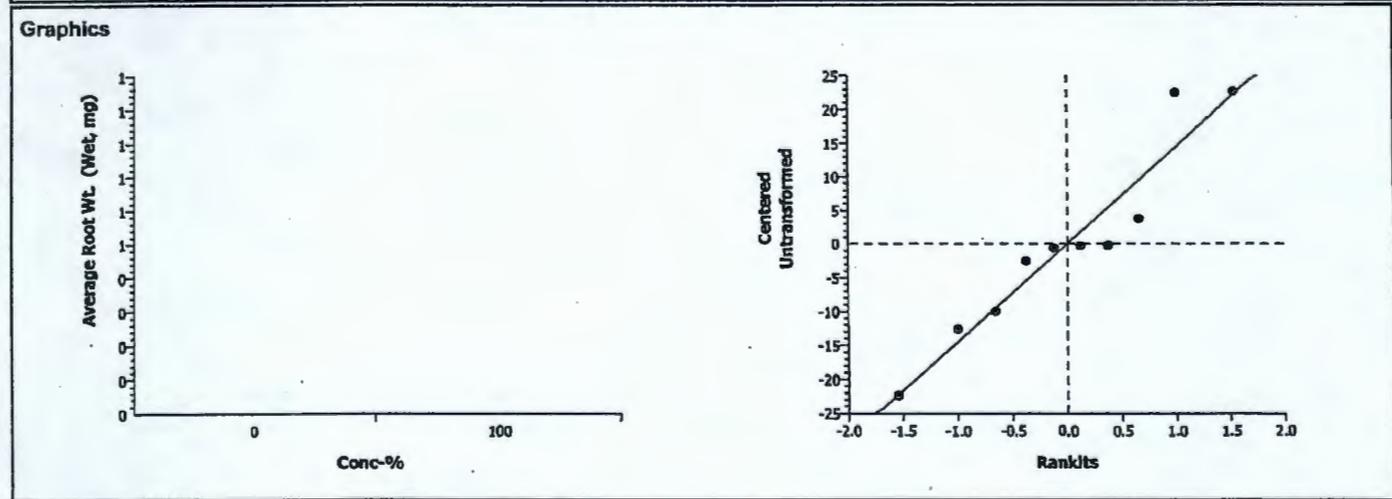
Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	3.29420	2.57400	4.43201	0.90234				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 1:10 PM  
 Analysis: 09-0207-2083/B158902psB

Plant Bioassay - Chronic							CH2M Hill			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Average Root Wt. (Wet, mg)	Comparison		10-2605-3685	10-2605-3685	19 Jul-06 1:10 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	38.85%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	3.23658	1.85955	0.0060	17.6257	Significant Effect			
ANOVA Table										
Source	Sum of Squares		Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	2352.818		2352.818	1	10.48	0.01194	Significant Effect			
Error	1796.826		224.6033	8						
Total	4149.6438		2577.4209	9						
ANOVA Assumptions										
Attribute	Test		Statistic	Critical	P-Value	Decision(0.01)				
Variances	Variance Ratio F		84.03751	23.15450	0.00082	Unequal Variances				
Distribution	Shapiro-Wilk W		0.91693		0.33205	Normal Distribution				
Data Summary										
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	14.692	12.134	18.440	2.2984				

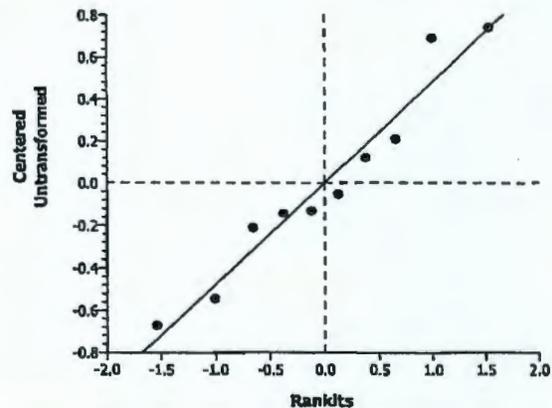
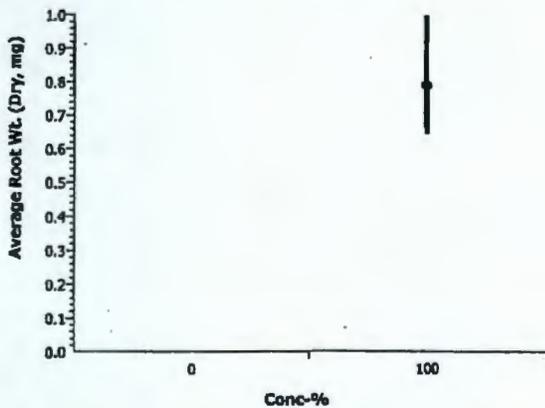


# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 1:10 PM  
 Analysis: 01-6077-2769/B158902psB

Plant Bioassay - Chronic							CH2M Hill			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Average Root Wt. (Dry, mg)	Comparison		10-2605-3685	10-2605-3685	19 Jul-06 1:10 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.74%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	3.13925	1.85955	0.0069	0.57533	Significant Effect			
ANOVA Table										
Source	Sum of Squares		Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	2.358332		2.358332	1	9.85	0.01382	Significant Effect			
Error	1.914449		0.239306	8						
Total	4.27278078		2.5976380	9						
ANOVA Assumptions										
Attribute	Test		Statistic	Critical	P-Value	Decision(0.01)				
Variances	Variance Ratio F		18.43950	23.15450	0.01533	Equal Variances				
Distribution	Shapiro-Wilk W		0.94001		0.55310	Normal Distribution				
Data Summary										
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	0.78581	0.64199	0.99402	0.15691				

## Graphics



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 1:10 PM  
 Analysis: 16-2675-7737/B158902psB

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	10-2605-3685	10-2605-3685	19 Jul-06 1:10 PM	CETISv1.1.2

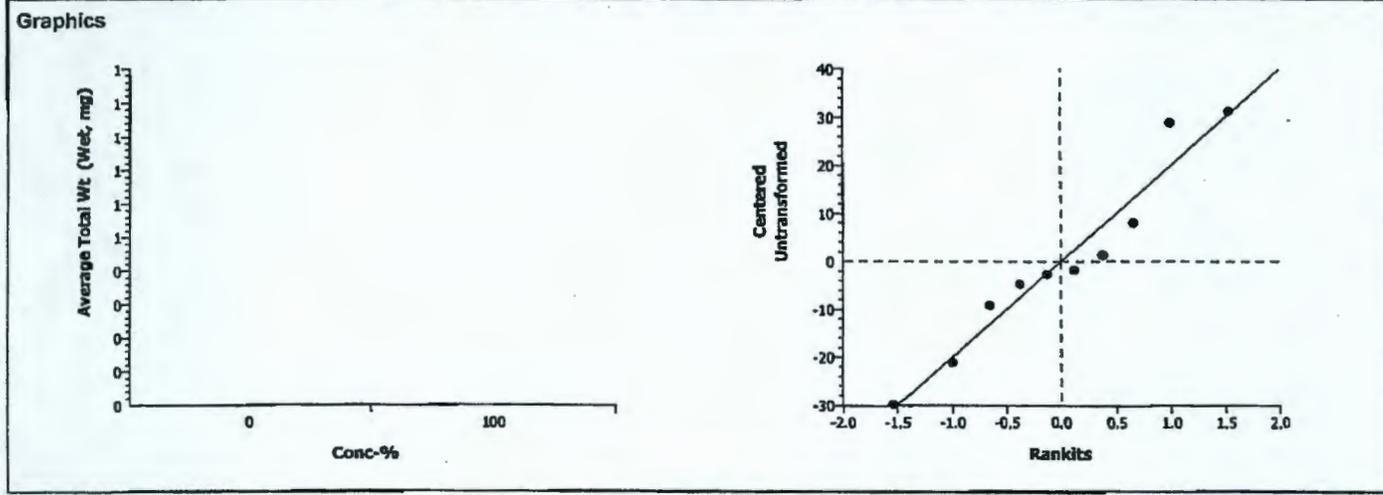
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	31.03%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.44714	1.85955	0.0044	23.993	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4945.523	4945.523	1	11.88	0.00873	Significant Effect
Error	3329.542	416.1927	8			
Total	8275.06445	5361.7156	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	32.99450	23.15450	0.00509	Unequal Variances	
Distribution	Shapiro-Wilk W	0.94020		0.55522	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	32.838	28.05	40.778	4.9483				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 1:10 PM  
 Analysis: 04-1777-4908/B158902psB

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	10-2605-3685	10-2605-3685	19 Jul-06 1:10 PM	CETISv1.1.2

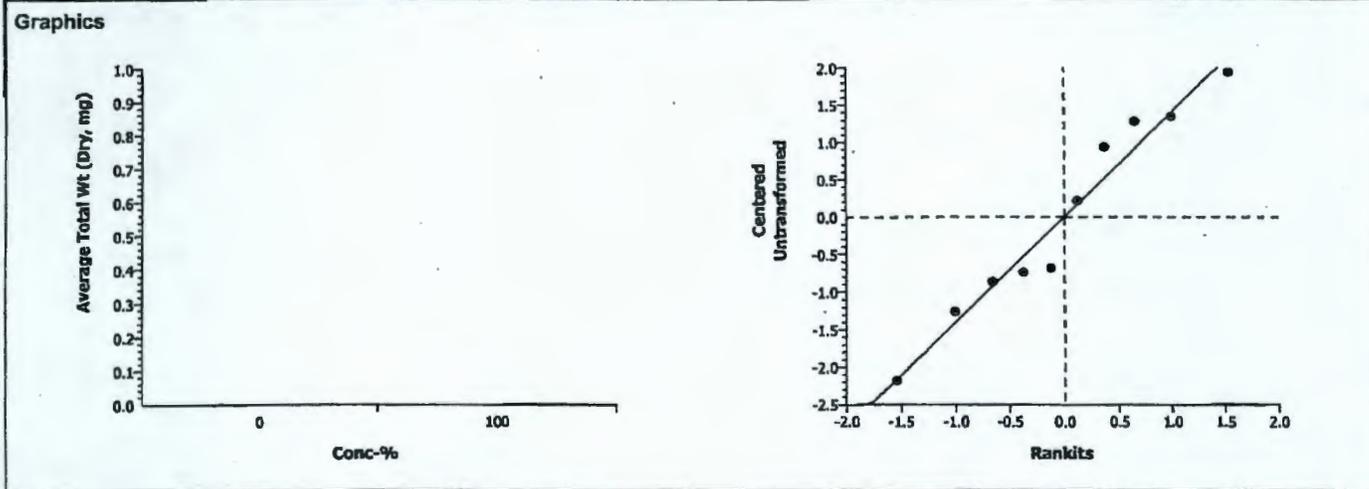
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	23.91%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.25103	1.85955	0.0058	1.67645	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	21.47569	21.47569	1	10.57	0.01168	Significant Effect
Error	16.2553	2.031912	8			
Total	37.7309875	23.507601	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.64381	23.15450	0.36922	Equal Variances
Distribution	Shapiro-Wilk W	0.94718		0.63530	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	1.71714				
100		5	4.08001	3.21599	5.42603	1.05606				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: May 11, 2006

6-2-06

Day 0 PP Day 12 NJ Day 14 NJ Day 16 NJ Day 18 DW Day 20 PP Day 22 PP Day 23 - Day 27 B Day 29 B

Bioassay Lab ID: BG 1589-03 Sample No: 5115/2

CONC.	REPLICATE	# seeds germinated							pH		
		12 days after planting	14 days after planting	16 days after planting	20 days after planting	22 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting)	14-DAYS POST-EMERGENCE (34 days after planting)	INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	7	7	7	7	8		8-5	5	9.2	7.9
	B	6	6	7	7	8		8-5	5		
	C	2	3	3	3	3		3	3		
	D	3	3	3	5	5		6-5	5		
	E	4	4	4	4	4		6-3	3		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 5 med G removed: 3 med G  
 Replicate B: 5 med G removed: 2 Sm G, 1 Sm B  
 Replicate C: 2 med G, 1 med w/ some yellowing on 1 shoot.  
 Replicate D: 2 med G removed: 1 Sm G  
 Replicate E: 1 Lg G, 2 med G removed: 1 dead Sm

Appearance Code: Good (G) = deep green color with no brown. Brown (B) = brown color noted. # Lg = # of large plants (tallest, 6+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 4 med G, 1 med G w/ 1 B shoot  
 Replicate B: 1 extra large G, 4 Lg G  
 Replicate C: 3 med G  
 Replicate D: 2 med G, 1 med G w/ 1 B shoot, 2 Sm G  
 Replicate E: 1 Lg G w/ 1 B shoot, 1 med G w/ 1 B shoot, 1 Sm G

Measure Shoot Height:

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	66 mm	69 mm	71 mm	69 mm	50 mm
Replicate B	120 mm	77 mm	58 mm	50 mm	77 mm
Replicate C	70 mm	71 mm	67 mm		
Replicate D	82 mm	60 mm	56 mm	73 mm	43 mm
Replicate E	52 mm	78 mm	32 mm		

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1226.00	1307.3	1242.09
Replicate B	1228.20	1363.3	1245.97
Replicate C	1237.84	1278.3	1245.38
Replicate D	1226.91	1279.6	1237.71
Replicate E	1234.33	1273.5	1242.98

Describe root appearance:

Replicate A: \_\_\_\_\_  
 Replicate B: \_\_\_\_\_  
 Replicate C: \_\_\_\_\_  
 Replicate D: \_\_\_\_\_  
 Replicate E: \_\_\_\_\_

Measure Root Length:

Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	58 mm	55 mm	144 mm	77 mm	53 mm
Replicate B	60 mm	64 mm	43 mm	88 mm	95 mm
Replicate C	79 mm	51 mm	50 mm		
Replicate D	11 mm	62 mm	56 mm	24 mm	130 mm
Replicate E	15 mm	37 mm	69 mm		

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1242.79	1320.3	1249.77
Replicate B	1246.94	1318.3	1254.41
Replicate C	1248.43	1287.6	1252.44
Replicate D	1251.22	1313.5	1255.43
Replicate E	1244.81	1282.7	1248.48

Comments:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

# CETIS Test Summary

Report Date: 19 Jul-06 1:13 PM  
 Test Link: 11-6712-6994/B158903psB

Plant Bioassay - Chronic CH2M Hill

Test No: 04-3852-3822	Test Type: Plant Chronic	Duration: N/A
Start Date: 11 May-06	Protocol: ASTM E1963-02 (2002)	Species: Poa sandbergii
Ending Date:	Dil Water:	Source:
Setup Date: 11 May-06	Brine:	

Comments: recalculated Height and Length data July 19, 2006

Sample No: 03-4747-8126	Code: B1589-03	Client:
Sample Date: 01 May-06 05:00 PM	Material: Soil	Project:
Receive Date:	Source: Hanford	
Sample Age: 9d 7h	Station:	

Comments: J11JY2

Comparison Summary						
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
09-5816-7499	% Germination	100	> 100	N/A	30.95%	Wilcoxon Rank Sum Two-Sample
03-0219-0774	Average Height (mm)	< 100	100	N/A	11.88%	Equal Variance t Two-Sample
14-2305-2426	Average Length (mm)	< 100	100	N/A	17.84%	Equal Variance t Two-Sample
05-6370-5197	Average AG Wt (Wet, mg)	< 100	100	N/A	26.40%	Equal Variance t Two-Sample
07-2220-4632	Average AG Wt (Dry, mg)	< 100	100	N/A	19.34%	Equal Variance t Two-Sample
07-8090-7123	Average Root Wt. (Wet, mg)	< 100	100	N/A	38.69%	Equal Variance t Two-Sample
17-4229-8003	Average Root Wt. (Dry, mg)	100	> 100	N/A	34.06%	Equal Variance t Two-Sample
07-6478-7791	Average Total Wt (Wet, mg)	< 100	100	N/A	31.55%	Equal Variance t Two-Sample
04-6985-8492	Average Total Wt (Dry, mg)	< 100	100	N/A	22.37%	Equal Variance t Two-Sample

Report Date:

19 Jul-06 1:13 PM

## CETIS Test Summary

Test Link:

11-6712-6994/B158903psB

% Germination Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
Average Height (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	65.700	54	76.400	3.7513	8.3881	12.77%
Average Length (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	60.740	40.3	76.800	6.2416	13.957	22.98%
Average AG Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	16.072	10.538	27.020	2.8835	6.4478	40.12%
Average AG Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	2.86573	2.15999	3.55400	0.24702	0.55235	19.27%
Average Root Wt. (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	13.583	12.456	15.502	0.5750	1.2858	9.47%
Average Root Wt. (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.25839	0.84202	1.49402	0.11295	0.25257	20.07%
Average Total Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	29.656	22.994	41.292	3.2377	7.2398	24.41%
Average Total Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	4.12413	3.00200	5.04802	0.34844	0.77913	18.89%

Report Date:

19 Jul-06 1:13 PM

Test Link:

11-6712-6994/B158903psB

## CETIS Test Summary

% Germination Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	1.00000	0.60000	0.60000
100		1.00000	1.00000	0.60000	1.00000	0.60000
Average Height (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		65	76.4000	70.3000	62.8	54
Average Length (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		76.8000	70	60	56.6	40.3
Average AG Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		16.2600	27.0200	13.4867	10.538	13.0567
Average AG Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		3.21799	3.55400	2.51335	2.15999	2.88334
Average Root Wt. (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		15.5020	14.2720	13.0566	12.4560	12.63
Average Root Wt. (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		1.39600	1.49402	1.33663	0.84202	1.22331
Average Total Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		31.7620	41.2920	26.5433	22.994	25.6866
Average Total Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		4.61399	5.04802	3.84998	3.00200	4.10665

# CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

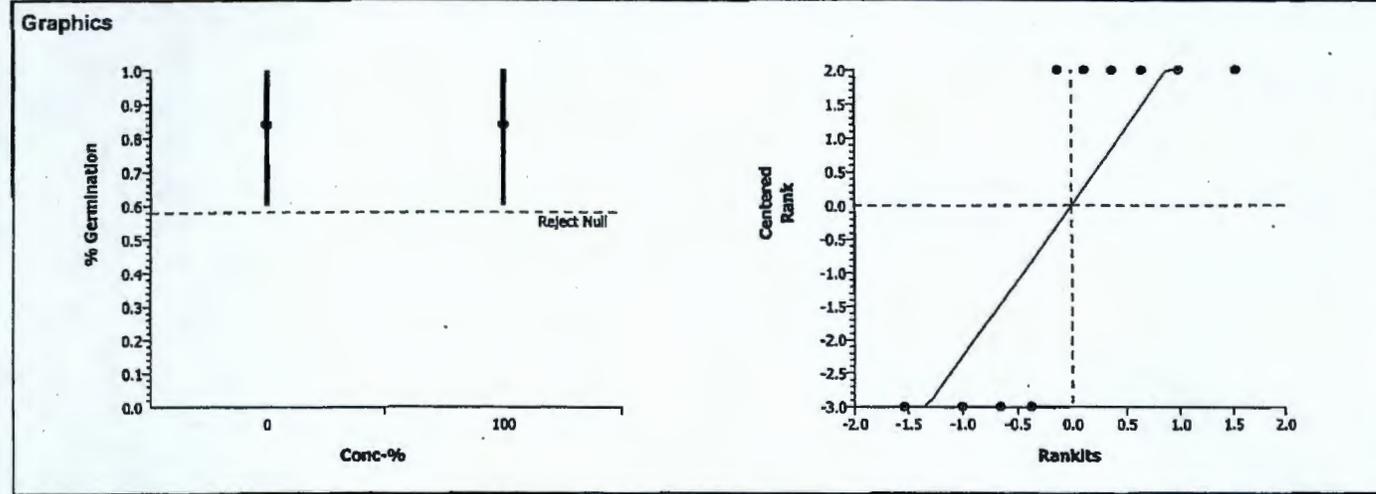
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	30.95%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedl		100	27.5		0.5000	5	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0	0	1	0.00	1.00000	Non-Significant Effect
Error	0.5060879	0.063261	8			
Total	0.5060879	0.063261	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00000	23.15450	1.00000	Equal Variances
Distribution	Shapiro-Wilk W	0.64049		0.00017	Non-normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.21909	5.50000	2.50000	7.50000	2.73861
100		5	0.84000	0.60000	1.00000	0.21909	5.50000	2.50000	7.50000	2.73861



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 1:13 PM  
 Analysis: 03-0219-0774/B158903ps8

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

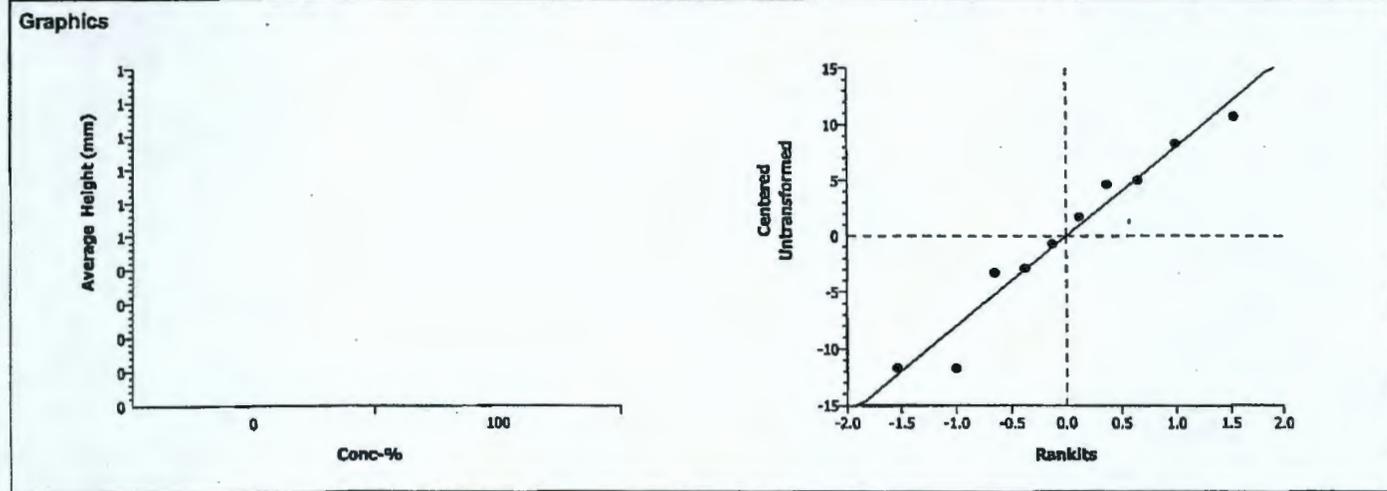
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	11.88%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.84692	1.85955	0.0108	9.53642	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	532.9	532.9	1	8.10	0.02158	Significant Effect
Error	526.0001	65.75002	8			
Total	1058.90009	598.64998	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.15080	23.15450	0.89500	Equal Variances	
Distribution	Shapiro-Wilk W	0.93923		0.54443	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	65.700	54	76.4	8.3881				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

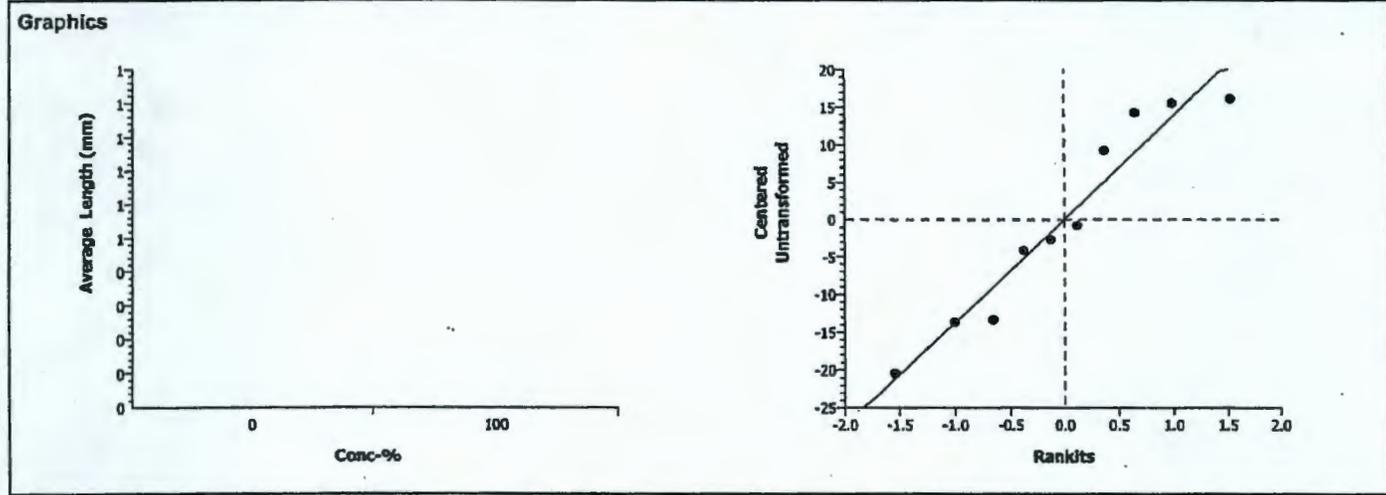
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	17.84%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.62073	1.85955	0.0034	16.6093	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2614.689	2614.689	1	13.11	0.00678	Significant Effect
Error	1595.58	199.4475	8			
Total	4210.26917	2814.1365	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.04784	23.15450	0.96496	Equal Variances	
Distribution	Shapiro-Wilk W	0.91387		0.30863	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	60.740	40.3	76.8	13.957				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 1:13 PM  
 Analysis: 05-6370-5197/B158903psB

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

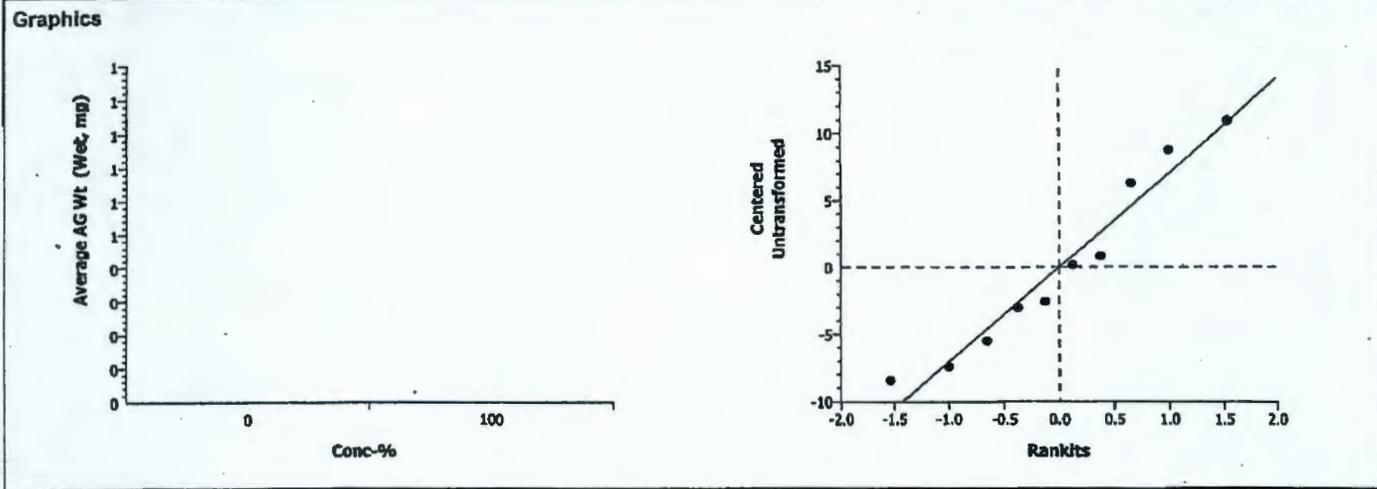
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	26.40%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.49955	1.85955	0.0040	8.4345	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	629.895	629.895	1	12.25	0.00808	Significant Effect
Error	411.4655	51.43319	8			
Total	1041.36050	681.32821	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.47430	23.15450	0.71599	Equal Variances	
Distribution	Shapiro-Wilk W	0.93470		0.49573	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	31.945	23.460	40.732	7.8289				
100		5	16.072	10.538	27.020	6.4478				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 1:13 PM  
 Analysis: 07-2220-4632/B158903psB

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

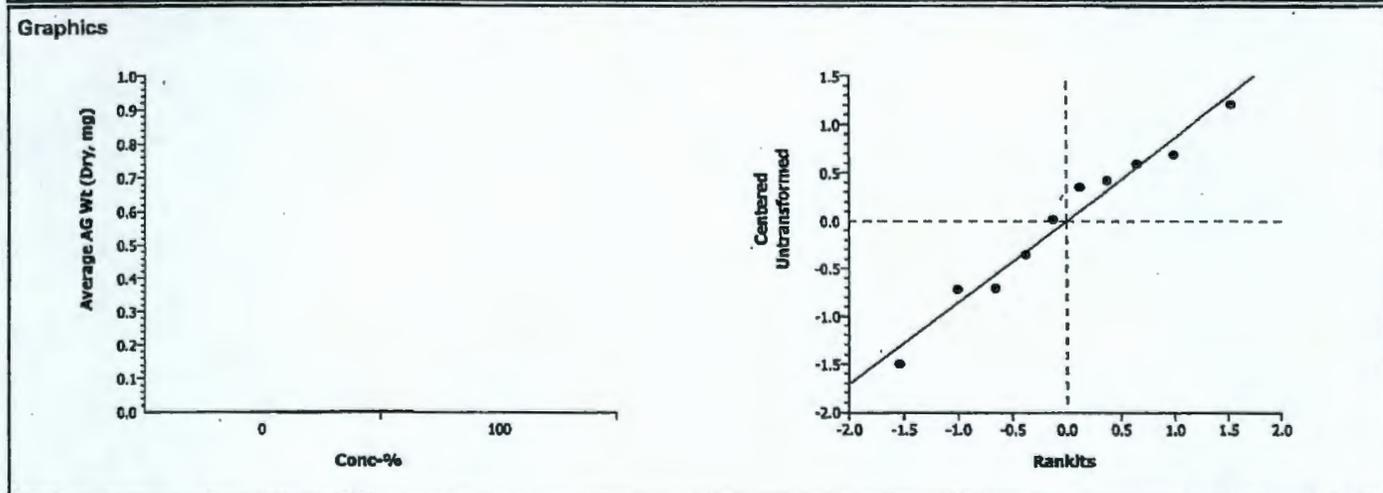
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	19.34%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.36938	1.85955	0.0012	1.01636	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	14.25793	14.25793	1	19.09	0.00238	Significant Effect
Error	5.97456	0.74682	8			
Total	20.2324886	15.004749	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	3.89569	23.15450	0.21625	Equal Variances	
Distribution	Shapiro-Wilk W	0.96608		0.85233	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	2.86573	2.15999	3.55400	0.55235				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 1:13 PM  
 Analysis: 07-8090-7123/B158903psB

Plant Bioassay - Chronic	CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

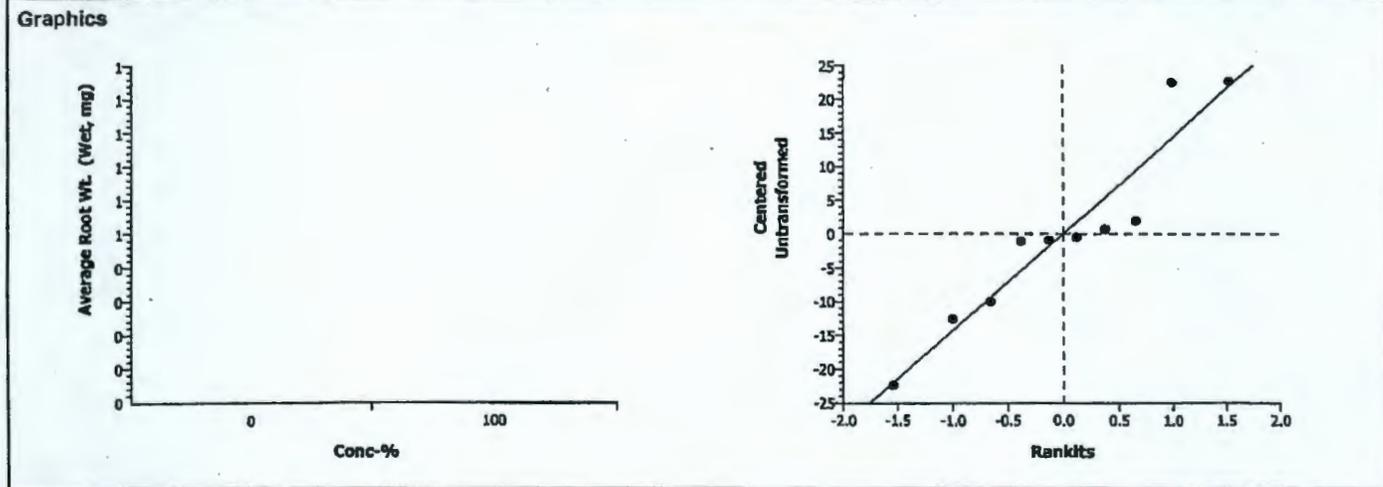
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	38.69%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.36715	1.85955	0.0049	17.5543	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2525.917	2525.917	1	11.34	0.00983	Significant Effect
Error	1782.309	222.7887	8			
Total	4308.22668	2748.7061	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	268.52560	23.15450	0.00008	Unequal Variances	
Distribution	Shapiro-Wilk W	0.90428		0.24399	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	13.583	12.456	15.502	1.2858				



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 1:13 PM  
 Analysis: 17-4229-8003/B158903psB

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

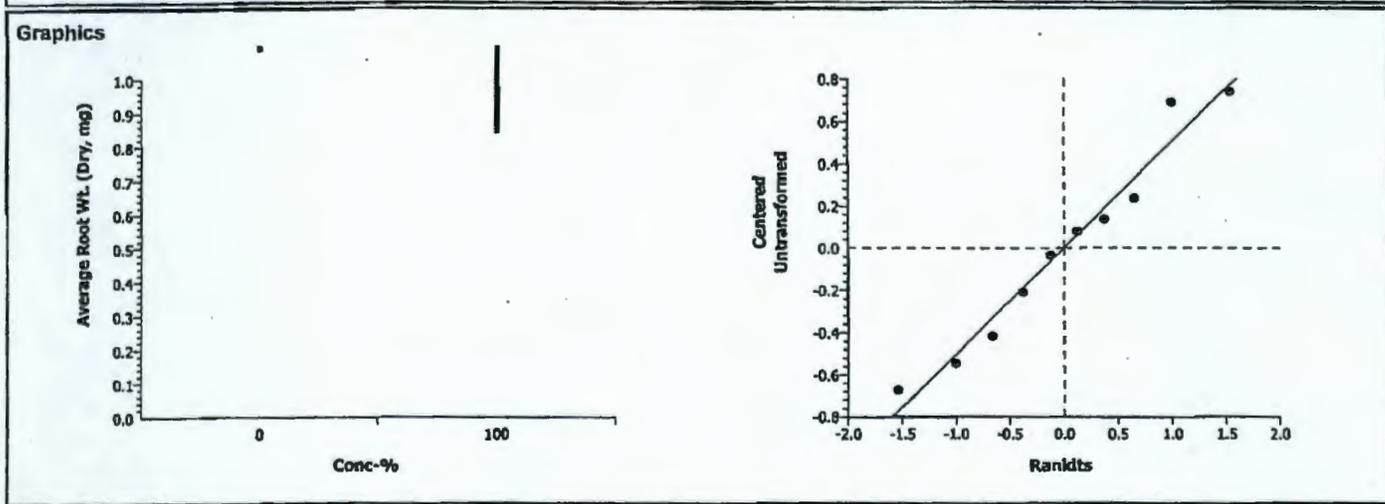
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.06%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.5496	1.85955	0.0799	0.59841	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.6216678	0.621668	1	2.40	0.15983	Non-Significant Effect
Error	2.071142	0.258893	8			
Total	2.69280952	0.8805605	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.11655	23.15450	0.08360	Equal Variances
Distribution	Shapiro-Wilk W	0.95079		0.67786	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.25839	0.84202	1.49402	0.25257				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 1:13 PM  
 Analysis: 07-6478-7791/B158903psB

Plant Bioassay - Chronic					CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

