0070472

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

COMPLETE COPY OF DATA PACKAGE TO:

Jill Thomson	H0-23	KW 7/27/06 INITIAL/DATE
Jackie Queen	H0-23	KW 7/27/06 INITIAL/DATE
Jeanette Duncan	H9-02	KW 7/27/06 INITIAL/DATE

RECEIVED
AUG 09 2006
EDMC

COMMENTS:

SDG F1399 SAF-RC-051

Rad only X Chem only Rad & Chem

X Complete Partial

Corrected Bluegrass Report for Soil Plant Toxicity

Waste Site: 100-K Riparian #5

ELR Consulting, Inc.

PROJECT MANAGEMENT, ENGINEERING, & TECHNICAL SERVICES

July 20, 2006

RECEIVED
JUL 2006
CONTROL

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

Dear Ms. Kessner:

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

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

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

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

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

Sincerely yours,

Emmett L. Richards
President

Enclosures

RC-051
F1399

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; ^{S}, 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 5, 2006																			
Laboratory Control		84	–	75.8	–	91.2	–	29.6	–	4.96	–	36.9	–	1.62	–	66.5	–	6.58	–
BG1542-01A	J10DW4A	88	ns	56.5	E ^{S}	49.2	E ^{S}	15.1	E ^{S}	2.71	E ^{S}	10.8	E ^{S}	0.95	E ^{S}	25.9	E ^{S}	3.66	E ^{S}
BG1542-02A	J10DV4A	60	ns	44.6	E ^{S}	29.3	E ^{S}	8.8	W ^{S}	1.86	E ^{S}	8.9	E ^{S}	0.98	E ^{S}	17.7	E ^{S}	2.85	E ^{S}
BG1542-03A	J10DT8A	100	ns	69.3	ns	56.8	E ^{S}	22.8	ns	3.58	ns	21.7	E ^{S}	1.36	ns	44.5	ns	4.94	ns
BG1542-08A	J10LJ5A	96	ns	51.5	E ^{S}	53.6	E ^{S}	16.9	E ^{S}	2.91	E ^{S}	23.0	E ^{S}	1.46	ns	39.9	E ^{S}	4.38	E ^{S}
BG1566-01	J11JB8	92	ns	56.8	E ^{S}	54.9	E ^{S}	27.8	ns	3.67	ns	33.7	ns	1.85	ns	61.5	ns	5.53	ns
BG1566-02	J11JB7	100	ns	53.9	E ^{S}	60.6	E ^{S}	18.6	E ^{S}	3.07	E ^{S}	28.5	ns	1.37	ns	47.1	ns	4.44	ns
BG1566-03	J11JH5	84	ns	63.0	ns	57.8	E ^{S}	23.6	ns	4.25	ns	32.5	ns	2.04	ns	56.1	ns	6.28	ns
BG1566-04	J11JH8	100	ns	64.8	ns	55.7	E ^{S}	24.9	ns	3.95	ns	30.8	ns	1.61	ns	55.7	ns	5.56	ns
BG1566-05	J11JH4	92	ns	64.7	E ^{S}	72.7	ns	23.1	ns	3.77	ns	31.7	ns	1.65	ns	54.9	ns	5.42	ns

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

Report Amended July 19, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

July 19, 2006
Lab I.D. Nos. BG1542-01A, -02A, -03A, and -08A
And BG1566-01 thru 05
SDG Number BG1566 and BG1542A

CONTENTS

Section	Page
INTRODUCTION	3
METHODS AND MATERIALS	3
TEST METHODS	3
TEST ORGANISMS	3
CONTROL SOIL	3
HYDRATION WATER	3
TEST CONCENTRATIONS	3
SAMPLE COLLECTION	4
SAMPLE CROSS-REFERENCE TABLE	4
SAMPLE PREPARATION	4
TEST INITIATION	5
TEST MONITORING	5
WATERING SCHEDULE	5
TEST TERMINATION	6
DATA ANALYSIS	7
RESULTS AND DISCUSSION	8
CHRONIC RESULTS	8
CERTIFICATION STATEMENT	10

APPENDIX A. RAW DATA SHEETS
APPENDIX B. CHAIN OF CUSTODY

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.

Following recommendations of an additional QA review, the statistical analysis for shoot height and root length presented in the original report (May 25, 2006) were recalculated. Subsequently, this document presents the amended results and serves as the final report.

METHODS AND MATERIALS

TEST METHODS

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

TEST ORGANISMS

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

CONTROL SOIL

The control soil used in the tests was artificial soil comprised of 70 grade silica sand (70 percent by weight), kaolin clay (20 percent), and peat moss (10 percent). Calcium carbonate (0.4 percent of total weight) was added to adjust soil pH to 7.0 ± 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 J10DW4A 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 J10DV4A 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 J10DT8A indicated a statistically significant reduction in average root length, and average root mass (wet) when compared to the laboratory control.

The results for sample J10LJ5A 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 a statistically significant reduction in average root length when compared to the laboratory control

The results for sample J10JH8 indicated a statistically significant reduction in average root length when compared to the laboratory control.

The results for sample J10JH4 indicated a statistically significant reduction in average stem (shoot) height 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 Bartlett 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; ^{S}, indicates statistically significant at alpha (α) = 0.05; –, indicates no statistical test performed.

Tests initiated on April 6, 2005

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?
Laboratory Control		84	–	75.8	–	91.2	–	29.6	–	4.96	–	36.9	–	1.62	–	66.5	–	6.58	–
BG1542-01A	J10DW4A	88	ns	56.5	E^{S}	49.2	E^{S}	15.1	E^{S}	2.71	E^{S}	10.8	E^{S}	0.96	E^{S}	25.9	E^{S}	3.66	E^{S}
BG1542-02A	J10DV4A	60	ns	44.6	E^{S}	29.3	E^{S}	8.8	W^{S}	1.86	E^{S}	8.9	E^{S}	0.98	E^{S}	17.7	E^{S}	2.85	E^{S}
BG1542-03A	J10DT8A	100	ns	69.3	ns	56.8	E^{S}	22.8	ns	3.58	ns	21.7	E^{S}	1.36	ns	44.5	ns	4.94	ns
BG1542-08A	J10LJ5A	96	ns	51.5	E^{S}	53.6	E^{S}	16.9	E^{S}	2.91	E^{S}	23.0	E^{S}	1.46	ns	39.9	E^{S}	4.38	E^{S}
BG1566-01	J11JB8	92	ns	56.8	E^{S}	54.9	E^{S}	27.8	ns	3.67	ns	33.7	ns	1.85	ns	61.5	ns	5.53	ns
BG1566-02	J11JB7	100	ns	53.9	E^{S}	60.6	E^{S}	18.6	E^{S}	3.07	E^{S}	28.5	ns	1.37	ns	47.1	ns	4.44	ns
BG1566-03	J11JH5	84	ns	63.0	ns	57.8	E^{S}	23.6	ns	4.25	ns	32.5	ns	2.04	ns	56.1	ns	6.28	ns
BG1566-04	J11JH8	100	ns	64.8	ns	55.7	E^{S}	24.9	ns	3.95	ns	30.8	ns	1.61	ns	55.7	ns	5.56	ns
BG1566-05	J11JH4	92	ns	64.7	E^{S}	72.7	ns	23.1	ns	3.77	ns	31.7	ns	1.65	ns	54.9	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 18 TP Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 32 [illegible]/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	6	5	5	5	5	5	5		
	C	5	7	7	8	8	8	8-25	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
Replicate B: 5 Lg G
Replicate C: 5 Lg G — removed: 1 Lg G, 2 mdt 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 Mdt 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	91 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 ~~995.35~~ 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	88 mm	40 mm	22 mm	mm	mm
Replicate B	~~110~~ 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 ~~979.44~~ NJ	1060.4	1022.39
Replicate B	1027.33	1253.6	1038.97
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:

MS

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

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

Bioassay Lab ID: BH 8H542-01 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 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance:

Replicate A: 1 Lg G, 1 Md G, 1 Sm G
Replicate B: 1 Lg G, 4 Md G — removed: 1 Md w/ brown tip, 1 Sm G
Replicate C: 3 Md G, 1 Sm G
Replicate D: 1 Lg G, 2 Md G, 2 Sm G
Replicate E: 1 Lg G, 4 Md 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 shaft, 1 Md G, 1 Sm G
Replicate B: 2 Lg G, 3 Md G
Replicate C: 2 Md G, 1 Md G w/ 1 B tip, 1 Sm w/ 1 B shaft 1 1 G shaft
Replicate D: 1 Lg G w/ 1 B shaft, 2 Md G, 2 Sm G
Replicate E: 1 Lg G, 3 Md G, 1 Md 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	1061.8	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	66 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	~~2015.490~~ 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: 19 Jul-06 9:15 AM
Test Link: 14-2145-6937/B154201psC

Plant Bioassay - Chronic — CH2M Hill

Test No:	08-9842-7406	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	05 Apr-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	05 Apr-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	18-1426-8954	Code:	B1542-01	Client:	
Sample Date:	31 Oct-05	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	156d 0h	Station:			

Comments: J10DW4, E274801

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
12-6240-8747	% Germination	100	> 100	N/A	27.99%	Wilcoxon Rank Sum Two-Sample
07-3590-2024	Average Height (mm)	< 100	100	N/A	13.17%	Equal Variance t Two-Sample
17-5063-9965	Average Length (mm)	< 100	100	N/A	24.87%	Equal Variance t Two-Sample
07-5263-2240	Average AG Wt (Wet, mg)	< 100	100	N/A	30.51%	Equal Variance t Two-Sample
10-1671-4027	Average AG Wt (Dry, mg)	< 100	100	N/A	30.89%	Equal Variance t Two-Sample
16-5188-4194	Average Root Wt. (Wet, mg	< 100	100	N/A	34.20%	Equal Variance t Two-Sample
10-0024-4642	Average Root Wt. (Dry, mg)	< 100	100	N/A	33.67%	Equal Variance t Two-Sample
09-5177-1719	Average Total Wt (Wet, mg	< 100	100	N/A	30.61%	Equal Variance t Two-Sample
09-0040-8336	Average Total Wt (Dry, mg)	< 100	100	N/A	31.34%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 9:15 AM
Test Link: 14-2145-6937/B154201psC

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%

Average Height (mm) Summary,

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	75.760	61	84.400	3.9903	8.9226	11.77%
100		5	56.52	45.3	65	3.5874	8.0217	14.19%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	91.22	50	117.40	11.4	25.491	27.94%
100		5	49.16	34.3	60.8	4.3468	9.7197	19.77%

Average AG Wt (Wet, mg) 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%

Average AG Wt (Dry, mg) 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	2.70991	2.03800	3.92800	0.32563	0.72814	26.87%

Average Root Wt. (Wet, mg) 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%

Average Root Wt. (Dry, mg) 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%

Average Total Wt (Wet, mg) 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	25.941	18.338	34.293	3.2461	7.2584	27.98%

Average Total Wt (Dry, mg) 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%

CETIS Test Summary

Report Date: 19 Jul-06 9:15 AM
Test Link: 14-2145-6937/B154201psC

% 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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	61	84.4000	75.8000	80.7	77
100		45.3	63.6	54.5	54.2000	65

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	50	117.400	99.8000	88.7	102.2
100		49.3	53.6	34.3	47.8	60.8

Average AG Wt (Wet, mg) 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		15.66	16.8920	10.8200	10.206	22.05

Average AG Wt (Dry, mg) 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	2.58800	2.29752	2.03800	3.92800

Average Root Wt. (Wet, mg) 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

Average Root Wt. (Dry, mg) 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	0.66400	1.41399

Average Total Wt (Wet, mg) Detail

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

Average Total Wt (Dry, mg) 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

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	14-2145-6937	14-2145-6937	19 Jul-06 8:14 AM	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	0.76898	Non-Significant Effect
Error	0.4233652	0.052921	8			
Total	0.42825247	0.0576079	9			

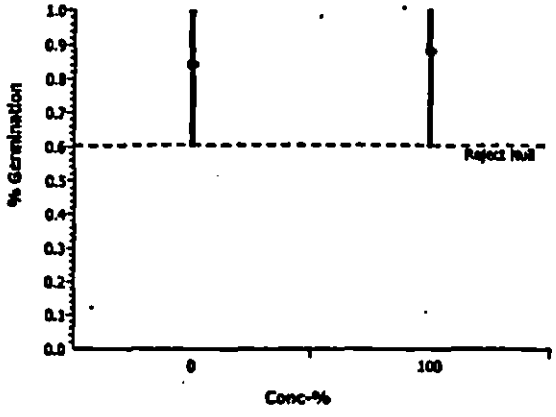
ANOVA Assumptions

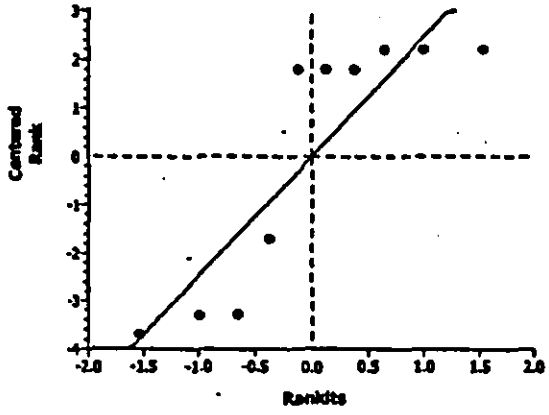
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.48569	23.15450	0.71064	Equal Variances
Distribution	Shapiro-Wilk W	0.76085		0.00484	Non-normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	14-2145-6937	14-2145-6937	19 Jul-06 8:14 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	13.17%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.5894	1.85955	0.0035	9.97796	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	927.3691	927.3691	1	12.88	0.00709	Significant Effect
Error	575.836	71.9795	8			
Total	1503.20508	999.34858	9			

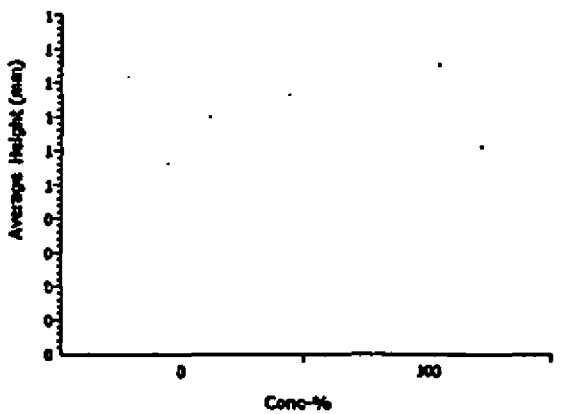
ANOVA Assumptions

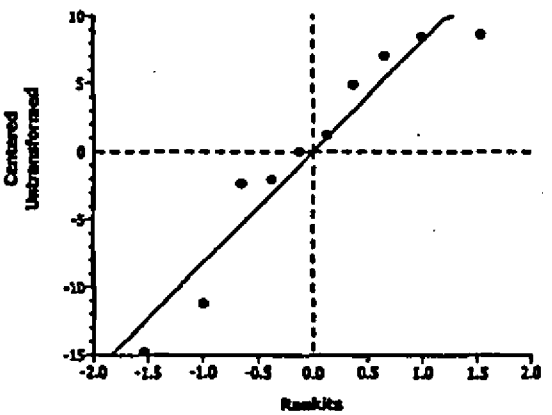
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.23723	23.15450	0.84154	Equal Variances
Distribution	Shapiro-Wilk W	0.90440		0.24472	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	75.780	61	84.4	8.9226				
100		5	56.52	45.3	65	8.0217				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	14-2145-6937	14-2145-6937	19 Jul-06 9:15 AM	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	24.87%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.44744	1.85955	0.0044	22.6872	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4422.609	4422.609	1	11.88	0.00873	Significant Effect
Error	2976.98	372.1225	8			
Total	7399.58887	4794.7314	9			

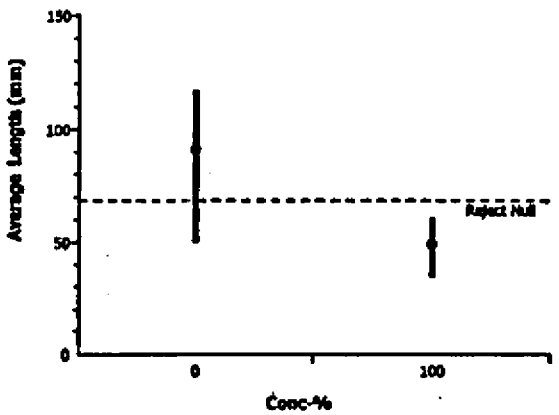
ANOVA Assumptions

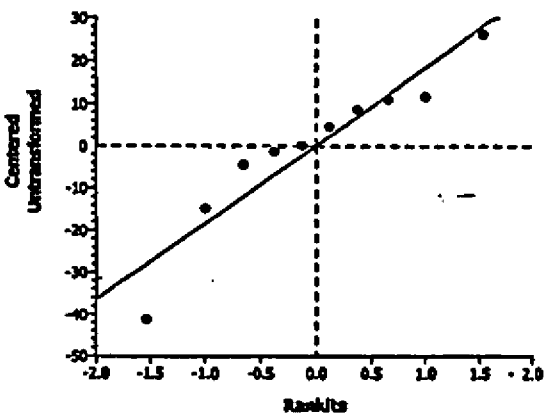
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.87786	23.15450	0.08850	Equal Variances
Distribution	Shapiro-Wilk W	0.91185		0.29394	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	91.22	50	117.4	25.491				
100		5	49.16	34.3	60.8	9.7197				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	14-2145-6937	14-2145-6937	19 Jul-06 8:14 AM	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			

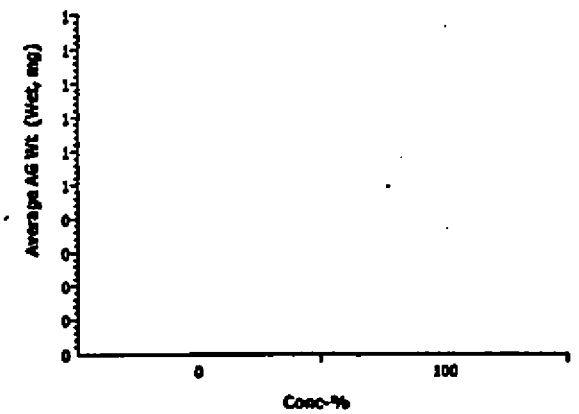
ANOVA Assumptions

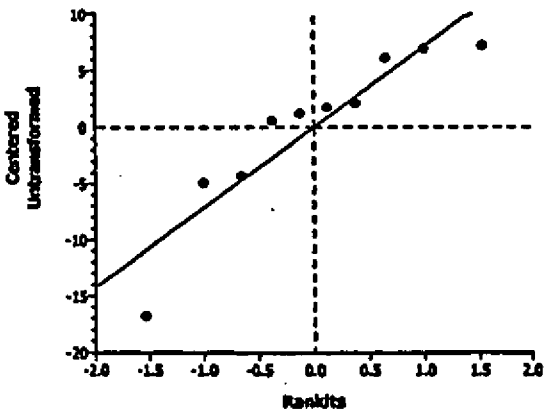
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.01387	23.15450	0.20694	Equal Variances
Distribution	Shapiro-Wilk W	0.85862		0.07350	Normal Distribution

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 Bioassay - Chronic — CH2M HILL

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	14-2145-6937	14-2145-6937	19 Jul-06 8:14 AM	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	2.73162	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			

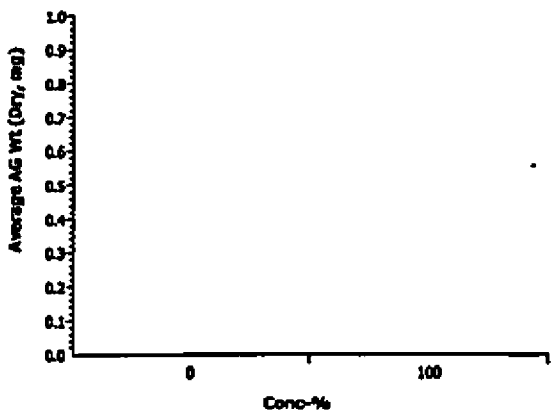
ANOVA Assumptions

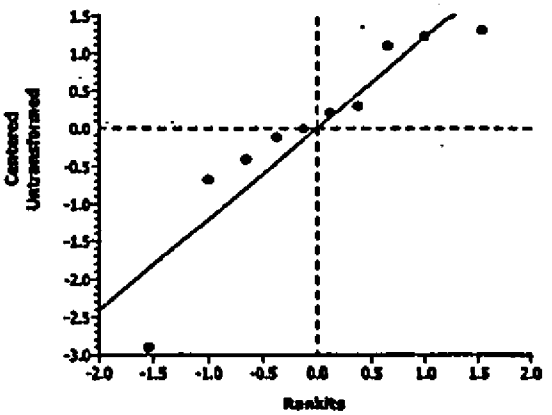
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.40119	23.15450	0.13118	Equal Variances
Distribution	Shapiro-Wilk W	0.86077		0.07792	Normal Distribution

Data Summary

Conc-%	Control Type	Count	Original Data Mean	Original Data Minimum	Original Data Maximum	Original Data SD	Transformed Data Mean	Transformed Data Minimum	Transformed Data Maximum	Transformed Data 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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	14-2145-6937	14-2145-6937	19 Jul-06 8:14 AM	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	0.0025	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			

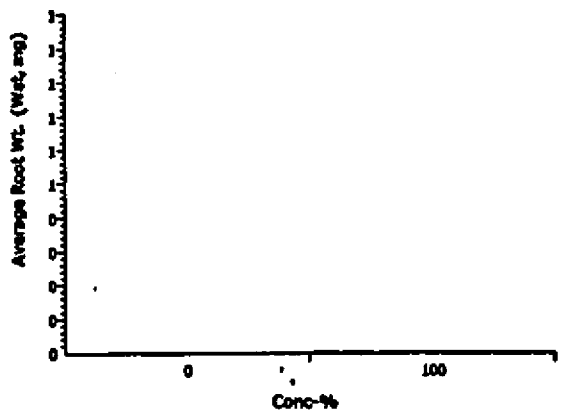
ANOVA Assumptions

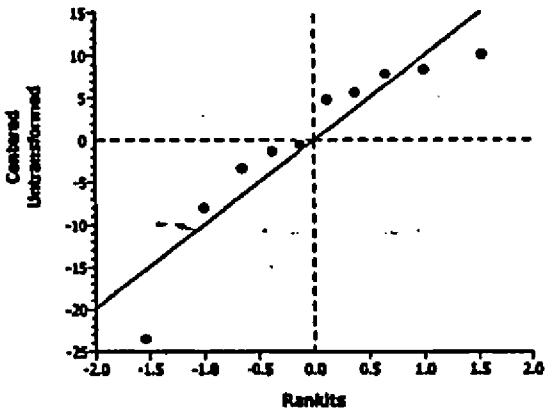
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.72166	23.15450	0.16192	Equal Variances
Distribution	Shapiro-Wilk W	0.88147		0.07941	Normal Distribution

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	6.3408				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	14-2145-6937	14-2145-6937	19 Jul-06 8:14 AM	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			

