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

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COMPLETE COPY OF DATA PACKAGE TO:

Jill Thomson	H0-23	___NB 6/5/06 INITIAL/DATE
Jeanette Duncan	H9-02	___NB 6/5/06 INITIAL/DATE

COMMENTS:

SDG F1470 SAF-RC-051

Rad only X Chem only Rad & Chem

X Complete Partial

Waste Site: Upper Riparian #12

BIOASSAY REPORT
CHRONIC SCREENING BIOASSAYS
Conducted April 5 through May 8, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

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Corvallis, Oregon 97330

May 25, 2006
Lab I.D. Nos. BG1542-01A, -02A, -03A, and -08A
And BG1566-01 thru 05
SDG Number BG1566 and BG1542A

RC-051
F1470

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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 April 5 through May 8, 2006.

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 ± 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 sub irrigation.

TEST CONCENTRATIONS

The concentration tested in the bluegrass tests was 100 percent test soil with control soil alone for the lab 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 to a maximum five seedlings per replicate.

SAMPLE COLLECTION

Individual soil samples used during the testing were collected between October 31, 2005, and December 6, 2005, for the SDG number BG1542 and March 21, 2006 through April 3, 2006, for SDG number BG1566. The samples were stored in the dark at 4°C until the initiation of the initiation of the tests. 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. The SDG 1542 samples were repeat tests from an earlier batch of tests due to a laboratory error on the test endpoint.

Table 1
Sample Cross-Reference

Client ID	Sample Date	Sample Location	Bluegrass test SDG	Analytical Lab SDG
J10DW4A	10/31/2005	600-131	BG1542-01A	E2748
J10DV4A	11/08/2005	PIT 23	BG1542-02A	E2801
J10DT8A	11/14/2005	Upland Backfill Elevated-100-F-2	BG1542-03A	E2831
J10LJ5A	11/28/2005	Riparin Low-Site #10 Downriver 100-D	BG1542-08A	E2897
J11JB8	03/21/2006	100-K RIPARIAN #5	BG1566-01	F1399
J11JB7	03/26/2006	100-K RIPARIAN #4	BG1566-02	F1421
J11JH5	03/28/2006	100-H RIPARIAN #8	BG1566-03	F1438
J11JH8	04/03/2006	UPPER RIPARIAN #12	BG1566-04	F1470
J11JH4	04/03/2006	100-F RIPARIAN #7	BG1566-05	F1471

SAMPLE PREPARATION

Test soils and control soil were dried and homogenized prior to use. For each replicate, 90 grams dry weight of soil was added to each test chamber. The soils were initially hydrated with Milli-Q equivalent de-ionized water via sub irrigation. 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 planting 10 seeds in each test chamber. Seeds were planted at a depth of 1 ½ times the seeds diameter (approximately 2 millimeters) and covered gently. 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 Native Grass Seed (seed supplier), germination should take place between 14 and 28 days. The number of seeds in each test chamber that had germinated was recorded on days 12, 14, 16, 19, 21, and 23. Germination was determined to have occurred on day 19.

Observations of the shoot appearance were recorded 7 days after germination (26 days after planting). The number of germinated seeds in each test chamber was also recorded. Chambers that had more than five germinated seeds had shoots removed to prevent overcrowding. These test chambers were thinned to five seedlings each.

Soil pH was taken at test initiation and termination by placing a subsample of soil into a specimen cup, adding hydration water, and mixing prior to the pH measurement.

WATERING SCHEDULE

Test chambers were hydrated via subirrigation with deionized water prior to test initiation and daily thereafter for the first 3 days via subirrigation. Test sediments were hydrated by placing the all test chambers of the same test concentration into a hydration chamber containing deionized water and allowing the water to percolate into the bottom of the chamber. Hydration chambers were kept full during this period.

On Day 4, the water was removed from the hydration chambers and the test chambers allowed to drain.

Starting on Day 5, test soils were supplemented with nutrients by the use of half strength Hoagland's solution delivered via subirrigation. Hydration chambers were kept filled for 24 hours, then empty for 24 hours.

TEST TERMINATION

Tests were terminated 14 days post germination (33 days 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 desiccator for a minimum of 2 hours and weighed to determine dry weight.

The wet and dry weight for the roots were obtained following the same procedure 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 harvested)
- Average Above Ground Shoot Mass (Dry)
  (Calculated as the total dry weight of the shoots divided by the number of seedlings harvested)
- Average Root Mass (Wet)
  (Calculated as the total wet weight of the roots divided by the number of seedlings harvested)
- Average Root Mass (Dry)
  (Calculated as the total dry weight of the roots divided by the number of seedlings harvested)
- Average Total Mass (Wet)
  (Calculated as the total combined wet weights of the shoots and roots divided by the number of seedlings harvested)
- Average Total Mass (Dry)
  (Calculated as the total combined dry weights of the shoots and roots divided by the number of seedlings harvested)
- Average Shoot Height
  (Calculated as the total combined height of the tallest shoot of each seedling divided by the number of seedlings harvested)
- Average Root Length
  (Calculated as the total combined length of the longest root of each seedling divided by the number of seedlings harvested)

Statistical analysis for each endpoint listed comprised of entering the data obtained from each replicate chamber of a test soil and comparing the results 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 below. The data represents the average value of the replicate chambers used in each test concentration.

The results for sample J10DW4 indicated a statistically significant reduction in average stem (shoot) 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 J10DV4 indicated a statistically significant reduction in 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 J10DT8 indicated a statistically significant reduction in average stem (shoot) height, average root length, and average root mass (wet) when compared to the laboratory control.

The results for sample J10LJ5 indicated a statistically significant reduction in average stem (shoot) 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 J10JB8 indicated a statistically significant reduction in average stem (shoot) height and average root length when compared to the laboratory control.

The results for sample J10JB7 indicated a statistically significant reduction in average stem (shoot) height, average root length, average above ground shoot mass (wet), and average above ground shoot mass (dry) when compared to the laboratory control.

The results for sample J10JH5 indicated no statistically significant reduction when compared to the laboratory control.

The results for sample J10JH8 indicated a statistically significant reduction in average stem (shoot) height and average root length when compared to the laboratory control.

The results for sample J10JH4 indicated no statistically significant reduction 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; W, statistically significant difference from lab control by use of Wilcoxon Rank Sum Two-Sample Test

ns indicates a non statistically significant result; [b], 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 April 8, 2008																		
Laboratory Control	94	-	15.0	-	21.2	-	29.0	-	4.60	-	38.0	-	1.02	-	68.5	--	8.58	-
BG1542-01 J10DW4A	88	ns	13.0	E [b]	11.5	E [b]	15.1	E [b]	2.71	E [b]	10.6	E [b]	0.85	E [b]	25.9	E [b]	3.69	E [b]
BG1542-02 J10DV4A	80	ns	16.0	ns	10.5	E [b]	8.8	W [b]	1.86	E [b]	8.9	E [b]	0.98	E [b]	17.7	E [b]	2.85	E [b]
BG1542-03 J10DT8A	100	ns	13.9	E [b]	11.4	E [b]	22.6	ns	3.56	ns	21.7	E [b]	1.38	ns	44.5	ns	4.94	ns
BG1542-04 J10LJ5A	96	ns	10.9	E [b]	11.3	E [b]	18.9	E [b]	2.91	E [b]	23.0	E [b]	1.46	ns	39.9	E [b]	4.38	E [b]
BG1568-01 J11JB6	92	ns	12.6	E [b]	12.3	E [b]	27.8	ns	3.67	ns	33.7	ns	1.85	ns	61.5	ns	5.53	ns
BG1568-02 J11JB7	100	ns	10.8	E [b]	12.1	E [b]	18.6	E [b]	3.07	E [b]	28.5	ns	1.37	ns	47.1	ns	4.44	ns
BG1568-03 J11JH5	94	ns	25.9	ns	23.2	ns	23.6	ns	4.25	ns	32.5	ns	2.04	ns	56.1	ns	6.29	ns
BG1568-04 J11JH6	100	ns	13.0	E [b]	11.2	E [b]	24.9	ns	3.95	ns	30.8	ns	1.61	ns	55.7	ns	5.56	ns
BG1568-05 J11JH4	92	ns	14.6	ns	16.7	ns	23.1	ns	3.77	ns	31.7	ns	1.85	ns	54.8	ns	5.42	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:

APPENDIX A
RAW DATA SHEETS

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 [illegible] Day 15 NJ Day 16 TP Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 Bm Day 32 Bm/NJ

Sample ID: Lab Control (70% 70 grade silica sand, 20% clay, 10% peat)

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	3	4	3	4	4	4	3	3	6.5	7.6
	B	5	5	5	5	5	5	5	5		
	C	5	7	7	8	8	8	8->5	5		
	D	3	3	3	3	3	3	3	3		
	E	4	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: 3 Lg G — removed: 1 sm brown/dead

Replicate B: 5 Lg G

Replicate C: 5 Lg G — removed: 1 Lg G, 2 med G

Replicate D: 3 Lg G

Replicate E: 5 Lg G — removed: 1 sm brown/dead

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

Replicate B: 4 Lg G, 1 Lg G w/ 1 B tip

Replicate C: 4 Lg G, 1 Lg G w/ 1 B shoot

Replicate D: 2 Lg G, 1 Lg G w/ 2 B shoots + 4 G shoots

Replicate E: 2 Lg G, 2 Med G, 1 Lg 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	54 mm	51 mm	78 mm	mm	mm
Replicate B	74 mm	75 mm	76 mm	89 mm	108 mm
Replicate C	64 mm	70 mm	76 mm	93 mm	86 mm
Replicate D	81 mm	83 mm	78 mm	mm	mm
Replicate E	65 mm	60 mm	90 mm	73 mm	97 mm

Measure Shoot Weight: Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1024.00 ~~1995.35~~ NJ	1062.5	1030.17
Replicate B	1022.87	1207.0	1053.13
Replicate C	991.36	1150.1	1017.66
Replicate D	971.26	1078.6	990.05
Replicate E	1011.00	1165.2	1036.85

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	80 mm	40 mm	22 mm	mm	mm
Replicate B	NJ ~~10~~ 121 mm	133 mm	133 mm	107 mm	93 mm
Replicate C	122 mm	88 mm	104 mm	63 mm	122 mm
Replicate D	90 mm	101 mm	69 mm	mm	mm
Replicate E	132 mm	100 mm	122 mm	70 mm	87 mm

Measure Root Weight: Total mass of all roots from all seedlings

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1020.45 ~~979.46~~ NJ	1060.4	1022.39
Replicate B	1027.33	1253.6	1036.97
Replicate C	1026.09	1207.8	1033.73
Replicate D	1039.03	1180.0	1045.22
Replicate E	998.16	1210.6	1007.76

Comments:

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 Bm Day 15 NT Day 16 [illegible] Day 19 NT Day 21 NT Day 23 [illegible] Day 26 Bm Day 33 Bm

Bioassay Lab ID: BH B4542-04 Sample No: J10DW4

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	1	3	3	3	3	3	3	3	7.4	7.9
	B	1	2	5	7	7	7	7→5	5		
	C	2	2	3	4	4	4	4	4		
	D	1	2	4	4	5	5	5	5		
	E	2	5	6	6	7	7	7→5	5		

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

Replicate A: 1 Lg G, 1 Med G, 1 Sm G

Replicate B: 1 Lg G, 4 Med G — removed: 1 Med w/ brown tip, 1 Sm G

Replicate C: 3 Med G, 1 Sm G

Replicate D: 1 Lg G, 2 Med G, 2 Sm G

Replicate E: 1 Lg G, 4 Med G — removed: 2 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: 1 Lg G w/ 1 B shoot, 1 Med G, 1 Sm G

Replicate B: 2 Lg G, 3 Med G

Replicate C: 2 Med G, 1 Med G w/ 1 B tip, 1 Sm w/ 1 B shoot 1 G shoot

Replicate D: 1 Lg G w/ 1 B shoot, 2 Med G, 2 Sm G

Replicate E: 1 Lg G, 3 Med G, 1 Med G w/ 1 B tip

Measure Shoot Height: Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	94 mm	31 mm	11 mm	mm	mm
Replicate B	66 mm	52 mm	62 mm	81 mm	57 mm
Replicate C	71 mm	63 mm	60 mm	24 mm	mm
Replicate D	79 mm	37 mm	50 mm	50 mm	55 mm
Replicate E	92 mm	64 mm	46 mm	63 mm	60 mm

Measure Shoot Weight: Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1005.22	1052.2	1013.32
Replicate B	977.34	1064.8	990.27
Replicate C	1043.72	1087.0	1052.91
Replicate D	1001.57	1052.6	1011.76
Replicate E	1021.25	1131.5	1040.89

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	12 mm	48 mm	38 mm	mm	mm
Replicate B	64 mm	52 mm	38 mm	44 mm	68 mm
Replicate C	10 mm	38 mm	38 mm	51 mm	mm
Replicate D	79 mm	41 mm	73 mm	16 mm	30 mm
Replicate E	65 mm	45 mm	41 mm	87 mm	66 mm

Measure Root Weight: Total mass of all roots from all seedlings

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1033.44	1039.3	1036.39
Replicate B	1002.23	1030.3	1007.17
Replicate C	1024.73 ~~2015.440~~	1054.8	1027.42
Replicate D	990.71	1038.2	994.03
Replicate E	1025.14	1039.2	1032.21

Comments:

CETIS Test Summary

Report Date: 15 May-06 1:11 PM
Test Link: 09-6405-2832/B154201psA

Plant Chronic test — **CH2M Hill**

Test No:	11-2434-8476	**Test Type:**	Plant Chronic test	**Duration:**	30d 0h
Start Date:	08 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	08 May-06	**Dil Water:**		**Source:**	
Setup Date:	08 Apr-06 12:00 AM	**Brine:**			

Comments: repeat test BG1542-01A

Sample No:	18-1426-8954	**Code:**	B1542-01	**Client:**	
Sample Date:	31 Oct-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	159d 0h	**Station:**			

Comments: J10DW4, E274801

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
12-6975-8433	% Germination	100	> 100	N/A	27.99%	Wilcoxon Rank Sum Two-Sample
04-5480-9468	AG Average Dry Wt.	< 100	100	N/A	30.89%	Equal Variance t Two-Sample
02-0518-1717	AG Average Height	< 100	100	N/A	22.72%	Equal Variance t Two-Sample
15-0652-1713	AG Average Wet Wt.	< 100	100	N/A	30.51%	Equal Variance t Two-Sample
05-2651-8289	Root Average Dry Wt.	< 100	100	N/A	33.67%	Equal Variance t Two-Sample
00-9747-2708	Root Average Length	< 100	100	N/A	25.28%	Equal Variance t Two-Sample
01-2129-3486	Root Average Wet Wt.	< 100	100	N/A	34.20%	Equal Variance t Two-Sample
14-2157-1016	Total Average Biomass Dry	< 100	100	N/A	31.34%	Equal Variance t Two-Sample
06-1880-7248	Total Average Biomass Wet	< 100	100	N/A	30.61%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 15 May-06 1:11 PM
Test Link: 09-6405-2832/B154201psA

% 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%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.96040	2.05888	6.26333	0.75679	1.69222	34.11%
100		5	2.70991	2.03800	3.92800	0.32563	0.72814	26.87%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.947	15.2	27	2.2136	4.9498	26.13%
100		5	13.02	10.8	15	0.6756	1.5106	11.60%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.826	4.3456	9.717	32.82%
100		5	15.126	10.206	22.05	2.1690	4.8501	32.07%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.25857	0.57819	35.75%
100		5	0.94703	0.66400	1.41399	0.13741	0.30727	32.45%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.227	13.333	29	2.546	5.693	26.82%
100		5	11.487	8.5	16.333	1.3592	3.0393	26.46%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.878	13.317	46.99	6.1616	13.778	37.36%
100		5	10.815	2.812	18.633	2.8356	6.3406	58.63%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	1.00853	2.25514	34.29%
100		5	3.65694	2.70200	5.34199	0.45998	1.02854	28.13%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.484	28.150	82.77	10.452	23.370	35.15%
100		5	25.941	18.338	34.293	3.2461	7.2584	27.98%

CETIS Test Summary

Report Date: 15 May-06 1:11 PM
Test Link: 09-6405-2832/B154201psA

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.60000	1.00000	1.00000	0.60000	1.00000
100		0.60000	1.00000	0.80000	1.00000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.05668	6.05200	5.26000	6.26333	5.17000
100		2.70001	2.58600	2.29752	2.03800	3.92800

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.3333	16.8	15.2	27	15.4
100		15	12.8	13.5	10.8	13

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	12.8333	38.8280	31.748	35.78	30.84
100		15.66	16.8920	10.8200	10.206	22.05

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.64667	1.92800	1.52800	2.06331	1.92001
100		0.99666	0.98800	0.67252	0.86400	1.41399

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3333	23.4	20	29	20.4
100		16.3333	10.8	8.5	9.6	12.2

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3167	45.2540	36.3420	46.99	42.488
100		18.6333	15.6140	7.51752	9.49799	2.81199

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.70335	7.98000	6.78801	8.32666	7.09000
100		3.69666	3.57400	2.97003	2.70200	5.34199

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	26.1500	82.0800	68.0900	82.77	73.328
100		34.2933	32.5060	18.3375	19.704	24.862

CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
% Germination	Comparison	09-6405-2832	09-6405-2832	12 May-06 4:18 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			

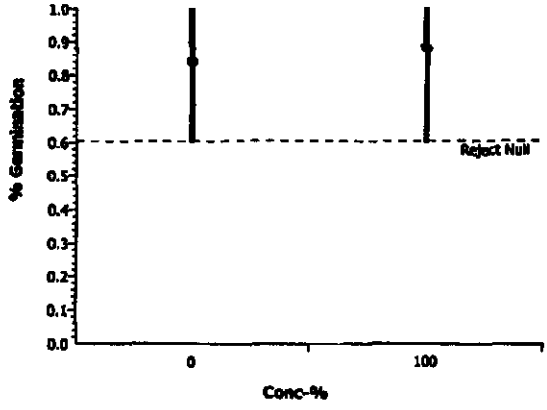
ANOVA Assumptions

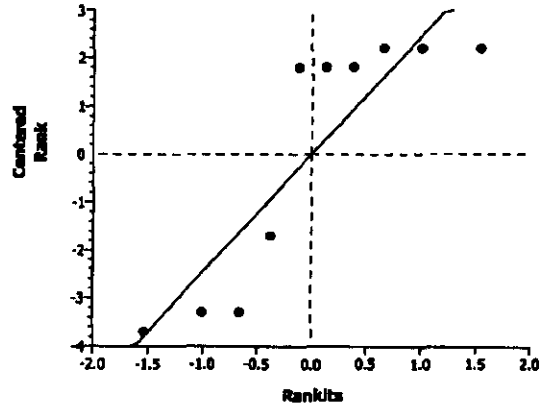
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.48569	23.15450	0.71064	Equal Variances
Distribution	Shapiro-Wilk W	0.76085		0.00484	Non-normal Distribution

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	09-6405-2832	09-6405-2832	12 May-06 4:18 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	30.89%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.73162	1.85955	0.0129	1.53203	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	12.66181	12.66181	1	7.46	0.02578	Significant Effect
Error	13.57522	1.696902	8			
Total	26.2370281	14.358715	9			

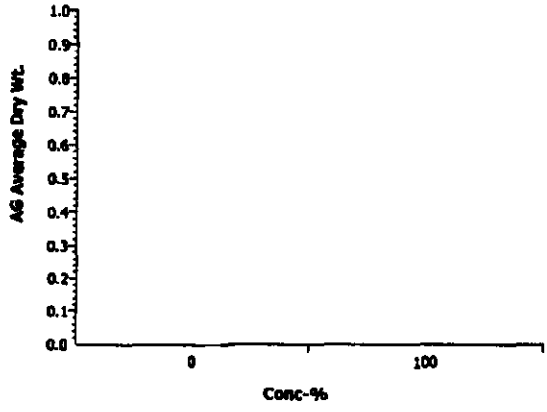
ANOVA Assumptions

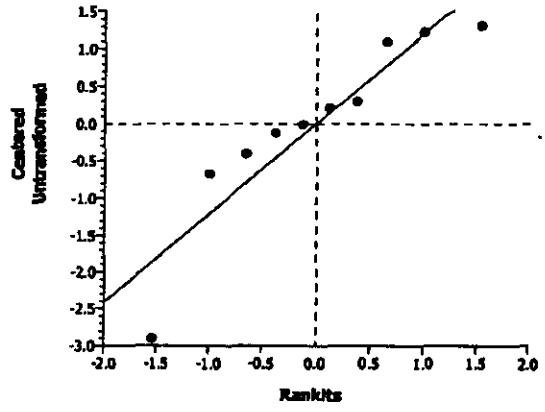
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.40119	23.15450	0.13118	Equal Variances
Distribution	Shapiro-Wilk W	0.86077		0.07792	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	1.69222				
100		5	2.70991	2.03800	3.92800	0.72814				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	09-6405-2832	09-6405-2832	12 May-06 4:18 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	22.72%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.56075	1.85955	0.0168	4.30379	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	87.81345	87.81345	1	6.56	0.03361	Significant Effect
Error	107.1316	13.39144	8			
Total	194.945	101.20489	9			

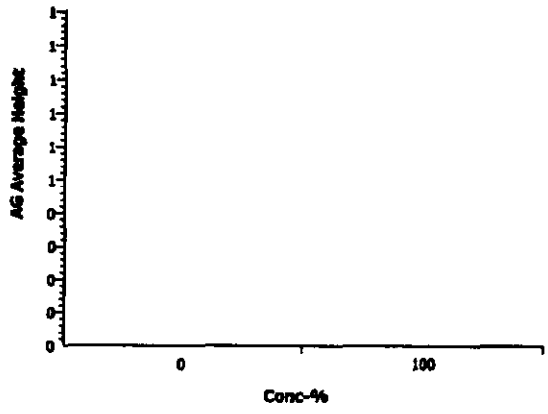
ANOVA Assumptions

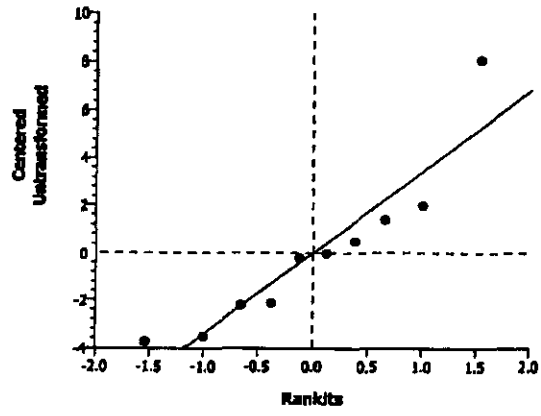
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.73659	23.15450	0.04108	Equal Variances
Distribution	Shapiro-Wilk W	0.87674		0.11969	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.947	15.2	27	4.9498				
100		5	13.020	10.8	15	1.5106				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Wet Wt.	Comparison	09-6405-2832	09-6405-2832	12 May-06 4:18 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	30.51%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.98135	1.85955	0.0088	9.03149	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	524.166	524.166	1	8.89	0.01756	Significant Effect
Error	471.7735	58.97168	8			
Total	995.939484	583.1377	9			

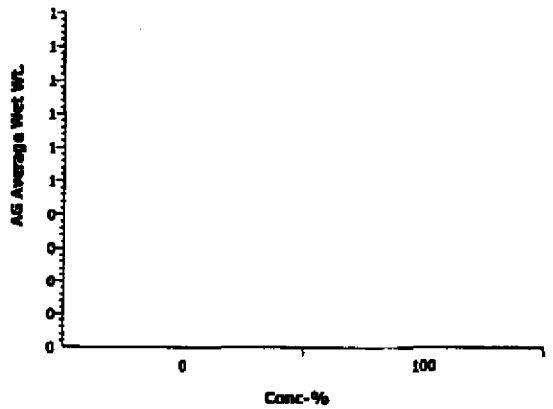
ANOVA Assumptions

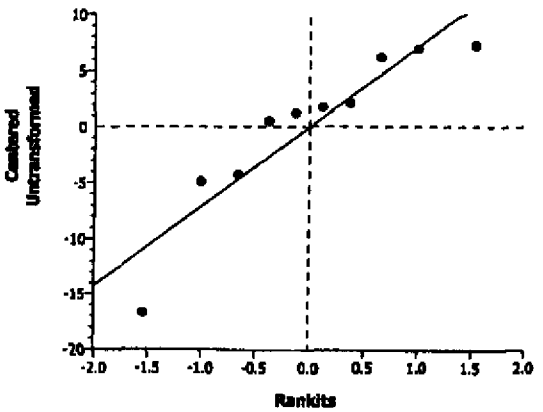
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.01387	23.15450	0.20694	Equal Variances
Distribution	Shapiro-Wilk W	0.85862		0.07350	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	29.605	12.833	36.826	9.717				
100		5	15.126	10.206	22.05	4.8501				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	09-6405-2832	09-6405-2832	12 May-06 4:18 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	33.67%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.28867	1.85955	0.0257	0.54451	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.122802	1.122802	1	5.24	0.05137	Non-Significant Effect
Error	1.714854	0.214357	8			
Total	2.83765602	1.3371589	9			

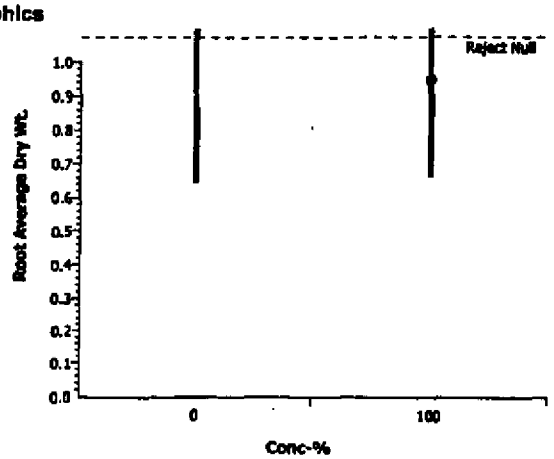
ANOVA Assumptions

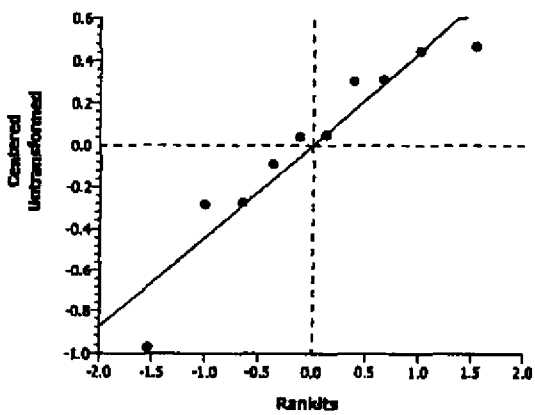
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.54078	23.15450	0.24827	Equal Variances
Distribution	Shapiro-Wilk W	0.89450		0.19044	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.57819				
100		5	0.94703	0.66400	1.41399	0.30727				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Length	Comparison	09-6405-2832	09-6405-2832	12 May-06 4:18 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	25.28%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.3748	1.85955	0.0049	5.36684	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	237.169	237.169	1	11.39	0.00972	Significant Effect
Error	166.5911	20.82389	8			
Total	403.760117	257.9929	9			

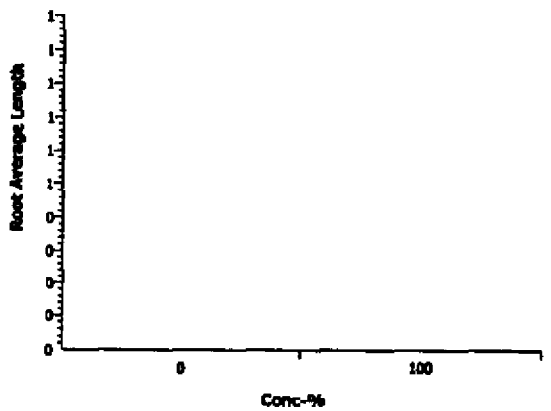
ANOVA Assumptions

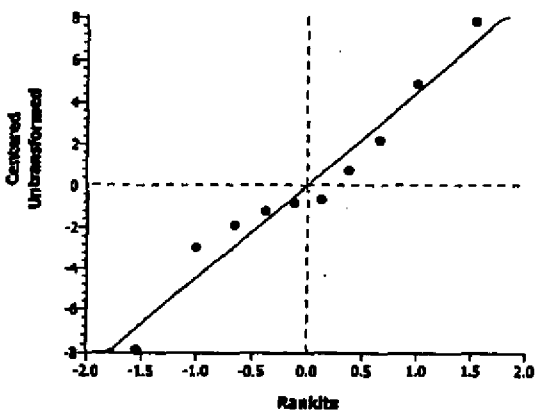
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.50853	23.15450	0.25153	Equal Variances
Distribution	Shapiro-Wilk W	0.96501		0.84114	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.227	13.333	29	5.693				
100		5	11.487	8.5	16.333	3.0393				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	09-6405-2832	09-6405-2832	12 May-06 4:18 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	34.20%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.84256	1.85955	0.0026	12.6129	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1698.222	1698.222	1	14.77	0.00493	Significant Effect
Error	920.1185	115.0148	8			
Total	2618.34033	1813.2366	9			

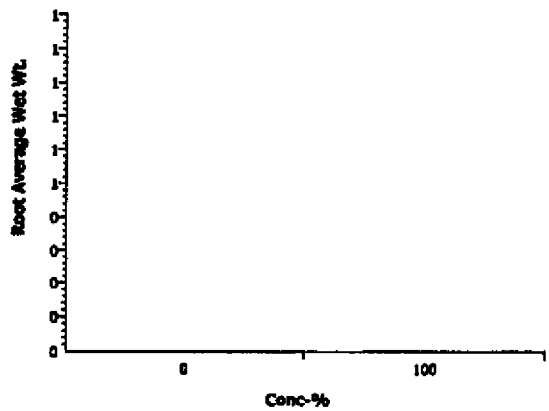
ANOVA Assumptions

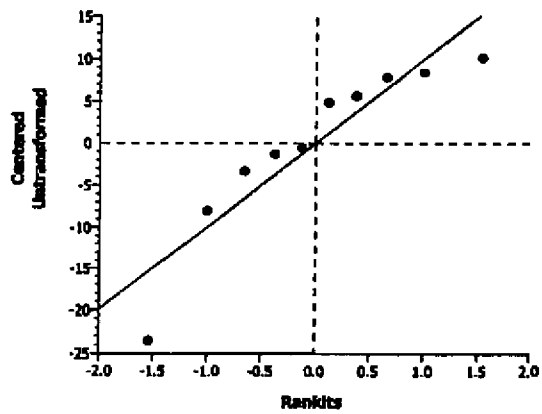
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.72166	23.15450	0.16192	Equal Variances
Distribution	Shapiro-Wilk W	0.86147		0.07941	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.878	13.317	46.99	13.778				
100		5	10.815	2.812	16.633	6.3406				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Total Average Biomass Dry Wt.	Comparison	09-6405-2832	09-6405-2832	12 May-06 4:18 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	31.34%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.63486	1.85955	0.0150	2.06126	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	21.32578	21.32578	1	6.94	0.02995	Significant Effect
Error	24.57421	3.071776	8			
Total	45.8999882	24.397555	9			

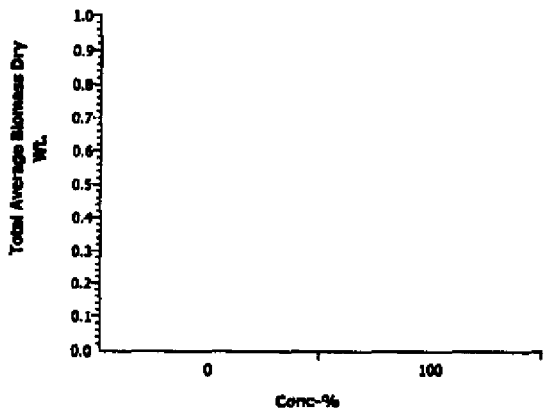
ANOVA Assumptions

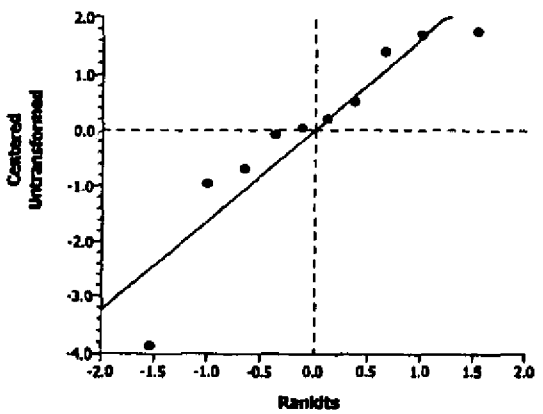
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.80730	23.15450	0.15749	Equal Variances
Distribution	Shapiro-Wilk W	0.86949		0.09860	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	2.25514				
100		5	3.65694	2.70200	5.34199	1.02854				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Total Average Biomass Wet Wt.	Comparison		09-6405-2832	09-6405-2832	12 May-06 4:18 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	30.61%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.70456	1.85955	0.0030	20.3510	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4109.343	4109.343	1	13.72	0.00600	Significant Effect
Error	2395.457	299.4322	8			
Total	6504.80005	4408.7749	9			

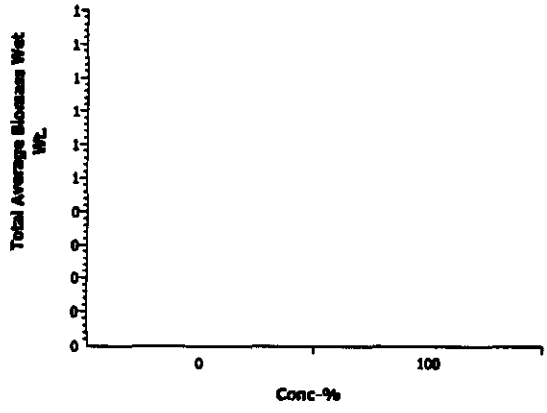
ANOVA Assumptions

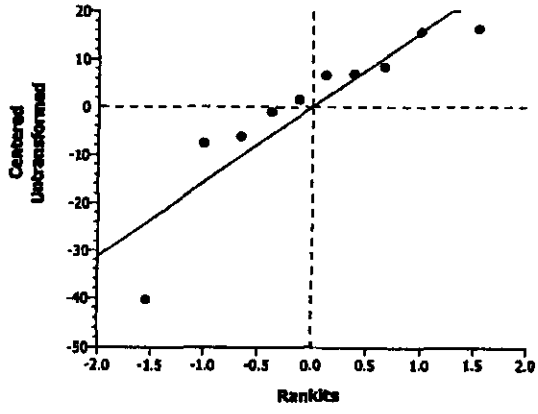
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.36698	23.15450	0.04371	Equal Variances
Distribution	Shapiro-Wilk W	0.82350		0.02793	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	66.484	26.15	82.77	23.370				
100		5	25.941	18.338	34.293	7.2584				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 Bm Day 15 NJ Day 16 [illegible] Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 Bm Day 33 BM/NJ

Bioassay Lab ID: BM 3615V2-038 Sample No: 510DV4

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting (NJ)	14 days after planting	16 days after planting	19 days after planting (4)	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH: INITIAL (@ planting)	pH: FINAL (@ 14 days Post-Emergence)
Control	A	2	2	2	2	2	2	2	2	7.8	7.8
	B	0	2	2	3	3	3	3	3		
	C	0	2	2	3	3	3	2	2		
	D	2	3	3	4	4	4	3	3		
	E	5	5	5	7	7	7	7→5	5		

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

Replicate A: 1 Lg G w/ brown tips on 1 shoot, 1 mb G

Replicate B: 2 Mb, 1 Sm G

Replicate C: 2 Mb G

Replicate D: 3 mb G — removed: 1 sm brown/dead

Replicate E: 2 Lg G, 3 mb G — removed: 1 mb 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: 1 Lg 3G shoots, 1 brown, 1 dark Green, 1 Sm 2 G shoots, 1 brown

Replicate B: 1 Lg, 2 Mb - 1 brown 1 shoot of large browning - otherwise all G

Replicate C: 1 Lg, 1 Mb - each w/ 3G & 1B shoot

Replicate D: 1 Mb G, 1 Mb w/ 3G + 1B, 1 Sm w/ 1G + 1B

Replicate E: 3 Lg, 2 Mb, each w/ multiple G shoots and 1 B shoot.

