0070588

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

RECEIVED
AUG 2 1 2006
EDMC

COMPLETE COPY OF DATA PACKAGE TO:

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

COMMENTS:

SDG F1518 SAF-RC-051

Rad only X Chem only Rad & Chem

X Complete Partial

Corrected Bluegrass Report for Soil Plant Toxicity

Waste Site: Upper Riparian #16

ELR Consulting, Inc.
PROJECT MANAGEMENT, ENGINEERING, & TECHNICAL SERVICES

July 20, 2006

RECEIVED
JUL 2006
corrected

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
F1518

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; [5], 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 26, 2006																			
Laboratory Control		88	--	88.6	--	106.3	--	34.2	--	6.05	--	36.2	--	1.54	--	70.4	--	7.59	--
BG1575-01	J11JB4	84	ns	69.5	ns	66.5	E [5]	27.0	ns	4.32	ns	29.2	ns	0.67	ns	56.2	ns	5.00	E [5]
BG1575-02	J11JB5	92	ns	76.3	ns	62.7	E [5]	30.4	ns	4.80	ns	29.2	ns	1.86	ns	59.6	ns	6.66	ns
BG1575-03	J11JH6	92	ns	75.2	ns	79.0	E [5]	27.2	ns	4.53	ns	38.3	ns	1.79	ns	65.5	ns	6.31	ns
BG1575-04	J11JJ0	96	ns	62.3	E [5]	71.7	E [5]	25.8	ns	3.55	E [5]	33.0	ns	1.92	ns	58.8	ns	5.47	ns
BG1575-05	J11JH9	76	ns	69.4	ns	69.5	E [5]	28.4	ns	4.72	ns	46.5	ns	2.15	ns	74.9	ns	6.86	ns
BG1575-06	J11JB6	80	ns	69.3	ns	60.2	E [5]	35.5	ns	5.04	ns	45.4	ns	1.81	ns	80.9	ns	6.85	ns
BG1575-07	J11K34	72	ns	66.5	E [5]	64.7	E [5]	16.8	E [5]	2.94	E [5]	14.4	E [5]	0.50	E [5]	31.2	E [5]	3.44	E [5]
BG1575-08	J11K28	44	E [5]	63.8	E [5]	58.8	E [5]	13.3	E [5]	2.63	E [5]	9.1	E [5]	0.70	E [5]	22.4	E [5]	3.33	E [5]
BG1575-09	J11K61	80	ns	93.3	ns	89.1	E [5]	34.4	ns	5.75	ns	39.1	ns	1.24	ns	73.5	ns	6.99	ns
BG1575-10	J11K40	80	ns	86.4	ns	80.3	E [5]	36.7	ns	5.31	ns	34.7	ns	1.67	ns	71.4	ns	6.98	ns
BG1575-11	J11JX6	68	ns	80.5	ns	89.1	ns	27.1	ns	4.64	ns	36.7	ns	1.80	ns	63.8	ns	6.44	ns

BIOASSAY REPORT
CHRONIC SCREENING BIOASSAYS
Conducted April 26 through May 31, 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. BG1575-01 thru 11
SDG Number BG1575

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	5
TEST INITIATION	5
TEST MONITORING	5
TEST TERMINATION	5
DATA ANALYSIS	6
RESULTS AND DISCUSSION	7
CHRONIC RESULTS	7
CERTIFICATION STATEMENT	9

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 26 through May 31, 2006.

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

METHODS AND MATERIALS

TEST METHODS

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

TEST ORGANISMS

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

CONTROL SOIL

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

HYDRATION WATER

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

TEST CONCENTRATIONS

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

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

SAMPLE COLLECTION

The soil samples were collected from April 7 through 26, 2006. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