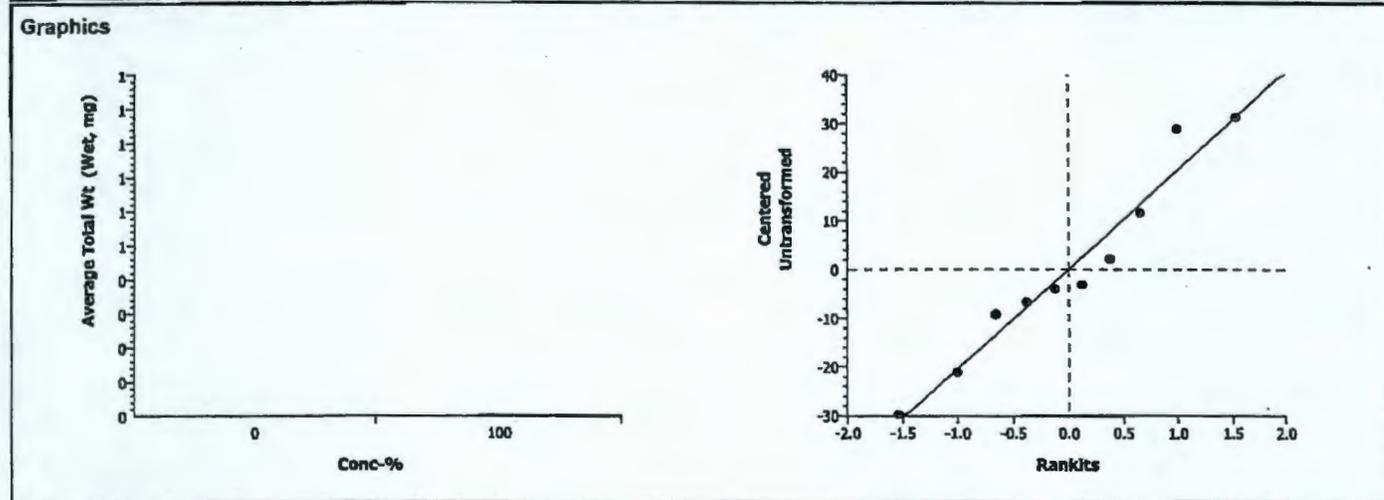
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	31.55%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.63334	1.85955	0.0033	24.3922	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5678.559	5678.559	1	13.20	0.00665	Significant Effect
Error	3441.258	430.1572	8			
Total	9119.81665	6108.7163	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	15.41355	23.15450	0.02137	Equal Variances
Distribution	Shapiro-Wilk W	0.94644		0.62666	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	29.656	22.994	41.292	7.2398				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 1:13 PM  
 Analysis: 04-6985-8492/B158903psB

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

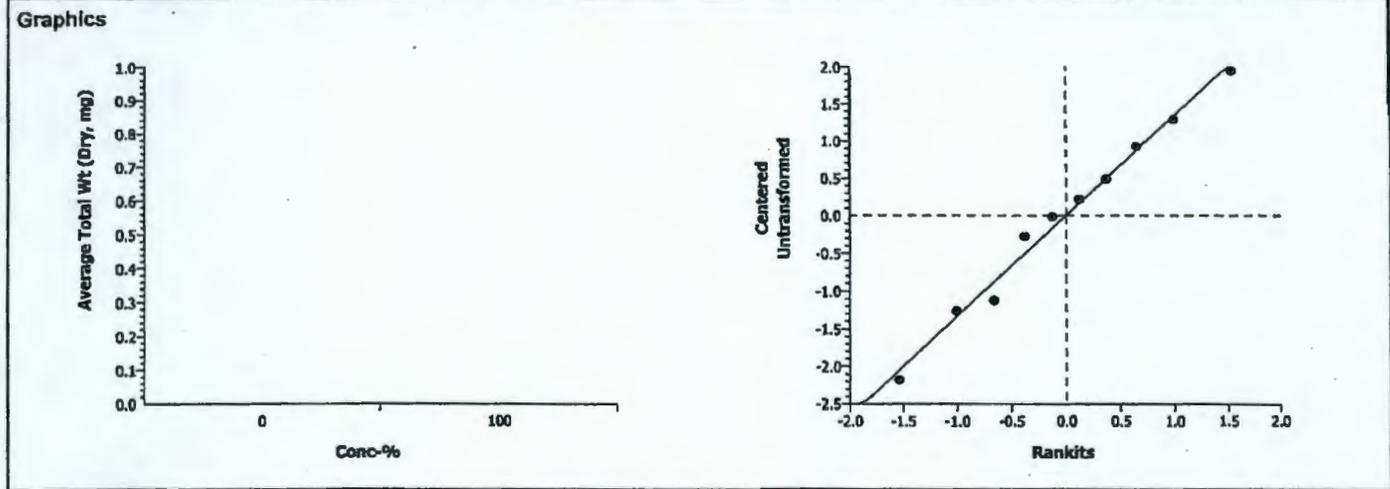
Method	Ajt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	22.37%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.4233	1.85955	0.0045	1.56812	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	20.83399	20.83399	1	11.72	0.00904	Significant Effect
Error	14.2224	1.7778	8			
Total	35.0563898	22.611790	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.85723	23.15450	0.15498	Equal Variances
Distribution	Shapiro-Wilk W	0.98453		0.98479	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	1.71714				
100		5	4.12413	3.00200	5.04802	0.77913				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

6-2-06

Test Start Date: May 11, 2006

Initials: TP Day 0 TP Day 12 NT Day 14 NJ Day 16 NJ Day 18 DW Day 20 TP Day 22 TP Day 23 - Day 27 Dr Day 31 Dr

Bioassay Lab ID: BG 1589-04 Sample No: J15W4

CONC.	REPLICATE	# seeds germinated							pH		
		12 days after planting	14 days after planting	16 days after planting	20 days after planting	22 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting)	14-DAYS POST-EMERGENCE (34 days after planting)	INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	5	5	5	5	5		5	5	8.1	7.5
	B	4	4	4	6	6		4	4		
	C	5	5	5	6	6		5	5		
	D	4	4	4	5	5		4	4		
	E	5	5	6	6	6		6-5	5		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 5 med G  
 Replicate B: 1 lg G, 3 med G removed: 2 dead Sm  
 Replicate C: 5 med G removed: 1 dead Sm  
 Replicate D: 1 lg G, 3 med G removed: 1 dead Sm  
 Replicate E: 5 med G removed: 1 Sm G

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted. # Lg = # of large plants (tallest, 6+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 Lg G, 2 med G  
 Replicate B: 2 Lg G, 2 med G  
 Replicate C: 5 med G  
 Replicate D: 4 Lg G  
 Replicate E: 2 Lg G, 1 Lg G w/ 1 B shoot, 2 med G

Measure Shoot Height:

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	103 mm	81 mm	76 mm	83 mm	58 mm
Replicate B	67 mm	85 mm	122 mm	105 mm	mm
Replicate C	93 mm	72 mm	70 mm	91 mm	76 mm
Replicate D	89 mm	74 mm	101 mm	114 mm	mm
Replicate E	75 mm	88 mm	96 mm	86 mm	95 mm

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare WL (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1240.97	1356.0	1259.79
Replicate B	1250.36	1367.6	1268.59
Replicate C	1248.12	1382.1	1268.86
Replicate D	1243.80	1389.3	1266.84
Replicate E	1242.01	1351.4	1260.17

Describe root appearance:

Replicate A: \_\_\_\_\_  
 Replicate B: \_\_\_\_\_  
 Replicate C: \_\_\_\_\_  
 Replicate D: \_\_\_\_\_  
 Replicate E: \_\_\_\_\_

Measure Root Length:

Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	82 mm	74 mm	52 mm	52 mm	95 mm
Replicate B	56 mm	109 mm	87 mm	51 mm	mm
Replicate C	46 mm	90 mm	83 mm	86 mm	102 mm
Replicate D	67 mm	82 mm	86 mm	117 mm	mm
Replicate E	73 mm	17 mm	70 mm	47 mm	33 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1252.26	1338.9	1257.13
Replicate B	1246.48	1347.9	1251.29
Replicate C	1242.89	1368.2	1247.96
Replicate D	1263.97	1413.1	1269.65
Replicate E	1248.21	1326.1	1252.75

Comments:

\_\_\_\_\_  
 \_\_\_\_\_

## CETIS Test Summary

Report Date:

19 Jul-06 1:20 PM

Test Link:

08-7845-1822/B158904psB

Plant Bioassay - Chronic		CH2M Hill				
Test No:	07-4891-1713	Test Type:	Plant Chronic	Duration:	N/A	
Start Date:	11 May-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii	
Ending Date:		Dil Water:		Source:		
Setup Date:	11 May-06	Brine:				
Comments:	recalculated Height and Length data July 19, 2006					
Sample No:	11-1984-5444	Code:	B1589-04	Client:		
Sample Date:	02 May-06 02:00 PM	Material:	Soil	Project:		
Receive Date:		Source:	Hanford			
Sample Age:	8d 10h	Station:				
Comments:	J11JW4					
Comparison Summary						
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
20-0020-1372	% Germination	100	> 100	N/A	23.96%	Equal Variance t Two-Sample
12-4539-1478	Average Height (mm)	100	> 100	N/A	10.34%	Equal Variance t Two-Sample
13-9817-5542	Average Length (mm)	< 100	100	N/A	18.16%	Equal Variance t Two-Sample
09-6602-1604	Average AG Wt (Wet, mg)	100	> 100	N/A	25.36%	Equal Variance t Two-Sample
09-9100-0647	Average AG Wt (Dry, mg)	100	> 100	N/A	21.94%	Equal Variance t Two-Sample
06-8388-0724	Average Root Wt. (Wet, mg)	< 100	100	N/A	41.70%	Equal Variance t Two-Sample
19-3025-2502	Average Root Wt. (Dry, mg)	< 100	100	N/A	33.37%	Equal Variance t Two-Sample
10-5216-2248	Average Total Wt (Wet, mg)	100	> 100	N/A	34.25%	Equal Variance t Two-Sample
01-2502-6544	Average Total Wt (Dry, mg)	100	> 100	N/A	23.94%	Equal Variance t Two-Sample

## CETIS Test Summary

Report Date:

19 Jul-06 1:20 PM

Test Link:

08-7845-1822/B158904psB

% Germination Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%
Average Height (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	88.580	80.2	94.800	2.7786	6.2131	7.01%
Average Length (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	70.980	48	88	6.4653	14.457	20.37%
Average AG Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	27.473	21.878	36.375	2.5917	5.7952	21.09%
Average AG Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	4.37230	3.63201	5.75998	0.38264	0.85562	19.57%
Average Root Wt. (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	24.121	15.578	37.283	3.8390	8.5843	35.59%
Average Root Wt. (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.10370	0.90801	1.42001	0.09300	0.20796	18.84%
Average Total Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	51.594	37.456	73.658	6.4147	14.344	27.80%
Average Total Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	5.47600	4.54001	7.17999	0.47453	1.06108	19.38%

## CETIS Test Summary

Report Date:

19 Jul-06 1:20 PM

Test Link:

08-7845-1822/B158904psB

% Germination Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	1.00000	0.60000	0.60000
100		1.00000	0.80000	1.00000	0.80000	1.00000
Average Height (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		80.2	94.8000	85.4000	94.5	88
Average Length (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		71	74.5	73.4000	88	48
Average AG Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		23.0060	29.31	26.796	36.375	21.8780
Average AG Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		3.76401	4.55750	4.14800	5.75998	3.63201
Average Root Wt. (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		17.3280	25.3550	25.062	37.2825	15.5780
Average Root Wt. (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		0.97400	1.20251	1.01399	1.42001	0.90801
Average Total Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		40.3340	54.6650	51.858	73.6575	37.4560
Average Total Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		4.73801	5.76001	5.16199	7.17999	4.54001

# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	08-7845-1822	08-7845-1822	19 Jul-06 1:19 PM	CETISv1.1.2

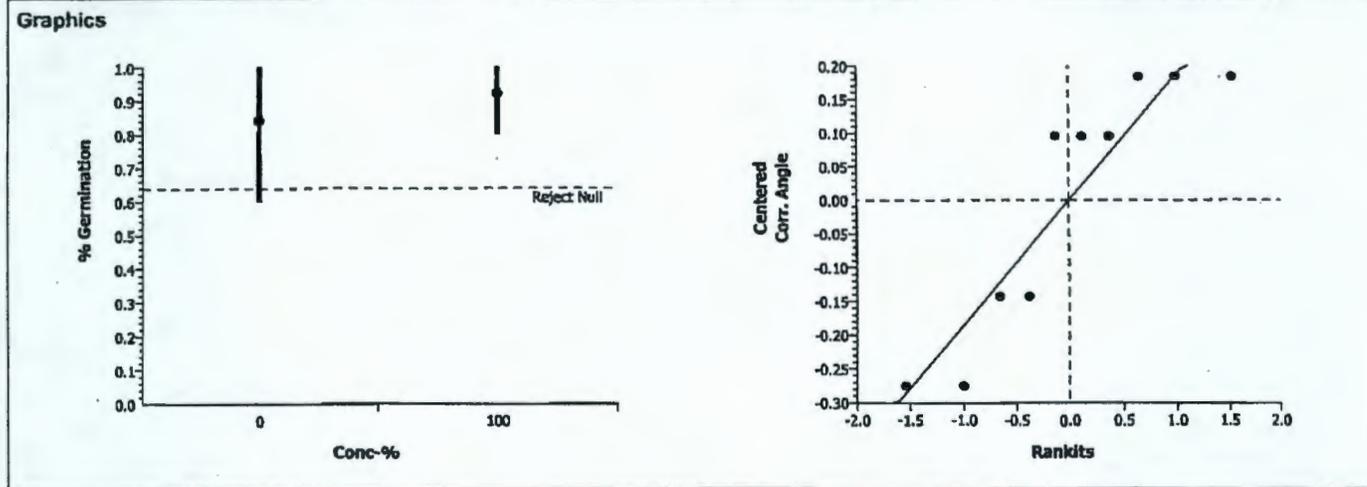
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	23.96%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.6979	1.85955	0.7475	0.23562	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0195491	0.019549	1	0.49	0.50502	Non-Significant Effect
Error	0.3210934	0.040137	8			
Total	0.34064250	0.0596857	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	3.71853	23.15450	0.23141	Equal Variances	
Distribution	Shapiro-Wilk W	0.82202		0.02681	Normal Distribution	

Data Summary		Original Data					Transformed Data				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.21909	1.16160	0.88608	1.34528	0.25152	
100		5	0.92000	0.80000	1.00000	0.10954	1.25003	1.10715	1.34528	0.13043	



# CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2

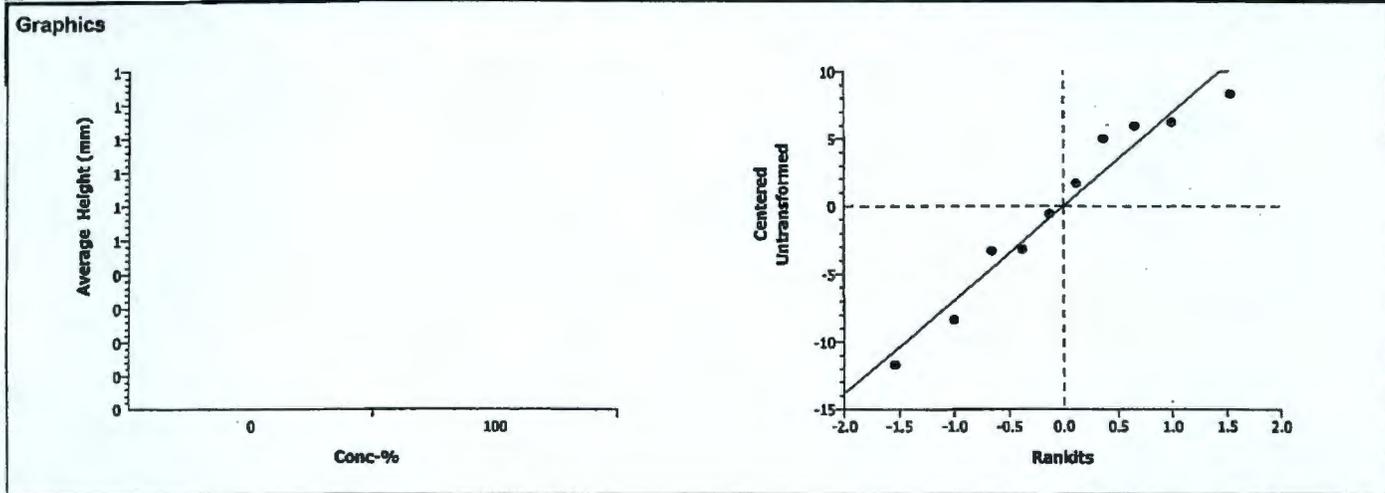
Method	Ajt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	10.34%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-1.8539	1.85955	0.9496	8.30542	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	171.396	171.396	1	3.44	0.10088	Non-Significant Effect
Error	398.9681	49.87101	8			
Total	570.364120	221.26702	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.58386	23.15450	0.66682	Equal Variances	
Distribution	Shapiro-Wilk W	0.93842		0.53555	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	88.580	80.2	94.8	6.2131				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2

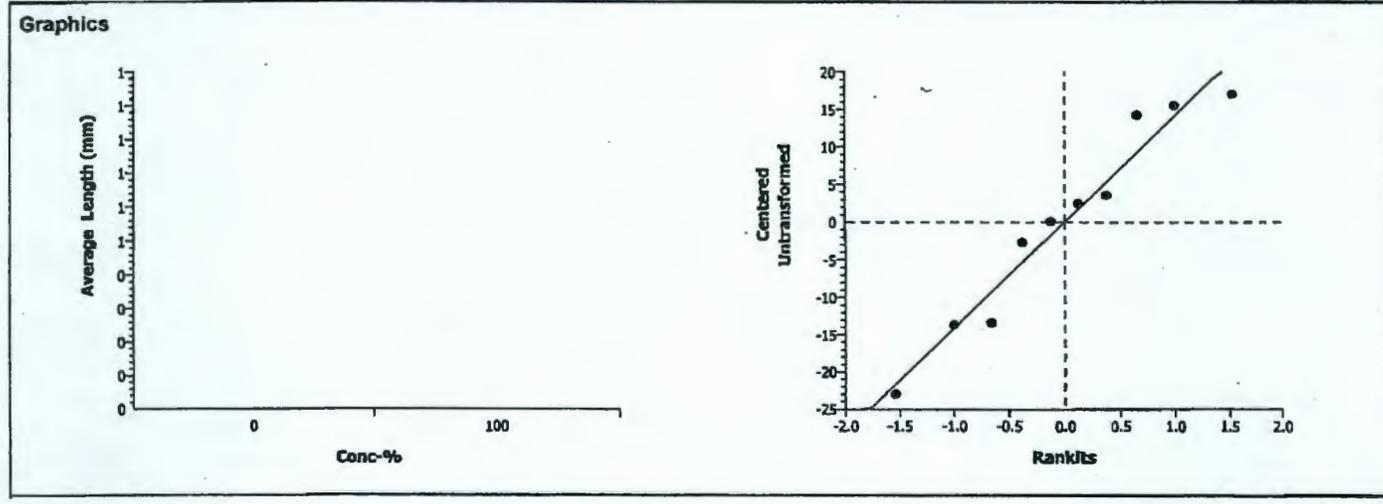
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	18.16%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.43134	1.85955	0.0206	16.9027	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1221.025	1221.025	1	5.91	0.04112	Significant Effect
Error	1652.436	206.5545	8			
Total	2873.46106	1427.5795	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.02398	23.15450	0.98223	Equal Variances
Distribution	Shapiro-Wilk W	0.93601		0.50953	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	70.980	48	88	14.457				



# CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2

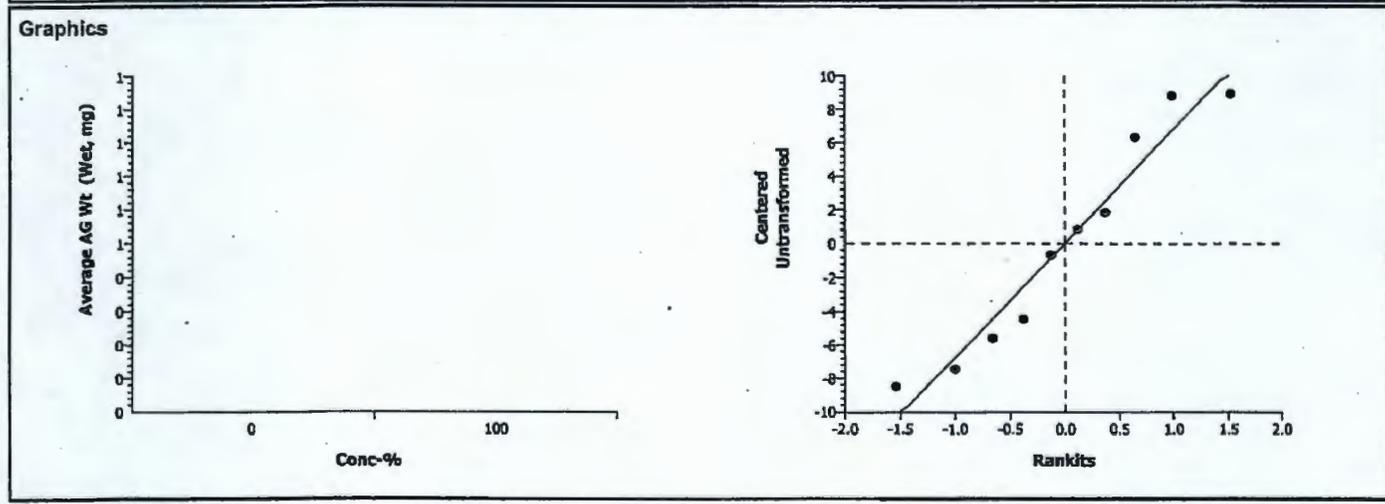
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	25.36%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.02672	1.85955	0.1673	8.10032	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	50.00734	50.00734	1	1.05	0.33459	Non-Significant Effect
Error	379.5063	47.43829	8			
Total	429.513653	97.445625	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.82504	23.15450	0.57439	Equal Variances
Distribution	Shapiro-Wilk W	0.92161		0.37060	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	31.945	23.460	40.732	7.8289				
100		5	27.473	21.878	36.375	5.7952				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 1:20 PM  
 Analysis: 09-9100-0647/B158904psB

Plant Bioassay - Chronic CH2M HILL

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2

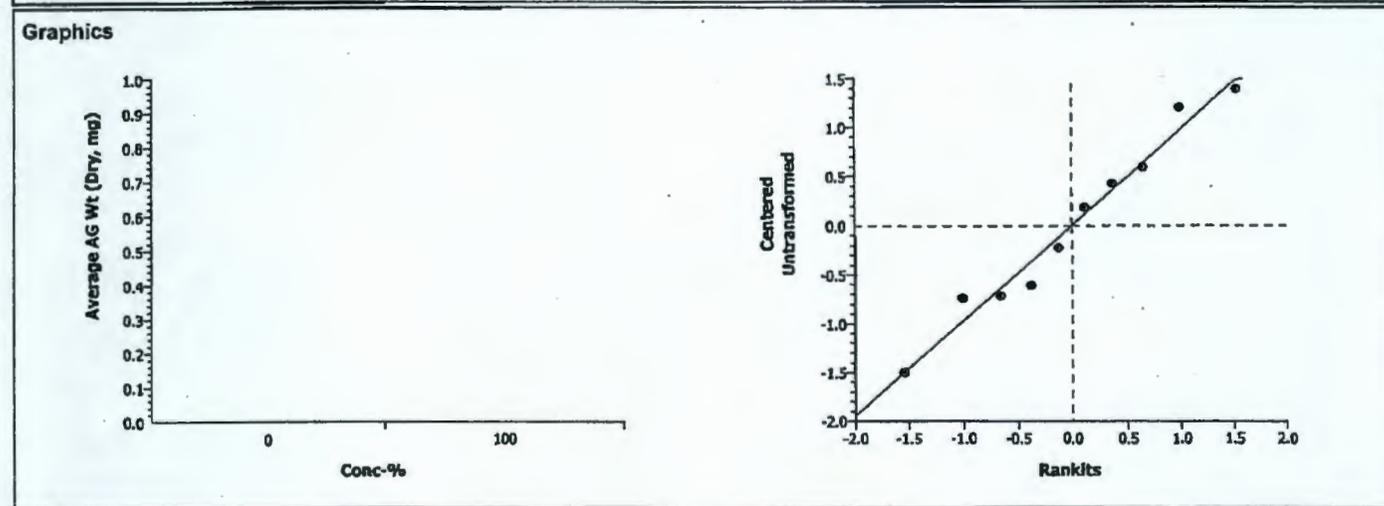
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	21.94%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.42239	1.85955	0.0964	1.15251	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.942901	1.942901	1	2.02	0.19271	Non-Significant Effect
Error	7.682498	0.960312	8			
Total	9.62539876	2.9032130	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.62353	23.15450	0.65021	Equal Variances	
Distribution	Shapiro-Wilk W	0.96452		0.83591	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	4.37230	3.63201	5.75998	0.85562				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 1:20 PM  
 Analysis: 06-8388-0724/B158904psB

Plant Bioassay - Chronic							CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2

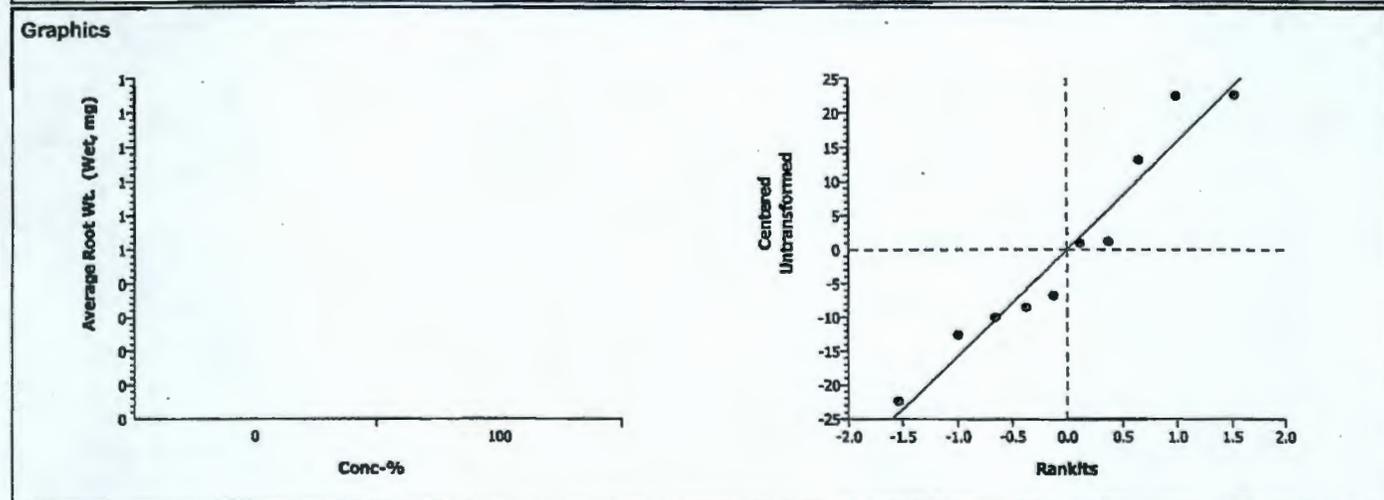
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	41.70%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedl		100	2.08838	1.85955	0.0351	18.9202	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1128.746	1128.746	1	4.36	0.07019	Non-Significant Effect
Error	2070.457	258.8072	8			
Total	3199.20374	1387.5536	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	6.02419	23.15450	0.11007	Equal Variances	
Distribution	Shapiro-Wilk W	0.92770		0.42565	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	24.121	15.578	37.283	8.5843				



# CETIS Analysis Detail

Plant Bioassay - Chronic							CH2M Hill
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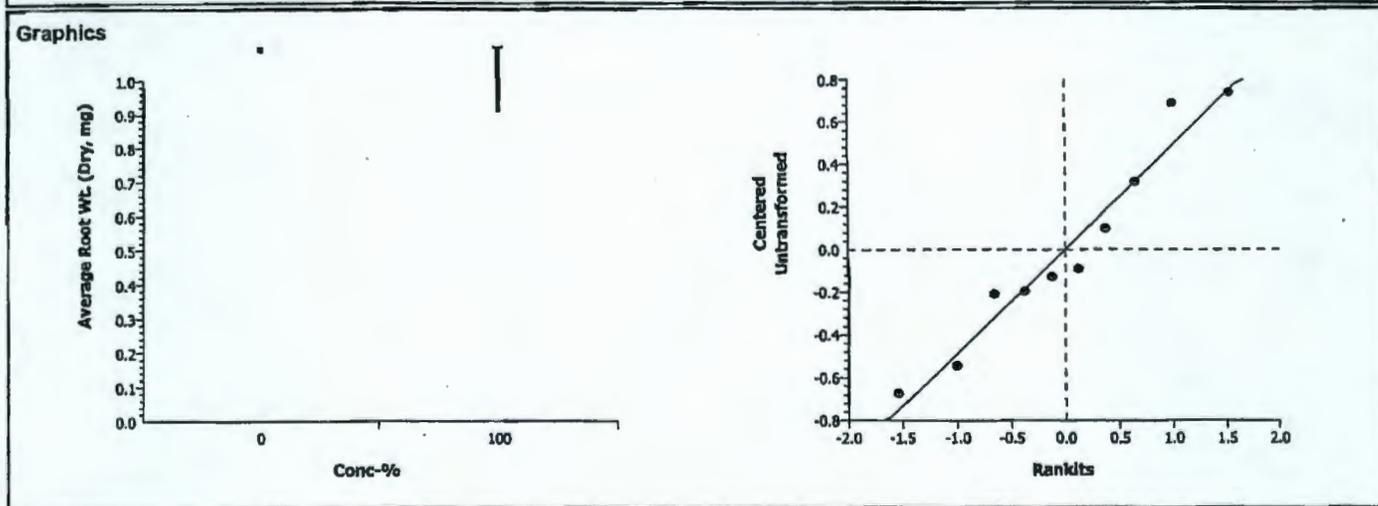
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
Average Root Wt. (Dry, mg)	Comparison	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	33.37%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.07182	1.85955	0.0360	0.58641	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.067179	1.067179	1	4.29	0.07203	Non-Significant Effect
Error	1.988951	0.248619	8			
Total	3.05612957	1.3157977	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	10.49787	23.15450	0.04275	Equal Variances	
Distribution	Shapiro-Wilk W	0.93943		0.54668	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.10370	0.90801	1.42001	0.20796				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 1:20 PM  
 Analysis: 10-5216-2248/B158904psB

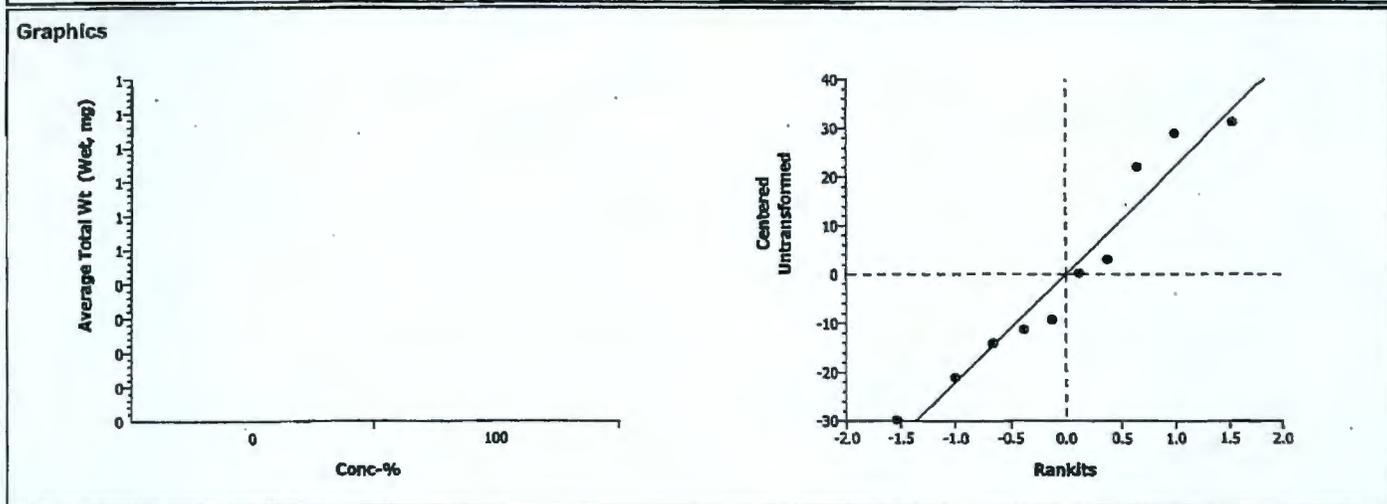
Plant Bioassay - Chronic							CH2M Hill	
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
Average Total Wt (Wet, mg)	Comparison	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.25%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.80647	1.85955	0.0542	26.4768	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1653.919	1653.919	1	3.26	0.10848	Non-Significant Effect
Error	4054.567	506.8209	8			
Total	5708.48657	2160.7403	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.92675	23.15450	0.21374	Equal Variances
Distribution	Shapiro-Wilk W	0.92955		0.44351	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	51.594	37.456	73.658	14.344				



# CETIS Analysis Detail

Plant Bioassay - Chronic							CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2

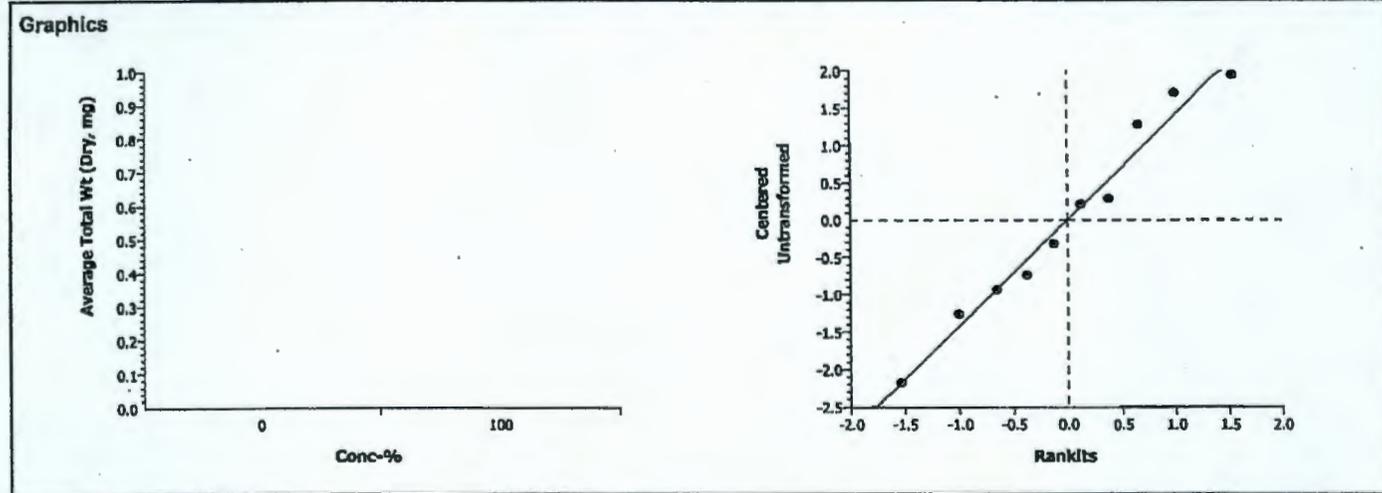
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	23.94%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.70034	1.85955	0.0637	1.67864	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5.889957	5.889957	1	2.89	0.12749	Non-Significant Effect
Error	16.29777	2.037222	8			
Total	22.1877303	7.9271786	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	2.61887	23.15450	0.37375	Equal Variances	
Distribution	Shapiro-Wilk W	0.96277		0.81692	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	1.71714				
100		5	5.47600	4.54001	7.17999	1.06108				