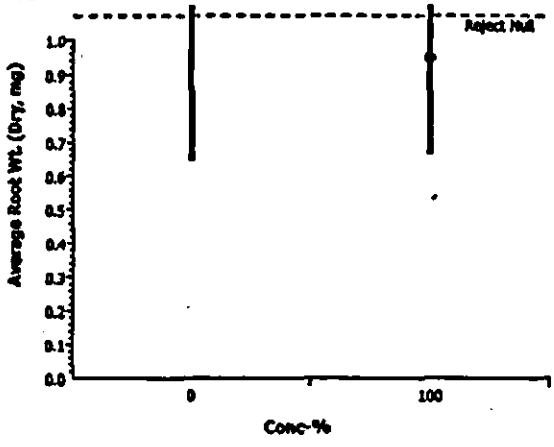
ANOVA Assumptions

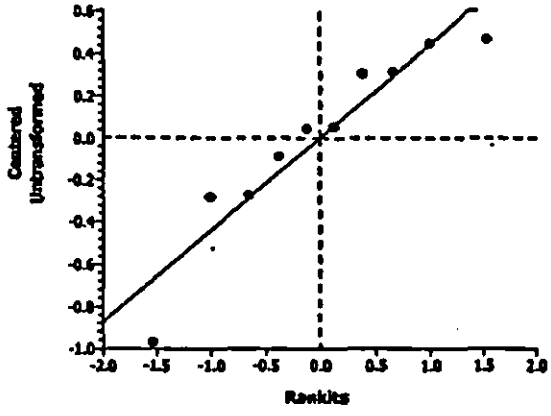
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.54078	23.15450	0.24827	Equal Variances
Distribution	Shapiro-Wilk W	0.89450		0.19044	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Total Wt (Wet, mg)	Comparison		14-2145-6937	14-2145-6937	19 Jul-06 8:14 AM	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			

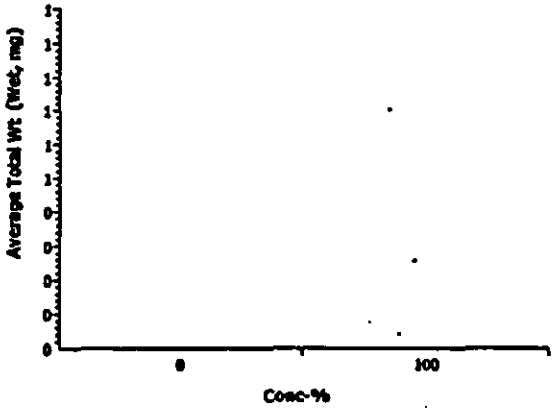
ANOVA Assumptions

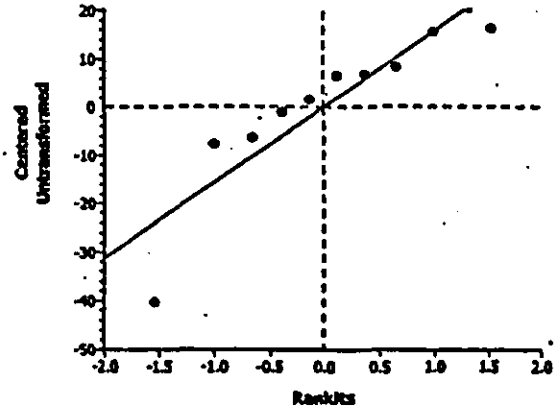
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.36698	23.15450	0.04371	Equal Variances
Distribution	Shapiro-Wilk W	0.82350		0.02793	Normal Distribution

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





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Total Wt (Dry, mg)	Comparison	14-2145-6937	14-2145-6937	19 Jul-06 8:14 AM	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	45.8999682	24.397555	9			

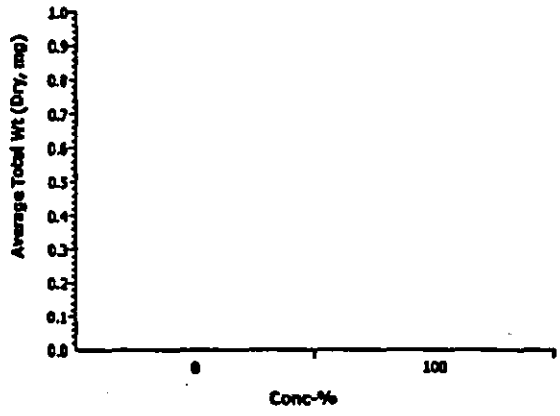
ANOVA Assumptions

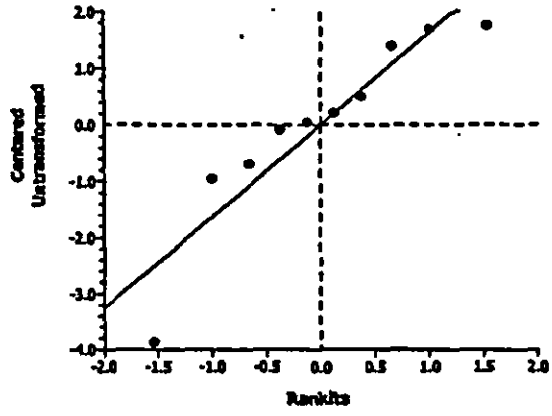
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.80730	23.15450	0.15749	Equal Variances
Distribution	Shapiro-Wilk W	0.86949		0.09860	Normal Distribution

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





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 (NP) Day 12 Bw Day 15 NJ Day 18 (TP) Day 19 NJ Day 21 NJ Day 23 (NP) Day 26 Bw Day 33 Bw/NJ

Bioassay Lab ID: BN B15V2-024 Sample No: J10 DV4

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	18 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	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 3 G shoots, 1 brown, 1 dark Green, 1 Sm 2 G shoots, 1 brown

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

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

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

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	29 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	~~1029~~ 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: 19 Jul-06 9:06 AM
Test Link: 04-8170-5301/B154202psC

Plant Bioassay - Chronic — CH2M Hill

Test No:	05-6800-9219	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	05 Apr-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	05 Apr-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

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
18-9781-9133	% Germination	100	> 100	N/A	32.24%	Equal Variance t Two-Sample
09-6520-4003	Average Height (mm)	< 100	100	N/A	13.24%	Equal Variance t Two-Sample
10-7495-4963	Average Length (mm)	< 100	100	N/A	23.60%	Equal Variance t Two-Sample
06-2244-4005	Average AG Wt (Wet, mg)	< 100	100	N/A	27.53%	Wilcoxon Rank Sum Two-Sample
16-5673-2573	Average AG Wt (Dry, mg)	< 100	100	N/A	29.97%	Equal Variance t Two-Sample
03-2953-5215	Average Root Wt. (Wet, mg	< 100	100	N/A	33.13%	Equal Variance t Two-Sample
14-7385-8785	Average Root Wt. (Dry, mg)	< 100	100	N/A	33.00%	Equal Variance t Two-Sample
12-4848-8881	Average Total Wt (Wet, mg	< 100	100	N/A	30.15%	Equal Variance t Two-Sample
13-5421-2953	Average Total Wt (Dry, mg)	< 100	100	N/A	29.82%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 9:06 AM
Test Link: 04-8170-5301/B154202psC

% 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%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	75.780	61	84.400	3.9903	8.9226	11.77%
100		5	44.580	32	54.700	3.6342	8.1263	18.23%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	91.22	50	117.40	11.4	25.491	27.94%
100		5	29.26	22.5	33.5	2.0131	4.5014	15.38%

Average AG Wt (Wet, mg) 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%

Average AG Wt (Dry, mg) 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	1.86100	1.20667	2.52496	0.25756	0.57593	30.95%

Average Root Wt. (Wet, mg) 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%

Average Root Wt. (Dry, mg) 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%

Average Total Wt (Wet, mg) 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	17.659	11.000	25.575	2.6359	5.894	33.38%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32668	1.00853	2.25514	34.29%
100		5	2.84546	1.78333	3.47495	0.30938	0.69180	24.31%

CETIS Test Summary

Report Date: 19 Jul-06 9:06 AM
Test Link: 04-8170-5301/B154202psC

% 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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	61	84.4000	75.8000	80.7	77
100		45.5	54.7000	44.5	32	46.2000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	50	117.400	99.8000	86.7	102.2
100		33.5	27	22.5	32.3	31

Average AG Wt (Wet, mg) 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

Average AG Wt (Dry, mg) 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

Average Root Wt. (Wet, mg) 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

Average Root Wt. (Dry, mg) 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

Average Total Wt (Wet, mg) 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

Average Total Wt (Dry, mg) 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

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	04-8170-5301	04-8170-5301	19 Jul-06 8:27 AM	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			

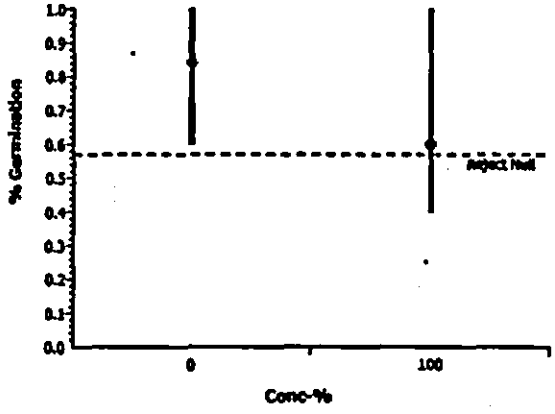
ANOVA Assumptions

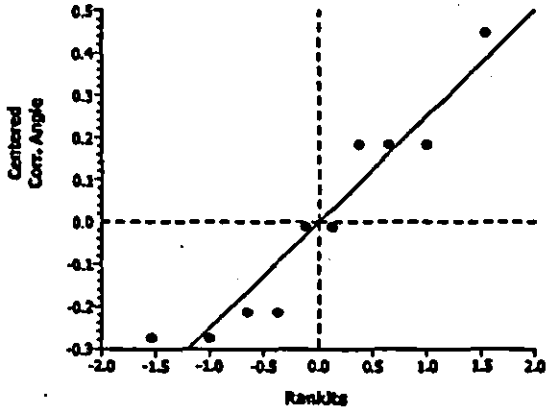
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.15127	23.15450	0.89470	Equal Variances
Distribution	Shapiro-Wilk W	0.89943		0.21598	Normal Distribution

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	0.88808	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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Height (mm)	Comparison	04-8170-5301	04-8170-5301	19 Jul-06 8:27 AM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	13.24%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	5.78077	1.85955	0.0002	10.0364	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2433.6	2433.6	1	33.42	0.00041	Significant Effect
Error	582.598	72.8245	8			
Total	3016.19611	2506.4246	9			

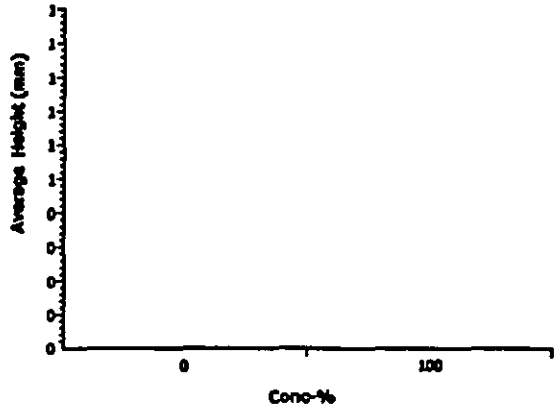
ANOVA Assumptions

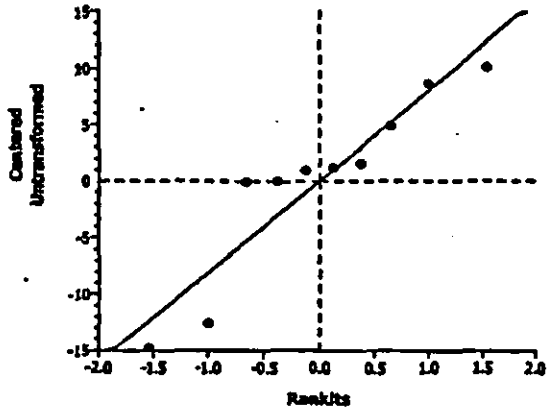
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.20557	23.15450	0.86060	Equal Variances
Distribution	Shapiro-Wilk W	0.87204		0.10558	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	75.780	61	84.4	8.9226				
100		5	44.580	32	54.7	8.1263				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Length (mm)	Comparison		04-8170-5301	04-8170-5301	19 Jul-06 9:06 AM	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	23.60%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	5.35239	1.85955	0.0003	21.5264	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	9597.604	9597.604	1	28.65	0.00068	Significant Effect
Error	2680.14	335.0175	8			
Total	12277.7437	9932.6210	9			

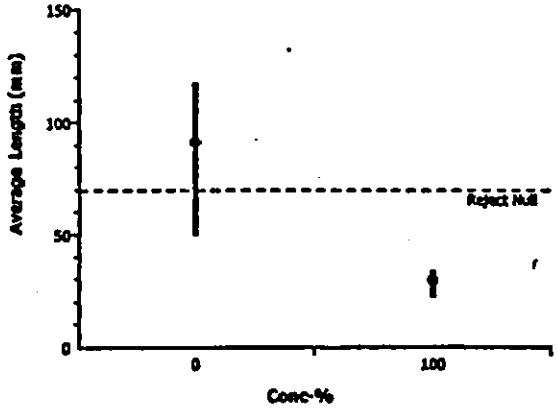
ANOVA Assumptions

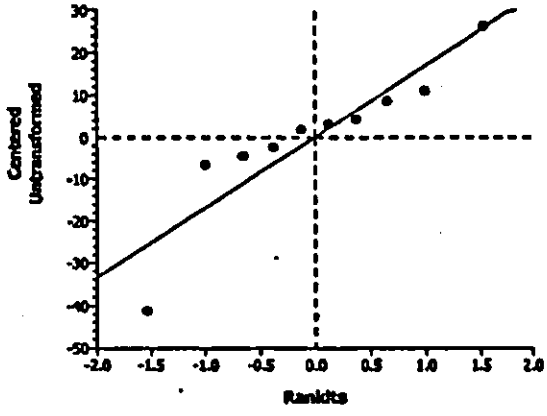
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	32.06692	23.15450	0.00538	Unequal Variances
Distribution	Shapiro-Wilk W	0.86549		0.08853	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	91.22	50	117.4	25.491				
100		5	29.26	22.5	33.5	4.5014				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	04-8170-5301	04-8170-5301	19 Jul-06 8:27 AM	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			

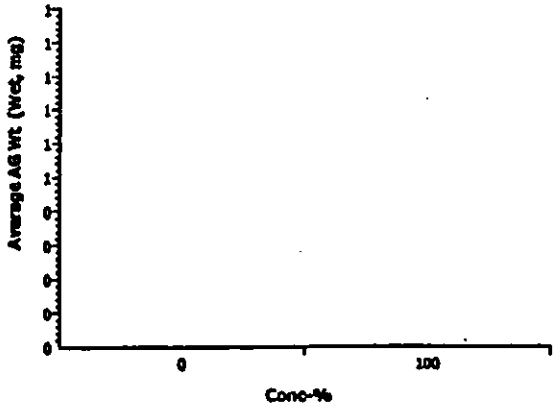
ANOVA Assumptions

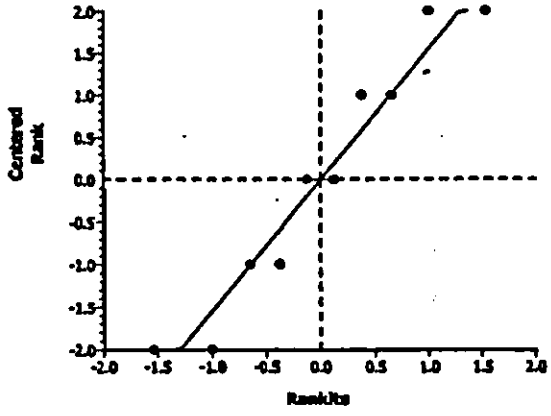
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	57.33263	23.15450	0.00174	Unequal Variances
Distribution	Shapiro-Wilk W	0.76115		0.00488	Non-normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	04-8170-5301	04-8170-5301	19 Jul-06 8:27 AM	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			

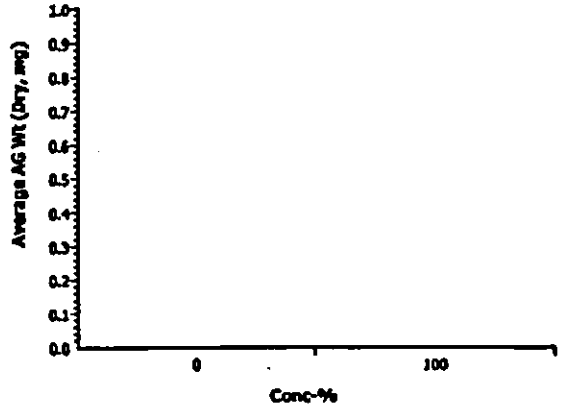
ANOVA Assumptions

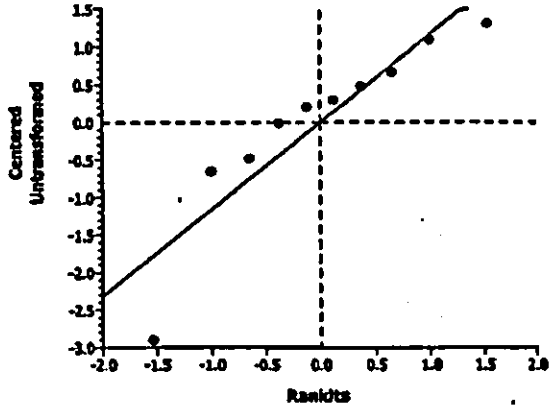
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.63338	23.15450	0.06018	Equal Variances
Distribution	Shapiro-Wilk W	0.85010		0.05825	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Root Wt. (Wet, mg)	Comparison		04-8170-5301	04-8170-5301	19 Jul-06 8:27 AM	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			

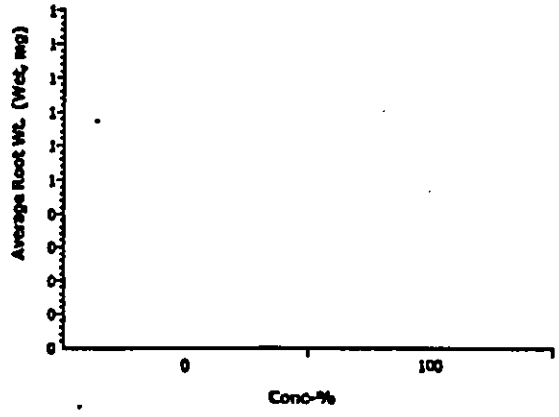
ANOVA Assumptions

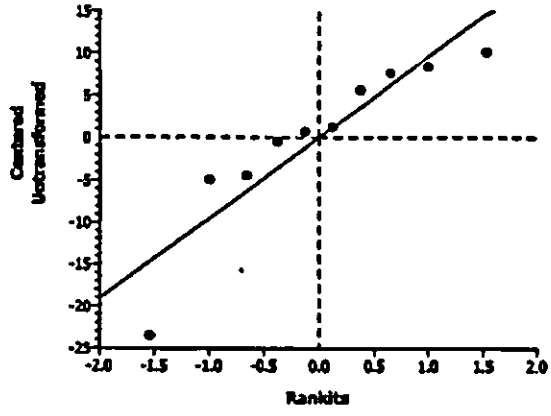
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.29820	23.15450	0.08013	Equal Variances
Distribution	Shapiro-Wilk W	0.84834		0.05551	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	04-8170-5301	04-8170-5301	19 Jul-06 8:27 AM	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			

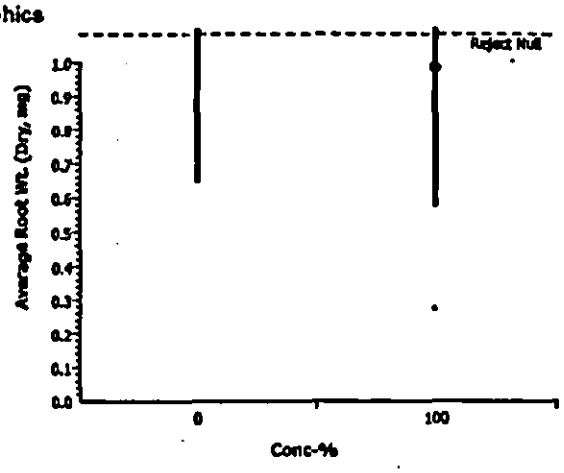
ANOVA Assumptions

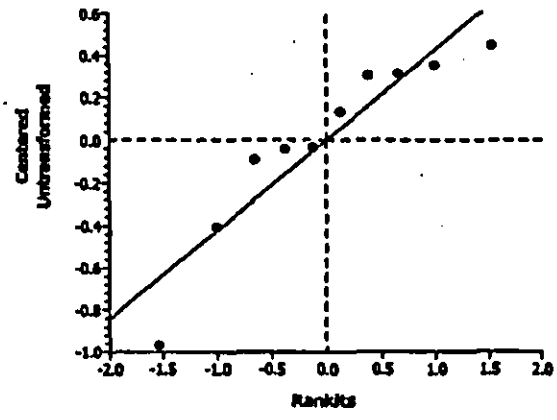
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.31054	23.15450	0.18604	Equal Variances
Distribution	Shapiro-Wilk W	0.87013		0.10032	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	04-8170-5301	04-8170-5301	19 Jul-06 8:27 AM	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			

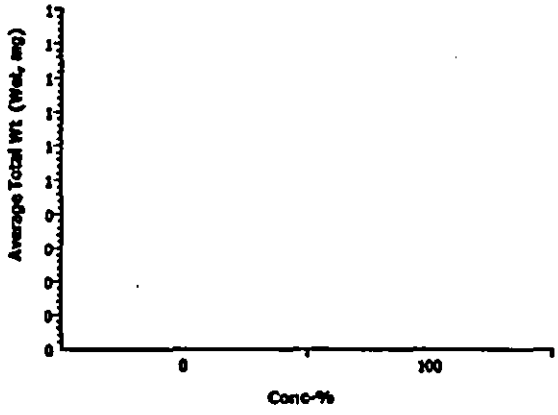
ANOVA Assumptions

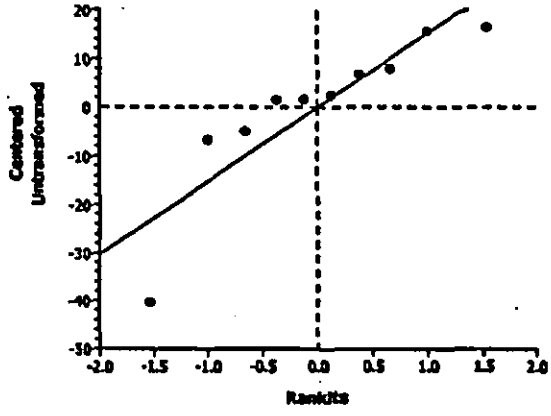
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	15.72240	23.15450	0.02060	Equal Variances
Distribution	Shapiro-Wilk W	0.80564		0.01698	Normal Distribution

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





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Total Wt (Dry, mg)	Comparison	04-8170-5301	04-8170-5301	19 Jul-06 8:27 AM	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			

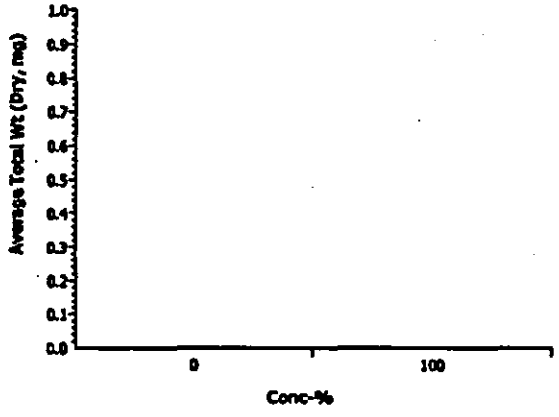
ANOVA Assumptions

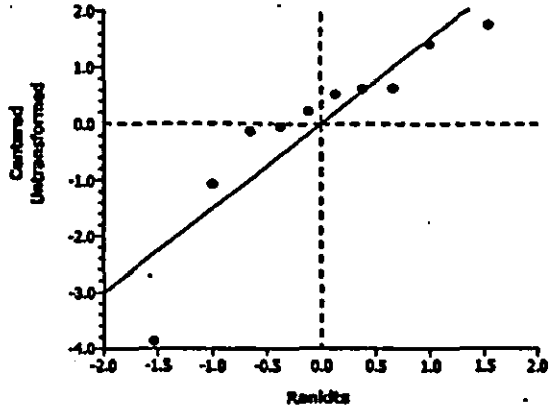
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.62648	23.15450	0.04184	Equal Variances
Distribution	Shapiro-Wilk W	0.82768		0.03137	Normal Distribution