SAMPLE CROSS-REFERENCE TABLE

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

Table 1
Sample Cross-Reference

Client ID	Sample Date	Sample Location	Bluegrass test SDG	Analytical Lab SDG
J11JB4	04/05/2006	100-H RIPARIAN #1	BG1575-01	F1493
J11JB5	04/09/2006	100-D RIPARIAN #2	BG1575-02	F1508
J11JH6	04/10/2006	100-H RIAPRIAN #9	BG1575-03	F1514
J11JJ0	04/11/2006	UPPER RIPARIAN #16	BG1575-04	F1518
J11JH9	04/12/2006	UPPER RIPARIAN #14	BG1575-05	F1522
J11JB6	04/17/2006	300-A RIPARIAN #6	BG1575-06	F1548
J11K34	04/18/2006	600--139	BG1575-07	F1556
J11K28	04/19/2006	600-132/600-190	BG1575-08	F1564
J11K61	04/24/2006	628-1	BG1575-09	F1586
J11K40	04/24/2006	600--204	BG1575-10	F1588
J11JX6	04/25/2006	300-49	BG1575-11	F1600

SAMPLE PREPARATION

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

TEST INITIATION

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

TEST MONITORING

According to information provided by the seed supplier, germination should take place between 14 and 28 days. The number of seeds in each test chamber that germinated was recorded on days 14, 16, 19, 21, and 23. Germination was determined to have occurred on day 21.

Observations of the shoot appearance were recorded 7 days after post germination (day 28 after planting). The number of germinated seeds in each test chamber was also recorded. Chambers that had more than five germinated seeds had the smallest seedlings removed until the number of seedlings was reduced to five.

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

TEST TERMINATION

Tests were terminated 14 days post germination (day 35 after planting). The number of seedlings, shoot appearance and height (tallest shoot of each plant), and root appearance and length (longest recovered root of each plant) was recorded.

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

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

DATA ANALYSIS

For each test chamber, the following endpoints were calculated:

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

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

RESULTS AND DISCUSSION

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

The results for sample J11JB4 indicated a statistically significant reduction in average root length and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11JB5 indicated a statistically significant reduction in average root length when compared to the laboratory control.

The results for sample J11JH6 indicated a statistically significant reduction in average root length when compared to the laboratory control.

The results for sample J11JJ0 indicated a statistically significant reduction in average stem (shoot) height, average root length, and average above ground shoot mass (dry) when compared to the laboratory control.

The results for sample J11JH9 indicated a statistically significant reduction in average root length when compared to the laboratory control.

The results for sample J11JB6 indicated a statistically significant reduction in average root length when compared to the laboratory control.

The results for sample J11JK34 indicated a statistically significant reduction in average 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 J11JK28 indicated a statistically significant reduction in 14 day germination, average 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 J11K61 indicated a statistically significant reduction in average root length when compared to the laboratory control.

The results for sample J11K40 indicated a statistically significant reduction in average root length when compared to the laboratory control.

The results for sample J11JX6 indicated no statistically significant reduction when compared to the laboratory control.

Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford

E, statistically significant difference from lab control by use of Equal Variance t Two-Sample Test. : W, statistically significant difference from lab control by use of Wilcoxon Rank Sum Two-Sample Test.

ns indicates a non statistically significant result; ^{5}, 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 29, 2008																			
Laboratory Control		88	--	88.6	--	106.3	--	34.2	--	6.05	--	36.2	--	1.54	--	70.4	--	7.59	--
BG1575-01	J11JB4	84	ns	69.5	ns	66.5	E^{5}	27.0	ns	4.32	ns	29.2	ns	0.67	ns	56.2	ns	5.00	E^{5}
BG1575-02	J11JB5	92	ns	76.3	ns	62.7	E^{5}	30.4	ns	4.80	ns	29.2	ns	1.86	ns	59.6	ns	6.66	ns
BG1575-03	J11JH6	92	ns	75.2	ns	79.0	E^{5}	27.2	ns	4.53	ns	38.3	ns	1.79	ns	65.5	ns	6.31	ns
BG1575-04	J11JJ0	96	ns	62.3	E^{5}	71.7	E^{5}	25.8	ns	3.55	E^{5}	33.0	ns	1.92	ns	58.8	ns	5.47	ns
BG1575-05	J11JH9	76	ns	69.4	ns	69.5	E^{5}	28.4	ns	4.72	ns	46.5	ns	2.15	ns	74.9	ns	6.86	ns
BG1575-06	J11JB6	80	ns	69.3	ns	60.2	E^{5}	35.5	ns	5.04	ns	45.4	ns	1.81	ns	80.9	ns	6.85	ns
BG1575-07	J11K34	72	ns	66.5	E^{5}	64.7	E^{5}	16.8	E^{5}	2.94	E^{5}	14.4	E^{5}	0.50	E^{5}	31.2	E^{5}	3.44	E^{5}
BG1575-08	J11K28	44	E^{5}	63.8	E^{5}	58.8	E^{5}	13.3	E^{5}	2.63	E^{5}	9.1	E^{5}	0.70	E^{5}	22.4	E^{5}	3.33	E^{5}
BG1575-09	J11K61	80	ns	93.3	ns	89.1	E^{5}	34.4	ns	5.75	ns	39.1	ns	1.24	ns	73.5	ns	6.99	ns
BG1575-10	J11K40	80	ns	86.4	ns	80.3	E^{5}	36.7	ns	5.31	ns	34.7	ns	1.67	ns	71.4	ns	6.98	ns
BG1575-11	J11JX6	68	ns	80.5	ns	89.1	ns	27.1	ns	4.64	ns	36.7	ns	1.80	ns	63.8	ns	6.44	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: 4-26-06