## CETIS Test Summary

 Report Date: 19 Jul-06 1:28 PM  
 Test Link: 13-4078-7643/B158905psB

Plant Bioassay - Chronic		CH2M Hill				
Test No: 02-8874-0620	Test Type: Plant Chronic	Duration: N/A				
Start Date: 11 May-06	Protocol: ASTM E1963-02 (2002)	Species: Poa sandbergii				
Ending Date:	Dil Water:	Source:				
Setup Date: 11 May-06	Brine:					
Comments: recalculated Height and Length data July 19, 2006						
Sample No: 10-1372-6560	Code: B1589-05	Client:				
Sample Date: 02 May-06 05:37 PM	Material: Soil	Project:				
Receive Date:	Source: Hanford					
Sample Age: 8d 6h	Station:					
Comments: J11K46						
Comparison Summary						
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
05-0814-8974	% Germination	100	> 100	N/A	33.67%	Equal Variance t Two-Sample
06-4527-7411	Average Height (mm)	100	> 100	N/A	12.65%	Equal Variance t Two-Sample
14-4375-6660	Average Length (mm)	100	> 100	N/A	22.98%	Equal Variance t Two-Sample
05-7021-4278	Average AG Wt (Wet, mg)	100	> 100	N/A	43.35%	Equal Variance t Two-Sample
07-7060-5007	Average AG Wt (Dry, mg)	100	> 100	N/A	33.74%	Equal Variance t Two-Sample
02-0026-0368	Average Root Wt (Wet, mg)	100	> 100	N/A	52.69%	Equal Variance t Two-Sample
17-4641-8711	Average Root Wt (Dry, mg)	100	> 100	N/A	46.91%	Equal Variance t Two-Sample
02-4839-9766	Average Total Wt (Wet, mg)	100	> 100	N/A	47.78%	Equal Variance t Two-Sample
03-0024-0421	Average Total Wt (Dry, mg)	100	> 100	N/A	36.25%	Equal Variance t Two-Sample

## CETIS Test Summary

Report Date:

19 Jul-06 1:28 PM

Test Link:

13-4078-7643/B158905psB

Average Root Wt. (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%	
100		5	4.46254	3.07501	7.58502	0.81932	1.83205	41.05%	
Average Root Wt. (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%	
100		5	35.028	15.647	66.710	8.7443	19.553	55.82%	
Average Total Wt (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	7.0109	4.834	8.954	0.7679	1.7171	24.49%	
100		5	6.0156	3.8550	10.255	1.1307	2.5283	42.03%	
Average Total Wt (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%	
100		5	65.665	34.690	122.57	15.268	34.14	51.99%	
Average AG Wt (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%	
100		5	30.636	19.043	55.855	6.5723	14.696	47.97%	
Average AG Wt (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%	
100		5	73.840	50	106.5	9.5676	21.394	28.97%	
Average Length (mm) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%	
100		5	77.040	70.300	93	4.1986	9.3884	12.19%	
Average Height (mm) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%	
100		5	0.76000	0.40000	1.00000	0.11662	0.26077	34.31%	
% Germination Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%	
100		5	0.76000	0.40000	1.00000	0.11662	0.26077	34.31%	

## CETIS Test Summary

Report Date:

19 Jul-06 1:28 PM

Test Link:

13-4078-7643/B158905psB

% Germination Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	1.00000	0.60000	0.60000
100		0.40000	1.00000	0.80000	1.00000	0.60000
Average Height (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		93	77.2	70.3000	74.4000	70.3000
Average Length (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		106.5	77	50	75.4000	60.3
Average AG Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		55.8550	29.73	19.0425	26.7080	21.8466
Average AG Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		7.58502	4.36599	3.07501	4.09001	3.19666
Average Root Wt. (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		66.7100	36.2120	15.6475	33.6520	22.9200
Average Root Wt. (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		2.66998	1.38000	0.78000	1.80200	1.13334
Average Total Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		122.565	65.942	34.6900	60.3600	44.7666
Average Total Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		10.2550	5.746	3.85501	5.89202	4.33

# CETIS Analysis Detail

Plant Bioassay - Chronic					CH2M HILL
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	13-4078-7643	13-4078-7643	19 Jul-06 1:28 PM	CETISv1.1.2

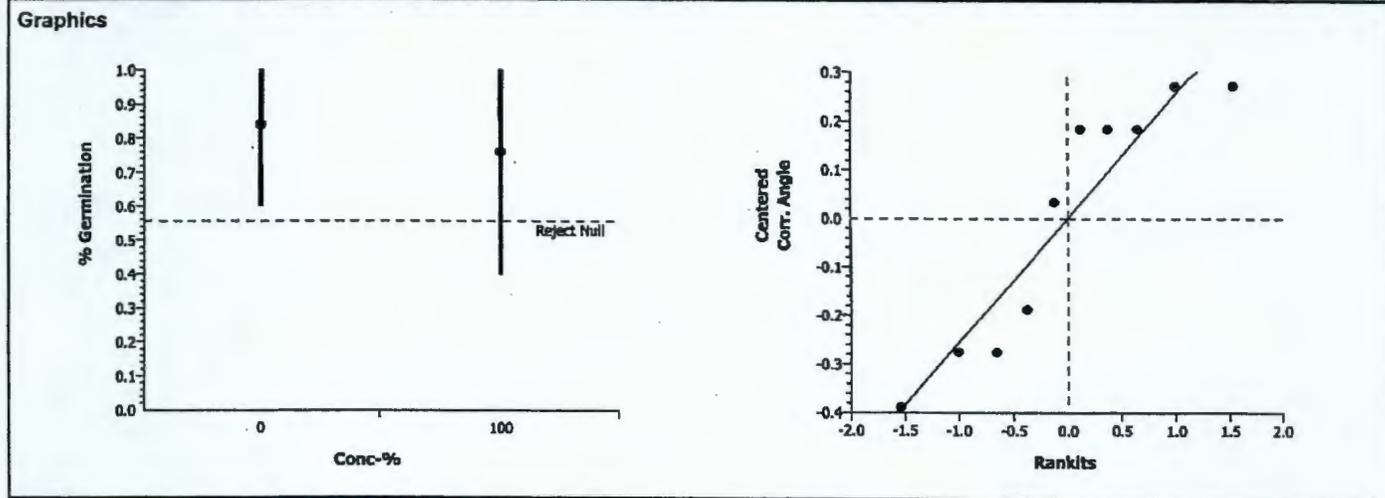
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	33.67%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.51255	1.85955	0.3111	0.3189	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0193153	0.019315	1	0.26	0.62211	Non-Significant Effect
Error	0.5881857	0.073523	8			
Total	0.60750106	0.0928385	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.32444	23.15450	0.79199	Equal Variances
Distribution	Shapiro-Wilk W	0.85463		0.06594	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.21909	1.16160	0.88608	1.34528	0.25152
100		5	0.76000	0.40000	1.00000	0.26077	1.07370	0.68472	1.34528	0.28946



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 1:28 PM  
 Analysis: 06-4527-7411/B158905psB

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	13-4078-7643	13-4078-7643	19 Jul-06 1:28 PM	CETISv1.1.2

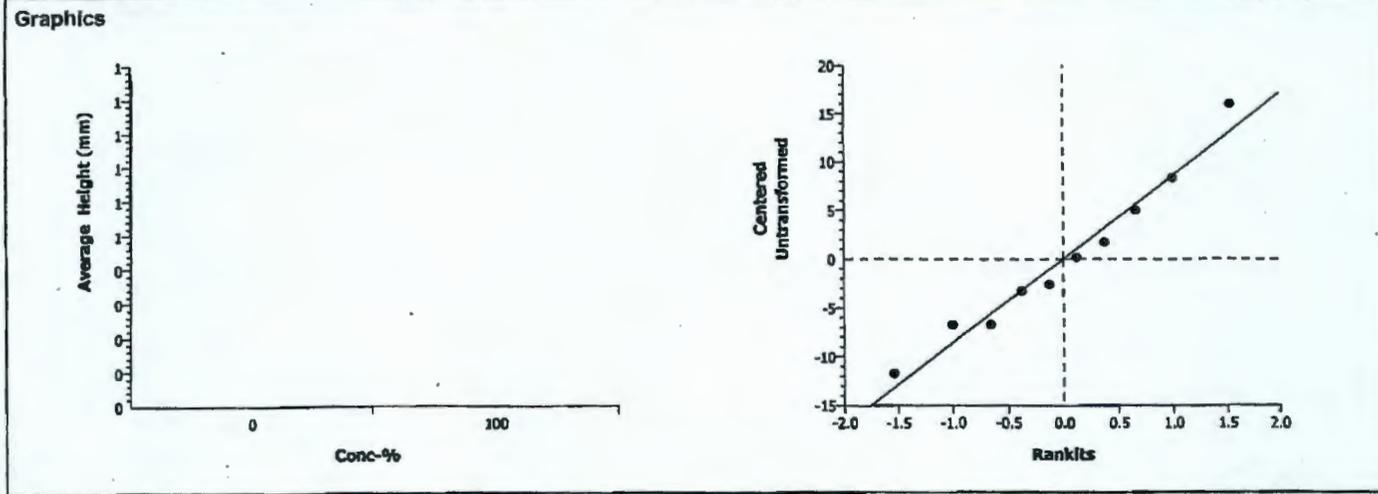
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	12.65%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.59662	1.85955	0.2836	10.1608	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	26.56898	26.56898	1	0.36	0.56726	Non-Significant Effect
Error	597.132	74.64149	8			
Total	623.700943	101.21048	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.44166	23.15450	0.73163	Equal Variances	
Distribution	Shapiro-Wilk W	0.96938		0.88508	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	77.040	70.3	93	9.3884				



# CETIS Analysis Detail

Plant Bioassay - Chronic					CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	13-4078-7643	13-4078-7643	19 Jul-06 1:28 PM	CETISv1.1.2

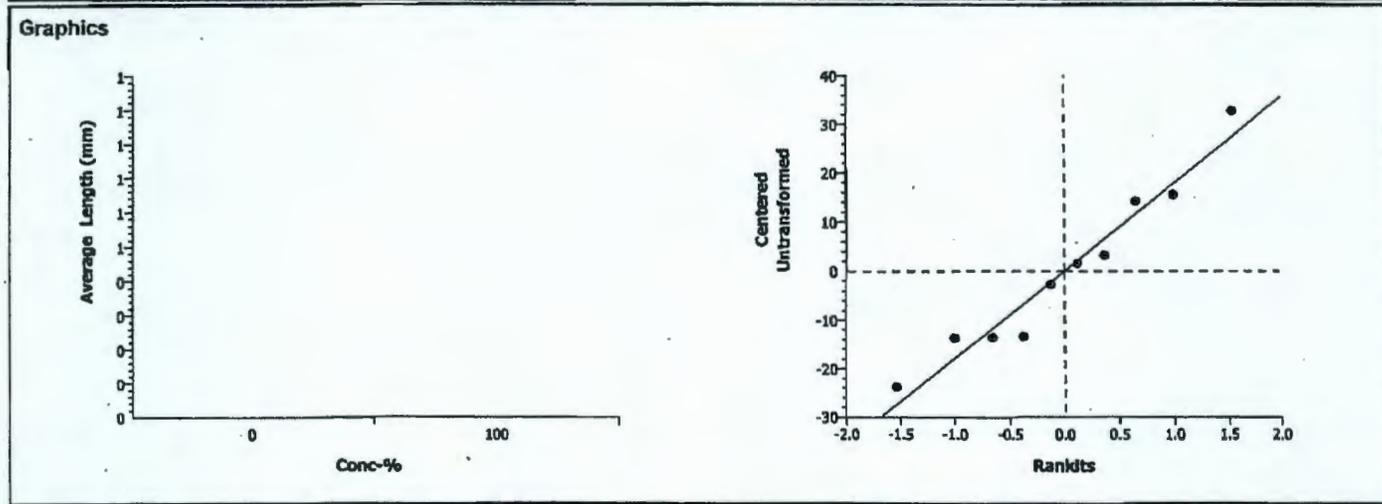
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	22.98%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.67235	1.85955	0.0665	21.3937	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	925.444	925.444	1	2.80	0.13300	Non-Significant Effect
Error	2647.2	330.9	8			
Total	3572.64423	1256.3441	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.24242	23.15450	0.45337	Equal Variances
Distribution	Shapiro-Wilk W	0.95091		0.67922	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	73.840	50	106.5	21.394				



# CETIS Analysis Detail

Plant Bioassay - Chronic					CH2M HILL
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	13-4078-7643	13-4078-7643	19 Jul-06 1:28 PM	CETISv1.1.2

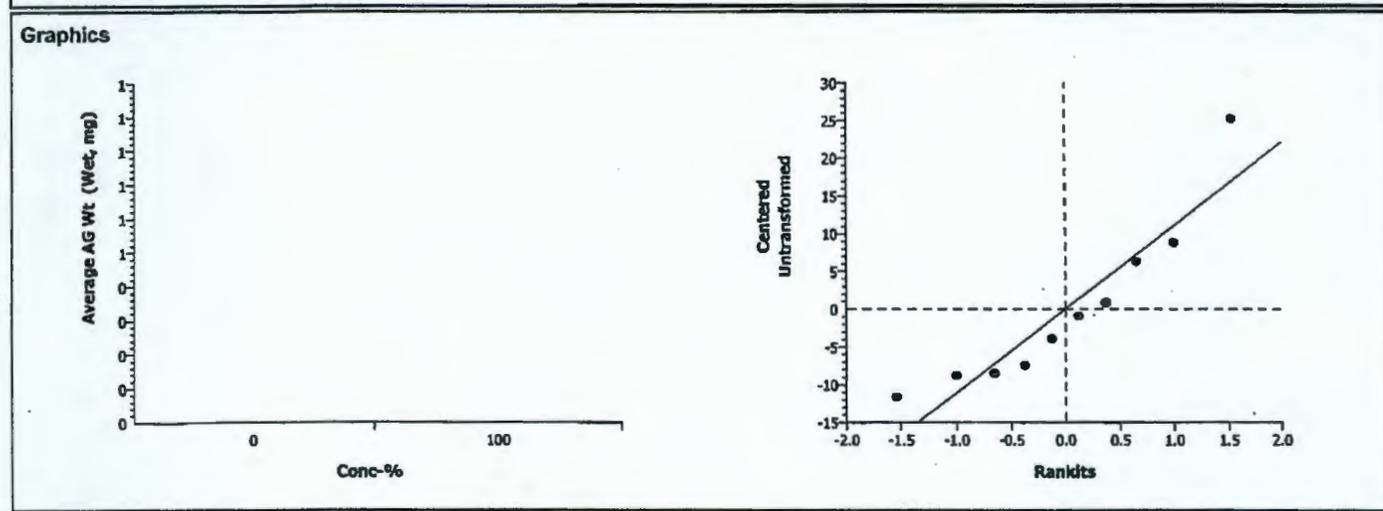
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	43.35%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.17579	1.85955	0.4324	13.8476	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4.283887	4.283887	1	0.03	0.86483	Non-Significant Effect
Error	1109.082	138.6352	8			
Total	1113.36555	142.9191	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.52373	23.15450	0.24999	Equal Variances
Distribution	Shapiro-Wilk W	0.87833		0.12483	Normal Distribution

Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	31.945	23.460	40.732	7.8289				
100		5	30.636	19.043	55.855	14.696				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 1:28 PM  
 Analysis: 07-7060-5007/B158905psB

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	13-4078-7643	13-4078-7643	19 Jul-06 1:28 PM	CETISv1.1.2

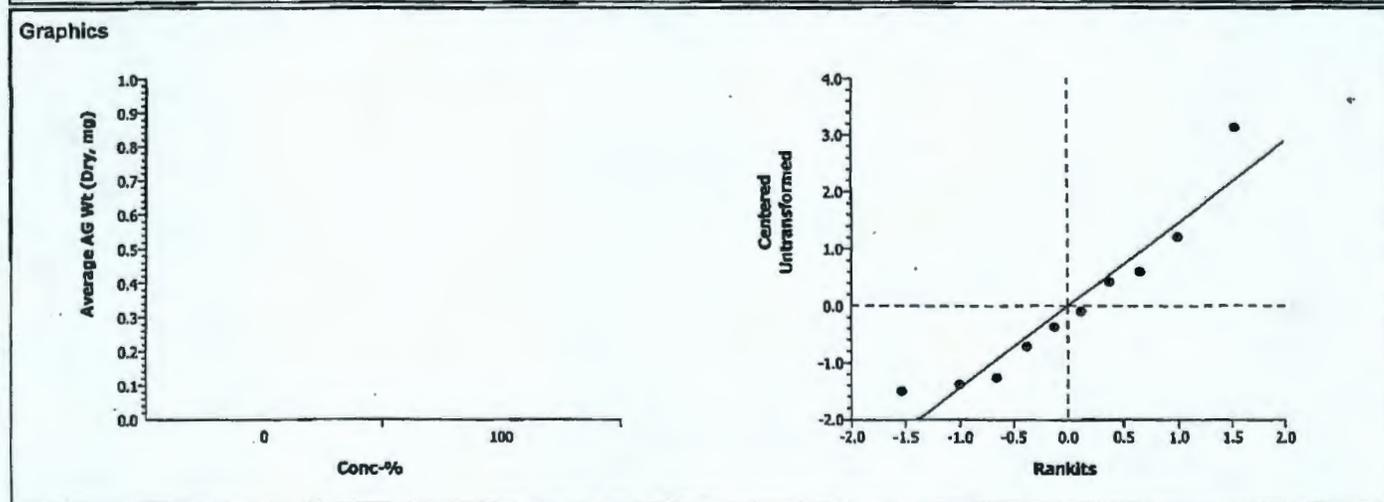
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	33.74%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.82999	1.85955	0.2153	1.77292	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.565494	1.565494	1	0.69	0.43061	Non-Significant Effect
Error	18.17988	2.272485	8			
Total	19.7453724	3.837979	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.82397	23.15450	0.33878	Equal Variances
Distribution	Shapiro-Wilk W	0.90494		0.24802	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	4.46254	3.07501	7.58502	1.83205				



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	13-4078-7643	13-4078-7643	19 Jul-06 1:28 PM	CETISv1.1.2

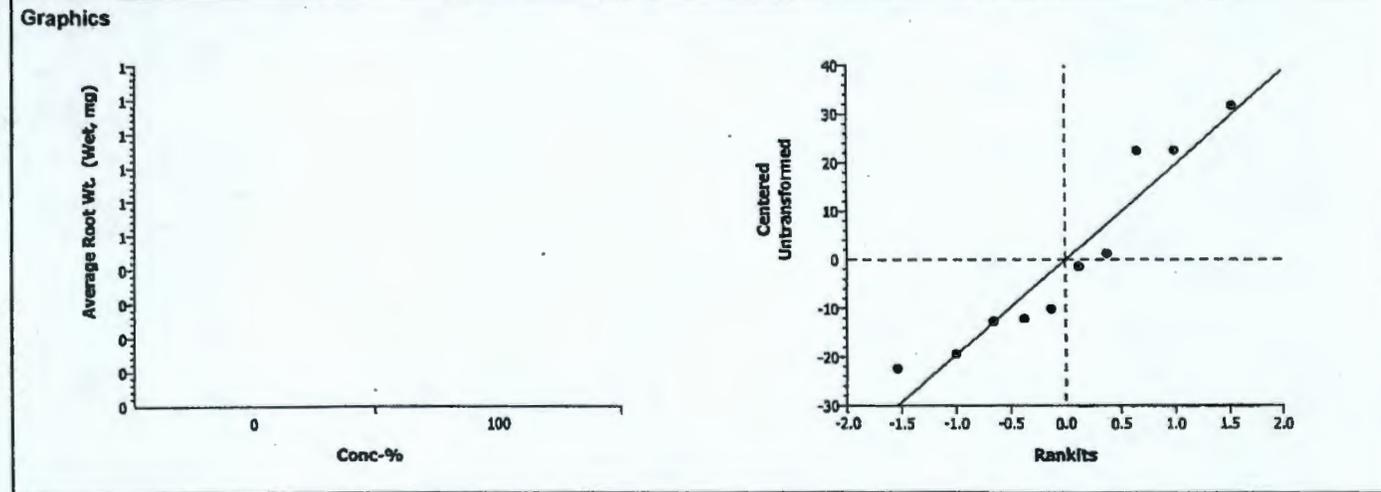
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	52.69%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedl		100	0.80447	1.85955	0.2222	23.9042	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	267.3557	267.3557	1	0.65	0.44438	Non-Significant Effect
Error	3304.95	413.1187	8			
Total	3572.30566	680.47446	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.16115	23.15450	0.88836	Equal Variances
Distribution	Shapiro-Wilk W	0.89311		0.18377	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	35.028	15.647	66.710	19.553				



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	13-4078-7643	13-4078-7643	19 Jul-06 1:28 PM	CETISv1.1.2

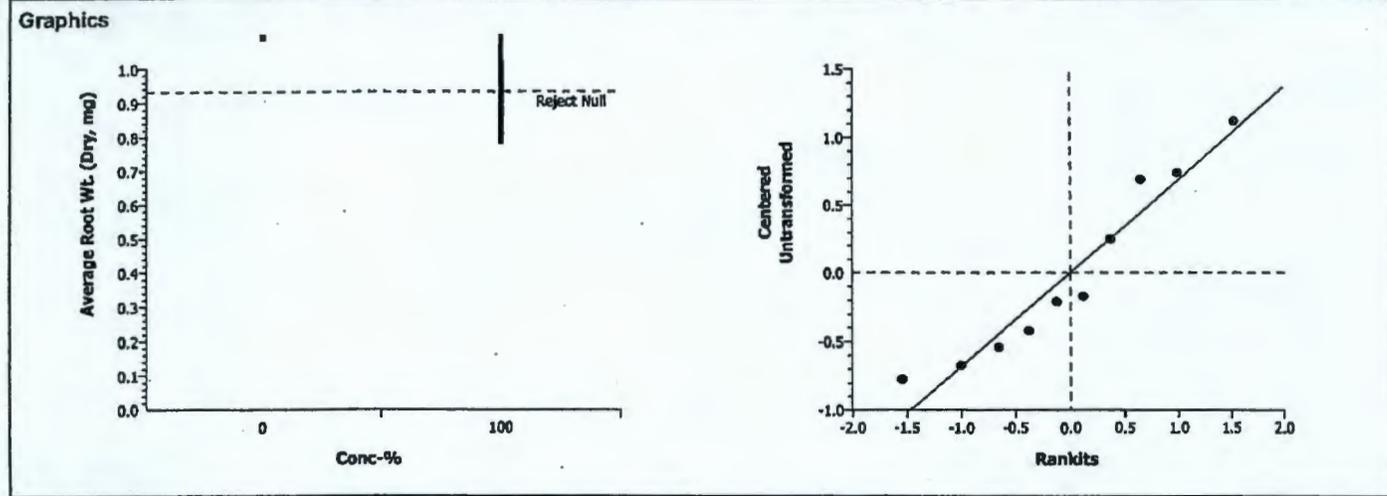
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	46.91%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedl		100	0.46023	1.85955	0.3288	0.82422	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1040327	0.104033	1	0.21	0.65760	Non-Significant Effect
Error	3.929191	0.491149	8			
Total	4.03322338	0.5951816	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.16369	23.15450	0.88674	Equal Variances
Distribution	Shapiro-Wilk W	0.91594		0.32430	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.55307	0.78000	2.66998	0.72685				



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	13-4078-7643	13-4078-7643	19 Jul-06 1:28 PM	CETISv1.1.2

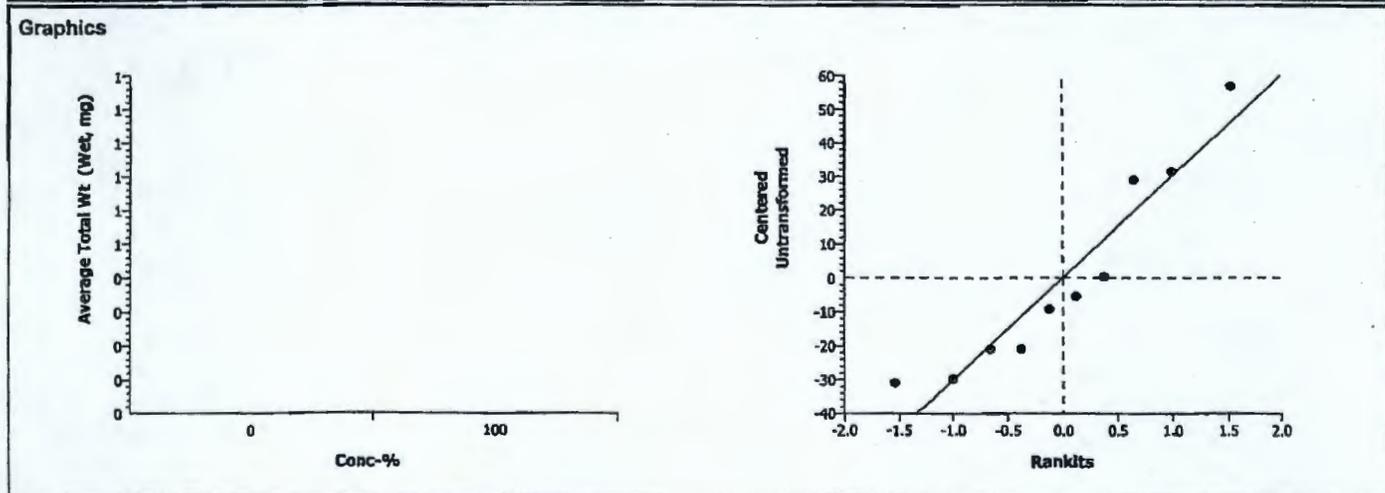
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	47.78%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.58643	1.85955	0.2869	36.9429	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	339.3248	339.3248	1	0.34	0.57376	Non-Significant Effect
Error	7893.626	986.7033	8			
Total	8232.95123	1326.0281	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.44264	23.15450	0.73116	Equal Variances
Distribution	Shapiro-Wilk W	0.89353		0.18578	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	65.665	34.69	122.57	34.14				



# CETIS Analysis Detail

Plant Bioassay - Chronic					CH2M HILL
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	13-4078-7643	13-4078-7643	19 Jul-06 1:28 PM	CETISv1.1.2

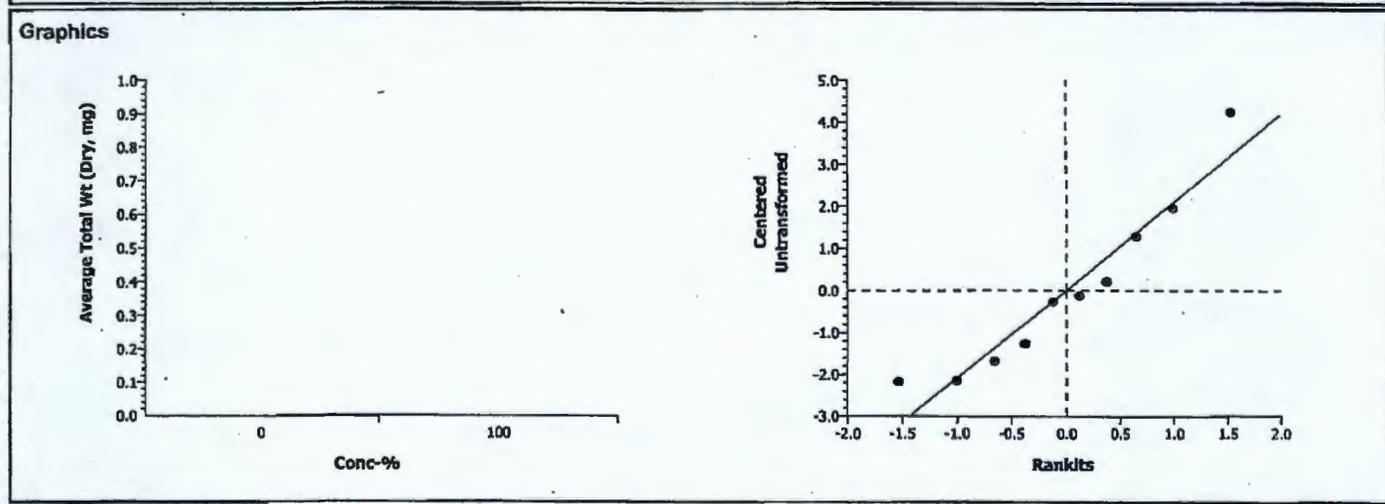
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	36.25%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.7282	1.85955	0.2436	2.54167	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.476653	2.476653	1	0.53	0.48726	Non-Significant Effect
Error	37.36414	4.670517	8			
Total	39.8407922	7.1471701	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.16800	23.15450	0.47203	Equal Variances
Distribution	Shapiro-Wilk W	0.91720		0.33418	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	1.71714				
100		5	6.01560	3.85501	10.2550	2.52834				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

6-2-06 Test Start Date: May 11, 2006

Initialed: Day 0 TP Day 12 NET Day 14 NT Day 16 NT Day 18 DW Day 20 TP Day 23 - Day 27 B Day 31 B

		Bioassay Lab ID: BG 1589-06 Sample No: J11K73							pH		
CONC.	REPLICATE	# seeds germinated					6-7-06	6-14-06	INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)	
		12 days after planting	14 days after planting	16 days after planting	20 days after planting	22 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting)			14-DAYS POST-EMERGENCE (34 days after planting)
Control	A	6	0	6	6	7		7→5	5	8.8	7.9
	B	6	6	6	6	6		6→5	5		
	C	2	2	2	3	3		3	3		
	D	4	5	5	5	6		4	4		
	E	4	6	9	9	9		9→5	5		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 6 tallest seedlings). Describe shoot appearance:

Replicate A: 5 Lg G removed: 1 Lg G, 1 Sm G  
 Replicate B: 3 Lg G, 2 med G removed: 1 med G  
 Replicate C: 3 med G  
 Replicate D: 2 Lg G, 2 med G removed: 2 deep Sm  
 Replicate E: 5 Lg G removed: 2 Lg G, 2 med G

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest, 8+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 5 Lg G  
 Replicate B: 4 Lg G, 1 med G  
 Replicate C: 3 med G  
 Replicate D: 2 Lg G, 2 med G  
 Replicate E: 5 Lg G

Measure Shoot Height:

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	81 mm	90 mm	96 mm	90 mm	82 mm
Replicate B	93 mm	91 mm	106 mm	79 mm	66 mm
Replicate C	59 mm	60 mm	73 mm		
Replicate D	48 <del>28</del> mm	91 mm	93 mm	66 mm	
Replicate E	71 mm	73 mm	76 mm	84 mm	86 mm

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1246.92	1387.4	1273.29
Replicate B	1247.56	1398.1	1272.35
Replicate C	1250.27	1297.4	1257.87
Replicate D	1245.18	1328.2	1272.35
Replicate E	1260.99	1386.5	1293.95

= 1260.09

Describe root appearance:

Replicate A: \_\_\_\_\_  
 Replicate B: \_\_\_\_\_  
 Replicate C: \_\_\_\_\_  
 Replicate D: \_\_\_\_\_  
 Replicate E: \_\_\_\_\_

Measure Root Length:

Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	72 mm	88 mm	96 mm	52 mm	97 mm
Replicate B	62 mm	57 mm	83 mm	91 mm	70 mm
Replicate C	67 mm	56 mm	40 mm		
Replicate D	69 mm	52 mm	83 mm	31 mm	
Replicate E	72 mm	63 mm	59 mm	73 mm	93 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1247.23	1365.9	1253.26
Replicate B	1250.18	1392.4	1256.45
Replicate C	1251.33	1292.9	1253.94
Replicate D	1233.88	1277.1	1236.99
Replicate E	1245.43	1348.8	1251.32

Comments:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## CETIS Test Summary

 Report Date: 19 Jul-06 1:35 PM  
 Test Link: 01-7024-1633/B158906psC

Plant Bioassay - Chronic		CH2M Hill				
Test No:	11-6821-8679	Test Type:	Plant Chronic			
Start Date:	11 May-06	Protocol:	ASTM E1963-02 (2002)			
Ending Date:		Dil Water:				
Setup Date:	11 May-06	Brine:				
Duration:	N/A	Species:	Poa sandbergii			
Source:						
Comments: recalculated Height and Length data July 19, 2006						
Sample No:	03-9367-5466	Code:	B1589-06			
Sample Date:	07 May-06 02:24 PM	Material:	Soil			
Receive Date:		Source:	Hanford			
Sample Age:	82h	Station:				
Client:		Project:				
Comments: J11K73						
Comparison Summary						
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
12-2088-9322	% Germination	100	> 100	N/A	27.99%	Wilcoxon Rank Sum Two-Sample
10-1013-1328	Average Height (mm)	100	> 100	N/A	12.99%	Equal Variance t Two-Sample
01-0369-5870	Average Length (mm)	< 100	100	N/A	15.17%	Equal Variance t Two-Sample
03-9916-7100	Average AG Wt (Wet, mg)	100	> 100	N/A	25.36%	Equal Variance t Two-Sample
05-1072-5650	Average AG Wt (Dry, mg)	100	> 100	N/A	24.57%	Equal Variance t Two-Sample
10-7463-9283	Average Root Wt (Wet, mg)	< 100	100	N/A	40.81%	Equal Variance t Two-Sample
10-8925-6724	Average Root Wt (Dry, mg)	< 100	100	N/A	33.51%	Equal Variance t Two-Sample
03-7676-8228	Average Total Wt (Wet, mg)	< 100	100	N/A	33.45%	Equal Variance t Two-Sample
15-2028-1520	Average Total Wt (Dry, mg)	100	> 100	N/A	25.49%	Equal Variance t Two-Sample

## CETIS Test Summary

Report Date:

19 Jul-06 1:35 PM

Test Link:

01-7024-1633/B158906psC

% Germination Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%	
100		5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%	
Average Height (mm) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%	
100		5	78.460	64	87.800	4.3888	9.8137	12.51%	
Average Length (mm) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%	
100		5	69.340	54.3	79	4.108	9.1857	13.25%	
Average AG Wt (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%	
100		5	23.954	15.710	30.108	2.5937	5.7996	24.21%	
Average AG Wt (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%	
100		5	4.21696	2.53333	5.27400	0.49403	1.10468	26.20%	
Average Root Wt. (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%	
100		5	19.503	10.805	28.444	3.2152	7.1894	36.86%	
Average Root Wt. (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%	
100		5	1.05709	0.77750	1.25398	0.09714	0.21722	20.55%	
Average Total Wt (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%	
100		5	43.457	29.567	58.552	5.6472	12.628	29.06%	
Average Total Wt (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%	
100		5	5.27405	3.40332	6.48000	0.57754	1.29142	24.49%	

Report Date:

19 Jul-06 1:35 PM

Test Link:

01-7024-1633/B158906psC

## CETIS Test Summary

% Germination Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	1.00000	0.60000	0.60000
100		1.00000	1.00000	0.60000	0.80000	1.00000
Average Height (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		87.8000	87	64	74.5	79
Average Length (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		79	72.6	54.3	68.8000	72
Average AG Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		28.096	30.108	15.7100	20.755	25.1020
Average AG Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		5.27400	4.95798	2.53333	3.72748	4.59199
Average Root Wt. (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		23.7340	28.444	13.8567	10.805	20.674
Average Root Wt. (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		1.20601	1.25398	0.87000	0.77750	1.17798
Average Total Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		51.8300	58.552	29.5667	31.56	45.7760
Average Total Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		6.48000	6.21196	3.40332	4.50497	5.76997

# CETIS Analysis Detail

Plant Bioassay - Chronic							CH2M Hill				
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version					
% Germination	Comparison		01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2					
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD			
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	27.99%			
Group Comparisons											
Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)				
Artificial Soil/Sedi		100	28.5		0.5000	3	Non-Significant Effect				
ANOVA Table											
Source	Sum of Squares		Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	0.0048873		0.004887	1	0.09	0.76896	Non-Significant Effect				
Error	0.4233652		0.052921	8							
Total	0.42825247		0.0578079	9							
ANOVA Assumptions											
Attribute	Test		Statistic	Critical	P-Value	Decision(0.01)					
Variances	Variance Ratio F		1.48569	23.15450	0.71064	Equal Variances					
Distribution	Shapiro-Wilk W		0.76085		0.00484	Non-normal Distribution					
Data Summary											
Conc-%			Original Data				Transformed Data				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD	
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.21909	5.30000	2.00000	7.50000	3.01247	
100		5	0.88000	0.60000	1.00000	0.17889	5.70000	2.00000	7.50000	2.56418	
Graphics											

# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

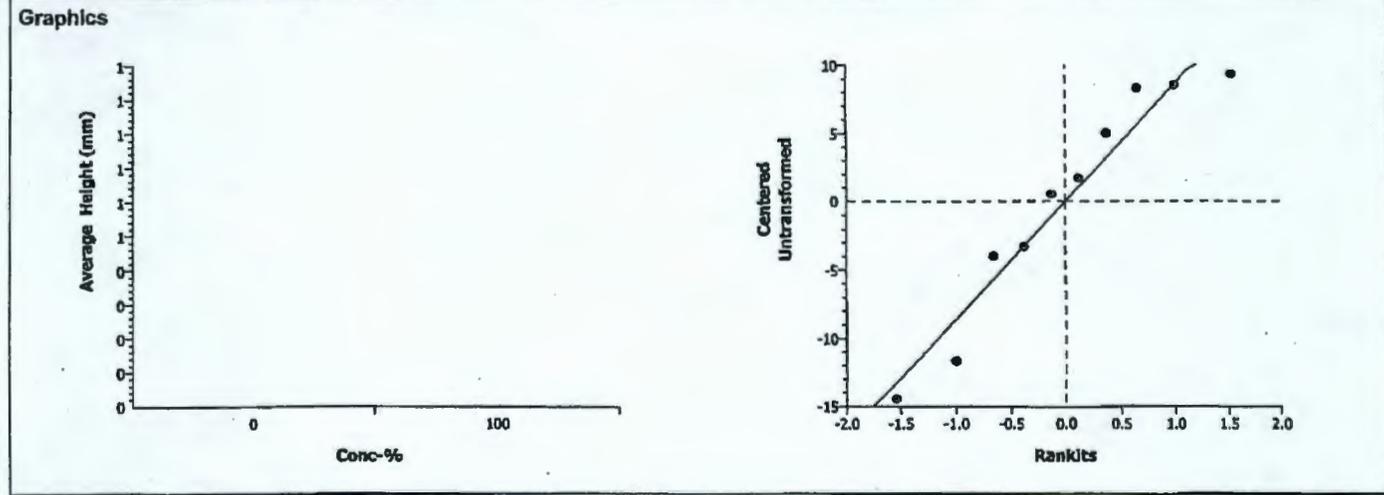
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	12.99%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.32789	1.85955	0.3757	10.435	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	8.463994	8.463994	1	0.11	0.75141	Non-Significant Effect
Error	629.7921	78.72401	8			
Total	638.256108	87.188008	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.57520	23.15450	0.67053	Equal Variances	
Distribution	Shapiro-Wilk W	0.91507		0.31767	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	78.460	64	87.8	9.8137				



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M HILL

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

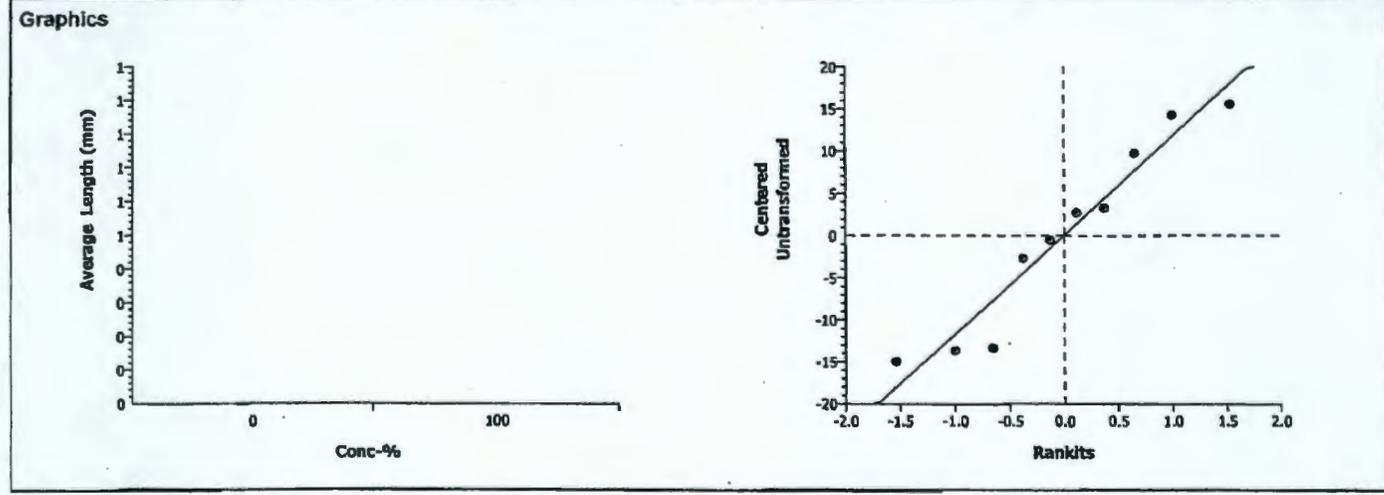
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	15.17%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.12539	1.85955	0.0071	14.1249	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1408.969	1408.969	1	9.77	0.01411	Significant Effect
Error	1153.94	144.2425	8			
Total	2562.90906	1553.2115	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	2.41896	23.15450	0.41320	Equal Variances	
Distribution	Shapiro-Wilk W	0.91575		0.32287	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	69.340	54.3	79	9.1858				



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

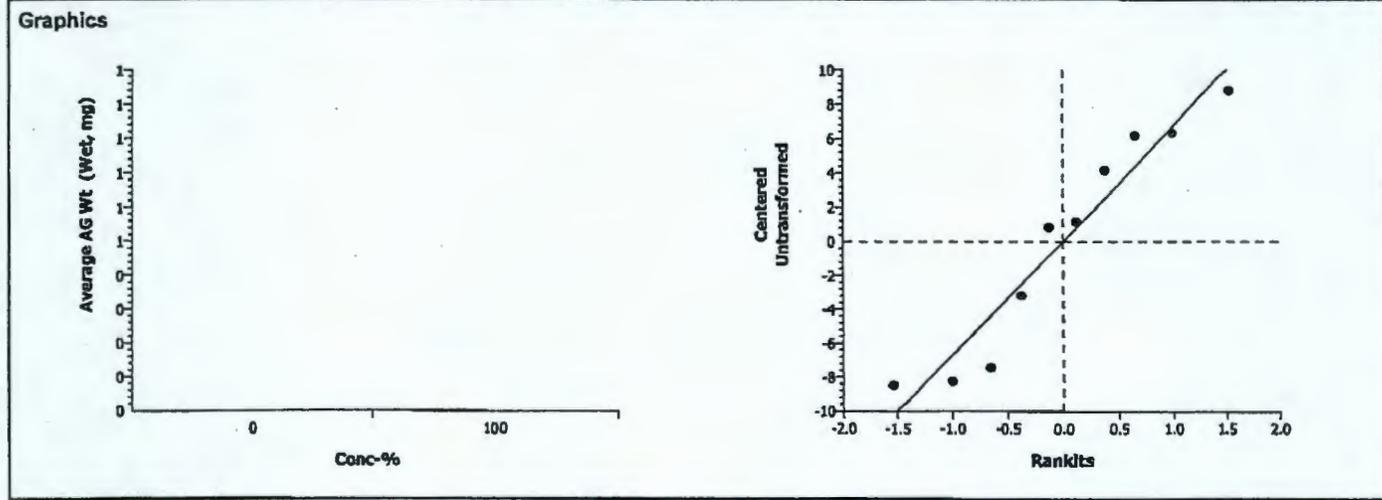
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	25.36%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.83402	1.85955	0.0520	8.10252	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	159.6511	159.6511	1	3.36	0.10399	Non-Significant Effect
Error	379.7126	47.46407	8			
Total	539.363693	207.11518	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.82224	23.15450	0.57535	Equal Variances
Distribution	Shapiro-Wilk W	0.90401		0.24231	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	31.945	23.460	40.732	7.8289				
100		5	23.954	15.71	30.108	5.7996				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

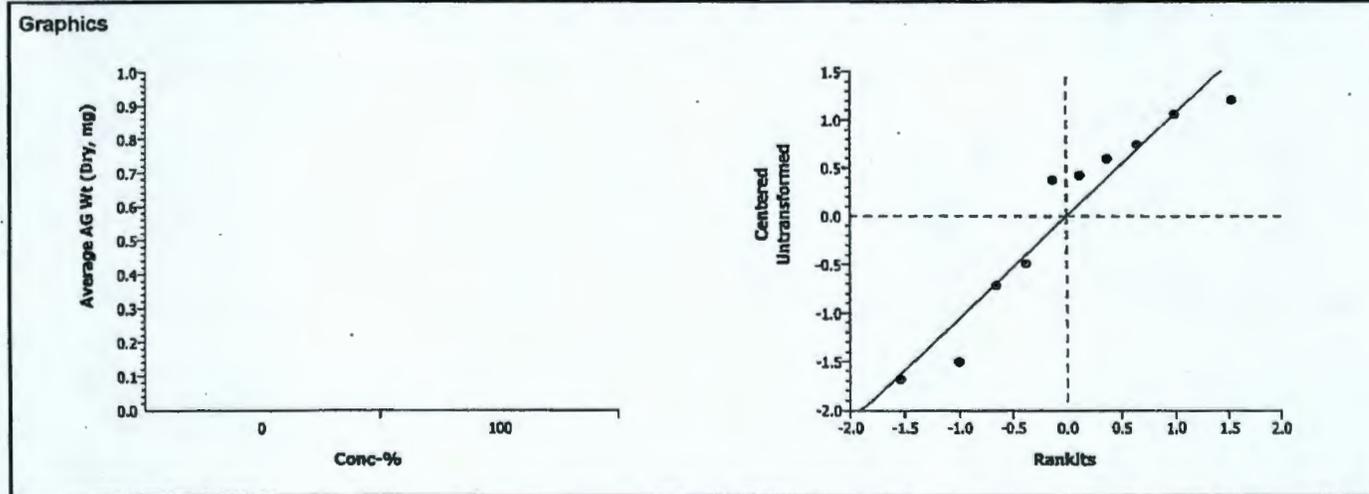
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	24.57%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.49389	1.85955	0.0868	1.29071	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.687955	2.687955	1	2.23	0.17356	Non-Significant Effect
Error	9.635506	1.204438	8			
Total	12.3234608	3.8923934	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.02674	23.15450	0.98021	Equal Variances
Distribution	Shapiro-Wilk W	0.90091		0.22418	Normal Distribution

Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	4.21696	2.53333	5.27400	1.10468				



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

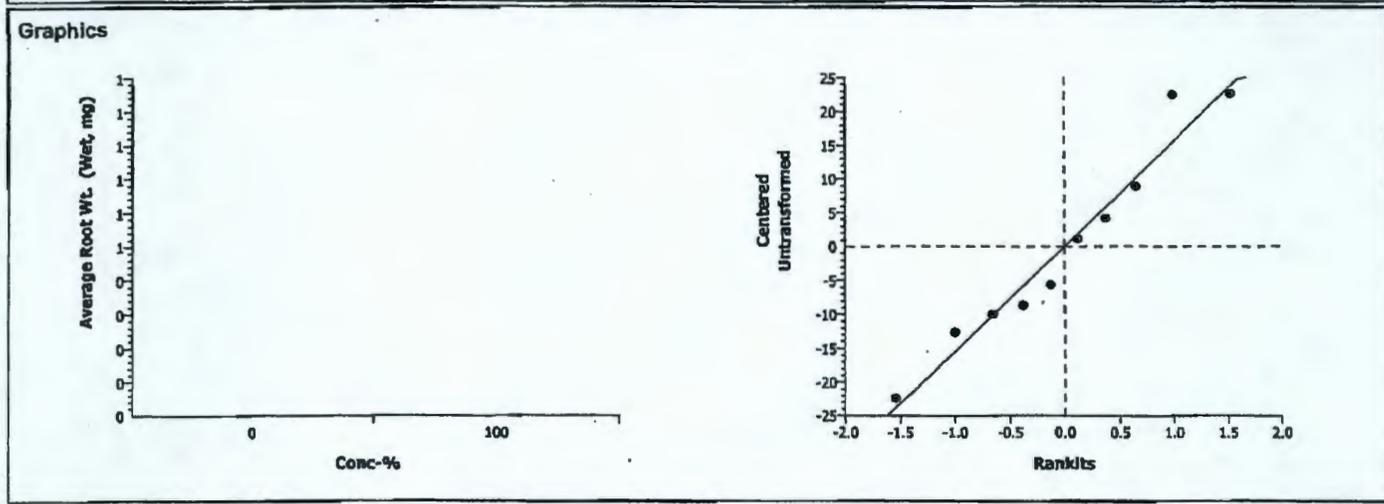
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	40.81%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.59811	1.85955	0.0159	18.5137	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1672.736	1672.736	1	6.75	0.03171	Significant Effect
Error	1982.447	247.8058	8			
Total	3655.18274	1920.5419	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	8.58861	23.15450	0.06072	Equal Variances	
Distribution	Shapiro-Wilk W	0.94453		0.60444	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	19.503	10.805	28.444	7.1894				



# CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

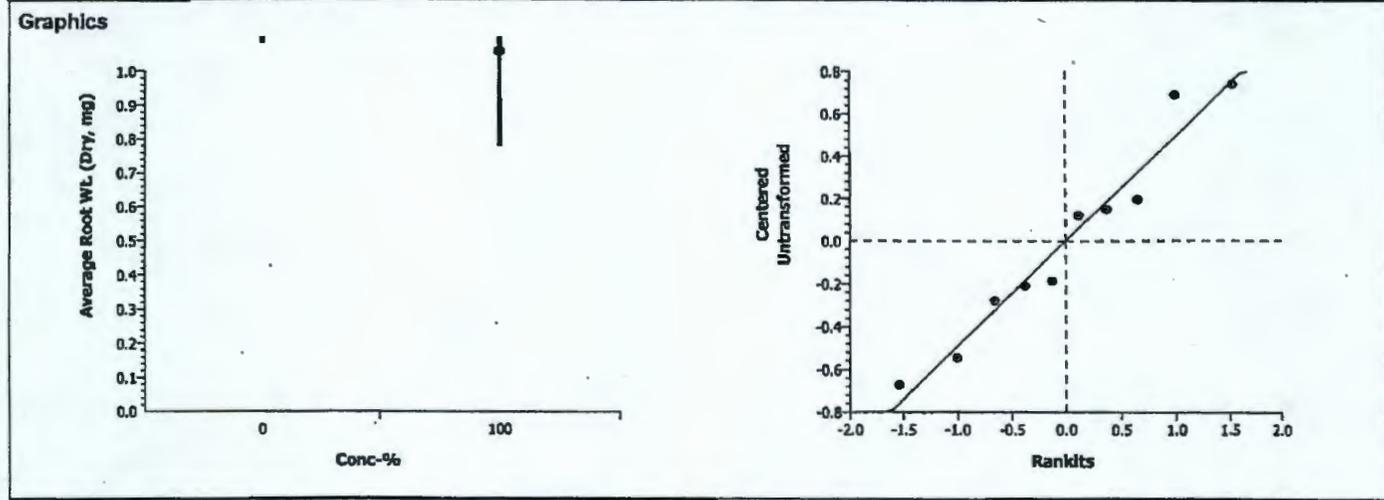
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	33.51%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.2109	1.85955	0.0290	0.58873	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.224887	1.224887	1	4.89	0.05800	Non-Significant Effect
Error	2.004699	0.250587	8			
Total	3.22958648	1.4754749	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	9.62191	23.15450	0.04984	Equal Variances	
Distribution	Shapiro-Wilk W	0.94290		0.58576	Normal Distribution	

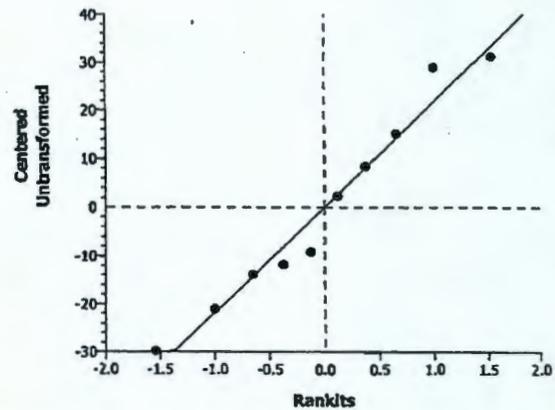
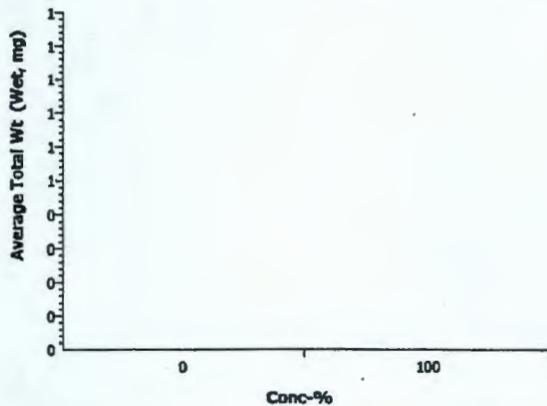
Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.05709	0.77750	1.25398	0.21722				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill				
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version					
Average Total Wt (Wet, mg)	Comparison	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2					
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	33.45%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	2.43419	1.85955	0.0205	25.8652	Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	2865.933	2865.933	1	5.93	0.04093	Significant Effect				
Error	3869.421	483.6777	8							
Total	6735.35400	3349.6103	9							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Variance Ratio F	5.06660	23.15450	0.14511	Equal Variances					
Distribution	Shapiro-Wilk W	0.95084		0.67848	Normal Distribution					
Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	43.457	29.567	58.552	12.628				

## Graphics



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

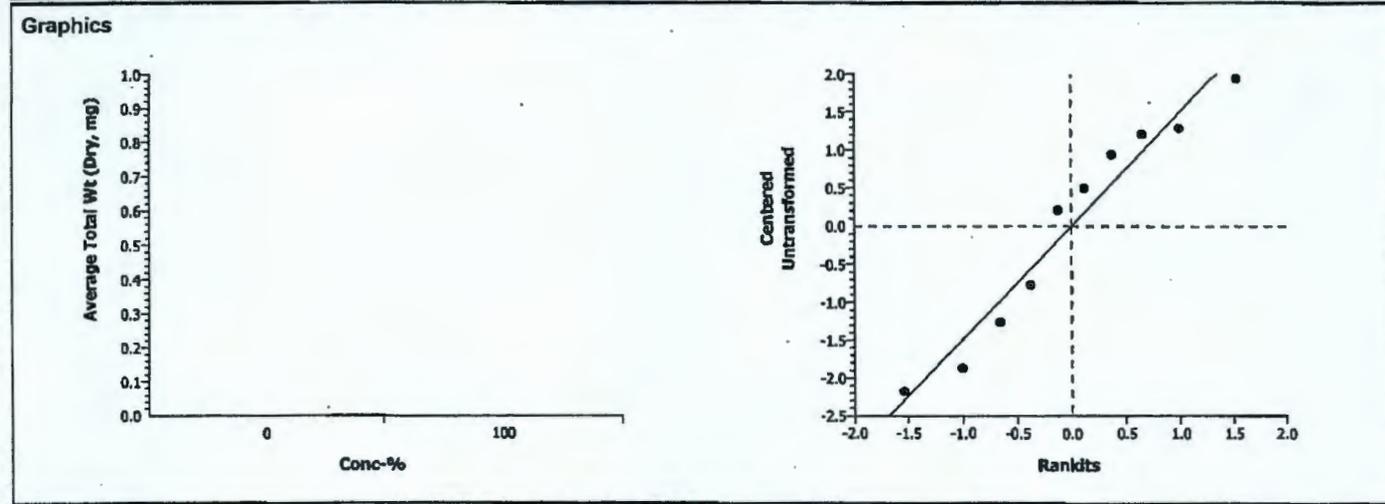
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	25.49%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.80762	1.85955	0.0541	1.78678	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7.541862	7.541862	1	3.27	0.10828	Non-Significant Effect
Error	18.46527	2.308159	8			
Total	26.0071373	9.8500218	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.76797	23.15450	0.59451	Equal Variances
Distribution	Shapiro-Wilk W	0.93303		0.47832	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	1.71714				
100		5	5.27405	3.40332	6.48000	1.29142				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

6-2-06 Test Start Date: May 11, 2006

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 18 DW Day 21 TP Day 23 - Day 27 BW Day 31 BW

Bioassay Lab ID: BG 1589-07 Sample No: J11K67

CONC.	REPLICATE	# seeds germinated							pH		
		Emergence					6-706	7-DAYS POST-EMERGENCE (27 days after planting)	14-DAYS POST-EMERGENCE (34 days after planting)	INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
		12 days after planting	14 days after planting	16 days after planting	20 days after planting	22 days after planting	23 days after planting				
Control	A	5	5	5	5	5		5	5	8.2	7.3
	B	6	7	7	7	7		7-75	5		
	C	8	8	8	8	8		8-75	5		
	D	5	5	6	6	6		6-75	5		
	E	7	7	7	7	8		7-75	5		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 3 med G, 2 Sm G  
 Replicate B: 2 Lg G, 3 med G *removed: 1 med G, 1 Sm G*  
 Replicate C: 3 Lg G, 2 med G *removed: 3 med G*  
 Replicate D: 5 med G *removed: 1 Sm G*  
 Replicate E: 4 med G, 1 med G w/ 1 B shoot *removed: 2 Sm G, 1 dead Sm*

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest, 6+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 Lg G w/ 1 B shoot, 2 med G, 2 Sm G  
 Replicate B: 3 med G, 2 med G w/ 1 B shoot  
 Replicate C: 3 med G, 2 med G w/ 1 B shoot  
 Replicate D: 5 med G  
 Replicate E: 4 med G, 1 med G w/ 1 B shoot

Measure Shoot Height:

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	66 mm	76 mm	77 mm	36 mm	30 mm
Replicate B	87 mm	61 mm	63 mm	75 mm	67 mm
Replicate C	73 mm	91 mm	73 mm	96 mm	80 mm
Replicate D	64 mm	70 mm	78 mm	79 mm	78 mm
Replicate E	71 mm	61 mm	69 mm	68 mm	86 mm

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1247.21	1327.2	1261.48
Replicate B	1245.80	1367.2	1268.49
Replicate C	1245.97	1395.1	1273.63
Replicate D	1253.90	1376.7	1276.28
Replicate E	1240.67	1347.4	1261.78

Describe root appearance:

Replicate A: \_\_\_\_\_  
 Replicate B: \_\_\_\_\_  
 Replicate C: \_\_\_\_\_  
 Replicate D: \_\_\_\_\_  
 Replicate E: \_\_\_\_\_

Measure Root Length:

Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	4 mm	73 mm	110 mm	36 mm	63 mm
Replicate B	73 mm	65 mm	50 mm	44 mm	83 mm
Replicate C	89 mm	86 mm	83 mm	60 mm	85 mm
Replicate D	88 mm	74 mm	50 mm	80 mm	80 mm
Replicate E	84 mm	73 mm	86 mm	63 mm	73 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1246.94	1346.0	1280.97
Replicate B	1251.77	1394.0	1259.71
Replicate C	1255.51	1395.8	1261.91
Replicate D	1246.27	1394.1	1252.92
Replicate E	1247.76	1363.1	1253.43

Comments:

\_\_\_\_\_

# CETIS Test Summary

Plant Bioassay - Chronic CH2M Hill

<b>Test No:</b> 11-1324-6085	<b>Test Type:</b> Plant Chronic	<b>Duration:</b> N/A
<b>Start Date:</b> 11 May-06	<b>Protocol:</b> ASTM E1963-02 (2002)	<b>Species:</b> Poa sandbergii
<b>Ending Date:</b>	<b>Dil Water:</b>	<b>Source:</b>
<b>Setup Date:</b> 11 May-06	<b>Brine:</b>	

**Comments:** recalculated Height and Length data July 19, 2006

<b>Sample No:</b> 10-8735-6780	<b>Code:</b> B1589-07	<b>Client:</b>
<b>Sample Date:</b> 08 May-06 04:00 PM	<b>Material:</b> Soil	<b>Project:</b>
<b>Receive Date:</b>	<b>Source:</b> Hanford	
<b>Sample Age:</b> 56h	<b>Station:</b>	

**Comments:** J11K67

Comparison Summary						
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
06-8550-8885	% Germination	100	> 100	N/A	20.96%	Equal Variance t Two-Sample
07-9361-1455	Average Height (mm)	< 100	100	N/A	11.24%	Equal Variance t Two-Sample
05-8004-9201	Average Length (mm)	< 100	100	N/A	15.46%	Equal Variance t Two-Sample
13-1560-7899	Average AG Wt (Wet, mg)	< 100	100	N/A	24.26%	Equal Variance t Two-Sample
10-2369-2621	Average AG Wt (Dry, mg)	100	> 100	N/A	23.01%	Equal Variance t Two-Sample
12-5537-6762	Average Root Wt. (Wet, mg)	< 100	100	N/A	39.37%	Equal Variance t Two-Sample
20-3520-1333	Average Root Wt. (Dry, mg)	100	> 100	N/A	34.66%	Equal Variance t Two-Sample
08-6934-2329	Average Total Wt (Wet, mg)	< 100	100	N/A	32.02%	Equal Variance t Two-Sample
11-6220-9613	Average Total Wt (Dry, mg)	100	> 100	N/A	24.74%	Equal Variance t Two-Sample

Report Date:

19 Jul-06 1:39 PM

## CETIS Test Summary

Test Link:

11-5408-1697/B158907psC

% Germination Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
Average Height (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	70.2	57	74.6	3.3657	7.526	10.72%
Average Length (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	70.280	57.200	80.6	4.3674	9.7659	13.90%
Average AG Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	23.202	15.998	29.826	2.2608	5.0553	21.79%
Average AG Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	4.32440	2.85400	5.53201	0.43009	0.96170	22.24%
Average Root Wt. (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	25.79	19.812	29.566	1.8655	4.1714	16.17%
Average Root Wt. (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.22760	0.80601	1.58799	0.12838	0.28706	23.38%
Average Total Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	48.992	35.810	57.884	3.9629	8.8613	18.09%
Average Total Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	5.55200	3.66001	6.81201	0.52913	1.18318	21.31%

## CETIS Test Summary

% Germination Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	1.00000	0.60000	0.60000
100		1.00000	1.00000	1.00000	1.00000	1.00000
Average Height (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		57	74.6	74.6	73.8000	71
Average Length (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		57.2000	63	80.6	74.8000	75.8000
Average AG Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		15.998	24.28	29.8260	24.56	21.346
Average AG Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		2.85400	4.53799	5.53201	4.47600	4.22200
Average Root Wt. (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		19.8120	28.446	28.0580	29.566	23.068
Average Root Wt. (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		0.80601	1.58799	1.28000	1.33000	1.13401
Average Total Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		35.8100	52.726	57.8840	54.126	44.414
Average Total Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		3.66001	6.12598	6.81201	5.80601	5.35601

# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

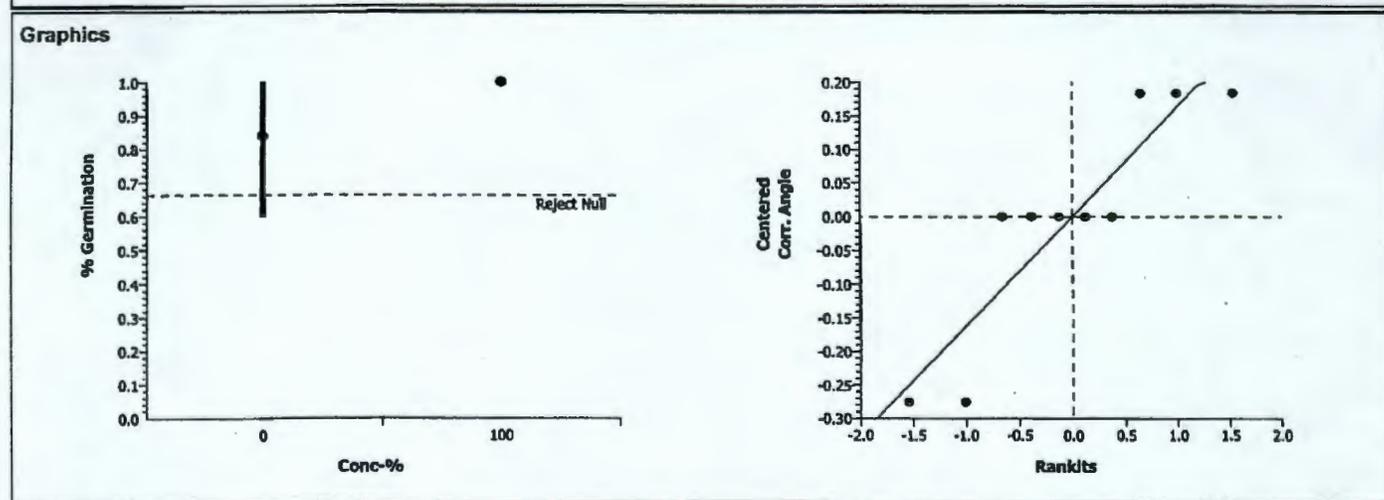
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
% Germination	Comparison	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	20.96%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-1.633	1.85955	0.9294	0.20917	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.084348	0.084348	1	2.67	0.14111	Non-Significant Effect
Error	0.2530439	0.031630	8			
Total	0.33739194	0.1159785	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	4.80000	11.25862	0.05984	Equal Variances
Distribution	Shapiro-Wilk W	0.81415		0.02153	Normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.21909	1.16160	0.88608	1.34528	0.25152
100		5	1.00000	1.00000	1.00000	0.00000	1.34528	1.34528	1.34528	0.00020



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

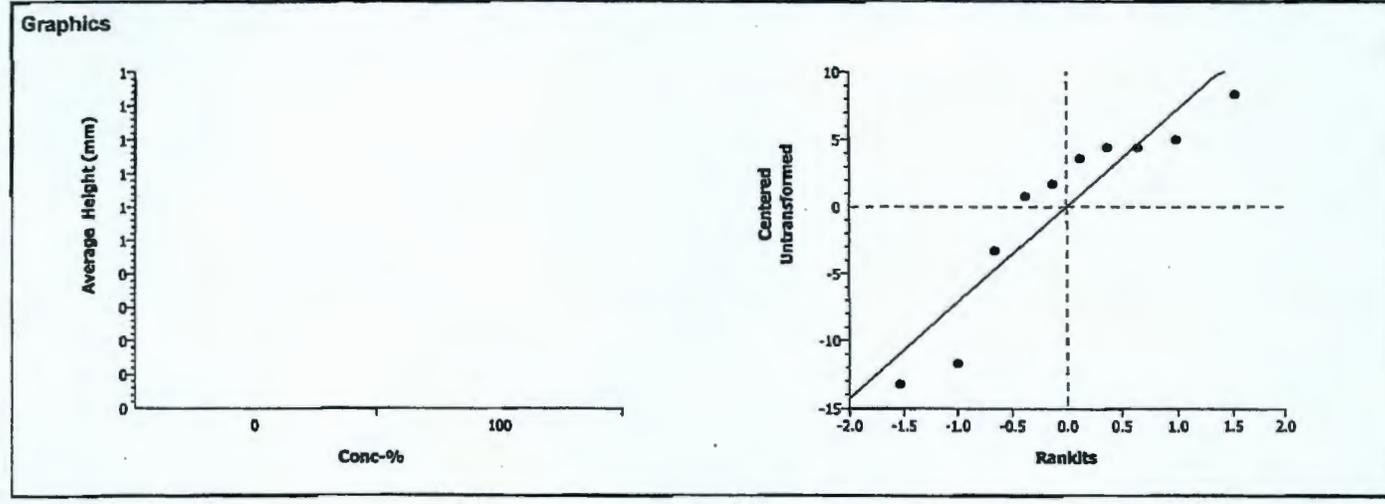
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	11.24%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.08099	1.85955	0.0355	9.02523	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	255.025	255.025	1	4.33	0.07101	Non-Significant Effect
Error	471.12	58.89	8			
Total	726.14502	313.915	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.07945	23.15450	0.94272	Equal Variances
Distribution	Shapiro-Wilk W	0.84882		0.05624	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	70.2	57	74.6	7.526				



# CETIS Analysis Detail

Plant Bioassay - Chronic							CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

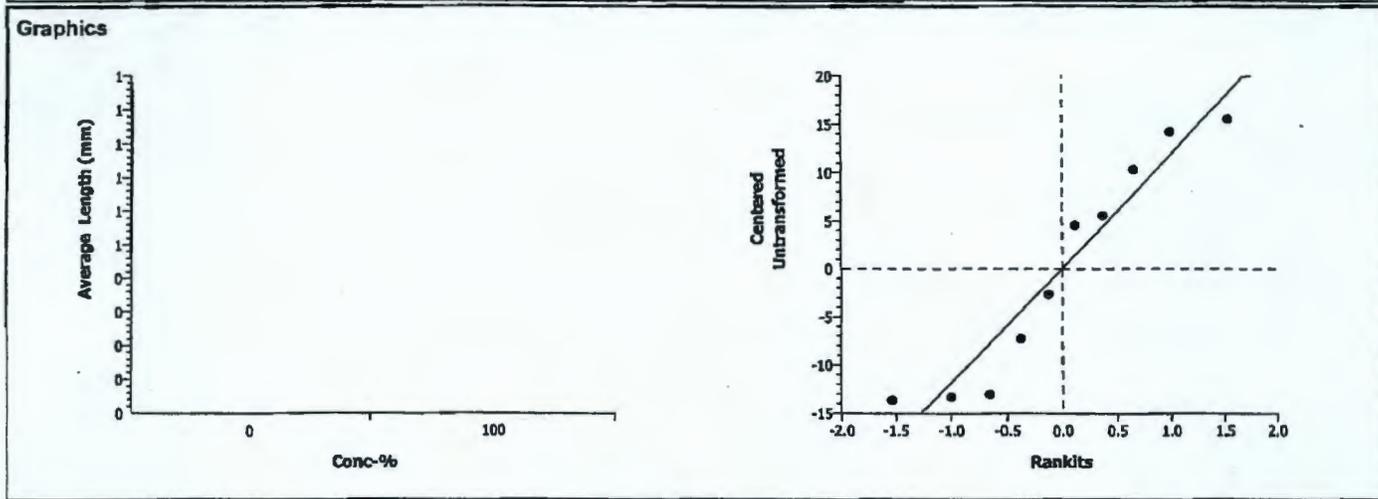
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	15.46%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.94603	1.85955	0.0093	14.3915	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1299.6	1299.6	1	8.68	0.01854	Significant Effect
Error	1197.916	149.7395	8			
Total	2497.51599	1449.3394	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	2.14011	23.15450	0.47931	Equal Variances	
Distribution	Shapiro-Wilk W	0.89307		0.18358	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	70.280	57.2	80.6	9.7659				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 1:39 PM  
 Analysis: 13-1560-7899/B158907psC

Plant Bioassay - Chronic	CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

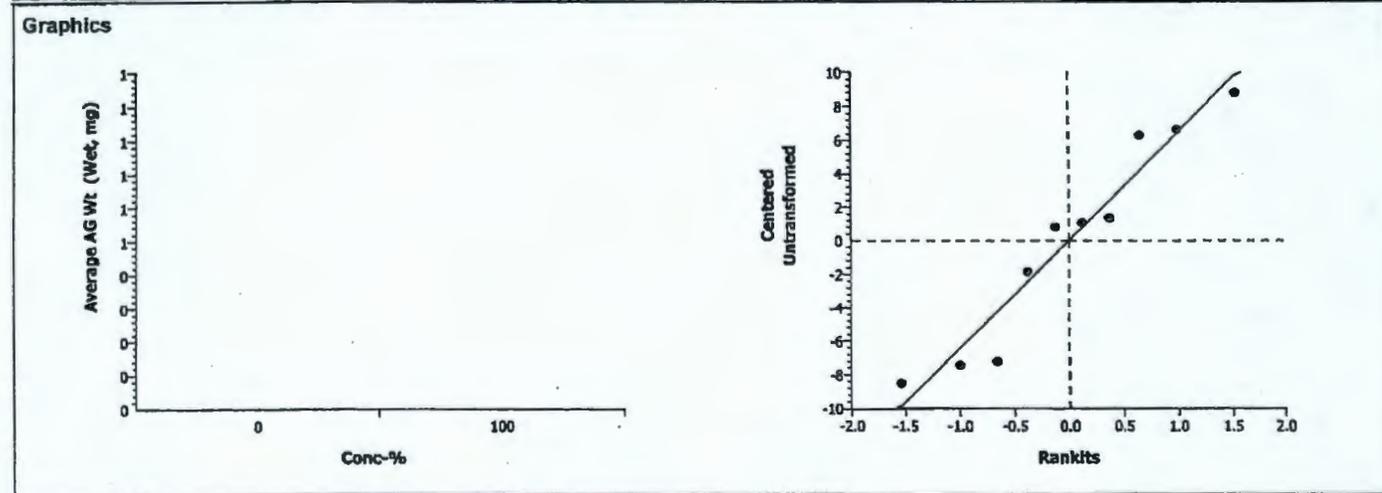
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	24.26%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.09791	1.85955	0.0346	7.75005	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	191.1208	191.1208	1	4.40	0.06916	Non-Significant Effect
Error	347.3957	43.42447	8			
Total	538.516479	234.54522	9			