Measure Shoot Height:

Individual height of each seedling (above ground)

↳ tallest shoot only

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	62 mm	39 mm	mm	mm	mm
Replicate B	96 ~~96~~ mm	39 mm	29 mm	mm	mm
Replicate C	54 mm	35 mm	mm	mm	mm
Replicate D	46 mm	31 mm	19 mm	mm	mm
Replicate E	59 mm	37 mm	39 mm	64 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	1025.30	1045.2	1030.35
Replicate B	999.34	1025.6	1003.49
Replicate C	997.97	1016.2	1002.65
Replicate D	1004.87	MT ~~24~~ 1024.8	1008.49
Replicate E	987.22	1034.8	996.47

Describe root appearance:

Replicate A: thin, white, Stringy

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	13 mm	54 mm	mm	mm	mm
Replicate B	50 mm	21 mm	10 mm	mm	mm
Replicate C	29 mm	16 mm	mm	mm	mm
Replicate D	52 mm	36 mm	9 mm	mm	mm
Replicate E	46 mm	24 mm	21 mm	43 mm	21 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1015.21	1035.3	1017.11
Replicate B	1010.57	1022.4	1014.58
Replicate C	985.78	1018.7	988.01
Replicate D	989.63	1002.7	991.36
Replicate E	998.35	1045.9	1003.07

Comments:

CETIS Test Summary

Report Date: 15 May-06 1:17 PM
Test Link: 02-2678-4041/B154202psA

Plant Chronic test — **CH2M Hill**

Test No:	08-3212-6496	**Test Type:**	Plant Chronic test	**Duration:**	33d 0h
Start Date:	05 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	08 May-06	**Dil Water:**		**Source:**	
Setup Date:	05 Apr-06 12:00 AM	**Brine:**			

Comments: repeat test BG1542-02A

Sample No:	07-3307-9513	**Code:**	B1542-02	**Client:**	
Sample Date:	08 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	148d 0h	**Station:**			

Comments: J10DV4, J10DV5, J10DV6, J10DV7, J10DV8. E280101

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
17-0101-0218	% Germination	100	> 100	N/A	32.24%	Equal Variance t Two-Sample
02-8316-6714	AG Average Dry Wt.	< 100	100	N/A	29.97%	Equal Variance t Two-Sample
05-6576-1716	AG Average Height	100	> 100	N/A	35.46%	Equal Variance t Two-Sample
05-5626-0548	AG Average Wet Wt.	< 100	100	N/A	27.53%	Wilcoxon Rank Sum Two-Sample
08-8042-9922	Root Average Dry Wt.	< 100	100	N/A	33.00%	Equal Variance t Two-Sample
11-7289-0458	Root Average Length	< 100	100	N/A	27.18%	Equal Variance t Two-Sample
14-7987-0099	Root Average Wet Wt.	< 100	100	N/A	33.13%	Equal Variance t Two-Sample
10-0039-0007	Total Average Biomass Dry	< 100	100	N/A	29.82%	Equal Variance t Two-Sample
00-8511-1875	Total Average Biomass Wet	< 100	100	N/A	30.15%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 15 May-06 1:17 PM
Test Link: 02-2678-4041/B154202psA

% 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	0.60000	0.40000	1.00000	0.10954	0.24495	40.82%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.96040	2.05868	6.26333	0.75679	1.69222	34.11%
100		5	1.86100	1.20667	2.52496	0.25756	0.57593	30.95%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.947	15.2	27	2.2136	4.9498	26.13%
100		5	16.64	9.2	23	2.8555	6.3852	38.37%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.826	4.3456	9.717	32.82%
100		5	8.7955	6.6434	9.95	0.5739	1.2833	14.59%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.25857	0.57819	35.75%
100		5	0.98446	0.57666	1.33667	0.12454	0.27849	28.29%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.227	13.333	29	2.546	5.693	26.82%
100		5	10.773	6.2	17	1.7733	3.9653	36.81%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.878	13.317	46.99	6.1616	13.778	37.36%
100		5	8.8630	3.9433	16.46	2.2808	5.1000	57.54%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	1.00853	2.25514	34.29%
100		5	2.84546	1.78333	3.47495	0.30938	0.69180	24.31%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.484	26.150	82.77	10.452	23.370	35.15%
100		5	17.859	11.000	25.575	2.6359	5.894	33.38%

CETIS Test Summary

Report Date: 15 May-06 1:17 PM
Test Link: 02-2678-4041/B154202psA

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.60000	1.00000	1.00000	0.60000	1.00000
100		0.40000	0.60000	0.40000	0.60000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.05668	6.05200	5.26000	6.26333	5.17000
100		2.52496	1.38332	2.34003	1.20667	1.85000

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.3333	16.8	15.2	27	15.4
100		23	18.3333	22	10.6667	9.2

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	12.8333	36.8260	31.748	35.78	30.84
100		9.94995	8.75332	9.11502	6.64335	9.51602

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.64667	1.92800	1.52800	2.06331	1.92001
100		0.94998	1.33667	1.11499	0.57666	0.94401

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3333	23.4	20	29	20.4
100		17	9	11	10.6667	6.2

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3167	45.2540	36.3420	46.99	42.488
100		10.0450	3.94334	16.46	4.35667	9.51001

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.70335	7.98000	6.78801	8.32666	7.09000
100		3.47495	2.71999	3.45502	1.78333	2.79401

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	26.1500	82.0800	68.0900	82.77	73.328
100		19.995	12.6966	25.5750	11.0000	19.0260

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	02-2678-4041	02-2678-4041	15 May-06 1:17 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	32.24%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.60156	1.85955	0.0740	0.30679	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1745378	0.174538	1	2.57	0.14792	Non-Significant Effect
Error	0.5443657	0.068046	8			
Total	0.71890347	0.2425835	9			

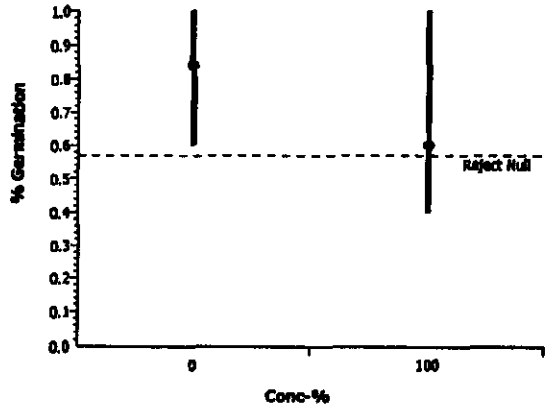
ANOVA Assumptions

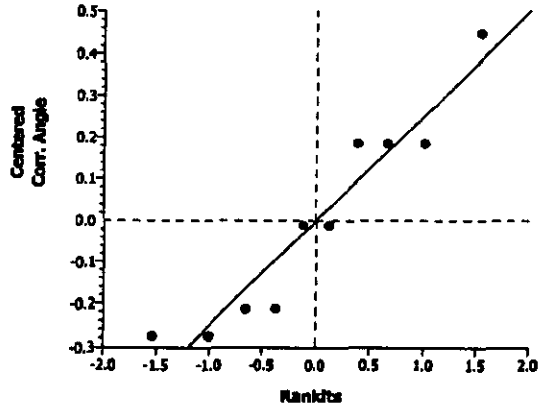
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.15127	23.15450	0.89470	Equal Variances
Distribution	Shapiro-Wilk W	0.89943		0.21598	Normal Distribution

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	0.60000	0.40000	1.00000	0.24495	0.89738	0.68472	1.34528	0.26987

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	02-2678-4041	02-2678-4041	15 May-06 1:17 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	29.97%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.8771	1.85955	0.0023	1.48655	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	24.01578	24.01578	1	15.03	0.00469	Significant Effect
Error	12.78125	1.597656	8			
Total	36.7970295	25.613437	9			

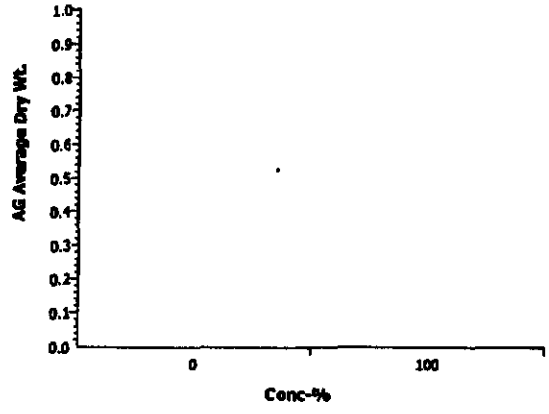
ANOVA Assumptions

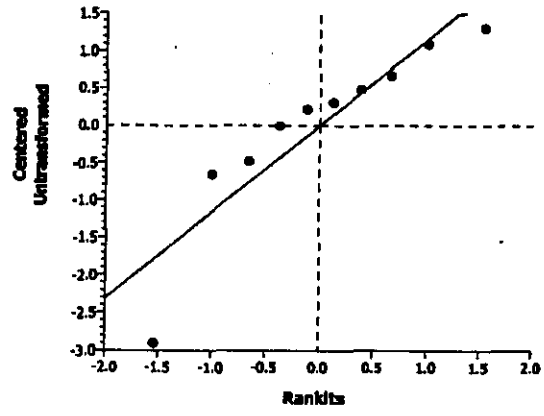
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.63338	23.15450	0.06018	Equal Variances
Distribution	Shapiro-Wilk W	0.85010		0.05825	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	1.69222				
100		5	1.86100	1.20667	2.52496	0.57593				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	02-2678-4041	02-2678-4041	15 May-06 1:17 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	35.46%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.63842	1.85955	0.2705	6.71866	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	13.30178	13.30178	1	0.41	0.54104	Non-Significant Effect
Error	261.0844	32.63556	8			
Total	274.38622	45.937333	9			

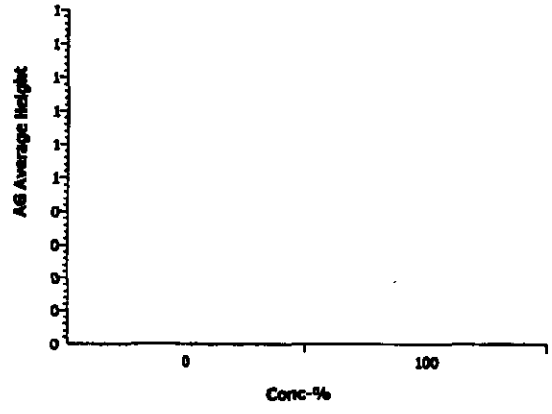
ANOVA Assumptions

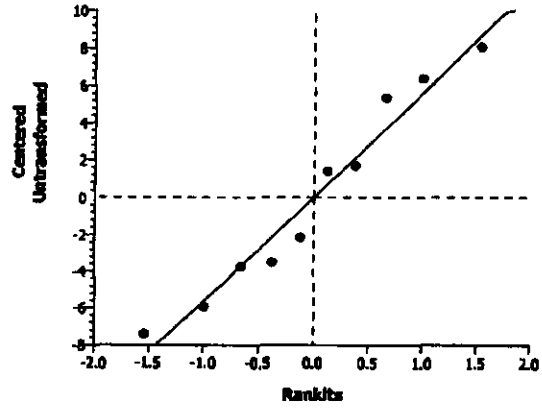
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.66403	23.15450	0.63386	Equal Variances
Distribution	Shapiro-Wilk W	0.94207		0.57629	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.947	15.2	27	4.9498				
100		5	16.640	9.2	23	6.3852				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	02-2678-4041	02-2678-4041	15 May-06 1:17 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		N/A	27.53%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	15		0.0040	0	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1082.633	1082.633	1	22.54	0.00145	Significant Effect
Error	384.2673	48.03341	8			
Total	1466.90033	1130.6665	9			

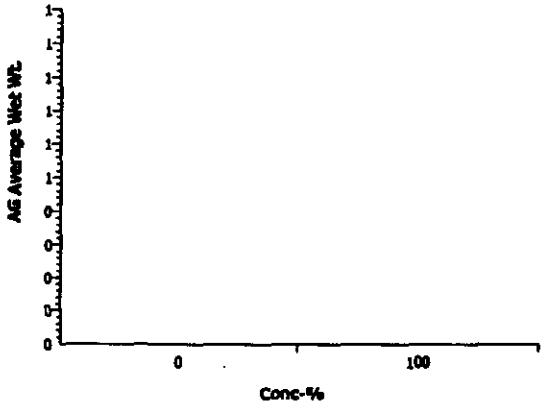
ANOVA Assumptions

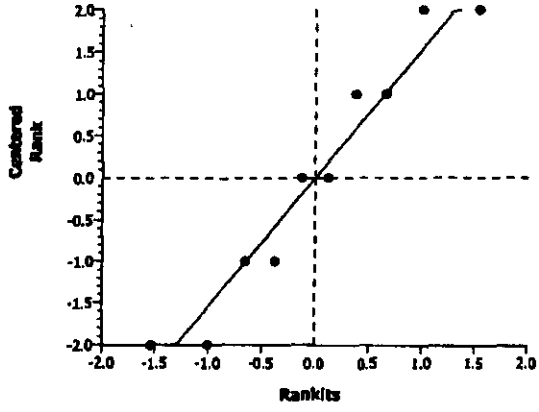
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	57.33263	23.15450	0.00174	Unequal Variances
Distribution	Shapiro-Wilk W	0.76115		0.00488	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	29.605	12.833	36.826	9.717	8.00000	6.00000	10.0000	1.58114
100		5	8.7955	6.6434	9.95	1.2833	3.00000	1.00000	5.00000	1.58114

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	02-2678-4041	02-2678-4041	15 May-06 1:17 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	33.00%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.20464	1.85955	0.0293	0.5337	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.000891	1.000891	1	4.86	0.05857	Non-Significant Effect
Error	1.647414	0.205927	8			
Total	2.64830458	1.2068177	9			

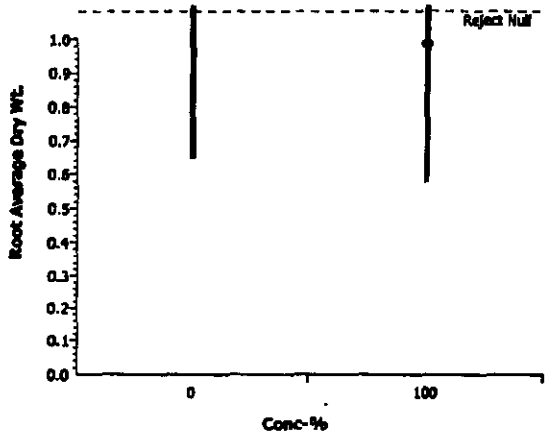
ANOVA Assumptions

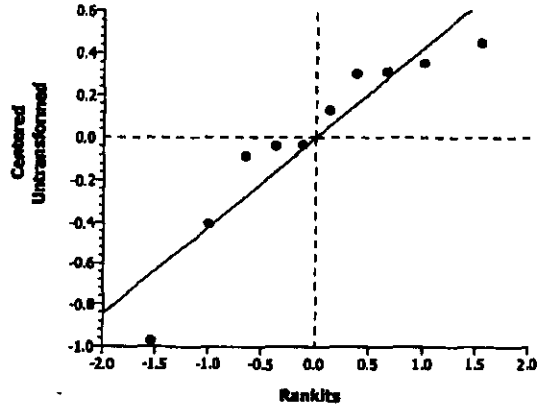
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.31054	23.15450	0.18604	Equal Variances
Distribution	Shapiro-Wilk W	0.87013		0.10032	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.57819				
100		5	0.98446	0.57666	1.33667	0.27849				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Length	Comparison	02-2678-4041	02-2678-4041	15 May-06 1:17 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	27.18%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.36911	1.85955	0.0049	5.76962	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	273.1805	273.1805	1	11.35	0.00980	Significant Effect
Error	192.5351	24.06689	8			
Total	465.715561	297.24734	9			

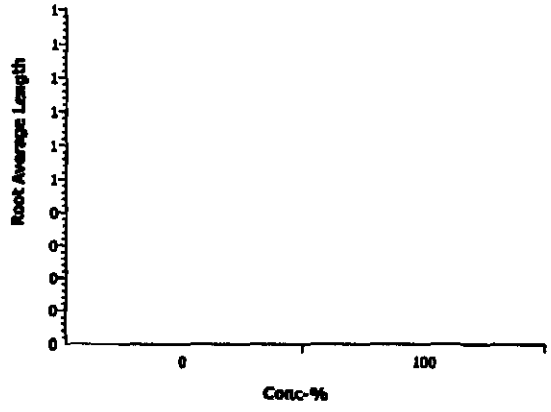
ANOVA Assumptions

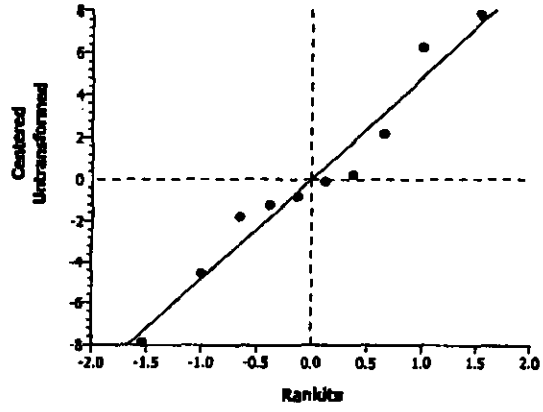
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.06125	23.15450	0.50082	Equal Variances
Distribution	Shapiro-Wilk W	0.95986		0.78426	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.227	13.333	29	5.693				
100		5	10.773	6.2	17	3.9653				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Root Average Wet Wt.	Comparison	02-2678-4041	02-2678-4041	15 May-06 1:17 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	33.13%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.26398	1.85955	0.0014	12.2176	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1962.119	1962.119	1	18.18	0.00275	Significant Effect
Error	863.3456	107.9182	8			
Total	2825.4646	2070.0372	9			

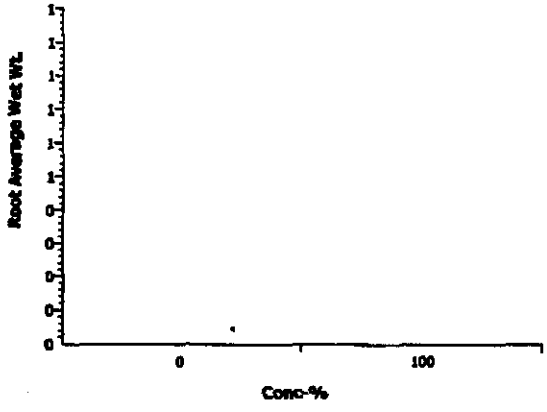
ANOVA Assumptions

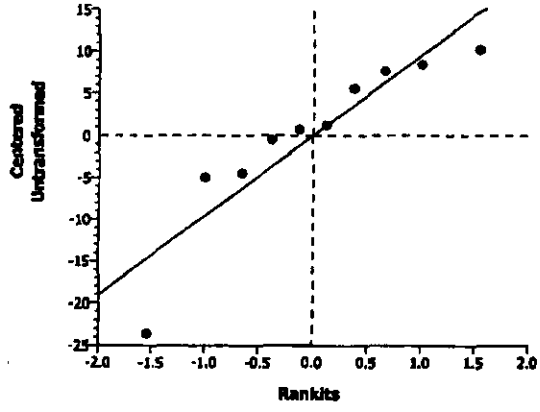
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.29820	23.15450	0.08013	Equal Variances
Distribution	Shapiro-Wilk W	0.84834		0.05551	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.878	13.317	46.99	13.778				
100		5	8.8630	3.9433	16.46	5.1000				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Total Average Biomass Dry Wt.	Comparison	02-2678-4041	02-2678-4041	15 May-06 1:17 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	29.82%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.53787	1.85955	0.0038	1.96167	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	34.82234	34.82234	1	12.52	0.00764	Significant Effect
Error	22.25693	2.782117	8			
Total	57.0792713	37.604455	9			

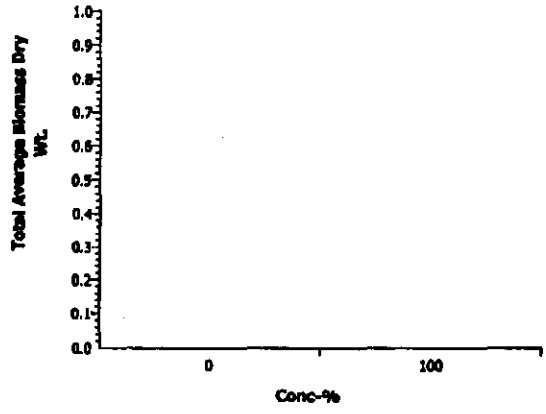
ANOVA Assumptions

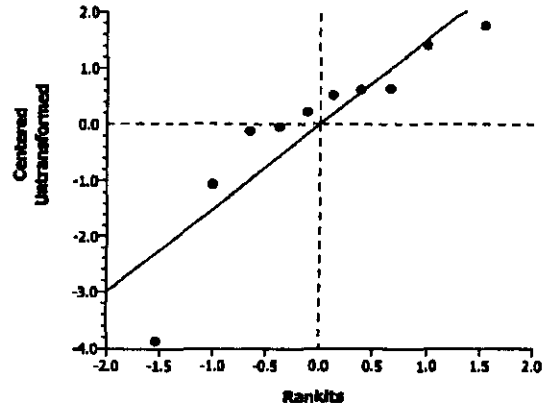
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.62648	23.15450	0.04184	Equal Variances
Distribution	Shapiro-Wilk W	0.82768		0.03137	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	2.25514				
100		5	2.84546	1.78333	3.47495	0.69180				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	02-2678-4041	02-2678-4041	15 May-06 1:17 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	30.15%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.52971	1.85955	0.0010	20.0438	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5959.718	5959.718	1	20.52	0.00193	Significant Effect
Error	2323.675	290.4594	8			
Total	8283.39282	6250.1772	9			

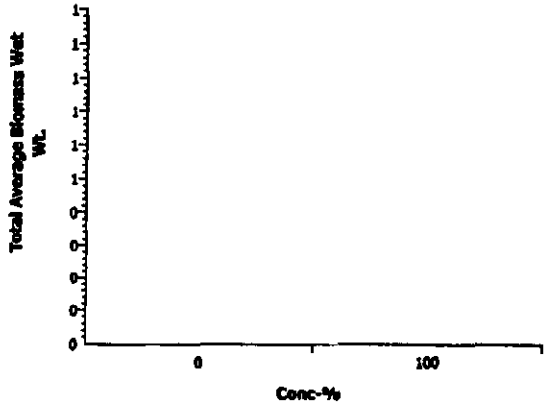
ANOVA Assumptions

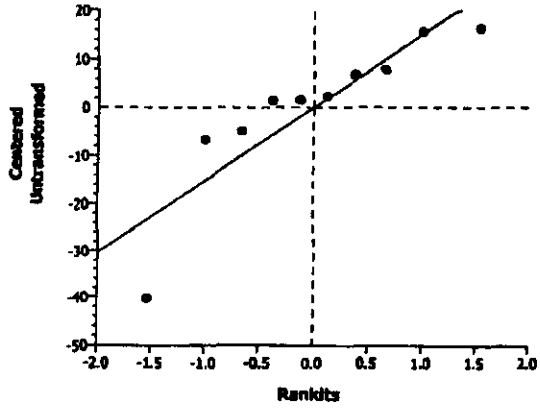
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	15.72240	23.15450	0.02060	Equal Variances
Distribution	Shapiro-Wilk W	0.80564		0.01698	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	66.484	26.15	82.77	23.370				
100		5	17.659	11.000	25.575	5.894				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 [illegible] Day 14 NJ Day 16 TP Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 33 [illegible]

Bioassay Lab ID: BN 8154203A Sample No: 510DT8

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	5	5	5	5	5	5	6→5	5	7.4	8.4
	B	6	7	8	8	8	8	8→5	5		
	C	5	5	5	5	5	5	5	5		
	D	6	7	7	7	7	7	7→5	5		
	E	4	5	5	5	5	5	5	5		

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

Replicate A: 5 Lg G — removed: 1 Sm G

Replicate B: 5 Lg G — removed: 1 Lg G, 2 Med G

Replicate C: 5 Lg G

Replicate D: 5 Lg G — removed: 1 Lg G, 1 Med G

Replicate E: 5 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: 5 Lg G, all w/ 1 B tip

Replicate B: 3 Lg G, 1 Lg G w/ 1 B short, 1 Med G

Replicate C: 5 Lg/Med G

Replicate D: 4 Lg G, 1 Lg w/ 1 B short

Replicate E: 3 Lg G, 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	55 mm	66 mm	67 mm	86 mm	108 mm
Replicate B	77 mm	49 mm	89 mm	86 mm	87 mm
Replicate C	55 mm	76 mm	59 mm	52 mm	61 mm
Replicate D	81 mm	75 mm	68 mm	69 mm	86 mm
Replicate E	77 mm	35 mm	34 mm	69 mm	66 mm

Measure Shoot Weight: Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1020.97	1167.1	1043.38
Replicate B	~~1000~~ 1001.85	1125.5	1022.29
Replicate C	1029.27	1111.2	1041.68
Replicate D	1040.36	1194.6	1064.64
Replicate E	998.51	1062.1	1008.55

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	54 mm	79 mm	53 mm	56 mm	42 mm
Replicate B	35 mm	67 mm	85 mm	59 mm	mm
Replicate C	33 mm	50 mm	52 mm	50 mm	62 mm
Replicate D	79 mm	87 mm	70 mm	49 mm	72 mm
Replicate E	67 mm	66 mm	21 mm	21 mm	44 mm

Measure Root Weight: Total mass of all roots from all seedlings

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	996.85	1123.0	~~1007~~ 1043.77
Replicate B	1002.94	1125.1	1010.65
Replicate C	973.77	1049.9	979.66
Replicate D	1022.54	1181.3	1033.00
Replicate E	972.22	1031.3	~~979~~ 976.30

Comments:

CETIS Test Summary

Report Date: 15 May-06 1:29 PM
Test Link: 02-6445-8985/B154203psA

Plant Chronic test — CH2M Hill

Test No:	01-7071-4913	**Test Type:**	Plant Chronic test	**Duration:**	33d 0h
Start Date:	05 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	08 May-06	**Dil Water:**		**Source:**	
Setup Date:	05 Apr-06 12:00 AM	**Brine:**			

Comments: repeat test BG1542-03A

Sample No:	15-5457-5144	**Code:**	B1542-03	**Client:**	
Sample Date:	14 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	142d 0h	**Station:**			

Comments: J10DT8, E283101

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
03-8076-1014	% Germination	100	> 100	N/A	20.96%	Equal Variance t Two-Sample
08-6295-7792	AG Average Dry Wt.	100	> 100	N/A	35.38%	Equal Variance t Two-Sample
10-3029-3936	AG Average Height	< 100	100	N/A	23.48%	Equal Variance t Two-Sample
11-0749-8506	AG Average Wet Wt.	100	> 100	N/A	35.26%	Equal Variance t Two-Sample
08-1680-6695	Root Average Dry Wt.	100	> 100	N/A	39.40%	Equal Variance t Two-Sample
07-9801-3032	Root Average Length	< 100	100	N/A	23.91%	Equal Variance t Two-Sample
09-0174-2180	Root Average Wet Wt.	< 100	100	N/A	36.01%	Equal Variance t Two-Sample
01-3143-0252	Total Average Biomass Dry	100	> 100	N/A	35.95%	Equal Variance t Two-Sample
02-9227-5895	Total Average Biomass Wet	100	> 100	N/A	35.37%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 15 May-06 1:29 PM
Test Link: 02-6445-8985/B154203psA

% 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%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	0.75679	1.69222	34.11%
100		5	3.57920	2.00800	4.85601	0.56377	1.26063	35.22%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.947	15.2	27	2.2136	4.9498	26.13%
100		5	13.88	11.2	15.6	0.9069	2.0278	14.61%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.826	4.3456	9.717	32.82%
100		5	22.778	12.718	30.848	3.5531	7.9451	34.88%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.25857	0.57819	35.75%
100		5	1.36240	0.81600	2.09200	0.22487	0.50283	36.91%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.227	13.333	29	2.546	5.693	26.82%
100		5	11.36	8.8	14.4	0.9826	2.1973	19.34%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.878	13.317	46.99	6.1616	13.778	37.36%
100		5	21.691	11.816	31.752	3.6095	8.0711	37.21%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	1.00853	2.25514	34.29%
100		5	4.94160	2.82400	6.94801	0.77480	1.73251	35.06%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.484	26.150	82.77	10.452	23.370	35.15%
100		5	44.469	24.534	62.600	7.1169	15.914	35.79%

CETIS Test Summary

Report Date: 15 May-06 1:29 PM
Test Link: 02-6445-8985/B154203psA

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.60000	1.00000	1.00000	0.60000	1.00000
100		1.00000	1.00000	1.00000	1.00000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.05668	6.05200	5.26000	6.26333	5.17000
100		4.48201	4.06799	2.48201	4.85601	2.00800

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.3333	16.8	15.2	27	15.4
100		15.2	15.6	12.2	15.2	11.2

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	12.8333	36.8260	31.748	35.78	30.84
100		29.2260	24.71	16.386	30.848	12.718

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.64667	1.92800	1.52800	2.06331	1.92001
100		1.38401	1.54200	0.97799	2.09200	0.81600

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3333	23.4	20	29	20.4
100		11.4	12.4	9.8	14.4	8.8

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3167	45.2540	36.3420	46.99	42.488
100		25.2300	24.432	15.2260	31.7520	11.8160

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.70335	7.98000	6.78801	8.32666	7.09000
100		5.86602	5.61000	3.46000	6.94801	2.82400

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	26.1500	82.0800	68.0900	82.77	73.328
100		54.4560	49.142	31.612	62.6000	24.5340

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	02-6445-8985	02-6445-8985	15 May-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	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			

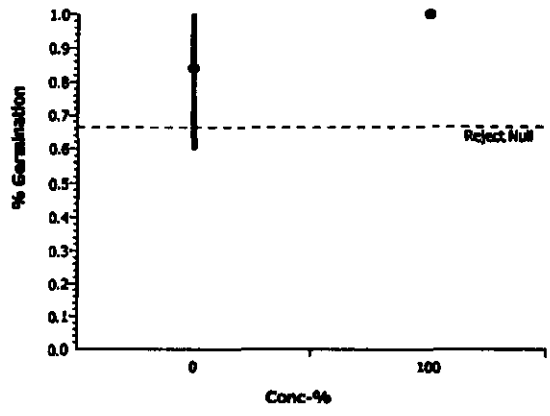
ANOVA Assumptions

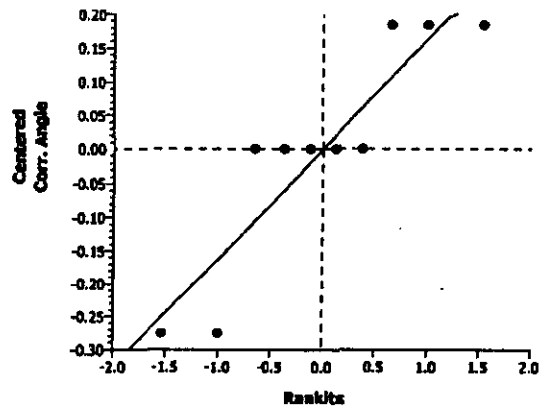
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	4.80000	11.25862	0.05984	Equal Variances
Distribution	Shapiro-Wilk W	0.81415		0.02153	Normal Distribution

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

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Dry Wt.	Comparison	02-6445-8985	02-6445-8985	15 May-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	35.38%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.46361	1.85955	0.0907	1.75485	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4.769275	4.769275	1	2.14	0.18145	Non-Significant Effect
Error	17.81121	2.226401	8			
Total	22.5804858	6.9956765	9			

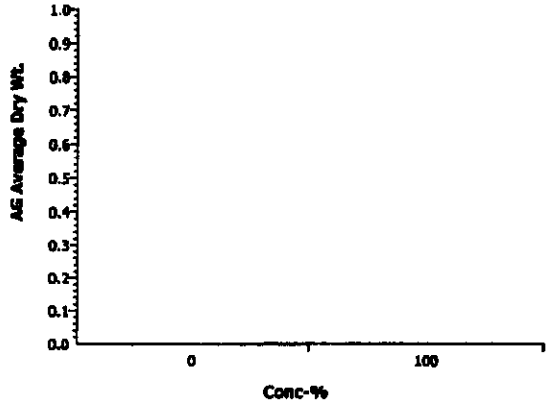
ANOVA Assumptions

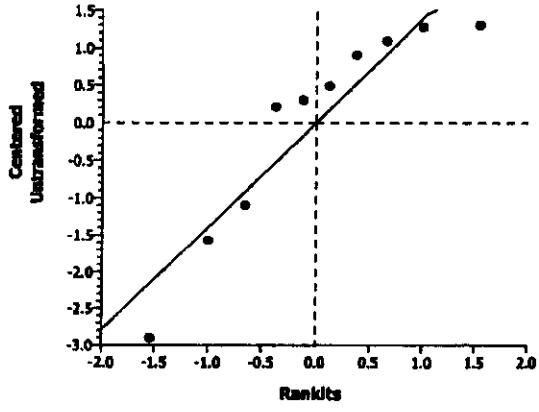
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.80195	23.15450	0.58241	Equal Variances
Distribution	Shapiro-Wilk W	0.85931		0.07488	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	1.69222				
100		5	3.57920	2.00800	4.85601	1.26063				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	02-6445-8985	02-6445-8985	15 May-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		N/A	23.48%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.11800	1.85955	0.0335	4.44839	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	64.17778	64.17778	1	4.49	0.06703	Non-Significant Effect
Error	114.4516	14.30644	8			
Total	178.629333	78.484224	9			

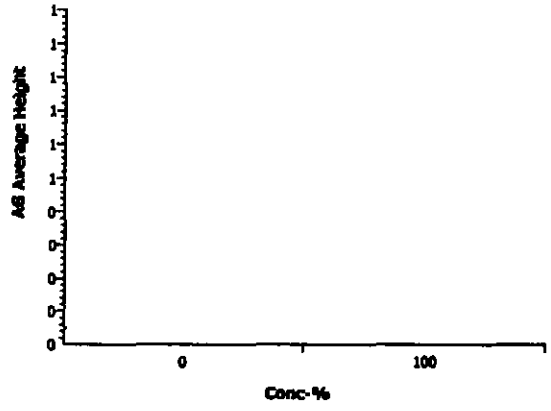
ANOVA Assumptions

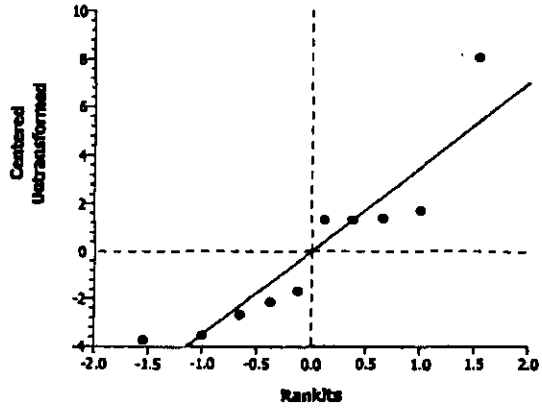
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.95839	23.15450	0.11205	Equal Variances
Distribution	Shapiro-Wilk W	0.85981		0.07593	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.947	15.2	27	4.9498				
100		5	13.88	11.2	15.6	2.0278				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	02-6445-8985	02-6445-8985	15 May-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	35.26%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.21636	1.85955	0.1293	10.4381	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	116.5494	116.5494	1	1.48	0.25851	Non-Significant Effect
Error	630.1755	78.77194	8			
Total	746.724945	195.32135	9			

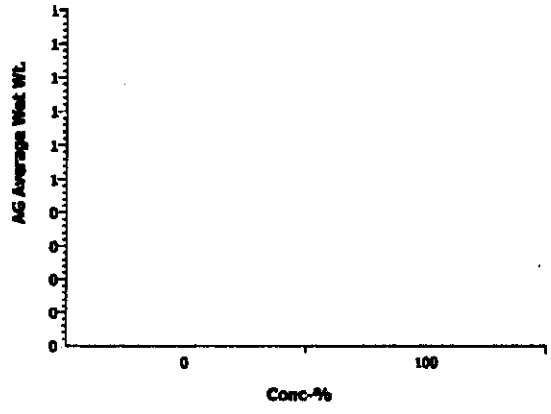
ANOVA Assumptions

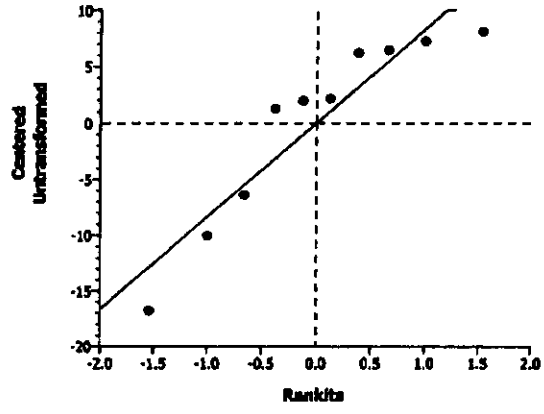
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.49579	23.15450	0.70595	Equal Variances
Distribution	Shapiro-Wilk W	0.86182		0.08017	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	29.605	12.833	36.826	9.717				
100		5	22.778	12.718	30.848	7.9451				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	02-6445-8985	02-6445-8985	15 May-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	39.40%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.74355	1.85955	0.2392	0.63723	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1623032	0.162303	1	0.55	0.47842	Non-Significant Effect
Error	2.348564	0.293571	8			
Total	2.51086763	0.4558738	9			