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	2.84548	1.78333	3.47495	0.69180				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Day 0 (by water) (NJ) Day 12 Dm Day 14 (15) NJ Day 16 (TP) Day 19 NJ Day 21 NJ Day 23 (CG) Day 26 Dm Day 33 Dm

Bioassay Lab ID: BN 8/15 92.03/A 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 Md G

Replicate C: 5 Lg G

Replicate D: 5 Lg G — removed: 1 Lg G, 1 Md 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, 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: 5 Lg G, all w/ 1 B tip

Replicate B: 3 Lg G, 1 Lg G w/ 1 B shoot, 1 Md G

Replicate C: 5 Lg/Md G

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

Replicate E: 3 Lg G, 2 Md 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	~~7000~~ 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	25 mm	59 mm	mm
Replicate C	33 mm	50 mm	52 mm	50 mm	62 mm
Replicate D	79 mm	87 mm	75 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~~ 1013.77
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:

MS

CETIS Test Summary

Report Date: 19 Jul-06 11:05 AM
Test Link: 11-4025-3012/B154203psC

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	16-8138-6754	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	05 Apr-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	05 Apr-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

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
09-3899-3413	% Germination	100	> 100	N/A	20.96%	Equal Variance t Two-Sample
16-7824-0721	Average Height (mm)	100	> 100	N/A	14.80%	Equal Variance t Two-Sample
17-6766-6021	Average Length (mm)	< 100	100	N/A	25.33%	Equal Variance t Two-Sample
01-0398-0874	Average AG Wt (Wet, mg)	100	> 100	N/A	35.26%	Equal Variance t Two-Sample
09-5216-6543	Average AG Wt (Dry, mg)	100	> 100	N/A	35.38%	Equal Variance t Two-Sample
07-6762-5312	Average Root Wt. (Wet, mg	< 100	100	N/A	36.01%	Equal Variance t Two-Sample
10-3047-5360	Average Root Wt. (Dry, mg)	100	> 100	N/A	39.40%	Equal Variance t Two-Sample
17-9521-7694	Average Total Wt (Wet, mg	100	> 100	N/A	35.37%	Equal Variance t Two-Sample
09-3124-9971	Average Total Wt (Dry, mg)	100	> 100	N/A	35.95%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 11:05 AM
Test Link: 11-4025-3012/B154203psC

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	75.780	61	84.400	3.9903	8.9226	11.77%
100		5	69.320	56.200	77.6	4.5213	10.11	14.58%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	91.22	50	117.40	11.4	25.491	27.94%
100		5	56.780	43.8	72.400	4.9457	11.059	19.48%

Average AG Wt (Wet, mg) 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%

Average AG Wt (Dry, mg) 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%

Average Root Wt. (Wet, mg) 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%

Average Root Wt. (Dry, mg) 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%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	66.464	26.150	82.77	10.452	23.370	35.15%
100		5	44.469	24.534	62.600	7.1169	15.914	35.79%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.57761	2.70335	8.32666	1.00853	2.26514	34.29%
100		5	4.94160	2.82400	6.94801	0.77480	1.73251	35.06%

CETIS Test Summary

Report Date: 19 Jul-06 11:05 AM
Test Link: 11-4025-3012/B154203psC

% 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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	61	84.4000	75.8000	80.7	77
100		76.4000	77.6	60.6	75.8000	56.2000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	50	117.400	99.8000	86.7	102.2
100		56.8	61.5	49.4000	72.4000	43.8

Average AG Wt (Wet, mg) 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

Average AG Wt (Dry, mg) 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

Average Root Wt. (Wet, mg) 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

Average Root Wt. (Dry, mg) 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

Average Total Wt (Wet, mg) 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

Average Total Wt (Dry, mg) 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

CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
% Germination	Comparison	11-4025-3012	11-4025-3012	19 Jul-06 8:31 AM	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			

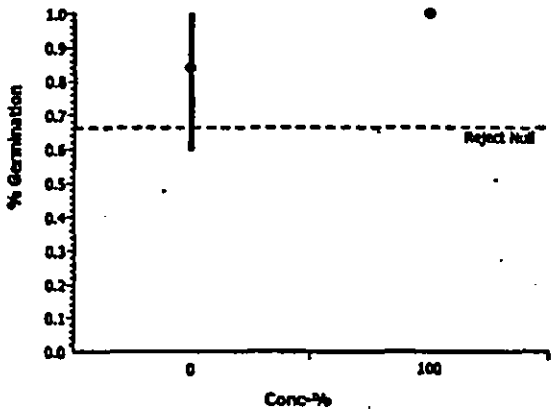
ANOVA Assumptions

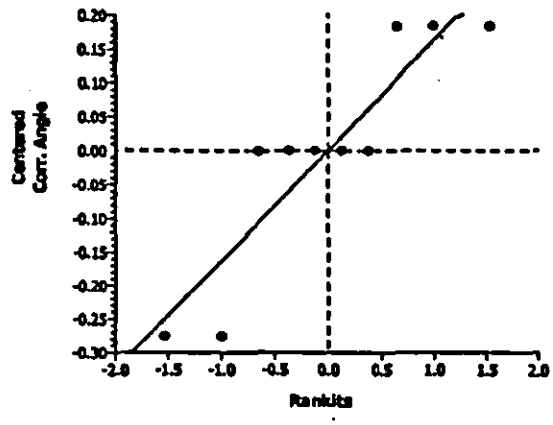
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	4.80000	11.25862	0.05984	Equal Variances
Distribution	Shapiro-Wilk W	0.81415		0.02153	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	11-4025-3012	11-4025-3012	19 Jul-06 8:31 AM	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	14.80%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.07125	1.85955	0.1577	11.2137	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	104.329	104.329	1	1.15	0.31531	Non-Significant Effect
Error	727.296	90.912	8			
Total	831.625015	195.241	9			

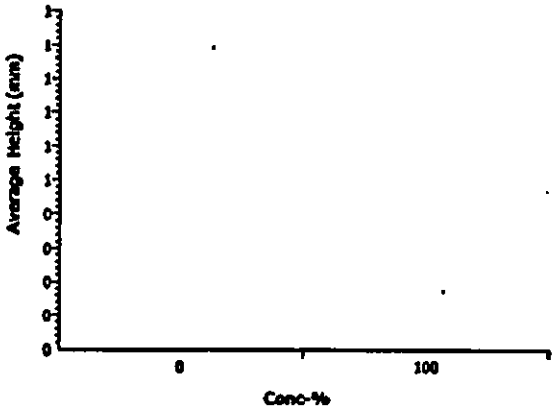
ANOVA Assumptions

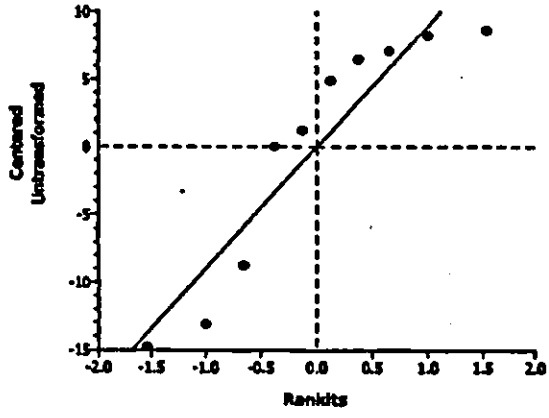
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.28388	23.15450	0.81452	Equal Variances
Distribution	Shapiro-Wilk W	0.84519		0.05090	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	75.780	61	84.4	8.9226				
100		5	69.320	56.2	77.6	10.110				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	11-4025-3012	11-4025-3012	19 Jul-06 11:05 AM	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	25.33%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.77152	1.85955	0.0121	23.1074	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2965.284	2965.284	1	7.68	0.02424	Significant Effect
Error	3088.296	386.037	8			
Total	6053.58008	3351.321	9			

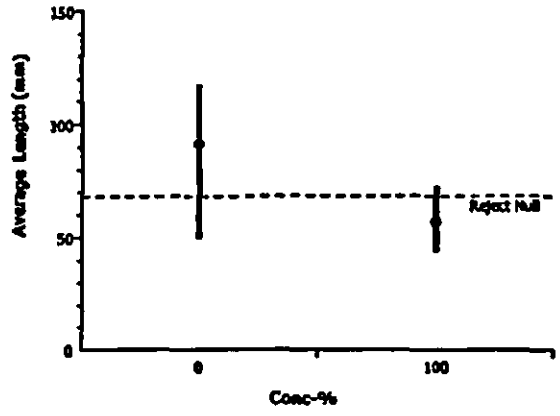
ANOVA Assumptions

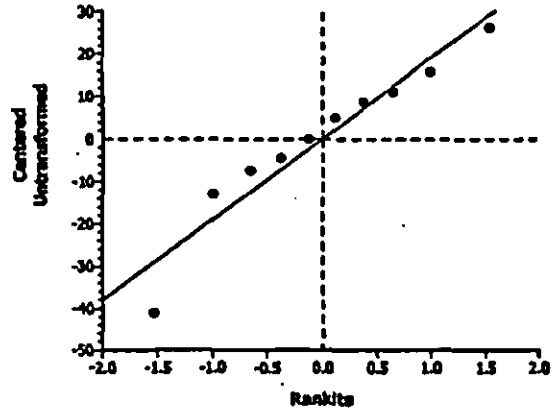
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.31285	23.15450	0.13466	Equal Variances
Distribution	Shapiro-Wilk W	0.93755		0.52613	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	91.22	50	117.4	25.491				
100		5	56.780	43.8	72.4	11.059				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	11-4025-3012	11-4025-3012	19 Jul-06 8:31 AM	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	1.21638	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			

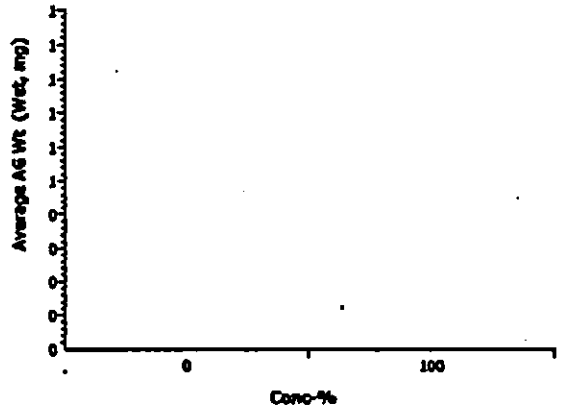
ANOVA Assumptions

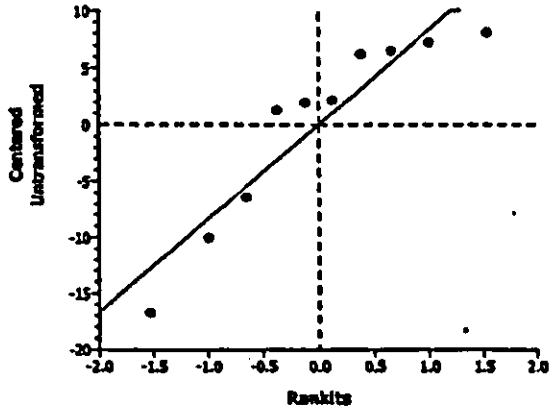
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.49579	23.15450	0.70595	Equal Variances
Distribution	Shapiro-Wilk W	0.86182		0.08017	Normal Distribution

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	12.633	36.826	9.717				
100		5	22.778	12.718	30.848	7.9451				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average AG Wt (Dry, mg)	Comparison	11-4025-3012	11-4025-3012	19 Jul-06 8:31 AM	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			

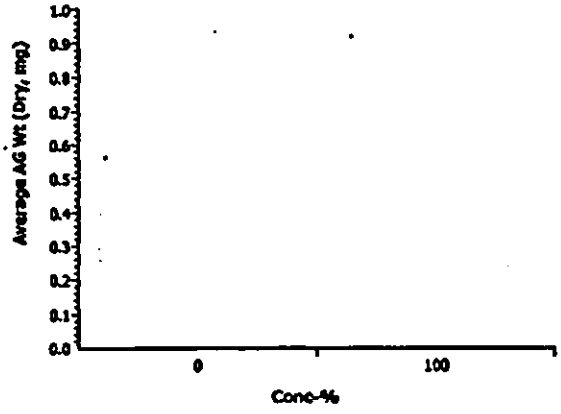
ANOVA Assumptions

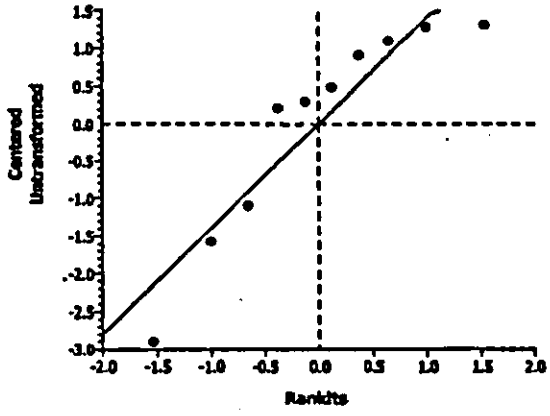
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.80195	23.15450	0.58241	Equal Variances
Distribution	Shapiro-Wilk W	0.85931		0.07488	Normal Distribution

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	2.05868	6.26333	1.69222				
100		5	3.57920	2.00800	4.85601	1.26063				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	11-4025-3012	11-4025-3012	19 Jul-06 8:31 AM	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			

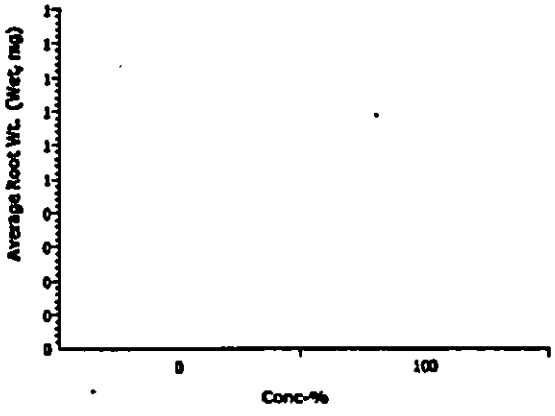
ANOVA Assumptions

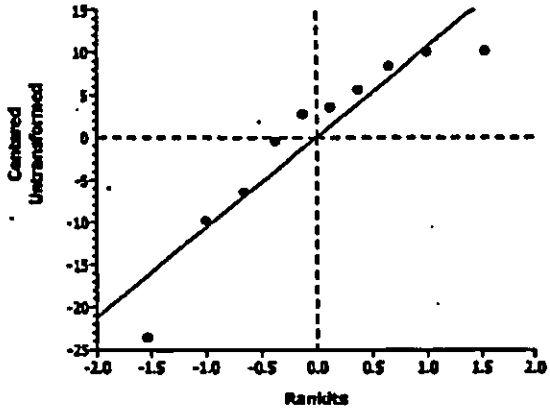
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.91398	23.15450	0.32495	Equal Variances
Distribution	Shapiro-Wilk W	0.87337		0.10940	Normal Distribution

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 Bioassay - Chronic					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Root Wt. (Dry, mg)	Comparison	11-4025-3012	11-4025-3012	19 Jul-06 8:31 AM	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			

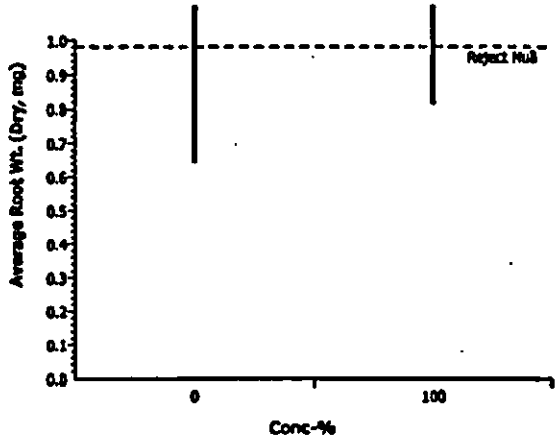
ANOVA Assumptions

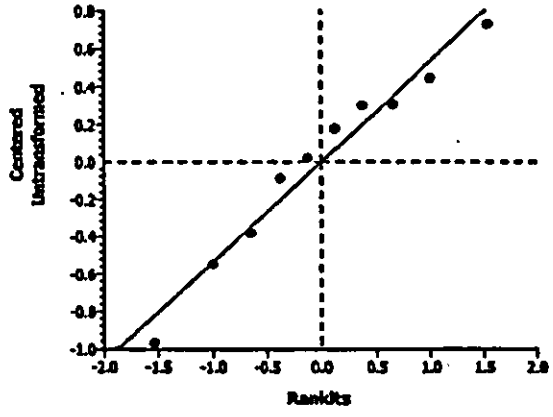
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.32217	23.15450	0.79323	Equal Variances
Distribution	Shapiro-Wilk W	0.96492		0.84022	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	11-4025-3012	11-4025-3012	19 Jul-06 8:31 AM	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			

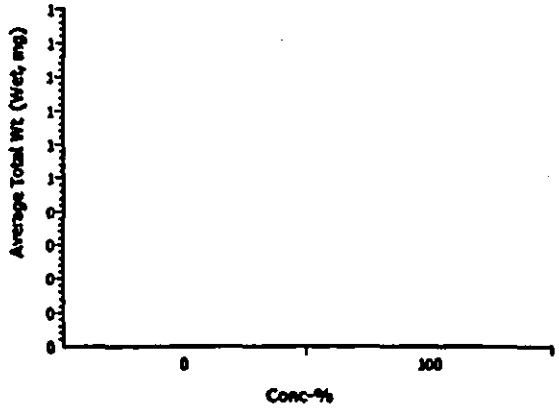
ANOVA Assumptions

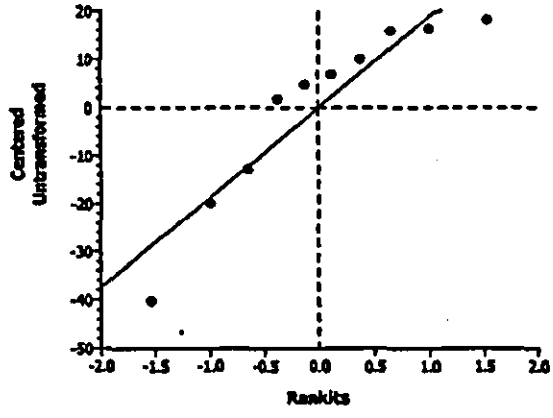
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.15665	23.15450	0.47497	Equal Variances
Distribution	Shapiro-Wilk W	0.86762		0.09378	Normal Distribution

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





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Total Wt (Dry, mg)	Comparison		11-4025-3012	11-4025-3012	19 Jul-06 8:31 AM	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	32.34898	4.043621	8			
Total	39.0402188	10.734875	9			

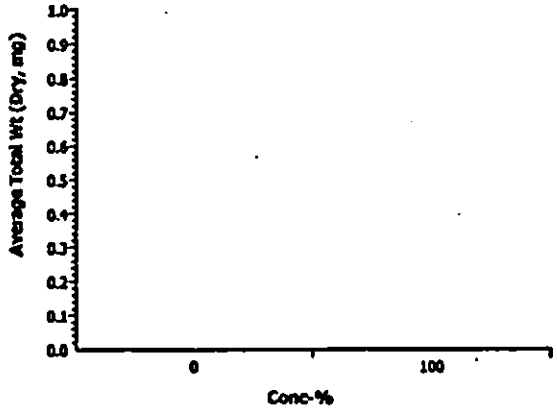
ANOVA Assumptions

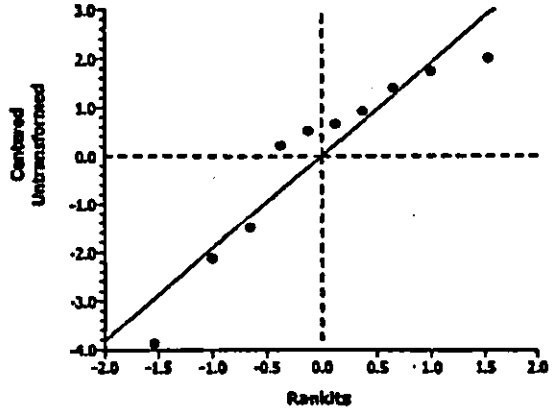
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.69432	23.15450	0.62201	Equal Variances
Distribution	Shapiro-Wilk W	0.88744		0.15864	Normal Distribution

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





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 (BR) Day 12 Bm Day 15 NJ Day 18 (TB) Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 33 Bm/NJ

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

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting (4-21)	19 days after planting (4-24)	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	~~4~~ 3	3	4	5	5	5	5		
	C	4	~~3~~ 4	5	5	5	5	4	5		
	D	6	~~3~~ 6	6	7	9	9	7 -> 5	5		
	E	4	~~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 Ls -> 5 Ls

Replicate B: 3 Ls + 2 Sm

Replicate C: 4 Ls + 3 broadleaf plants - broadleaf removed

Replicate D: 6 Ls, 1 Sm -> 5 Ls

Replicate E: 3 Ls + 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, 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 Ls G, 2 Md G, 1 Md G w/ 1 B tip, 1 Md G w/ 1 B shoot.