Initials:
Day 0 DO/Bm Day 12 _____ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 NJ Day 28 TP Day 35 BM

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 (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		6	6	7	8	8	5	5	6.2	7.5
	B		5	5	5	5	5	5	5		
	C		4	4	4	4	4	4	2L, 2 dead		
	D		5	6	6	6	6	5	5		
	E		7	7	8	8	8	5	5		

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

Replicate A 2lg G, 3 sm G Removed 3sm G - w/1 B tip
Replicate B 4lg G, 1 md G
Replicate C 1lg G 1sm G 2sm B
Replicate D 3lg G, 2 md G Removed 1sm B
Replicate E 5 lg G Removed 2lg G + 1 md 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 md G 4 md w/ 1 B shoot.
Replicate B 1 Lg w/ 1 B shoot 2 Med G, 2 med w/ 1 B shoot.
Replicate C 1 Lg w/ 1 B shoot, 1 med G 2 Sm dead - removed
Replicate D 2 md G, 2 md w/ 1 B shoot.
Replicate E 3 Lg G, 2 Lg G w/ 1 B shoot each.

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	31 mm	70 mm	70 mm	100 mm	72 mm
Replicate B	120 mm	55 mm	75 mm	55 mm	90 mm
Replicate C	45 mm	89 mm	mm	mm	mm
Replicate D	102 mm	93 mm	80 mm	81 mm	98 mm
Replicate E	110 mm	128 mm	146 mm	95 mm	98 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	995.35	1147.4	1018.02
Replicate B	1245.74	1411.6	1278.86
Replicate C	1257.58	1297.5	1265.85
Replicate D	1252.12	1423.3	1283.56
Replicate E	1237.76	1503.8	~~1283.56~~ 1281.17

Describe root appearance:

Replicate A
Replicate B
Replicate C
Replicate D
Replicate E

Measure Root Length:
Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	136 mm	97 mm	121 mm	82 mm	78 mm
Replicate B	153 mm	76 mm	120 mm	110 mm	113 mm
Replicate C	134 mm	31 mm	mm	mm	mm
Replicate D	113 mm	112 mm	108 mm	105 mm	122 mm
Replicate E	149 mm	120 mm	94 mm	128 mm	109 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	979.16	1145.8	985.50
Replicate B	1246.64	1451.3	1255.08
Replicate C	1246.62	1273.8	1248.49
Replicate D	1239.77	1381.3	1245.32
Replicate E	1250.43	1515.7	1263.82

Comments:

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 11-26-06

Initials: Day 0 (A) Day 12 _____ Day 14 NJ Day 16 NJ Day 19 (TP) Day 21 NJ Day 23 NJ Day 28 NJ Day 35 DW

Bioassay Lab ID: BG 1575-01 Sample No: J11J34

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 (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		3	3	4	4	4	4	4	6.2	7.3
	B		2	2	3	3	3	3	3		
	C		2	3	4	6	6	5	5		
	D		1	2	3	4	4	4	4		
	E		2	3	4	4	5	5	5		