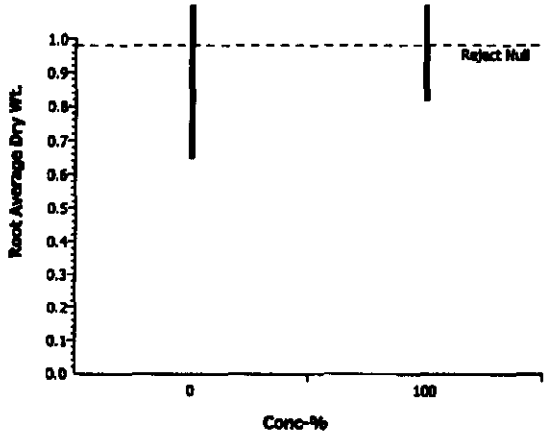
ANOVA Assumptions

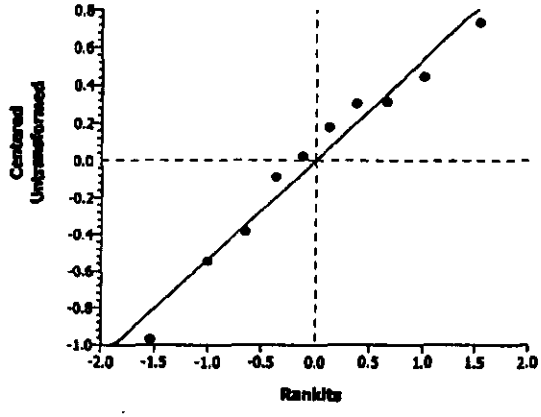
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.32217	23.15450	0.79323	Equal Variances
Distribution	Shapiro-Wilk W	0.96492	-	0.84022	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.57819				
100		5	1.36240	0.81600	2.09200	0.50283				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Length	Comparison	02-6445-8985	02-6445-8985	15 May-06 1:29 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	3.61544	1.85955	0.0034	5.07478	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	243.3778	243.3778	1	13.07	0.00683	Significant Effect
Error	148.9529	18.61911	8			
Total	392.330673	261.99689	9			

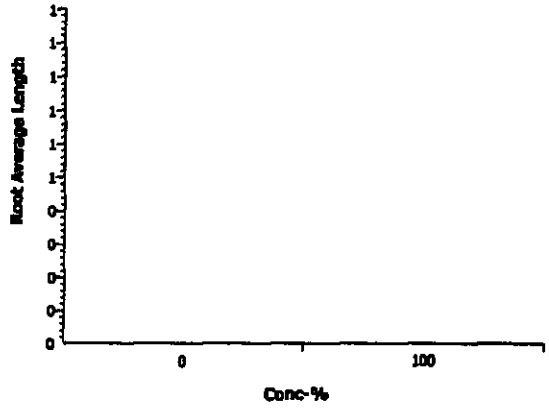
ANOVA Assumptions

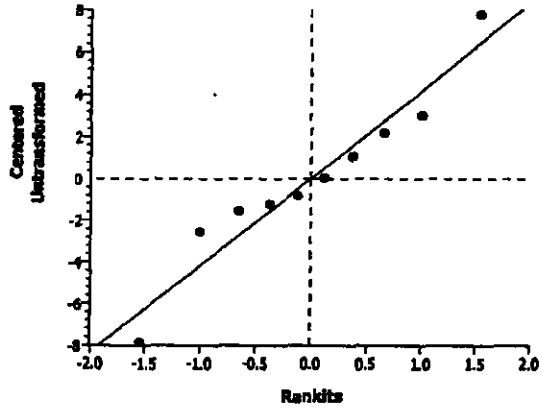
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.71297	23.15450	0.09214	Equal Variances
Distribution	Shapiro-Wilk W	0.95770		0.75941	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.227	13.333	29	5.693				
100		5	11.36	8.8	14.4	2.1973				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	02-6445-8985	02-6445-8985	15 May-06 1:29 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	36.01%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.12672	1.85955	0.0331	13.2790	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	576.6071	576.6071	1	4.52	0.06613	Non-Significant Effect
Error	1019.879	127.4848	8			
Total	1596.48572	704.09194	9			

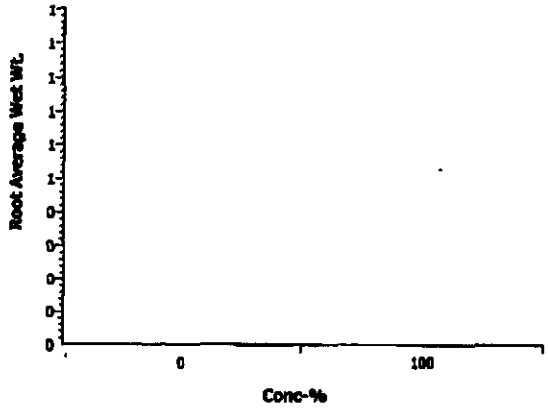
ANOVA Assumptions

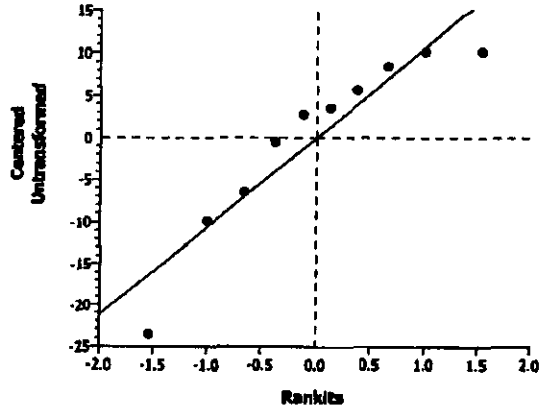
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.91398	23.15450	0.32495	Equal Variances
Distribution	Shapiro-Wilk W	0.87337		0.10940	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.878	13.317	46.99	13.778				
100		5	21.691	11.816	31.752	8.0711				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	02-6445-8985	02-6445-8985	15 May-06 1:29 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	35.95%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.28638	1.85955	0.1171	2.36495	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	6.691254	6.691254	1	1.65	0.23429	Non-Significant Effect
Error	32.34896	4.043621	8			
Total	39.0402188	10.734875	9			

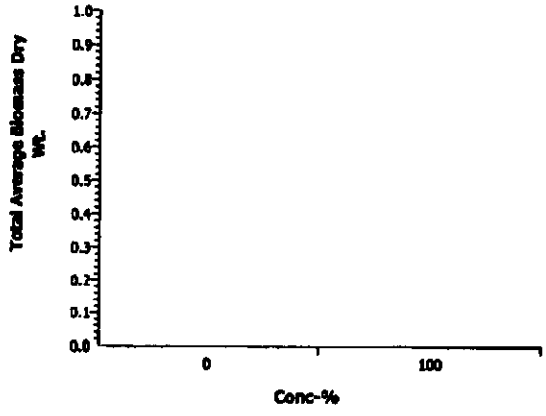
ANOVA Assumptions

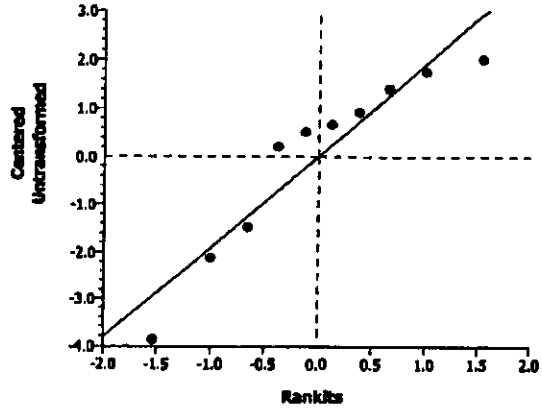
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.69432	23.15450	0.62201	Equal Variances
Distribution	Shapiro-Wilk W	0.88744		0.15864	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	2.25514				
100		5	4.94160	2.82400	6.94801	1.73251				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	02-6445-8985	02-6445-8985	15 May-06 1:29 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	35.37%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.74104	1.85955	0.0599	23.5133	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1211.628	1211.628	1	3.03	0.11986	Non-Significant Effect
Error	3197.737	399.7171	8			
Total	4409.36499	1611.3455	9			

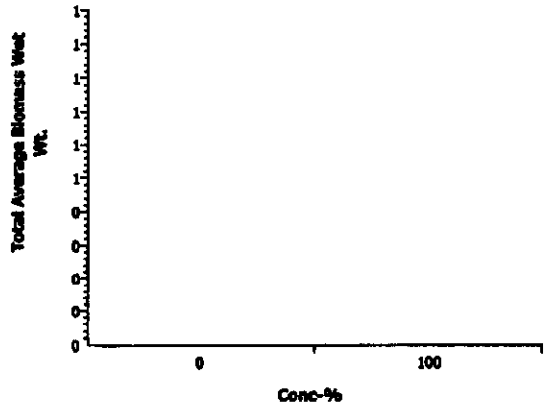
ANOVA Assumptions

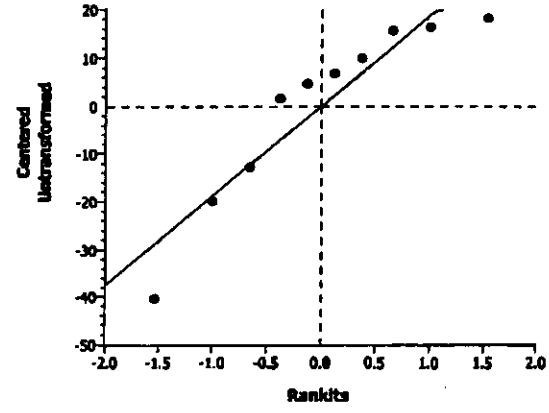
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.15665	23.15450	0.47497	Equal Variances
Distribution	Shapiro-Wilk W	0.86762		0.09378	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	66.484	26.15	82.77	23.370				
100		5	44.469	24.534	62.600	15.914				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 [illegible] Day 15 NJ Day 18 [illegible] Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 33 [illegible]/NJ

Bioassay Lab ID: BN542-07A Sample No: J10LJ5

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	4-21 16 days after planting	4-24 19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	4	4	5	6	6	6	6→5	5	6.3	7.5
	B	3	~~2~~ 3	3	4	5	5	5	5		
	C	4	NJ ~~3~~ 4	5	5	5	5	4	5		
	D	6	NJ ~~5~~ 6	6	7	9	9	7→5	5		
	E	4	NJ ~~3~~ 4	4	5	6	6	4	4		

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

- Replicate A: good 6 lg → 5 lg
- Replicate B: 3 lg + 2 sm
- Replicate C: 4 lg + 3 broadleaf plants - broadleaf removed
- Replicate D: 6 Lg, 1 sm → 5 lg
- Replicate E: 3 lg + 1 med, 3 seedlings of another species removed (broadleaf) → removed

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: 1 Lg G, 2 Md G, 1 Md G w/ 1 B tip, 1 Md G w/ 1 B shoot.
- Replicate B: 2 Lg G, 1 Lg G w/ 2 B tips, 2 Sm G
- Replicate C: 3 Lg G, 1 Md G, 1 Sm G
- Replicate D: 3 Md G, 1 Md G w/ 1 B shoot, 1 Sm w/ 2 B 1 4G shoots
- Replicate E: 1 Lg G, 1 Md G, 1 Md G w/ 1 B tip, 1 Sm G w/ 1 B tip

Measure Shoot Height: Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	61 mm	49 mm	44 mm	54 mm	42 mm
Replicate B	65 mm	55 mm	55 mm	12 mm	11 mm
Replicate C	89 mm	74 mm	82 mm	46 mm	29 mm
Replicate D	57 mm	61 mm	50 mm	50 mm	27 mm
Replicate E	77 mm	47 mm	55 mm	40 mm	— mm

Measure Shoot Weight: Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1027.21	1094.4	1037.13
Replicate B	1043.93	1109.8	1055.52
Replicate C	1019.24	1145.4	1038.84
Replicate D	988.02	1059.1	1001.26
Replicate E	1001.92	1073.7	1014.31

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	53 mm	48 mm	47 mm	54 mm	55 mm
Replicate B	57 mm	57 mm	61 mm	9 mm	12 mm
Replicate C	69 mm	60 mm	30 mm	78 mm	95 mm
Replicate D	35 mm	51 mm	54 mm	79 mm	46 mm
Replicate E	85 mm	55 mm	54 mm	54 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	1011.97	1119.1	1018.86
Replicate B	998.58	1062.4	1003.81
Replicate C	981.26	1170.6	991.49
Replicate D	1005.89	1101.2	1012.80
Replicate E	1006.09	1101.5	1011.95

Comments:

CETIS Test Summary

Report Date: 15 May-06 1:35 PM
Test Link: 04-1720-8149/B154208psA

Plant Chronic test — CH2M HILL

Test No:	08-6132-1752	**Test Type:**	Plant Chronic test	**Duration:**	33d 0h
Start Date:	05 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	08 May-06	**Dil Water:**		**Source:**	
Setup Date:	05 Apr-06 12:00 AM	**Brine:**			

Comments: repeat test BG1542-08A

Sample No:	15-5450-5055	**Code:**	B1542-08	**Client:**	
Sample Date:	28 Nov-05	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	128d 0h	**Station:**			

Comments: J10LJ5, E289701

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
05-8535-7141	% Germination	100	> 100	N/A	22.99%	Equal Variance t Two-Sample
04-4372-5688	AG Average Dry Wt.	< 100	100	N/A	30.26%	Equal Variance t Two-Sample
15-8788-4376	AG Average Height	< 100	100	N/A	24.06%	Equal Variance t Two-Sample
17-2158-6620	AG Average Wet Wt.	< 100	100	N/A	30.69%	Equal Variance t Two-Sample
12-9654-4472	Root Average Dry Wt.	100	> 100	N/A	35.11%	Equal Variance t Two-Sample
04-3460-2963	Root Average Length	< 100	100	N/A	24.97%	Equal Variance t Two-Sample
07-6351-6603	Root Average Wet Wt.	< 100	100	N/A	37.46%	Equal Variance t Two-Sample
12-6733-3681	Total Average Biomass Dry	< 100	100	N/A	31.11%	Equal Variance t Two-Sample
09-9644-3668	Total Average Biomass Wet	< 100	100	N/A	34.17%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 15 May-06 1:35 PM
Test Link: 04-1720-8149/B154208psA

% 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%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	0.75679	1.69222	34.11%
100		5	2.91350	2.31799	3.92000	0.28112	0.62860	21.58%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.947	15.2	27	2.2136	4.9496	26.13%
100		5	10.87	8	13.75	1.0526	2.3536	21.65%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.826	4.3456	9.717	32.82%
100		5	16.921	13.174	25.232	2.2337	4.9947	29.52%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.25857	0.57819	35.75%
100		5	1.46240	1.04600	2.04600	0.16241	0.36317	24.83%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.227	13.333	29	2.546	5.693	26.82%
100		5	11.3	7.8	15.5	1.2806	2.8636	25.34%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.878	13.317	46.99	6.1616	13.778	37.36%
100		5	22.994	12.764	37.868	4.1506	9.281	40.36%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	1.00853	2.25514	34.29%
100		5	4.37590	3.36399	5.96599	0.44024	0.98441	22.50%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.484	26.150	82.77	10.452	23.370	35.15%
100		5	39.915	25.938	63.1	6.3258	14.145	35.44%

CETIS Test Summary

Report Date: 15 May-06 1:35 PM
Test Link: 04-1720-8149/B154208psA

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.60000	1.00000	1.00000	0.60000	1.00000
100		1.00000	1.00000	1.00000	1.00000	0.80000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.05668	6.05200	5.26000	6.26333	5.17000
100		2.58401	2.31799	3.92000	2.64800	3.09750

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.3333	16.8	15.2	27	15.4
100		10	8	12.8	9.8	13.75

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	12.8333	36.8260	31.748	35.78	30.84
100		14.0380	13.174	25.2320	14.216	17.945

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.64667	1.92800	1.52800	2.06331	1.92001
100		1.37800	1.04600	2.04600	1.38199	1.45999

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3333	23.4	20	29	20.4
100		10.2	7.8	12.4	10.6	15.5

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3167	45.2540	36.3420	46.99	42.488
100		21.4260	12.7640	37.868	19.062	23.8525

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.70335	7.98000	6.78801	8.32666	7.09000
100		3.96201	3.36399	5.96599	4.03000	4.55751

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	26.1500	82.0800	68.0900	82.77	73.328
100		35.4640	25.938	63.1	33.278	41.7975

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	04-1720-8149	04-1720-8149	15 May-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	Angular (Corrected)		100	>100	1	N/A	22.99%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		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			

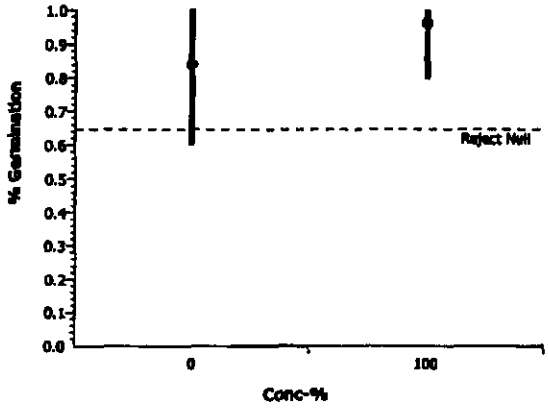
ANOVA Assumptions

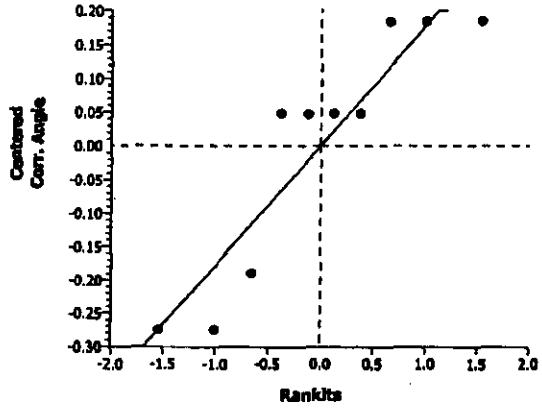
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.57779	23.15450	0.12462	Equal Variances
Distribution	Shapiro-Wilk W	0.82019		0.02548	Normal Distribution

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

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Dry Wt.	Comparison	04-1720-8149	04-1720-8149	15 May-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	30.26%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.53545	1.85955	0.0175	1.50124	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	10.47451	10.47451	1	6.43	0.03496	Significant Effect
Error	13.03506	1.629382	8			
Total	23.5095625	12.103888	9			

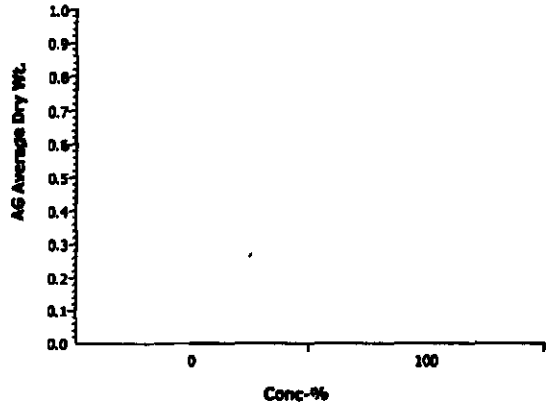
ANOVA Assumptions

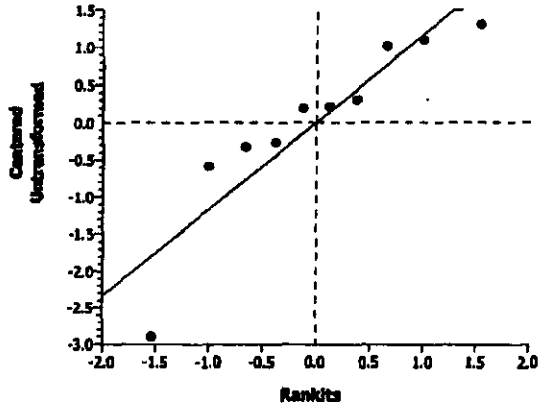
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.24704	23.15450	0.08109	Equal Variances
Distribution	Shapiro-Wilk W	0.84825		0.05537	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	1.69222				
100		5	2.91350	2.31799	3.92000	0.62860				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Height	Comparison	04-1720-8149	04-1720-8149	15 May-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	24.06%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.29507	1.65955	0.0055	4.55801	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	163.0814	163.0814	1	10.86	0.01094	Significant Effect
Error	120.1616	15.02019	8			
Total	283.242912	178.10155	9			

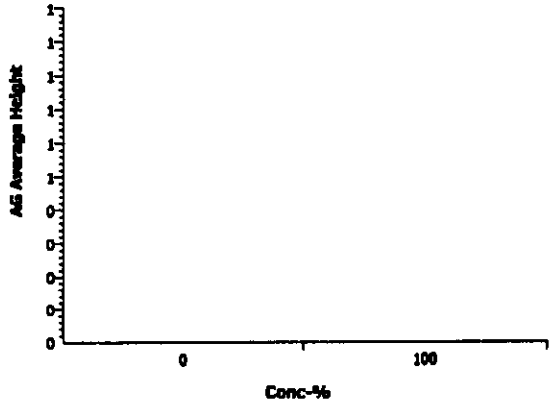
ANOVA Assumptions

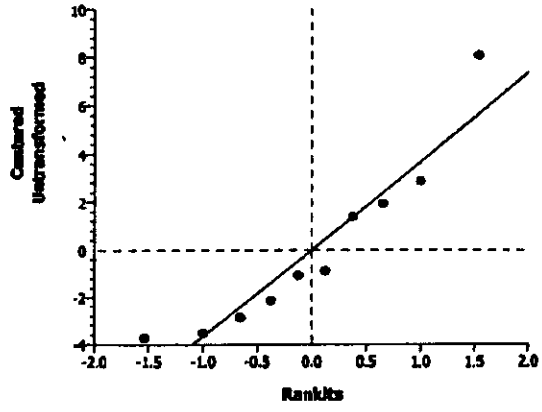
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.42294	23.15450	0.17894	Equal Variances
Distribution	Shapiro-Wilk W	0.89231		0.18001	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.947	15.2	27	4.9498				
100		5	10.870	8	13.75	2.3536				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	04-1720-8149	04-1720-8149	15 May-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	30.69%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.59606	1.85955	0.0159	9.08585	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	402.2389	402.2389	1	6.74	0.03181	Significant Effect
Error	477.4698	59.68373	8			
Total	879.708771	461.92265	9			

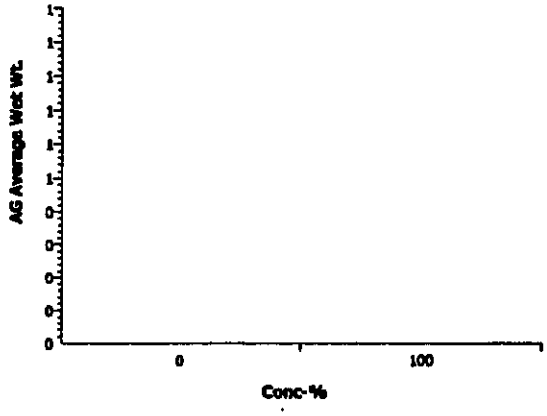
ANOVA Assumptions

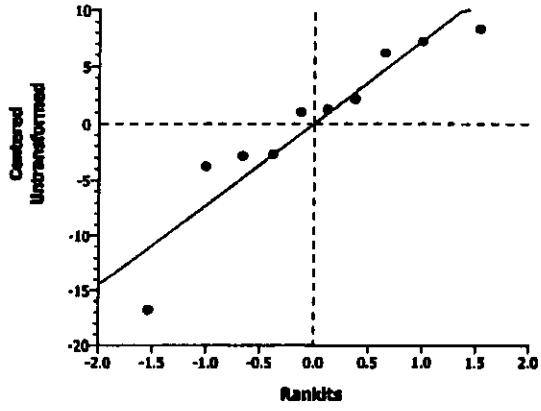
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.78474	23.15450	0.22556	Equal Variances
Distribution	Shapiro-Wilk W	0.88392		0.14468	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	29.605	12.833	36.826	9.717				
100		5	16.921	13.174	25.232	4.9947				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	04-1720-8149	04-1720-8149	15 May-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	35.11%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.50697	1.85955	0.3129	0.56781	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0599097	0.05991	1	0.26	0.62585	Non-Significant Effect
Error	1.864768	0.233096	8			
Total	1.92467780	0.2930057	9			

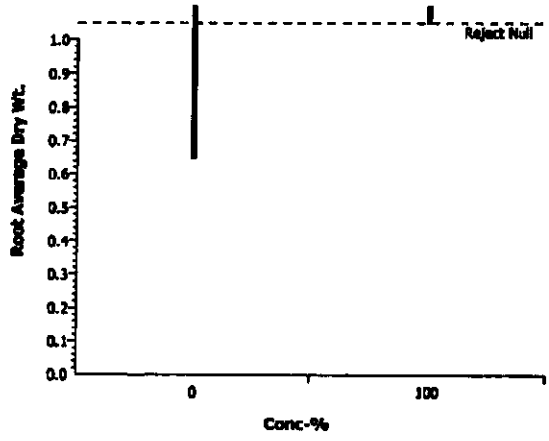
ANOVA Assumptions

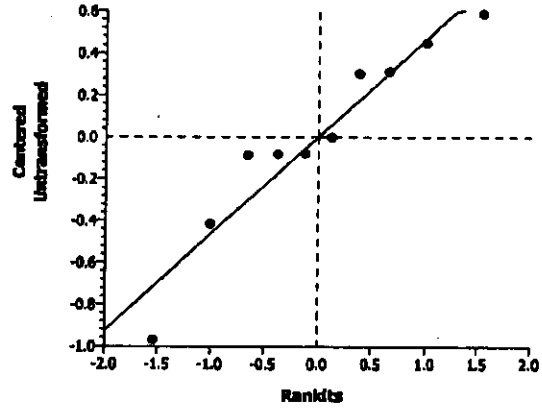
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.53463	23.15450	0.38967	Equal Variances
Distribution	Shapiro-Wilk W	0.92278		0.38072	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.57819				
100		5	1.46240	1.04600	2.04600	0.36317				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	04-1720-8149	04-1720-8149	15 May-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	24.97%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.48314	1.85955	0.0041	5.29956	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	246.3468	246.3468	1	12.13	0.00828	Significant Effect
Error	162.4409	20.30511	8			
Total	408.787659	266.65188	9			

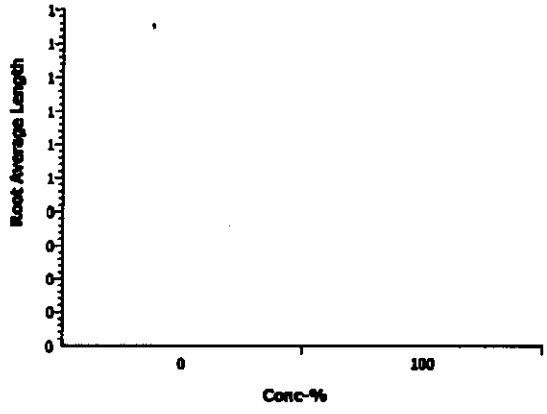
ANOVA Assumptions

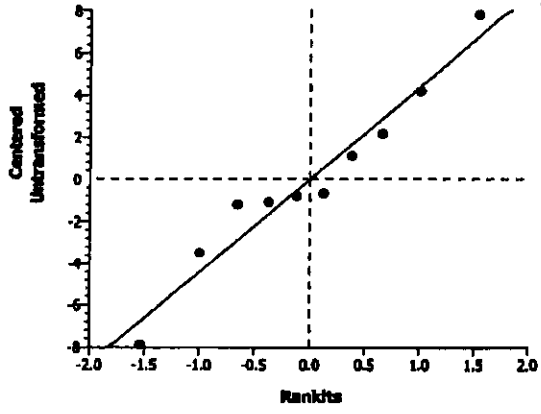
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.95247	23.15450	0.21170	Equal Variances
Distribution	Shapiro-Wilk W	0.96578		0.84922	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.227	13.333	29	5.693				
100		5	11.3	7.8	15.5	2.8636				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	04-1720-8149	04-1720-8149	15 May-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	37.46%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.86880	1.85955	0.0493	13.8149	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	481.8888	481.8888	1	3.49	0.09859	Non-Significant Effect
Error	1103.85	137.9813	8			
Total	1585.73911	619.87006	9			

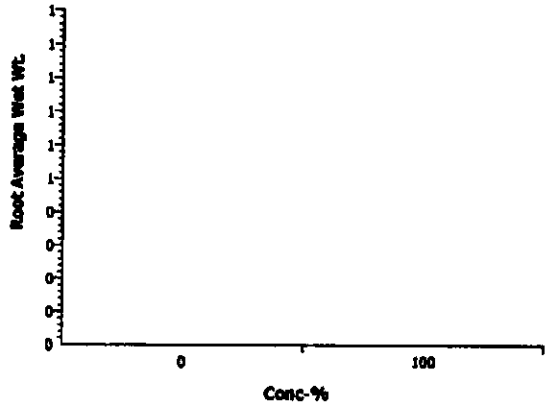
ANOVA Assumptions

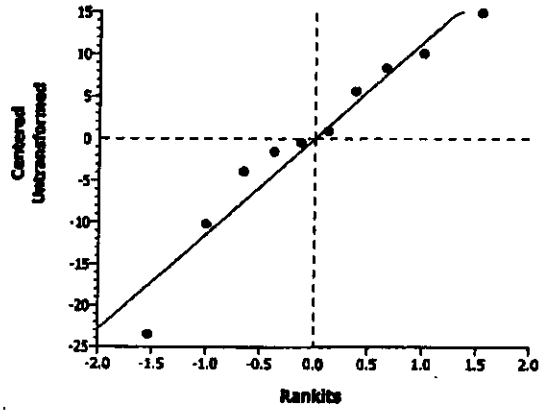
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.20379	23.15450	0.46291	Equal Variances
Distribution	Shapiro-Wilk W	0.94621		0.62394	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.878	13.317	46.99	13.778				
100		5	22.994	12.764	37.868	9.281				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	04-1720-8149	04-1720-8149	15 May-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	31.11%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.00077	1.85955	0.0402	2.04630	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	12.11875	12.11875	1	4.00	0.08042	Non-Significant Effect
Error	24.21888	3.02736	8			
Total	36.3376379	15.146115	9			

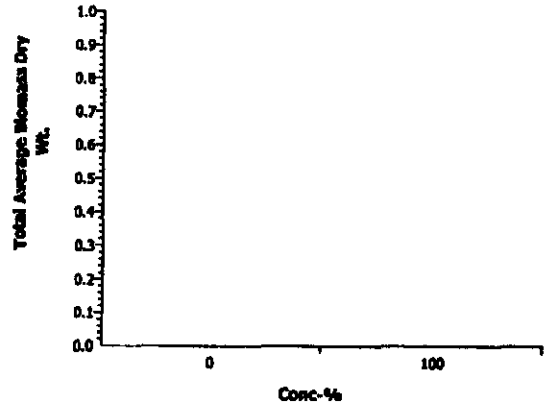
ANOVA Assumptions

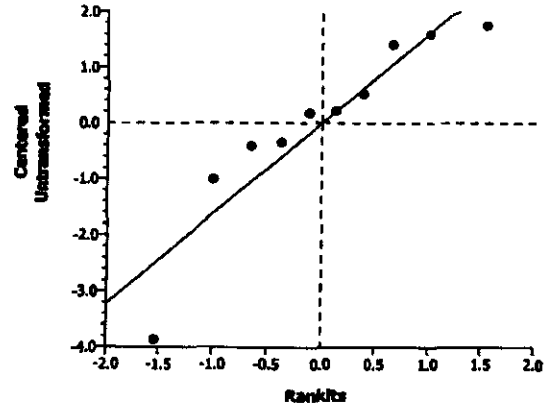
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.24797	23.15450	0.13730	Equal Variances
Distribution	Shapiro-Wilk W	0.86537		0.08825	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	2.25514				
100		5	4.37590	3.36399	5.96599	0.98441				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Total Average Biomass Wet Wt.	Comparison	04-1720-8149	04-1720-8149	15 May-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	34.17%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.17471	1.85955	0.0307	22.7178	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1764.66	1764.66	1	4.73	0.06137	Non-Significant Effect
Error	2985.025	373.1281	8			
Total	4749.68494	2137.7879	9			

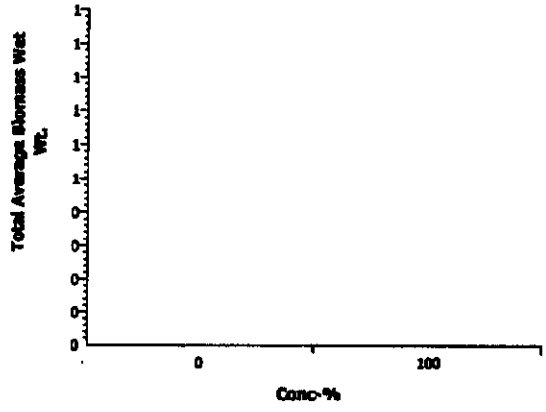
ANOVA Assumptions

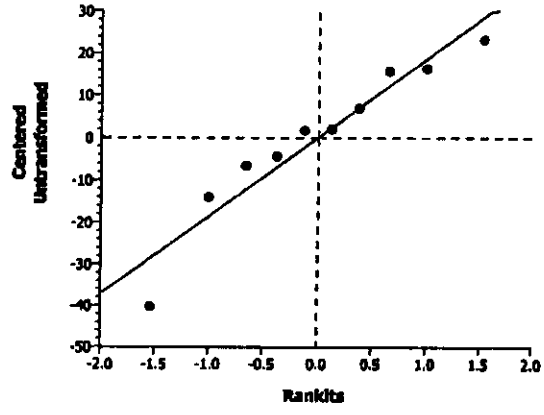
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.72986	23.15450	0.35420	Equal Variances
Distribution	Shapiro-Wilk W	0.92551		0.40519	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	66.484	26.15	82.77	23.370				
100		5	39.915	25.938	63.1	14.145				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 [illegible] Day 15 NJ Day 18 JD Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 33 [illegible]

Bioassay Lab ID: BW B6 1546-01 Sample No: J11J B8

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	18 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	8	8	8	8	8	8	8→5	5	6.2	7.7
	B	2	2	2	2	3	3	3	3		
	C	7	8	8	8	8	9	8→5	5		
	D	6	6	6	6	6	4	6→5	5		
	E	6	7	7	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 Lg G — removed: 1 Lg G, 2 med G + 5 broadleaves

Replicate B: 2 Lg G, 1 Sm G — removed: broadleaf seedlings

Replicate C: 5 Lg G — removed: 1 Lg w/ brown tips 2 med G, broadleaf seedlings

Replicate D: 3 Lg G, 1 med G, 1 Sm G — removed: 1 Sm G, broadleaf

Replicate E: 4 Lg G + 1 Lg w/ 1 brown tip — removed: broadleaf

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest, 5+ 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 Lg G, 1 med G w/ 1 B shoot, 1 med G

Replicate B: 2 Lg G, 1 Sm G

Replicate C: 3 Lg G, 2 Lg G w/ 1 B shoot each

Replicate D: 3 Lg G, 1 med G w/ 1 B shoot, 1 Sm G w/ all shoots having Brown tips

Replicate E: 3 Lg G, 1 Lg G w/ 2 B tips, 1 Lg G w/ 1 B tip & 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	73 mm	63 mm	58 mm	52 mm	49 mm
Replicate B	83 mm	68 mm	16 mm	mm	mm
Replicate C	81 mm	55 mm	77 mm	55 mm	49 mm
Replicate D	58 mm	76 mm	34 mm	54 mm	18 mm
Replicate E	69 mm	57 mm	59 mm	53 mm	51 mm

Measure Shoot Weight: Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	997.57	1119.6	1016.55
Replicate B	999.57	1120.2	1009.72
Replicate C	1018.50	1146.7	1039.29
Replicate D	1000.91	1105.3	1017.30
Replicate E	1007.30	1147.4	1026.08

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	75 mm	52 mm	60 mm	25 mm	29 mm
Replicate B	31 mm	57 mm	63 mm	mm	mm
Replicate C	90 mm	54 mm	51 mm	60 mm	71 mm
Replicate D	23 mm	62 mm	55 mm	51 mm	89 mm
Replicate E	56 mm	37 mm	52 mm	62 mm	68 mm

Measure Root Weight: Total mass of all roots from all seedlings

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	993.48	1228.7	1004.85
Replicate B	1023.81	1069.6	1028.03
Replicate C	1009.45	1186.1	1020.67
Replicate D	1016.77	1170.6	1024.45
Replicate E	1020.40	1219.9	1028.05

Comments:

CETIS Test Summary

Report Date: 15 May-06 1:51 PM
Test Link: 02-4923-3771/BG156601ps

Plant Chronic test — CH2M Hill

Test No:	18-2151-9846	**Test Type:**	Plant Chronic test	**Duration:**	33d 0h
Start Date:	05 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	08 May-06	**Dil Water:**		**Source:**	
Setup Date:	05 Apr-06 12:00 AM	**Brine:**			
Comments:	BG1566-01				

Sample No:	07-8112-4502	**Code:**	B1566-01	**Client:**	
Sample Date:	22 Mar-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	14d 0h	**Station:**			
Comments:	J11JB8				

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
05-1554-1035	% Germination	100	> 100	N/A	27.93%	Wilcoxon Rank Sum Two-Sample
00-9297-1693	AG Average Dry Wt.	100	> 100	N/A	28.98%	Equal Variance t Two-Sample
01-4184-2571	AG Average Height	< 100	100	N/A	26.44%	Equal Variance t Two-Sample
06-0316-2632	AG Average Wet Wt.	100	> 100	N/A	34.28%	Equal Variance t Two-Sample
08-1965-4440	Root Average Dry Wt.	100	> 100	N/A	35.48%	Equal Variance t Two-Sample
07-8046-6898	Root Average Length	< 100	100	N/A	24.73%	Equal Variance t Two-Sample
13-3311-8140	Root Average Wet Wt.	100	> 100	N/A	40.92%	Equal Variance t Two-Sample
19-0102-5163	Total Average Biomass Dry	100	> 100	N/A	29.78%	Equal Variance t Two-Sample
00-5708-4133	Total Average Biomass Wet	100	> 100	N/A	30.99%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 15 May-06 1:51 PM
Test Link: 02-4923-3771/BG156601ps