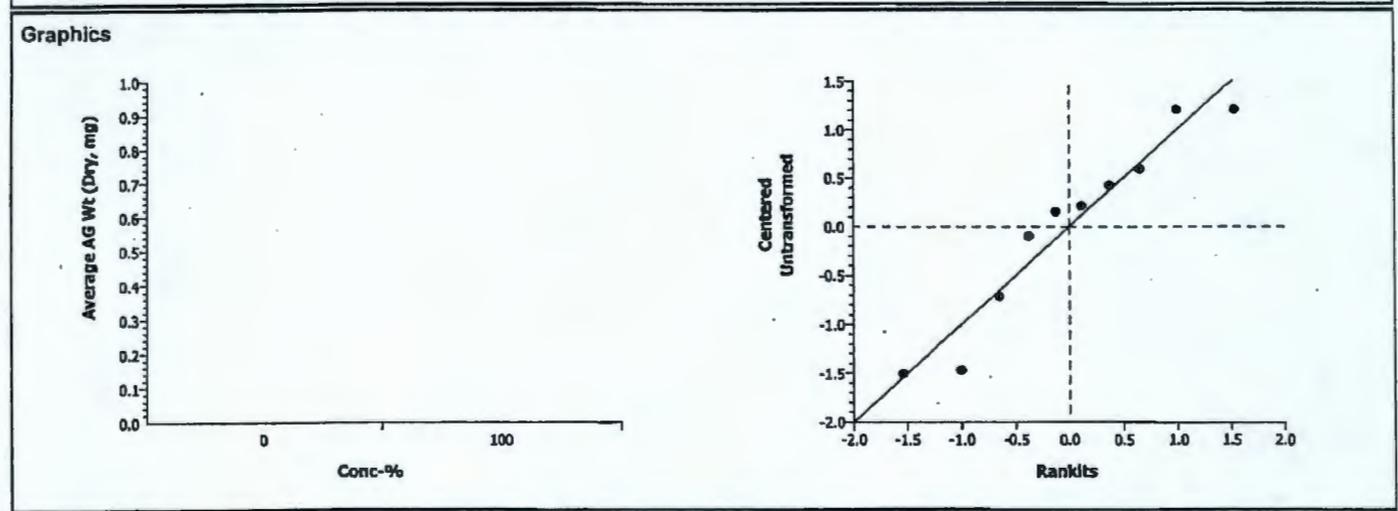
ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	2.39831	23.15450	0.41762	Equal Variances	
Distribution	Shapiro-Wilk W	0.91608		0.32540	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	31.945	23.460	40.732	7.8289				
100		5	23.202	15.998	29.826	5.0553				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill				
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version					
Average AG Wt (Dry, mg)	Comparison	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2					
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	23.01%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	1.42964	1.85955	0.0953	1.20897	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	2.159768	2.159768	1	2.04	0.19069	Non-Significant Effect				
Error	8.453657	1.056707	8							
Total	10.6134255	3.2164755	9							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Variance Ratio F	1.28510	23.15450	0.81382	Equal Variances					
Distribution	Shapiro-Wilk W	0.91614		0.32590	Normal Distribution					
Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	4.32440	2.85400	5.53201	0.96170				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

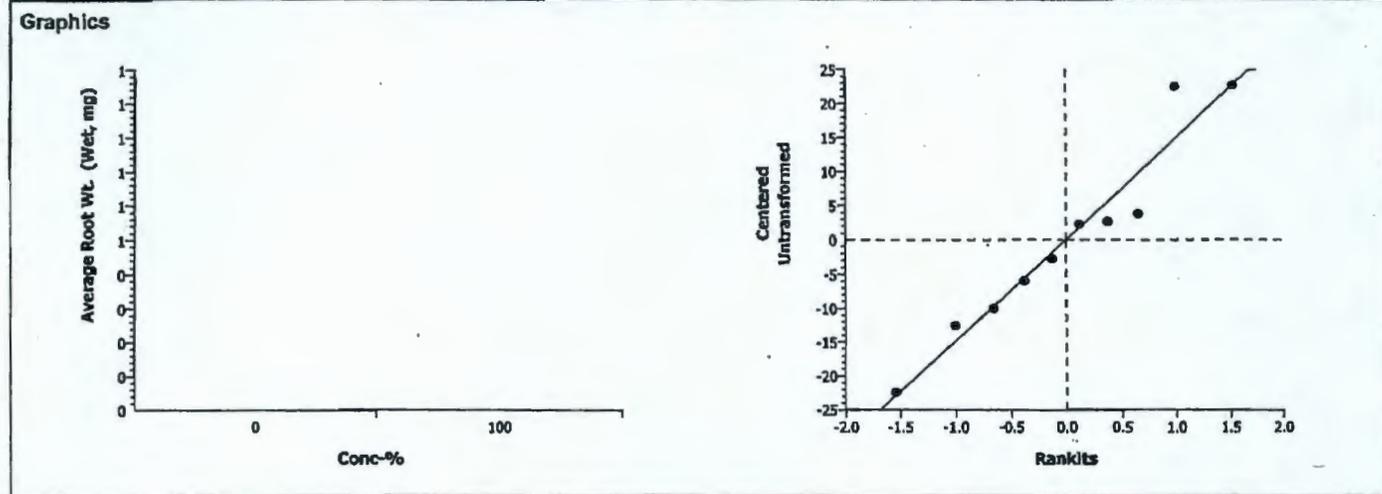
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	39.37%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.03838	1.85955	0.0379	17.8618	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	958.4015	958.4015	1	4.15	0.07586	Non-Significant Effect
Error	1845.298	230.6623	8			
Total	2803.69983	1189.0638	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	25.51217	23.15450	0.00832	Unequal Variances
Distribution	Shapiro-Wilk W	0.93622		0.51173	Normal Distribution

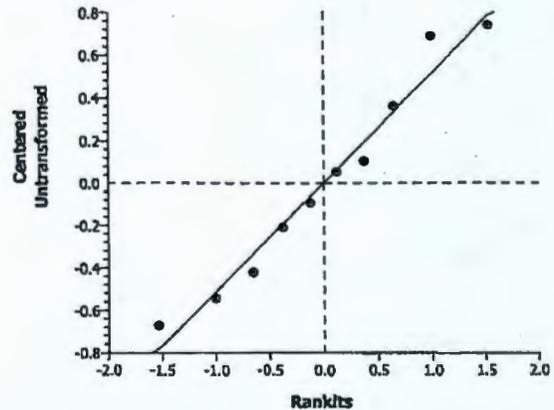
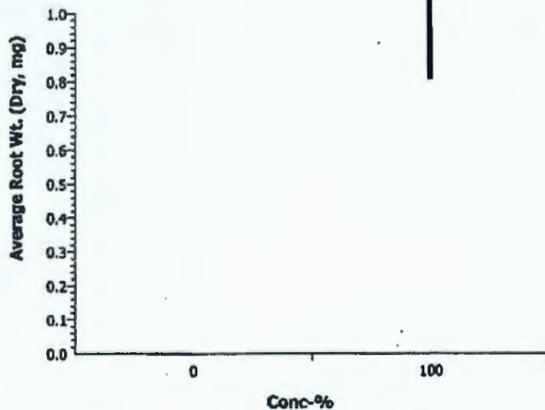
Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	25.79	19.812	29.566	4.1714				



# CETIS Analysis Detail

Plant Bioassay - Chronic							CH2M Hill			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Average Root Wt. (Dry, mg)	Comparison		11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.66%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	1.61649	1.85955	0.0723	0.60907	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares		Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	0.7008101		0.700810	1	2.61	0.14465	Non-Significant Effect			
Error	2.14558		0.268198	8						
Total	2.84639013		0.9690076	9						
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Variance Ratio F	5.50938	23.15450	0.12710	Equal Variances					
Distribution	Shapiro-Wilk W	0.95060		0.67555	Normal Distribution					
Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.22760	0.80601	1.58799	0.28706				

## Graphics



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

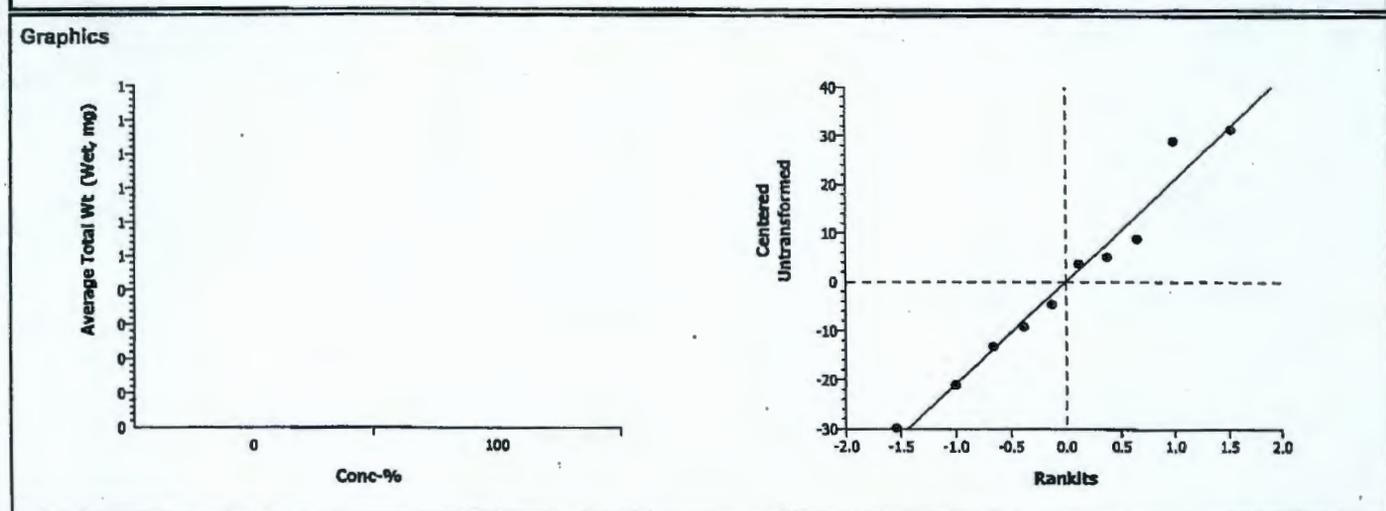
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
Average Total Wt (Wet, mg)	Comparison	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.02%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.12718	1.85955	0.0330	24.7596	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2005.49	2005.49	1	4.52	0.06608	Non-Significant Effect
Error	3545.689	443.2112	8			
Total	5551.17969	2448.7016	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.28872	23.15450	0.04430	Equal Variances
Distribution	Shapiro-Wilk W	0.95917		0.77640	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	48.992	35.810	57.884	8.8613				



# CETIS Analysis Detail

Plant Bioassay - Chronic							CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

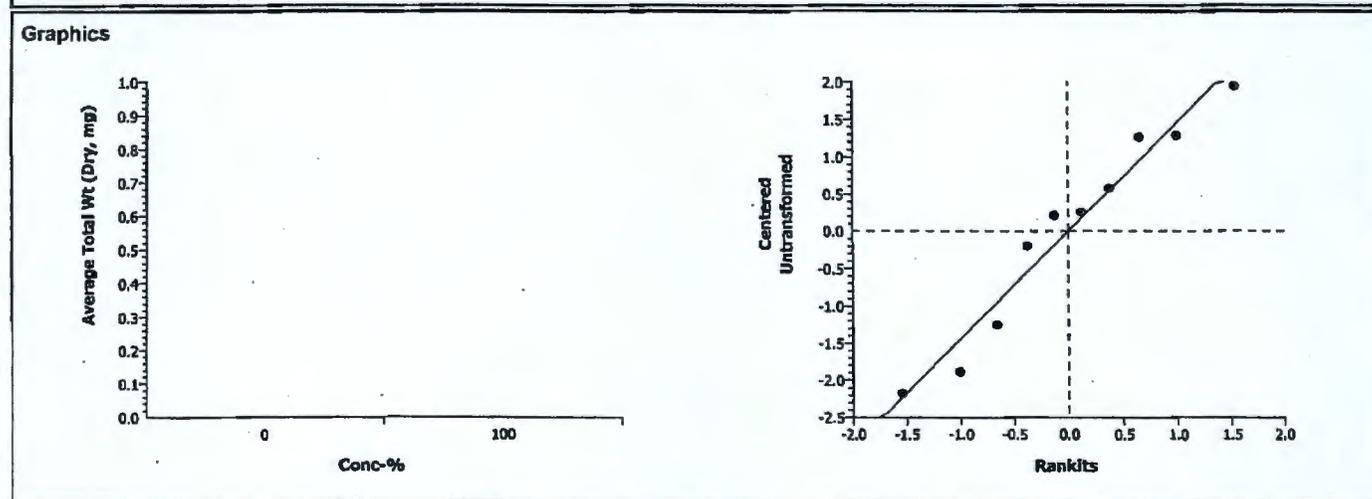
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	24.74%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100		1.56441	1.85955	0.0782	1.73417	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5.321138	5.321138	1	2.45	0.15635	Non-Significant Effect
Error	17.39386	2.174233	8			
Total	22.7149997	7.4953706	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.10625	23.15450	0.48838	Equal Variances
Distribution	Shapiro-Wilk W	0.94047		0.55831	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	1.71714				
100		5	5.55200	3.66001	6.81201	1.18318				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

6-2-06

Test Start Date: May 11, 2006

Initials:

Day 0 JP Day 12 NJ Day 14 NJ Day 16 NJ Day 18 DW Day 20 DW Day 22 JP Day 23 - Day 27 BW Day 29 BW

Bioassay Lab ID: BG 158A-08 Sample No: J11K55

CONC.	REPLICATE	# seeds germinated							pH			
		12 days after planting	14 days after planting	16 days after planting	18 days after planting	20 days after planting	22 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting)	14-DAYS POST-EMERGENCE (34 days after planting)	INITIAL (at planting)	FINAL (at 14 days Post-Emergence)
Control	A	6	6	6	6	6			6-7-06 6-7-5	5	7.6	7.2
	B	3	3	3	3	3			3	3		
	C	4	5	5	6	6			5	5		
	D	4	4	4	4	4			4	4		
	E	6	6	6	6	6			6-7-5	5		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 5 med G removed: 1 med G  
 Replicate B: 3 med G  
 Replicate C: 5 med G removed: 1 dead Sm  
 Replicate D: 3 med G, 1 med G w/ 1 B tip removed: 1 med G  
 Replicate E: 1 Lg G, 4 med G removed: 1 med G

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest, 6+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 5 Lg G  
 Replicate B: 3 Lg G  
 Replicate C: 1 Lg G, 1 Lg G w/ 1 B shoot, 3 med G  
 Replicate D: 3 med G, 1 med G w/ 1 B shoot  
 Replicate E: 2 Lg G w/ 1 B shoot, 2 med G, 1 med/Sm G

Measure Shoot Height:

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	80 mm	77 mm	81 mm	85 mm	104 mm
Replicate B	80 mm	79 mm	92 mm		
Replicate C	81 mm	80 mm	77 mm	65 mm	105 mm
Replicate D	81 mm	59 mm	78 mm	81 mm	
Replicate E	103 mm	80 mm	93 mm	88 mm	64 mm

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1242.78	1426.4	1271.58
Replicate B	1244.25	1355.8	1262.07
Replicate C	1266.08	1427.0	1292.04
Replicate D	1242.39	1337.4	1344.0 km
Replicate E	1250.63	1410.0	1279.35

DRY WT = 1261.25

Describe root appearance:

Replicate A: \_\_\_\_\_  
 Replicate B: \_\_\_\_\_  
 Replicate C: \_\_\_\_\_  
 Replicate D: \_\_\_\_\_  
 Replicate E: \_\_\_\_\_

Measure Root Length:

Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	110 mm	90 mm	88 mm	53 mm	84 mm
Replicate B	98 mm	64 mm	57 mm		
Replicate C	73 mm	59 mm	96 mm	50 mm	85 mm
Replicate D	83 mm	77 mm	54 mm	74 mm	
Replicate E	76 mm	96 mm	51 mm	78 mm	74 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1253.28	1450.9	1260.91
Replicate B	1264.11	1359.2	1268.57
Replicate C	1252.91	1419.8	1260.46
Replicate D	1249.20	1293.7	1296.1 km
Replicate E	1255.90	1414.2	1262.45

DRY WT = 1252.47

Comments:

## CETIS Test Summary

Report Date:

19 Jul-06 1:42 PM

Test Link:

10-5075-5165/B158908psC

## Plant Bioassay - Chronic

CH2M HILL

Test No: 08-9015-8778	Test Type: Plant Chronic	Duration: N/A
Start Date: 11 May-06	Protocol: ASTM E1963-02 (2002)	Species: Poa sandbergii
Ending Date:	Dil Water:	Source:
Setup Date: 11 May-06	Brine:	

Comments: recalculated Height and Length data July 19, 2006

Sample No: 08-8549-6126	Code: B1589-08	Client:
Sample Date: 08 May-06 07:55 PM	Material: Soil	Project:
Receive Date:	Source: Hanford	
Sample Age: 52h	Station:	

Comments: J11K55

## Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
04-7871-9749	% Germination	100	> 100	N/A	27.99%	Wilcoxon Rank Sum Two-Sample
12-5952-7099	Average Height (mm)	100	> 100	N/A	9.32%	Equal Variance t Two-Sample
09-3405-9100	Average Length (mm)	< 100	100	N/A	13.65%	Equal Variance t Two-Sample
07-0586-7813	Average AG Wt (Wet, mg)	100	> 100	N/A	23.77%	Equal Variance t Two-Sample
14-3635-2267	Average AG Wt (Dry, mg)	100	> 100	N/A	19.03%	Equal Variance t Two-Sample
14-4775-2246	Average Root Wt. (Wet, mg)	100	> 100	N/A	43.15%	Equal Variance t Two-Sample
09-2958-9294	Average Root Wt. (Dry, mg)	100	> 100	N/A	34.90%	Equal Variance t Two-Sample
04-6045-1100	Average Total Wt (Wet, mg)	100	> 100	N/A	34.47%	Equal Variance t Two-Sample
12-8502-1101	Average Total Wt (Dry, mg)	100	> 100	N/A	22.27%	Equal Variance t Two-Sample

Report Date:

19 Jul-06 1:42 PM

## CETIS Test Summary

Test Link:

10-5075-5165/B158908psC

% Germination Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%
Average Height (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	82.22	74.800	85.6	1.9896	4.4488	5.41%
Average Length (mm) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	75.52	72	85	2.4229	5.4177	7.17%
Average AG Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	32.704	25.552	37.183	2.1015	4.6992	14.37%
Average AG Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	5.47019	4.71500	5.93998	0.22664	0.50679	9.26%
Average Root Wt. (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	29.597	11.725	39.524	4.6953	10.499	35.47%
Average Root Wt. (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.33003	0.81750	1.52600	0.13387	0.29933	22.51%
Average Total Wt (Wet, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	62.300	37.277	76.248	6.6187	14.8	23.76%
Average Total Wt (Dry, mg) Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	6.80022	5.53250	7.42664	0.33982	0.75985	11.17%

Report Date:

19 Jul-06 1:42 PM

Test Link:

10-5075-5165/B158908psC

## CETIS Test Summary

% Germination Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	1.00000	0.60000	0.60000
100		1.00000	0.60000	1.00000	0.80000	1.00000
Average Height (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		85.4000	83.7	81.6	74.8000	85.6
Average Length (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		85	73	72.6	72	75
Average AG Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		36.724	37.1833	32.1840	25.5525	31.874
Average AG Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		5.75999	5.93998	5.19202	4.71500	5.74399
Average Root Wt. (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		39.524	31.6967	33.3780	11.7250	31.66
Average Root Wt. (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		1.52600	1.48665	1.50999	0.81750	1.30999
Average Total Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		76.2480	68.8800	65.5620	37.2775	63.534
Average Total Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		7.28599	7.42664	6.70200	5.53250	7.05398

# CETIS Analysis Detail

Plant Bloassay - Chronic					CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	10-5075-5165	10-5075-5165	19 Jul-06 1:41 PM	CETISv1.1.2

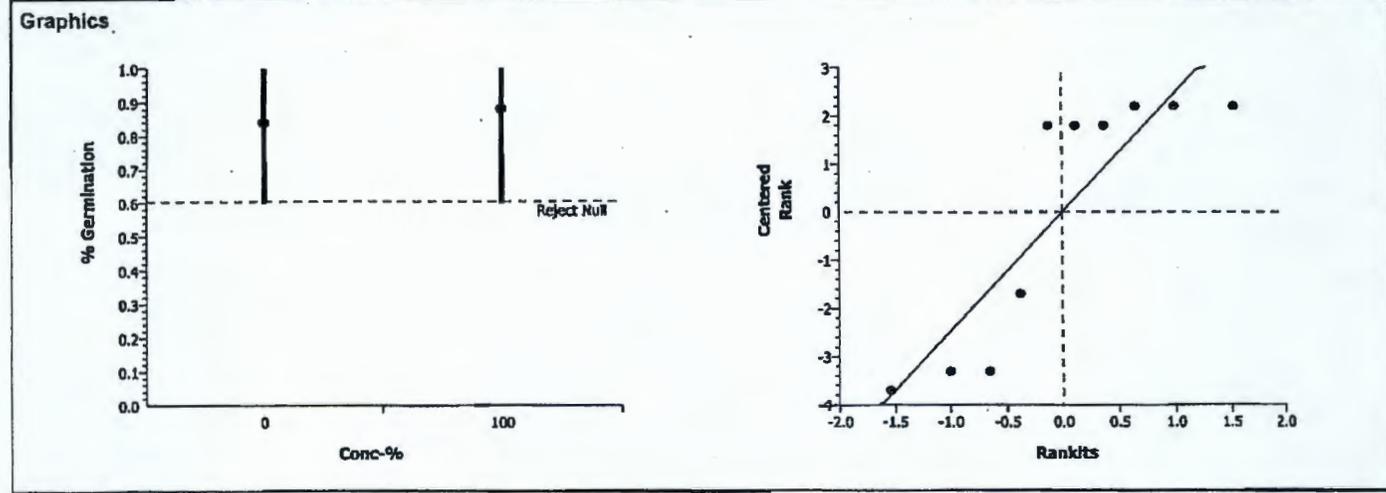
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	27.99%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	28.5		0.5000	3	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0048873	0.004887	1	0.09	0.76896	Non-Significant Effect
Error	0.4233652	0.052921	8			
Total	0.42825247	0.0578079	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.48569	23.15450	0.71064	Equal Variances
Distribution	Shapiro-Wilk W	0.76085		0.00484	Non-normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.21909	5.30000	2.00000	7.50000	3.01247
100		5	0.88000	0.60000	1.00000	0.17889	5.70000	2.00000	7.50000	2.56418



# CETIS Analysis Detail

Plant Bioassay - Chronic					CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	10-5075-5165	10-5075-5165	19 Jul-06 1:41 PM	CETISv1.1.2

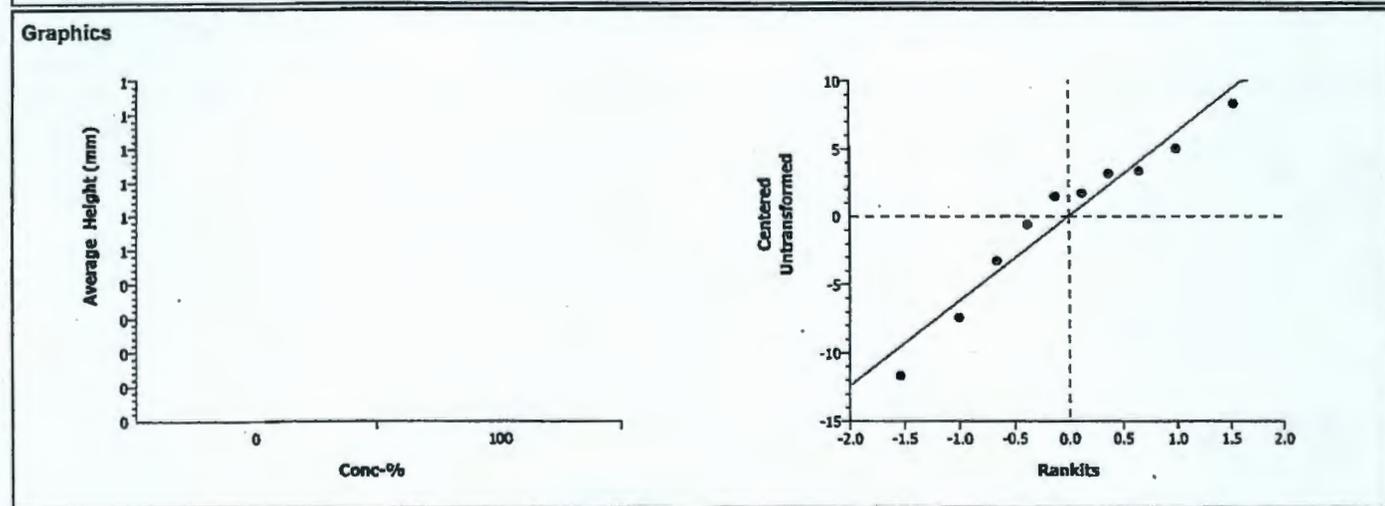
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	9.32%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedl		100	-0.4772	1.85955	0.6770	7.48139	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	9.215997	9.215997	1	0.23	0.64596	Non-Significant Effect
Error	323.728	40.466	8			
Total	332.943994	49.681996	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.08913	23.15450	0.30033	Equal Variances
Distribution	Shapiro-Wilk W	0.94249		0.58100	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	82.22	74.8	85.6	4.4488				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 1:42 PM  
 Analysis: 09-3405-9100/B158908psC

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	10-5075-5165	10-5075-5165	19 Jul-06 1:41 PM	CETISv1.1.2

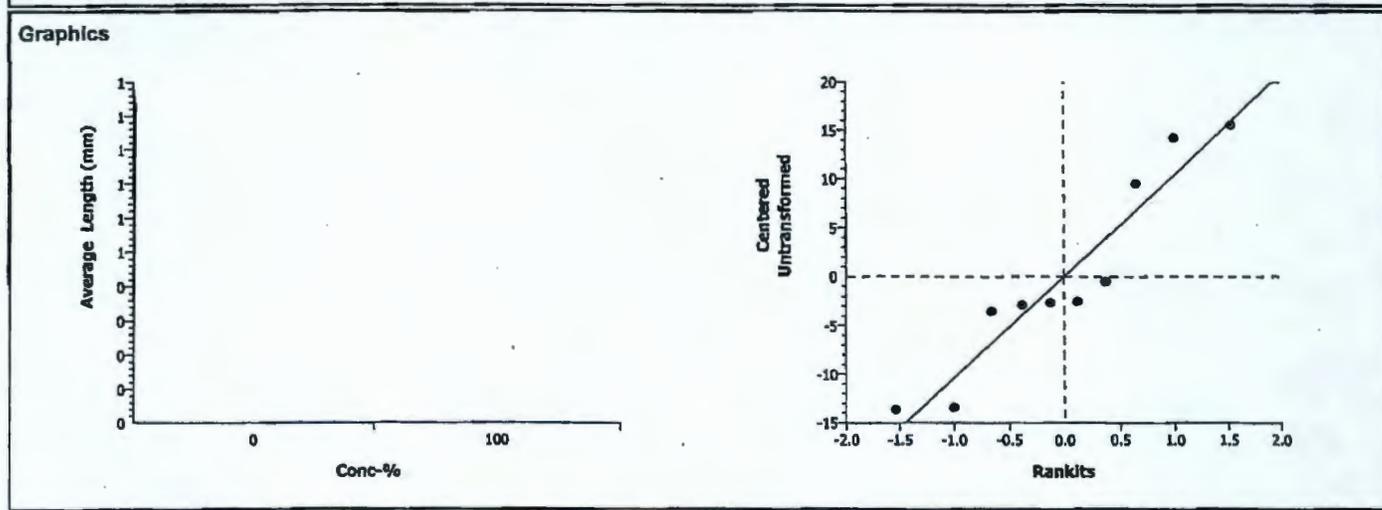
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	13.65%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedl		100	2.56983	1.85955	0.0166	12.7066	Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	770.884	770.884	1	6.60	0.03314	Significant Effect
Error	933.8361	116.7295	8			
Total	1704.72009	887.61354	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	6.95377	23.15450	0.08689	Equal Variances	
Distribution	Shapiro-Wilk W	0.89561		0.19592	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	75.52	72	85	5.4177				



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M HILL

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	10-5075-5165	10-5075-5165	19 Jul-06 1:42 PM	CETISv1.1.2

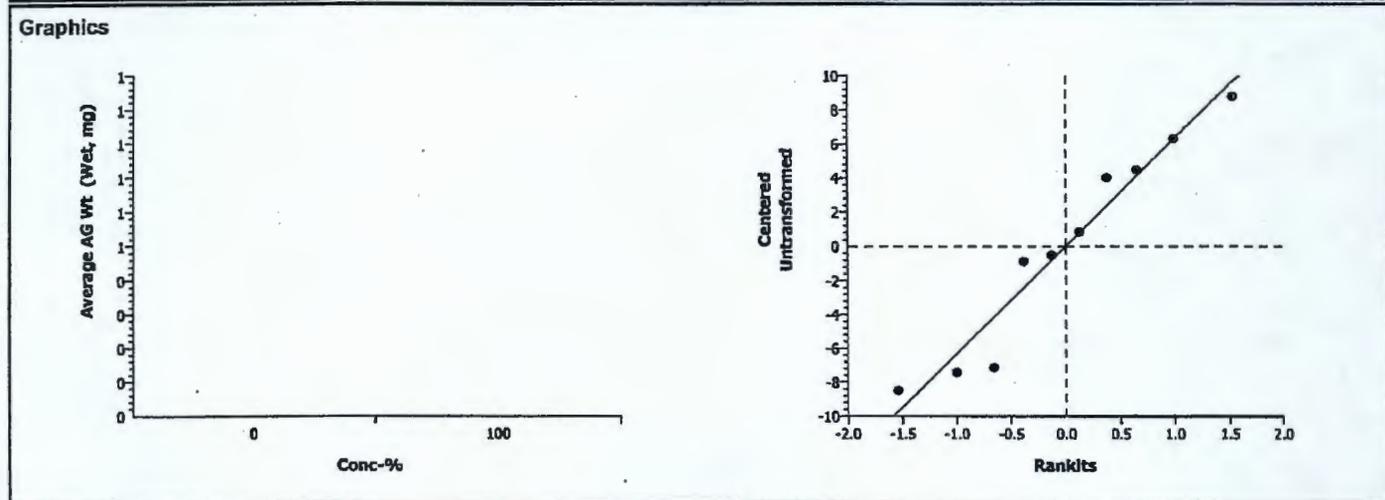
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	23.77%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.1857	1.85955	0.5713	7.59345	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.436808	1.436808	1	0.03	0.85734	Non-Significant Effect
Error	333.4981	41.68727	8			
Total	334.934947	43.124076	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.77566	23.15450	0.34657	Equal Variances
Distribution	Shapiro-Wilk W	0.92648		0.41414	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	31.945	23.460	40.732	7.8289				
100		5	32.704	25.552	37.183	4.6992				



# CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	10-5075-5165	10-5075-5165	19 Jul-06 1:42 PM	CETISv1.1.2

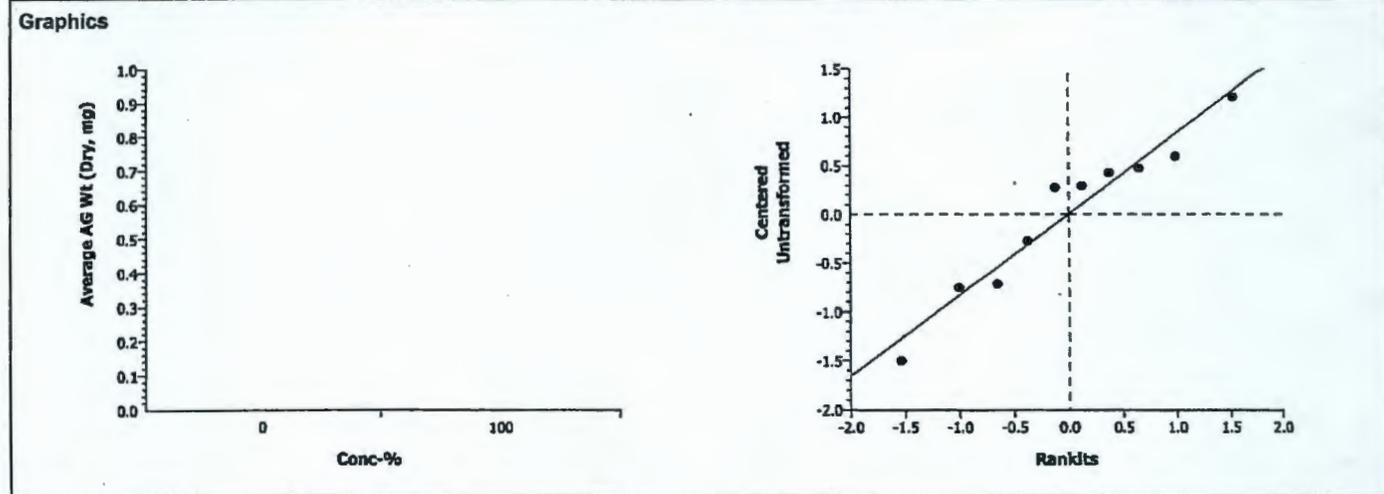
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	19.03%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.4024	1.85955	0.6510	0.99980	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.116996	0.116996	1	0.16	0.69796	Non-Significant Effect
Error	5.781542	0.722693	8			
Total	5.89853783	0.8396887	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	4.62761	23.15450	0.16701	Equal Variances	
Distribution	Shapiro-Wilk W	0.94541		0.61457	Normal Distribution	

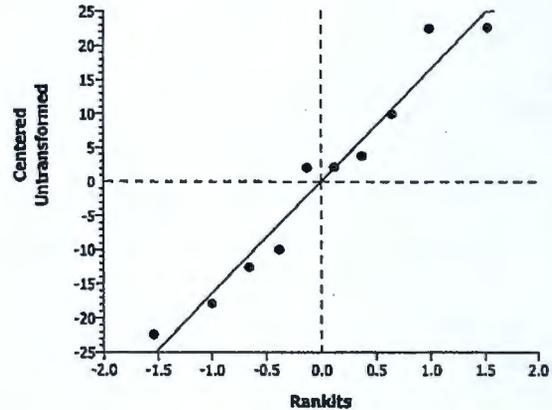
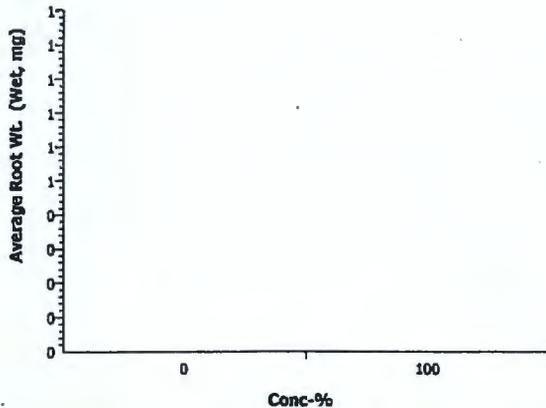
Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	5.47019	4.71500	5.93998	0.50679				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill				
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version					
Average Root Wt. (Wet, mg)	Comparison	10-5075-5165	10-5075-5165	19 Jul-06 1:42 PM	CETISv1.1.2					
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	43.15%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	1.49824	1.85955	0.0862	19.5766	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)				
Between	621.9584	621.9584	1	2.24	0.17245	Non-Significant Effect				
Error	2216.61	277.0763	8							
Total	2838.56873	899.03467	9							
ANOVA Assumptions										
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)					
Variances	Variance Ratio F	4.02731	23.15450	0.20592	Equal Variances					
Distribution	Shapiro-Wilk W	0.93825		0.53374	Normal Distribution					
Data Summary										
		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	29.597	11.725	39.524	10.499				

## Graphics



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	10-5075-5165	10-5075-5165	19 Jul-06 1:42 PM	CETISv1.1.2