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

Replicate A: 3lg G, 1md G

Replicate B: 1lg G, 1md G, 1sm G

Replicate C: NTS 2lg G, 1md G, 2sm G Removed 1sm G

Replicate D: 1lg G, 1med G, 2sm G

Replicate E: 2lg G, 3sm 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: 1 Md G, 3 Md w/ B tips

Replicate B: 2 Lg G, 1 Sm G

Replicate C: 2 Lg G, 1 Md G, 2 Sm G

Replicate D: 2 Md G, 2 Sm G

Replicate E: 1 Md G, 1 Md w/ 1 B shoot, 3 Sm G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	32 mm	94 mm	61 mm	97 mm	mm
Replicate B	134 mm	101 mm	39 mm	mm	mm
Replicate C	93 mm	70 mm	101 mm	27 mm	40 mm
Replicate D	105 mm	68 mm	40 mm	17 mm	mm
Replicate E	91 mm	96 mm	28 mm	6 mm	23 mm

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

992.17

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	~~1001.15~~	1142.10	1022.45
Replicate B	1257.92	1357.10	1272.72
Replicate C	1255.06	1374.49	1273.56
Replicate D	1265.17	1318.15	1243.04
Replicate E	1248.72	1386.52	1265.96

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	45 mm	81 mm	78 mm	112 mm	mm
Replicate B	76 mm	133 mm	41 mm	mm	mm
Replicate C	26 mm	39 mm	98 mm	93 mm	92 mm
Replicate D	67 mm	22 mm	36 mm	70 mm	mm
Replicate E	78 mm	47 mm	36 mm	13 mm	86 mm

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

1001.15

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	~~992.17~~	1149.40	997.78
Replicate B	1246.57	1360.91	1251.37
Replicate C	1262.94	1424.60	1267.81
Replicate D	1245.56	1302.11	1248.15
Replicate E	1246.83	1368.20	1251.77

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 10:18 AM
Test Link: 11-8811-6060/B157501psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	13-0819-5743	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	16-5207-3918	**Code:**	B1574-01	**Client:**	
Sample Date:	07 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	19d 0h	**Station:**			

Comments: J11JB4

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
17-2113-9957	% Germination	100	> 100	N/A	28.11%	Wilcoxon Rank Sum Two-Sample
17-9030-4749	Average Height (mm)	100	> 100	N/A	23.71%	Equal Variance t Two-Sample
14-6232-4345	Average Length (mm)	< 100	100	N/A	16.75%	Equal Variance t Two-Sample
17-0075-6680	Average AG Wt (Wet, mg)	100	> 100	N/A	36.98%	Equal Variance t Two-Sample
16-2394-5043	Average AG Wt (Dry, mg)	100	> 100	N/A	38.17%	Equal Variance t Two-Sample
04-5932-8324	Average Root Wt. (Wet, mg	100	> 100	N/A	49.20%	Equal Variance t Two-Sample
10-1933-8355	Average Root Wt. (Dry, mg)	100	> 100	N/A	62.26%	Equal Variance t Two-Sample
13-8367-1787	Average Total Wt (Wet, mg	100	> 100	N/A	42.48%	Equal Variance t Two-Sample
06-1775-8595	Average Total Wt (Dry, mg)	< 100	100	N/A	32.75%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:18 AM
Test Link: 11-8811-6060/B157501psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.84000	0.60000	1.00000	0.07483	0.16733	19.92%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	69.46	48.8	91.300	7.9203	17.710	25.50%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	66.540	48.8	83.300	6.9701	15.586	23.42%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	27.049	13.257	37.482	4.156	9.2931	34.36%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	4.32376	1.96750	7.57001	0.93855	2.09867	48.54%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	29.183	14.135	38.110	4.4846	10.028	34.36%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	0.67341	-0.8425	1.60002	0.40906	0.91468	135.83

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	56.231	27.392	74.545	8.3953	18.772	33.38%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	4.9972	2.615	6.7275	0.7566	1.6917	33.85%