% 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	0.60000	1.00000	0.08000	0.17889	19.44%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	0.75679	1.69222	34.11%
100		5	3.67426	3.27800	4.15801	0.15767	0.35255	9.60%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.947	15.2	27	2.2136	4.9498	26.13%
100		5	12.853	9.6	18.667	1.535	3.4323	26.70%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.826	4.3456	9.717	32.82%
100		5	27.831	20.878	40.21	3.3027	7.385	26.54%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.25857	0.57819	35.75%
100		5	1.85146	1.53000	2.27400	0.16841	0.37657	20.34%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.227	13.333	29	2.546	5.693	26.82%
100		5	12.293	9.6	16.667	1.2196	2.7271	22.18%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.878	13.317	46.99	6.1616	13.778	37.36%
100		5	33.714	15.53	47.044	5.2816	11.810	35.03%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	1.00853	2.25514	34.29%
100		5	5.52573	4.81399	6.40199	0.30399	0.67973	12.30%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.484	26.150	82.77	10.452	23.370	35.15%
100		5	61.545	51.644	71.45	3.6797	8.2281	13.37%

CETIS Test Summary

Report Date: 15 May-06 1:51 PM
Test Link: 02-4923-3771/BG156601ps

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.60000	1.00000	1.00000	0.60000	1.00000
100		1.00000	0.60000	1.00000	1.00000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.05668	6.05200	5.26000	6.26333	5.17000
100		3.79600	3.38332	4.15801	3.27800	3.75599

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.3333	16.8	15.2	27	15.4
100		11.8	18.6667	12.6	9.6	11.6

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	12.8333	36.8260	31.748	35.78	30.84
100		24.406	40.21	25.64	20.8780	28.0200

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.64667	1.92800	1.52800	2.06331	1.92001
100		2.27400	1.67334	2.24399	1.53599	1.53000

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3333	23.4	20	29	20.4
100		9.6	16.6667	13	11.2	11

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3167	45.2540	36.3420	46.99	42.488
100		47.044	15.53	35.33	30.766	39.9000

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.70335	7.98000	6.78801	8.32666	7.09000
100		6.06999	5.05664	6.40199	4.81399	5.28601

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	26.1500	82.0800	68.0900	82.77	73.328
100		71.45	55.74	60.97	51.644	67.92

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	02-4923-3771	02-4923-3771	15 May-06 1:51 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	27.93%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	30		0.6548	3	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.021087	0.021087	1	0.40	0.54474	Non-Significant Effect
Error	0.4217399	0.052717	8			
Total	0.44282693	0.0738045	9			

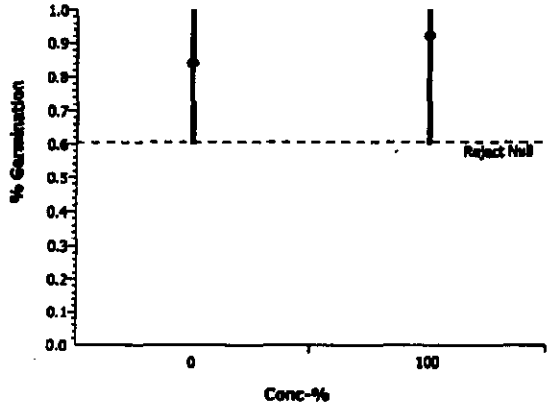
ANOVA Assumptions

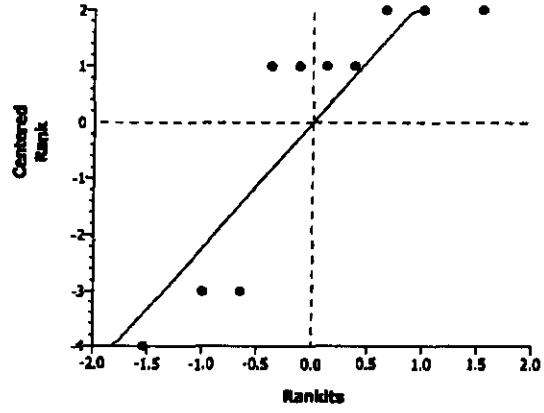
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.50000	23.15450	0.70400	Equal Variances
Distribution	Shapiro-Wilk W	0.75864		0.00455	Non-normal Distribution

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	5.00000	2.00000	7.00000	2.73861
100		5	0.92000	0.60000	1.00000	0.17889	6.00000	2.00000	7.00000	2.23607

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	02-4923-3771	02-4923-3771	15 May-06 1:51 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	28.98%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.86375	1.85955	0.0674	1.4375	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4.135365	4.135365	1	2.77	0.13473	Non-Significant Effect
Error	11.95168	1.493957	8			
Total	16.0870247	5.6293229	9			

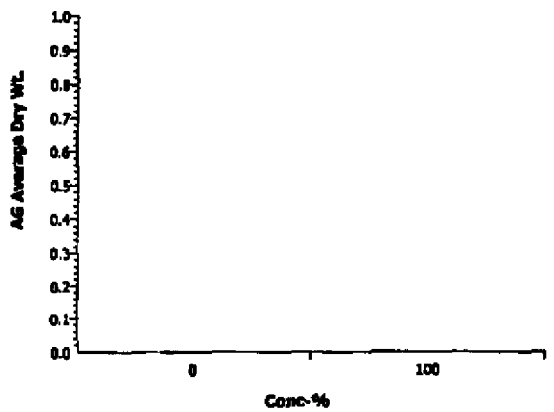
ANOVA Assumptions

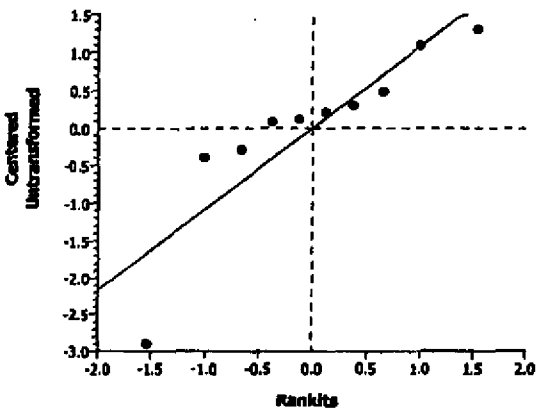
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	23.03905	23.15450	0.01009	Equal Variances
Distribution	Shapiro-Wilk W	0.80366		0.01606	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	1.69222				
100		5	3.67426	3.27800	4.15801	0.35255				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	02-4923-3771	02-4923-3771	15 May-06 1:51 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	26.44%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.26202	1.85955	0.0268	5.00918	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	92.82178	92.82178	1	5.12	0.05355	Non-Significant Effect
Error	145.1271	18.14089	8			
Total	237.948883	110.96267	9			

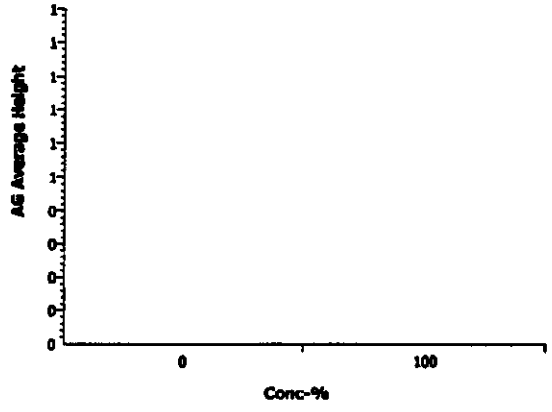
ANOVA Assumptions

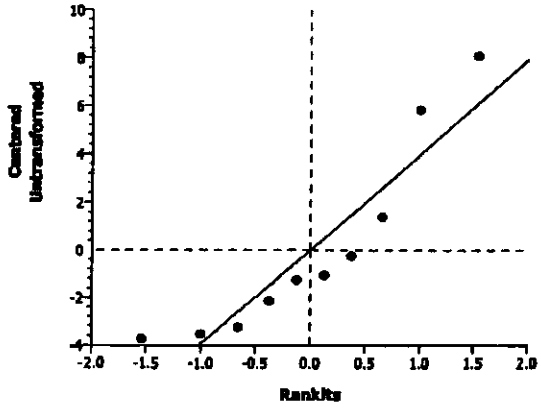
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.07971	23.15450	0.49566	Equal Variances
Distribution	Shapiro-Wilk W	0.84655		0.05284	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.947	15.2	27	4.9498				
100		5	12.853	9.6	18.667	3.4323				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Wet Wt.	Comparison		02-4923-3771	02-4923-3771	15 May-06 1:51 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	34.28%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.32514	1.85955	0.3767	10.1497	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7.873582	7.873582	1	0.11	0.75342	Non-Significant Effect
Error	595.8298	74.47873	8			
Total	603.703416	82.352311	9			

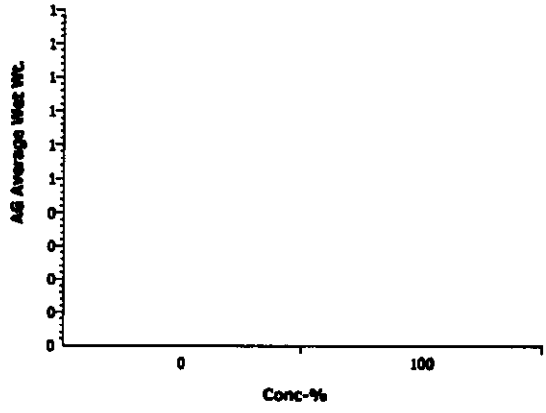
ANOVA Assumptions

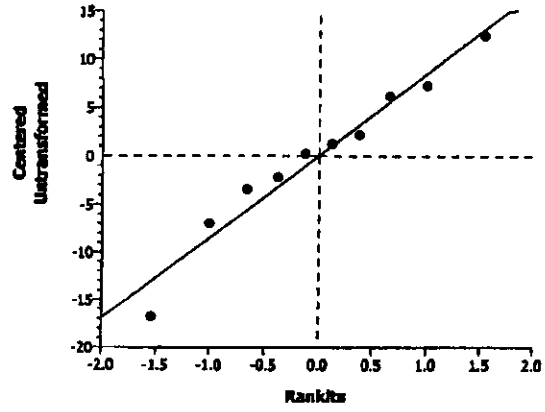
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.73128	23.15450	0.60796	Equal Variances
Distribution	Shapiro-Wilk W	0.96823		0.87396	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	29.605	12.833	36.826	9.717				
100		5	27.831	20.878	40.21	7.385				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	02-4923-3771	02-4923-3771	15 May-06 1:51 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	35.48%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.7592	1.85955	0.7652	0.57382	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1372013	0.137201	1	0.58	0.46952	Non-Significant Effect
Error	1.904404	0.238051	8			
Total	2.04160514	0.3752518	9			

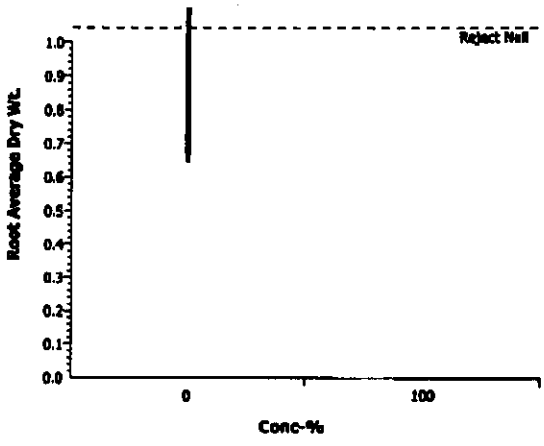
ANOVA Assumptions

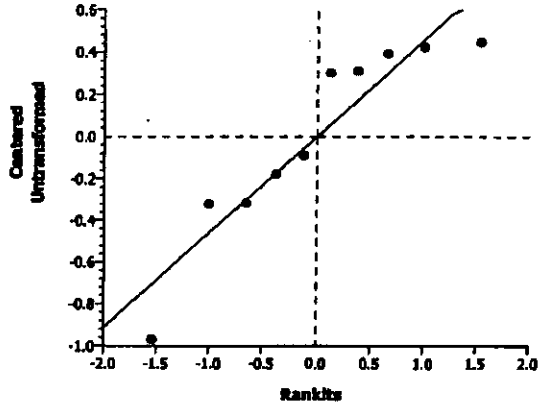
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.35752	23.15450	0.42657	Equal Variances
Distribution	Shapiro-Wilk W	0.86708		0.09240	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.57819				
100		5	1.85146	1.53000	2.27400	0.37657				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	02-4923-3771	02-4923-3771	15 May-06 1:51 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	24.73%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.16446	1.85955	0.0067	5.24954	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	199.5111	199.5111	1	10.01	0.01331	Significant Effect
Error	159.3884	19.92356	8			
Total	358.899551	219.43466	9			

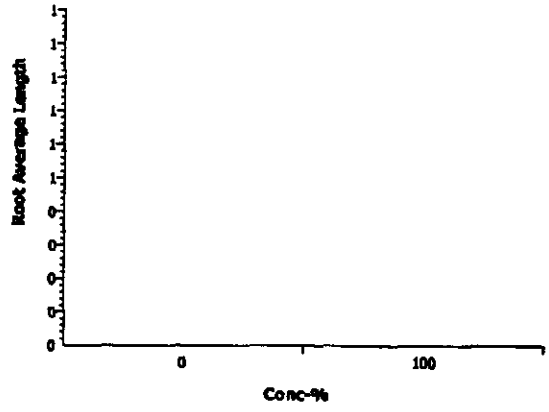
ANOVA Assumptions

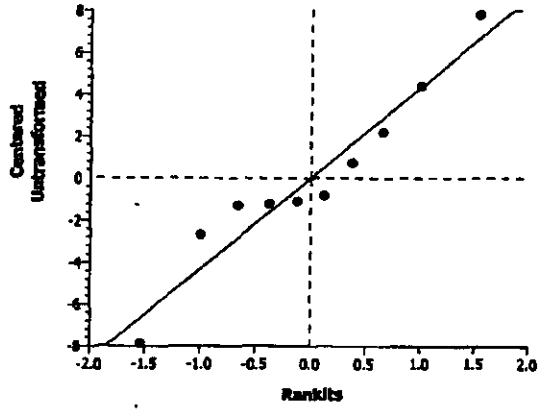
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.35804	23.15450	0.18299	Equal Variances
Distribution	Shapiro-Wilk W	0.94982		0.66638	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.227	13.333	29	5.693				
100		5	12.293	9.6	16.667	2.7271				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	02-4923-3771	02-4923-3771	15 May-06 1:51 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	40.92%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.38989	1.85955	0.3534	15.0911	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	25.0295	25.0295	1	0.15	0.70679	Non-Significant Effect
Error	1317.221	164.6527	8			
Total	1342.25081	189.68216	9			

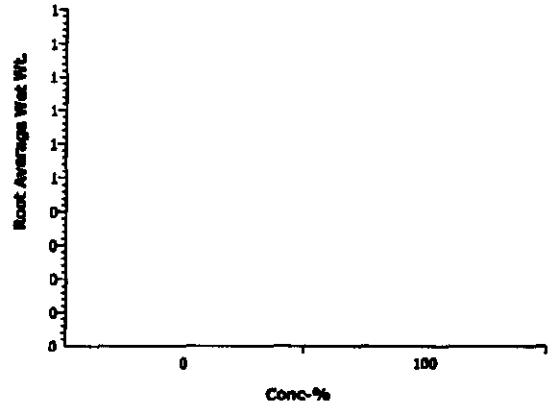
ANOVA Assumptions

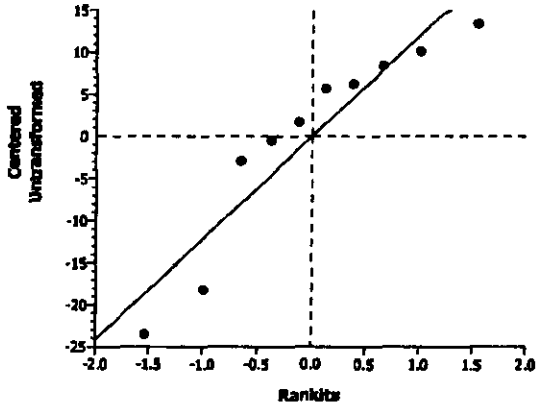
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.36097	23.15450	0.77245	Equal Variances
Distribution	Shapiro-Wilk W	0.87175		0.10478	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.878	13.317	46.99	13.778				
100		5	33.714	15.53	47.044	11.810				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	02-4923-3771	02-4923-3771	15 May-06 1:51 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	29.78%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.99861	1.85955	0.1736	1.95875	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.766133	2.766133	1	1.00	0.34723	Non-Significant Effect
Error	22.19074	2.773843	8			
Total	24.9568751	5.5399754	9			

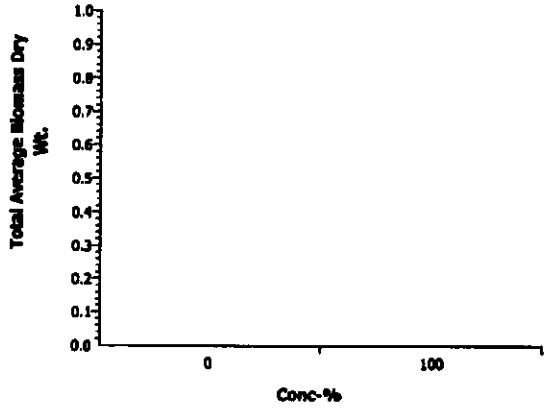
ANOVA Assumptions

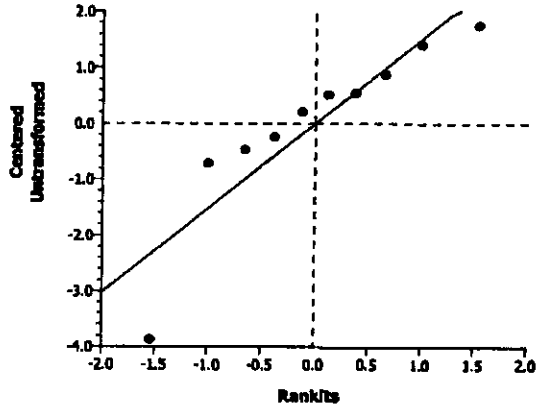
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	11.00706	23.15450	0.03931	Equal Variances
Distribution	Shapiro-Wilk W	0.84038		0.04459	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	2.25514				
100		5	5.52573	4.81399	6.40199	0.67973				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	02-4923-3771	02-4923-3771	15 May-06 1:51 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	30.99%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.44572	1.85955	0.3338	20.6046	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	60.97949	60.97949	1	0.20	0.66761	Non-Significant Effect
Error	2455.527	306.9409	8			
Total	2516.50683	367.92041	9			

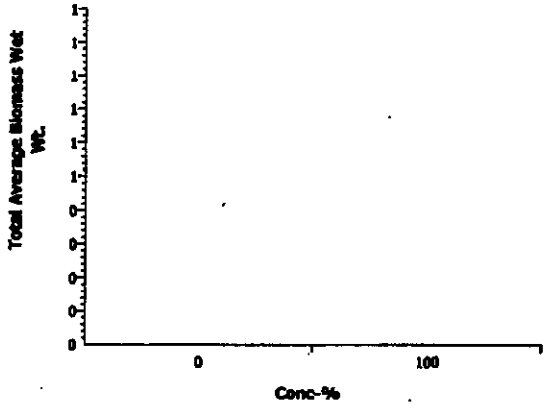
ANOVA Assumptions

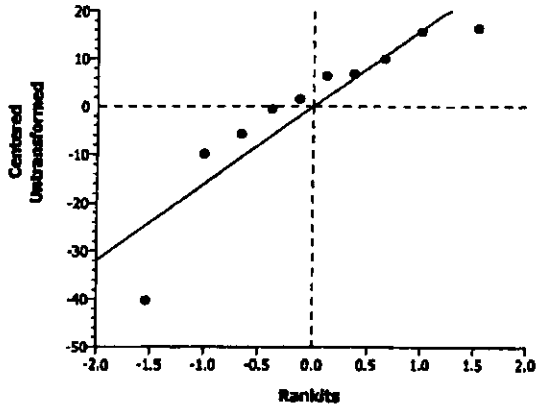
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.06740	23.15450	0.06761	Equal Variances
Distribution	Shapiro-Wilk W	0.83722		0.04087	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	66.484	26.15	82.77	23.370				
100		5	61.545	51.644	71.45	8.2281				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 [illegible] Day 14 NJ Day 16 [illegible] Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 33 [illegible]

Bioassay Lab ID: BG 1566-02 Sample No: J11JB7

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH INITIAL (@ planting)	pH FINAL (@ 14 days Post-Emergence)
Control	A	6	7	7	7	7	7	7→5	5	6.2	7.6
	B	4	5	6	5	5	9	5	5		
	C	2	4	4	7	8	9	9→5	5		
	D	8	8	9	10	11	11*	10→5	5		
	E	6	6	6	6	6	6	6→5	5		

* 10 Bluegrass + 1 broadleaf

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

Replicate A: 5 Lg G — removed: 1 med G, 1 med w/brown, broadleaf seedling

Replicate B: 5 Lg G — removed: broadleaf

Replicate C: 2 Lg G, 2 med G, 1 sm G — removed: 4 sm G, broadleaf

Replicate D: 5 Lg G — removed: 2 Lg G, 3 med G, broadleaf

Replicate E: 5 Lg 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 G, 1 Lg G w/1B tip, 1 Lg G w/1B shoot

Replicate B: 2 Lg G, 2 Lg G w/1B tip each, 1 Md G w/1B shoot

Replicate C: 2 Md G, 1 Md G w/1B shoot, 2 Sm G

Replicate D: 1 Lg G, 2 Lg G w/1B tip each, 2 Lg G w/1B shoot each

Replicate E:

Measure Shoot Height: Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	69 mm	52 mm	61 mm	80 mm	58 mm
Replicate B	67 mm	58 mm	33 mm	43 mm	43 mm
Replicate C	40 mm	49 mm	15 mm	31 mm	52 mm
Replicate D	70 mm	56 mm	77 mm	59 mm	55 mm
Replicate E	81 mm	43 mm	49 mm	62 mm	39 mm

Measure Shoot Weight: Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt. (mg)	Dry Wt. (mg)
Replicate A	981.78	1094.1	1001.49
Replicate B	1034.81	1115.6	1047.85
Replicate C	996.47	~~1112.0~~ 1039.6	1003.22
Replicate D	988.56	1112.0	1008.62
Replicate E	988.94	1093.4	1006.12

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	~~54~~ 41 mm	79 mm	63 mm	64 mm	77 mm
Replicate B	55 mm	66 mm	79 mm	37 mm	79 mm
Replicate C	~~64~~ 32 mm	31 mm	52 mm	63 mm	47 mm
Replicate D	64 mm	67 mm	72 mm	59 mm	66 mm
Replicate E	54 mm	71 mm	73 mm	89 mm	35 mm

Measure Root Weight: Total mass of all roots from all seedlings

	Tin Tare Wt. (mg)	Wet Wt. (mg)	Dry Wt. (mg)
Replicate A	985.82	1169.3	995.24
Replicate B	1034.96	1144.4	1040.44
Replicate C	1001.76	1055.7	1005.03
Replicate D	1026.16	1235.0	1034.75
Replicate E	1016.36	~~1179~~ 1173.0	1023.77

Comments:

CETIS Test Summary

Report Date: 15 May-06 1:56 PM
Test Link: 05-4012-6287/BG156602ps

Plant Chronic test — CH2M Hill

Test No:	12-2756-8859	**Test Type:**	Plant Chronic test	**Duration:**	33d 0h
Start Date:	05 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	08 May-06	**DII Water:**		**Source:**	
Setup Date:	05 Apr-06 12:00 AM	**Brine:**			

Comments: BG1566-02

Sample No:	06-7557-8523	**Code:**	B1566-02	**Client:**	
Sample Date:	27 Mar-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	9d 0h	**Station:**			

Comments: J11JB7

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
07-3049-9835	% Germination	100	> 100	N/A	20.96%	Equal Variance t Two-Sample
01-6840-9449	AG Average Dry Wt.	< 100	100	N/A	33.96%	Equal Variance t Two-Sample
04-1817-3375	AG Average Height	< 100	100	N/A	23.91%	Equal Variance t Two-Sample
06-1778-4905	AG Average Wet Wt.	< 100	100	N/A	32.62%	Equal Variance t Two-Sample
10-9034-6985	Root Average Dry Wt.	100	> 100	N/A	39.19%	Equal Variance t Two-Sample
10-5846-0601	Root Average Length	< 100	100	N/A	23.34%	Equal Variance t Two-Sample
07-1319-0997	Root Average Wet Wt.	100	> 100	N/A	41.70%	Equal Variance t Two-Sample
06-9688-5993	Total Average Biomass Dry	100	> 100	N/A	34.99%	Equal Variance t Two-Sample
10-6936-9311	Total Average Biomass Wet	100	> 100	N/A	37.41%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 15 May-06 1:56 PM
Test Link: 05-4012-6287/BG156602ps

% 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%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	0.75679	1.69222	34.11%
100		5	3.06959	1.35000	4.01200	0.49767	1.11283	36.25%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.947	15.2	27	2.2136	4.9498	26.13%
100		5	10.76	7.4	13	1.0167	2.2733	21.13%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.826	4.3456	9.717	32.82%
100		5	18.574	8.6660	24.886	2.8451	6.3618	34.25%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.25857	0.57819	35.75%
100		5	1.36680	0.65400	1.88400	0.22198	0.49637	36.32%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.227	13.333	29	2.546	5.693	26.82%
100		5	12.12	9	13.2	0.7864	1.7584	14.51%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.878	13.317	46.99	6.1616	13.778	37.36%
100		5	28.494	10.788	41.768	5.5165	12.335	43.29%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	1.00853	2.25514	34.29%
100		5	4.43639	2.00400	5.82599	0.71726	1.60385	36.15%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.484	26.150	82.77	10.452	23.370	35.15%
100		5	47.067	19.454	66.456	8.3444	18.659	39.64%

CETIS Test Summary

Report Date: 15 May-06 1:56 PM
Test Link: 05-4012-6287/BG156602ps

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.60000	1.00000	1.00000	0.60000	1.00000
100		1.00000	1.00000	1.00000	1.00000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.05668	6.05200	5.26000	6.26333	5.17000
100		3.94199	2.60798	1.35000	4.01200	3.43600

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.3333	16.8	15.2	27	15.4
100		13	9.8	7.4	12.6	11

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	12.8333	36.8260	31.748	35.78	30.84
100		22.464	16.158	8.66602	24.688	20.8920

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.64667	1.92800	1.52800	2.06331	1.92001
100		1.88400	1.09600	0.65400	1.71799	1.48201

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3333	23.4	20	29	20.4
100		13	12.6	9	13.2	12.8

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3167	45.2540	36.3420	46.99	42.488
100		36.6960	21.8880	10.788	41.768	31.3280

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.70335	7.98000	6.78801	8.32666	7.09000
100		5.82599	3.70398	2.00400	5.73000	4.91799

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	26.1500	82.0800	68.0900	82.77	73.328
100		59.16	38.046	19.4540	66.456	52.22

CETIS Analysis Detail

Plant Chronic test — CH2M HILL

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	05-4012-6287	05-4012-6287	15 May-06 1:55 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			

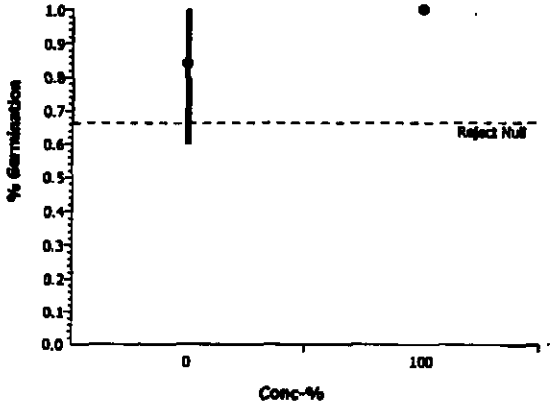
ANOVA Assumptions

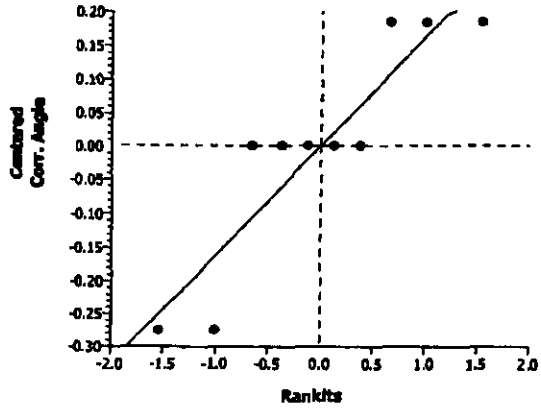
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	4.80000	11.25862	0.05984	Equal Variances
Distribution	Shapiro-Wilk W	0.81415		0.02153	Normal Distribution

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	05-4012-6287	05-4012-6287	15 May-06 1:55 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	33.96%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.08754	1.85955	0.0351	1.68430	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	8.937865	8.937865	1	4.36	0.07029	Non-Significant Effect
Error	16.40803	2.051004	8			
Total	25.3458948	10.988869	9			

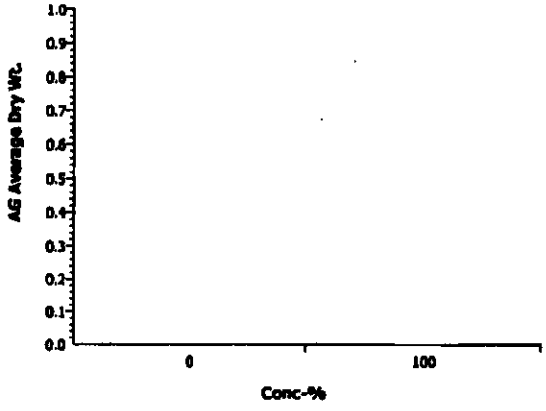
ANOVA Assumptions

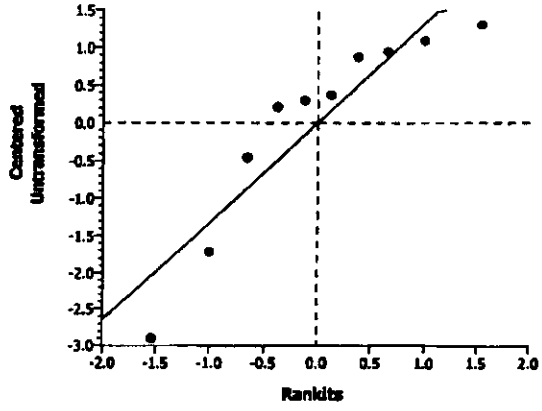
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.31238	23.15450	0.43679	Equal Variances
Distribution	Shapiro-Wilk W	0.84486		0.05044	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	1.69222				
100		5	3.06959	1.35000	4.01200	1.11283				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	05-4012-6287	05-4012-6287	15 May-06 1:55 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	3.36079	1.85955	0.0050	4.52974	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	167.5538	167.5538	1	11.29	0.00992	Significant Effect
Error	118.6756	14.83444	8			
Total	286.229324	182.38822	9			

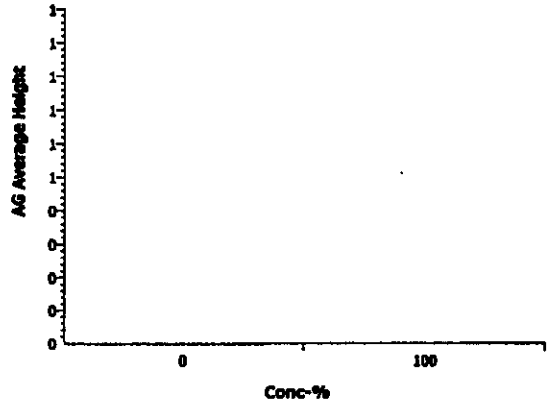
ANOVA Assumptions

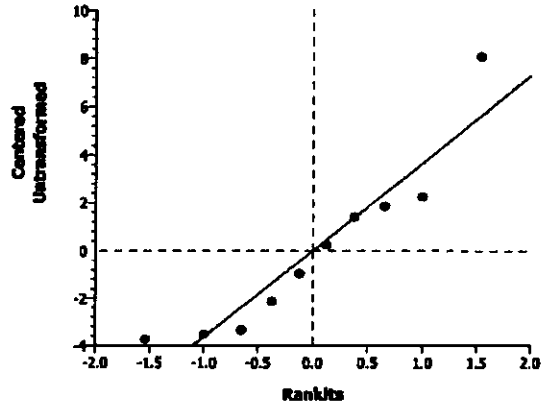
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.74088	23.15450	0.16091	Equal Variances
Distribution	Shapiro-Wilk W	0.88876		0.16420	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.947	15.2	27	4.9498				
100		5	10.760	7.4	13	2.2733				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	05-4012-6287	05-4012-6287	15 May-06 1:55 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	32.62%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.12393	1.85955	0.0332	9.65866	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	304.255	304.255	1	4.51	0.06642	Non-Significant Effect
Error	539.5712	67.4464	8			
Total	843.826233	371.70141	9			

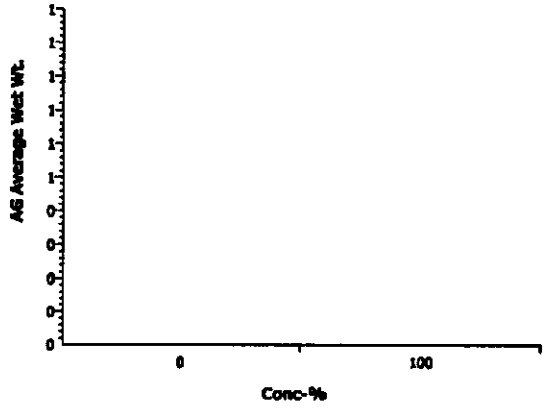
ANOVA Assumptions

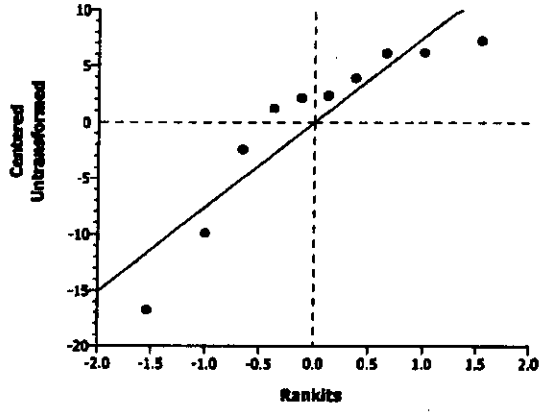
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.33292	23.15450	0.43209	Equal Variances
Distribution	Shapiro-Wilk W	0.83430		0.03769	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	29.605	12.833	36.826	9.717				
100		5	18.574	8.6660	24.688	6.3618				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	05-4012-6287	05-4012-6287	15 May-06 1:55 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	39.19%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.73477	1.85955	0.2417	0.63371	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1567499	0.15675	1	0.54	0.48346	Non-Significant Effect
Error	2.322712	0.290339	8			
Total	2.47946206	0.4470889	9			

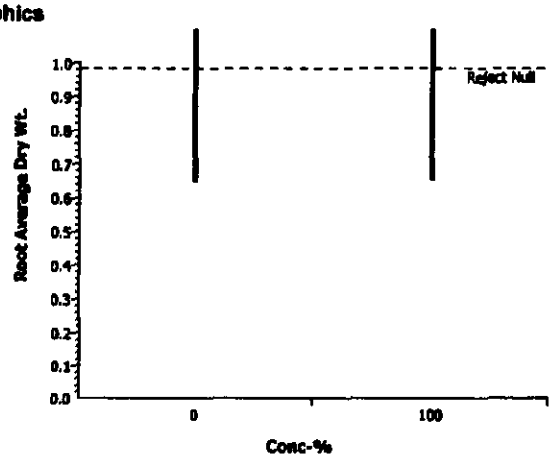
ANOVA Assumptions

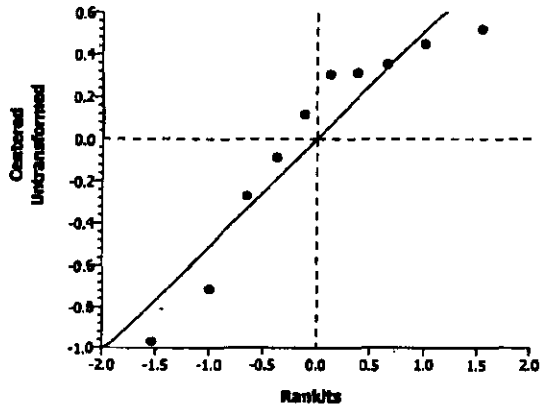
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.35685	23.15450	0.77462	Equal Variances
Distribution	Shapiro-Wilk W	0.87393		0.11105	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.57819				
100		5	1.36680	0.65400	1.88400	0.49637				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	05-4012-6287	05-4012-6287	15 May-06 1:56 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	23.34%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.41756	1.85955	0.0046	4.95507	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	207.3284	207.3284	1	11.68	0.00912	Significant Effect
Error	142.0089	17.75111	8			
Total	349.337341	225.07956	9			