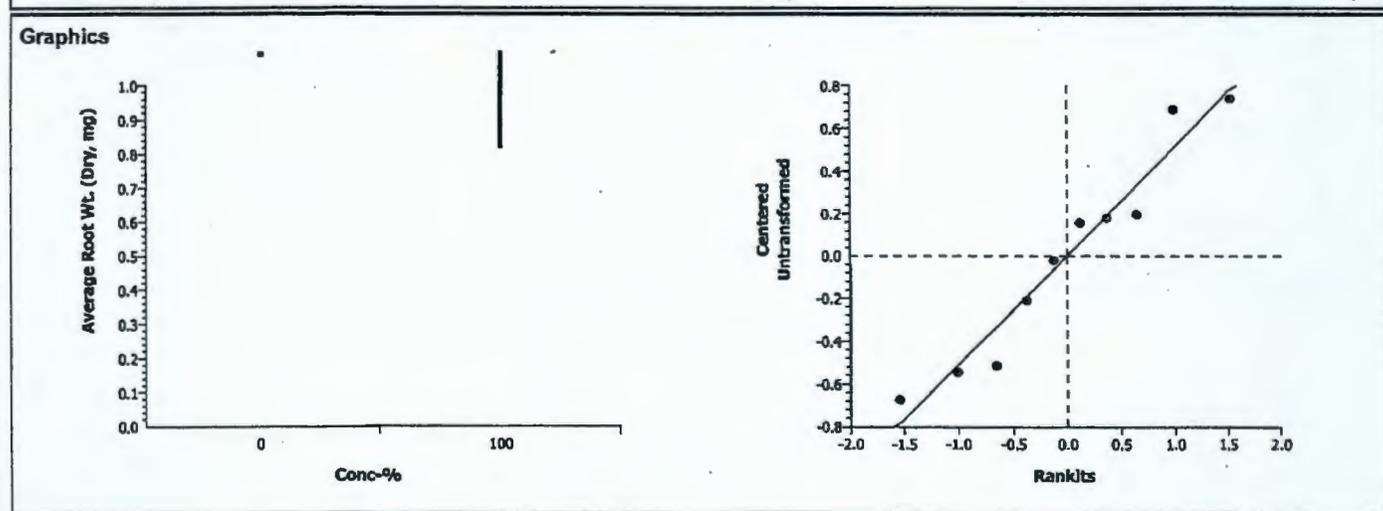
Method	Ajt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.90%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.29512	1.85955	0.1157	0.61314	Non-Significant Effect

ANOVA Table							
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)	
Between	0.4558926	0.455893	1	1.68	0.23140	Non-Significant Effect	
Error	2.17437	0.271796	8				
Total	2.63026240	0.7276888	9				

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	5.06682	23.15450	0.14510	Equal Variances	
Distribution	Shapiro-Wilk W	0.93145		0.46235	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.33003	0.81750	1.52600	0.29933				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 1:42 PM  
 Analysis: 04-6045-1100/B158908psc

Plant Bioassay - Chronic							CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	10-5075-5165	10-5075-5165	19 Jul-06 1:42 PM	CETISv1.1.2

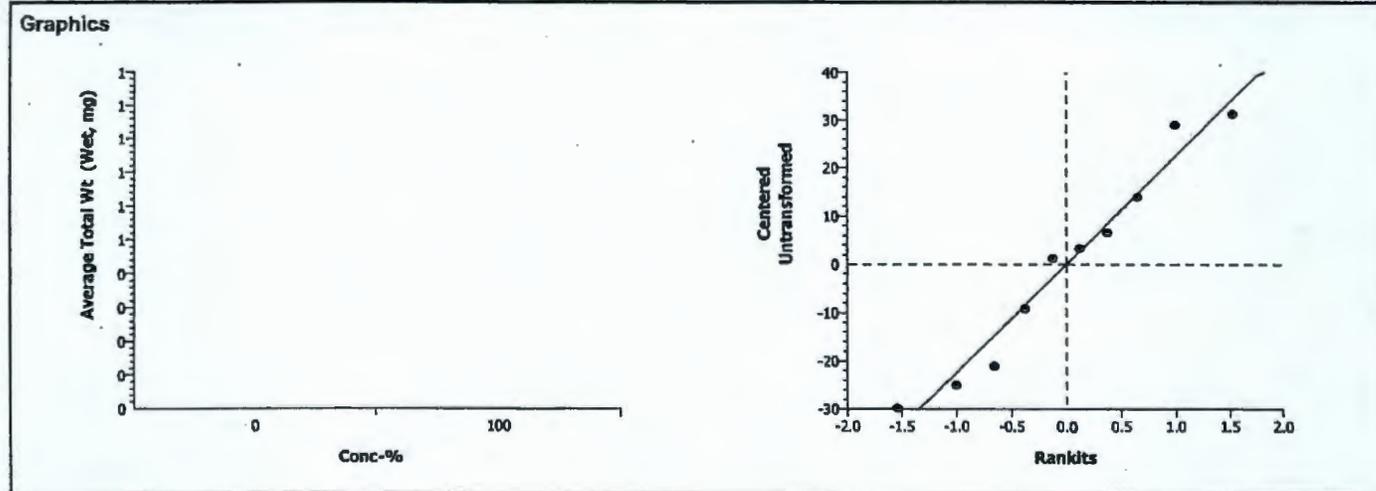
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.47%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.04769	1.85955	0.1627	26.6498	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	563.6076	563.6076	1	1.10	0.32540	Non-Significant Effect
Error	4107.73	513.4663	8			
Total	4671.33807	1077.0739	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	3.68848	23.15450	0.23414	Equal Variances	
Distribution	Shapiro-Wilk W	0.94532		0.61362	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	62.300	37.278	76.248	14.8				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 1:42 PM  
 Analysis: 12-8502-1101/B158908psC

**Plant Bioassay - Chronic** CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	10-5075-5165	10-5075-5165	19 Jul-06 1:42 PM	CETISv1.1.2

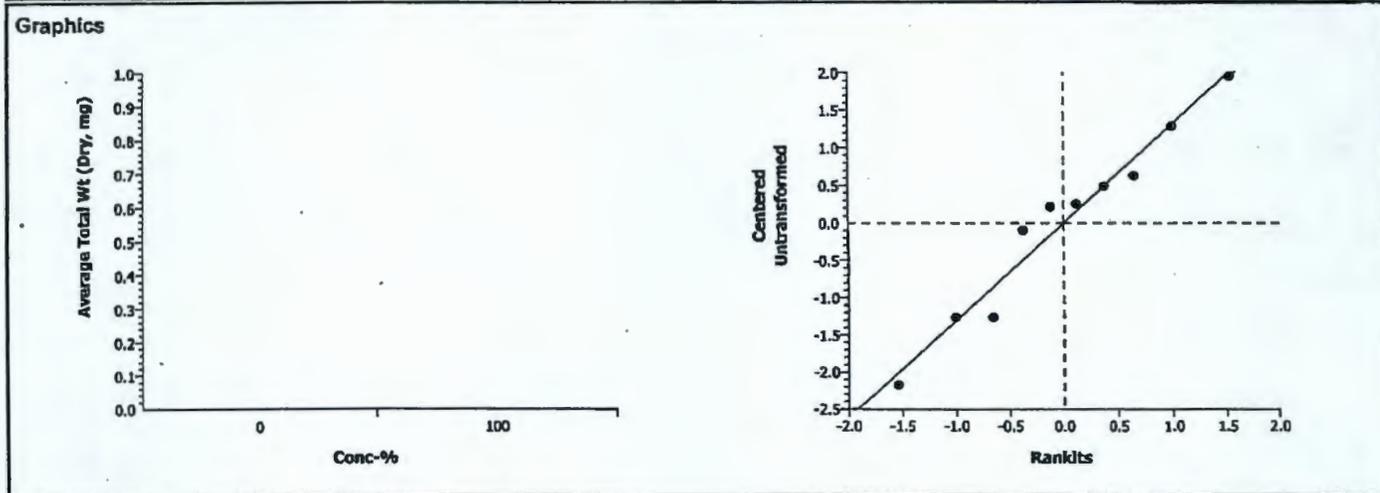
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	22.27%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.25091	1.85955	0.4041	1.56156	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.11099	0.11099	1	0.06	0.80821	Non-Significant Effect
Error	14.10374	1.762968	8			
Total	14.2147307	1.8739576	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	5.10679	23.15450	0.14332	Equal Variances	
Distribution	Shapiro-Wilk W	0.96048		0.79133	Normal Distribution	

Data Summary		Original Data				Transformed Data				
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	1.71714				
100		5	6.80022	5.53250	7.42664	0.75985				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

6-206

Test Start Date: May 11, 2006

Day 0 TP Day 12 NJ Day 14 NJ Day 16 NT Day 18 DW Day 20 TP Day 23 - Day 27 B Day 31 B

		Bioassay Lab ID: BG 1589-09 Sample No: J11K05							pH		
CONC.	REPLICATE	# seeds germinated						7-DAYS POST-EMERGENCE (27 days after planting)	14-DAYS POST-EMERGENCE (34 days after planting)	INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
		12 days after planting	14 days after planting	16 days after planting	20 days after planting	22 days after planting	23 days after planting				
Control	A	0	1	1	1	2		3	3	7.0	6.9
	B	5	5	5	6	6		6→5	5		
	C	5	5	6	6	6		6→5	5		
	D	2	3	3	4	4		4	4		
	E	5	6	6	6	6		6→5	5		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A	1 med G, 2 Sm G	
Replicate B	2 Lg G, 3 med G	removed: 1 med G
Replicate C	5 med G	removed: 1 med G
Replicate D	1 Lg G, 3 med G	
Replicate E	5 Lg G	removed: 1 Lg G

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest, 6+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A	1 med G, 2 Sm G
Replicate B	1 Lg G, 1 Lg G w/ 1 B shoot, 3 med G
Replicate C	5 med G
Replicate D	4 med G
Replicate E	5 med G

Measure Shoot Height:

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	64 mm	36 mm	40 mm	mm	mm
Replicate B	95 mm	117 mm	63 mm	60 mm	47 mm
Replicate C	67 mm	91 mm	38 mm	74 mm	71 mm
Replicate D	75 mm	59 mm	62 mm	57 mm	mm
Replicate E	77 mm	85 mm	84 mm	75 mm	86 mm

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1250.70	1270.5	1253.55
Replicate B	1250.36	1354.1	1250.53
Replicate C	1245.09	1434.7	1272.51
Replicate D	1250.60	1311.8	1260.65
Replicate E	1248.26	1395.2	1277.08

1269.46

Describe root appearance:

Replicate A	
Replicate B	
Replicate C	
Replicate D	
Replicate E	

Measure Root Length:

Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	40 mm	20 mm	70 mm	mm	mm
Replicate B	45 mm	64 mm	54 mm	86 mm	115 mm
Replicate C	90 mm	80 mm	74 mm	100 mm	94 mm
Replicate D	61 mm	58 mm	27 mm	42 mm	mm
Replicate E	48 mm	80 mm	95 mm	96 mm	111 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1245.98	1259.3	1247.20
Replicate B	1244.53	1425.4	1250.53
Replicate C	1248.62	1516.8	1256.85
Replicate D	1244.53	1289.8	1247.72
Replicate E	1240.66	1426.3	1247.73

Comments:

Report Date: 19 Jul-06 1:44 PM

Test Link: 18-2059-0600/B158909psC

## CETIS Test Summary

Plant Bioassay - Chronic		CH2M Hill				
Test No: 05-8395-3197	Test Type: Plant Chronic	Duration: N/A				
Start Date: 11 May-06	Protocol: ASTM E1963-02 (2002)	Species: Poa sandbergii				
Ending Date:	Dil Water:	Source:				
Setup Date: 11 May-06	Brine:					
Sample No: 11-1767-6848	Code: B1589-09	Client:				
Sample Date: 09 May-06 02:00 PM	Material: Soil	Project:				
Receive Date:	Source: Hanford					
Sample Age: 34h	Station:					
Comments: J11KC5						
Comparison Summary						
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
16-0306-6842	% Germination	100	> 100	N/A	27.99%	Wilcoxon Rank Sum Two-Sample
15-4864-0898	Average Height (mm)	100	> 100	N/A	16.79%	Equal Variance t Two-Sample
06-5789-3717	Average Length (mm)	< 100	100	N/A	22.76%	Equal Variance t Two-Sample
19-3035-4431	Average AG Wt (Wet, mg)	100	> 100	N/A	37.65%	Equal Variance t Two-Sample
06-0035-4435	Average AG Wt (Dry, mg)	100	> 100	N/A	36.43%	Equal Variance t Two-Sample
12-2775-1168	Average Root Wt. (Wet, mg)	100	> 100	N/A	53.56%	Equal Variance t Two-Sample
11-0974-6226	Average Root Wt. (Dry, mg)	100	> 100	N/A	39.56%	Equal Variance t Two-Sample
04-7593-2673	Average Total Wt (Wet, mg)	100	> 100	N/A	46.08%	Equal Variance t Two-Sample
11-8940-4265	Average Total Wt (Dry, mg)	100	> 100	N/A	36.08%	Equal Variance t Two-Sample

Report Date:

19 Jul-06 1:44 PM

Test Link:

18-2059-0600/B158909psC

## CETIS Test Summary

% Germination Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%	
100		5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%	
Average Height (mm) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%	
100		5	69.500	46.700	81.400	6.3515	14.202	20.44%	
Average Length (mm) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%	
100		5	67.340	43.3	87.6	9.4343	21.096	31.33%	
Average AG Wt (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%	
100		5	21.992	6.6000	37.922	5.4392	12.163	55.31%	
Average AG Wt (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%	
100		5	3.70611	0.95003	5.76399	0.90635	2.02666	54.68%	
Average Root Wt. (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%	
100		5	28.539	4.4400	53.636	9.0534	20.244	70.93%	
Average Root Wt. (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%	
100		5	1.09283	0.40666	1.64600	0.22121	0.49464	45.26%	
Average Total Wt (Wet, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%	
100		5	50.531	11.040	91.558	14.337	32.058	63.44%	
Average Total Wt (Dry, mg) Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%	
100		5	4.79893	1.35669	7.17798	1.12269	2.51041	52.31%	

Report Date:

19 Jul-06 1:44 PM

Test Link:

18-2059-0600/B158909psC

## CETIS Test Summary

% Germination Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	1.00000	0.60000	0.60000
100		0.60000	1.00000	1.00000	0.80000	1.00000
Average Height (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		46.7000	76.4000	78.2	64.8000	81.4000
Average Length (mm) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		43.3	72.8000	87.6	47	86
Average AG Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		6.60002	20.748	37.922	15.3000	29.388
Average AG Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		0.95003	3.82000	5.48401	2.51251	5.76399
Average Root Wt. (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		4.44002	36.174	53.6360	11.3175	37.1280
Average Root Wt. (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		0.40666	1.20000	1.64600	0.79749	1.41399
Average Total Wt (Wet, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		11.0400	56.922	91.5580	26.6175	66.516
Average Total Wt (Dry, mg) Detail						
Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		1.35669	5.02000	7.13000	3.31000	7.17798

# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2

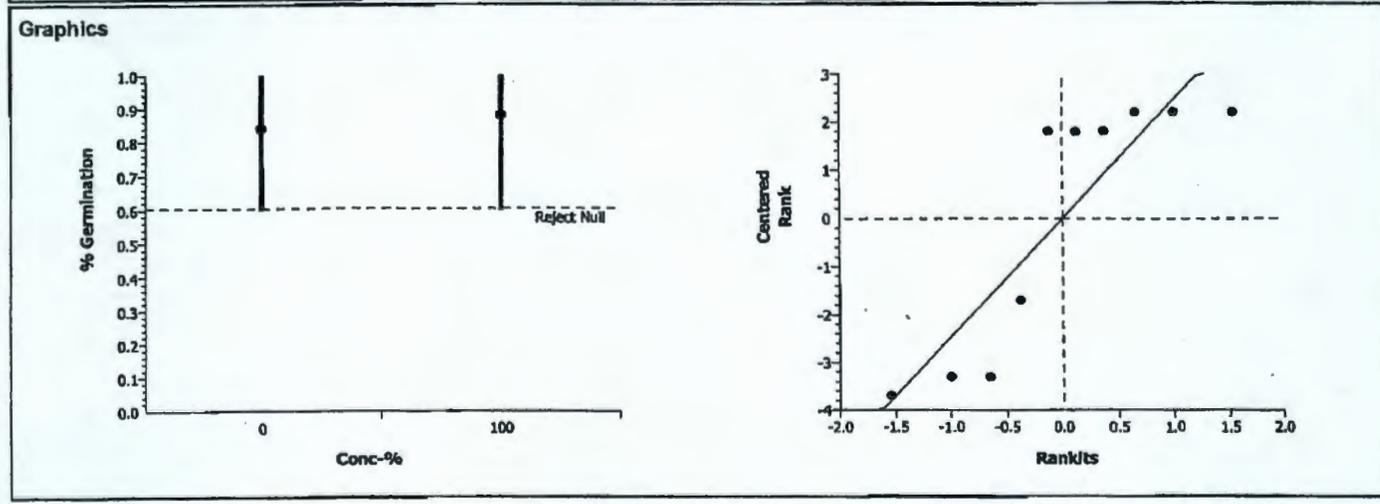
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	27.99%

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	28.5		0.5000	3	Non-Significant Effect

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0048873	0.004887	1	0.09	0.76896	Non-Significant Effect
Error	0.4233652	0.052921	8			
Total	0.42825247	0.0578079	9			

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.48569	23.15450	0.71064	Equal Variances
Distribution	Shapiro-Wilk W	0.76085		0.00484	Non-normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.21909	5.30000	2.00000	7.50000	3.01247
100		5	0.88000	0.60000	1.00000	0.17889	5.70000	2.00000	7.50000	2.56418



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 1:44 PM  
 Analysis: 15-4864-0898/B158909psC

Plant Bioassay - Chronic							CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2

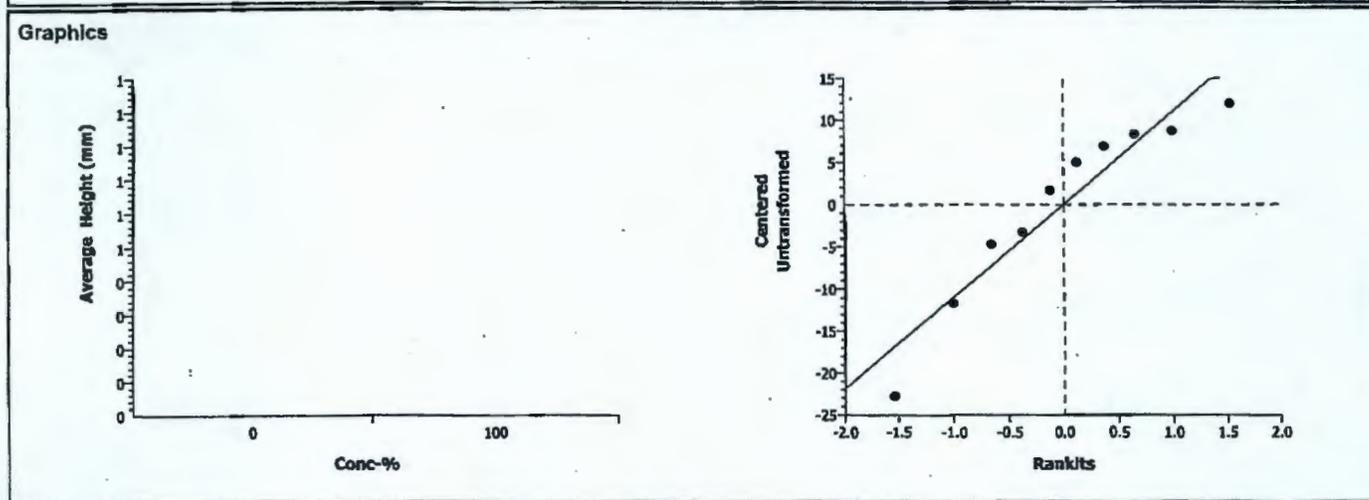
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	16.79%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.48955	1.85955	0.0873	13.4827	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	291.5999	291.5999	1	2.22	0.17467	Non-Significant Effect
Error	1051.4	131.425	8			
Total	1342.99997	423.02495	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	3.29915	23.15450	0.27429	Equal Variances	
Distribution	Shapiro-Wilk W	0.90169		0.22863	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	69.500	46.7	81.4	14.202				

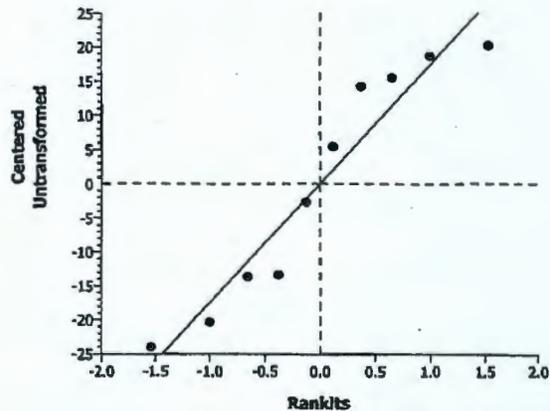
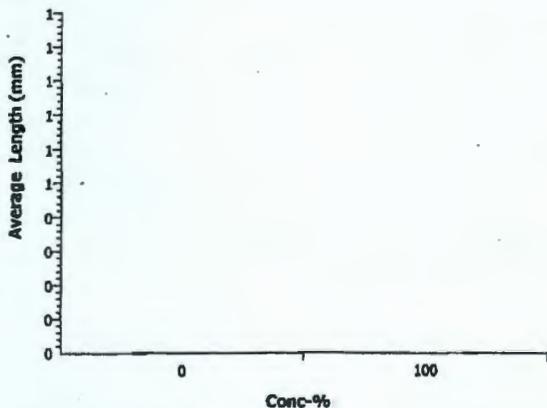


# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 1:44 PM  
 Analysis: 06-5789-3717/B158909psC

Plant Bioassay - Chronic							CH2M Hill			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Average Length (mm)	Comparison		18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	22.76%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	2.25905	1.85955	0.0269	21.188	Significant Effect			
ANOVA Table										
Source	Sum of Squares		Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	1656.369		1656.369	1	5.10	0.05380	Non-Significant Effect			
Error	2596.54		324.5675	8						
Total	4252.90906		1980.9365	9						
ANOVA Assumptions										
Attribute	Test		Statistic	Critical	P-Value	Decision(0.01)				
Variances	Variance Ratio F		2.18037	23.15450	0.46885	Equal Variances				
Distribution	Shapiro-Wilk W		0.89548		0.19528	Normal Distribution				
Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	67.340	43.3	87.6	21.096				

## Graphics



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

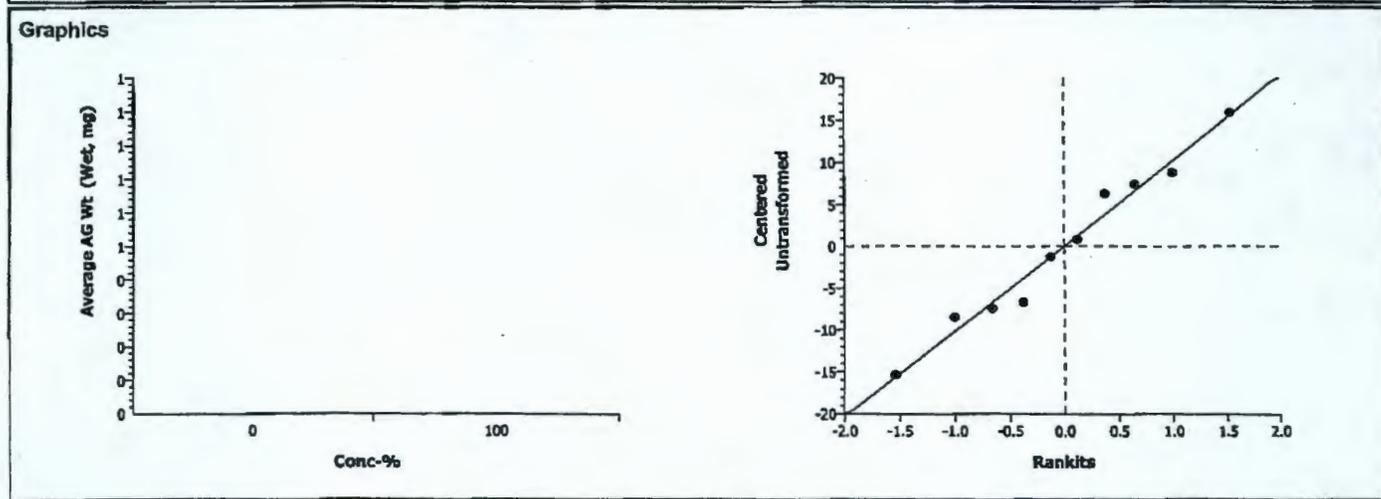
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
Average AG Wt (Wet, mg)	Comparison	18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	37.65%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.53878	1.85955	0.0812	12.0288	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	247.6984	247.6984	1	2.37	0.16242	Non-Significant Effect
Error	836.8786	104.6098	8			
Total	1084.57697	352.30819	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.41347	23.15450	0.41437	Equal Variances
Distribution	Shapiro-Wilk W	0.97144		0.90391	Normal Distribution

Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	31.945	23.460	40.732	7.8289				
100		5	21.992	6.6000	37.922	12.163				



# CETIS Analysis Detail

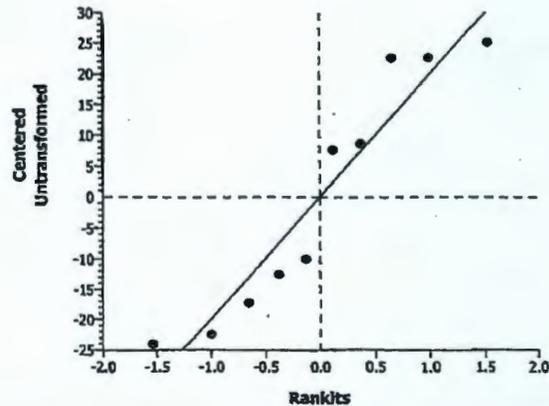
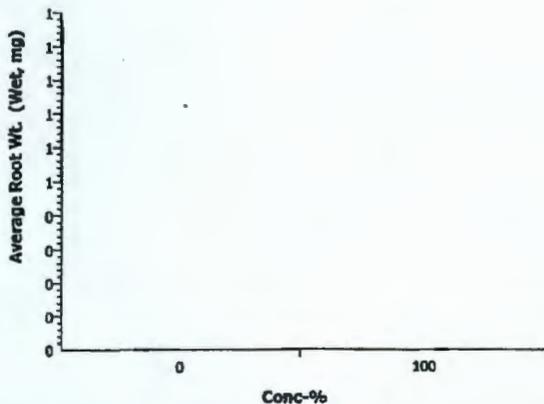
Plant Bioassay - Chronic							CH2M Hill			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Average AG Wt (Dry, mg)	Comparison		18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	36.43%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedi		100	1.5039	1.85955	0.0855	1.91378	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares		Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	5.988886		5.988886	1	2.26	0.17102	Non-Significant Effect			
Error	21.18359		2.647949	8						
Total	27.1724763		8.6368351	9						
ANOVA Assumptions										
Attribute	Test		Statistic	Critical	P-Value	Decision(0.01)				
Variances	Variance Ratio F		3.45577	23.15450	0.25699	Equal Variances				
Distribution	Shapiro-Wilk W		0.96806		0.87231	Normal Distribution				
Data Summary										
			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	3.70611	0.95003	5.76399	2.02666				
Graphics										

# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 1:44 PM  
 Analysis: 12-2775-1168/B158909psC

Plant Bioassay - Chronic							CH2M Hill			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
Average Root Wt. (Wet, mg)	Comparison		18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	53.56%		
Group Comparisons										
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)			
Artificial Soil/Sedl		100	1.28801	1.85955	0.1169	24.2988	Non-Significant Effect			
ANOVA Table										
Source	Sum of Squares		Mean Square	DF	F Statistic	P-Value	Decision(0.05)			
Between	708.1634		708.1634	1	1.66	0.23375	Non-Significant Effect			
Error	3414.961		426.8701	8						
Total	4123.12457		1135.0335	9						
ANOVA Assumptions										
Attribute	Test		Statistic	Critical	P-Value	Decision(0.01)				
Variances	Variance Ratio F		1.08323	23.15450	0.94011	Equal Variances				
Distribution	Shapiro-Wilk W		0.88065		0.13276	Normal Distribution				
Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	28.539	4.4400	53.636	20.244				

## Graphics



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2

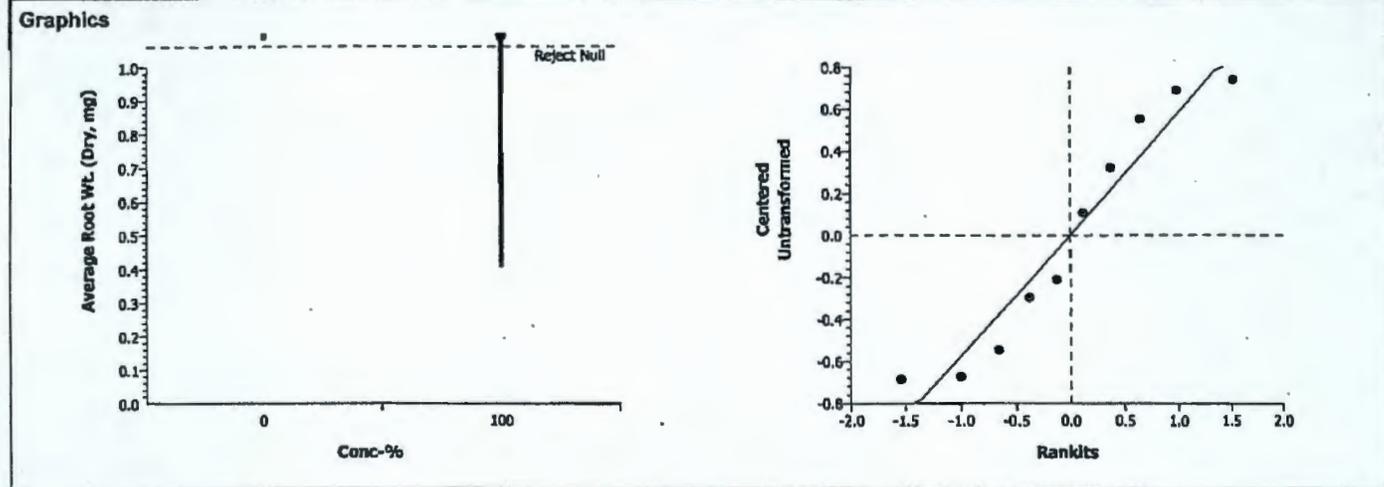
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	39.56%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.77694	1.85955	0.0567	0.69511	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.103015	1.103015	1	3.16	0.11348	Non-Significant Effect
Error	2.79465	0.349331	8			
Total	3.89766467	1.4523461	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	1.85552	23.15450	0.56404	Equal Variances	
Distribution	Shapiro-Wilk W	0.90430		0.24411	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.09283	0.40666	1.84600	0.49464				



# CETIS Analysis Detail

Plant Bioassay - Chronic					CH2M HILL
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2

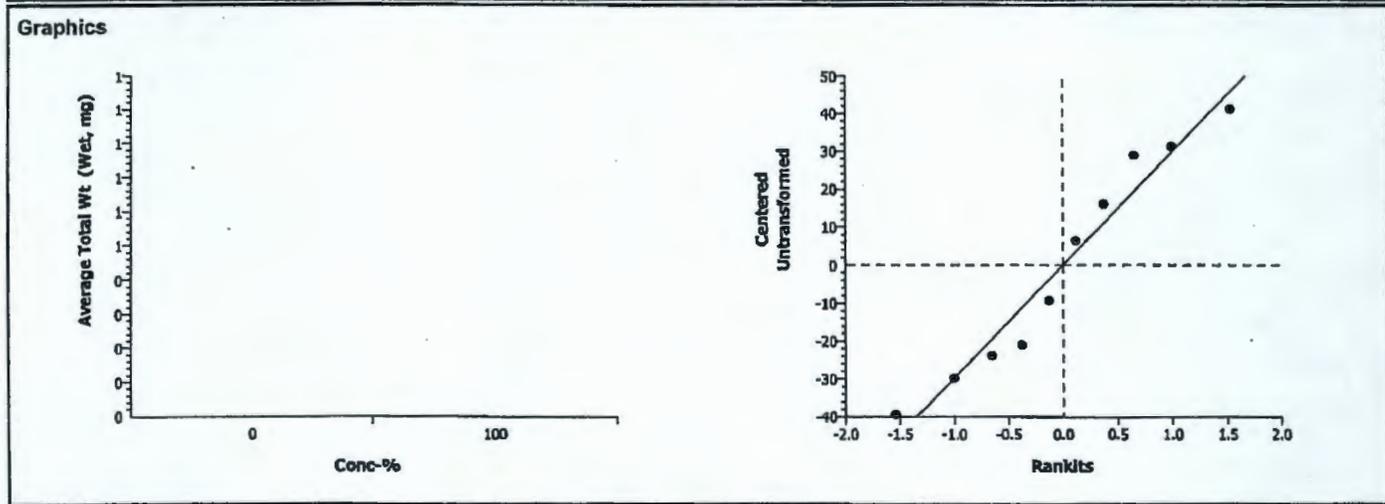
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	46.08%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.39789	1.85955	0.0998	35.6301	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1793.503	1793.503	1	1.95	0.19969	Non-Significant Effect
Error	7342.568	917.821	8			
Total	9136.07178	2711.3245	9			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.27212	23.15450	0.82121	Equal Variances
Distribution	Shapiro-Wilk W	0.93345		0.48264	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	50.531	11.040	91.558	32.058				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 1:44 PM  
 Analysis: 11-8940-4265/B158909psC

Plant Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2

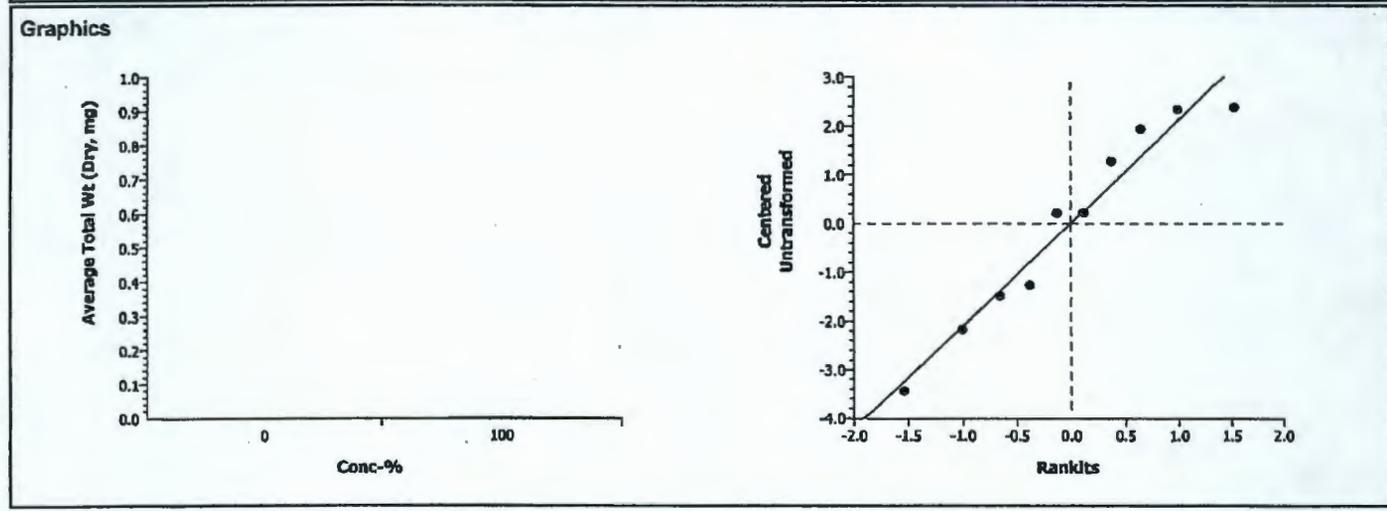
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	36.08%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.62623	1.85955	0.0713	2.52936	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	12.23226	12.23226	1	2.64	0.14255	Non-Significant Effect
Error	37.00282	4.625352	8			
Total	49.2350798	16.857616	9			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	2.13737	23.15450	0.48004	Equal Variances	
Distribution	Shapiro-Wilk W	0.93153		0.46311	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	1.71714				
100		5	4.79893	1.35669	7.17798	2.51041				



**APPENDIX B  
CHAIN OF CUSTODY**

F 1610

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-138	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code <b>8L</b>	Data Turnaround <b>45 Days</b>	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-D-48:2	SAF No. RC-051	Air Quality <input type="checkbox"/>			
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT			
Shipped To CH2MHILL	Offsite Property No. A060151	Bill of Lading/Air Bill No. SEE OSPC				

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.	<b>Preservation</b>	None	None								
	<b>Type of Container</b>	G/P	P/G								
	<b>No. of Container(s)</b>	1	1								
	<b>Volume</b>	1000g	4000g								

<b>SAMPLE ANALYSIS</b>		See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172								
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Sample No.	Matrix *	Sample Date	Sample Time								
53JTO	SOIL	4-26-06	1500	1	1						

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  36 1589-01 Blngers				S=Soil SE=Soil/soil SO=Soil SL=Sludge W = Water D=Oil A=Air DS=Dregs Solids DL=Drum Liquids T=Trash W=Wipe L=Liquid V=Vegetation X=Other
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					

<b>LABORATORY SECTION</b>	Received By	Title	Date/Time
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method	Disposed By	Date/Time