Replicate B: 2 Ls G, 1 Ls G w/ 2 B tips, 2 Sm G

Replicate C: 3 Ls 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 4 G shoots

Replicate E: 1 Ls 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	71 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	1024.21	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	75 mm
Replicate D	35 mm	51 mm	54 mm	79 mm	46 mm
Replicate E	65 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: 19 Jul-06 9:11 AM
Test Link: 07-8369-5277/B154208psC

Plant Bioassay - Chronic — CH2M Hill

Test No:	13-1444-4664	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	05 Apr-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	05 Apr-06	Brine:			

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

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
08-9339-6639	% Germination	100	> 100	N/A	22.99%	Equal Variance t Two-Sample
05-9747-9566	Average Height (mm)	< 100	100	N/A	13.83%	Equal Variance t Two-Sample
14-1673-3355	Average Length (mm)	< 100	100	N/A	24.80%	Equal Variance t Two-Sample
14-1079-1146	Average AG Wt (Wet, mg)	< 100	100	N/A	30.69%	Equal Variance t Two-Sample
15-7306-8313	Average AG Wt (Dry, mg)	< 100	100	N/A	30.26%	Equal Variance t Two-Sample
14-6069-9442	Average Root Wt. (Wet, mg	< 100	100	N/A	37.46%	Equal Variance t Two-Sample
01-4665-3750	Average Root Wt. (Dry, mg)	100	> 100	N/A	35.11%	Equal Variance t Two-Sample
08-4711-9313	Average Total Wt (Wet, mg	< 100	100	N/A	34.17%	Equal Variance t Two-Sample
09-1572-4544	Average Total Wt (Dry, mg)	< 100	100	N/A	31.11%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 9:11 AM
Test Link: 07-8369-5277/B154208psC

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	75.780	61	84.400	3.9903	8.9226	11.77%
100		5	51.48	39.6	64	3.9828	8.9057	17.30%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	91.22	50	117.40	11.4	25.491	27.94%
100		5	53.600	39.200	62.400	4.2459	9.4942	17.71%

Average AG Wt (Wet, mg) 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%

Average AG Wt (Dry, mg) 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%

Average Root Wt. (Wet, mg) 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%

Average Root Wt. (Dry, mg) 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%

Average Total Wt (Wet, mg) 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%

Average Total Wt (Dry, mg) 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%

CETIS Test Summary

Report Date: 19 Jul-06 9:11 AM
Test Link: 07-8369-5277/B154208psC

% 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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	61	84.4000	75.8000	80.7	77
100		50	39.6	64	49	54.8

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	50	117.400	99.8000	86.7	102.2
100		51.4000	39.2000	62.4000	53	62

Average AG Wt (Wet, mg) 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

Average AG Wt (Dry, mg) 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

Average Root Wt. (Wet, mg) 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

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.54667	1.92800	1.52800	2.06331	1.92001
100		1.37800	1.04600	2.04600	1.38199	1.45999

Average Total Wt (Wet, mg) 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	33.276	41.7975

Average Total Wt (Dry, mg) 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

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	07-8369-5277	07-8369-5277	19 Jul-06 8:36 AM	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			

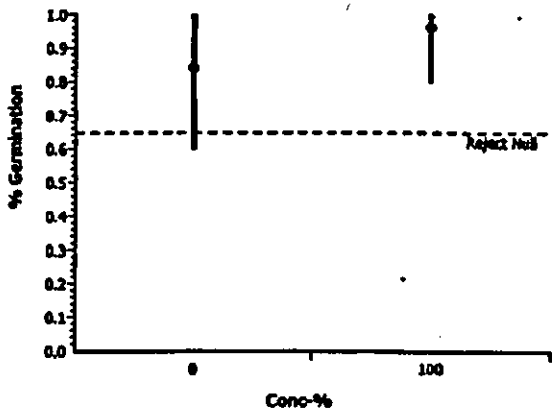
ANOVA Assumptions

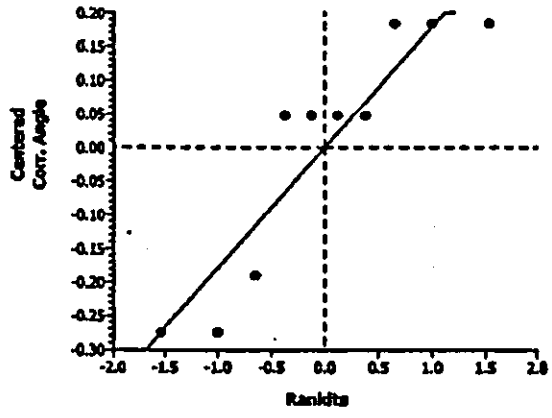
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.57779	23.15450	0.12462	Equal Variances
Distribution	Shapiro-Wilk W	0.82019		0.02548	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Height (mm)	Comparison	07-8369-5277	07-8369-5277	19 Jul-06 8:36 AM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	13.83%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.31019	1.85955	0.0013	10.4838	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1476.225	1476.225	1	18.58	0.00258	Significant Effect
Error	635.696	79.46201	8			
Total	2111.92114	1555.6871	9			

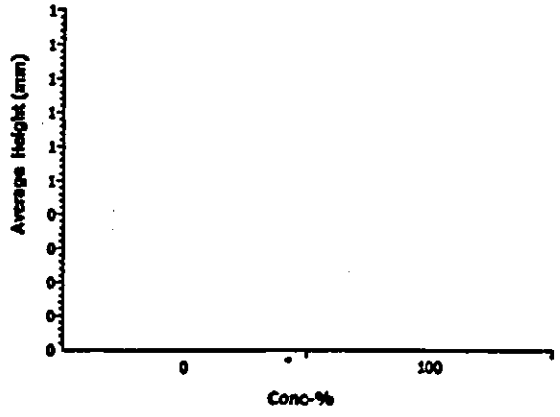
ANOVA Assumptions

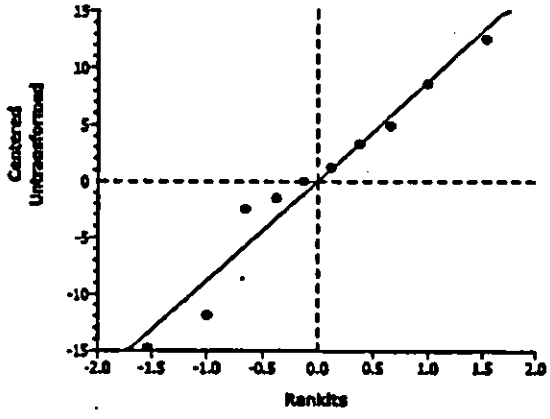
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00378	23.15450	0.99717	Equal Variances
Distribution	Shapiro-Wilk W	0.95429		0.71928	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	75.780	61	84.4	8.9226				
100		5	51.48	39.6	64	8.9057				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Length (mm)	Comparison	07-8369-5277	07-8369-5277	19 Jul-06 9:10 AM	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	24.80%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	3.09253	1.85955	0.0074	22.6210	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3538.161	3538.161	1	9.56	0.01483	Significant Effect
Error	2959.648	369.956	8			
Total	6497.80908	3908.1169	9			

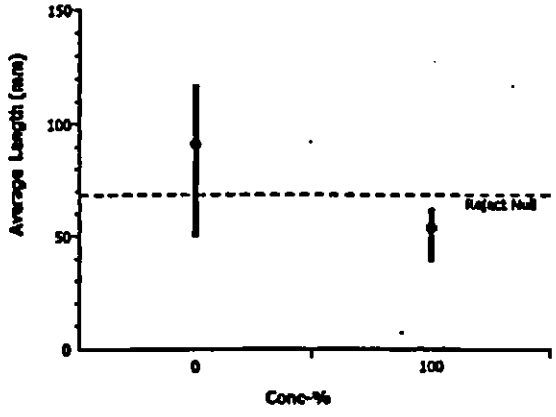
ANOVA Assumptions

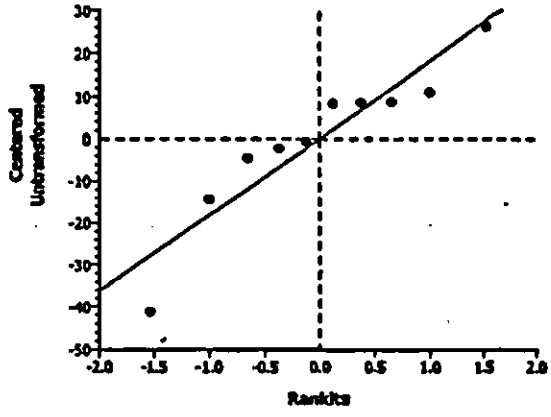
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.20848	23.15450	0.08182	Equal Variances
Distribution	Shapiro-Wilk W	0.89813		0.20895	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	91.22	50	117.4	25.491				
100		5	53.600	39.2	62.4	9.4942				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average AG Wt (Wet, mg)	Comparison		07-8369-5277	07-8369-5277	19 Jul-06 8:36 AM	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			

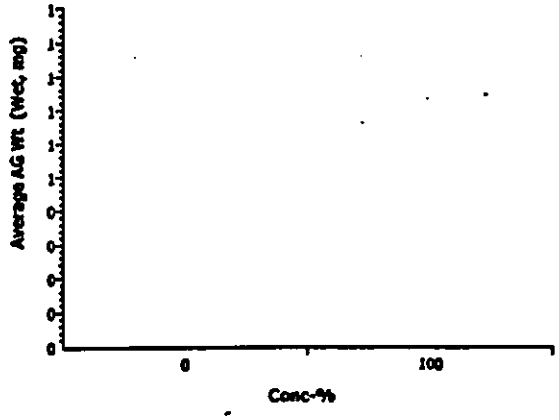
ANOVA Assumptions

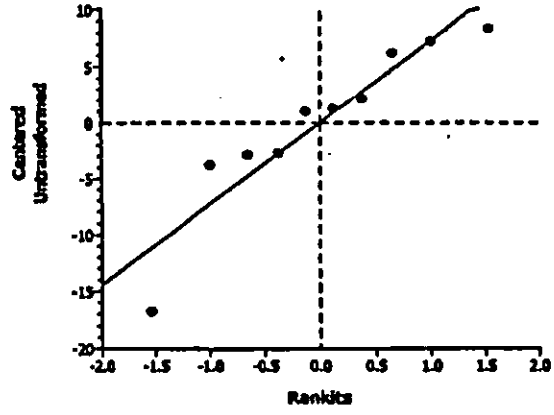
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.78474	23.15450	0.22556	Equal Variances
Distribution	Shapiro-Wilk W	0.88392		0.14468	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	07-8369-5277	07-8369-5277	19 Jul-06 8:36 AM	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			

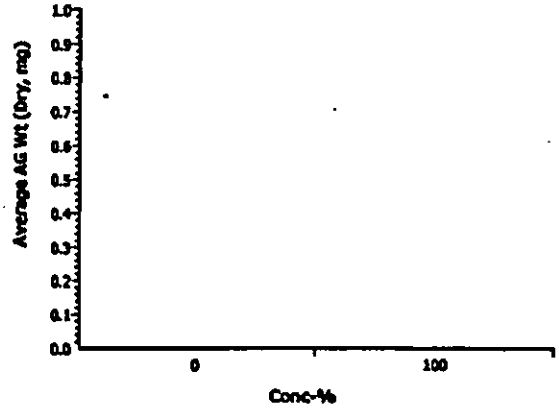
ANOVA Assumptions

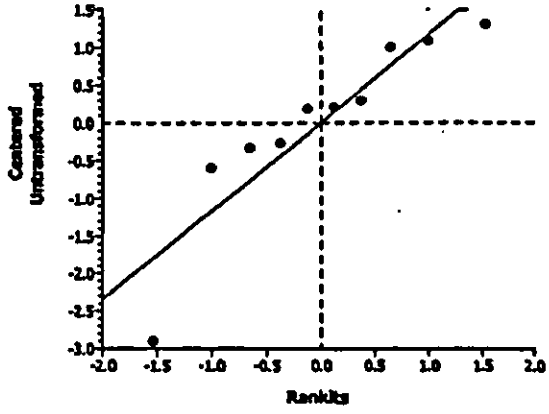
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.24704	23.15450	0.08109	Equal Variances
Distribution	Shapiro-Wilk W	0.84825		0.05537	Normal Distribution

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 Bioassay - Chronic CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	07-8369-5277	07-8369-5277	19 Jul-06 8:36 AM	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			

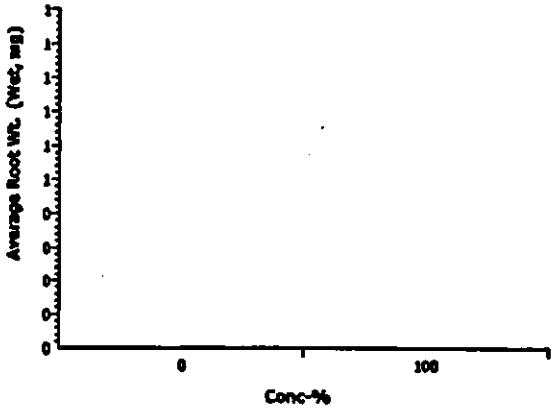
ANOVA Assumptions

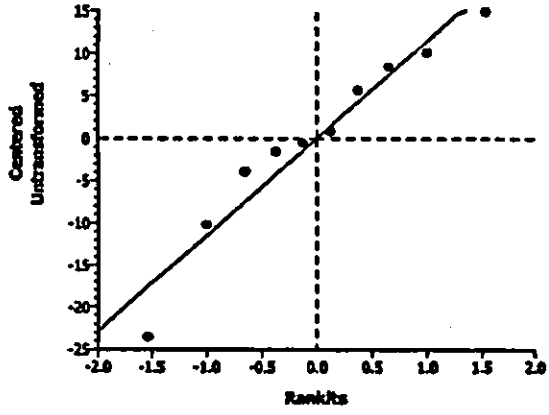
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.20379	23.15450	0.46291	Equal Variances
Distribution	Shapiro-Wilk W	0.94621		0.62394	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Root Wt. (Dry, mg)	Comparison		07-8369-5277	07-8369-5277	19 Jul-06 8:36 AM	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			

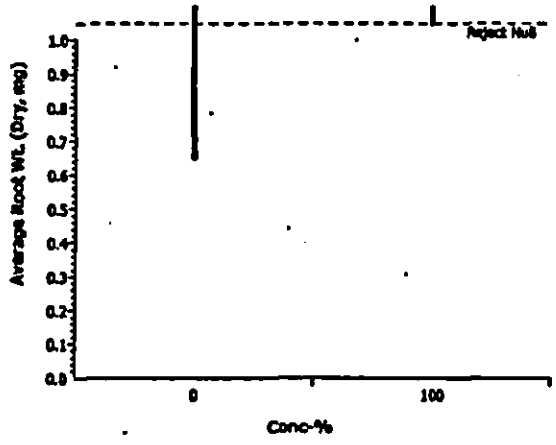
ANOVA Assumptions

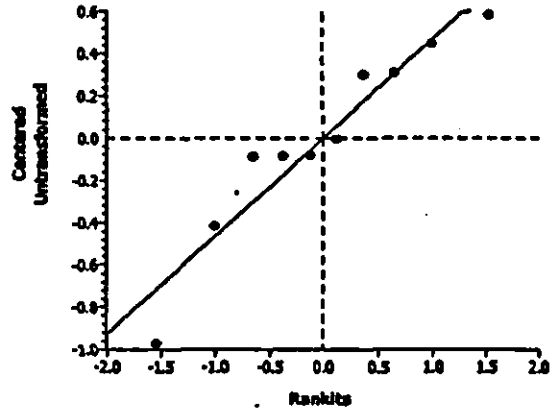
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.53463	23.15450	0.38967	Equal Variances
Distribution	Shapiro-Wilk W	0.92278		0.38072	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Total Wt (Wet, mg)	Comparison	07-8369-5277	07-8369-5277	19 Jul-06 8:36 AM	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			

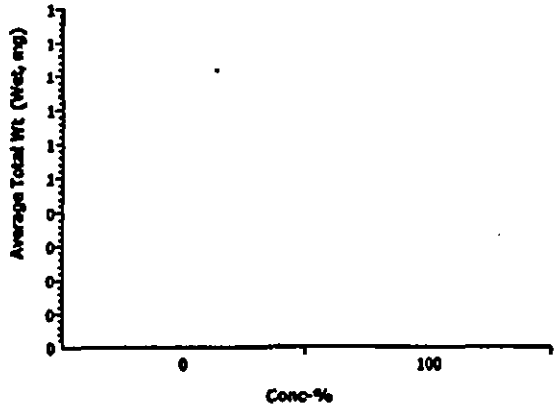
ANOVA Assumptions

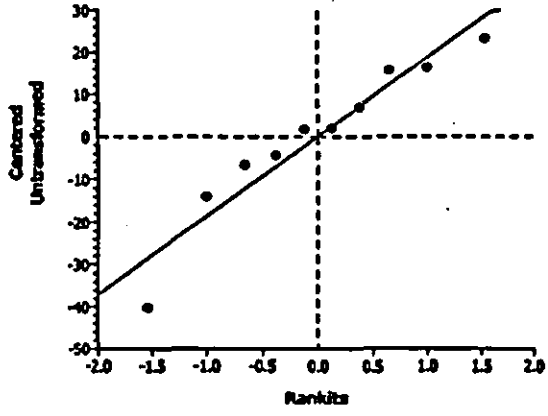
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.72966	23.15450	0.35420	Equal Variances
Distribution	Shapiro-Wilk W	0.92551		0.40519	Normal Distribution

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





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Total Wt (Dry, mg)	Comparison		07-8369-5277	07-8369-5277	19 Jul-06 8:36 AM	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			

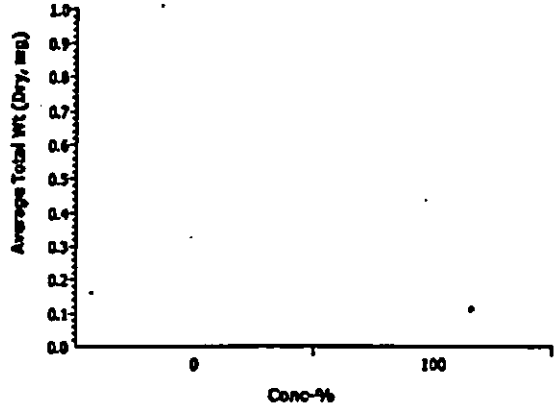
ANOVA Assumptions

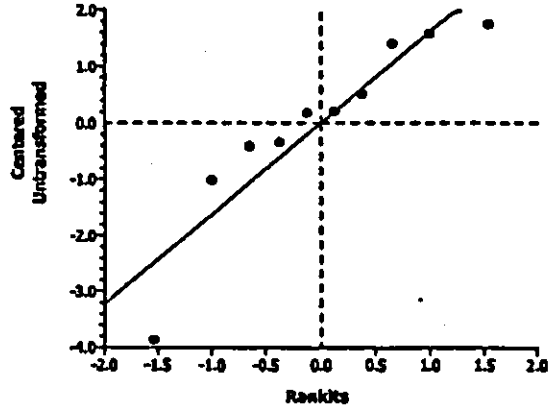
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.24797	23.15450	0.13730	Equal Variances
Distribution	Shapiro-Wilk W	0.86537		0.08825	Normal Distribution

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





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 TD Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 33 [illegible]

Bioassay Lab ID: BT B61566-01 Sample No: J11JB8

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	8	8	8	8	8	8	8-75	5	6.2	7.7
	B	2	2	2	2	3	3	3	3		
	C	7	8	8	8	8	9	8-75	5		
	D	6	6	6	6	6	4	6-75	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 mdG + 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 mdG, broadleaf seedlings
Replicate D: 3 Lg G, 1 mdG, 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, 6+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 Lg G w/ 1 B shoot, 2 Lg G, 1 mdG w/ 1 B shoot, 1 mdG
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 mdG 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	93 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	1023.01	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:

[illegible]

CETIS Test Summary

Report Date: 19 Jul-06 9:14 AM
Test Link: 16-9232-9707/B156601psA

Plant Bioassay - Chronic — CH2M Hill

Test No:	09-4616-5996	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	05 Apr-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	05 Apr-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

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
18-1051-4761	% Germination	100	> 100	N/A	27.93%	Wilcoxon Rank Sum Two-Sample
09-1223-6020	Average Height (mm)	< 100	100	N/A	11.59%	Equal Variance t Two-Sample
03-4648-6761	Average Length (mm)	< 100	100	N/A	24.00%	Equal Variance t Two-Sample
03-8041-1052	Average AG Wt (Wet, mg)	100	> 100	N/A	34.28%	Equal Variance t Two-Sample
02-2888-7817	Average AG Wt (Dry, mg)	100	> 100	N/A	28.98%	Equal Variance t Two-Sample
09-6062-0345	Average Root Wt. (Wet, mg	100	> 100	N/A	40.92%	Equal Variance t Two-Sample
10-4590-5559	Average Root Wt. (Dry, mg)	100	> 100	N/A	35.48%	Equal Variance t Two-Sample
02-5986-7407	Average Total Wt (Wet, mg	100	> 100	N/A	30.99%	Equal Variance t Two-Sample
12-1118-5198	Average Total Wt (Dry, mg)	100	> 100	N/A	29.78%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 9:14 AM
Test Link: 16-9232-9707/B156601psA

% 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%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	75.780	61	84.400	3.9903	8.9226	11.77%
100		5	56.780	48	63.400	2.5303	5.6579	9.96%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	91.22	50	117.40	11.4	25.491	27.94%
100		5	54.94	48.200	65.2	2.9441	6.5832	11.98%

Average AG Wt (Wet, mg) 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%

Average AG Wt (Dry, mg) 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%

Average Root Wt. (Wet, mg) 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%

Average Root Wt. (Dry, mg) 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%

Average Total Wt (Wet, mg) 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	51.844	71.45	3.6797	8.2281	13.37%

Average Total Wt (Dry, mg) 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%

CETIS Test Summary

Report Date: 19 Jul-06 9:14 AM
Test Link: 16-9232-9707/B156601paA

% 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	0.80000	1.00000	1.00000	1.00000

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	61	84.4000	75.8000	80.7	77
100		59	55.7000	63.4000	48	57.8

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	50	117.400	99.8000	86.7	102.2
100		48.2000	50.3	65.2	56	55

Average AG Wt (Wet, mg) 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

Average AG Wt (Dry, mg) 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

Average Root Wt. (Wet, mg) 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

Average Root Wt. (Dry, mg) 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

Average Total Wt (Wet, mg) 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

Average Total Wt (Dry, mg) 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

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	16-9232-9707	16-9232-9707	19 Jul-06 8:39 AM	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			

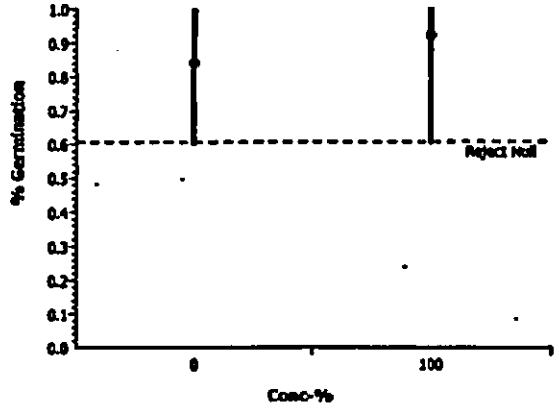
ANOVA Assumptions

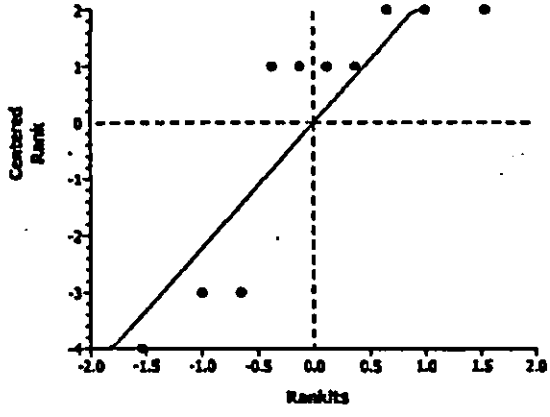
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.50000	23.15450	0.70400	Equal Variances
Distribution	Shapiro-Wilk W	0.75864		0.00455	Non-normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	16-9232-9707	16-9232-9707	19 Jul-06 8:39 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	11.59%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.02124	1.85955	0.0019	8.78620	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	902.5	902.5	1	16.17	0.00383	Significant Effect
Error	446.496	55.812	8			
Total	1348.99600	958.31200	9			

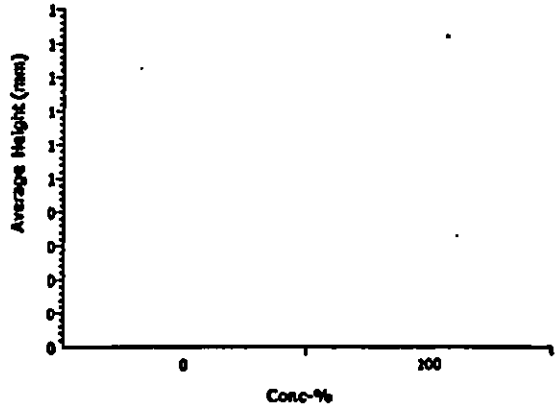
ANOVA Assumptions

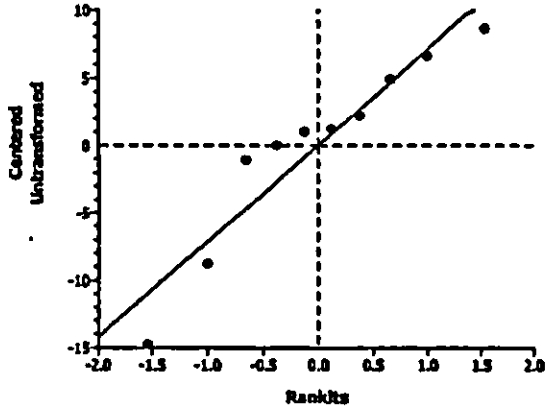
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.48694	23.15450	0.39912	Equal Variances
Distribution	Shapiro-Wilk W	0.90083		0.22372	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	75.780	61	84.4	8.9226				
100		5	56.780	48	63.4	5.6579				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	16-9232-9707	16-9232-9707	19 Jul-06 9:13 AM	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	24.00%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	3.08142	1.85955	0.0075	21.8939	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3290.596	3290.596	1	9.50	0.01508	Significant Effect
Error	2772.44	346.555	8			
Total	6063.03589	3637.1509	9			