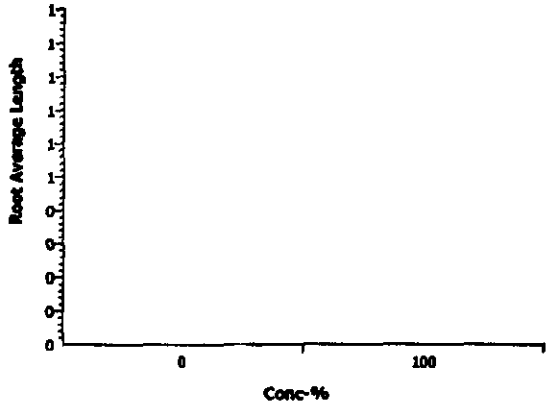
ANOVA Assumptions

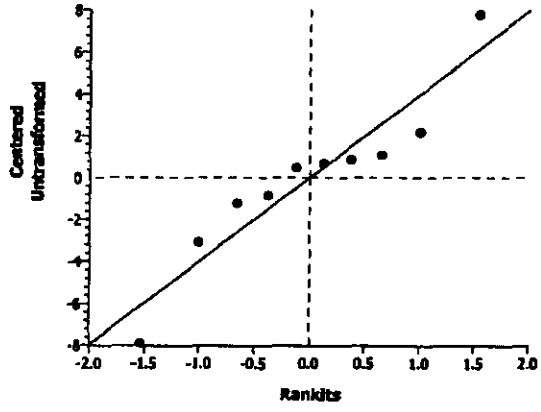
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.48196	23.15450	0.04287	Equal Variances
Distribution	Shapiro-Wilk W	0.92184		0.37254	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.227	13.333	29	5.693				
100		5	12.120	9	13.2	1.7584				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	05-4012-6287	05-4012-6287	15 May-06 1:56 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	41.70%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.01382	1.85955	0.1702	15.379	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	175.7511	175.7511	1	1.03	0.34035	Non-Significant Effect
Error	1367.951	170.9939	8			
Total	1543.70190	346.74495	9			

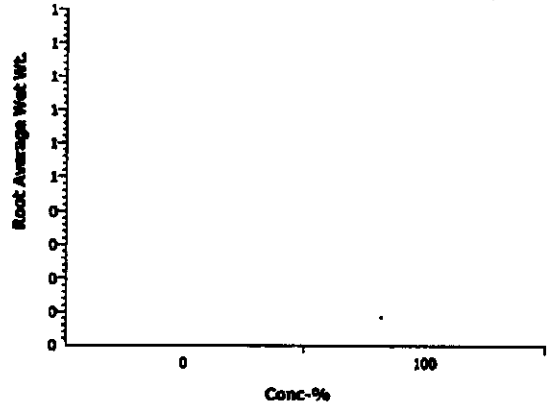
ANOVA Assumptions

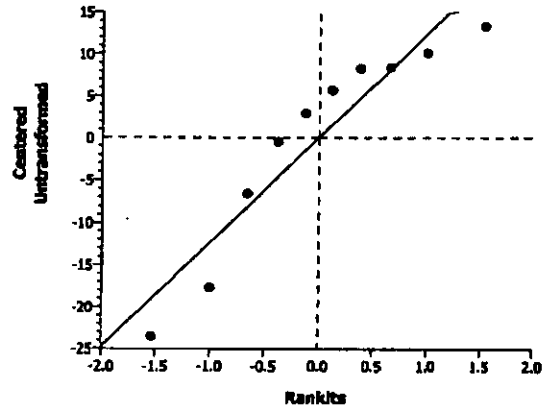
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.24753	23.15450	0.83546	Equal Variances
Distribution	Shapiro-Wilk W	0.87920		0.12775	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.878	13.317	46.99	13.778				
100		5	28.494	10.788	41.768	12.335				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	05-4012-6287	05-4012-6287	15 May-06 1:56 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	34.99%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	1.73017	1.85955	0.0609	2.30133	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	11.46197	11.46197	1	2.99	0.12185	Non-Significant Effect
Error	30.6319	3.828987	8			
Total	42.0938644	15.290956	9			

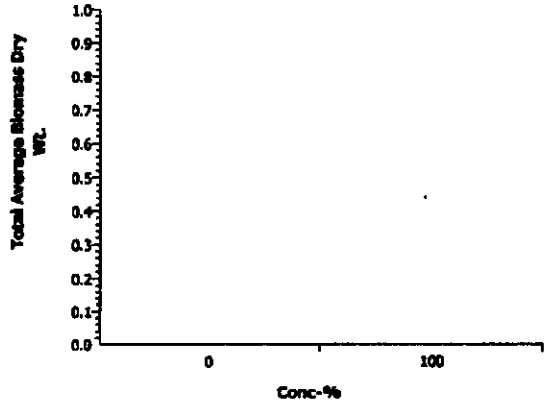
ANOVA Assumptions

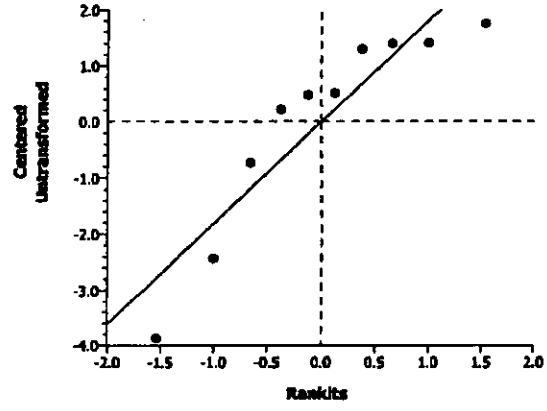
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.97707	23.15450	0.52538	Equal Variances
Distribution	Shapiro-Wilk W	0.84141		0.04587	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	2.25514				
100		5	4.43639	2.00400	5.82599	1.60385				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	05-4012-6287	05-4012-6287	15 May-06 1:56 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	37.41%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.4518	1.85955	0.0923	24.8697	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	942.4918	942.4918	1	2.11	0.18462	Non-Significant Effect
Error	3577.302	447.1627	8			
Total	4519.79327	1389.6544	9			

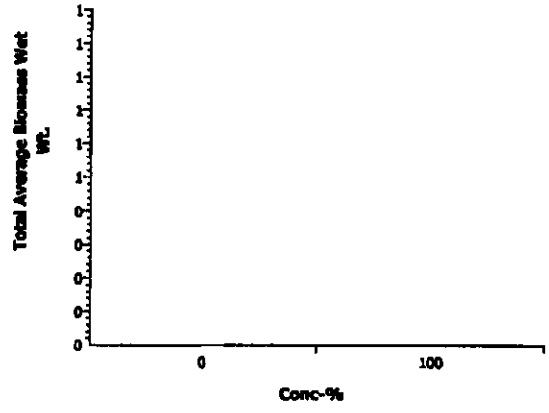
ANOVA Assumptions

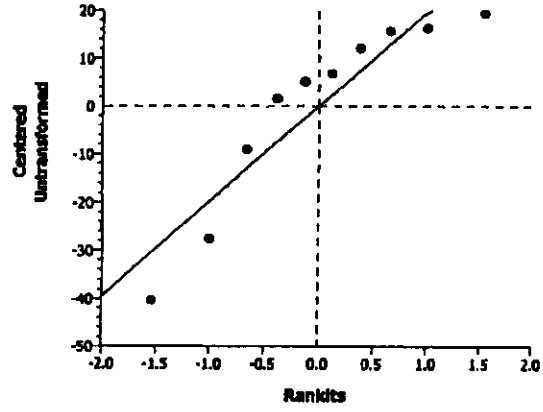
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.56883	23.15450	0.67328	Equal Variances
Distribution	Shapiro-Wilk W	0.85602		0.06847	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	66.484	26.15	82.77	23.370				
100		5	47.067	19.454	66.456	18.659				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 Bm Day 15 NJ Day 18 [illegible] Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 Bm Day 33 BM

Bioassay Lab ID: BM06 1566-03 Sample No: 5IIJH5

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	4	6	6	6	6	6	6→5	5	6.3	7.4
	B	4	5	5	7	6	6	7→5	5		
	C	7	10	10	11	12	12	11→5	5		
	D	1	1	1	1	1	1	1	1		
	E	3	3	4	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 Lg G; removed: 1 Lg G

Replicate B: 1 Lg G, 3 Md G, 1 Sm G; removed: 2 Sm G

Replicate C: 4 Lg G, 1 Md G; removed: 2 Md G, 4 Sm G + 1 non-bluegrass seedling

Replicate D: 1 Lg G

Replicate E: 2 Lg G, 2 Md 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, 1 Lg G w/ 1 B shoot, 2 Md G

Replicate B: 2 Lg G w/ 1 B tip each, 2 Md G, 1 Sm G

Replicate C: 4 Lg G, 1 Md G w/ 1 B tip

Replicate D: 1 Lg w/ 2 B tips

Replicate E: 2 Lg G, 1 Md G, 1 Md 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	49 mm	51 mm	77 mm	51 mm	87 mm
Replicate B	67 mm	68 mm	34 mm	47 mm	59 mm
Replicate C	90 mm	85 mm	56 mm	97 mm	38 mm
Replicate D	83 mm	mm	mm	mm	mm
Replicate E	86 mm	67 mm	45 mm	26 mm	41 mm

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1033.26	1133.8	1049.56
Replicate B	995.50	1051.3	1006.14
Replicate C	989.87	1132.0	1014.38
Replicate D	980.24	1023.3	988.75
Replicate E	973.52	1030.4	985.73

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	67 mm	49 mm	48 mm	68 mm	63 mm
Replicate B	10 mm	60 mm	51 mm	46 mm	40 mm
Replicate C	52 mm	63 mm	83 mm	66 mm	78 mm
Replicate D	73 mm	mm	mm	mm	mm
Replicate E	19 mm	63 mm	16 mm	31 mm	107 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1016.26	1121.9	1022.22
Replicate B	1000.48	1058.2	1005.22
Replicate C	996.43	1199.2	1013.65
Replicate D	997.30	1067.9	1000.75
Replicate E	995.90	1088.7	1001.64

Comments:

CETIS Test Summary

Report Date: 15 May-06 2:01 PM
Test Link: 11-7211-8663/BG156603ps

Plant Chronic test — **CH2M Hill**

Test No:	06-9018-7681	**Test Type:**	Plant Chronic test	**Duration:**	33d 0h
Start Date:	05 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	08 May-06	**Dil Water:**		**Source:**	
Setup Date:	05 Apr-06 12:00 AM	**Brine:**			
Comments:	BG1566-03				

Sample No:	03-3130-8104	**Code:**	B1566-03	**Client:**	
Sample Date:	30 Mar-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	6d 0h	**Station:**			
Comments:	J11JH5				

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
15-4902-9508	% Germination	100	> 100	N/A	41.99%	Wilcoxon Rank Sum Two-Sample
03-4255-8269	AG Average Dry Wt.	100	> 100	N/A	52.20%	Equal Variance t Two-Sample
18-2999-4225	AG Average Height	100	> 100	N/A	142.17%	Wilcoxon Rank Sum Two-Sample
14-3415-6893	AG Average Wet Wt.	100	> 100	N/A	44.73%	Equal Variance t Two-Sample
09-0554-6174	Root Average Dry Wt.	100	> 100	N/A	72.74%	Equal Variance t Two-Sample
15-4360-3201	Root Average Length	100	> 100	N/A	111.63%	Wilcoxon Rank Sum Two-Sample
07-7960-4753	Root Average Wet Wt.	100	> 100	N/A	62.15%	Equal Variance t Two-Sample
04-4976-7362	Total Average Biomass Dry	100	> 100	N/A	55.73%	Equal Variance t Two-Sample
01-2756-4511	Total Average Biomass Wet	100	> 100	N/A	54.13%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 15 May-06 2:01 PM
Test Link: 11-7211-8663/BG156603ps

% 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	0.20000	1.00000	0.16000	0.35777	42.59%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.96040	2.05668	8.26333	0.75679	1.69222	34.11%
100		5	4.24840	2.12800	8.51001	1.16886	2.61365	61.52%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.947	15.2	27	2.2136	4.9498	26.13%
100		5	25.88	8.6	83	14.315	32.009	123.68

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.826	4.3456	9.717	32.82%
100		5	23.626	11.160	43.06	5.6416	12.615	53.39%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.25857	0.57819	35.75%
100		5	2.03640	0.94800	3.45001	0.57735	1.29098	63.40%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.227	13.333	29	2.546	5.693	26.82%
100		5	23.2	8.2	73	12.485	27.918	120.34

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.878	13.317	46.99	6.1616	13.778	37.36%
100		5	32.477	11.544	70.600	10.675	23.871	73.50%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.5776	2.7033	8.3267	1.0085	2.2551	34.29%
100		5	6.2848	3.0780	11.960	1.6937	3.7873	60.26%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.484	26.150	82.77	10.452	23.370	35.15%
100		5	56.103	22.704	113.66	16.289	36.423	64.92%

CETIS Test Summary

Report Date: 15 May-06 2:01 PM
Test Link: 11-7211-8863/BG156603ps

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.60000	1.00000	1.00000	0.60000	1.00000
100		1.00000	1.00000	1.00000	0.20000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.05668	6.05200	5.26000	6.26333	5.17000
100		3.26001	2.12800	4.90200	8.51001	2.44199

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.3333	16.8	15.2	27	15.4
100		12.6	8.6	14.6	83	10.6

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	12.8333	36.8260	31.748	35.78	30.84
100		20.1080	11.1600	28.4260	43.06	15.3760

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.64667	1.92800	1.52800	2.06331	1.92001
100		1.19199	0.94800	3.44401	3.45001	1.14800

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3333	23.4	20	29	20.4
100		11.8	8.2	13.6	73	9.4

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3167	45.2540	36.3420	46.99	42.488
100		21.1280	11.544	40.564	70.6000	18.56

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.70335	7.98000	6.78801	8.32666	7.09000
100		4.45200	3.07600	8.34601	11.9600	3.58999

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	26.1500	82.0800	68.0900	82.77	73.328
100		41.2360	22.7040	68.98	113.66	33.936

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	11-7211-8663	11-7211-8663	15 May-06 2:01 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	41.99%

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	0.0001352	0.000135	1	0.00	0.97281	Non-Significant Effect
Error	0.8748686	0.109359	8			
Total	0.87500388	0.1094938	9			

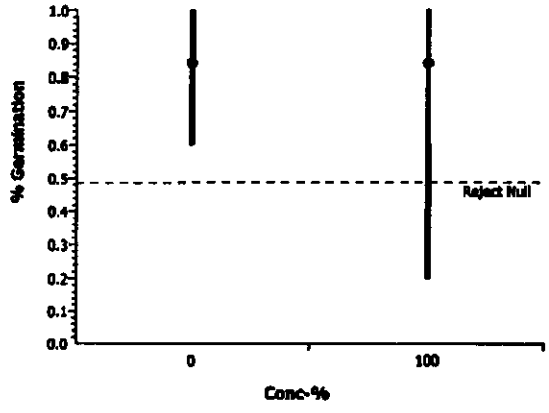
ANOVA Assumptions

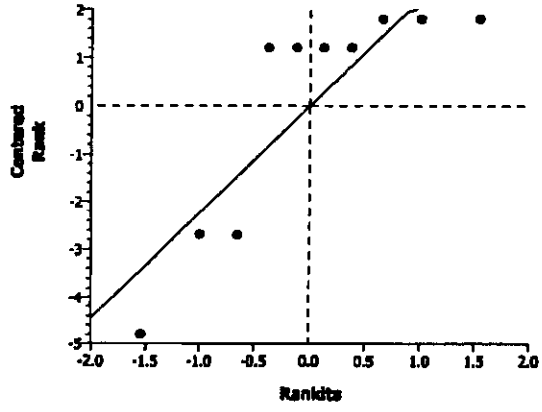
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.45738	23.15450	0.40516	Equal Variances
Distribution	Shapiro-Wilk W	0.65938		0.00028	Non-normal Distribution

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	5.20000	2.50000	7.00000	2.46475
100		5	0.84000	0.20000	1.00000	0.35777	5.80000	1.00000	7.00000	2.68328

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Dry Wt.	Comparison	11-7211-8663	11-7211-8663	15 May-06 2:01 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	52.20%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.51132	1.85955	0.3115	2.58935	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.26735	1.26735	1	0.26	0.62294	Non-Significant Effect
Error	38.7791	4.847388	8			
Total	40.0464520	6.1147375	9			

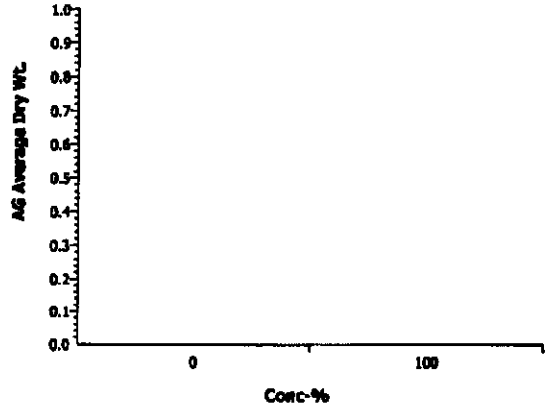
ANOVA Assumptions

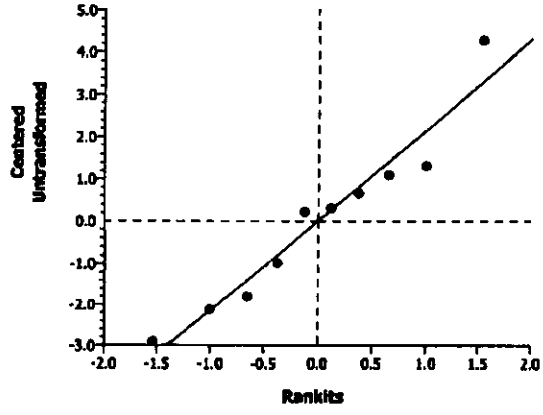
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.38550	23.15450	0.42040	Equal Variances
Distribution	Shapiro-Wilk W	0.94807		0.64572	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	1.69222				
100		5	4.24840	2.12800	8.51001	2.61365				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	11-7211-8663	11-7211-8663	15 May-06 2:01 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	142.17%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	20		0.0754	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	120.1778	120.1778	1	0.23	0.64499	Non-Significant Effect
Error	4196.372	524.5464	8			
Total	4316.54936	644.72423	9			

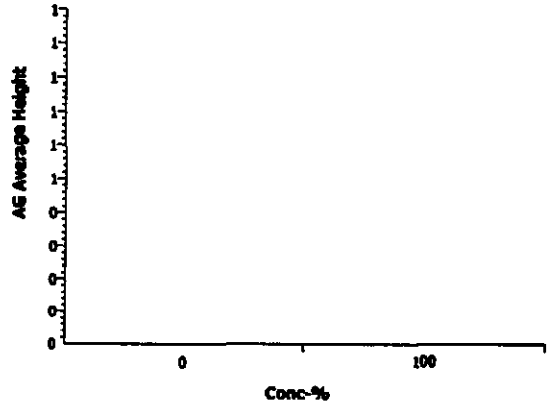
ANOVA Assumptions

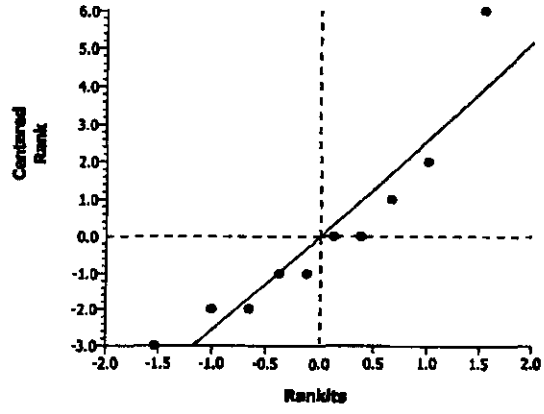
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	41.81857	23.15450	0.00322	Unequal Variances
Distribution	Shapiro-Wilk W	0.71129		0.00121	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.947	15.2	27	4.9498	7.00000	5.00000	9.00000	1.58114
100		5	25.880	8.6	83	32.009	4.00000	1.00000	10.0000	3.53553

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	11-7211-8663	11-7211-8663	15 May-06 2:01 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	44.73%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.83967	1.85955	0.2127	13.2423	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	89.38481	89.38481	1	0.71	0.42548	Non-Significant Effect
Error	1014.24	126.78	8			
Total	1103.6245	216.16477	9			

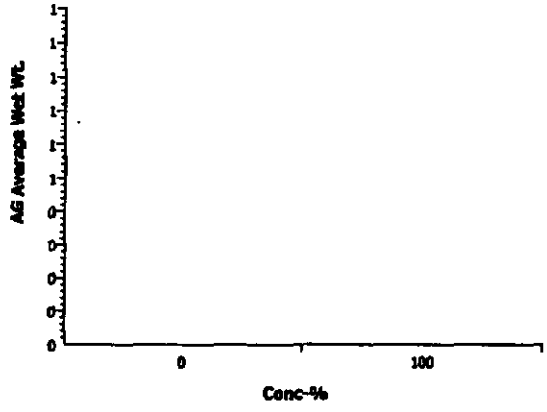
ANOVA Assumptions

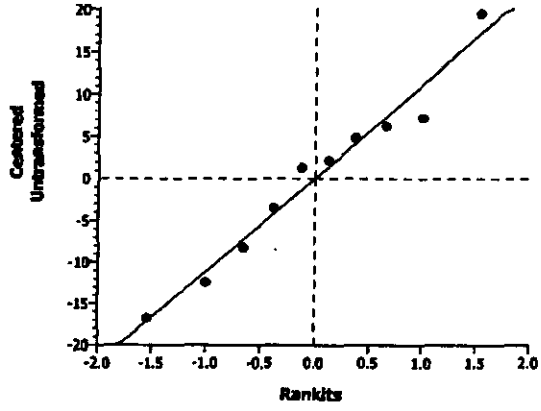
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.68545	23.15450	0.62545	Equal Variances
Distribution	Shapiro-Wilk W	0.97199		0.90865	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	29.605	12.833	36.826	9.717				
100		5	23.626	11.160	43.06	12.615				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Dry Wt.	Comparison	11-7211-8663	11-7211-8663	15 May-06 2:01 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	72.74%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.6627	1.85955	0.7369	1.17636	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.4393268	0.439327	1	0.44	0.52617	Non-Significant Effect
Error	8.003755	1.000469	8			
Total	8.44308144	1.4397961	9			

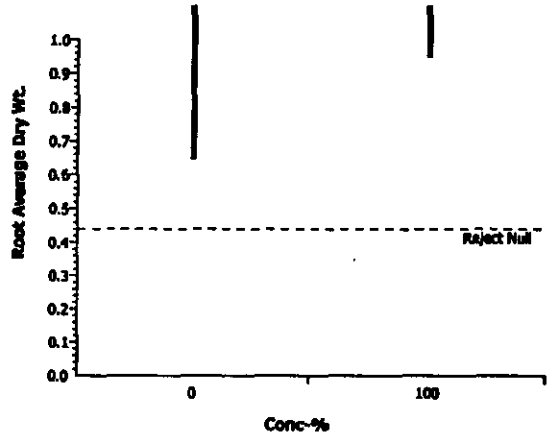
ANOVA Assumptions

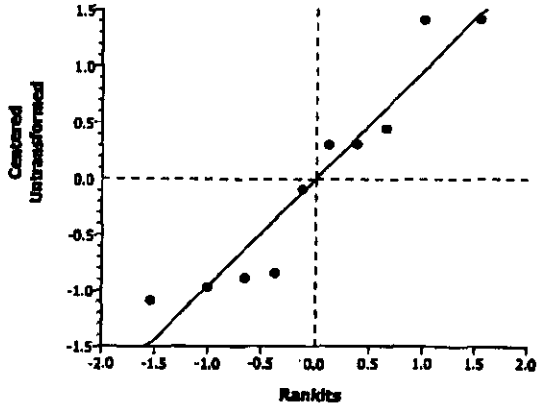
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.98547	23.15450	0.14882	Equal Variances
Distribution	Shapiro-Wilk W	0.88498		0.14871	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.57819				
100		5	2.03640	0.94800	3.45001	1.29098				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M HILL

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	11-7211-6663	11-7211-6663	15 May-06 2:01 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	111.63%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	21		0.1111	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	9.735111	9.735111	1	0.02	0.88076	Non-Significant Effect
Error	3247.241	405.9051	8			
Total	3256.97608	415.64023	9			

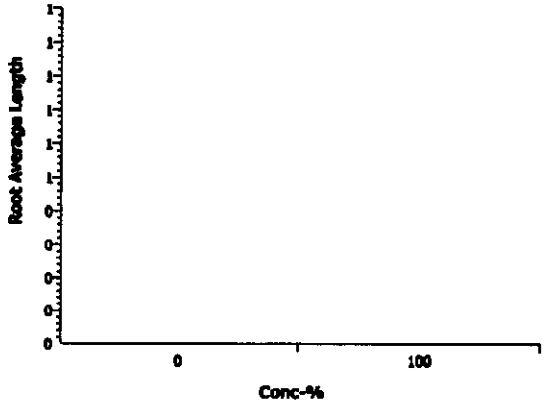
ANOVA Assumptions

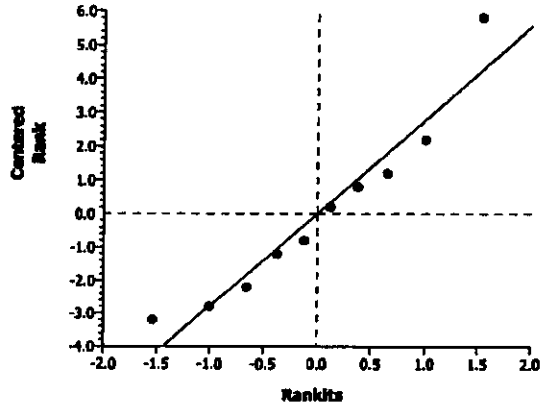
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	24.04797	23.15450	0.00931	Unequal Variances
Distribution	Shapiro-Wilk W	0.72521		0.00178	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.227	13.333	29	5.693	6.80000	4.00000	9.00000	1.92354
100		5	23.2	8.2	73	27.918	4.20000	1.00000	10.0000	3.56371

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	11-7211-8663	11-7211-8663	15 May-06 2:01 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	62.15%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.35705	1.85955	0.3651	22.9207	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	48.42056	48.42056	1	0.13	0.73029	Non-Significant Effect
Error	3038.583	379.8229	8			
Total	3087.00356	428.24343	9			

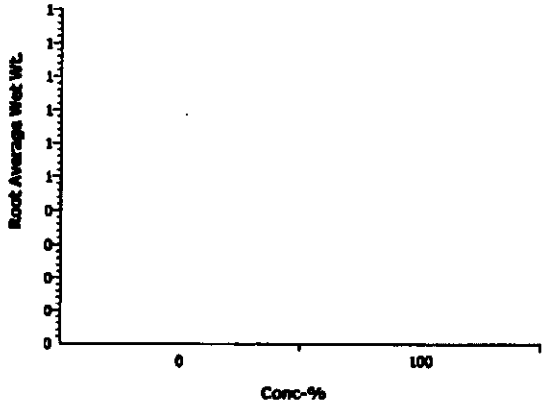
ANOVA Assumptions

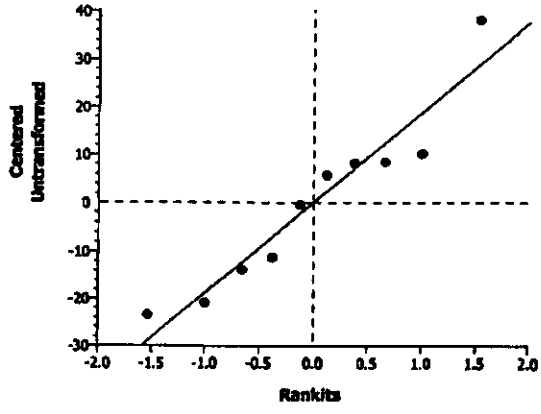
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.00179	23.15450	0.31225	Equal Variances
Distribution	Shapiro-Wilk W	0.92487		0.39940	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.878	13.317	46.99	13.778				
100		5	32.477	11.544	70.600	23.871				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	11-7211-8663	11-7211-8663	15 May-06 2:01 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	55.73%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	0.14854	1.85955	0.4428	3.66564	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.2143312	0.214331	1	0.02	0.88560	Non-Significant Effect
Error	77.71687	9.714608	8			
Total	77.9311967	9.9289394	9			

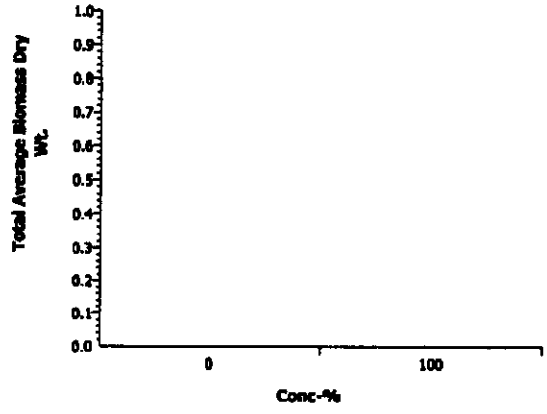
ANOVA Assumptions

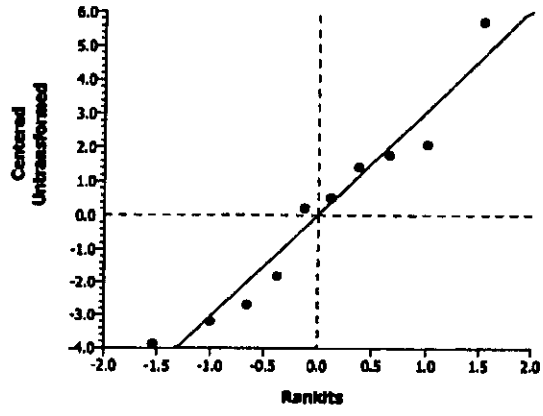
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.82040	23.15450	0.33935	Equal Variances
Distribution	Shapiro-Wilk W	0.94597		0.62111	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	2.25514				
100		5	6.28480	3.07600	11.9600	3.78729				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Total Average Biomass Wet Wt.	Comparison	11-7211-8663	11-7211-8663	15 May-06 2:01 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	54.13%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.53636	1.85955	0.3032	35.989	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	269.3819	269.3819	1	0.29	0.60630	Non-Significant Effect
Error	7491.238	936.4048	8			
Total	7760.62021	1205.7867	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.42893	23.15450	0.41109	Equal Variances
Distribution	Shapiro-Wilk W	0.94578		0.63064	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	66.484	26.15	82.77	23.370				
100		5	56.103	22.704	113.66	36.423				

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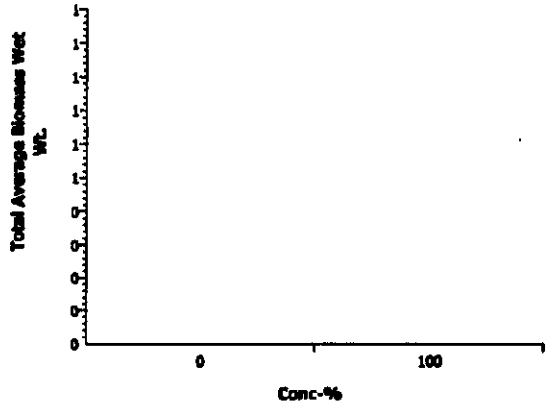
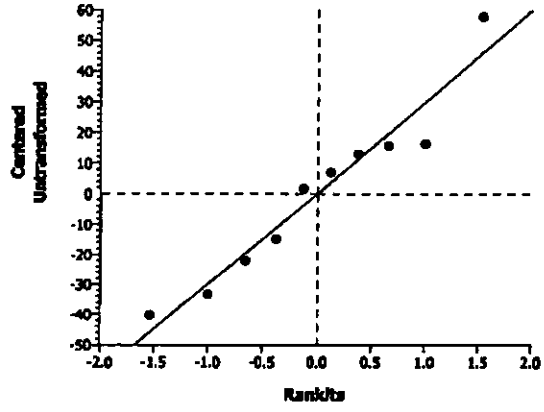




BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 _____ Day 15 NJ Day 16 [illegible] Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 33 [illegible]

Bioassay Lab ID: PNL 061506-04 Sample No: JHJH8

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	4	6	6	7	7	7	7→5	5	6.3	7.7
	B	2	4	4	6	7	7	6→5	5		
	C	5	7	7	7	7	7	7→5	5		
	D	6	6	6	6	6	6	6→5	5		
	E	7	8	9	9	10	10	10→5	5		

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

Replicate A: 5 Lg G, 1 mb 1 Sm G removed

Replicate B: 1 Lg G, 4 med G, 1 Sm G removed

Replicate C: 5 Lg G, Removed: 2 med G

Replicate D: 3 Lg G, 2 mb G Removed: 1 mb G

Replicate E: 5 Lg G Removed: 1 Lg, 3 mb, 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: 4 Lg G, 1 Lg G w/ 1 B tip

Replicate B: 1 Lg G, 2 mb G, 1 Sm G, 1 Sm G w/ 1 B shoot

Replicate C: 3 Lg G, 2 Lg G w/ 1 B tip each

Replicate D: 1 Lg G, 2 Lg G w/ 1 B tip each, 2 Sm - 1 G / 1 G w/ 2 B shoots

Replicate E: 4 Lg G, 1 Lg G w/ 1 B tip

Measure Shoot Height: Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	64 mm	74 mm	55 mm	64 mm	55 mm
Replicate B	55 mm	83 mm	24 mm	44 mm	24 mm
Replicate C	95 mm	74 mm	53 mm	74 mm	74 mm
Replicate D	95 mm	60 mm	78 mm	53 mm	32 mm
Replicate E	100 mm	90 mm	72 mm	75 mm	68 mm

Measure Shoot Weight: Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1019.94	1139.6	1040.64
Replicate B	1010.34	1062.1	~~1016.20~~ NJ 1016.20
Replicate C	1010.95	1160.5	1034.42
Replicate D	985.24	1112.5	1006.14
Replicate E	992.61	1166.4	1020.46

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	47 mm	67 mm	65 mm	67 mm	41 mm
Replicate B	13 mm	25 mm	28 mm	53 mm	52 mm
Replicate C	67 mm	56 mm	68 mm	49 mm	55 mm
Replicate D	52 mm	24 mm	74 mm	42 mm	82 mm
Replicate E	71 mm	64 mm	58 mm	58 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	1000.61	1164.2	1008.50
Replicate B	1020.23	1042.8	1021.95
Replicate C	1025.29	1223.0	1034.51
Replicate D	1010.78	1153.6	1018.08
Replicate E	~~1004~~ NJ 1039.98	1284.4	1054.10

Comments:

CETIS Test Summary

Report Date: 15 May-06 2:09 PM
Test Link: 09-5382-7322/BG156604ps

Plant Chronic test — **CH2M Hill**

Test No:	20-3747-5618	**Test Type:**	Plant Chronic test	**Duration:**	33d 0h
Start Date:	05 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	08 May-06	**Dil Water:**		**Source:**	
Setup Date:	05 Apr-06 12:00 AM	**Brine:**			

Comments: BG1566-04

Sample No:	11-8681-3426	**Code:**	B1566-04	**Client:**	
Sample Date:	04 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	24h	**Station:**			

Comments: J11JH6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
10-4296-6091	% Germination	100	> 100	N/A	20.96%	Equal Variance t Two-Sample
06-5675-2370	AG Average Dry Wt.	100	> 100	N/A	39.71%	Wilcoxon Rank Sum Two-Sample
18-8985-8305	AG Average Height	< 100	100	N/A	24.83%	Equal Variance t Two-Sample
09-3523-9846	AG Average Wet Wt.	100	> 100	N/A	37.50%	Equal Variance t Two-Sample
11-7626-6043	Root Average Dry Wt.	100	> 100	N/A	54.49%	Equal Variance t Two-Sample
04-8151-0611	Root Average Length	< 100	100	N/A	24.22%	Equal Variance t Two-Sample
09-2915-6004	Root Average Wet Wt.	100	> 100	N/A	48.66%	Equal Variance t Two-Sample
14-6818-4113	Total Average Biomass Dry	100	> 100	N/A	42.74%	Equal Variance t Two-Sample
08-0482-5495	Total Average Biomass Wet	100	> 100	N/A	43.45%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 15 May-06 2:09 PM
Test Link: 09-5382-7322/BG158604ps

% 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%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.98040	2.05668	6.26333	0.75679	1.69222	34.11%
100		5	3.95120	1.17200	5.57001	0.74109	1.65713	41.94%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.947	15.2	27	2.2136	4.9498	26.13%
100		5	12.96	9.2	16.2	1.2254	2.7401	21.14%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.826	4.3456	9.717	32.82%
100		5	24.881	10.352	34.758	4.0937	9.1538	36.79%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.25857	0.57819	35.75%
100		5	1.61000	0.34401	2.82400	0.39717	0.88809	55.16%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.227	13.333	29	2.546	5.693	26.82%
100		5	11.16	7	13	1.0778	2.41	21.59%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.878	13.317	46.99	6.1616	13.778	37.36%
100		5	30.844	4.5140	48.884	7.4266	16.606	53.84%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	1.00853	2.25514	34.29%
100		5	5.56120	1.51602	8.39399	1.12635	2.51859	45.29%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.484	26.150	82.77	10.462	23.370	35.15%
100		5	55.725	14.866	83.642	11.491	25.695	46.11%