F1630

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-156	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH		Price Code 8L	Data Turnaround
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 100-D-49-2	SAF No. RC-051		Air Quality <input type="checkbox"/>	45 Days
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT			
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC			

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.	Preservation	None	None							
	Type of Container	G/P	P/G							
	No. of Container(s)	1	1							
	Volume	1000g	4000g							

<b>SAMPLE ANALYSIS</b>		See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172							
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Sample No.	Matrix *	Sample Date	Sample Time							
J11.08	SOIL	4-30-06	1420	1	1					

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>
Relinquished By/Removed From <i>Elyse H. T. [Signature]</i>	Date/Time 9:00 AM 5-1-06	Received By/Stored In <i>Joan Kessler</i>	Date/Time 5-1-06	* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessler for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  B61529-02 Bluegrass				S=Soil SD=Sediment SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue Wt=Wipe L=Liquid V=Vegetation X=Other
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					

<b>LABORATORY SECTION</b>	Received By	Title	Date/Time
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method	Disposed By	Date/Time

F1636

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-180	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH		Price Code 8L	Data Turnaround -
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 1607-D2:1	SAF No. RC-051		Air Quality <input type="checkbox"/>	45 Days
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT			
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC			

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.	Preservation	None	None									
	Type of Container	G/P	P/G									
	No. of Container(s)	1	1									
	Volume	1000g	4000g									

<b>SAMPLE ANALYSIS</b>		See item (1) in Special Instructions.	Soil Pesticide Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									
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Sample No.	Matrix *	Sample Date	Sample Time									
J10W2	SOIL	5-1-06	1700	1	1							

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b> S=Soil SE=Settlement SO=Solid SI=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Titrate W=Wipe L=Liquid V=Vegetation X=Other
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	These marks indicate that unless lined out, analytes to be included with Strontium-89,90 - Total Sr analysis fraction.				
Elizabeth M. Terpen	5-2-06 09:00	Joan Kessner	5-2-06 09:57	~ These marks indicate that this is a non-analysis used to properly format COC form.				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	Contact Joan Kessner for any questions.				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	361589-03 Bluesgrass				

<b>LABORATORY SECTION</b>	Received By	Title	Date/Time
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method	Disposed By	Date/Time

F1045

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-162	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH		Price Code 8L	Data Turnaround
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 116-F-1	SAF No. RC-051		Air Quality <input type="checkbox"/>		45 Days
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT			
Shipped To CH2MHILL	Offsite Property No. A060151	Bill of Lading/Air Bill No. SEE OSPC				

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> Use page 3 for original material to Corvalls for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.	Preservation	None	None								
	Type of Container	G/P	P/G								
	No. of Container(s)	1	1								
	Volume	1000g	4000g								

<b>SAMPLE ANALYSIS</b>				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172												
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Sample No.	Matrix *	Sample Date	Sample Time														
J1104	SOIL	5-2-06	14:00	1	1												

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>
Relinquished By/Removed From <i>Elizabeth M Teggs</i>	Date/Time 16:30 <del>5-2-06</del>	Received By/Stored In <i>Joan Kessner</i>	Date/Time 5-2-06 16:08	* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.				S=Soil SE=Sediment SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue W=Wipe L=Liquid V=Vegetation X=Other
Relinquished By/Removed From <i>ET</i>	Date/Time 5-2-06	Received By/Stored In	Date/Time	(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	36-1589-04 Bluegrass				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					

<b>LABORATORY SECTION</b>	Received By	Title	Date/Time
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method	Disposed By	Date/Time

F1648

Washington Closure Hanford		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-051-234		Page 1 of 1			
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 8L			
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 600-208		SAF No. RC-051		Air Quality <input type="checkbox"/>		Data Turnaround 45 Days			
Ice Chest No.		Field Logbook No. EL-1596-1		COA BESRAS6520		Method of Shipment GROUND TRANSPORT					
Shipped To CH2MHILL		Offsite Property No. A060151				Bill of Lading/Air Bill No. SEE OSPC					
POSSIBLE SAMPLE HAZARDS/REMARKS NONE		Preservation		None							
Special Handling and/or Storage Use page 3 for original material to Corvallis for MIS preparation and aliquating, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.		Type of Container		G/P							
		No. of Container(s)		1							
		Volume		1000g		4000g					
SAMPLE ANALYSIS				See item (1) in Special Instructions.		Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172					
Sample No.	Matrix *	Sample Date	Sample Time								
J11K16	SOIL	5-2-06	17:37								
CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix *			
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  BG1589-05 Bluegrass			
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		S=Soil SE=Soil/Element SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Trace W=Wipe L=Liquid V=Vegetation X=Other			
LABORATORY SECTION		Received By				Title				Date/Time	
FINAL SAMPLE DISPOSITION		Disposal Method				Disposed By				Date/Time	

File 90

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-258	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH		Price Code 8L	Data Turnaround
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location YAKIMA RIDGE II	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT	Air Quality <input type="checkbox"/>	45 Days
Ice Chest No.	Offsite Property No. A060151	Bill of Lading/Air Bill No. SEE OSPC				

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.	Preservation	None	None									
	Type of Container	G/P	P/G									
	No. of Container(s)	1	1									
	Volume	1000g	4000g									

<b>SAMPLE ANALYSIS</b>				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172							
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Sample No.	Matrix *	Sample Date	Sample Time									
J11K	SOIL	5-7-06	1424	1	1							

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b> S=Soil SE=Soil SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Trace Wt=Wt% L=Liquid V=Vegetation X=Other
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	* These marks indicate that unless lined out, analytes to be included with Strontium-89.90 -- Total Sr analysis fraction. ^ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  36 1589-06 Bluegrass				
<i>Elmer M. Taylor</i>	5-8-06	<i>Joan Kessner</i>	5-8-06					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					

<b>LABORATORY SECTION</b>	Received By	Title	Date/Time
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method	Disposed By	Date/Time

F169.1

Washington Closure Hanford		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST						RC-051-252		Page 1 of 1																																																													
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 8L		Data Turnaround																																																													
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 600-171		SAF No. RC-051		Air Quality <input type="checkbox"/>		45 Days																																																															
Ice Chest No.		Field Logbook No. EL-1596-1		COA BESRAS6520		Method of Shipment GROUND TRANSPORT																																																																	
Shipped To CH2MHILL		Offsite Property No. A060151				Bill of Lading/Air Bill No. SEE OSPC																																																																	
POSSIBLE SAMPLE HAZARDS/REMARKS NONE			Preservation		None		None																																																																
Special Handling and/or Storage Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.			Type of Container		G/P		P/G																																																																
			No. of Container(s)		1		1																																																																
			Volume		1000g		4000g																																																																
			SAMPLE ANALYSIS		See item (1) in Special Instructions.		Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172																																																																
<table border="1"> <thead> <tr> <th>Sample No.</th> <th>Matrix *</th> <th>Sample Date</th> <th>Sample Time</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>J11187</td> <td>SOIL</td> <td>5-8-06</td> <td>1600</td> <td>1</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> </tr> <tr> <td></td> </tr> <tr> <td></td> </tr> </tbody> </table>												Sample No.	Matrix *	Sample Date	Sample Time									J11187	SOIL	5-8-06	1600	1	1																																										
Sample No.	Matrix *	Sample Date	Sample Time																																																																				
J11187	SOIL	5-8-06	1600	1	1																																																																		
CHAIN OF POSSESSION				Sign/Print Names				SPECIAL INSTRUCTIONS				Matrix *																																																											
Relinquished By/Removed From		Date/Time 1600		Received By/Stored In		Date/Time 5-8-06		* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  B5 1589-07      3/loss				Se=Soil SB=Soilmen SO=Solid St=Sludge W=Water O=Oil Am=Air DS=Drum Solids DL=Drum Liquids T=Truss Wt=Wipe L=Liquid V=Vegetation X=Other																																																											
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time																																																																	
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LABORATORY SECTION		Received By		Title				Date/Time																																																															
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By				Date/Time																																																															

F1700

Washington Closure Hanford		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST			RC-051-240	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH		Price Code 8L	Data Turnaround
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600--181	SAF No. RC-051	Air Quality <input type="checkbox"/>		45 Days	
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT			
Shipped To CH2MHILL	Offsite Property No. A060151	Bill of Lading/Air Bill No. SEE OSPC				

POSSIBLE SAMPLE HAZARDS/REMARKS NONE  Special Handling and/or Storage Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.	Preservation	None	None									
	Type of Container	G/P	P/G									
	No. of Container(s)	1	1									
	Volume	1000g	4000g									
SAMPLE ANALYSIS		See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

Sample No.	Matrix *	Sample Date	Sample Time									
J11K33	SOIL	5-8-06	1955	1	1							

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix *
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D423; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  36 1529-08 Bluegrass				S=Soil SE=Soil/Estm SO=Solid SL=Sludge W = Water O=Oil A=Air DS=Drum Solids DL=Drum Liquid T=Tissue WI=Wipe L=Liquid V=Vegetation X=Other
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
LABORATORY SECTION	Received By	Title		Date/Time				
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By		Date/Time				

F1703

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-276	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH		Price Code 8L	Data Turnaround
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location SADDLE MOUNTAIN		SAF No. RC-051	Air Quality <input type="checkbox"/>	45 Days
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520		Method of Shipment GROUND TRANSPORT		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC			

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.	Preservation	None	None								
	Type of Container	G/P	P/G								
	No. of Container(s)	1	1								
	Volume	1000g	4000g								

<b>SAMPLE ANALYSIS</b>				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172												
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Sample No.	Matrix *	Sample Date	Sample Time														
J11K05	SOIL	5-9-06	1400	1	1												

<b>CHAIN OF POSSESSION</b>				<b>Sign/Print Names</b>				<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>			
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  BG 1589-09 Bluegrass							
<i>Donald W. Tapp</i>	1405 5-9-06	<i>Joan Kessner</i>	5-9-06 1415												
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time												
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time												
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time												
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time												

<b>LABORATORY SECTION</b>	Received By	Title	Date/Time
<b>FINAL SAMPLE DISPOSITION</b>	Disposal Method	Disposed By	Date/Time



**BIOASSAY REPORT**  
**ACUTE SCREENING BIOASSAYS**  
**Conducted May 18 through 19, 2006**

Prepared for

**ELR CONSULTING, INC.**  
**WASHINGTON CLOSURE HANFORD**  
**RICHLAND, WASHINGTON**

Prepared by

**CH2M HILL**  
**2300 NW Walnut Boulevard**  
**Corvallis, Oregon 97330**

June 1, 2006

Lab I.D. Nos. BN1588-01 thru -05  
SDG Number BN1588

**RC-051**  
**F1705**

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## INTRODUCTION

CH2M HILL conducted acute screening bioassay tests using the nematode (*Caenorhabditis elegans*) on soil samples provided by the ELR Consulting for the Washington Closure Hanford project, Richland, Washington. The tests were conducted from May 18 through 19, 2006.

## METHODS AND MATERIALS

### TEST METHODS

The chronic test methods were performed according to: *Standard Guide for Conducting Laboratory Soil Toxicity Tests with the Nematode Caenorhabditis elegans*, ASTM E 2172-01 (2001).

### TEST ORGANISMS

The nematodes used were obtained from CH2M HILL's in-house cultures and were age synchronized as 4 day old organisms at test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the ASTM protocol. The test organisms appeared vigorous and in good condition prior to testing.

### CONTROL SOIL

The control soil used in the tests was 70 grade silica sand.

### HYDRATION WATER

The water used to hydrate the control and test soils was Milli-Q equivalent de-ionized water.

### TEST CONCENTRATIONS

The concentrations tested in the nematode test were 100 percent test sample with control soil alone for the control. For the nematode test, 30 organisms per concentration were used with three test chambers per concentration and 10 organisms per chamber.

### SAMPLE COLLECTION

The soil samples were collected from May 2, 2006, through 9, 2006. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

## SAMPLE CROSS-REFERENCE TABLE

Table 1 provides a cross-reference of the Client ID numbers, sampling dates, sampling locations, Nematode test sample identification (SDG) numbers, and Analytical Lab SDG numbers.

Client ID	Sample Date	Sample Location	Nematode test SDG	Analytical Lab SDG
J11K46	05/02/2006	600--208	BN1588-01	F1648
J11K73	05/07/2006	YAKIMA RIDGE II	BN1588-02	F1690
J11K67	05/08/2006	600-171	BN1588-03	F1691
J11K55	05/08/2006	600--181	BN1588-04	F1700
J11KC5	05/09/2006	SADDLE MOUNTAIN	BN1588-05	F1705

## SAMPLE PREPARATION

Test soils and control soil were dried and homogenized prior to use. For each replicate, 2.33 g dry weight of soil was added to each test chamber. The soils were then hydrated to 40 percent of the dry weight by addition of hydration water (0.93 ml) and test chambers were then covered. In addition, 23.3 g of soil was added to a surrogate chamber and hydrated to provide for pH measurements. All test chambers were allowed to equilibrate at test conditions for seven days prior to test initiation.

## TEST INITIATION

Tests were initiated by the addition of 10 test organisms to each test chamber. Organisms were added to test chambers in random order.

## TEST TERMINATION

Tests were terminated after 24 hours. The contents of the test chambers were added to a centrifuge tube, 10 ml of Ludox-AM silica solution added, and each tube was hand shaken to suspend the nematodes into the Ludox solution. The tubes were then centrifuged to concentrate the soil and the supernatant transferred to a 15 cm petri dish and allowed to sit for 15 minutes. The petri dish was then placed under a dissecting microscope and the nematodes were retrieved and inspected. The recovered test organisms were recorded as alive (responded with independent movement to tactile stimulation) or dead. Missing or unrecovered test organisms are scored as dead during data analysis.

## TEST ACCEPTABILITY CRITERIA

The test must meet the following two test acceptability criteria to be considered valid:

- A minimum of 80 percent of test organisms must be recovered, both in the control and each test concentration tested.
- The controls must achieve a minimum 90 percent survival.

## MONITORING OF BIOASSAYS

The soil pH was measured from surrogate test chambers at test initiation. Temperature was monitored in the test incubator at test initiation and termination.

## DATA ANALYSIS

The endpoints measured during the nematode test included survival over the 24 hour exposure period. The statistical analyses performed were those outlined in *Standard Guide for Conducting Laboratory Soil Toxicity Tests with the Nematode *Caenorhabditis elegans**, ASTM E 2172-01, using CETIS version 1.1.2. Equal Variance t Two-Sample Test was used to compare the survival data between the control and each test soil. When the assumptions of normality or homogeneity of variance necessary for Equal variance t Two-Sample Test could not be met, Unequal Variance t Two-Sample Test was used to analyze the data.

## RESULTS AND DISCUSSION

### ACUTE RESULTS

Table 2 summarizes the survival data for the nematode acute test initiated on May 18, 2006.

<b>Client ID</b>	<b>Percent Survival</b>	<b>Percent Recovered</b>
Control	93.3	100
J11K46	86.7	93.3
J11K73	86.7	90.0
J11K67	86.7	93.3
J11K55	93.3	93.3
J11KC5	90.0	93.3

The nematode results indicated no statistically significant reduction in survival in the J11K46, J11K73, J11K67, J11K55, and J11KC5 samples when compared to the control.

Test acceptability criteria was met with control survival of 90.0 percent and recovery of test organisms was greater than 80 percent in all test concentrations.

Test temperatures remained at 20±1°C. The tests proceeded without interruption or incidents that could have affected test results.

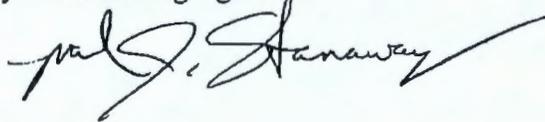
## REFERENCE TOXICANT TEST

The results of the reference toxicant test conducted in May with cupric chloride indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1994). The  $LC_{50}$  value and control chart limits are listed in the table below.

<b>Species (test)</b>	<b><math>LC_{50}</math></b>	<b>Control Chart Limits</b>
<i>Caenorhabditis elegans</i> (survival)	110.0	41 to 125

## CERTIFICATION STATEMENT

I certify that this data package is in compliance with the Statement of Work, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature:



**APPENDIX A  
RAW DATA SHEETS**





Client ELR - Washington Closure Hanford  
 Sample Description \_\_\_\_\_ Lab ID#: BN1588  
 Test Species: Caenorhabditis elegans ID#: Nem 014  
 Test Initiation: Tech: Tech: NJ Time: 1010

Beginning, Date 5-18-06 Time 1010  
 Ending, Date 5-19-06 Time 1045

Test Termination: Tech: Tech: NJ/ Time: 1045

Chamber Number	Start Count	# alive found	total # found
	0	24 hr	24 hr
1	10	8	9
2	10	10	10
3	10	7	8
4	10	8	9
5	10	10	10
6	10	7	8
7	10	9	10
8	10	10	10
9	10	10	10
10	10	9	10
11	10	10	10
12	10	9	10
13	10	9	10
14	10	10	10
15	10	10	10

Comments:  
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Chamber Number	Start Count	# alive found	total # found
	0	24 hr	24 hr
16	10	8	8
17	10	8	8
18	10	9	9
19	10		
20	10		
21	10		
22	10		
23	10		
24	10		
25	10		
26	10		
27	10		
28	10		
29	10		
30	10		

Comments:  
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# CETIS Test Summary

Page 1 of 1  
 Report Date: 19 May-06 2:41 PM  
 Test Link: 10-5401-5620/BN158801ce

Nematode 24 hour Acute test							CH2M Hill		
<b>Test No:</b>	18-9677-4590	<b>Test Type:</b>	Nematode Survival	<b>Duration:</b>	25h				
<b>Start Date:</b>	18 May-06 10:10 AM	<b>Protocol:</b>	ASTM E2172-01 (2001)	<b>Species:</b>	Caenorhabditis elegans				
<b>Ending Date:</b>	19 May-06 10:45 AM	<b>Dil Water:</b>		<b>Source:</b>	In-House Culture				
<b>Setup Date:</b>	18 May-06 10:10 AM	<b>Brine:</b>							
<b>Sample No:</b>	05-0926-5266	<b>Code:</b>	B1588-01	<b>Client:</b>					
<b>Sample Date:</b>	02 May-06 05:37 PM	<b>Material:</b>	Soil	<b>Project:</b>					
<b>Receive Date:</b>		<b>Source:</b>	Hanford						
<b>Sample Age:</b>	15d 16h	<b>Station:</b>							
<b>Comments:</b>	J11K46								
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method			
01-7981-1737	% Recovery	100	> 100	N/A	7.35%	Equal Variance t Two-Sample			
14-7039-5952	% Survival	100	> 100	N/A	18.67%	Equal Variance t Two-Sample			
% Recovery Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%	
100		3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%	
% Survival Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%	
100		3	0.86667	0.80000	1.00000	0.06667	0.11547	13.32%	
% Recovery Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3					
0	Artificial Soil/S	1.00000	1.00000	1.00000					
100		1.00000	0.90000	0.90000					
% Survival Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3					
0	Artificial Soil/S	0.90000	0.90000	1.00000					
100		1.00000	0.80000	0.80000					

# CETIS Analysis Detail

Nematode 24 hour Acute test CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	10-5401-5620	10-5401-5620	19 May-06 2:40 PM	CETISv1.1.2

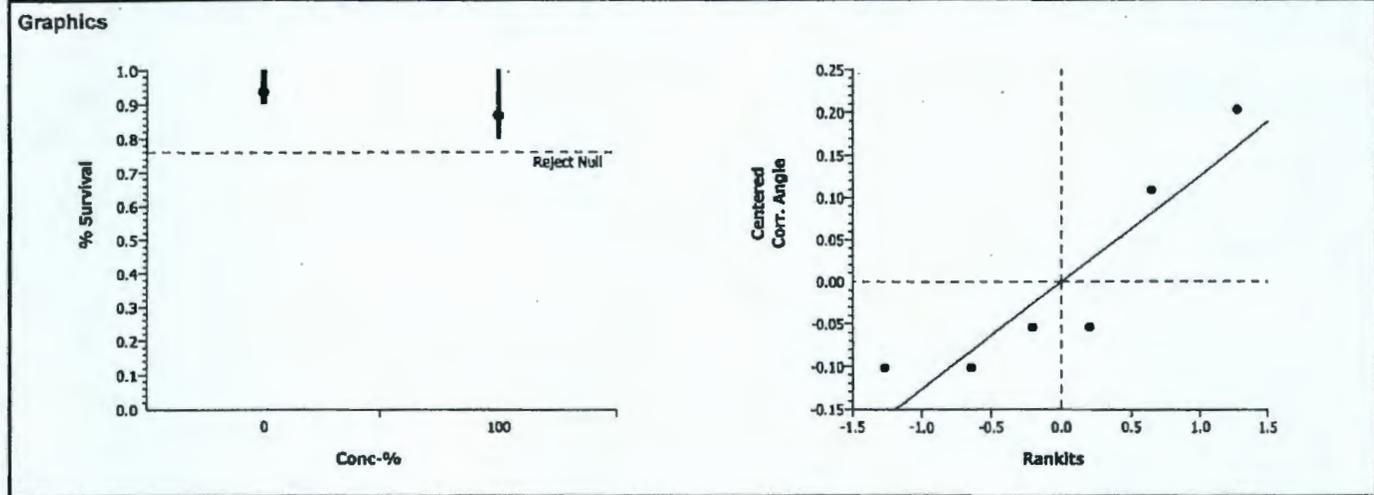
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	18.67%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.82094	2.13185	0.2289	0.24565	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0134232	0.013423	1	0.67	0.45779	Non-Significant Effect
Error	0.079669	0.019917	4			
Total	0.09309216	0.0333404	5			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.49949	199.00000	0.44449	Equal Variances
Distribution	Shapiro-Wilk W	0.81649		0.08226	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.86667	0.80000	1.00000	0.11547	1.20877	1.10715	1.41202	0.17602



Report Date: 19 May-06 2:46 PM  
 Test Link: 07-8480-5743/BN158802ce

# CETIS Test Summary

Nematode 24 hour Acute test							CH2M Hill		
Test No:	18-5560-0722	Test Type:	Nematode Survival	Duration:	25h				
Start Date:	18 May-06 10:10 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans				
Ending Date:	19 May-06 10:45 AM	Dil Water:		Source:	In-House Culture				
Setup Date:	18 May-06 10:10 AM	Brine:							
Sample No:	16-5929-9553	Code:	B1588-02	Client:					
Sample Date:	07 May-06 02:24 PM	Material:	Soil	Project:					
Receive Date:		Source:	Hanford						
Sample Age:	10d 19h	Station:							
Comments:	J11K73								
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method			
12-2364-8026	% Recovery	100	> 100	N/A	11.54%	Equal Variance t Two-Sample			
06-6740-0371	% Survival	100	> 100	N/A	10.75%	Equal Variance t Two-Sample			
% Recovery Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%	
100		3	0.90000	0.80000	1.00000	0.05774	0.10000	11.11%	
% Survival Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%	
100		3	0.86667	0.80000	0.90000	0.03333	0.05774	6.66%	
% Recovery Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3					
0	Artificial Soil/S	1.00000	1.00000	1.00000					
100		0.80000	1.00000	0.90000					
% Survival Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3					
0	Artificial Soil/S	0.90000	0.90000	1.00000					
100		0.80000	0.90000	0.90000					

# CETIS Analysis Detail

Comparisons: Page 1 of 2  
 Report Date: 19 May-06 2:46 PM  
 Analysis: 06-6740-0371/BN158802ce

Nematode 24 hour Acute test CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	07-8480-5743	07-8480-5743	19 May-06 2:46 PM	CETISv1.1.2

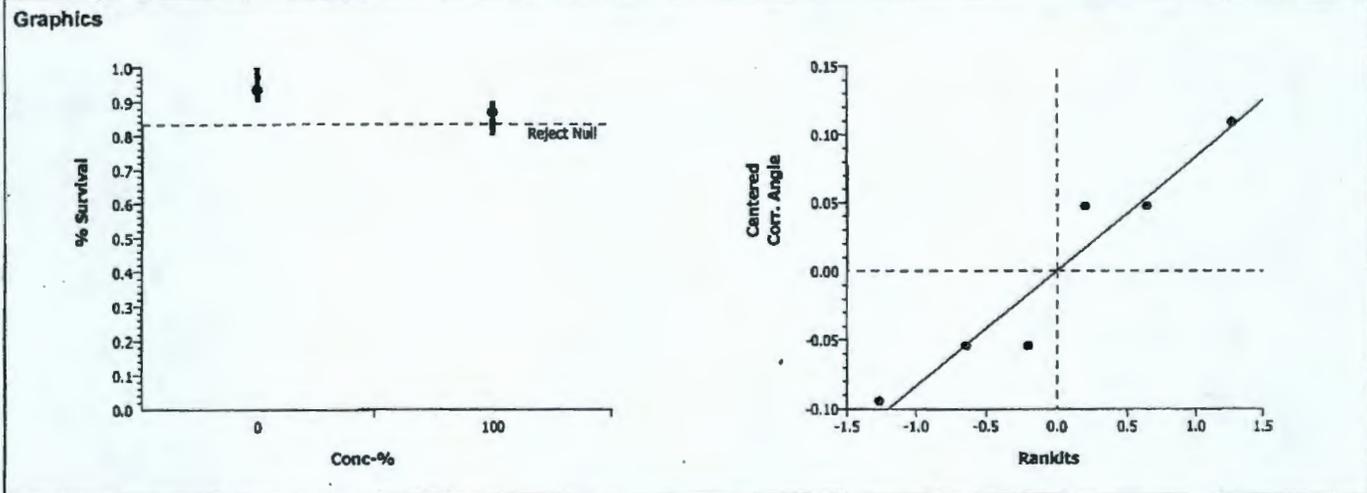
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	10.75%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.41085	2.13185	0.1156	0.15356	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0154907	0.015491	1	1.99	0.23112	Non-Significant Effect
Error	0.0311294	0.007782	4			
Total	0.04662009	0.0232730	5			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.31908	199.00000	0.86241	Equal Variances
Distribution	Shapiro-Wilk W	0.90857		0.42702	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.86667	0.80000	0.90000	0.05773	1.20175	1.10715	1.24905	0.08192



# CETIS Test Summary

Report Date: 19 May-06 2:47 PM  
 Test Link: 14-8738-9492/BN158803ce

Nematode 24 hour Acute test						CH2M Hill		
Test No:	09-9184-0568	Test Type:	Nematode Survival	Duration:	25h			
Start Date:	18 May-06 10:10 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans			
Ending Date:	19 May-06 10:45 AM	Dil Water:		Source:	In-House Culture			
Setup Date:	18 May-06 10:10 AM	Brine:						
Sample No:	04-3554-1104	Code:	B1588-03	Client:				
Sample Date:	08 May-06 04:00 PM	Material:	Soil	Project:				
Receive Date:		Source:	Hanford					
Sample Age:	9d 18h	Station:						
Comments:	J11K67							
<b>Comparison Summary</b>								
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method		
15-1622-9780	% Recovery	100	> 100	N/A	13.44%	Equal Variance t Two-Sample		
03-7338-7825	% Survival	100	> 100	N/A	22.43%	Equal Variance t Two-Sample		
<b>% Recovery Summary</b>								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		3	0.93333	0.80000	1.00000	0.06667	0.11547	12.37%
<b>% Survival Summary</b>								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.86667	0.70000	1.00000	0.08819	0.15275	17.63%
<b>% Recovery Detail</b>								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3				
0	Artificial Soil/S	1.00000	1.00000	1.00000				
100		0.80000	1.00000	1.00000				
<b>% Survival Detail</b>								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3				
0	Artificial Soil/S	0.90000	0.90000	1.00000				
100		0.70000	0.90000	1.00000				

# CETIS Analysis Detail

Nematode 24 hour Acute test CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	14-8738-9492	14-8738-9492	19 May-06 2:47 PM	CETISv1.1.2

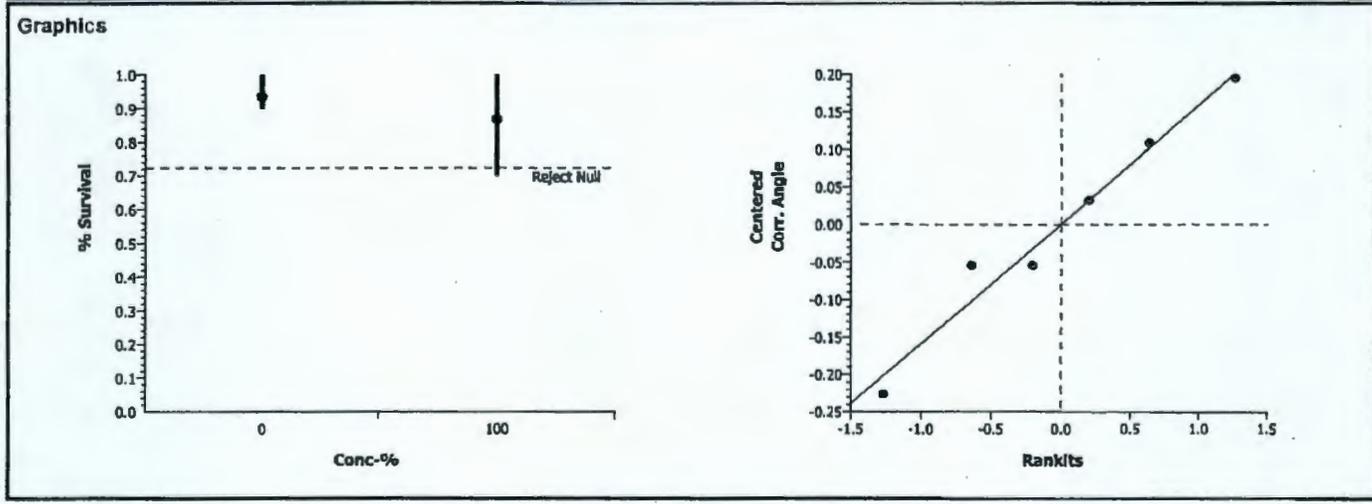
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	22.43%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.64142	2.13185	0.2781	0.28571	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0110845	0.011084	1	0.41	0.55616	Non-Significant Effect
Error	0.1077692	0.026942	4			
Total	0.11885366	0.0380268	5			

ANOVA Assumptions						
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)	
Variances	Variance Ratio F	5.08652	199.00000	0.32860	Equal Variances	
Distribution	Shapiro-Wilk W	0.97369		0.91624	Normal Distribution	

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.86667	0.70000	1.00000	0.15275	1.21741	0.99116	1.41202	0.21221



# CETIS Test Summary

Page 1 of 1  
 Report Date: 19 May-06 2:49 PM  
 Test Link: 07-1616-5395/BN158804ce

Nematode 24 hour Acute test							CH2M Hill		
Test No:	14-0938-0092	Test Type:	Nematode Survival	Duration:	25h				
Start Date:	18 May-06 10:10 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans				
Ending Date:	19 May-06 10:45 AM	Dil Water:		Source:	In-House Culture				
Setup Date:	18 May-06 10:10 AM	Brine:							
Sample No:	14-1131-2104	Code:	B1588-04	Client:					
Sample Date:	08 May-06 07:55 PM	Material:	Soil	Project:					
Receive Date:		Source:	Hanford						
Sample Age:	9d 14h	Station:							
Comments:	J11K55								
Comparison Summary									
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method			
05-6444-6707	% Recovery	100	> 100	N/A	13.44%	Equal Variance t Two-Sample			
08-7387-5831	% Survival	100	> 100	N/A	18.67%	Equal Variance t Two-Sample			
% Recovery Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%	
100		3	0.93333	0.80000	1.00000	0.06667	0.11547	12.37%	
% Survival Summary									
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV	
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%	
100		3	0.93333	0.80000	1.00000	0.06667	0.11547	12.37%	
% Recovery Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3					
0	Artificial Soil/S	1.00000	1.00000	1.00000					
100		0.80000	1.00000	1.00000					
% Survival Detail									
Conc-%	Control Type	Rep 1	Rep 2	Rep 3					
0	Artificial Soil/S	0.90000	0.90000	1.00000					
100		0.80000	1.00000	1.00000					

# CETIS Analysis Detail

Comparisons: Page 1 of 2  
 Report Date: 19 May-06 2:49 PM  
 Analysis: 08-7387-5831/BN158804ce

Nematode 24 hour Acute test CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	07-1616-5395	07-1616-5395	19 May-06 2:49 PM	CETISv1.1.2

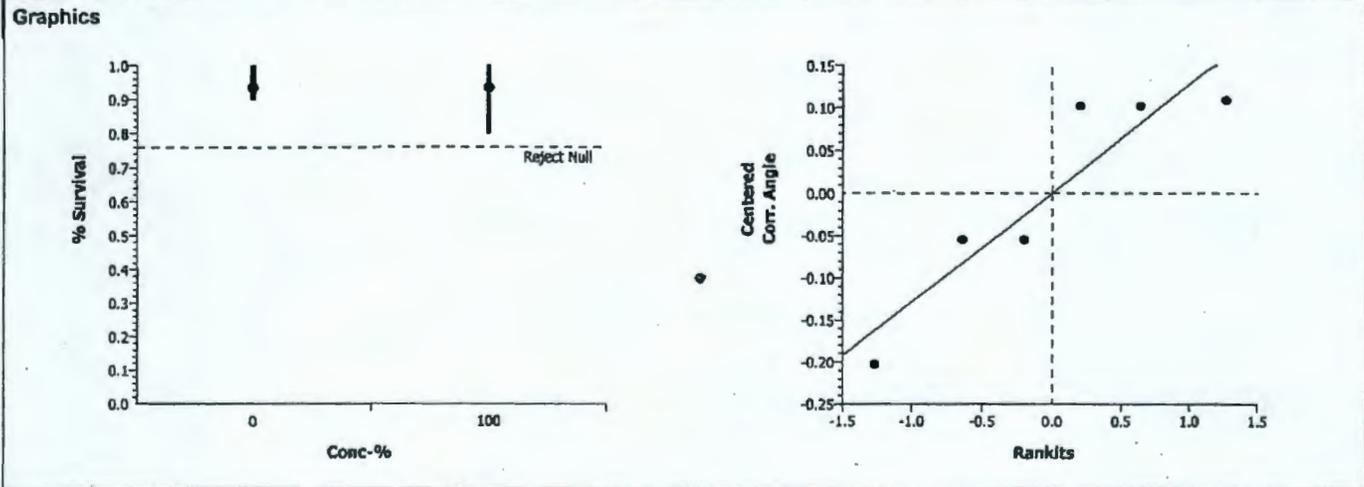
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	18.67%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.061	2.13185	0.5228	0.24565	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7.401E-05	7.40E-05	1	0.00	0.95432	Non-Significant Effect
Error	0.079669	0.019917	4			
Total	0.07974299	0.0199913	5			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.49949	199.00000	0.44449	Equal Variances
Distribution	Shapiro-Wilk W	0.83600		0.12074	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.93333	0.80000	1.00000	0.11547	1.31039	1.10715	1.41202	0.17602



Report Date: 19 May-06 2:50 PM  
 Test Link: 06-2072-0759/BN158805ce

# CETIS Test Summary

Nematode 24 hour Acute test							CH2M HILL	
Test No:	01-0920-6317	Test Type:	Nematode Survival	Duration:	25h			
Start Date:	18 May-06 10:10 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans			
Ending Date:	19 May-06 10:45 AM	Dil Water:		Source:	In-House Culture			
Setup Date:	18 May-06 10:10 AM	Brine:						
Sample No:	11-4128-0026	Code:	B1588-05	Client:				
Sample Date:	09 May-06 02:00 PM	Material:	Soil	Project:				
Receive Date:		Source:	Hanford					
Sample Age:	8d 20h	Station:						
Comments:	J11KC5							
Comparison Summary								
Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method		
18-3365-8380	% Recovery	100	> 100	N/A	13.44%	Equal Variance t Two-Sample		
12-3066-1568	% Survival	100	> 100	N/A	25.84%	Equal Variance t Two-Sample		
% Recovery Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
100		3	0.93333	0.80000	1.00000	0.06667	0.11547	12.37%
% Survival Summary								
Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.90000	0.70000	1.00000	0.10000	0.17321	19.25%
% Recovery Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3				
0	Artificial Soil/S	1.00000	1.00000	1.00000				
100		0.80000	1.00000	1.00000				
% Survival Detail								
Conc-%	Control Type	Rep 1	Rep 2	Rep 3				
0	Artificial Soil/S	0.90000	0.90000	1.00000				
100		0.70000	1.00000	1.00000				

# CETIS Analysis Detail

Nematode 24 hour Acute test CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	06-2072-0759	06-2072-0759	19 May-06 2:50 PM	CETISv1.1.2