CETIS Test Summary

Report Date: 19 Jul-06 10:18 AM
Test Link: 11-8811-6060/B157501psB

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		0.80000	0.60000	1.00000	0.80000	1.00000

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	78.6	91	67	90.8000	115.400
100		83.5	91.3000	66.2	57.5	48.8

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		79	83.3000	69.6	48.8	52

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		37.4825	33.06	23.888	13.2575	27.5560

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		7.57001	4.93331	3.70000	1.96750	3.44800

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		37.0625	38.1100	32.3320	14.135	24.274

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		-0.84250	1.60002	0.97402	0.64749	0.98801

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		74.5450	71.1700	56.22	27.3925	51.8300

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		6.72751	6.53333	4.67402	2.61499	4.43601

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	11-8811-6060	11-8811-6060	19 Jul-06 10:18 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	28.11%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	24		0.2738	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0075576	0.007558	1	0.12	0.73659	Non-Significant Effect
Error	0.4983389	0.062292	8			
Total	0.50589649	0.0698499	9			

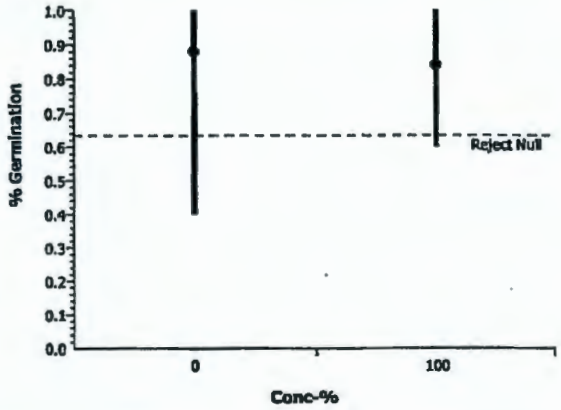
ANOVA Assumptions

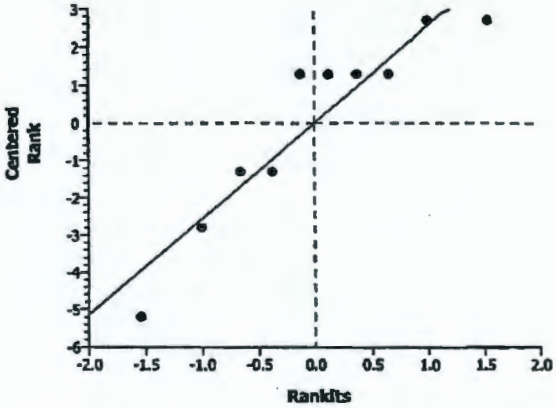
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.33866	23.15450	0.43080	Equal Variances
Distribution	Shapiro-Wilk W	0.77968		0.00820	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	6.20000	1.00000	7.50000	2.90689
100		5	0.84000	0.60000	1.00000	0.16733	4.80000	2.00000	7.50000	2.53969

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	11-8811-6060	11-8811-6060	19 Jul-06 10:18 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	23.71%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.69152	1.85955	0.0646	20.9973	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	912.0251	912.0251	1	2.86	0.12920	Non-Significant Effect
Error	2550.004	318.7505	8			
Total	3462.02948	1230.7756	9			