CETIS Test Summary

Report Date: 15 May-06 2:09 PM
Test Link: 09-5382-7322/BG156604ps

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.60000	1.00000	1.00000	0.60000	1.00000
100		1.00000	1.00000	1.00000	1.00000	1.00000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.05668	6.05200	5.26000	6.26333	5.17000
100		4.14000	1.17200	4.69401	4.18001	5.57001

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.3333	16.8	15.2	27	15.4
100		12.4	9.2	15	12	16.2

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	12.8333	36.8260	31.748	35.78	30.84
100		23.932	10.352	29.91	25.4520	34.7580

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.64667	1.92800	1.52800	2.06331	1.92001
100		1.57800	0.34401	1.84399	1.46000	2.82400

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3333	23.4	20	29	20.4
100		11.4	7	11.8	12.6	13

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3167	45.2540	36.3420	46.99	42.488
100		32.718	4.51401	39.542	28.564	48.8840

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.70335	7.98000	6.78801	8.32666	7.09000
100		5.71799	1.51602	6.53799	5.63999	8.39399

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	26.1500	82.0800	68.0900	82.77	73.328
100		56.65	14.8660	69.4520	54.016	83.6420

CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
% Germination	Comparison	09-5382-7322	09-5382-7322	15 May-06 2:08 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			

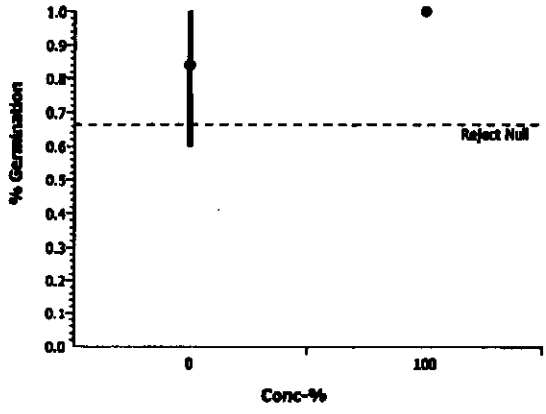
ANOVA Assumptions

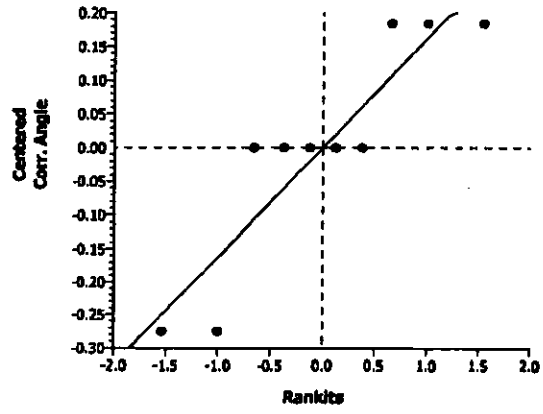
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	4.80000	11.25862	0.05984	Equal Variances
Distribution	Shapiro-Wilk W	0.81415		0.02153	Normal Distribution

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

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	09-5382-7322	09-5382-7322	15 May-06 2:08 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	39.71%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	21		0.1111	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.546196	2.546196	1	0.91	0.36860	Non-Significant Effect
Error	22.43875	2.804843	8			
Total	24.9849429	5.3510389	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.04281	23.15450	0.96857	Equal Variances
Distribution	Shapiro-Wilk W	0.78590		0.00977	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	4.96040	2.05668	6.26333	1.69222	6.80000	2.00000	10.0000	3.11448
100		5	3.95120	1.17200	5.57001	1.65713	4.20000	1.00000	8.00000	2.58844

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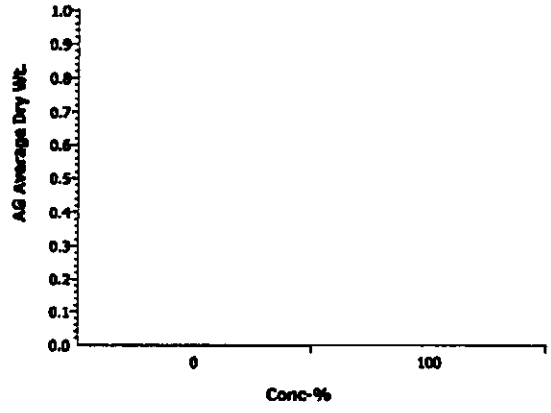
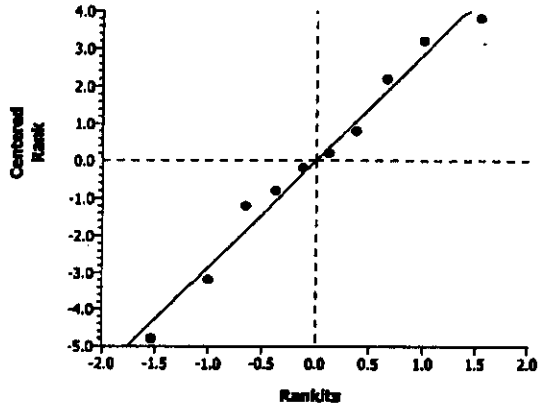




CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	09-5382-7322	09-5382-7322	15 May-06 2:08 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	24.83%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.36611	1.85955	0.0228	4.70498	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	89.60044	89.60044	1	5.60	0.04552	Significant Effect
Error	128.0356	16.00444	8			
Total	217.635994	105.60489	9			

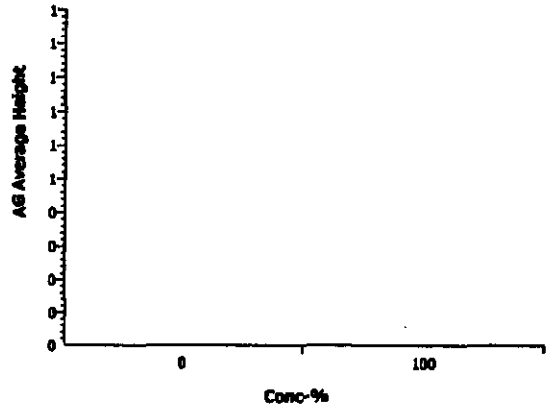
ANOVA Assumptions

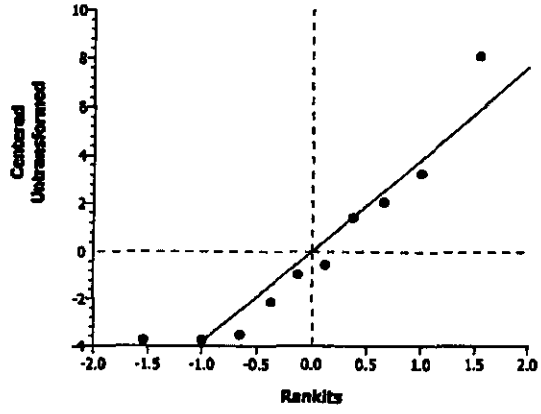
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.26330	23.15450	0.27849	Equal Variances
Distribution	Shapiro-Wilk W	0.89810		0.20879	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.947	15.2	27	4.9498				
100		5	12.960	9.2	16.2	2.7401				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Wet Wt.	Comparison	09-5382-7322	09-5382-7322	15 May-06 2:08 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	37.50%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.79139	1.85955	0.2258	11.1017	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	55.80611	55.80611	1	0.63	0.45154	Non-Significant Effect
Error	712.8447	89.10558	8			
Total	768.650776	144.91169	9			

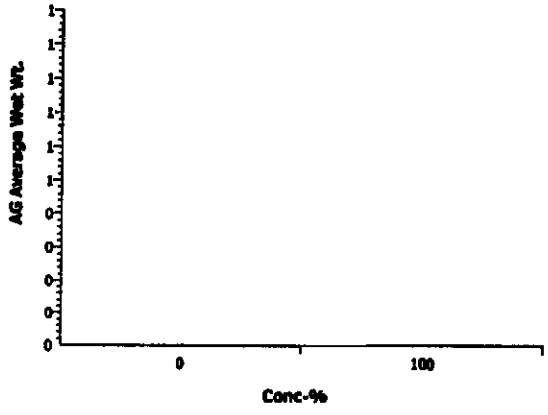
ANOVA Assumptions

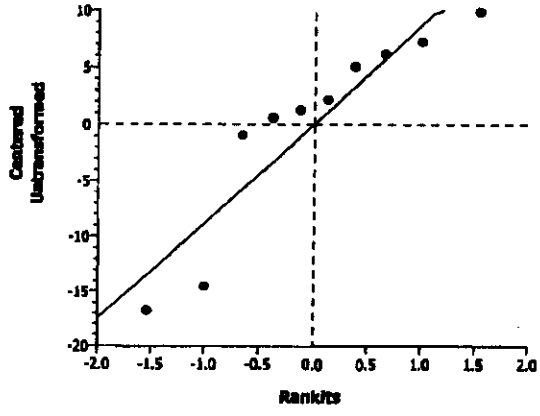
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.12685	23.15450	0.91064	Equal Variances
Distribution	Shapiro-Wilk W	0.84581		0.05178	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	29.605	12.833	36.826	9.717				
100		5	24.881	10.352	34.758	9.1538				

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	09-5382-7322	09-5382-7322	15 May-06 2:08 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	54.49%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.01519	1.85955	0.4941	0.88128	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0001296	0.00013	1	0.00	0.98825	Non-Significant Effect
Error	4.492009	0.561501	8			
Total	4.49213825	0.5616306	9			

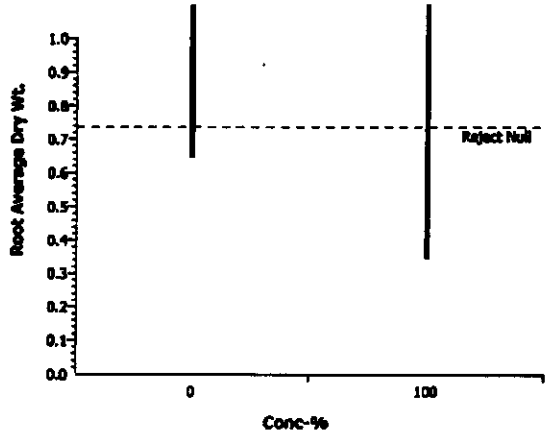
ANOVA Assumptions

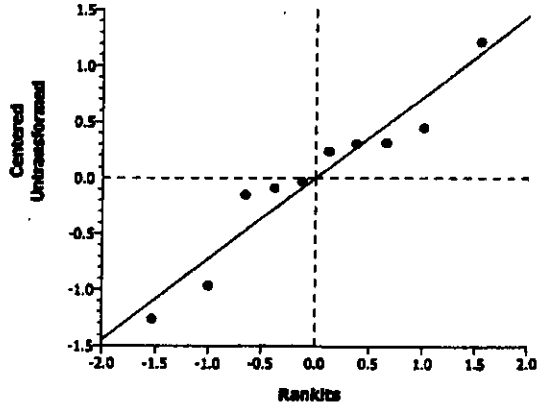
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.35927	23.15450	0.42618	Equal Variances
Distribution	Shapiro-Wilk W	0.93228		0.47069	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.57819				
100		5	1.61000	0.34401	2.82400	0.88809				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Length	Comparison	09-5382-7322	09-5382-7322	15 May-06 2:08 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	24.22%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.64112	1.85955	0.0033	5.14112	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	253.3445	253.3445	1	13.26	0.00658	Significant Effect
Error	152.8729	19.10911	8			
Total	406.217346	272.45356	9			

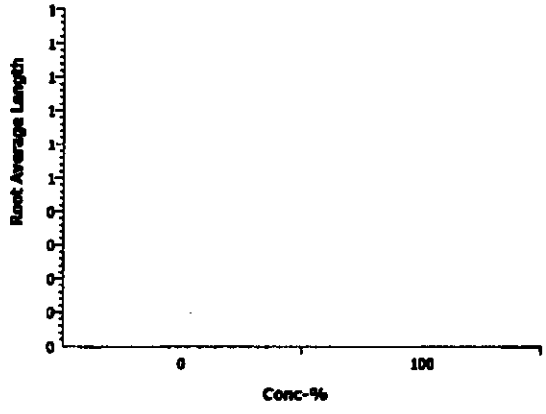
ANOVA Assumptions

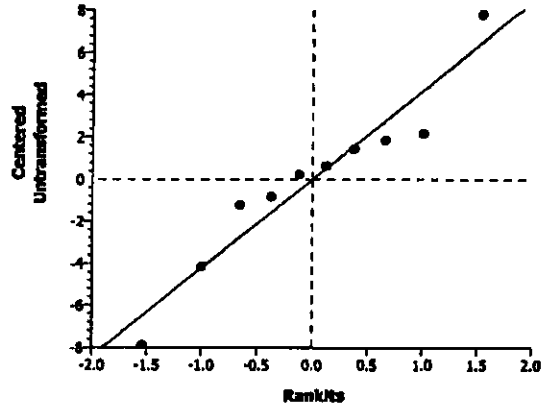
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.58027	23.15450	0.12453	Equal Variances
Distribution	Shapiro-Wilk W	0.94563		0.61720	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.227	13.333	29	5.693				
100		5	11.160	7	13	2.41				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	09-5382-7322	09-5382-7322	15 May-06 2:08 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	48.66%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.62527	1.85955	0.2746	17.9443	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	91.01494	91.01494	1	0.39	0.54921	Non-Significant Effect
Error	1862.381	232.7976	8			
Total	1953.39592	323.81256	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.45274	23.15450	0.72627	Equal Variances
Distribution	Shapiro-Wilk W	0.86473		0.08673	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	36.878	13.317	46.99	13.778				
100		5	30.844	4.5140	48.884	16.606				

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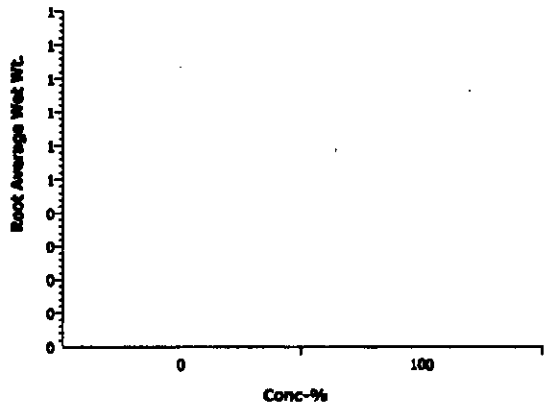
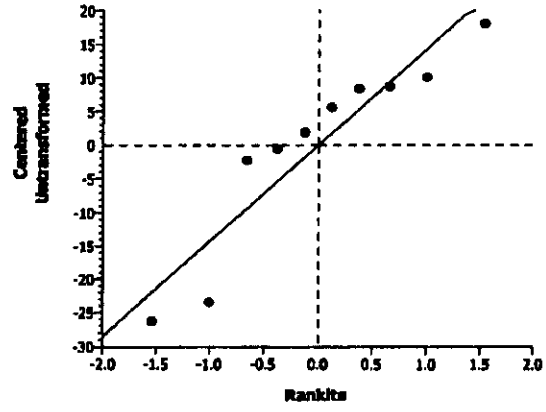




CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	09-5382-7322	09-5382-7322	15 May-06 2:08 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	42.74%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.67228	1.85955	0.2602	2.81142	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.58272	2.58272	1	0.45	0.52034	Non-Significant Effect
Error	45.71575	5.714468	8			
Total	48.2984681	8.2971888	9			

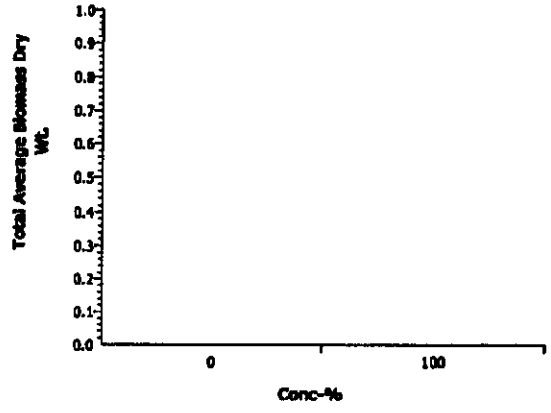
ANOVA Assumptions

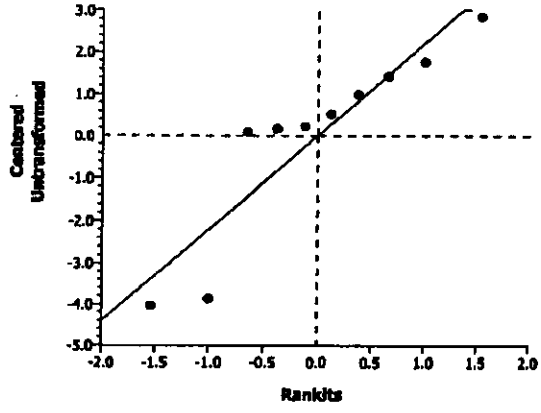
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.24729	23.15450	0.83561	Equal Variances
Distribution	Shapiro-Wilk W	0.83879		0.04267	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	2.25514				
100		5	5.56120	1.51602	8.39399	2.51859				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	09-5382-7322	09-5382-7322	15 May-06 2:09 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	43.45%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.6926	1.85955	0.2541	28.8851	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	289.3578	289.3578	1	0.48	0.50816	Non-Significant Effect
Error	4825.742	603.2178	8			
Total	5115.09998	892.57556	9			

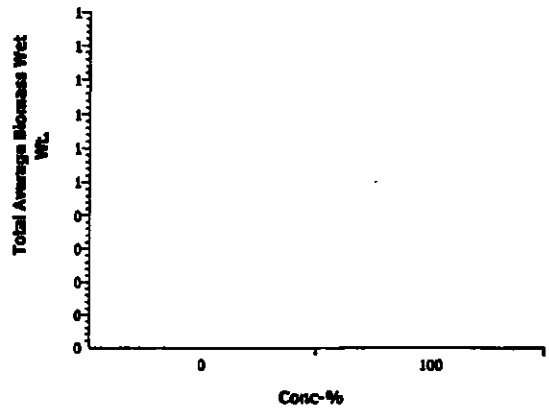
ANOVA Assumptions

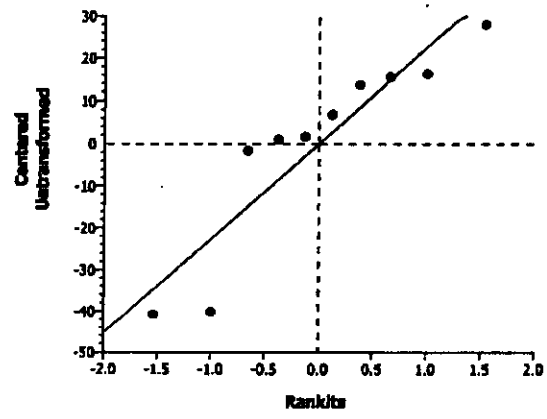
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.20886	23.15450	0.85859	Equal Variances
Distribution	Shapiro-Wilk W	0.83756		0.04125	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	66.484	26.15	82.77	23.370				
100		5	55.725	14.866	83.642	25.695				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 (illegible) Day 12 (illegible) Day 14 NJ Day 16 (illegible) Day 19 NJ Day 21 NJ Day 23 (illegible) Day 26 (illegible) Day 33 (illegible)

Bioassay Lab ID: BC 1506 - 05 Sample No: JHJH4

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (33 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	6	6	6	6	7	7	8→5	5	6.2	7.3
	B	6	7	7	8	8	8	8→5	5		
	C	4	6	6	7	8	8	8→5	5		
	D	8	8	8	9	9	9	9→5	5		
	E	3	3	3	3	4	4	3	3		

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

Replicate A: 2 Lg G, 3 med G — removed: 3 Sm G

Replicate B: 5 Lg G — removed: 2 med G, 1 med w/ brown tip

Replicate C: 5 Lg G — removed: 1 Sm brown/dead, 1 Sm G, 1 med G

Replicate D: 5 Lg G — removed: 1 Lg G, 1 Lg w/ brown tip, 2 sm G

Replicate E: 3 Lg G, 1 Lg w/ brown tip — removed: 1 brown/dead

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, 3 Md G - 1 brown/dead plant noted

Replicate B: 3 Lg G, 1 Lg G w/ 1 B tip, 1 Med G w/ 1 B tip

Replicate C: 3 Md G, 2 Md G w/ 1 B shoot each

Replicate D: 4 Lg G, 1 Lg G w/ 1 B shoot

Replicate E: 1 Lg G w/ 1 B tip, 1 Lg G w 1 B tip & 1 B shoot, 1 Lg 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	51 mm	68 mm	41 mm	105 mm	41 mm
Replicate B	65 mm	71 mm	78 mm	66 mm	41 mm
Replicate C	59 mm	62 mm	79 mm	53 mm	57 mm
Replicate D	70 mm	71 mm	64 mm	94 mm	67 mm
Replicate E	52 mm	75 mm	61 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	982.33	1052.4	993.94
Replicate B	978.83	1103.7	998.37
Replicate C	999.11	1099.7	1015.08
Replicate D	996.59	1130.7	1018.80
Replicate E	1027.91	1117.3	1042.81

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	43 mm	51 mm	42 mm	85 mm	49 mm
Replicate B	86 mm	49 mm	78 mm	83 mm	87 mm
Replicate C	51 mm	62 mm	83 mm	101 mm	75 mm
Replicate D	80 mm	85 mm	67 mm	95 mm	71 mm
Replicate E	102 mm	75 mm	60 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	987.41	1089.1	992.69
Replicate B	1022.79	1232.0	1032.17
Replicate C	1019.29	1150.9	1026.90
Replicate D	1029.43	1200.0	~~1018.80~~ 1039.60
Replicate E	1026.48	1134.7	1031.84

Comments:

CETIS Test Summary

Report Date: 15 May-06 2:15 PM
Test Link: 02-6435-3225/BG156605ps

Plant Chronic test — **CH2M Hill**

Test No:	10-9161-4520	**Test Type:**	Plant Chronic test	**Duration:**	33d 0h
Start Date:	05 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	08 May-06	**Dil Water:**		**Source:**	
Setup Date:	05 Apr-06 12:00 AM	**Brine:**			

Comments: BG1566-05

Sample No:	14-5469-5117	**Code:**	B1566-05	**Client:**	
Sample Date:	04 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	24h	**Station:**			

Comments: J11JH4

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
10-2614-5013	% Germination	100	> 100	N/A	27.93%	Wilcoxon Rank Sum Two-Sample
06-9816-5069	AG Average Dry Wt.	100	> 100	N/A	33.30%	Equal Variance t Two-Sample
12-7858-0968	AG Average Height	100	> 100	N/A	27.13%	Equal Variance t Two-Sample
12-4163-3516	AG Average Wet Wt.	100	> 100	N/A	32.37%	Equal Variance t Two-Sample
11-7585-1124	Root Average Dry Wt.	100	> 100	N/A	35.66%	Equal Variance t Two-Sample
06-2382-5640	Root Average Length	100	> 100	N/A	31.77%	Equal Variance t Two-Sample
03-8355-0816	Root Average Wet Wt.	100	> 100	N/A	36.45%	Equal Variance t Two-Sample
09-4776-1406	Total Average Biomass Dry	100	> 100	N/A	33.47%	Equal Variance t Two-Sample
05-5096-3625	Total Average Biomass Wet	100	> 100	N/A	34.13%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 15 May-06 2:15 PM
Test Link: 02-6435-3225/BG156605ps

% 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	0.60000	1.00000	0.08000	0.17889	19.44%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	0.75679	1.69222	34.11%
100		5	3.76653	2.32200	4.96667	0.46535	1.04056	27.63%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.947	15.2	27	2.2136	4.9498	26.13%
100		5	14.6	12.2	21	1.6553	3.7014	25.35%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.826	4.3456	9.717	32.82%
100		5	23.145	14.014	29.797	2.7717	6.1977	26.78%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.25857	0.57819	35.75%
100		5	1.65493	1.05601	2.03398	0.17121	0.38285	23.13%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.227	13.333	29	2.546	5.693	26.82%
100		5	16.667	10.8	26.333	2.5826	5.7748	34.65%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.878	13.317	46.99	6.1616	13.778	37.36%
100		5	31.738	20.338	41.842	3.7804	8.4532	26.63%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	1.00853	2.25514	34.29%
100		5	5.42147	3.37800	6.75334	0.62011	1.38660	25.58%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.484	26.150	82.77	10.452	23.370	35.15%
100		5	54.883	34.352	66.816	6.2951	14.076	25.65%

CETIS Test Summary

Report Date: 15 May-06 2:15 PM
Test Link: 02-6435-3225/BG156605ps

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.60000	1.00000	1.00000	0.60000	1.00000
100		1.00000	1.00000	1.00000	1.00000	0.60000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.05668	6.05200	5.26000	6.26333	5.17000
100		2.32200	3.90800	3.19401	4.44199	4.96667

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.3333	16.8	15.2	27	15.4
100		12.2	12.8	12.4	14.6	21

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	12.8333	36.8260	31.748	35.78	30.84
100		14.0140	24.974	20.118	26.822	29.7967

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.64667	1.92800	1.52800	2.06331	1.92001
100		1.05601	1.87601	1.52201	2.03398	1.78666

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3333	23.4	20	29	20.4
100		10.8	15.4	14.8	16	26.3333

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	13.3167	45.2540	36.3420	46.99	42.488
100		20.3380	41.8420	26.3220	34.114	36.0733

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	2.70335	7.98000	6.78801	8.32666	7.09000
100		3.37800	5.78400	4.71603	6.47598	6.75334

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	26.1500	82.0800	68.0900	82.77	73.328
100		34.352	66.816	46.4400	60.936	65.87

000-092-101-1 CETIS™ v1.1.2revl Analyst: B Approval:

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	02-6435-3225	02-6435-3225	15 May-06 2:15 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	27.93%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	30		0.6548	3	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.021087	0.021087	1	0.40	0.54474	Non-Significant Effect
Error	0.4217399	0.052717	8			
Total	0.44282693	0.0738045	9			

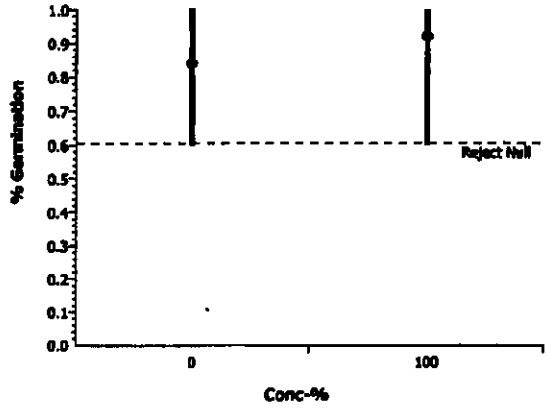
ANOVA Assumptions

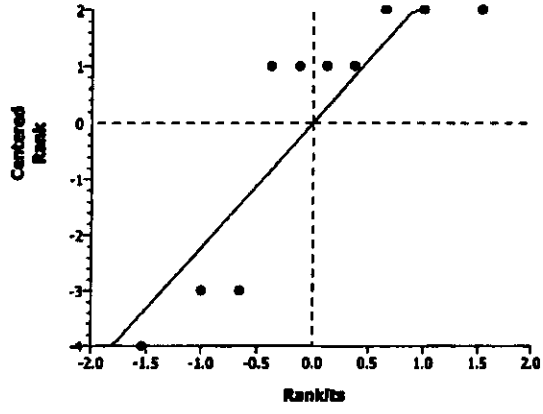
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.50000	23.15450	0.70400	Equal Variances
Distribution	Shapiro-Wilk W	0.75884		0.00455	Non-normal Distribution

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	5.00000	2.00000	7.00000	2.73861
100		5	0.92000	0.60000	1.00000	0.17889	6.00000	2.00000	7.00000	2.23607

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Dry Wt.	Comparison		02-8435-3225	02-8435-3225	15 May-06 2:15 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	33.30%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.34382	1.85955	0.1079	1.65205	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3.563297	3.563297	1	1.81	0.21587	Non-Significant Effect
Error	15.78555	1.973194	8			
Total	19.3488472	5.5364908	9			

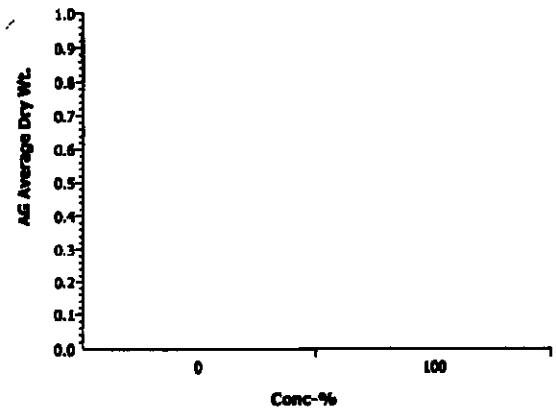
ANOVA Assumptions

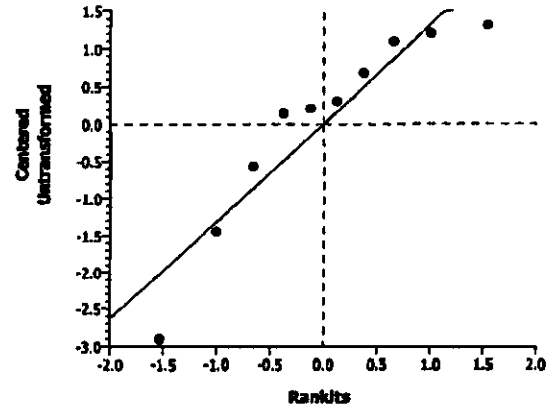
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.64472	23.15450	0.36905	Equal Variances
Distribution	Shapiro-Wilk W	0.87162		0.10441	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.96040	2.05668	6.26333	1.69222				
100		5	3.76653	2.32200	4.96667	1.04056				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Height	Comparison	02-6435-3225	02-6435-3225	15 May-06 2:15 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	27.13%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.57255	1.85955	0.0772	5.13995	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	47.23378	47.23378	1	2.47	0.15447	Non-Significant Effect
Error	152.8036	19.10044	8			
Total	200.037334	66.334221	9			

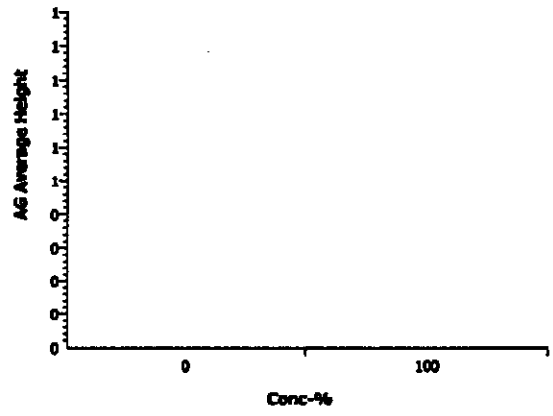
ANOVA Assumptions

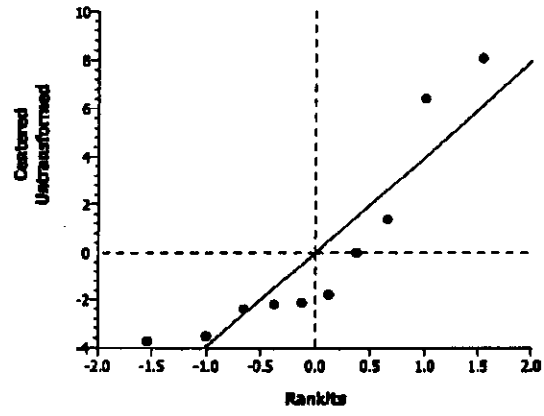
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.78839	23.15450	0.58719	Equal Variances
Distribution	Shapiro-Wilk W	0.81182		0.02017	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.947	15.2	27	4.9498				
100		5	14.6	12.2	21	3.7014				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Wet Wt.	Comparison	02-6435-3225	02-6435-3225	15 May-06 2:15 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	32.37%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.25344	1.85955	0.1227	9.58459	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	104.3463	104.3463	1	1.57	0.24544	Non-Significant Effect
Error	531.3278	66.41598	8			
Total	635.674072	170.76223	9			

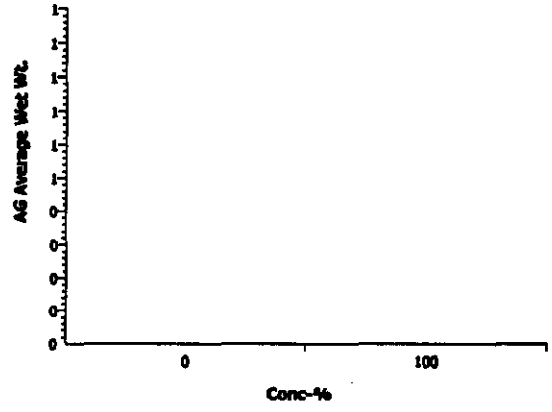
ANOVA Assumptions

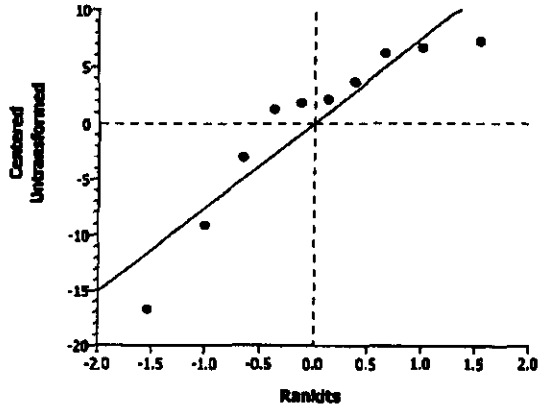
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.45808	23.15450	0.40501	Equal Variances
Distribution	Shapiro-Wilk W	0.84922		0.05686	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	29.605	12.833	36.826	9.717				
100		5	23.145	14.014	29.797	6.1977				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	02-6435-3225	02-6435-3225	15 May-06 2:15 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	35.66%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.1217	1.85955	0.5469	0.57868	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0035600	0.003560	1	0.01	0.90615	Non-Significant Effect
Error	1.923489	0.240436	8			
Total	1.92704911	0.2439961	9			

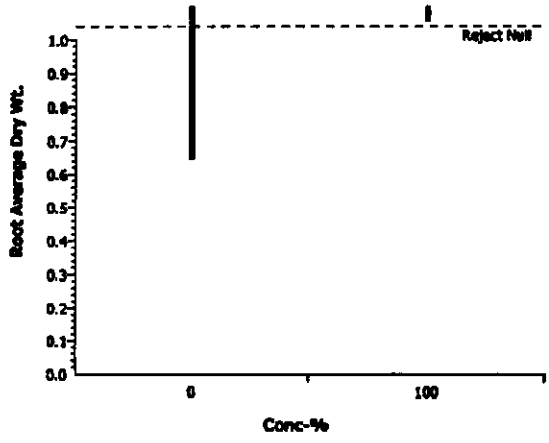
ANOVA Assumptions

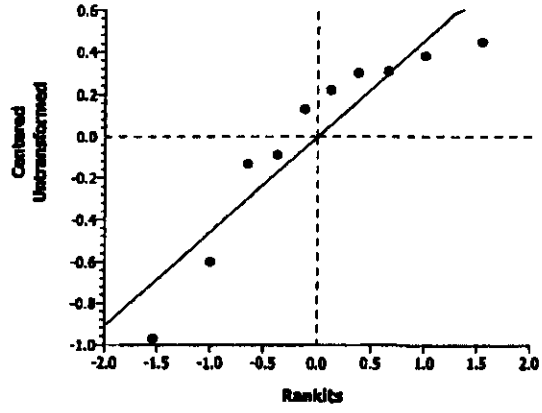
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.28077	23.15450	0.44417	Equal Variances
Distribution	Shapiro-Wilk W	0.85352		0.06397	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.61720	0.64667	2.06331	0.57819				
100		5	1.65493	1.05601	2.03398	0.38285				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Root Average Length	Comparison		02-6435-3225	02-6435-3225	15 May-06 2:15 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	31.77%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.2574	1.85955	0.1220	6.74373	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	51.984	51.984	1	1.58	0.24407	Non-Significant Effect
Error	263.0364	32.87955	8			
Total	315.020439	84.863556	9			