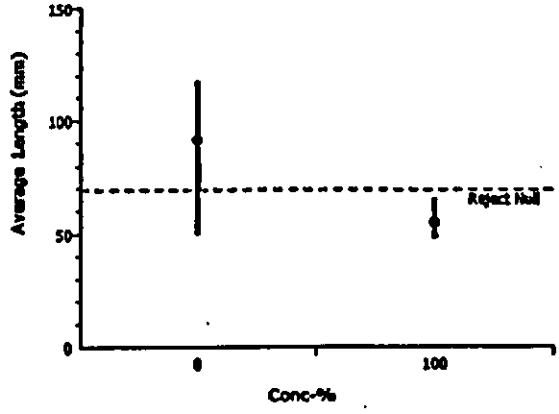
ANOVA Assumptions

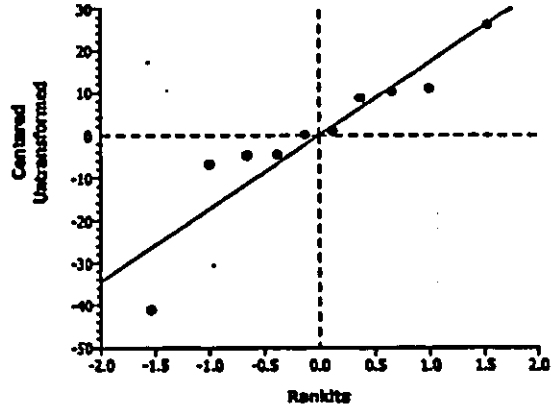
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	14.99313	23.15450	0.02248	Equal Variances
Distribution	Shapiro-Wilk W	0.87809		0.12406	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	91.22	50	117.4	25.491				
100		5	54.94	48.2	65.2	6.5832				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average AG Wt (Wet, mg)	Comparison	16-9232-9707	16-9232-9707	19 Jul-06 8:39 AM	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			

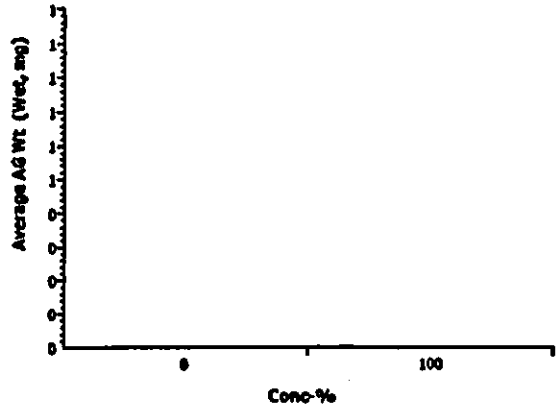
ANOVA Assumptions

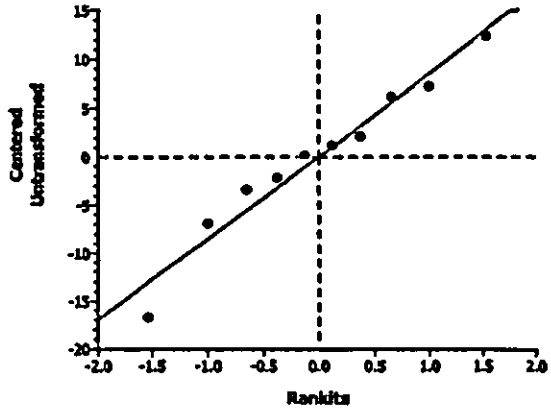
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.73128	23.15450	0.60798	Equal Variances
Distribution	Shapiro-Wilk W	0.96823		0.87396	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	16-9232-9707	16-9232-9707	19 Jul-06 8:39 AM	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	1.66375	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	11.95166	1.493957	8			
Total	16.0870247	5.6293229	9			

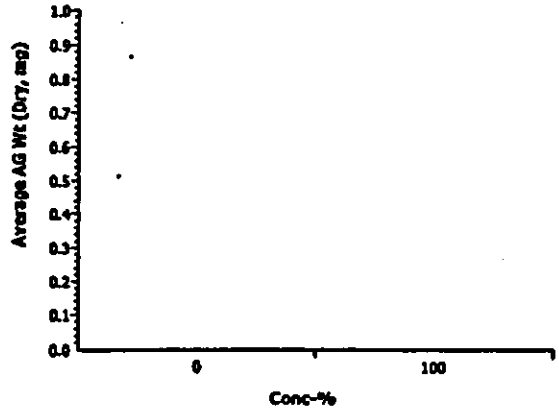
ANOVA Assumptions

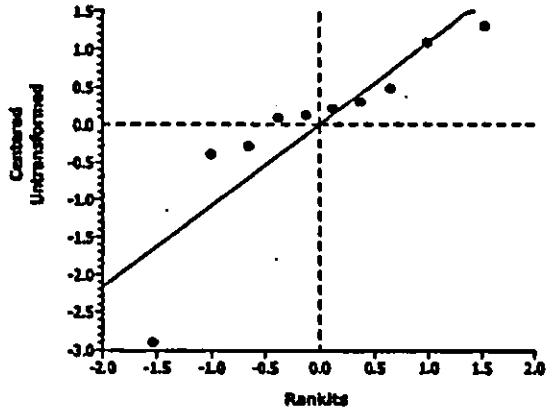
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	23.03905	23.15450	0.01009	Equal Variances
Distribution	Shapiro-Wilk W	0.80366		0.01606	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Root Wt. (Wet, mg)	Comparison		16-9232-9707	16-9232-9707	19 Jul-06 8:39 AM	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			

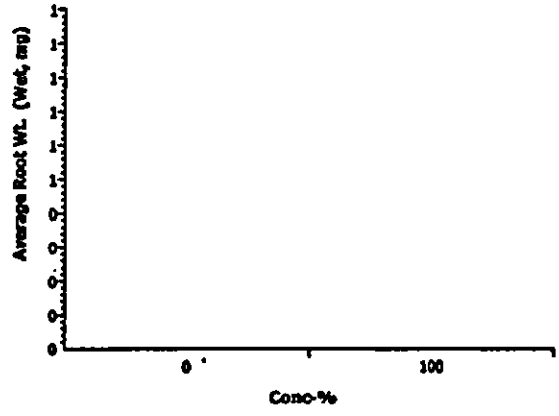
ANOVA Assumptions

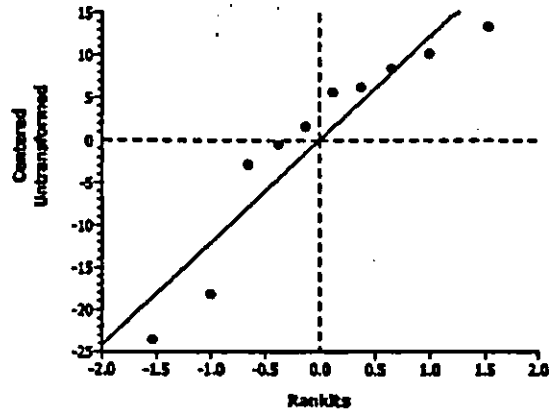
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.36097	23.15450	0.77245	Equal Variances
Distribution	Shapiro-Wilk W	0.87175		0.10478	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	16-9232-9707	16-9232-9707	19 Jul-06 8:39 AM	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			

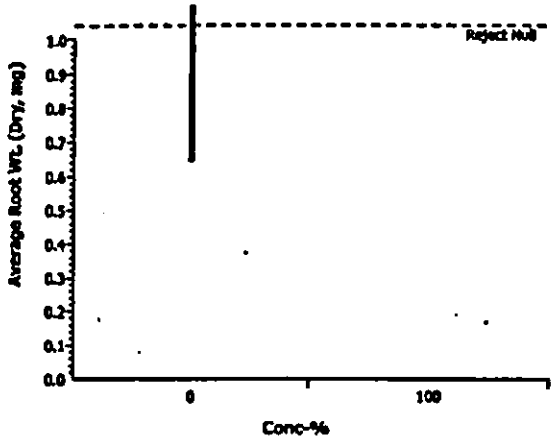
ANOVA Assumptions

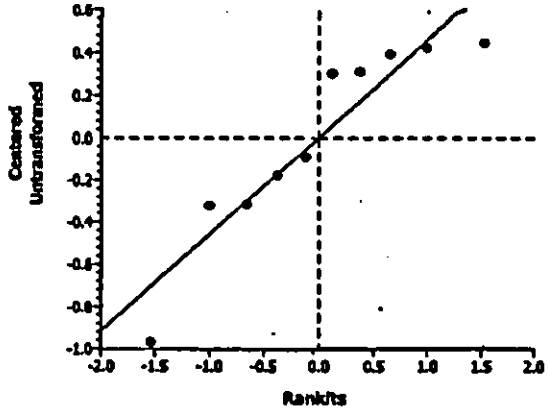
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.35752	23.15450	0.42657	Equal Variances
Distribution	Shapiro-Wilk W	0.86708		0.09240	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Total Wt (Wet, mg)	Comparison	16-9232-9707	16-9232-9707	19 Jul-06 8:39 AM	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			

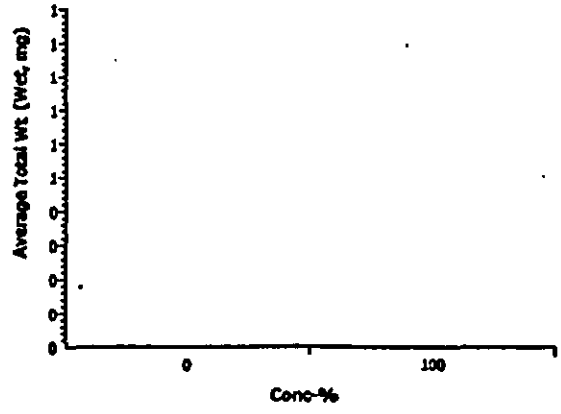
ANOVA Assumptions

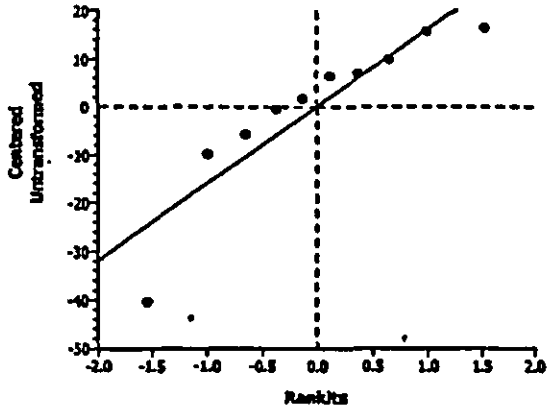
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.06740	23.15450	0.06761	Equal Variances
Distribution	Shapiro-Wilk W	0.83722		0.04087	Normal Distribution

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





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Total Wt (Dry, mg)	Comparison	16-9232-9707	16-9232-9707	19 Jul-06 8:39 AM	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	29.76%

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			

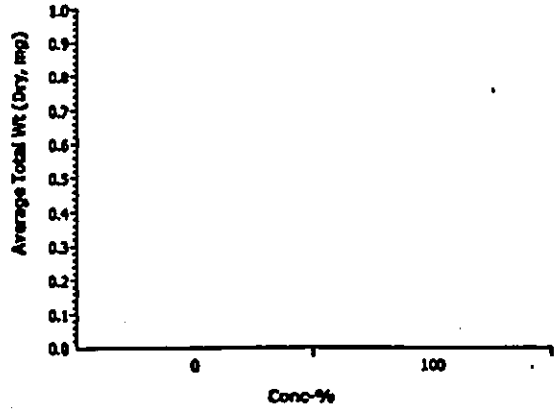
ANOVA Assumptions

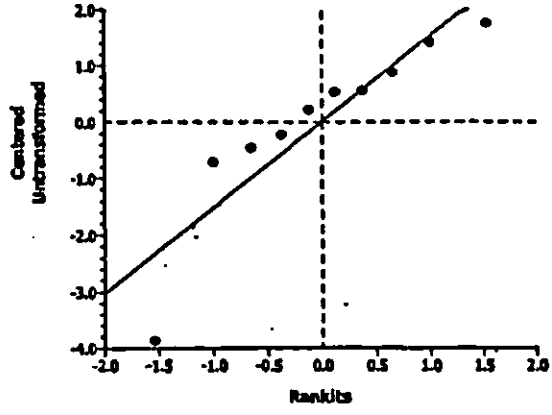
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	11.00706	23.15450	0.03931	Equal Variances
Distribution	Shapiro-Wilk W	0.84038		0.04459	Normal Distribution

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





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 8 [illegible] Day 12 [illegible] Day 15 NT Day 18 [illegible] Day 19 NT Day 21 NT 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	5	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		

7-Days Post-Emergence: Selectively thin down to 5 Seedlings (leave the 5 tallest seedlings). Describe shoot appearance: * 10 Bluegrass + 1 broadleaf

Replicate A: 5 Lg G — removed: 1 med G, 1 med w/brown, 6 broadleaf seedlings

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 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 (1-5 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 Med G w/1B shoot

Replicate C: 2 Med G, 1 Med 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~~ 1039.8	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 mm	79 mm	63 mm	64 mm	77 mm
Replicate B	55 mm	66 mm	79 mm	37 mm	79 mm
Replicate C	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	~~1173.0~~ 1173.0	1023.77

Comments:

MS

CETIS Test Summary

Report Date: 19 Jul-06 9:17 AM
Test Link: 15-6440-9896/B156602psB

Plant Bioassay - Chronic — CH2M Hill

Test No:	09-7104-7132	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	05 Apr-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	05 Apr-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

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
07-0787-0776	% Germination	100	> 100	N/A	20.96%	Equal Variance t Two-Sample
15-0357-2986	Average Height (mm)	< 100	100	N/A	15.82%	Equal Variance t Two-Sample
16-0101-1954	Average Length (mm)	< 100	100	N/A	24.57%	Equal Variance t Two-Sample
04-2251-3543	Average AG Wt (Wet, mg)	< 100	100	N/A	32.62%	Equal Variance t Two-Sample
10-2274-8929	Average AG Wt (Dry, mg)	< 100	100	N/A	33.96%	Equal Variance t Two-Sample
00-9088-8642	Average Root Wt. (Wet, mg	100	> 100	N/A	41.70%	Equal Variance t Two-Sample
09-9206-1899	Average Root Wt. (Dry, mg)	100	> 100	N/A	39.19%	Equal Variance t Two-Sample
12-3314-0779	Average Total Wt (Wet, mg	100	> 100	N/A	37.41%	Equal Variance t Two-Sample
07-5363-6775	Average Total Wt (Dry, mg)	100	> 100	N/A	34.99%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 9:17 AM
Test Link: 15-6440-9896/B156602psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	75.780	61	84.400	3.9903	8.9226	11.77%
100		5	53.880	37.400	65	5.0623	11.32	21.01%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	91.22	50	117.40	11.4	25.491	27.94%
100		5	60.600	45	65.6	3.9192	8.7636	14.46%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	29.605	12.833	36.828	4.3456	9.717	32.82%
100		5	18.574	8.6660	24.888	2.8451	6.3618	34.25%

Average AG Wt (Dry, mg) 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	3.08959	1.35000	4.01200	0.49767	1.11283	36.25%

Average Root Wt. (Wet, mg) 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%

Average Root Wt. (Dry, mg) 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%

Average Total Wt (Wet, mg) 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%

Average Total Wt (Dry, mg) 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	0.71728	1.60385	36.15%

CETIS Test Summary

Report Date: 19 Jul-06 9:17 AM
Test Link: 15-6440-9896/B156602psB

% 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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	61	84.4000	75.8000	80.7	77
100		65	48.8	37.4000	63.4000	54.8

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	50	117.400	99.8000	86.7	102.2
100		64.8000	63.2000	45	65.6	64.4000

Average AG Wt (Wet, mg) 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

Average AG Wt (Dry, mg) 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

Average Root Wt. (Wet, mg) 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

Average Root Wt. (Dry, mg) 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

Average Total Wt (Wet, mg) 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

Average Total Wt (Dry, mg) 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

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	15-6440-9896	15-6440-9896	19 Jul-06 8:43 AM	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			

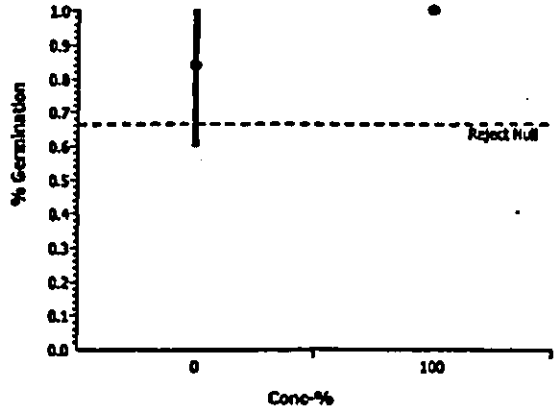
ANOVA Assumptions

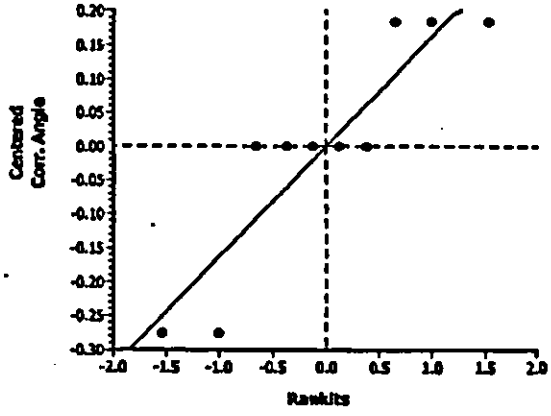
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	4.80000	11.25862	0.05984	Equal Variances
Distribution	Shapiro-Wilk W	0.81415		0.02153	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Height (mm)	Comparison	15-6440-9896	15-6440-9896	19 Jul-06 8:43 AM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	15.82%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.39754	1.85955	0.0047	11.9863	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1199.025	1199.025	1	11.54	0.00939	Significant Effect
Error	830.976	103.872	8			
Total	2030.00098	1302.8970	9			

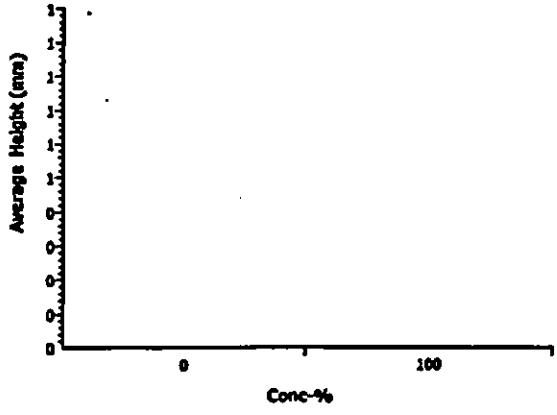
ANOVA Assumptions

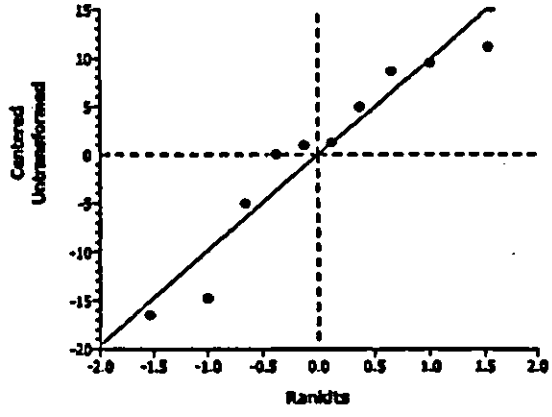
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.60946	23.15450	0.65604	Equal Variances
Distribution	Shapiro-Wilk W	0.90207		0.23082	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	75.780	61	84.4	8.9226				
100		5	53.880	37.4	65	11.32				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	15-6440-9896	15-6440-9896	19 Jul-06 9:17 AM	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	24.57%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.5401	1.85955	0.0174	22.4162	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2343.961	2343.961	1	6.45	0.03471	Significant Effect
Error	2906.288	363.286	8			
Total	5250.24902	2707.2469	9			

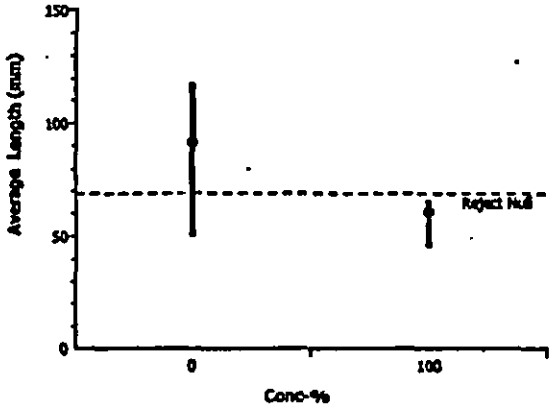
ANOVA Assumptions

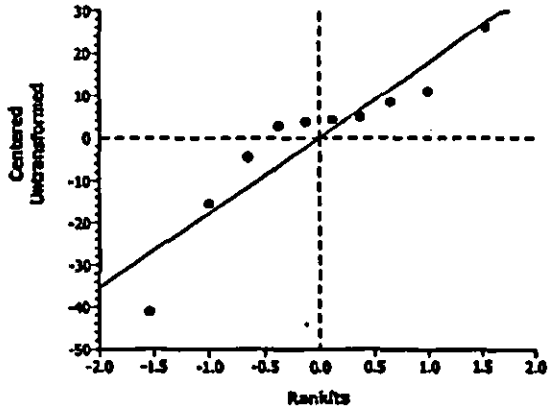
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.46057	23.15450	0.06231	Equal Variances
Distribution	Shapiro-Wilk W	0.87858		0.12566	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	91.22	50	117.4	25.491				
100		5	60.600	45	65.6	8.7636				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	15-6440-9896	15-6440-9896	19 Jul-06 8:43 AM	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			

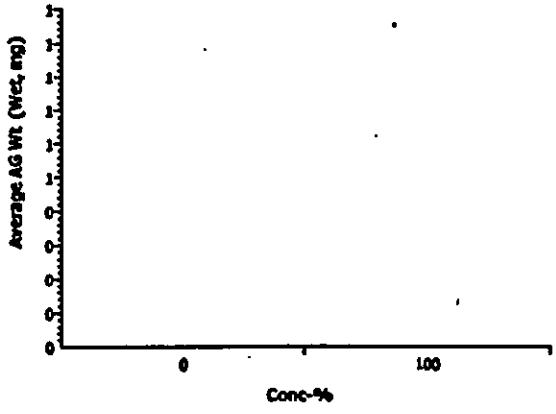
ANOVA Assumptions

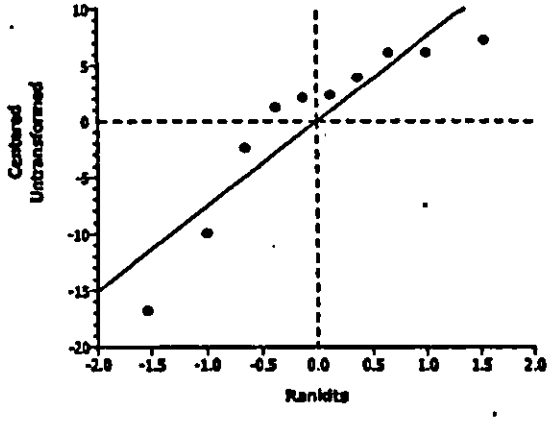
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.33292	23.15450	0.43209	Equal Variances
Distribution	Shapiro-Wilk W	0.83430		0.03769	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	15-6440-9896	15-6440-9896	19 Jul-06 8:43 AM	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			