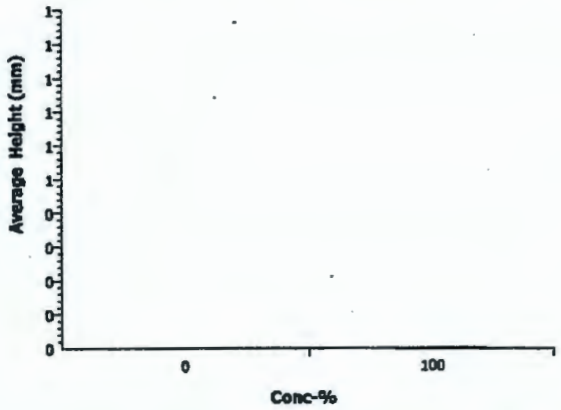
ANOVA Assumptions

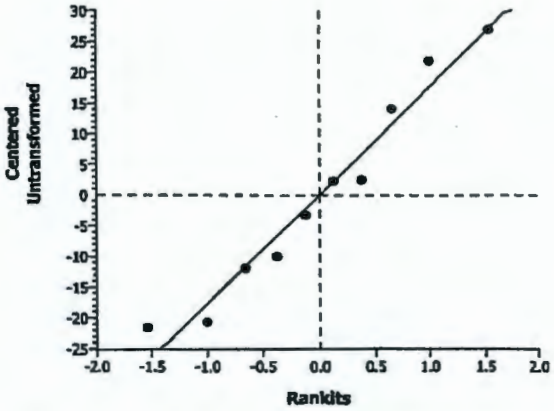
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.03250	23.15450	0.97601	Equal Variances
Distribution	Shapiro-Wilk W	0.94407		0.59917	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	69.46	48.8	91.3	17.710				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	11-8811-6060	11-8811-6060	19 Jul-06 10:18 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	16.75%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.15384	1.85955	0.0016	17.8173	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3960.1	3960.1	1	17.25	0.00319	Significant Effect
Error	1836.104	229.513	8			
Total	5796.20422	4189.6131	9			

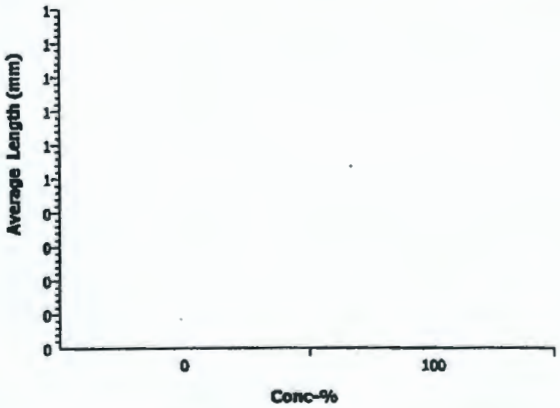
ANOVA Assumptions

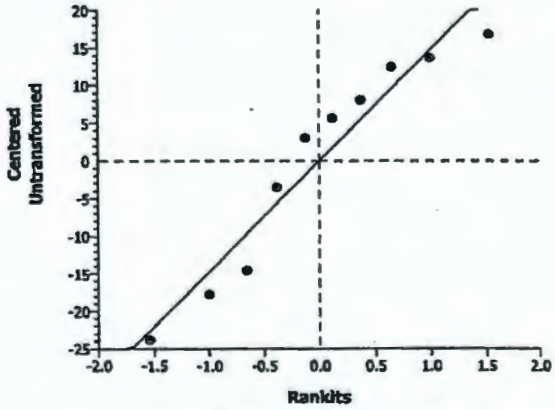
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.12396	23.15450	0.91256	Equal Variances
Distribution	Shapiro-Wilk W	0.91278		0.30065	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	66.540	48.8	83.3	15.586				

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	11-8811-6060	11-8811-6060	19 Jul-06 10:18 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	36.98%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.05115	1.85955	0.1620	12.6459	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	127.7498	127.7498	1	1.10	0.32390	Non-Significant Effect
Error	924.9483	115.6185	8			
Total	1052.69807	243.36831	9			