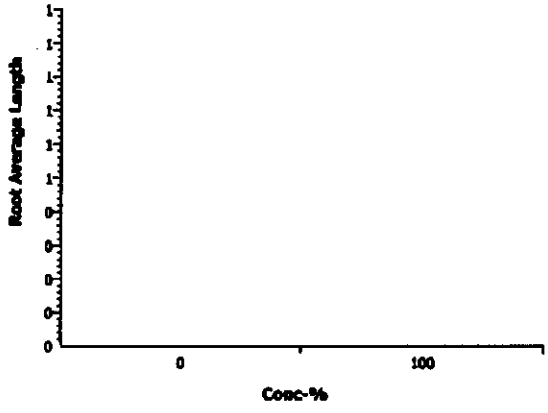
ANOVA Assumptions

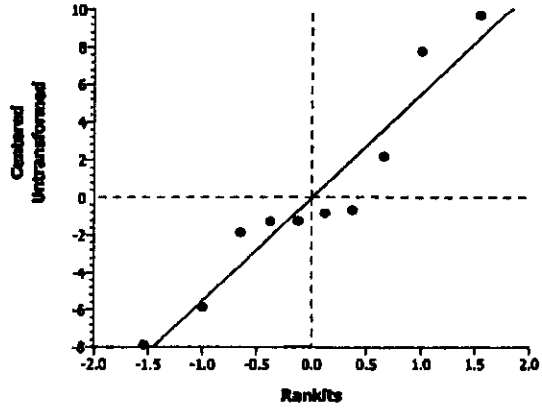
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.02896	23.15450	0.97859	Equal Variances
Distribution	Shapiro-Wilk W	0.91541		0.32023	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.227	13.333	29	5.693				
100		5	16.667	10.8	26.333	5.7748				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	02-6435-3225	02-6435-3225	15 May-06 2:15 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	36.45%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.71108	1.85955	0.2486	13.4424	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	66.05597	66.05597	1	0.51	0.49724	Non-Significant Effect
Error	1045.13	130.6412	8			
Total	1111.18549	196.69716	9			

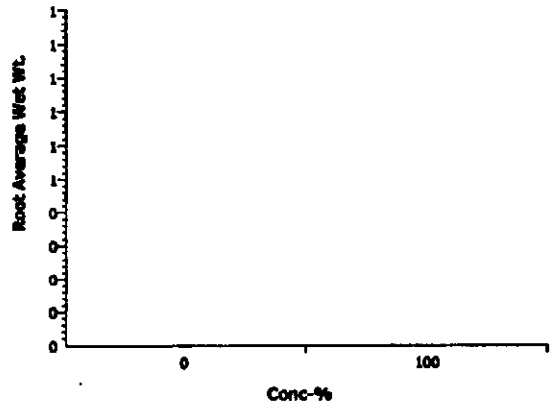
ANOVA Assumptions

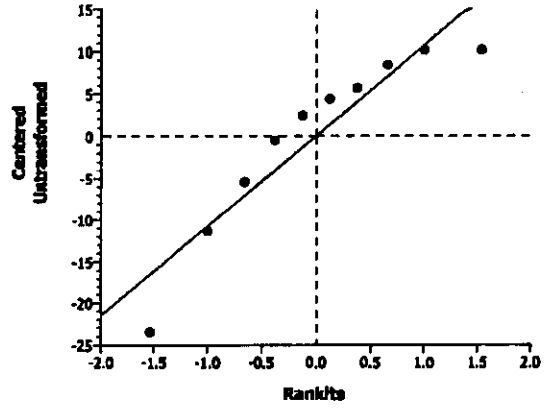
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.65655	23.15450	0.36694	Equal Variances
Distribution	Shapiro-Wilk W	0.87165		0.10448	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.878	13.317	46.99	13.778				
100		5	31.738	20.338	41.842	8.4532				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	02-6435-3225	02-6435-3225	15 May-06 2:15 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	33.47%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.97653	1.85955	0.1787	2.20155	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3.341636	3.341636	1	0.95	0.35740	Non-Significant Effect
Error	28.03329	3.504161	8			
Total	31.3749232	6.8457971	9			

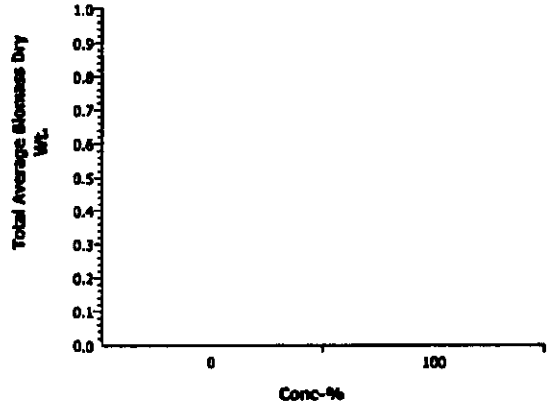
ANOVA Assumptions

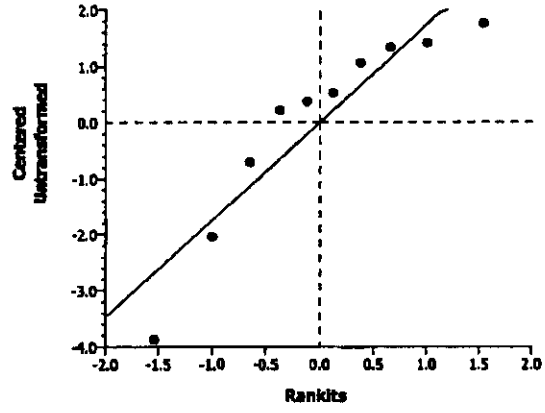
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.64510	23.15450	0.36899	Equal Variances
Distribution	Shapiro-Wilk W	0.85862		0.07350	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	2.25514				
100		5	5.42147	3.37800	6.75334	1.38660				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	02-6435-3225	02-6435-3225	15 May-06 2:15 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	34.13%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.95081	1.85955	0.1848	22.6883	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	336.4471	336.4471	1	0.90	0.36954	Non-Significant Effect
Error	2977.274	372.1593	8			
Total	3313.72122	708.60632	9			

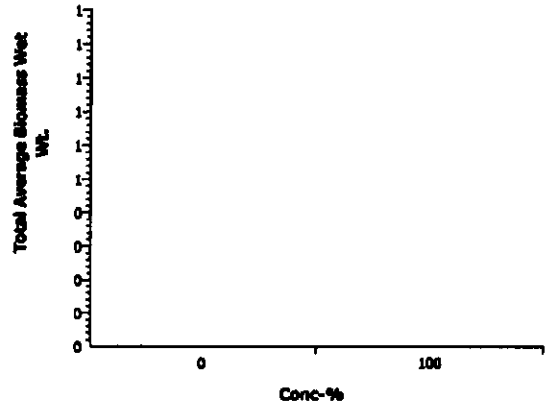
ANOVA Assumptions

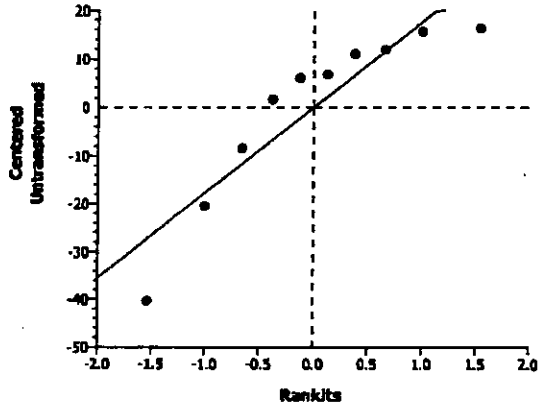
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.75655	23.15450	0.34972	Equal Variances
Distribution	Shapiro-Wilk W	0.83700		0.04061	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	66.484	26.15	82.77	23.370				
100		5	54.883	34.352	66.816	14.076				

Graphics





APPENDIX B
CHAIN OF CUSTODY

E 2748

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-3	Page 1 of 1
Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600-131		SAF No. RC-051	Data Turnaround 45 Days
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment	
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	~~2000g~~ 4000g	21 11/8/05								
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									

11-1-05 LRC.

Sample No.	Matrix *	Sample Date	Sample Time										
~~J10DW9~~ J10DW4	SOIL	10-31-05	1530	X	X								
~~J10DW0~~	SOIL												
~~J10DW1~~	SOIL												
~~J10DW2~~	SOIL												
~~J10DW3~~	SOIL												

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From	Date/Time 11-1-05 0800	Received By/Stored In	Date/Time 11-1-05 10-30
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

SPECIAL INSTRUCTIONS

(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

Biocassay ID = B1542-01

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

E 2801

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-4	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental 'So	Sampling Location PIT 23		SAF No. RC-051		
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.		

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	~~3000g~~ 1000g	ET 11-8-5								
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										
J10DV4	SOIL	11-8-05	16:00	1	1								-1
J10DV5	SOIL												
J10DV6	SOIL												
J10DV7	SOIL												
J10DV8	SOIL												

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tolles	11-9-05 12:00	[illegible]	11-9-05 12:[illegible]
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

SPECIAL INSTRUCTIONS
This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(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

1 ET
11/10/05
As per
Rich Walsh

Bioassay ID = B1542-02

Matrix *
S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
OS=Drum Solids
OL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

E.2P31

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-9	Page 1 of 1
Collector L. COLLOM	Company Contact JOAN KESSNER Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Upland Backfill Elevated-100-F-2	SAF No. RC-051	Data Turnaround 45 Days
Ice Chest No.	Field Logbook No. EL-1596 COA BESRA56520	Method of Shipment	
Shipped To CH2MHILL	Offsite Property No. A060151	Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS

Potentially Radioactive.

Special Handling and/or Storage

NONE

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	400g									
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											
10DT8 / SOIL / 11/14/05 / 17:21	1	1									

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth Tepper	Date/Time 11/15/05 11:00	Received By/Stored In Nayna Kaumann	Date/Time 11/15/05 11:01
Relinquished By/Removed From Elizabeth Tepper	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

SPECIAL INSTRUCTIONS

(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

Bioassay ID = B1542-03

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

HI-EE-011 (08/29/2005)

E2897 E2897

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-20	Page 1 of 1

Collector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Riparian Low-Site#10 Downriver 100-D		SAF No. RC-051		
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.		

POSSIBLE SAMPLE HAZARDS/REMARKS
NONE

Special Handling and/or Storage
NONE

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									

CT 11-28-05

Sample No.	Matrix *	Sample Date	Sample Time										
J1CLJ5	SOIL	11-28-05	~~16:19~~	1	1								-1
			16:19										

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth Teipner	Date/Time 11-28-05 16:25	Received By/Stored In Mindy Buchan	Date/Time 11-28-05 16:25
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

SPECIAL INSTRUCTIONS
This chain of custody form documents the transfer of bulk field collected soils to the CH2M Hill Corvallis laboratory for incremental preparation and aliquoting.

(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

Biocassay 2.0 = B1542-08

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-0 3/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-69	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 100-K RIPARIAN #5	SAF No. RC-051	Air Quality ☐
Ice Chest No.	Field Logbook No. EL-1596 COA BESRAS6520	Method of Shipment GROUND TRANSPORT	
Shipped To CH2MHILL	Offsite Property No. ~~A060151-TRE~~ 37606 A060380	Bill of Lading/Air Bill No.	

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										
J11JB8	SOIL	3-21-06	16:00	✓	✓								

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth M Tepper	Date/Time	Received By/Stored In CH2M Hill	Date/Time
Relinquished By/Removed From Elizabeth M Tepper	Date/Time 3-22-06 11:30	Received By/Stored In [illegible]	Date/Time 3/22/06 1130
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

SPECIAL INSTRUCTIONS

* 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

F1349-01-SOIL 2

BIOASSY COPY

Matrix *

Sa=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
Lv=Liquid
Vg=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-68	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-K RIPARIAN #4		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

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										
J11JB7	SOIL	3-26-06	14:30	✓	✓								

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth M Tepper	Date/Time	~~Received By/Stored In~~ CH2M Hill →	Date/Time
Relinquished By/Removed From Elizabeth M Tepper	Date/Time 3-27-06 11:30	Received By/Stored In Wayne Hammond	Date/Time 3/27/06 11:30
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

SPECIAL INSTRUCTIONS

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

F14Z01-S012

Batch #2 Copy

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-96	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-H RIPARIAN #8		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

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										
J11JH5	SOIL	3-28-06	15:00	1	1								

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tepper		CH2M HILL	
Elizabeth M Tepper	3-29-06 11:30	Raymond Lumpkin	3-29-06 11:30

SPECIAL INSTRUCTIONS

* These marks indicate that unless lined out, analyses 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

Batch # 3

F1436-S012

Matrix *

S=Soil
SL=Sediment
SOl=Oil
Sl=Sludge
W=Water
OwOil
AtAir
DSolDrum Solids
DLiqDrum Liquids
TsTissue
WtWipe
LtLeachate
VsVegetation
XoOther

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

BHI-EE-011 (08/29/2005)

F1470

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-99	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location UPPER RIPARIAN #12		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

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									
J11JH8	SOIL	4-3-06	18:45	1	1							~1

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth M Tepper		Received By/Stored In: CH2M Hill	
Relinquished By/Removed From: Elizabeth M Tepper	4-4-06 10:30	Received By/Stored In: Fed	
Relinquished By/Removed From		Received By/Stored In: [illegible]	4/4/06 10:50
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

These marks indicate that unless lined out, analytes to be included with Stronxium-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~~

CT 4-3-06

Matrix *

S=Soil
SE=Sediment
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

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

BHI-EE-011 (08/29/2005)

F1471

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-95	Page 1 of 1

Collector ~~STANKOVICH, M.~~ L. Cotton 3-24-06	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 100-F RIPARIAN #7		SAF No. RC-051	Air Quality ☐	
Ice Chest No.	Field Logbook No. EL-1596	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									
J11JH4	SOIL	4-3-06	19:00	1	1							~2

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth M Tepper		Received By/Stored In: CH2M Hill →	
Relinquished By/Removed From: Elizabeth M Tepper	Date/Time 10:30 4-4-06	Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In: [illegible] 4-4-06	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

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~~ ET 4-3-06

Matrix *
SeSeal
SFeSediment
SOeSoil
SleSludge
WeWater
OeOil
AeAir
DSeDrum Solid
DLeDrum Liquid
TeTissue
WIeWipe
LeLiquid
VeVegetation
XeOther

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

BHI-EE-011 (08/29/2005)

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

CH2MHILL
Applied Sciences Laboratory

RECEIVED
MAY 2006

May 8, 2006

ELR Consulting
2328 S. Garfield Street
Kennewick, WA 99337

RE: Laboratory Report for ELR Consulting
Applied Sciences Laboratory Reference No. F1470 ; SAF RC-051

Dear Emmett Richards:

On April 04, 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. F1470

Sample ID	Client Sample ID	Date Collected	Time Collected
F147001	J11JH8	04/03/2006	18:45

Table of Contents
CH2M HILL Laboratory Reference No. F1470

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Anions Analysis by Method EPA300.0 19
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QC Summary 24

Moisture Analysis by Method ASTM D2216 36

Particle Size Analysis by Method D422 38

pH Analysis by Method SW9045C 40

Total Kjeldahl Nitrogen Analysis by Method EPA351.2 42
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Total Organic Carbon Analysis by Method ASTM E777 56
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QC Summary 61

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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.: F1470

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 Tepp Date: 4-27-06

Reviewed by: Douglas A Hardy Date: 4/28/06

SAMPLE DATA
SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JH8

SDG No.: F1470

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F147001

Date Received: 04/04/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7664-41-7	Ammonia-N	1.02	3.80	2.57	B	mg/kg	1	0.5313 G	E350.3	04/05/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0405

SDG No.: F1470

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0405

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7664-41-7	Ammonia-N	0.534	2.00	1.03	B	mg/kg	1	1 G	E350.3	04/05/06

ET060427-19:55-F1470-W

FORM I GEN CHEM

QC DATA
SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 04/05/06 1500

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506NH3

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Ammonia-N	0.10	160	1.0	103	10.0	51.0	100	-8.2						

Comments:

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 04/05/06 1500

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506NH3

Analyte	Curve Type	r	Q
Ammonia-N	LNR	0.9994	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Second Source ID: ICV-0405

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506NH3

Analyte	Expected	Found	%D	Q
Ammonia-N	10	9.93	-0.7	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Analytical Lot ID: 040506NH3

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506NH3

CCV #1 ID: CV1-0405 CCV #2 ID: CV2-0405 CCV #3 ID: CV3-0405

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Ammonia-N	1	1.06	5.8		10	9.03	-9.7		10	8.73	-12.7	

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0405

SDG No.: F1470

Analysis Method: E350.3

Initial Cal ID: 040506NH3

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0405

Date Analyzed: 04/05/06

Time Analyzed: 1606

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
09	BS1S0405	BS1S0405	04/05/06	1559
15	J11JH8	F147001	04/05/06	1621

COMMENTS: _____

ET060427-19:55-F1470-W

FORM III GEN CHEM

E350.3

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1470

Analysis Method: E350.3

Initial Cal ID: 040506NH3

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS1S0405

Date Analyzed: 04/05/06

Time Analyzed: 1559

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Ammonia-N	200	199	99.3	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 040506NH3

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	LEVEL 1	LEVEL 1	04/05/06	1544
01	LEVEL 2	LEVEL 2	04/05/06	1546
02	LEVEL 3	LEVEL 3	04/05/06	1548
03	LEVEL 4	LEVEL 4	04/05/06	1550
05	CV1-0405	CV1-0405	04/05/06	1554
06	CV2-0405	CV2-0405	04/05/06	1556
07	ICV-0405	ICV-0405	04/05/06	1559
09	BS1S0405	BS1S0405	04/05/06	1559
10	SB1-0405	SB1-0405	04/05/06	1606
15	J11JH8	F147001	04/05/06	1621
22	CV3-0405	CV3-0405	04/05/06	1650

COMMENTS: _____

CH2MHILL
Applied Sciences Laboratory

CH2M HILL
Applied Sciences Labortory (ASL)
2300 NW Walnut Blvd.
P.O. Box 428
Corvallis, OR 97330-0428
Telephone: 541-752-4271
Fax: 541-752-0276

04/27/06

MDL Study Report

Analytical Method: E350.3

Matrix: Soil

Instrument ID: NONE

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Ammonia	08/05/05	2	2.18	1.70	1.73	1.70	1.73	1.74	1.81		0.170	0.534

ANIONS BY METHOD EPA300.0A

CASE NARRATIVE
ANIONS

Analytical Method: EPA300.0 Batch No.: F1470

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: 5/5/06

Reviewed by: Date: 5/8/06

AFCEE FORM I-1

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JH8

SDG No.: F1470

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F147001

Date Received: 04/04/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.0581	0.478	1.88		mg/kg	1	5.28 G	E300.0A	04/07/06
16984-48-8	Fluoride	0.0519	0.478	0.478	U	mg/kg	1	5.28 G	E300.0A	04/07/06
14797-55-8	Nitrate-N	0.0449	0.478	3.02		mg/kg	1	5.28 G	E300.0A	04/07/06
14797-65-0	Nitrite-N	0.0429	0.478	0.488		mg/kg	1	5.28 G	E300.0A	04/07/06
14808-79-8	Sulfate	0.0771	0.478	3.82		mg/kg	1	5.28 G	E300.0A	04/07/06

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0407

SDG No.: F1470

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0407

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.0607	0.500	0.500	U	mg/kg	1	5 G	E300.0A	04/07/06
16984-48-8	Fluoride	0.0543	0.500	0.500	U	mg/kg	1	5 G	E300.0A	04/07/06
14797-55-8	Nitrate-N	0.0469	0.500	0.500	U	mg/kg	1	5 G	E300.0A	04/07/06
14797-65-0	Nitrite-N	0.0449	0.500	0.500	U	mg/kg	1	5 G	E300.0A	04/07/06
14808-79-8	Sulfate	0.0806	0.500	0.500	U	mg/kg	1	5 G	E300.0A	04/07/06

QC DATA SUMMARY

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 01/30/06 18:27

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Chloride	0.020	0.0032	0.050	0.0041	0.10	0.023	0.50	0.050	1.0	0.11	5.0	0.67	10.0	1.5
Fluoride					0.10	0.0085	0.50	0.046	1.0	0.13	5.0	0.85	10.0	1.8
Nitrate-N	0.020	0.0059	0.050	0.012	0.10	0.067	0.50	0.14	1.0	0.32	5.0	1.8	10.0	4.1
Nitrite-N	0.020	0.0067	0.050	0.012	0.10	0.050	0.50	0.10	1.0	0.25	5.0	1.4	10.0	3.0
Sulfate	0.060	0.0065	0.15	0.014	0.30	0.059	1.5	0.13	3.0	0.27	15.0	1.5	30.0	3.2

Comments:

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 01/30/06 18:27

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

Analyte	Curve Type	r	Q
Chloride	LNR	0.9985	
Fluoride	LNR	0.9988	
Nitrate-N	LNR	0.9983	
Nitrite-N	LNR	0.9988	
Sulfate	LNR	0.9991	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Second Source ID: ICV-0130

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

Analyte	Expected	Found	%D	Q
Chloride	5	5.06	1.2	
Fluoride	5	4.57	-8.6	
Nitrate-N	7.19	7.13	-0.8	
Nitrite-N	1.13	1.02	-9.4	
Sulfate	5	5.14	2.8	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Analytical Lot ID: 040706Q2

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

CCV #1 ID: CV1-0407 CCV #2 ID: CV2-0407 CCV #3 ID: CV3-0407

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Chloride	5	5.24	4.8		2.5	2.61	4.4		5	5.12	2.4	
Fluoride	5	5.46	9.2		2.5	2.64	5.5		5	5.32	6.5	
Nitrate-N	5	5.34	6.8		2.5	2.66	6.5		5	5.31	6.2	
Nitrite-N	5	5.05	1.0		2.5	2.42	-3.2		5	5.01	0.1	
Sulfate	15	16.5	9.7		7.5	8.09	7.8		15	16.2	8.1	

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0407

SDG No.: F1470

Analysis Method: E300.0A

Initial Cal ID: 300A-013006

Matrix: (Soil/Water) SOIL

Instrument: ICQ

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0407

Date Analyzed: 04/07/06

Time Analyzed: 1128

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
16	BS2S0407	BS2S0407	04/07/06	1049
17	BS3S0407	BS3S0407	04/07/06	1059
19	BS5S0407	BS5S0407	04/07/06	1118
33	J11JH8	F147001	04/07/06	1346

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS2S0407

Initial Cal ID: 300A-013006

Date Analyzed: 04/07/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1049

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Chloride	25	25.4	102	70-130	
Fluoride	25	24.3	97.3	70-130	
Sulfate	25	27.1	108	70-130	

* Values outside of QC limits

Comments:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS3S0407

Initial Cal ID: 300A-013006

Date Analyzed: 04/07/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1059

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Nitrite-N	5.65	6.07	107	70-130	

* Values outside of QC limits

Comments:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS5S0407

Initial Cal ID: 300A-013006

Date Analyzed: 04/07/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1118

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Nitrate-N	35.95	39.1	109	70-130	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 300A-013006

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	LEVEL1	LEVEL1	01/30/06	1729
03	LEVEL2	LEVEL2	01/30/06	1739
04	LEVEL3	LEVEL3	01/30/06	1749
05	LEVEL4	LEVEL4	01/30/06	1758
06	LEVEL5	LEVEL5	01/30/06	1808
07	LEVEL6	LEVEL6	01/30/06	1818
08	LEVEL7	LEVEL7	01/30/06	1827
10	ICV-0130	ICV-0130	01/30/06	1846
11	ICV-0130	ICV-0130	01/30/06	1856
13	ICV-0130	ICV-0130	01/30/06	1916

COMMENTS: _____

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 040706Q2

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
15	CV1-0407	CV1-0407	04/07/06	1007
16	BS2W0407	BS2S0407	04/07/06	1049
17	BS3W0407	BS3S0407	04/07/06	1059
19	BS5W0407	BS5S0407	04/07/06	1118
20	SB1-0407	SB1-0407	04/07/06	1128
32	CV2-0407	CV2-0407	04/07/06	1337
33	J11JH8	F147001	04/07/06	1346
46	CV3-0407	CV3-0407	04/07/06	1543

COMMENTS: _____

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05/05/06

MDL Study Report

Analytical Method: E300.0

Matrix: Soil

Instrument ID: ICO

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Nitrate	11/01/05	0.25	0.225	0.250	0.215	0.240	0.245	0.225	0.255		0.0149	0.0469
Nitrite-N	11/01/05	0.25	0.230	0.270	0.270	0.260	0.270	0.260	0.265		0.0143	0.0449
Sulfate	11/01/05	0.75	0.790	0.735	0.730	0.795	0.775	0.750	0.760		0.0256	0.0806
Chloride	11/01/05	0.25	0.315	0.315	0.340	0.340	0.290	0.300	0.330		0.0193	0.0607
Fluoride	11/02/05	0.5	0.505	0.480	0.500	0.470	0.490	0.485	0.455		0.0173	0.0543

PERCENT MOISTURE
ASTM D2216

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JH8

SDG No.: F1470

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F147001

Date Received: 04/04/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
MOISTURE	Moisture	0.00	0.00	1.14		%	1	9.016 G	ASTM D2216	04/07/06

PARTICLE SIZE
METHOD 422

Hanford

Particle Size

500.0 g sample used

Weight retained is the weight of material ON each sieve

ANALYST: KM 04/19/2006

Lab I.D.	Client I.D.	Sieve #	Sieve Size (um)	Sieve Size (mm)	Weight Retained (g)	Weight Retained (%)	Cumulative Coarser (%)	Cumulative Finer (%)
F147001	J11JH8	8	2362	2.362	0.00	0.00	0.00	100.00
		16	1180	1.180	47.80	9.59	9.59	90.41
		30	600	0.600	88.30	17.71	27.30	72.70
		50	500	0.500	165.70	33.24	60.54	39.46
		100	147	0.147	142.00	28.49	89.03	10.97
		200	75	0.075	38.70	7.76	96.79	3.21
		pan			16.00	3.21	100.00	0.00
		total			498.5			

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pH
METHOD SW9045C

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JH8

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Matrix: SOIL

Lab Sample ID: F147001

% Moisture: 1

Date Received: 04/04/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
pH	pH	0.00	0.00	7.20		pH	1	20 G	SW9045C	04/07/06

TKN
METHOD EPA 351.4

CASE NARRATIVE
TKN

Analytical Method: EPA 351.4 Batch No.: F1470

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 aceeptance 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. Tapps Date: 4-27-06

Reviewed by: Ginger Collins Date: 5/2/06

SAMPLE DATA
SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JH8

SDG No.: F1470

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F147001

Date Received: 04/04/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	56.9	209	834		mg/kg	1	0.4839 G	E351.4	04/05/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0405

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Matrix: SOIL

Lab Sample ID: SB1-0405

% Moisture: 0

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	27.3	100	43.9	B	mg/kg	1	1 G	E351.4	04/05/06

QC DATA
SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 04/05/06 1800

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506TKN

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Total Kjeldahl Nitrogen	2.0	159	20.0	105	200	51.9	2000	-6.7						

Comments:

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 04/05/06 1800

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506TKN

Analyte	Curve Type	r	Q
Total Kjeldahl Nitrogen as N	LNR	0.9995	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Second Source ID: ICV-0405

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506TKN

Analyte	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	13.6	14.8	9.0	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Analytical Lot ID: 040506TKNprobe

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506TKN

CCV #1 ID: CV1-0405 CCV #2 ID: CV2-0405 CCV #3 ID: CV3-0405

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	20	20.1	0.3		200	182	-8.8		20	19.6	-1.8	

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0405

SDG No.: F1470

Analysis Method: E351.4

Initial Cal ID: 040506TKN

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0405

Date Analyzed: 04/05/06

Time Analyzed: 1906

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
09	BS1S0405	BS1S0405	04/05/06	1904
15	J11JH8	F147001	04/05/06	1930

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1470

Analysis Method: E351.4

Initial Cal ID: 040506TKN

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS1S0405

Date Analyzed: 04/05/06

Time Analyzed: 1904

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Kjeldahl Nitrogen as N	680	741	109	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 040506TKNprobe

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	LEVEL 1	LEVEL 1	04/05/06	1850
01	LEVEL 2	LEVEL 2	04/05/06	1852
02	LEVEL 3	LEVEL 3	04/05/06	1854
03	LEVEL 4	LEVEL 4	04/05/06	1856
05	CV1-0405	CV1-0405	04/05/06	1858
06	CV2-0405	CV2-0405	04/05/06	1900
07	ICV-0405	ICV-0405	04/05/06	1902
09	BS1S0405	BS1S0405	04/05/06	1904
10	SB1-0405	SB1-0405	04/05/06	1906
15	J11JH8	F147001	04/05/06	1930
22	CV3-0405	CV3-0405	04/05/06	1955

COMMENTS: _____

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04/27/06

MDL Study Report

Analytical Method: E351.4
Matrix: Soil

Instrument ID: NONE
Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Total Kjeldahl Nitrogen	03/13/06	100	168	154	161	147	152	161	171		8.67	27.3

ET060427-19:56-F1470-W

TOTAL ORGANIC CARBON
BY ASTM E777

CASE NARRATIVE
TOC SOILS

Analytical Method: ASTM E-777 Batch No.: F1470

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: 4-25-06

Reviewed by: Ginger Collins Date: 4/25/02

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JH8

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Matrix: SOIL

Lab Sample ID: F147001

% Moisture: 0

Date Received: 04/04/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	132	377	11200		mg/kg	1	0.2653 G	ASTM E777	04/24/06

AD060425-09:44-F1470-W

FORM I GEN CHEM

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0424

SDG No.: F1470

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0424

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	35.0	100	100	U	mg/kg	1	1 G	ASTM E777	04/24/06

AD060425-09:44-F1470-W

FORM I GEN CHEM

QC DATA SUMMARY

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Initial Calibration Date: 10/14/05 11:48

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Total Organic Carbon	100	737000	200	1600000	1000	6840000	4000	2.48E+7	8000	4.79E+7				

Comments:

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Initial Calibration Date: 10/14/05 11:48

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

Analyte	Curve Type	r	Q
Total Organic Carbon	LNR	0.9997	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Second Source ID: ICV-1014

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

Analyte	Expected	Found	%D	Q
Total Organic Carbon	6430	6680	3.9	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Analytical Lot ID: 042406TOCS

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

CCV #1 ID: CV1-0424 CCV #2 ID: CV2-0424 CCV #3 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Organic Carbon	4000	3970	-0.7		4000	3880	-3.0					

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0424

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Sample ID: SB1-0424

Initial Cal ID: 101405S1

Date Analyzed: 04/24/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1551

Instrument: TOC Skalar

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	BS1S0424	BS1S0424	04/24/06	1541
07	J11JH8	F147001	04/24/06	1630

COMMENTS: _____

AD060425-09:44-F1470-W

FORM III GEN CHEM

ASTM E777

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1470

Analysis Method: ASTM E777

Initial Cal ID: 101405S1

Matrix: (Soil/Water) SOIL

Instrument: TOC Skalar

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS1S0424

Date Analyzed: 04/24/06

Time Analyzed: 1541

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Organic Carbon	8840	9420	107	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Code: CVO

Instrument: TOC SKALAR

Analytical Lot ID: 101405TOCS

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	LEVEL1	LEVEL1	10/14/05	1148
03	LEVEL2	LEVEL2	10/14/05	1158
04	LEVEL3	LEVEL3	10/14/05	1208
05	LEVEL4	LEVEL4	10/14/05	1218
06	LEVEL5	LEVEL5	10/14/05	1228
07	ICV-1014	ICV-1014	10/14/05	1252

COMMENTS: _____

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1470

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Code: CVO

Instrument: TOC Skalar

Analytical Lot ID: 042406TOCS

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	CV1-0424	CV1-0424	04/24/06	1531
02	BS1S0424	BS1S0424	04/24/06	1541
03	SB1-0424	SB1-0424	04/24/06	1551
07	J11JH8	F147001	04/24/06	1630
12	CV2-0424	CV2-0424	04/24/06	1754

COMMENTS: _____

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Fax: 541-752-0276

04/25/06

MDL Study Report

Analytical Method: ASTM E777

Matrix: Soil

Instrument ID: TOC Skalar

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Total Organic Carbon	08/17/05	140	31.0	14.4	8.89	29.4	32.4	27.1	6.37		11.1	35.0

CHAIN OF CUSTODY/SHIPPING DOCUMENTS

F1470

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-99	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: UPPER RIPARIAN #12	SAF No.: RC-051	Air Quality ☐
Ice Chest No.: 0	Field Logbook No.: EL-1596 — 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										
J11JH8	SOIL	4-3-06	18:45	1	1								~1

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tepper		CH2M Hill	
Elizabeth M Tepper	4-4-06 10:30	Fed	
		Dana Lumann	4/4/06 1030

SPECIAL INSTRUCTIONS

` 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~~ ET 4-3-06

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

CH2MHILL
Analytical Services

Sample Receipt Record

Batch Number: F1470 Date received: 4/4/06 10:30

Client/Project Washington Closure

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation		YES	NO
Radiological Screening for AFCEE			✓
Were custody seals intact and on the outside of the cooler?			
If yes, Where? Front____ Rear____ Lt Side____ Rt Side____	HD		
Type of packing material: Ice Blue Ice Bubble wrap	HD		
Was the Chain of Custody inside the cooler?		✓	
Was the Chain of Custody properly filled out?		✓	
Were the sample containers in good condition?		✓	
Containers supplied by ASL?		✓	
Any sample with < 1/2 holding time remaining? If so contact LPM			✓
Was there ice in the cooler? Enter temp. 21 c	HD		
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								X
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

Dayna Kaumann 4/4/06 10:30

Date/Time Date/Time

Rev 11/05/2003-recptrcd.xls

VersionCo	LabName	SDG	FieldID	NativeID	QAQCTyp	LRType	Matrix	LabSampl	AnalysisM	ExtractionI	SampleDa	SampleTin	ReceiveDa	ExtractDat	ExtractTim	AnalysisDa	AnalysisTi	PercentSo	LabLotCtlN	CAS	ParamID	Analyte	Result
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	ASTM E77	NONE	4/3/2006	18:45	4/4/2006			4/24/2006	16:30	98.86		TOC	TOC	Total Orga	11200
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	E350.3	METHOD	4/3/2006	18:45	4/4/2006	4/5/2006	16:21	4/5/2006	16:21	98.86	SB1-0405	7664-41-7	NH3N	Ammonia-I	2.57
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	E351.4	METHOD	4/3/2006	18:45	4/4/2006	4/5/2006	19:30	4/5/2006	19:30	98.86	SB1-0405	7727-37-9	KN	Total Kjeld	834
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	E300.0A	METHOD	4/3/2006	18:45	4/4/2006	4/7/2006	13:46	4/7/2006	13:46	98.86	SB1-0407	16887-00-(	CL	Chloride	1.88
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	E300.0A	METHOD	4/3/2006	18:45	4/4/2006	4/7/2006	13:46	4/7/2006	13:46	98.86	SB1-0407	16984-48-I	F	Fluoride	0.478
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	E300.0A	METHOD	4/3/2006	18:45	4/4/2006	4/7/2006	13:46	4/7/2006	13:46	98.86	SB1-0407	14797-55-(	NO3N	Nitrate-N	3.02
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	E300.0A	METHOD	4/3/2006	18:45	4/4/2006	4/7/2006	13:46	4/7/2006	13:46	98.86	SB1-0407	14797-65-(	NO2N	Nitrite-N	0.488
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	E300.0A	METHOD	4/3/2006	18:45	4/4/2006	4/7/2006	13:46	4/7/2006	13:46	98.86	SB1-0407	14808-79-(	SO4	Sulfate	3.82
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	ASTM D22	NONE	4/3/2006	18:45	4/4/2006			4/7/2006	12:14	98.86		MOISTURI	MOIST	Moisture	1.14
4.00EPAC	CHMC	F1470	J11JH8	J11JH8	N		SOIL	F147001	SW9045C	METHOD	4/3/2006	18:45	4/4/2006	4/7/2006	11:29	4/7/2006	11:29	98.86	SB1-0407	pH	PH	pH	7.2
4.00EPAC	CHMC	F1470	BS1S0405	BS1S0405	BS		SOIL	BS1S0405	E350.3	METHOD				4/5/2006	15:59	4/5/2006	15:59	100	SB1-0405	7664-41-7	NH3N	Ammonia-I	199
4.00EPAC	CHMC	F1470	BS1S0405	BS1S0405	BS		SOIL	BS1S0405	E351.4	METHOD				4/5/2006	19:04	4/5/2006	19:04	100	SB1-0405	7727-37-9	KN	Total Kjeld	741
4.00EPAC	CHMC	F1470	BS1S0424	BS1S0424	BS		SOIL	BS1S0424	ASTM E77	NONE						4/24/2006	15:41	100		TOC	TOC	Total Orga	9420
4.00EPAC	CHMC	F1470	BS2S0407	BS2S0407	BS		SOIL	BS2S0407	E300.0A	METHOD				4/7/2006	10:49	4/7/2006	10:49	100	SB1-0407	16887-00-(	CL	Chloride	25.4
4.00EPAC	CHMC	F1470	BS2S0407	BS2S0407	BS		SOIL	BS2S0407	E300.0A	METHOD				4/7/2006	10:49	4/7/2006	10:49	100	SB1-0407	16984-48-I	F	Fluoride	24.3
4.00EPAC	CHMC	F1470	BS2S0407	BS2S0407	BS		SOIL	BS2S0407	E300.0A	METHOD				4/7/2006	10:49	4/7/2006	10:49	100	SB1-0407	14808-79-(	SO4	Sulfate	27.1
4.00EPAC	CHMC	F1470	BS3S0407	BS3S0407	BS		SOIL	BS3S0407	E300.0A	METHOD				4/7/2006	10:59	4/7/2006	10:59	100	SB1-0407	14797-65-(	NO2N	Nitrite-N	6.07
4.00EPAC	CHMC	F1470	BS5S0407	BS5S0407	BS		SOIL	BS5S0407	E300.0A	METHOD				4/7/2006	11:18	4/7/2006	11:18	100	SB1-0407	14797-55-(	NO3N	Nitrate-N	39.1
4.00EPAC	CHMC	F1470	SB1-0405	SB1-0405	LB		SOIL	SB1-0405	E350.3	METHOD				4/5/2006	16:06	4/5/2006	16:06	100	SB1-0405	7664-41-7	NH3N	Ammonia-I	1.03
4.00EPAC	CHMC	F1470	SB1-0405	SB1-0405	LB		SOIL	SB1-0405	E351.4	METHOD				4/5/2006	19:06	4/5/2006	19:06	100	SB1-0405	7727-37-9	KN	Total Kjeld	43.9
4.00EPAC	CHMC	F1470	SB1-0407	SB1-0407	LB		SOIL	SB1-0407	E300.0A	METHOD				4/7/2006	11:28	4/7/2006	11:28	100	SB1-0407	16887-00-(	CL	Chloride	0.093
4.00EPAC	CHMC	F1470	SB1-0407	SB1-0407	LB		SOIL	SB1-0407	E300.0A	METHOD				4/7/2006	11:28	4/7/2006	11:28	100	SB1-0407	16984-48-I	F	Fluoride	0.5
4.00EPAC	CHMC	F1470	SB1-0407	SB1-0407	LB		SOIL	SB1-0407	E300.0A	METHOD				4/7/2006	11:28	4/7/2006	11:28	100	SB1-0407	14797-55-(	NO3N	Nitrate-N	0.5
4.00EPAC	CHMC	F1470	SB1-0407	SB1-0407	LB		SOIL	SB1-0407	E300.0A	METHOD				4/7/2006	11:28	4/7/2006	11:28	100	SB1-0407	14797-65-(	NO2N	Nitrite-N	0.5
4.00EPAC	CHMC	F1470	SB1-0407	SB1-0407	LB		SOIL	SB1-0407	E300.0A	METHOD				4/7/2006	11:28	4/7/2006	11:28	100	SB1-0407	14808-79-(	SO4	Sulfate	0.3
4.00EPAC	CHMC	F1470	SB1-0424	SB1-0424	LB		SOIL	SB1-0424	ASTM E77	NONE						4/24/2006	15:51	100		TOC	TOC	Total Orga	100