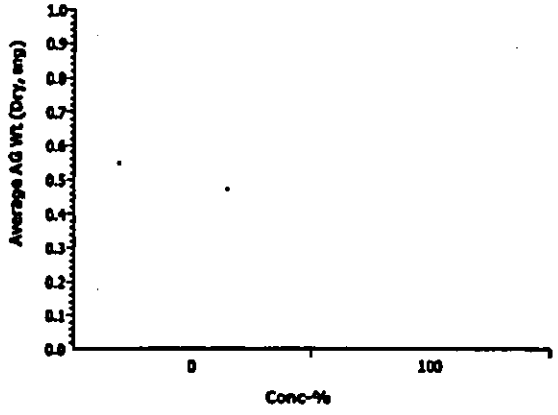
ANOVA Assumptions

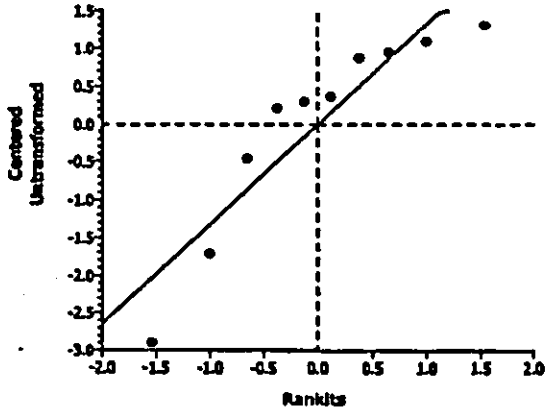
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.31238	23.15450	0.43679	Equal Variances
Distribution	Shapiro-Wilk W	0.84486		0.05044	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Root Wt. (Wet, mg)	Comparison		15-6440-9896	15-6440-9896	19 Jul-06 8:43 AM	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			

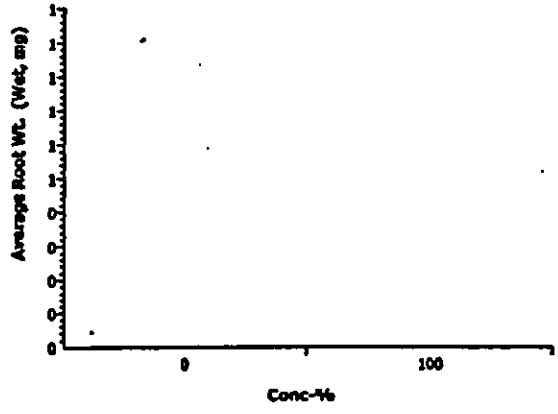
ANOVA Assumptions

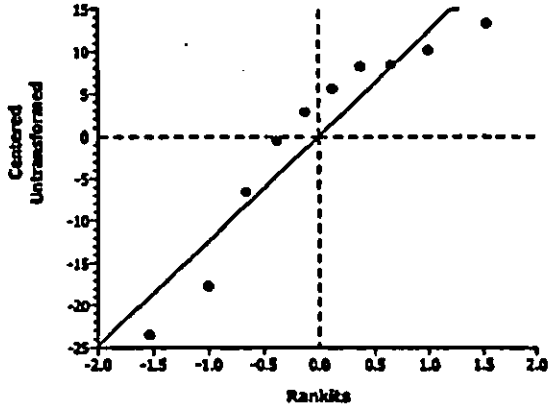
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.24753	23.15450	0.83546	Equal Variances
Distribution	Shapiro-Wilk W	0.87920		0.12775	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Root Wt. (Dry, mg)	Comparison	15-6440-9896	15-6440-9896	19 Jul-06 8:43 AM	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			

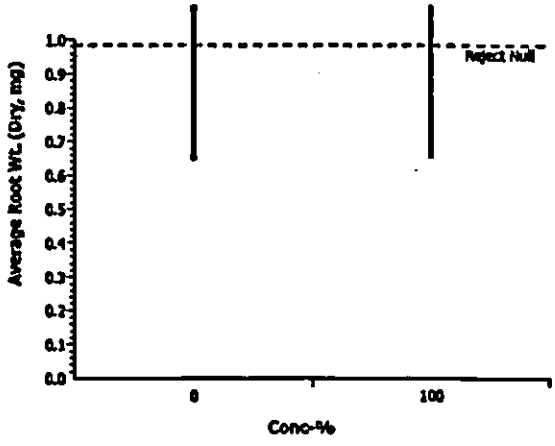
ANOVA Assumptions

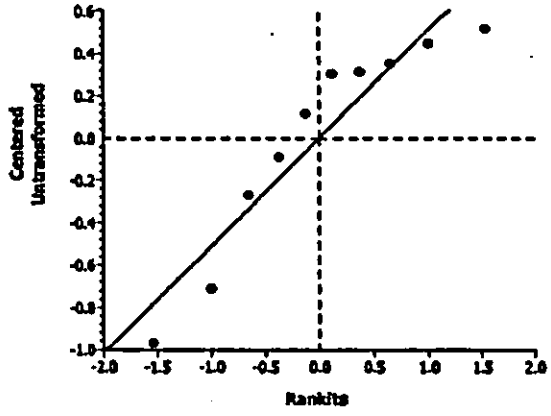
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.35685	23.15450	0.77462	Equal Variances
Distribution	Shapiro-Wilk W	0.87393		0.11105	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Total Wt (Wet, mg)	Comparison	15-6440-9896	15-6440-9896	19 Jul-06 8:43 AM	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			

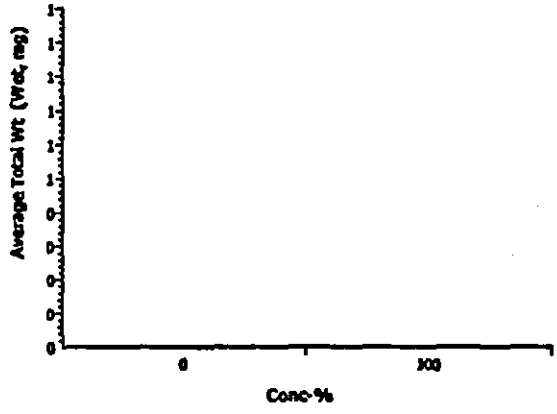
ANOVA Assumptions

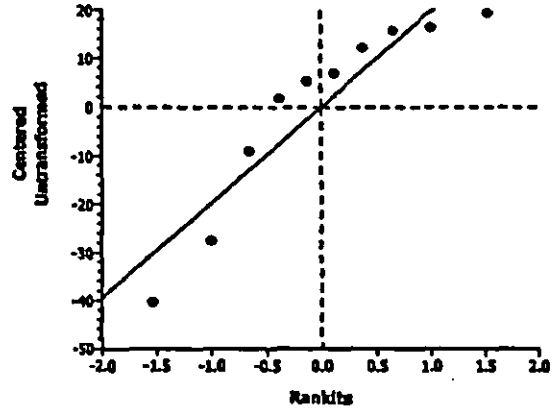
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.56883	23.15450	0.67328	Equal Variances
Distribution	Shapiro-Wilk W	0.85602		0.06847	Normal Distribution

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





CETIS Analysis Detail

Plant Bioassay - Chronic					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Total Wt (Dry, mg)	Comparison	15-6440-9896	15-6440-9896	19 Jul-06 8:43 AM	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	15.290958	9			

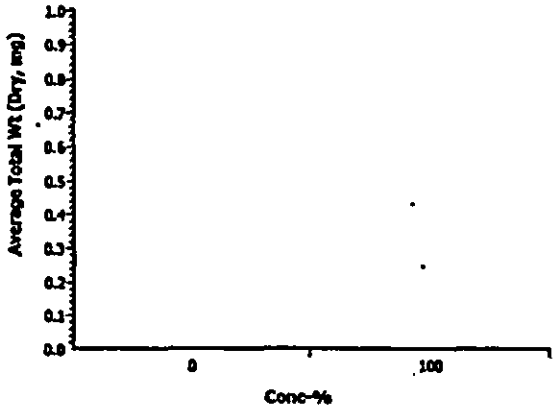
ANOVA Assumptions

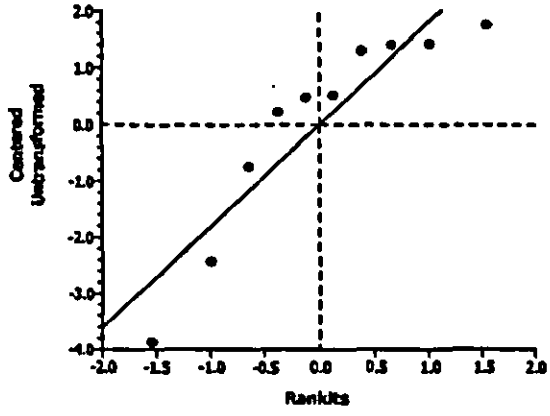
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.97707	23.15450	0.52538	Equal Variances
Distribution	Shapiro-Wilk W	0.84141		0.04587	Normal Distribution

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





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 18 NJ Day 21 NJ Day 23 [illegible] Day 26 Bm Day 28 BM

Bioassay Lab ID: PNL06-1566-03 Sample No: SIIJHS

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	18 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	4	6	6	6	6	6	6→5	5	6.3	7.4
	B	4	5	4→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 Mb G, 1 Sm G. removed: 2 Sm G

Replicate C: 4 Lg G, 1 Mb G. removed: 2 Mb G, 4 Sm G + 1 non-Bluegrass seedling

Replicate D: 1 Lg G

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

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

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

Replicate D: 1 Lg w/2 B tips

Replicate E: 2 Lg G, 1 Mb G, 1 Mb 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	48 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	1050.4	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	1059.2	1005.27
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:

MS

CETIS Test Summary

Report Date: 19 Jul-06 9:21 AM
Test Link: 10-4856-7465/B156603psC

Plant Bioassay - Chronic — CH2M Hill

Test No:	05-5352-4510	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	05 Apr-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	05 Apr-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

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
09-4240-7124	% Germination	100	> 100	N/A	41.99%	Wilcoxon Rank Sum Two-Sample
00-9654-0043	Average Height (mm)	100	> 100	N/A	19.95%	Equal Variance t Two-Sample
03-3823-1455	Average Length (mm)	< 100	100	N/A	26.29%	Equal Variance t Two-Sample
03-2295-5367	Average AG Wt (Wet, mg)	100	> 100	N/A	44.73%	Equal Variance t Two-Sample
13-4570-8180	Average AG Wt (Dry, mg)	100	> 100	N/A	52.20%	Equal Variance t Two-Sample
10-8115-4404	Average Root Wt. (Wet, mg	100	> 100	N/A	62.15%	Equal Variance t Two-Sample
06-1666-2616	Average Root Wt. (Dry, mg)	100	> 100	N/A	72.74%	Equal Variance t Two-Sample
17-7998-0152	Average Total Wt (Wet, mg	100	> 100	N/A	54.13%	Equal Variance t Two-Sample
07-1279-4134	Average Total Wt (Dry, mg)	100	> 100	N/A	55.73%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 9:21 AM
Test Link: 10-4856-7465/B156603psC

% 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%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	75.760	61	84.400	3.9903	8.9226	11.77%
100		5	63.04	43	83	7.0853	15.843	25.13%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	91.22	50	117.40	11.4	25.491	27.94%
100		5	57.800	41.400	73	6.0256	13.474	23.31%

Average AG Wt (Wet, mg) 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%

Average AG Wt (Dry, mg) 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%

Average Root Wt. (Wet, mg) 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%

Average Root Wt. (Dry, mg) 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%

Average Total Wt (Wet, mg) 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	113.68	16.289	36.423	64.92%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.5778	2.7033	8.3267	1.0085	2.2551	34.29%
100		5	6.2848	3.0760	11.960	1.6937	3.7873	60.26%

CETIS Test Summary

Report Date: 19 Jul-06 9:21 AM
Test Link: 10-4856-7465/B156603psC

% 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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	61	84.4000	75.8000	80.7	77
100		63	43	73.2	83	53

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	50	117.400	99.8000	86.7	102.2
100		59	41.4000	68.4000	73	47.2000

Average AG Wt (Wet, mg) 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

Average AG Wt (Dry, mg) 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

Average Root Wt. (Wet, mg) 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	40.554	70.6000	18.56

Average Root Wt. (Dry, mg) 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

Average Total Wt (Wet, mg) 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

Average Total Wt (Dry, mg) 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

CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
% Germination	Comparison	10-4856-7465	10-4856-7465	19 Jul-06 8:47 AM	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	0.8746686	0.109359	8			
Total	0.87500388	0.1094938	9			

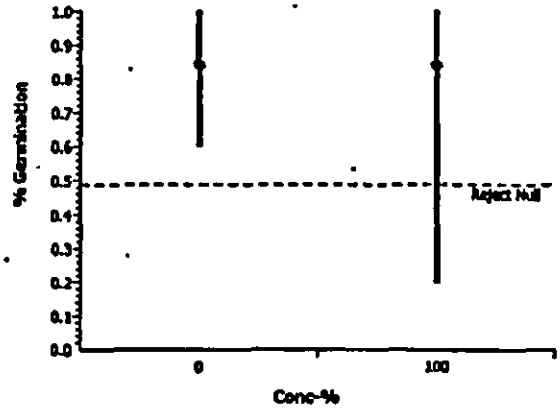
ANOVA Assumptions

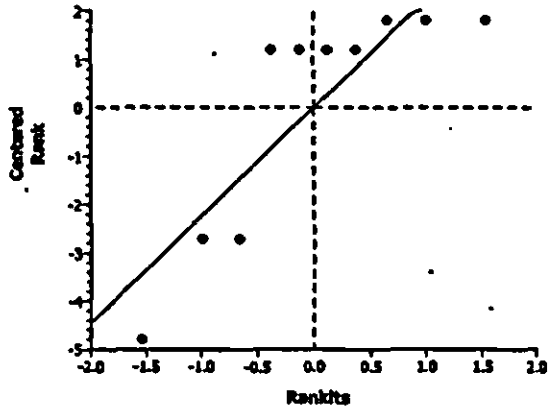
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.45738	23.15450	0.40518	Equal Variances
Distribution	Shapiro-Wilk W	0.85938		0.00028	Non-normal Distribution

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 Bioassay - Chronic	CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	10-4856-7465	10-4856-7465	19 Jul-06 8:47 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	19.95%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.56672	1.85955	0.0779	15.1212	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	405.7691	405.7691	1	2.45	0.15582	Non-Significant Effect
Error	1322.48	165.31	8			
Total	1728.24905	571.07907	9			

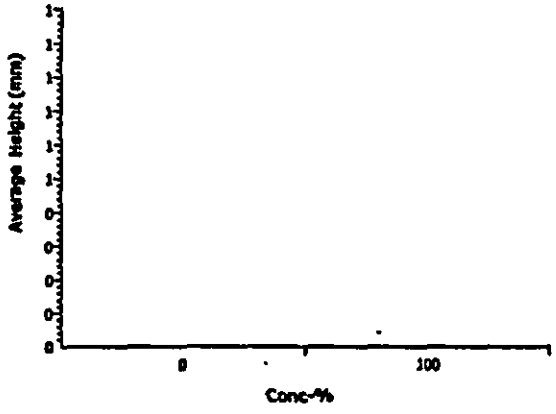
ANOVA Assumptions

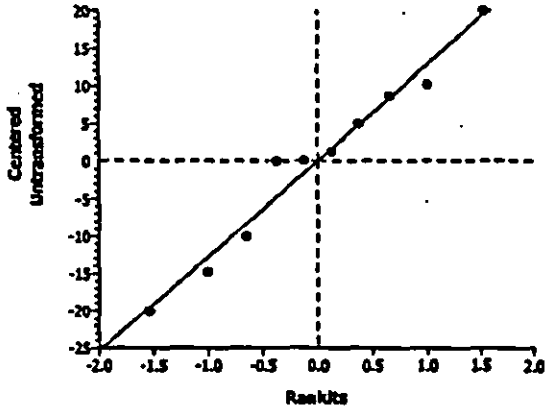
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.15289	23.15450	0.29205	Equal Variances
Distribution	Shapiro-Wilk W	0.96966		0.88768	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	75.780	61	84.4	8.9226				
100		5	63.04	43	83	15.843				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	10-4856-7465	10-4856-7465	19 Jul-06 9:21 AM	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	26.29%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.59165	1.85955	0.0160	23.9775	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2792.241	2792.241	1	6.72	0.03202	Significant Effect
Error	3325.248	415.656	8			
Total	6117.48877	3207.8967	9			

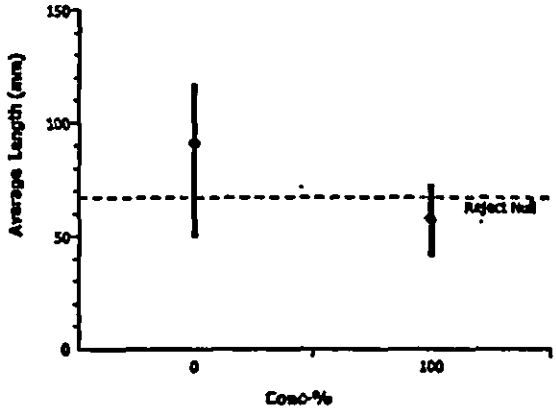
ANOVA Assumptions

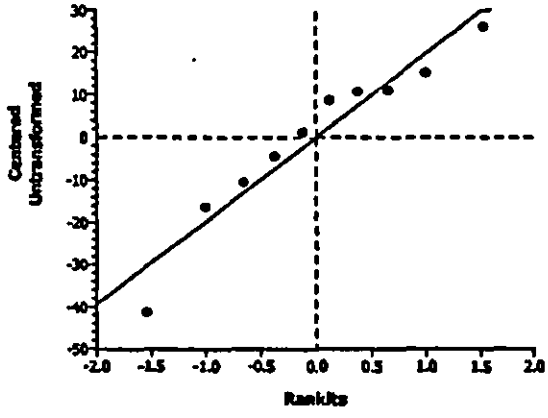
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.57922	23.15450	0.24448	Equal Variances
Distribution	Shapiro-Wilk W	0.93777		0.52849	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	91.22	50	117.4	25.491				
100		5	57.800	41.4	73	13.474				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	10-4856-7465	10-4856-7465	19 Jul-06 8:47 AM	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			

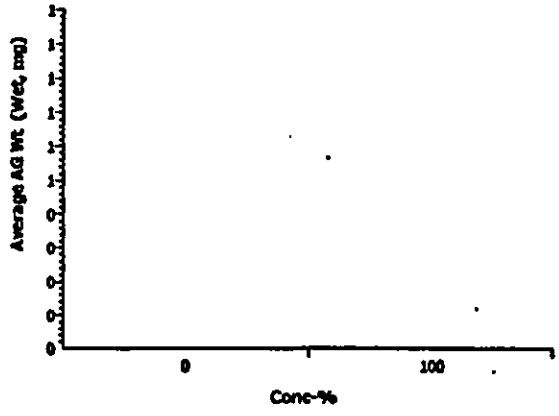
ANOVA Assumptions

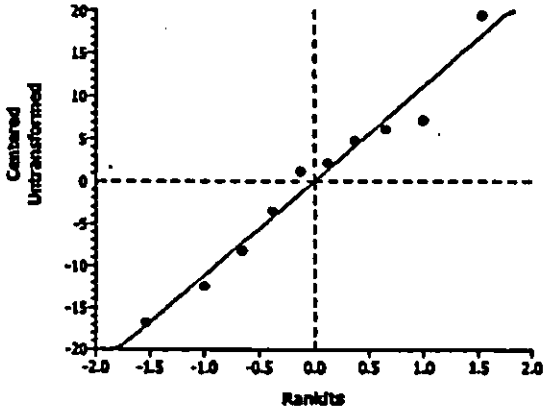
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.68545	23.15450	0.62545	Equal Variances
Distribution	Shapiro-Wilk W	0.97199		0.90865	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	10-4856-7465	10-4856-7465	19 Jul-06 8:47 AM	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			

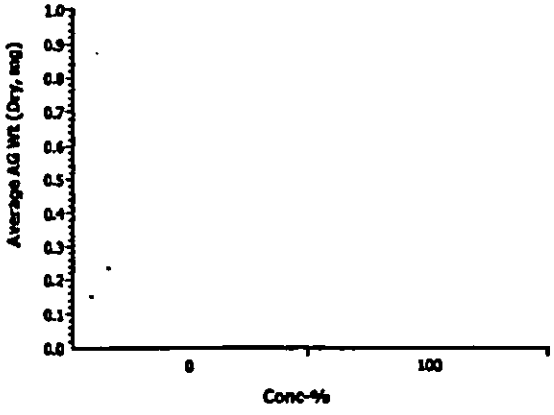
ANOVA Assumptions

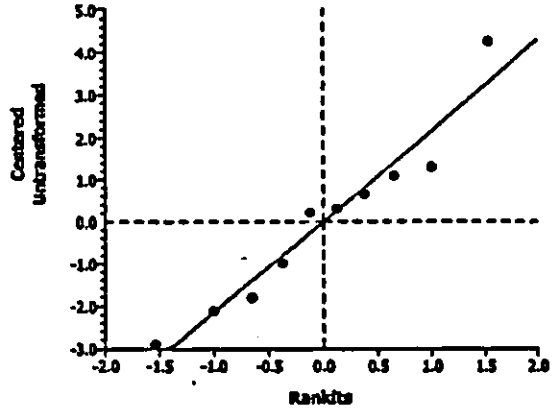
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.38550	23.15450	0.42040	Equal Variances
Distribution	Shapiro-Wilk W	0.94807		0.64572	Normal Distribution

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	6.51001	2.61365				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	10-4856-7465	10-4856-7465	19 Jul-06 8:47 AM	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			

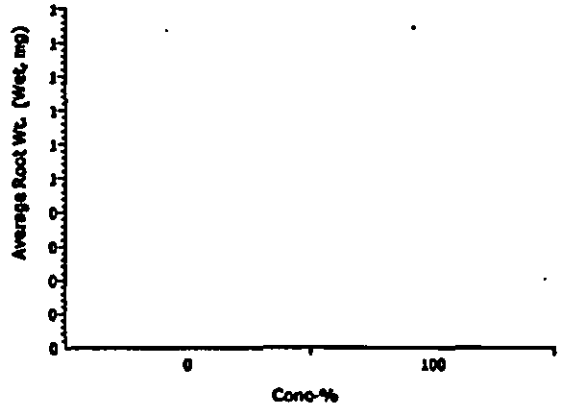
ANOVA Assumptions

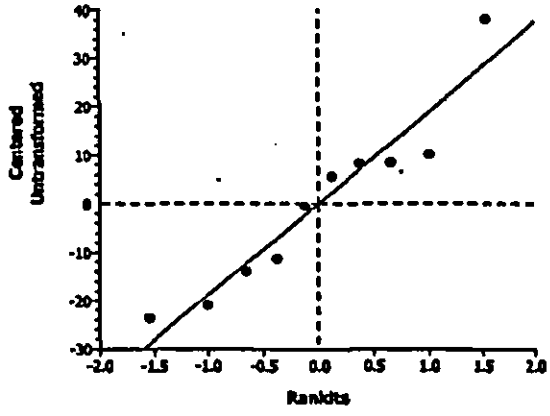
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.00179	23.15450	0.31225	Equal Variances
Distribution	Shapiro-Wilk W	0.92487		0.39940	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Data Analyzed**	**Version**
Average Root Wt. (Dry, mg)	Comparison		10-4856-7465	10-4856-7465	19 Jul-06 8:47 AM	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			