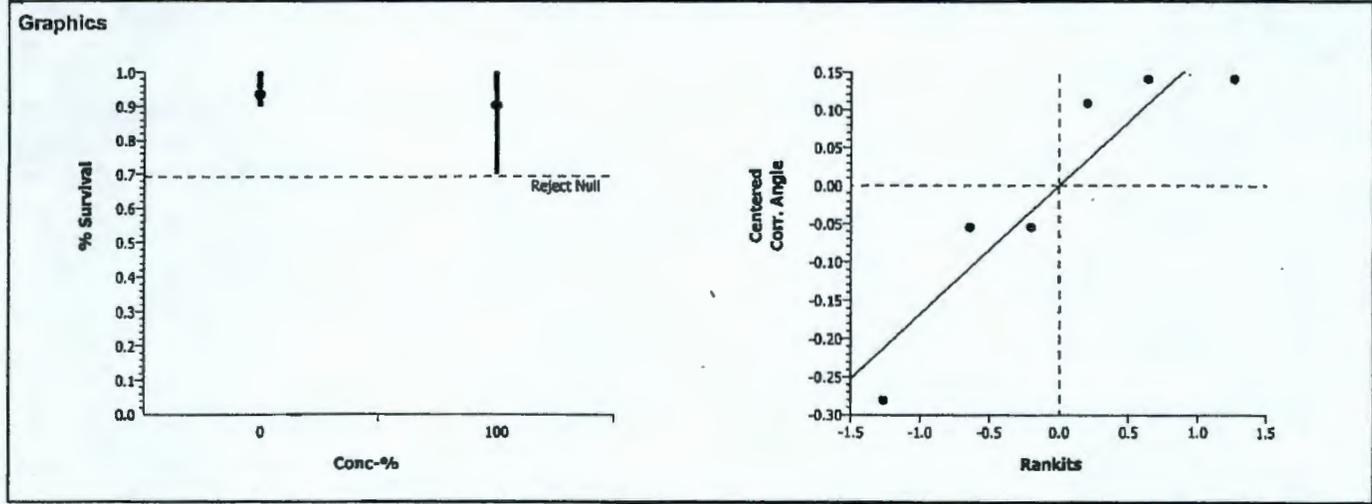
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	25.84%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.21032	2.13185	0.4218	0.32071	Non-Significant Effect

ANOVA Table						
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0015016	0.001502	1	0.04	0.84370	Non-Significant Effect
Error	0.1357881	0.033947	4			
Total	0.13728965	0.0354486	5			

ANOVA Assumptions					
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.66895	199.00000	0.26079	Equal Variances
Distribution	Shapiro-Wilk W	0.84939		0.15562	Normal Distribution

Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.90000	0.70000	1.00000	0.17321	1.27173	0.99116	1.41202	0.24298



**APPENDIX B**  
**REFERENCE TOXICANT DATA SHEETS**

Client QA/QC

Beginning, Date 5-18-06

Time 0900

Sample Description Cu as CuCl<sub>2</sub>·xH<sub>2</sub>O

Lab ID# 1B-248-05

Ending, Date 5-19-06

Time 0945 0920  
NJ

Test Species: Caenorhabditis elegans

ID#: Ncm 014

Test Initiation:

Tech:

Tech:

NJ

Time: 0900

Test Termination:

Tech:

Tech:

NJ/B

Time: 0926

Chamber Number	Start Count	# alive found	total # found
	0	24 hr	24 hr
1	10	0	10
2	10	2	10
3	10	10	10
4	10	8	10
5	10	6	10
6	10	7	10
7	10	0	10
8	10	9	10
9	10	<del>8</del> 10	10
10	10	7	10
11	10	10	10
12	10	9	10
13	10	10	10
14	10	9	10
15	10	10	10

Comments:

Endpoint

LC50

Cusum Chart Limits

Task Manager

*[Signature]*

Survival

110 mg/L

41 to 125

Project Manager

*[Signature]*

QA Officer

*[Signature]*



# CETIS Test Summary

Page 1 of 1  
 Report Date: 19 May-06 11:18 AM  
 Test Link: 17-1623-5361/rcea014

Nematode 24 hour Acute test			CH2M Hill
Test No:	10-9243-8639	Test Type:	Nematode Survival
Start Date:	18 May-06 09:00 AM	Protocol:	ASTM E2172-01 (2001)
Ending Date:	19 May-06 09:20 AM	Dil Water:	
Setup Date:	18 May-06 09:00 AM	Brine:	
Duration:	24h	Species:	Caenorhabditis elegans
Source:	In-House Culture	Client:	
Sample No:	15-1457-1183	Code:	1B048-05
Sample Date:	16 May-06	Material:	Copper
Receive Date:		Source:	Reference Toxicant
Sample Age:	57h	Station:	
Project:			
Comments:	in K medium		

Point Estimate Summary						
Analysis	Endpoint	% Effect	Conc-mg/L	95% LCL	95% UCL	Method
04-9941-0734	% Survival	50	110.0226	51.11752	306.4394	Linear Regression

% Survival Summary								
Conc-mg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
10		3	0.96667	0.90000	1.00000	0.03333	0.05774	5.97%
50		3	0.83333	0.70000	0.90000	0.06667	0.11547	13.86%
100		3	0.70000	0.60000	0.80000	0.05774	0.10000	14.29%
250		3	0.06667	0.00000	0.20000	0.06667	0.11547	173.21

% Survival Detail				
Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1.00000	1.00000	1.00000
10		1.00000	1.00000	0.90000
50		0.70000	0.90000	0.90000
100		0.60000	0.70000	0.80000
250		0.00000	0.00000	0.20000

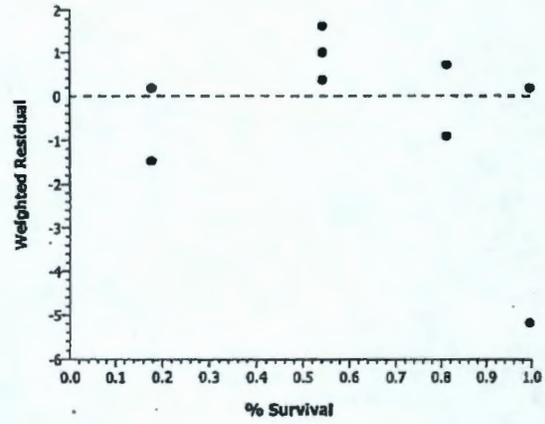
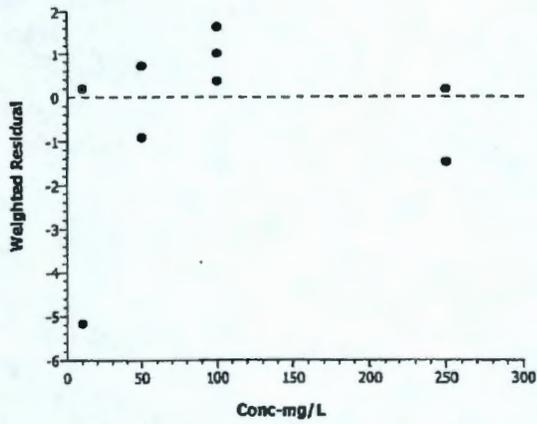
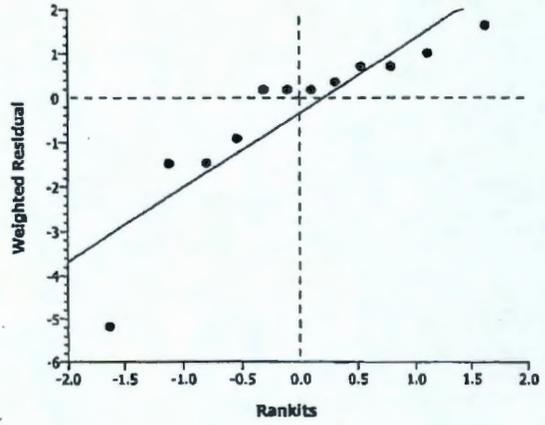
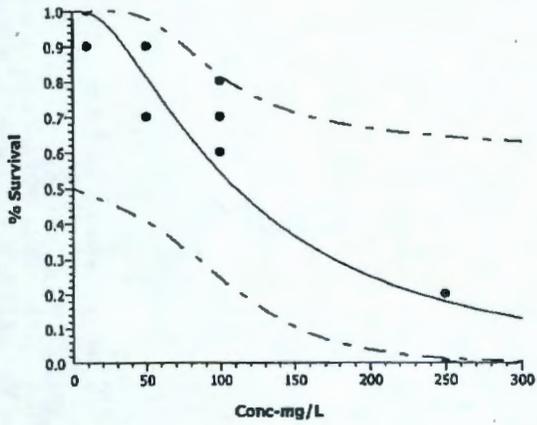
# CETIS Analysis Detail

Linear Regression: Page 1 of 2  
 Report Date: 19 May-06 11:18 AM  
 Analysis: 04-9941-0734/rcea014

Nematode 24 hour Acute test										CH2M Hill	
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version					
% Survival	Linear Regression		17-1623-5361	17-1623-5361	19 May-06 11:18 AM	CETISv1.1.2					
Linear Regression Options											
Model Function	Threshold Option	Threshold	Threshold Opt	Reweighted	Pooled Groups	Het Corr					
Log-Normal [NED=A+B*log(X)]	Control Threshold	0	Yes	Yes	No	Yes					
Regression Summary											
Iters	Log Likelihood	Mu	Sigma	G	Chi-Sq	Critical	P-Value	Decision(0.05)			
5	-48.13368	-0.11105	0.38609	0.61289	36.80609	18.30704	0.00006	Significant Heterogeneity			
Point Estimates											
% Effect	Conc-mg/L	95% LCL	95% UCL								
50	110.0226	51.11752	306.4394								
Regression Parameters											
Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P-Value	Decision(0.05)				
Slope	2.590097	0.9100504	0.5623779	4.617815	2.846	0.01737	Significant				
Intercept	-0.2876353	1.846492	-4.401875	3.826605	-0.156	0.87931	Not Significant				
Residual Analysis											
Attribute	Method		Statistic	Critical	P-Value	Decision(0.05)					
Variances	Modified Levene		1.514036	4.06618	0.28357	Equal Variances					
Distribution	Shapiro-Wilk W		0.8021035		0.00990	Non-normal Distribution					
Data Summary											
			Calculated Variate(A/B)								
Conc-mg/	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B		
0	Dilution Water	3	1.00000	1.00000	1.00000	0.00000	0.00000	30	30		
10		3	0.96667	0.90000	1.00000	0.01179	0.05773	29	30		
50		3	0.83333	0.70000	0.90000	0.02357	0.11547	25	30		
100		3	0.70000	0.60000	0.80000	0.02041	0.10000	21	30		
250		3	0.06667	0.00000	0.20000	0.02357	0.11547	2	30		
Data Detail											
Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1.00000	1.00000	1.00000							
10		1.00000	1.00000	0.90000							
50		0.70000	0.90000	0.90000							
100		0.60000	0.70000	0.80000							
250		0.00000	0.00000	0.20000							

# CETIS Analysis Detail

## Graphics



**APPENDIX C**  
**CHAIN OF CUSTODY**

F1648

Washington Closure Hanford		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-051-234		Page 1 of 1				
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 8L		Data Turnaround		
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 600--208		SAF No. RC-051		Air Quality <input type="checkbox"/>		45 Days				
Ice Chest No.		Field Logbook No. EL-1596-1		COA BESRAS6520		Method of Shipment GROUND TRANSPORT						
Shipped To CH2MHILL		Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC								
POSSIBLE SAMPLE HAZARDS/REMARKS NONE				Preservation	None	None						
Special Handling and/or Storage Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.				Type of Container	G/P	P/G						
				No. of Container(s)	1	1						
				Volume	1000g	4000g						
SAMPLE ANALYSIS				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172							
Sample No.	Matrix *	Sample Date	Sample Time									
J11K46	SOIL	5-2-06	17:37									
CHAIN OF POSSESSION				Sign/Print Names				SPECIAL INSTRUCTIONS				Matrix *
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 - Total Sr analysis fraction. ~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  <b>Nematodes</b> <b>BN1588-01</b>				S=Soil SE=Soilment SO=Solid SW=Sludge W=Water O=Oil A=Air OS=Drum Solids OL=Drum Liquids T=Tissue Wf=Wipe L=Liquid V=Vegetative X=Other
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time						
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time						
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time						
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time						
LABORATORY SECTION	Received By			Title			Date/Time					
FINAL SAMPLE DISPOSITION	Disposal Method			Disposed By			Date/Time					

F-11690

Washington Closure Hanford		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-051-258		Page 1 of 1	
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 8L Data Turnaround 45 Days	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location YAKIMA RIDGE II		SAF No. RC-051		Air Quality <input type="checkbox"/>			
Ice Chest No.		Field Logbook No. EL-1596-1		COA BESRAS6520		Method of Shipment GROUND TRANSPORT			
Shipped To CH2MHILL		Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC					
POSSIBLE SAMPLE HAZARDS/REMARKS NONE				Preservation	None	None			
Special Handling and/or Storage Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.				Type of Container	G/P	P/G			
				No. of Container(s)	1	1			
				Volume	1000g	4000g			
SAMPLE ANALYSIS				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172				
Sample No.	Matrix *	Sample Date	Sample Time						
J11K73	SOIL	5-7-06	1424	1	1				
CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix *	
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ^~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  <b>Nematodes</b> <b>BN1588-02</b>	
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time			
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time			
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time			
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time			
LABORATORY SECTION		Received By		Title				Date/Time	
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By				Date/Time	

F1691

Washington Closure Hanford		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-051-252		Page 1 of 1	
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code <b>8L</b> Data Turnaround <b>45 Days</b>	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 600-171		SAF No. RC-051		Air Quality <input type="checkbox"/>			
Ice Chest No.		Field Logbook No. EL-1596-1		COA BESRAS6520		Method of Shipment GROUND TRANSPORT			
Shipped To CH2MHILL		Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC					
POSSIBLE SAMPLE HAZARDS/REMARKS  NONE				Preservation	None	None			
Special Handling and/or Storage Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.				Type of Container	G/P	P/G			
				No. of Container(s)	1	1			
				Volume	1000g	4000g			
SAMPLE ANALYSIS				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172				
Sample No.	Matrix *	Sample Date	Sample Time						
J11K67	SOIL	5-8-06	1600	1	1				
CHAIN OF POSSESSION				Sign/Print Names		SPECIAL INSTRUCTIONS			
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ^ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  Nematodes BN 1588-03	
Elegabeth M. Type		1600		Dwain Hanford		5-8-06			
Date/Time		Date/Time		Date/Time		Date/Time			
Date/Time		Date/Time		Date/Time		Date/Time			
Date/Time		Date/Time		Date/Time		Date/Time			
Date/Time		Date/Time		Date/Time		Date/Time		Matrix * S=Soil SE=Sediment SO=Solid SL=Sludge W = Water O=Oil A=Air DS=Drum Solid DL=Drum Liquid T=Trace WJ=Wipe L=Liquid V=Vegetation X=Other	
LABORATORY SECTION		Received By		Title		Date/Time			
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time			

F1700

Washington Closure Hanford		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-051-240		Page 1 of 1			
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 8L Data Turnaround 45 Days			
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 600--181		SAF No. RC-051		Air Quality <input type="checkbox"/>					
Ice Chest No.		Field Logbook No. EL-1596-1		COA BESRAS6520		Method of Shipment GROUND TRANSPORT					
Shipped To CH2MHILL		Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC							
POSSIBLE SAMPLE HAZARDS/REMARKS NONE				Preservation None		None					
Special Handling and/or Storage Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.				Type of Container		G/P					
				No. of Container(s)		1					
				Volume		1000g		4000g			
SAMPLE ANALYSIS				See item (1) in Special Instructions.		Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172					
Sample No.	Matrix *	Sample Date	Sample Time								
J11K55	SOIL	5-8-06	1955	1	1						
CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix *			
Relinquished By/Removed From		Date/Time		Sign/Print Names		Date/Time		<p>These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.</p> <p>These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.</p> <p>(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 331.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids</p> <p>Nematodes BN1588-04</p> <p>S=Soil SE=Sediment SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue W=Wipe L=Liquid V=Vegetation X=Other</p>			
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time					
LABORATORY SECTION		Received By		Title		Date/Time					
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time					

F1705

Washington Closure Hanford		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				RC-051-276		Page 1 of 1			
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 8L Data Turnaround 45 Days			
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sample Location SADDLE MOUNTAIN		SAF No. RC-051		Air Quality <input type="checkbox"/>					
Ice Chest No.		Field Logbook No. EL-1596-1		COA BESRAS6520		Method of Shipment GROUND TRANSPORT					
Shipped To CH2MHILL		Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC							
POSSIBLE SAMPLE HAZARDS/REMARKS NONE				Preservation		None					
Special Handling and/or Storage Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.				Type of Container		G/P					
				No. of Container(s)		1					
				Volume		1000g		4000g			
SAMPLE ANALYSIS				See item (1) in Special Instructions.		Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172					
Sample No.		Matrix *	Sample Date	Sample Time							
J11K05		SOIL	5-9-06	1400	1	1					
CHAIN OF POSSESSION				Sign/Print Names		SPECIAL INSTRUCTIONS					
Relinquished By/Removed From		Date/Time		Received By/Stored In		These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.					
<i>Joan Kessner</i>		1405 5-9-06		<i>Joan Kessner</i>		^ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.					
Relinquished By/Removed From		Date/Time		Received By/Stored In		(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.3; Ammonia - 350.3; IC Anions - 300.0; Percent Solids					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Nematodes					
Relinquished By/Removed From		Date/Time		Received By/Stored In		BN1588-05					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Matrix *					
Relinquished By/Removed From		Date/Time		Received By/Stored In		S=Soil SS=Sediment SL=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids OL=Drum Liquids T=Tissue W=Wipe L=Liquid V=Vegetation X=Other					
LABORATORY SECTION		Received By		Title		Date/Time					
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time					



CH2M HILL  
Applied Sciences Laboratory  
2300 NW Walnut Blvd  
Corvallis, OR  
97330-3538  
P.O. Box 428  
Corvallis, OR  
97339-0428  
Tel 541.752.4271  
Fax 541.752.0276

June 12, 2006

ELR Consulting  
2328 S. Garfield Street  
Kennewick, WA 99337

RE: Laboratory Report for ELR Consulting  
Applied Sciences Laboratory Reference No. F1705

Dear Emmett Richards:

On May 09, 2006, CH2M HILL Applied Sciences Laboratory received one sample with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative. This data package meets standards requested by client and is not intended or implied to meet any other standard.

CH2M HILL Applied Sciences Laboratory appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Mark Bos at (541) 758-0235, extension 3135.

Sincerely,

Mark Bos  
Analytical Manager

Enclosures

**CLIENT SAMPLE CROSS-REFERENCE**

**CH2M HILL Applied Sciences Laboratory Reference No. F1705**

<b>Sample ID</b>	<b>Client Sample ID</b>	<b>Date Collected</b>	<b>Time Collected</b>
F170501	J11KC5	05/09/2006	14:00

**Table of Contents**  
**CH2M HILL Laboratory Reference No. F1705**

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## Applied Sciences Laboratory

### Organic CLP and CLP Like Data Qualifiers

- U The analyte was analyzed for, but not detected above the reported sample quantitation limit.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- P The primary and confirmation analyte result recoveries do not match.
- E The analyte was positively identified; the associated numerical value exceeded the instrument calibration range.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

### Inorganic CLP and CLP Like Data Qualifiers

- U The analyte was analyzed for, but not detected above the reported sample quantitation limit.
- B The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- E The analyte was positively identified; the associated numerical value exceeded the instrument calibration range.
- N The matrix spike/matrix spike duplicate recovery for the analyte is outside of acceptance criteria—qualifier is applied to the native sample only.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

**AMMONIA  
METHOD EPA 350.3**

**CASE NARRATIVE  
AMMONIA**

Analytical Method: EPA 350.3

Batch No.: F1705

Lab Name: CH2M HILL Applied Sciences Lab

Contract #: 920842.OTC

Project Name: ELR Consulting

Prime Contractor.: \_\_\_\_\_

---

I. Holding Times:

All acceptance criteria were met.

II. Analysis:

A. Calibration:

All acceptance criteria were met.

B. Blanks:

All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)

All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)

All acceptance criteria were met.

E. Duplicate Sample(s):

All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:

None.

III. Sampling Equipment:

None.

IV. Documentation Exceptions:

None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: Elizabeth W. Tigger

Date: 5-30-06

Reviewed by: Joseph A. Amuly

Date: 6/1/06

**SAMPLE DATA  
SUMMARY**





**QC DATA  
SUMMARY**



















**ANIONS BY METHOD EPA300.0A**

**CASE NARRATIVE  
ANIONS**

Analytical Method: EPA300.0

Batch No.: F1705

Lab Name: CH2M HILL Applied Sciences Lab

Contract #: 920842.OTC

Base/Command: ELR Consulting

Prime Contractor.: \_\_\_\_\_

I. Holding Times:  
All acceptance criteria were met.

II. Analysis:

A. Calibration:  
All acceptance criteria were met.

B. Blanks:  
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate Sample(s):  
Samples were analyzed in accordance with SOP.

D. Laboratory Control Spike(LCS)  
All acceptance criteria were met.

E. Analytical Exception:  
None.

F. Other:  
None.

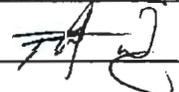
III. Sampling Equipment:  
None.

IV. Documentation Exceptions:  
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: 

Date: 6/6/06

Reviewed by: 

Date: 6-7-06

**SAMPLE DATA  
SUMMARY**





**QC DATA SUMMARY**























**PERCENT MOISTURE,  
ASTM D2216**



**PARTICLE SIZE  
METHOD 422**

Hanford

Particle Size

500.0 g sample used

Weight retained is the weight of material ON each sieve

ANALYST: KRM 05/19/2006

Lab	I.D.	Client I.D.	Sieve #	Sieve Size (um)	Sieve Size (mm)	Weight Retained (g)	Weight Retained (%)	Cumulative Coarser (%)	Cumulative Finer (%)
F170501		J11KC5	8	2362	2.362	0.20	0.04	0.04	99.96
			16	1180	1.180	17.70	3.54	3.58	96.42
			30	600	0.600	27.60	5.52	9.11	90.89
			50	500	0.500	34.60	6.92	16.03	83.97
			100	147	0.147	107.80	21.57	37.60	62.40
			200	75	0.075	238.90	47.81	85.41	14.59
			pan			72.90	14.59	100.00	0.00
			total			499.7			

**pH**  
**METHOD SW9045C**



**TKN  
METHOD EPA 351.4**

CASE NARRATIVE  
TKN

Analytical Method: EPA 351.4

Batch No.: F1705

Lab Name: CH2M HILL Applied Sciences Lab

Contract #: 920842.OTC

Project Name: ELR Consulting

Prime Contractor.: \_\_\_\_\_

I. Holding Times:  
All acceptance criteria were met.

II. Analysis:

A. Calibration:  
All acceptance criteria were met.

B. Blanks:  
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)  
All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)  
All acceptance criteria were met.

E. Duplicate Sample(s):  
All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:  
None.

III. Sampling Equipment:  
None.

IV. Documentation Exceptions:  
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: Elizabeth M. Torres

Date: 6-9-06

Reviewed by: Douglas A. Hardy

Date: 6/12/06

**SAMPLE DATA  
SUMMARY**





**QC DATA  
SUMMARY**

















**TOTAL ORGANIC CARBON  
BY ASTM E777**

**CASE NARRATIVE  
TOC SOILS**

Analytical Method: ASTM E-777

Batch No.: F1705

Lab Name: CH2M HILL Applied Sciences Lab

Contract #: 920842.OTC

Project Name: ELR Consulting

Prime Contractor: \_\_\_\_\_

---

**I. Holding Times:**

All acceptance criteria were met.

**II. Analysis:**

**A. Calibration:**

All acceptance criteria were met.

**B. Blanks:**

All acceptance criteria were met.

**C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)**

All analyses were performed in accordance with standard operating procedures.

**D. Laboratory Control Spike(LCS)**

All acceptance criteria were met.

**E. Duplicate Sample(s):**

All analyses were performed in accordance with standard operating procedures.

**F. Analytical Exceptions:**

All acceptance criteria were met.

**III. Sampling Equipment:**

None.

**IV. Documentation Exceptions:**

None

**V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.**

Reported by: 

Date: 6/3/08

Reviewed by: 

Date: 12 June 2008

**SAMPLE DATA SUMMARY**





QC SUMMARY



















**CHAIN OF CUSTODY/SHIPPING DOCUMENTS**

F1705

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-051-276		Page 1 of 1		
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code 8L Data Turnaround 45 Days		
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location SADDLE MOUNTAIN		SAF No. RC-051		Air Quality <input type="checkbox"/>				
Ice Chest No.		Field Logbook No. EL-1596-1		COA BESRAS6520		Method of Shipment GROUND TRANSPORT				
Shipped To CH2MHILL		Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC						
POSSIBLE SAMPLE HAZARDS/REMARKS NONE			Preservation	None	None					
Special Handling and/or Storage Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.			Type of Container	G/P	P/G					
			No. of Container(s)	1	1					
			Volume	1000g	4000g					
SAMPLE ANALYSIS				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172					
Sample No.	Matrix *	Sample Date	Sample Time							
J11KC5	SOIL	5-9-06	1400	1	1					
CHAIN OF POSSESSION				Sign/Print Names		SPECIAL INSTRUCTIONS				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids						Matrix *
<i>Elizabeth M. Tapp</i>	1405 5-9-06	<i>Joan Kessner</i>	5-9-06 1415							S=Soil SE=Sediment SO=Solid S=Sludge W=Water O=Oil A=Air OS=Drum Solids OL=Drum Liquids T=Tissue Wt=Wipe L=Liquid V=Vegetation X=Other
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time							
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time							
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time							
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time							
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time							
LABORATORY SECTION	Received By	Title		Date/Time						
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By		Date/Time						



# Sample Receipt Record

Batch Number: F1705

Date received: 5-9-06

Client/Project: FLR Consulting

**VERIFICATION OF SAMPLE CONDITIONS** (verify all items) \* HD = Client Hand delivered Samples

Observation	YES	NO
Radiological Screening for AFCEE		X
Were custody seals intact and on the outside of the cooler?		HD
If yes, Where? Front <input type="checkbox"/> Rear <input type="checkbox"/> Lt Side <input type="checkbox"/> Rt Side <input type="checkbox"/>		
Type of packing material: Ice <input type="checkbox"/> Blue Ice <input type="checkbox"/> Bubble wrap <input type="checkbox"/>		HD
Was the Chain of Custody inside the cooler?		HD
Was the Chain of Custody properly filled out?	X	
Were the sample containers in good condition?	X	
Containers supplied by ASL?	X	
Any sample with < 1/2 holding time remaining? If so contact LPM		X
Was there ice in the cooler? Enter temp. <u>21.2 C</u>		X
All VOCs free of air bubbles?		NA

**VERIFICATION OF SAMPLE PRESERVATION**

Sample No	Nutrients pH <2	Metals pH <2	Volatiles pH <2	Cyanides pH >12	TOC pH <2	TOX pH <2	Other (specify)	N/A (soils/unpres)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								

LOGIN AND pH VERIFICATIONS PERFORMED BY

Dorothy Hubbard 5-9-06 14:16  
Date/Time

\_\_\_\_\_  
Date/Time

Version	Co	LabName	SDG	FieldID	NativeID	QAQCTyp	LRTYPE	Matrix	LabSample	AnalysisM	ExtractionM	SampleDa	SampleTin	ReceiveDa	ExtractDat	ExtractTim	AnalysisD	AnalysisTi	PercentSo	LabLotC	CAS	ParamID	Analyte	Result	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	ASTM E77	NONE	5/9/2006	14:00	5/9/2006			6/6/2006	16:18	99.35		TOC	TOC	Total Orga	3400	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	E350.3	METHOD	5/9/2006	14:00	5/9/2006	5/24/2006	11:08	5/24/2006	11:08	99.35	SB1-0524	7664-41-7	NH3N	Ammonia-l	1.28	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	E351.4	METHOD	5/9/2006	14:00	5/9/2006	5/22/2006	20:11	5/22/2006	20:11	99.35	SB1-0522	7727-37-9	KN	Total Kjeld	415	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	E300.0A	METHOD	5/9/2006	14:00	5/9/2006	5/31/2006	12:17	5/31/2006	12:17	99.35	SB1-0530	16887-00-t	CL	Chloride	0.395	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	E300.0A	METHOD	5/9/2006	14:00	5/9/2006	5/31/2006	12:17	5/31/2006	12:17	99.35	SB1-0530	16984-48-t	F	Fluoride	0.391	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	E300.0A	METHOD	5/9/2006	14:00	5/9/2006	5/31/2006	12:17	5/31/2006	12:17	99.35	SB1-0530	14797-55-t	NO3N	Nitrate-N	0.0771	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	E300.0A	METHOD	5/9/2006	14:00	5/9/2006	5/31/2006	12:17	5/31/2006	12:17	99.35	SB1-0530	14797-65-t	NO2N	Nitrite-N	0.484	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	E300.0A	METHOD	5/9/2006	14:00	5/9/2006	5/31/2006	12:17	5/31/2006	12:17	99.35	SB1-0530	14808-79-t	SO4	Sulfate	2.2	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	ASTM D22	NONE	5/9/2006	14:00	5/9/2006			5/19/2006	16:30	99.35		MOISTURI	MOIST	Moisture	0.655	
4.00	EPAC	CHMC	F1705	J11KC5	J11KC5	N		SOIL	F170501	SW9045C	METHOD	5/9/2006	14:00	5/9/2006	5/12/2006	15:56	5/12/2006	15:56	99.35	SB1-0512		pH	PH	pH	7.45
4.00	EPAC	CHMC	F1705	BS1S0522	BS1S0522	BS		SOIL	BS1S0522	E351.4	METHOD				5/22/2006	19:47	5/22/2006	19:47	100	SB1-0522	7727-37-9	KN	Total Kjeld	1440	
4.00	EPAC	CHMC	F1705	BS1S0524	BS1S0524	BS		SOIL	BS1S0524	E350.3	METHOD				5/24/2006	9:55	5/24/2006	9:55	100	SB1-0524	7664-41-7	NH3N	Ammonia-l	20.7	
4.00	EPAC	CHMC	F1705	BS1S0530	BS1S0530	BS		SOIL	BS1S0530	E300.0A	METHOD				5/30/2006	17:47	5/30/2006	17:47	100	SB1-0530	16887-00-t	CL	Chloride	25	
4.00	EPAC	CHMC	F1705	BS1S0530	BS1S0530	BS		SOIL	BS1S0530	E300.0A	METHOD				5/30/2006	17:47	5/30/2006	17:47	100	SB1-0530	16984-48-t	F	Fluoride	24.4	
4.00	EPAC	CHMC	F1705	BS1S0530	BS1S0530	BS		SOIL	BS1S0530	E300.0A	METHOD				5/30/2006	17:47	5/30/2006	17:47	100	SB1-0530	14808-79-t	SO4	Sulfate	26.6	
4.00	EPAC	CHMC	F1705	BS1S0606	BS1S0606	BS		SOIL	BS1S0606	ASTM E77	NONE						6/6/2006	11:20	100		TOC	TOC	Total Orga	9530	
4.00	EPAC	CHMC	F1705	BS2S0530	BS2S0530	BS		SOIL	BS2S0530	E300.0A	METHOD				5/30/2006	18:57	5/30/2006	18:57	100	SB1-0530	14797-65-t	NO2N	Nitrite-N	5.63	
4.00	EPAC	CHMC	F1705	BS3S0530	BS3S0530	BS		SOIL	BS3S0530	E300.0A	METHOD				5/30/2006	20:08	5/30/2006	20:08	100	SB1-0530	14797-55-t	NO3N	Nitrate-N	38	
4.00	EPAC	CHMC	F1705	SB1-0522	SB1-0522	LB		SOIL	SB1-0522	E351.4	METHOD				5/22/2006	19:50	5/22/2006	19:50	100	SB1-0522	7727-37-9	KN	Total Kjeld	77.3	
4.00	EPAC	CHMC	F1705	SB1-0524	SB1-0524	LB		SOIL	SB1-0524	E350.3	METHOD				5/24/2006	10:21	5/24/2006	10:21	100	SB1-0524	7664-41-7	NH3N	Ammonia-l	2	
4.00	EPAC	CHMC	F1705	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	16887-00-t	CL	Chloride	0.5	
4.00	EPAC	CHMC	F1705	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	16984-48-t	F	Fluoride	0.5	
4.00	EPAC	CHMC	F1705	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	14797-55-t	NO3N	Nitrate-N	0.5	
4.00	EPAC	CHMC	F1705	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	14797-65-t	NO2N	Nitrite-N	0.5	
4.00	EPAC	CHMC	F1705	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	14808-79-t	SO4	Sulfate	0.5	
4.00	EPAC	CHMC	F1705	SB1-0606	SB1-0606	LB		SOIL	SB1-0606	ASTM E77	NONE						6/6/2006	11:29	100		TOC	TOC	Total Orga	100	

ExpectedV	Units	Dilution	MDL	RL	LabQualif	Surrogate	Comments	ParVal	Unc	Recovery	LowerCont	UpperCont	Basis	ConcQual	MDLAdjus	RLAdjus	SampleDe	LeachMett	LeachDate	LeachTime	LeachLot	AnalysisLo	CalRefID
	MG/KG	1	105	300	N								D	=	105	300	J11KC5	NONE				SB1-0606	101405S1
	MG/KG	1	0.891	3.34	B	N							D	J	0.9	3.37	J11KC5	NONE				052406NH	052406NH3
	MG/KG	1	59.2	217		N							D	=	59.8	219	J11KC5	NONE				052206KN	052206TKN
	MG/KG	1	0.0581	0.479	B	N							D	J	0.0587	0.484	J11KC5	NONE				053006Q3	300A-013006
	MG/KG	1	0.052	0.479	B	N							D	J	0.0525	0.484	J11KC5	NONE				053006Q3	300A-013006
	MG/KG	1	0.045	0.479	B	N							D	J	0.0454	0.484	J11KC5	NONE				053006Q3	300A-013006
	MG/KG	1	0.043	0.479	U	N							D	U	0.0434	0.484	J11KC5	NONE				053006Q3	300A-013006
	MG/KG	1	0.0772	0.479		N							D	=	0.078	0.484	J11KC5	NONE				053006Q3	300A-013006
	PERCENT	1	0	0		N							D	=	0	0	J11KC5	NONE				051906MC	NONE
	PH UNITS	1	0	0		N							D	=	0	0	J11KC5	NONE				051206PH	NONE
1420	MG/KG	1	27.3	100		N		102	75	125	D		D	=	27.3	100		NONE			052206KN	052206TKN	
20	MG/KG	1	0.534	2		N		103	75	125	D		D	=	0.534	2		NONE			052406NH	052406NH3	
25	MG/KG	1	0.0607	0.5		N		99.9	90	110	D		D	=	0.0607	0.5		NONE			053006Q3	300A-013006	
25	MG/KG	1	0.0543	0.5		N		97.6	90	110	D		D	=	0.0543	0.5		NONE			053006Q3	300A-013006	
25	MG/KG	1	0.0806	0.5		N		106	90	110	D		D	=	0.0806	0.5		NONE			053006Q3	300A-013006	
8840	MG/KG	1	58.1	166		N		108	75	125	D		D	=	58.1	166		NONE			SB1-0606	101405S1	
5.65	MG/KG	1	0.0449	0.5		N		99.6	90	110	D		D	=	0.0449	0.5		NONE			053006Q3	300A-013006	
36	MG/KG	1	0.0469	0.5		N		106	90	110	D		D	=	0.0469	0.5		NONE			053006Q3	300A-013006	
0	MG/KG	1	27.3	100	B	N							D	J	27.3	100		NONE			052206KN	052206TKN	
0	MG/KG	1	0.534	2	U	N							D	U	0.534	2		NONE			052406NH	052406NH3	
0	MG/KG	1	0.0607	0.5	U	N							D	U	0.0607	0.5		NONE			053006Q3	300A-013006	
0	MG/KG	1	0.0543	0.5	U	N							D	U	0.0543	0.5		NONE			053006Q3	300A-013006	
0	MG/KG	1	0.0469	0.5	U	N							D	U	0.0469	0.5		NONE			053006Q3	300A-013006	
0	MG/KG	1	0.0449	0.5	U	N							D	U	0.0449	0.5		NONE			053006Q3	300A-013006	
0	MG/KG	1	0.0806	0.5	U	N							D	U	0.0806	0.5		NONE			053006Q3	300A-013006	
0	MG/KG	1	35	100	U	N							D	U	35	100		NONE			SB1-0606	101405S1	