ExpectedV	Units	Dilution	MDL	RL	LabQualifi	Surrogate	Comments	ParValUnc	Recovery	LowerCont	UpperCont	Basis	ConcQual	MDLAdjus	RLAdjuste	SampleDe	LeachMeth	LeachDate	LeachTime	LeachLot	AnalysisLo	CalRefID
	MG/KG	1	132	377		N						D	=	132	377	J11JH8	NONE				SB1-0424	101405S1
	MG/KG	1	1	3.76	B	N						D	J	1.02	3.8	J11JH8	NONE				040506NH	040506NH3
	MG/KG	1	56.4	207		N						D	=	56.9	209	J11JH8	NONE				040506KN	040506TKN
	MG/KG	1	0.0575	0.473		N						D	=	0.0581	0.478	J11JH8	NONE				040706Q2	300A-013006
	MG/KG	1	0.0514	0.473	U	N						D	U	0.0519	0.478	J11JH8	NONE				040706Q2	300A-013006
	MG/KG	1	0.0445	0.473		N						D	=	0.0449	0.478	J11JH8	NONE				040706Q2	300A-013006
	MG/KG	1	0.0425	0.473		N						D	=	0.0429	0.478	J11JH8	NONE				040706Q2	300A-013006
	MG/KG	1	0.0764	0.473		N						D	=	0.0771	0.478	J11JH8	NONE				040706Q2	300A-013006
	PERCENT	1	0	0		N						D	=	0	0	J11JH8	NONE				040706MC	NONE
	PH UNITS	1	0	0		N						D	=	0	0	J11JH8	NONE				040706PH	NONE
200	MG/KG	1	0.534	2		N			99.3	75	125	D	=	0.534	2		NONE				040506NH	040506NH3
680	MG/KG	1	27.3	100		N			109	75	125	D	=	27.3	100		NONE				040506KN	040506TKN
8840	MG/KG	1	74.7	214		N			107	75	125	D	=	74.7	214		NONE				SB1-0424	101405S1
25	MG/KG	1	0.0607	0.5		N			102	70	130	D	=	0.0607	0.5		NONE				040706Q2	300A-013006
25	MG/KG	1	0.0543	0.5		N			97.3	70	130	D	=	0.0543	0.5		NONE				040706Q2	300A-013006
25	MG/KG	1	0.0806	0.5		N			108	70	130	D	=	0.0806	0.5		NONE				040706Q2	300A-013006
5.65	MG/KG	1	0.0449	0.5		N			107	70	130	D	=	0.0449	0.5		NONE				040706Q2	300A-013006
36	MG/KG	1	0.0469	0.5		N			109	70	130	D	=	0.0469	0.5		NONE				040706Q2	300A-013006
0	MG/KG	1	0.534	2	B	N						D	J	0.534	2		NONE				040506NH	040506NH3
0	MG/KG	1	27.3	100	B	N						D	J	27.3	100		NONE				040506KN	040506TKN
0	MG/KG	1	0.0607	0.5	B	N						D	J	0.0607	0.5		NONE				040706Q2	300A-013006
0	MG/KG	1	0.0543	0.5	U	N						D	U	0.0543	0.5		NONE				040706Q2	300A-013006
0	MG/KG	1	0.0469	0.5	U	N						D	U	0.0469	0.5		NONE				040706Q2	300A-013006
0	MG/KG	1	0.0449	0.5	U	N						D	U	0.0449	0.5		NONE				040706Q2	300A-013006
0	MG/KG	1	0.0806	0.5	B	N						D	J	0.0806	0.5		NONE				040706Q2	300A-013006
0	MG/KG	1	35	100	U	N						D	U	35	100		NONE				SB1-0424	101405S1

RECEIVED
MAY 2006

BIOASSAY REPORT
ACUTE SCREENING BIOASSAYS
Conducted April 17 through 18, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

May 4, 2006
Lab I.D. Nos. BN1565-01 thru -05
SDG Number BN1565

RC-051
F1470

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APPENDIX A. RAW DATA SHEETS
APPENDIX B. REFERENCE TOXICANT RAW DATA SHEETS
APPENDIX C. CHAIN OF CUSTODY

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. The tests were conducted from April 17 through 18, 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 March 21, 2006, through April 3, 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.

Table 1
Sample Cross-Reference

Client ID	Sample Date	Sample Location	Nematode test SDG	Analytical Lab SDG
J11JB8	03/21/2006	100-K RIPARIAN #5	BN1565-01	F1399
J11JB7	03/26/2006	100-K RIPARIAN #4	BN1565-02	F1421
J11JH5	03/28/2006	100-H RIPARIAN #8	BN1565-03	F1438
J11JH8	04/03/2006	UPPER RIPARIAN #12	BN1565-04	F1470
J11JH4	04/03/2006	100-F RIPARIAN #7	BN1565-05	F1471

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 un-recovered 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 April 17, 2006.

Table 2
***Caenorhabditis elegans* Results**
Test initiated on April 17, 2006

Client ID	Percent Survival	Percent Recovered
Control	90.0	96.7
J11JB8	63.3 [a]	96.7
J11JB7	30.0 [a]	86.7
J11JH5	50.0	93.3
J11JH8	50.0 [a]	90.0
J11JH4	70.0 [a]	96.7

[a] Indicates a statistically significant reduction when compared to the control at the p equal to 0.05 level using Equal Variance t Two Sample Test.

The nematode results indicated no statistically significant reduction in survival in the J11JH5 sample and a statistically significant reduction in survival in the J11JB8, J11JB7, J11JH8, and J11JH4 samples when compared to the control.

Test acceptability criteria was met with control survival of 90 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 April 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.

Table 4
Chronic Reference Toxicant Tests (ug/L)

Species (test)	LC_{50}	Control Chart Limits
Caenorhabditis elegans (survival)	52.6	40.8 to 100.3

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

CH2M HILL *TOXICITY TEST ORGANISM AND WATER QUALITY DATA*

Client: Washington Closure Hanford — Test Initiation: Date 4-17-06 — Test Termination: Date 4-18-06

Contact: — Technician: Johnson

Test Species/ID: *Caenorhabditis elegans* / Nem 011 /

/ /

Sample ID Number	Field ID	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Dechlor.	Ammonia NH_3-N mg/l	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
BH1565-01	J11J38	3/21/06	-	- / -	-	-	-
-02	J11J37	3/21/06	-	- / -	-	-	-
-03	J11J45	3/29/06	-	- / -	-	-	-
-04	J11J48	4/3/06	-	- / -	-	-	-
-05	J11J49	4/3/06	-	- / -	-	-	-
				/			
				/			
				/			
				/			
				/			
				/			
				/			
				/			

Test Species Information	ID# Nem 011	ID#	ID#	ID#
	Acute			
Organism Age at Initiation	4 days			
	—			
Test Container Size	15 mm petri			
Test Volume	2.33 g dry wt.			
Feeding: Type	none			
Amount	-			
Aeration: Began	none			
Amount	—			
Dilution Water ID#	Milli-Q Equiv.			
Acclimation Period	4 days			
Test Location	#7			
Organism Source				
Size (mm)	-	-	-	-
Loading Rate	-	-	-	-

Dilution Water	ID#	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$	Initial pH
Milli-Q equivalent Water	NA	0	0	NA

Comments: ☑ Indicates the following action was taken, (☐ Indicates action not taken):

Water Quality Meters Used/ID#

Dissolved Oxygen #2 pH #3 Conductivity #2

CH2M HILL TODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client: Washington Closure Hanford
Sample Description: see below
Test Species: *Caenorhabditis elegans* ID#: Nem 011

Tech. 0 Hrs NJ 24 Hrs NJ
Time 0 Hrs 0910 24 Hrs 1025

Beginning, Date ~~4-16-06~~ 4-17-06 NJ Time 0910
Ending, Date 4-18-06 Time 1025

Lab ID	Soil pH 0 hr	Soil pH 24 hr	Soil % Moisture 0 hr	Soil Temperature (°C) 0 hr	Soil Temperature (°C) 24 hr	Comments: All test soils were dried during sampling process.
Lab Control	7.5	~~6.7~~ 6.7 NJ		20.7	20.7	Each test chamber has 2.33 g dry wt. soil + 0.93 ml Milli-Q water (40% of sry wt.).
BN1565-01	6.7	6.3		20.7	20.7	Samples hydrated 7 days prior to test initiation.
BN1565-02	6.7	6.3		20.7	20.7	
BN1565-03	6.9	6.5		20.7	20.7	
BN1565-04	6.9	6.6		20.7	20.7	
BN1565-05	7.0	6.6		20.7	20.7	

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	Artificial Soil	A	3	BN1565-04	J11JH8	A	12				0
Lab Control	Artificial Soil	B	2	BN1565-04	J11JH8	B	7				0
Lab Control	Artificial Soil	C	18	BN1565-04	J11JH8	C	16				0
BN1565-01	J11JB8	A	4	BN1565-05	J11JH4	A	17				0
BN1565-01	J11JB8	B	14	BN1565-05	J11JH4	B	15				0
BN1565-01	J11JB8	C	1	BN1565-05	J11JH4	C	8				0
BN1565-02	J11JB7	A	10				0				0
BN1565-02	J11JB7	B	11				0				0
BN1565-02	J11JB7	C	9				0				0
BN1565-03	J11JH5	A	5				0				0
BN1565-03	J11JH5	B	13				0				0
BN1565-03	J11JH5	C	6				0				0

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client Washington Closure Hanford
Sample Description 8. Lab ID#: B
Test Species: *Caenorhabditis elegans* ID#: Nem 011

Beginning, Date 4-17-06 Time 0910
Ending, Date 4-18-06 Time 1025

Test Initiation: Tech: Tech: NJ Time: 0910

Test Termination: Tech: Tech: NJ Time: 1025

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

Chamber Number	Start Count 0	# alive found 24 hr	total # found 24 hr	Comments:
16	10	6	8	
17	10	7	10	
18	10	9	10	
19	10			
20	10			
21	10			
22	10			
23	10			
24	10			
25	10			
26	10			
27	10			
28	10			
29	10			
30	10			

CETIS Test Summary

Report Date: 27 Apr-06 2:22 PM
Test Link: 09-5002-9821/BN156501ce

Nematode 24 hour Acute test — CH2M Hill

Test No:	15-2936-4443	**Test Type:**	Nematode Survival	**Duration:**	25h
Start Date:	17 Apr-06 09:10 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	18 Apr-06 10:25 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	17 Apr-06 09:10 AM	**Brine:**			

Sample No:	08-3887-5702	**Code:**	BN1565-01	**Client:**	
Sample Date:	22 Mar-06	**Material:**	Sediment	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	26d 9h	**Station:**			

Comments: J11JB8

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
04-9564-1835	% Survival	< 100	100	N/A	11.50%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.63333	0.50000	0.70000	0.06667	0.11547	18.23%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	0.90000
100		0.70000	0.50000	0.70000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	09-5002-9821	09-5002-9821	27 Apr-06 2:22 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		N/A	11.50%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	4.76008	2.13185	0.0045	0.14622	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1598792	0.159879	1	22.66	0.00890	Significant Effect
Error	0.0282244	0.007056	4			
Total	0.18810356	0.1669353	5			

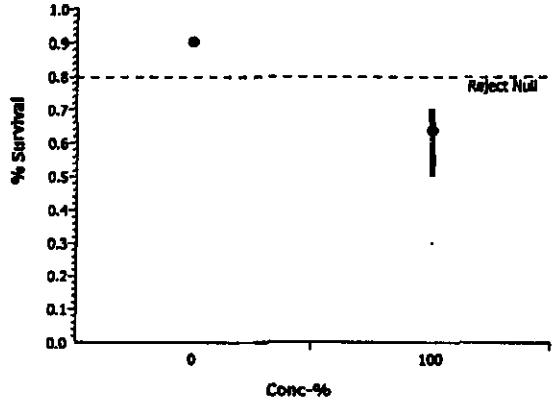
ANOVA Assumptions

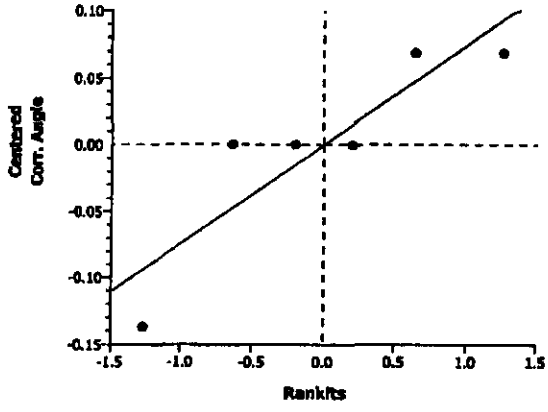
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4767834000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.81374		0.07784	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.63333	0.50000	0.70000	0.11547	0.92257	0.78540	0.99116	0.11879

Graphics





CETIS Test Summary

Report Date: 27 Apr-06 2:24 PM
Test Link: 02-2164-3682/BN156502ce

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	09-1547-8539	**Test Type:**	Nematode Survival	**Duration:**	25h
Start Date:	17 Apr-06 09:10 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	18 Apr-06 10:25 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	17 Apr-06 09:10 AM	**Brine:**			

Sample No:	13-4339-7398	**Code:**	BN1565-02	**Client:**	
Sample Date:	27 Mar-06	**Material:**	Sediment	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	21d 9h	**Station:**			

Comments: J11JB7

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
05-0227-4855	% Survival	< 100	100	N/A	0.00%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.30000	0.30000	0.30000	0.00000	0.00000	0.00%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	0.90000
100		0.30000	0.30000	0.30000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	02-2164-3682	02-2164-3682	27 Apr-06 2:24 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		N/A	0.00%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	6.0E+07	2.13185	0.0000	2.4E-08	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.6721566	0.672157	1	151356	0.00000	Significant Effect
Error	1.776E-15	4.44E-16	4			
Total	0.67215663	0.6721566	5			

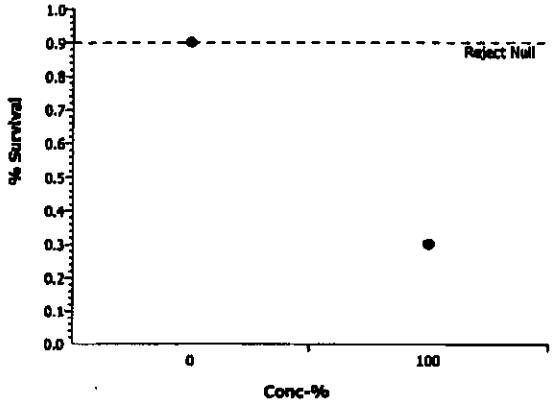
ANOVA Assumptions

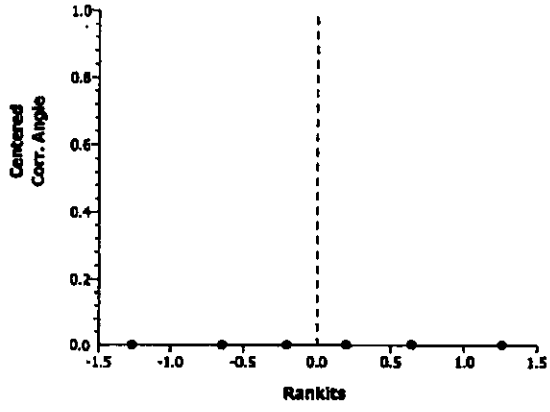
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.00000	199.00000	0.40000	Equal Variances

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.30000	0.30000	0.30000	0.00007	0.57964	0.57964	0.57964	0.00014

Graphics





CETIS Test Summary

Report Date: 27 Apr-06 2:27 PM
Test Link: 04-8183-7543/BN156503ce

Nematode 24 hour Acute test — CH2M Hill

Test No:	06-8780-2302	**Test Type:**	Nematode Survival	**Duration:**	25h
Start Date:	17 Apr-06 09:10 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	18 Apr-06 10:25 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	17 Apr-06 09:10 AM	**Brine:**			

Sample No:	05-8445-0621	**Code:**	BN1565-03	**Client:**	
Sample Date:	30 Mar-06	**Material:**	Sediment	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	18d 9h	**Station:**			

Comments: J11JH5

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
09-2582-8113	% Survival	100	> 100	N/A	48.31%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.50000	0.10000	0.80000	0.20817	0.36056	72.11%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	0.90000
100		0.80000	0.10000	0.60000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M HILL**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	04-8183-7543	04-8183-7543	27 Apr-06 2:27 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	48.31%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	2.04159	2.13185	0.0554	0.49849	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.3418475	0.341848	1	4.17	0.11074	Non-Significant Effect
Error	0.3260625	0.082016	4			
Total	0.66990995	0.4238631	5			

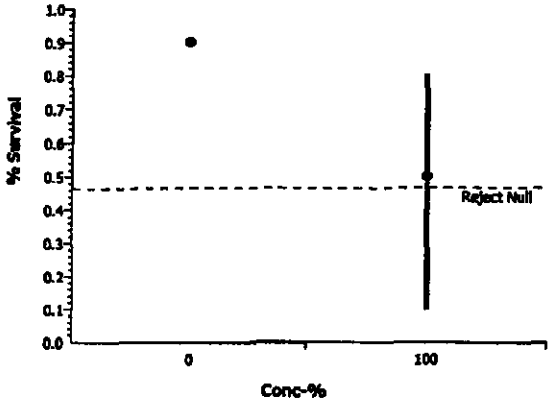
ANOVA Assumptions

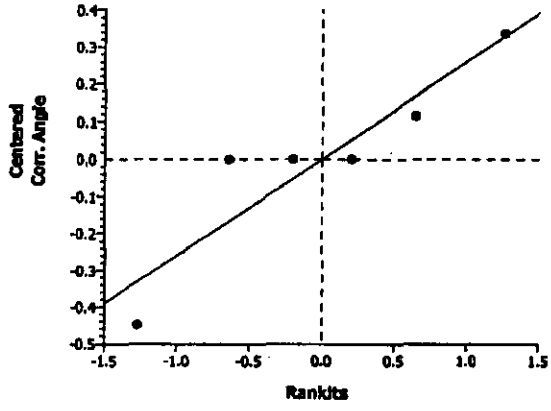
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5541836000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.87938		0.26612	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.50000	0.10000	0.80000	0.36056	0.77166	0.32175	1.10715	0.40501

Graphics





CETIS Test Summary

Report Date: 27 Apr-06 2:29 PM
Test Link: 04-2752-0189/BN156504ce

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	10-5989-3435	**Test Type:**	Nematode Survival	**Duration:**	25h
Start Date:	17 Apr-06 09:10 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	18 Apr-06 10:25 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	17 Apr-06 09:10 AM	**Brine:**			

Sample No:	11-4001-4512	**Code:**	BN1565-04	**Client:**	
Sample Date:	04 Apr-06	**Material:**	Sediment	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	13d 9h	**Station:**			

Comments: J11JH8

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-5808-3906	% Survival	< 100	100	N/A	9.53%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.50000	0.40000	0.60000	0.05774	0.10000	20.00%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	0.90000
100		0.40000	0.50000	0.60000

CETIS Analysis Detail

Nematode 24 hour Acute test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
% Survival	Comparison	04-2752-0189	04-2752-0189	27 Apr-06 2:29 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		N/A	9.53%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	7.97646	2.13185	0.0007	0.12392	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.3224536	0.322454	1	63.62	0.00134	Significant Effect
Error	0.0202725	0.005068	4			
Total	0.34272615	0.3275218	5			

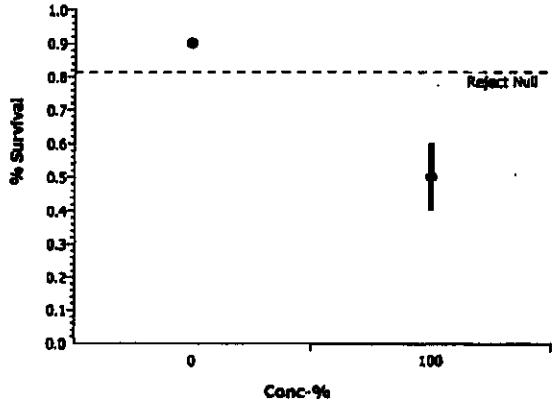
ANOVA Assumptions

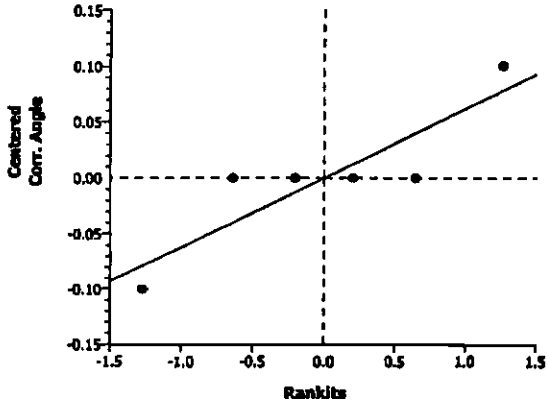
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3424558000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.82682		0.10101	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.50000	0.40000	0.60000	0.10000	0.78540	0.68472	0.88608	0.10068

Graphics





CETIS Test Summary

Report Date: 27 Apr-06 2:30 PM
Test Link: 12-6357-8957/BN156505ce

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	18-1406-4313	**Test Type:**	Nematode Survival	**Duration:**	25h
Start Date:	17 Apr-06 09:10 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	18 Apr-06 10:25 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	17 Apr-06 09:10 AM	**Brine:**			

Sample No:	04-3531-9532	**Code:**	BN1565-05	**Client:**	
Sample Date:	04 Apr-06	**Material:**	Sediment	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	13d 9h	**Station:**			

Comments: J11JH4

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
05-2085-7438	% Survival	< 100	100	N/A	5.45%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%
100		3	0.66667	0.60000	0.70000	0.03333	0.05774	8.66%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	0.90000
100		0.70000	0.60000	0.70000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	12-6357-8957	12-6357-8957	27 Apr-06 2:30 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		N/A	5.45%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	8.36269	2.13185	0.0006	0.07467	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1286994	0.128699	1	69.93	0.00112	Significant Effect
Error	0.0073611	0.001840	4			
Total	0.13606052	0.1305397	5			

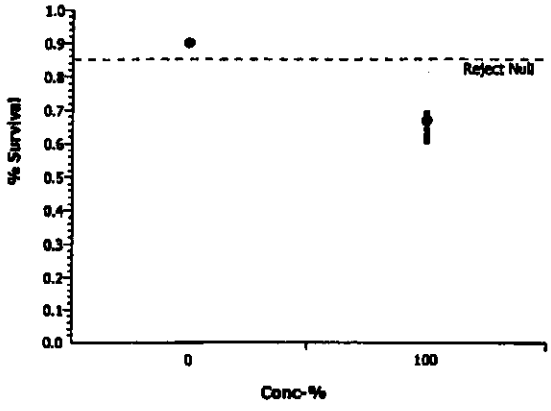
ANOVA Assumptions

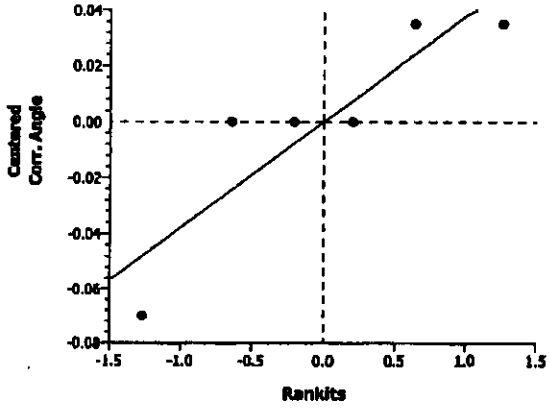
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1243488000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.81374		0.07784	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016
100		3	0.66667	0.60000	0.70000	0.05773	0.95613	0.88608	0.99116	0.06067

Graphics





APPENDIX B
REFERENCE TOXICANT DATA SHEETS

CH2M HILL NEMATODE TOXICITY TEST SURVIVAL DATA

Client QA / QC
Sample Description Cu as $CuCl_2xH_2O$ Lab ID#: B053-06
Test Species: *Caenorhabditis elegans* ID#: Nem 009

Beginning, Date 4-3-06 Time 0930
Ending, Date 4-4-06 Time 0830

Test Initiation: Tech: Tech: NJ Time: 0930 Test Termination: Tech: Tech: NJ Time: 0830

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

Comments:
* an extra nematode was added at test initiation but was still alive at test ending.

Endpoint	LC50	Cusum Chart Limits
Survival	52.6	40.9 to 100.3

Task Manager Natisha Johnson
Project Manager
QA Officer

CH2M HILL TODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client QA / QC
Sample Description see below
Test Specie *Caenorhabditis elegans* ID#: Nem009

Tech. 0 Hrs NJ 24 Hrs NJ
Time 0 Hrs 1930 24 Hrs 0930

Beginning, Date 4-3-06 Time 0930
Ending, Date 4-4-06 Time 0830

Lab ID	K-Medium pH		% Moisture	Temperature (°C)		Comments:
	0 hr	24 hr	0 hr	0 hr	24 hr	
Lab Control	5.8	~~6.2~~ 6.0 NJ	NA	21.7	21.7	
10 mg/L Cu	5.4	5.5	NA	21.9	21.7	
50 mg/L Cu	5.3	5.3	NA	21.9	21.7	
100 mg/L Cu	5.2	5.2	NA	21.9	21.7	
250 mg/L Cu	NJ ~~8~~ 4.9	4.8	NA	21.8	21.7	

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	K-medium	A	12	250 mg/L Cu		A	13				
Lab Control	K-medium	B	6	250 mg/L Cu		B	2				
Lab Control	K-medium	C	9	250 mg/L Cu		C	1				
10 mg/L Cu		A	15								
10 mg/L Cu		B	14								
10 mg/L Cu		C	5								
50 mg/L Cu		A	10								
50 mg/L Cu		B	11								
50 mg/L Cu		C	7								
100 mg/L Cu		A	3								
100 mg/L Cu		B	4								
100 mg/L Cu		C	8								

CETIS Test Summary

Report Date: 04 Apr-06 11:24 AM
Test Link: 01-8280-8779/rcea009

Nematode 24 hour Acute test — CH2M Hill

Test No:	07-1495-1310	Test Type:	Nematode Survival	Duration:	23h
Start Date:	03 Apr-06 09:30 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	04 Apr-06 08:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	03 Apr-06 09:30 AM	Brine:			

Sample No:	09-6954-2135	Code:	1B033-06	Client:	
Sample Date:	16 Jan-06	Material:	Copper	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	77d 9h	Station:			

Comments: 250 mg/L Cu in K medium

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
11-1509-7834	% Survival	50	52.63094	38.6932	68.37195	Linear Regression

% Survival Summary

Conc-µg/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	0.56667	0.30000	0.80000	0.14530	0.25166	44.41%
100		3	0.16667	0.10000	0.20000	0.03333	0.05774	34.64%
250		3	0.06667	0.00000	0.20000	0.06667	0.11547	173.21

% Survival Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1.00000	1.00000	1.00000
10		0.90000	1.00000	1.00000
50		0.80000	0.60000	0.30000
100		0.20000	0.20000	0.10000
250		0.00000	0.20000	0.00000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Linear Regression	01-8280-8779	01-8280-8779	04 Apr-06 11:24 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	No

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G	Chi-Sq	Critical	P-Value	Decision(0.05)
4	-46.54554	0.24538	0.39332	0.09484	15.56585	18.30704	0.11275	Non-Significant Heterogeneity

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
50	52.63094	38.6932	68.37195

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P-Value	Decision(0.05)
Slope	2.54243	0.3994823	1.759445	3.325415	6.364	0.00008	Significant
Intercept	0.6238645	0.7404562	-0.8274295	2.075159	0.843	0.41918	Not Significant

Residual Analysis

Attribute	Method	Statistic	Critical	P-Value	Decision(0.05)
Variances	Bartlett	2.977855	7.81473	0.39505	Equal Variances
Distribution	Shapiro-Wilk W	0.9184941		0.27369	Normal Distribution

Data Summary

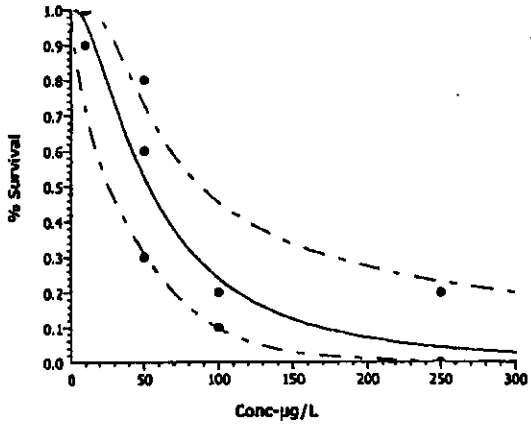
			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Dilution Water	3	1.00000	1.00000	1.00000	0.00000	0.00000	31	31
10		3	0.96667	0.90000	1.00000	0.01179	0.05773	29	30
50		3	0.56667	0.30000	0.80000	0.05137	0.25166	17	30
100		3	0.16667	0.10000	0.20000	0.01179	0.05774	5	30
250		3	0.06667	0.00000	0.20000	0.02357	0.11547	2	30

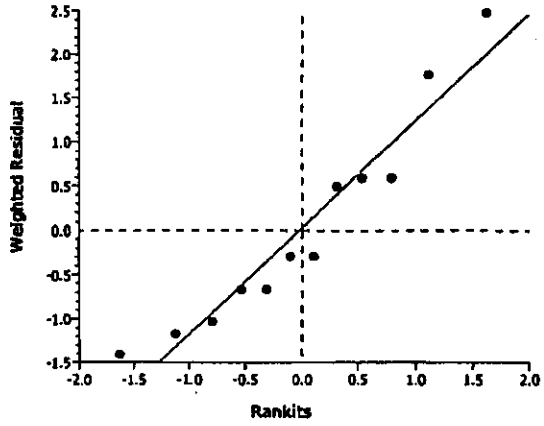
Data Detail

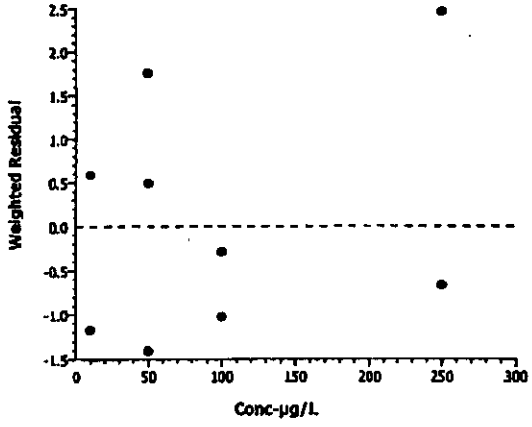
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1.00000	1.00000	1.00000							
10		0.90000	1.00000	1.00000							
50		0.80000	0.60000	0.30000							
100		0.20000	0.20000	0.10000							
250		0.00000	0.20000	0.00000							

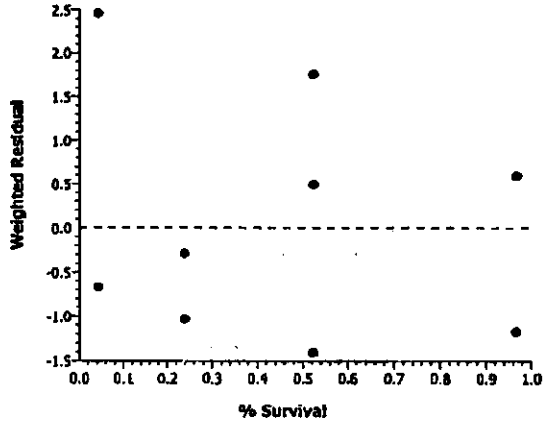
CETIS Analysis Detail

Graphics









APPENDIX C
CHAIN OF CUSTODY

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-69	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 100-K RIPARIAN #5		SAF No. RC-051	Air Quality ☐
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT	
Shipped To CH2MHILL	Offsite Property No. ~~A060131~~ TRE 3-16-06 A060380		Bill of Lading/Air Bill No.	

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									
J11JB8	SOIL	3-21-06	16:00	✓	✓							

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth M Tepper		CH2M Hill	
Relinquished By/Removed From: Elizabeth M Tepper	3-22-06 11:30	Received By/Stored In: [signature]	3/22/06 11:30
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

SPECIAL INSTRUCTIONS

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 property 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

F1349-01 · Seal 2

BN1565-01

BIOASSY COPY

Matrix *

SeSoil
SEsSediment
SOsSolid
SlsSludge
W=Water
OnOil
AnAir
DSsDrum Solids
DLsDrum Liquids
T=Tissue
WIsWipe
LnLiquid
VnVegetation
XnOther

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

BHI-EE-011 (08/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-68	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-K RIPARIAN #4		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

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										
J11JB7	SOIL	3-26-06	14:30	✓	—								

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth M Tepper	Date/Time	~~Received By/Stored In~~ CH2M Hill	Date/Time
Relinquished By/Removed From Elizabeth M Tepper	Date/Time 3-27-06 11:30	Received By/Stored In Wayne Hammond	Date/Time 3/27/06 11:30
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

SPECIAL INSTRUCTIONS

` 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

F14201-3012

BN1565-02

Batch #2 Copy

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
Ve=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-96	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-H RIPARIAN #8		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

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 Louisville.

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										
J11JH5	SOIL	3-28-06	15:00	1	1								

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tepper		CH2M Hill	
Relinquished By/Removed From	Date/Time 11:30	Received By/Stored In	Date/Time
Elizabeth M Tepper	3-29-06	[illegible]	3/29/06
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time 1130
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

SPECIAL INSTRUCTIONS

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(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

Batch # 3

F1438-501 2

BN/565-03

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W=Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vapor/Gas
X=Other

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

BHI-SE-011 (08/29/2005)

F1470

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-99	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location UPPER RIPARIAN #12		SAF No. RC-051
Ice Chest No. 1	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

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									
J11JH8	SOIL	4-3-06	18:45	1	1							-1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth M Tepper	Date/Time	Received By/Stored In CH2M Hill	Date/Time
Relinquished By/Removed From Elizabeth M Tepper	Date/Time 10:30 4-4-06	Received By/Stored In [illegible]	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In [illegible]	Date/Time 10:50
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

SPECIAL INSTRUCTIONS

' These marks indicate that unless lined out, analyses to be included with Strontium-89,90 -- Total Sr analysis fraction.

A- 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~~

ET 4-3-06

BN 1565-04

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
Li=Liquid
Ve=Vegetation
X=Other

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

BHI-EE-011 (08/29/2005)

132

F1471

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-95	Page 1 of 1
Collector ~~STANKOVICH, M.~~ L. Cellon 3-24-06	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 100-F RIPARIAN #7		SAF No. RC-051	Air Quality ☐
Ice Chest No.	Field Logbook No. EL-1596	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 aliquating, 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									
J11JH4	SOIL	4-3-06	19:00	1	1							^2

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From Elizabeth M Tepper		Received By/Stored In CH2M Hill	
Relinquished By/Removed From Elizabeth M Tepper	Date/Time 10:30 4-4-06	Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In [illegible] 4/4/06	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

* 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~~ ET 4-3-06

BN 1565-05

Matrix *
SeSoil
SlSalmon
SOSolid
SlSludge
W = Water
OtOil
AtAir
DSoDrum Solid
DLqDrum Liquid
TsTissue
WiWipe
LtLiquid
VtVegetation
XOther

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

BHI-EE-011 (08/29/2005)