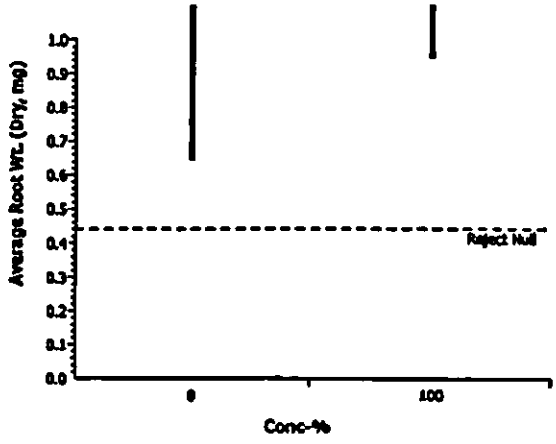
ANOVA Assumptions

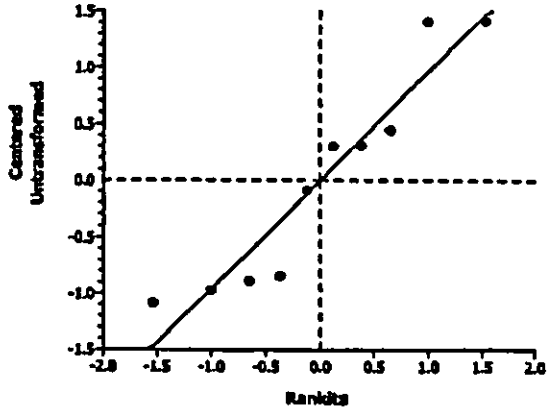
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.98547	23.15450	0.14882	Equal Variances
Distribution	Shapiro-Wilk W	0.88496		0.14871	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Total Wt (Wet, mg)	Comparison	10-4856-7465	10-4856-7465	19 Jul-06 8:47 AM	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			

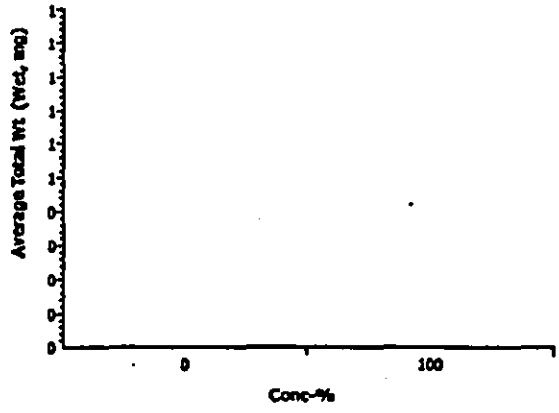
ANOVA Assumptions

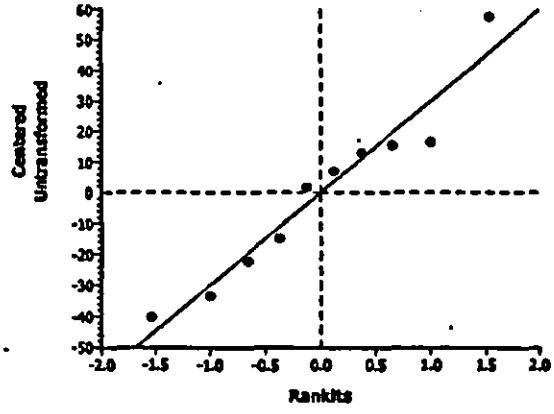
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.42893	23.15450	0.41109	Equal Variances
Distribution	Shapiro-Wilk W	0.94678		0.63064	Normal Distribution

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				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Total Wt (Dry, mg)	Comparison	10-4856-7465	10-4856-7465	19 Jul-06 8:47 AM	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			

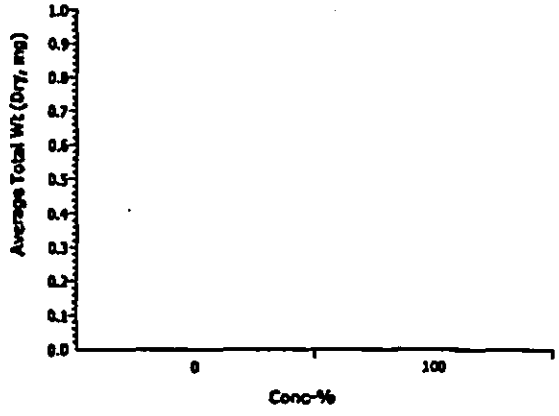
ANOVA Assumptions

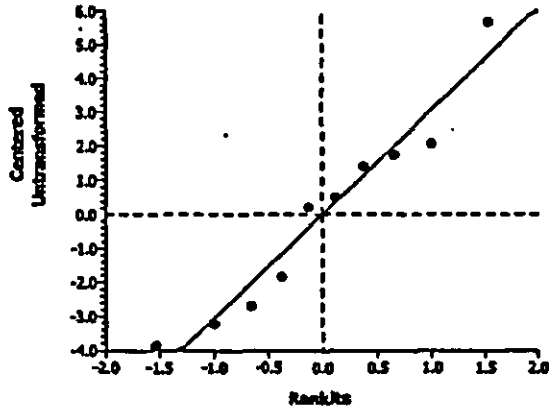
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.82040	23.15450	0.33935	Equal Variances
Distribution	Shapiro-Wilk W	0.94597		0.62111	Normal Distribution

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





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 _____ Day 15 NJ Day 18 [illegible] Day 19 NJ Day 21 NJ Day 22 [illegible] Day 26 [illegible] Day 33 [illegible]

Bioassay Lab ID: PA 06 1566-04 Sample No: JJJJH8

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	8→7	7→5	5		
	D	6	6	6	6	6	6	6→5	5		
	E	7	9	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. Remvd: 2 med G

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

Replicate E: 5 Lg G Remvd: 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	53 mm
Replicate B	55 mm	93 mm	24 mm	44 mm	24 mm
Replicate C	95 mm	79 mm	53 mm	74 mm	74 mm
Replicate D	95 mm	60 mm	78 mm	33 mm	32 mm
Replicate E	100 mm	90 mm	72 mm	75 mm	63 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	~~1016.35~~ NS 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	42 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	1222.0	1034.51
Replicate D	1010.78	1153.6	1018.08
Replicate E	~~1054~~ NS 1039.98	1284.4	1054.10

Comments:

NS ~~1054~~

CETIS Test Summary

Report Date: 19 Jul-06 9:24 AM
Test Link: 13-8778-5451/B156604psC

Plant Bioassay - Chronic | CH2M Hill

Test No:	12-9523-2194	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	05 Apr-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		DII Water:		Source:	
Setup Date:	05 Apr-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

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: J11JH8

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
06-8058-6086	% Germination	100	> 100	N/A	20.96%	Equal Variance t Two-Sample
13-1607-1216	Average Height (mm)	100	> 100	N/A	17.96%	Equal Variance t Two-Sample
11-2675-2308	Average Length (mm)	< 100	100	N/A	25.75%	Equal Variance t Two-Sample
02-4597-4713	Average AG Wt (Wet, mg)	100	> 100	N/A	37.50%	Equal Variance t Two-Sample
15-5615-7255	Average AG Wt (Dry, mg)	100	> 100	N/A	39.71%	Wilcoxon Rank Sum Two-Sample
04-1075-3129	Average Root Wt. (Wet, mg	100	> 100	N/A	48.66%	Equal Variance t Two-Sample
05-9625-5204	Average Root Wt. (Dry, mg)	100	> 100	N/A	54.49%	Equal Variance t Two-Sample
17-3037-7884	Average Total Wt (Wet, mg	100	> 100	N/A	43.45%	Equal Variance t Two-Sample
00-3240-5620	Average Total Wt (Dry, mg)	100	> 100	N/A	42.74%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 9:24 AM
Test Link: 13-8778-5451/B156604psC

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	75.760	61	84.400	3.9903	8.9226	11.77%
100		5	64.8	48	81	6.1348	13.718	21.17%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	91.22	50	117.40	11.4	25.491	27.94%
100		5	55.720	34.6	64.800	5.4415	12.168	21.84%

Average AG Wt (Wet, mg) 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%

Average AG Wt (Dry, mg) 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	3.95120	1.17200	5.57001	0.74109	1.65713	41.94%

Average Root Wt. (Wet, mg) 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%

Average Root Wt. (Dry, mg) 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%

Average Total Wt (Wet, mg) 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	55.725	14.866	83.642	11.491	25.695	46.11%

Average Total Wt (Dry, mg) 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%

CETIS Test Summary

Report Date: 19 Jul-06 9:24 AM
Test Link: 13-8778-5451/B156604psC

% 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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	61	84.4000	75.8000	80.7	77
100		62.4000	46	75	59.8	81

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	50	117.400	99.8000	86.7	102.2
100		57.4000	34.8	59	62.8	64.8000

Average AG Wt (Wet, mg) 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

Average AG Wt (Dry, mg) 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

Average Root Wt. (Wet, mg) 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	42.486
100		32.718	4.51401	39.542	28.564	48.8840

Average Root Wt. (Dry, mg) 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

Average Total Wt (Wet, mg) 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

Average Total Wt (Dry, mg) 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

CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
% Germination	Comparison		13-8778-5451	13-8778-5451	19 Jul-06 8:51 AM	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			

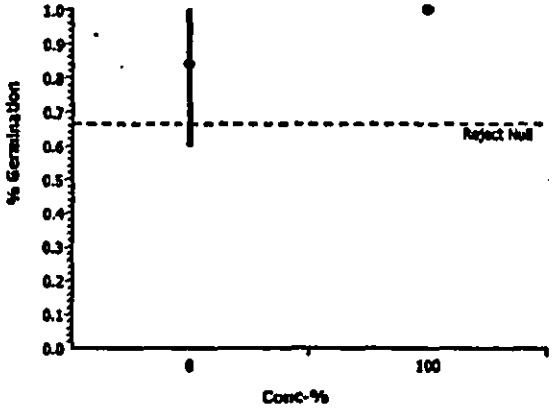
ANOVA Assumptions

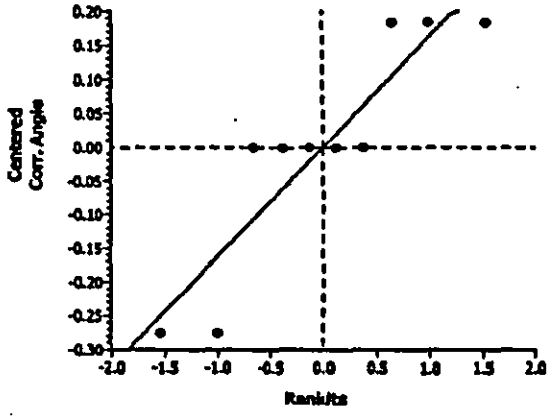
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	4.80000	11.25862	0.05984	Equal Variances
Distribution	Shapiro-Wilk W	0.81415		0.02153	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	13-8778-5451	13-8778-5451	19 Jul-06 8:51 AM	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	17.96%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.50034	1.85955	0.0860	13.6088	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	301.401	301.401	1	2.25	0.17192	Non-Significant Effect
Error	1071.168	133.896	8			
Total	1372.56900	435.29703	9			

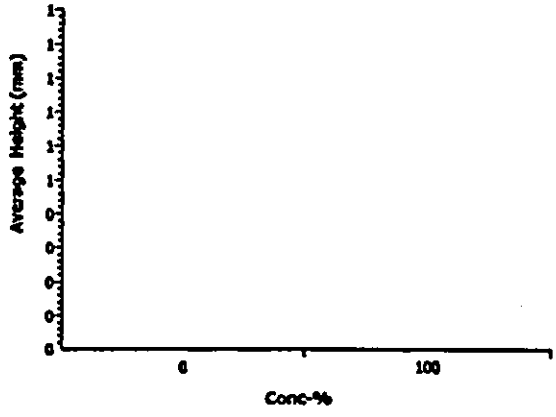
ANOVA Assumptions

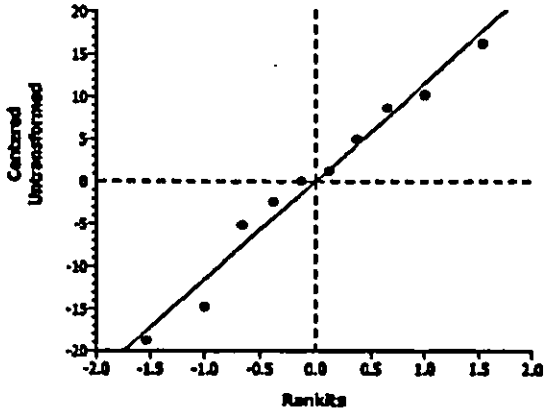
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.36371	23.15450	0.42519	Equal Variances
Distribution	Shapiro-Wilk W	0.96837		0.87533	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	75.780	61	84.4	8.9226				
100		5	64.8	46	81	13.718				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Length (mm)	Comparison		13-8778-5451	13-8778-5451	19 Jul-06 9:23 AM	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	25.75%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.81035	1.85955	0.0114	23.4896	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3150.625	3150.625	1	7.90	0.02283	Significant Effect
Error	3191.296	398.912	8			
Total	6341.9209	3549.5368	9			

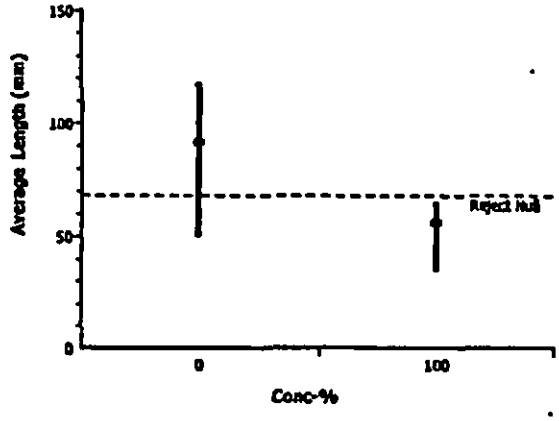
ANOVA Assumptions

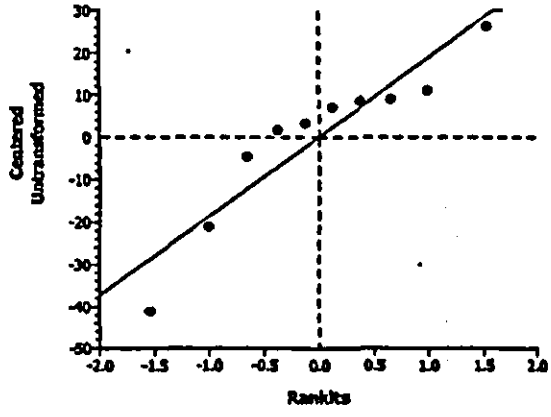
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.38881	23.15450	0.18106	Equal Variances
Distribution	Shapiro-Wilk W	0.88496		0.14871	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	91.22	50	117.4	25.491				
100		5	55.720	34.6	64.8	12.168				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average AG Wt (Wet, mg)	Comparison		13-8778-5451	13-8778-5451	19 Jul-06 8:51 AM	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			

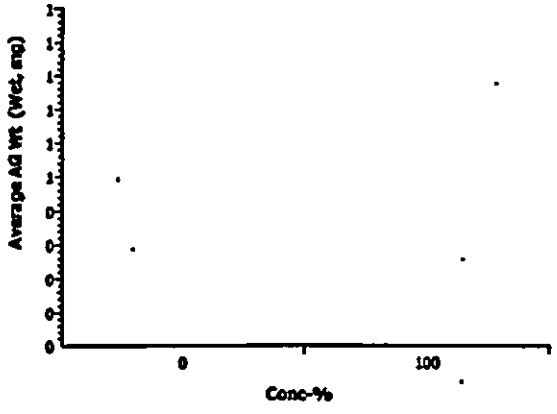
ANOVA Assumptions

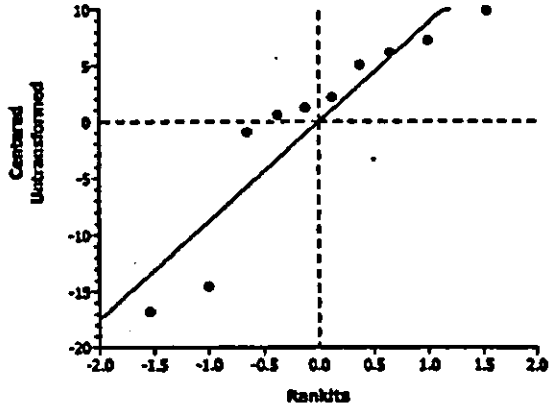
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.12685	23.15450	0.91064	Equal Variances
Distribution	Shapiro-Wilk W	0.84581		0.05178	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average AG Wt (Dry, mg)	Comparison	13-8778-5451	13-8778-5451	19 Jul-06 8:51 AM	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			

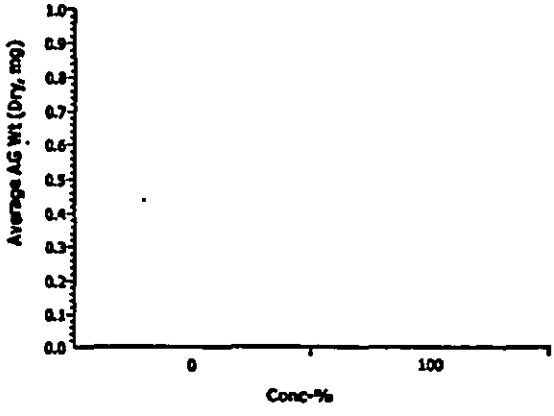
ANOVA Assumptions

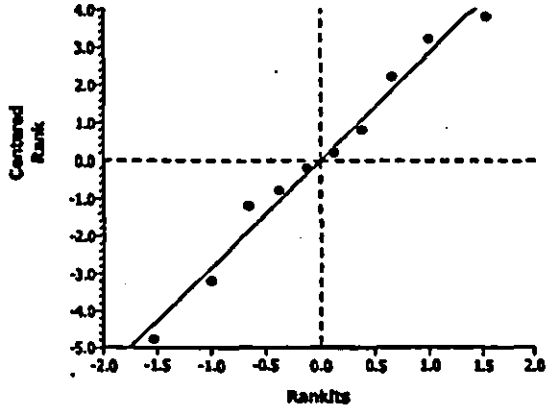
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.04281	23.15450	0.96857	Equal Variances
Distribution	Shapiro-Wilk W	0.78590		0.00977	Non-normal Distribution

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Root Wt. (Wet, mg)	Comparison		13-8778-5451	13-8778-5451	19 Jul-06 8:51 AM	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			

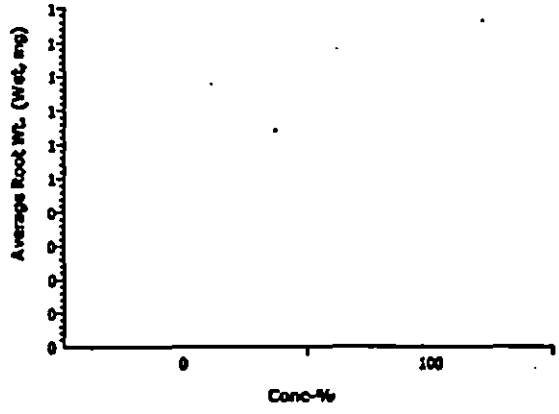
ANOVA Assumptions

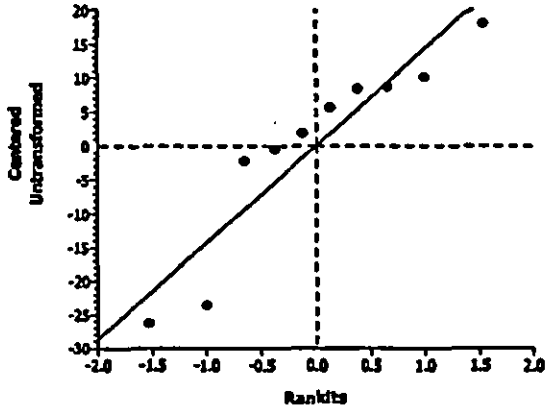
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.45274	23.15450	0.72627	Equal Variances
Distribution	Shapiro-Wilk W	0.86473		0.08673	Normal Distribution

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				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Root Wt. (Dry, mg)	Comparison		13-8778-5451	13-8778-5451	19 Jul-06 8:51 AM	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	0.5616308	9			

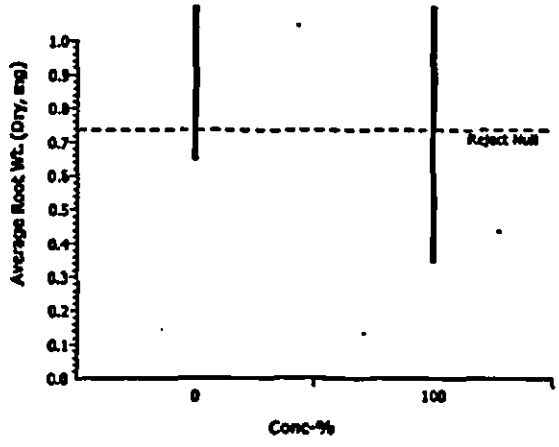
ANOVA Assumptions

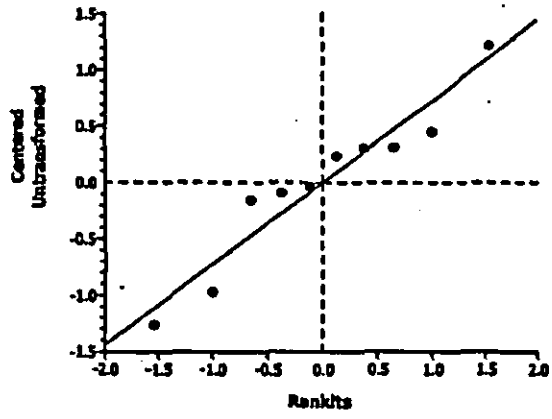
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.35927	23.15450	0.42618	Equal Variances
Distribution	Shapiro-Wilk W	0.93228		0.47069	Normal Distribution

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	0.84667	2.06331	0.57819				
100		5	1.61000	0.34401	2.82400	0.88809				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	13-8778-5451	13-8778-5451	19 Jul-06 8:51 AM	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			

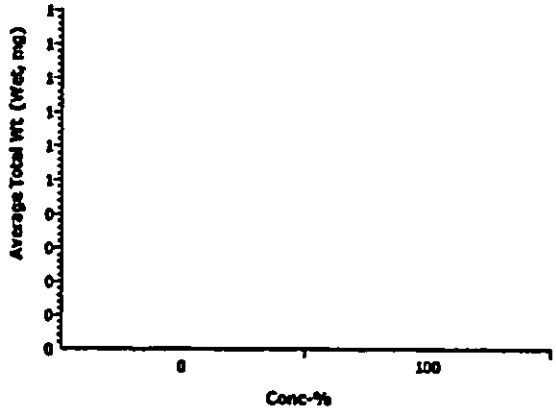
ANOVA Assumptions

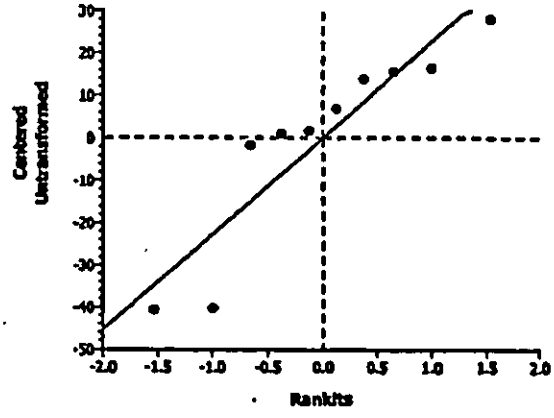
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.20886	23.15450	0.85859	Equal Variances
Distribution	Shapiro-Wilk W	0.83756		0.04125	Normal Distribution

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





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	13-8778-5451	13-8778-5451	19 Jul-06 8:51 AM	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			

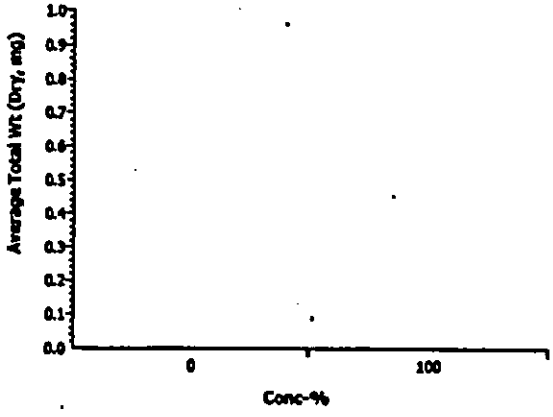
ANOVA Assumptions

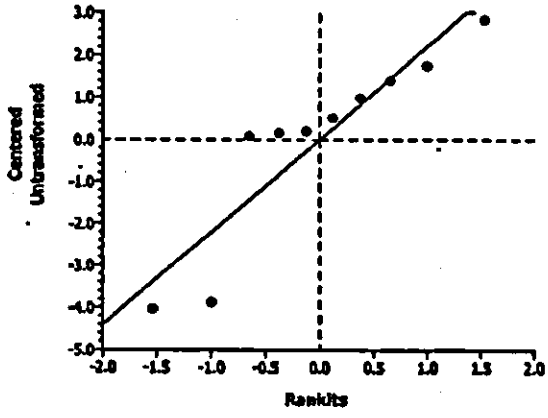
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.24729	23.15450	0.83561	Equal Variances
Distribution	Shapiro-Wilk W	0.83879		0.04267	Normal Distribution

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





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

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

Bioassay Lab ID: BP BC 1506-05 Sample No: JJJH4

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: 23 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, 5+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-2 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 2 Lg G, 3 Med G - 1 broad leaf plant noted
Replicate B: 3 Lg G, 1 Lg G w/ 1 B tip, 1 Med G w/ 1 B tip
Replicate C: 3 Med G, 2 MG 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	1089.7	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	63 mm	83 mm	101 mm	75 mm
Replicate D	80 mm	83 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: 19 Jul-06 9:25 AM
Test Link: 08-7339-5020/B156605psC

Plant Bioassay - Chronic — CH2M Hill

Test No:	03-3337-9736	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	05 Apr-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	05 Apr-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

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
05-9958-0999	% Germination	100	> 100	N/A	27.93%	Wilcoxon Rank Sum Two-Sample
09-4865-9500	Average Height (mm)	< 100	100	N/A	11.17%	Equal Variance t Two-Sample
13-2897-9281	Average Length (mm)	100	> 100	N/A	25.19%	Equal Variance t Two-Sample
12-7179-0270	Average AG Wt (Wet, mg)	100	> 100	N/A	32.37%	Equal Variance t Two-Sample
04-1030-1329	Average AG Wt (Dry, mg)	100	> 100	N/A	33.30%	Equal Variance t Two-Sample
04-5048-9747	Average Root Wt. (Wet, mg	100	> 100	N/A	36.45%	Equal Variance t Two-Sample
08-4828-7799	Average Root Wt. (Dry, mg)	100	> 100	N/A	35.66%	Equal Variance t Two-Sample
04-0228-6494	Average Total Wt (Wet, mg	100	> 100	N/A	34.13%	Equal Variance t Two-Sample
05-2803-0914	Average Total Wt (Dry, mg)	100	> 100	N/A	33.47%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 9:25 AM
Test Link: 08-7339-5020/B156605psC

% 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%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	75.780	61	84.400	3.9903	8.9226	11.77%
100		5	64.66	61.200	73.2	2.1913	4.8998	7.58%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	91.22	50	117.40	11.4	25.491	27.94%
100		5	72.72	54	79.6	4.7702	10.666	14.67%

Average AG Wt (Wet, mg) 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%

Average AG Wt (Dry, mg) 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%

Average Root Wt. (Wet, mg) 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%

Average Root Wt. (Dry, mg) 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%

Average Total Wt (Wet, mg) 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%

Average Total Wt (Dry, mg) 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%

CETIS Test Summary

Report Date: 19 Jul-06 9:25 AM
Test Link: 08-7339-5020/B156605psC

% 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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	61	84.4000	75.8000	80.7	77
100		61.2000	64.2	62	73.2	62.7000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	50	117.400	99.8000	86.7	102.2
100		54	76.6	74.4000	79.6	79

Average AG Wt (Wet, mg) 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

Average AG Wt (Dry, mg) 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

Average Root Wt. (Wet, mg) 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

Average Root Wt. (Dry, mg) 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

Average Total Wt (Wet, mg) 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

Average Total Wt (Dry, mg) 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

CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
% Germination	Comparison	08-7339-5020	08-7339-5020	19 Jul-06 8:55 AM	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			

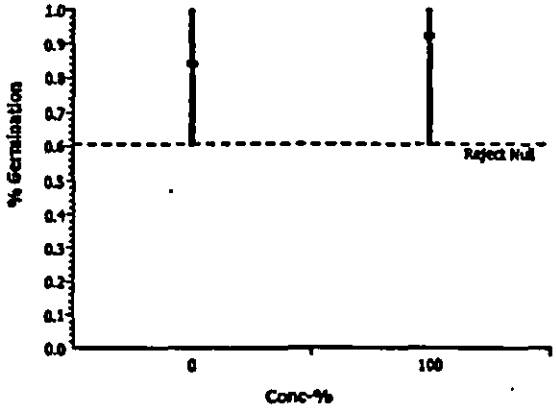
ANOVA Assumptions

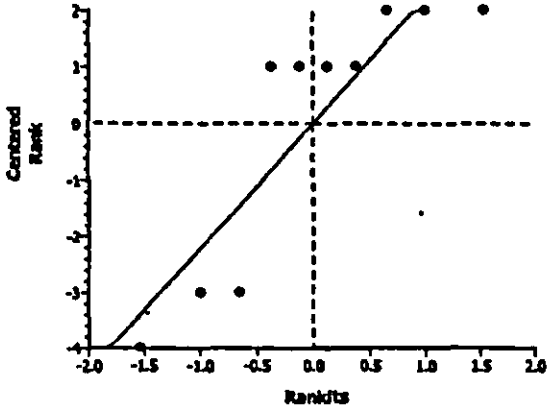
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.50000	23.15450	0.70400	Equal Variances
Distribution	Shapiro-Wilk W	0.75864		0.00455	Non-normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	08-7339-5020	08-7339-5020	19 Jul-06 8:55 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	11.17%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.44269	1.85955	0.0202	8.46534	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	309.1361	309.1361	1	5.97	0.04039	Significant Effect
Error	414.4799	51.80999	8			
Total	723.616028	360.94607	9			

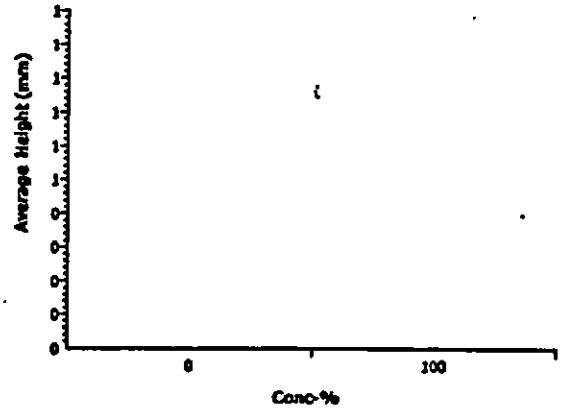
ANOVA Assumptions

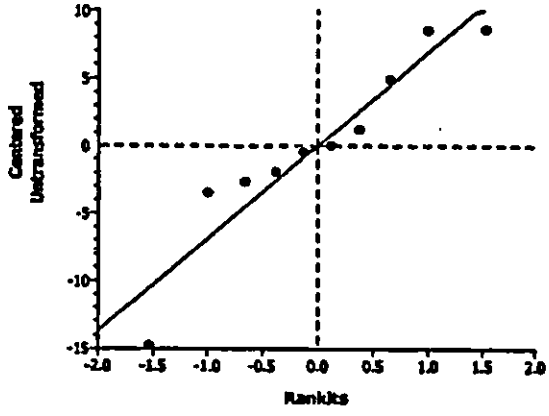
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.31606	23.15450	0.27234	Equal Variances
Distribution	Shapiro-Wilk W	0.90869		0.27211	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	75.780	61	84.4	8.9226				
100		5	64.66	61.2	73.2	4.8998				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	08-7339-5020	08-7339-5020	19 Jul-06 9:25 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	25.19%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.49706	1.85955	0.0864	22.9794	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	855.625	855.625	1	2.24	0.17275	Non-Significant Effect
Error	3054.176	381.772	8			
Total	3909.80103	1237.3970	9			

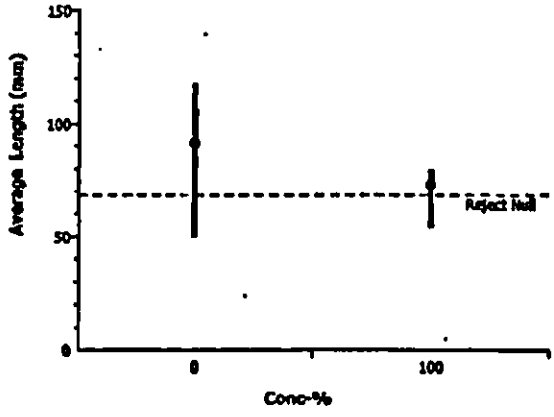
ANOVA Assumptions

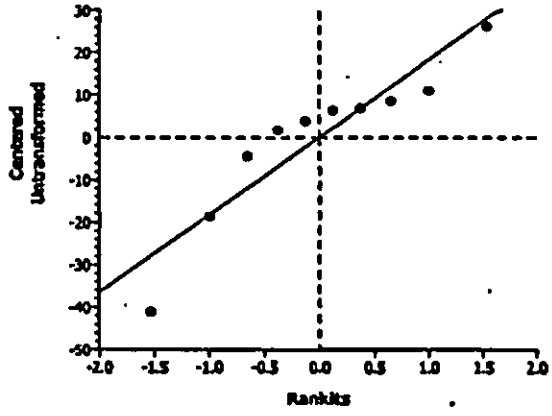
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.71118	23.15450	0.11998	Equal Variances
Distribution	Shapiro-Wilk W	0.88471		0.14774	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	91.22	50	117.4	25.491				
100		5	72.72	54	79.6	10.666				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average AG Wt (Wet, mg)	Comparison	08-7339-5020	08-7339-5020	19 Jul-06 8:56 AM	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			

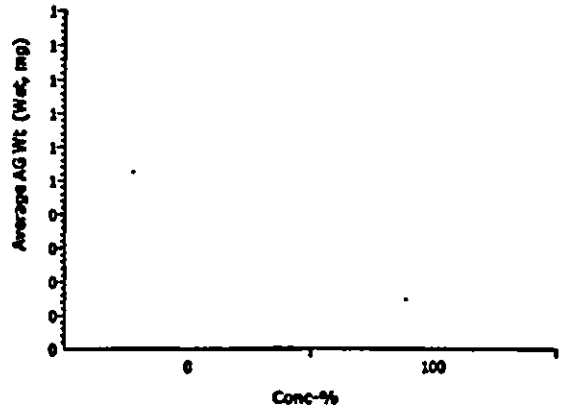
ANOVA Assumptions

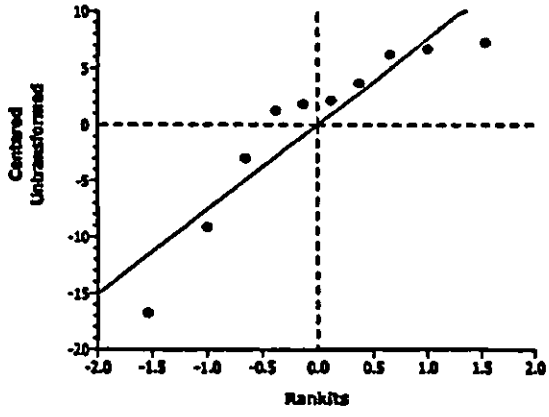
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.45808	23.15450	0.40501	Equal Variances
Distribution	Shapiro-Wilk W	0.84922		0.05686	Normal Distribution

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 Bioassay - Chronic					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average AG Wt (Dry, mg)	Comparison	08-7339-5020	08-7339-5020	19 Jul-06 8:56 AM	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			

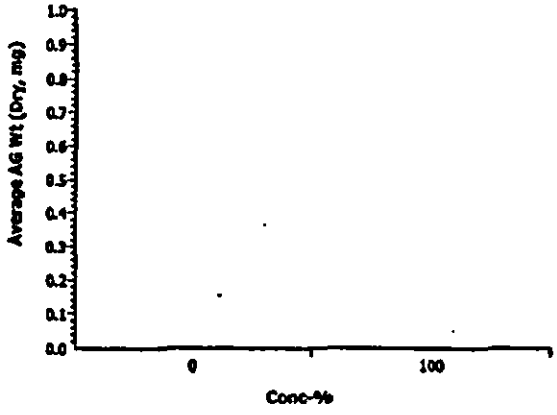
ANOVA Assumptions

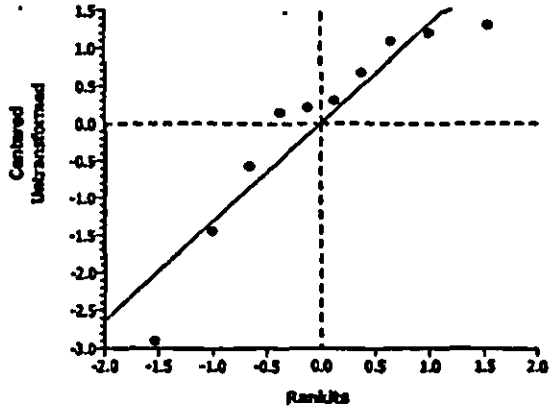
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.64472	23.15450	0.36905	Equal Variances
Distribution	Shapiro-Wilk W	0.87162		0.10441	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Root Wt. (Wet, mg)	Comparison	08-7339-5020	08-7339-5020	19 Jul-06 8:56 AM	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			

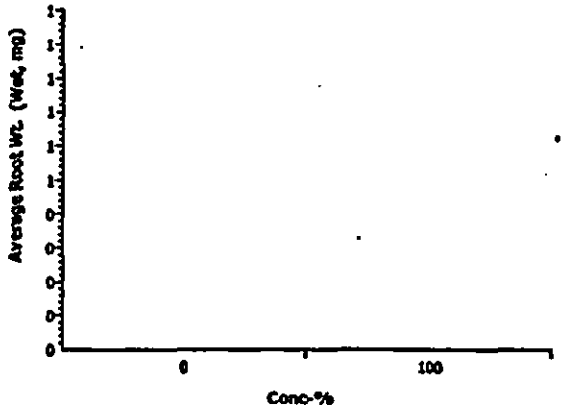
ANOVA Assumptions

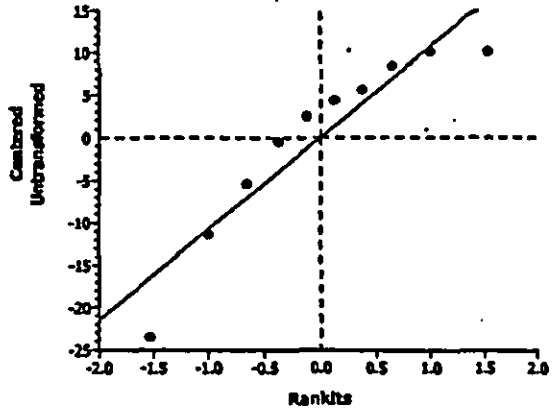
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.65655	23.15450	0.36694	Equal Variances
Distribution	Shapiro-Wilk W	0.87165		0.10448	Normal Distribution

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 Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Average Root Wt. (Dry, mg)	Comparison	08-7339-5020	08-7339-5020	19 Jul-06 8:56 AM	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	0.57668	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			

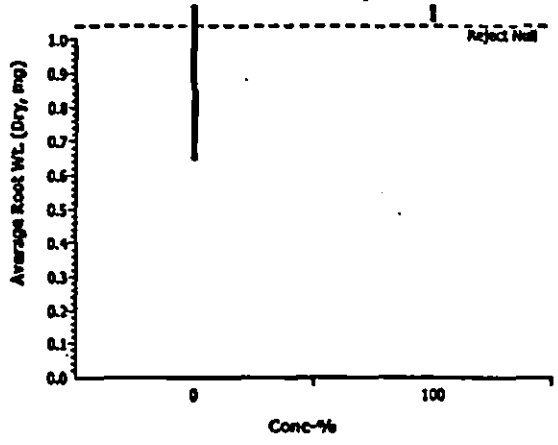
ANOVA Assumptions

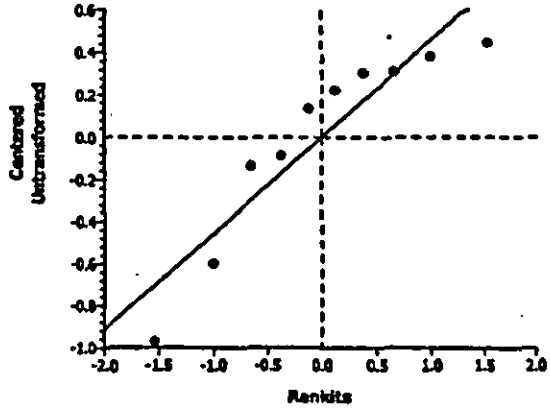
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.28077	23.15450	0.44417	Equal Variances
Distribution	Shapiro-Wilk W	0.85352		0.06397	Normal Distribution

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 Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	08-7339-5020	08-7339-5020	19 Jul-06 8:56 AM	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			

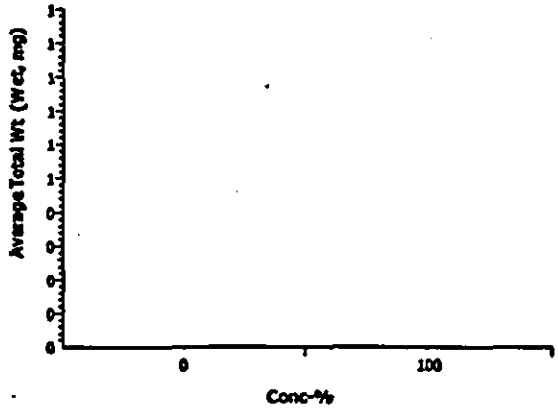
ANOVA Assumptions

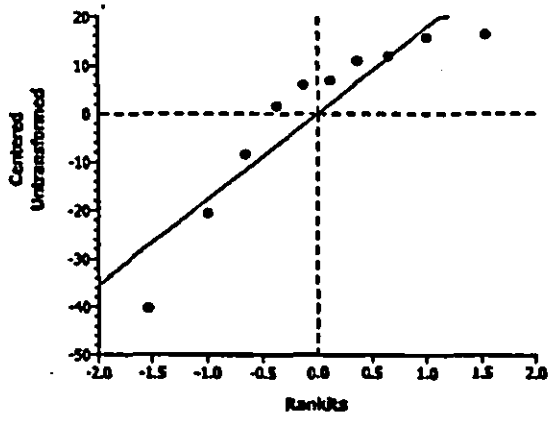
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.75655	23.15450	0.34972	Equal Variances
Distribution	Shapiro-Wilk W	0.83700		0.04061	Normal Distribution

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





CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Average Total Wt (Dry, mg)	Comparison		08-7339-5020	08-7339-5020	19 Jul-06 8:56 AM	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			

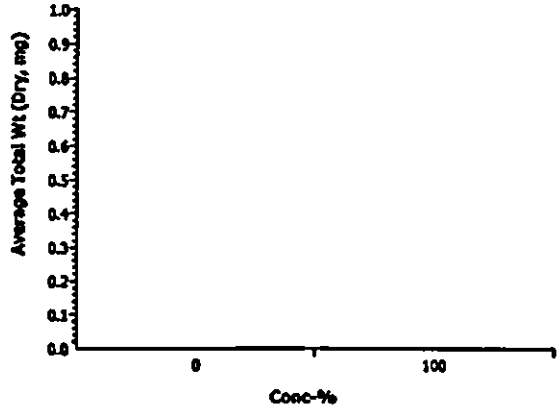
ANOVA Assumptions

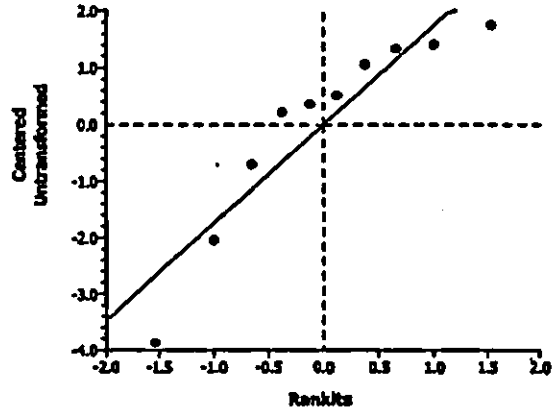
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.64510	23.15450	0.36899	Equal Variances
Distribution	Shapiro-Wilk W	0.85862		0.07350	Normal Distribution

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





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; Data Turnaround: 45 Days
Project Designation: 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location: 600-131	SAF No.: RC-051	Air Quality:
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/O									
No. of Container(s)	1	1									
Volume	1000g	~~1000g~~ 4000g									

SAMPLE ANALYSIS

11-1-05 LRC.

Sample No.	Matrix *	Sample Date	Sample Time	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172								
~~J10DV0~~ 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 @ 1045	Received By/Stored In	Date/Time 11-1-05 10:3
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
SD=Sediment
SO=Solid
D=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

BHPEE-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. 375-4638	Project Coordinator KESSNER, JH	Price Code 8L Air Quality 1	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 11-8-05								
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 Tolfes	11-9-05 12:00	[illegible]	11-9-05 12:00
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

ET 11/10/05 As per Rich Weiss

Bioassay ID = B1542-02

Matrix *
S=Soil
SE=Sediment
SD=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

BHFE-011 (08/29/2005)

E2P31

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-9	Page 1 of 1
llector L. COLLOM	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Data Turnaround 45 Days
oject Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location Upland Backfill Elevated-100-F-2		SAF No. RC-051	Air Quality
Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment	
ipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.	

OSSIBLE SAMPLE HAZARDS/REMARKS
otentially Radioactive.

pecial Handling and/or Storage
ONE

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										
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 11:30	Received By/Stored In Dayna Kaumann	Date/Time 11/15/05 11:31
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
SD=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; Data Turnaround: 45 Days; Air Quality:
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										
J10LJ5	SOIL	11-28-05	~~16:19~~ 16:19	1	1								-1

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: CH2MHILL Elizabeth Tepper	16:25 11-28-05	Received By/Stored In: Rhonda Dickson	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 instrumental 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; (C Anions - 300.0; Percent Solids

Bioassay ID = 81542-08

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-EE0 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
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-K RIPARIAN #5		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. ~~A060131-1RE~~ 316-06 A060380		Bill of Lading/Air Bill No.

Price Code 8L

Data Turnaround 45 Days

Air Quality ☐

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	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tepper		CH2M Hill	
Elizabeth M Tepper	3-22-06 11:30	Lynne Kaumann	3/22/06 1130

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-SUL2

BIO ASSY COPY

Matrix *

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	Price Code 8L Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-K RIPARIAN #4	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.	

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	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tepper		CH2M Hill	→
Relinquished By/Removed From	Date/Time 3-27-06 11:30	Received By/Stored In	Date/Time 3/27/06 11:30
Elizabeth M Tepper		Maria Hammond	
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

F142101-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	Price Code: 8L; Data Turnaround: 45 Days
Project Designation: 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location: 100-H RIPARIAN #8	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 Limville.

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	18:00	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	Received By/Stored In	Date/Time
CH2M Hill Tepper	3-29-06 11:30	[illegible]	3-29-06 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 forms. 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 F1436-5012

Matrix *

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

BHCE-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								^

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 4-4-06 10:30	Received By/Stored In Fed	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In [illegible]	Date/Time 4/4/06 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

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 Solid
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 L. Cotton 3-24-06 ~~STANKOVICH,M.~~	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 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	Data Turnaround 45 Days
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	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 10:30 4-4-06	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time 4-4-06
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

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
SlS=Sediment
SO=Solid
St=Sludge
W = Water
O=Oil
A=Air
OS=Cross Solid
DL=Drum Liquid
T=Tissue
Wi=Wipe
L=Liquid
Vs=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)