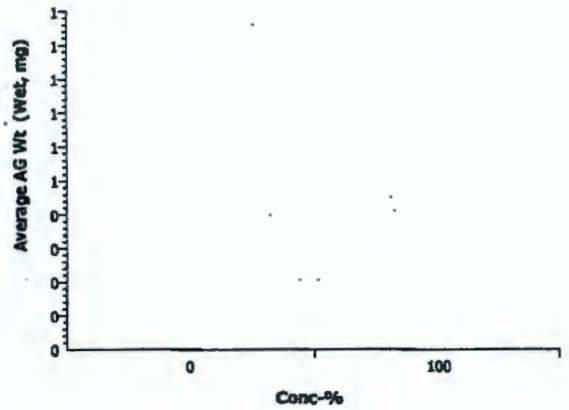
ANOVA Assumptions

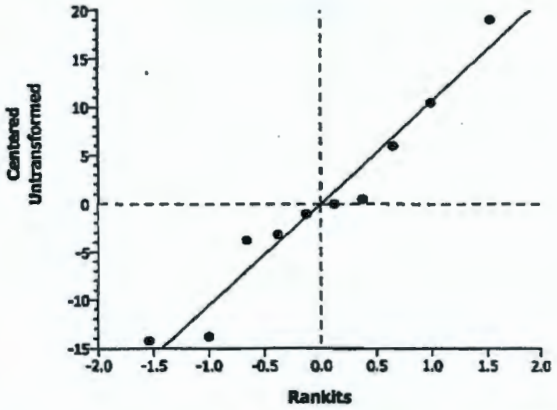
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.67756	23.15450	0.62853	Equal Variances
Distribution	Shapiro-Wilk W	0.94965		0.66441	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	27.049	13.257	37.483	9.2931				

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	11-8811-6060	11-8811-6060	19 Jul-06 10:18 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	38.17%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.3922	1.85955	0.1007	2.31054	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7.480916	7.480916	1	1.94	0.20134	Non-Significant Effect
Error	30.87747	3.859683	8			
Total	38.3583822	11.340599	9			

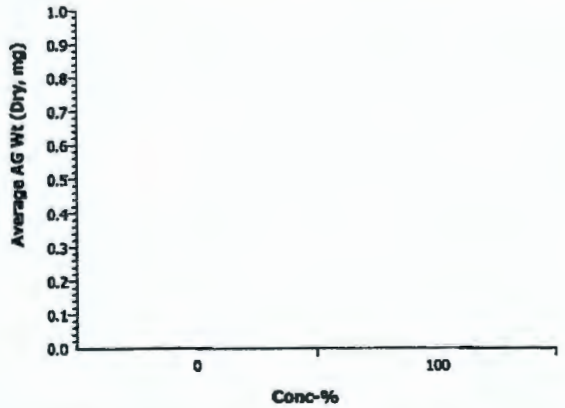
ANOVA Assumptions

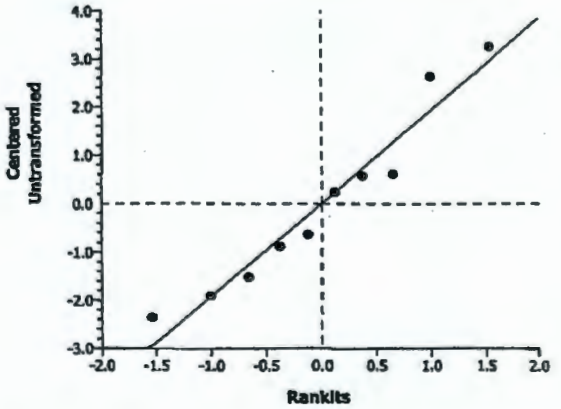
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.32865	23.15450	0.78970	Equal Variances
Distribution	Shapiro-Wilk W	0.93627		0.51234	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	4.32376	1.96750	7.57001	2.09867				

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	11-8811-6060	11-8811-6060	19 Jul-06 10:18 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	49.20%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.73619	1.85955	0.2413	17.8311	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	124.5844	124.5844	1	0.54	0.48264	Non-Significant Effect
Error	1838.945	229.8682	8			
Total	1963.52973	354.45258	9			

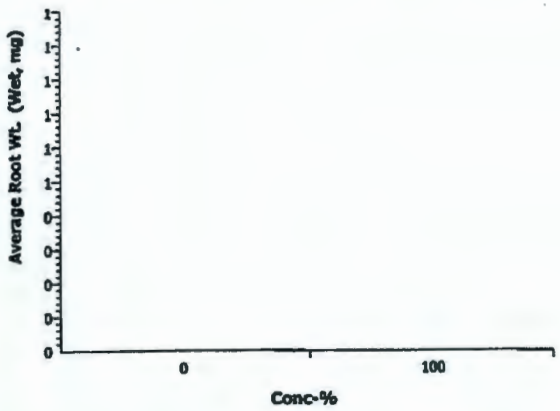
ANOVA Assumptions

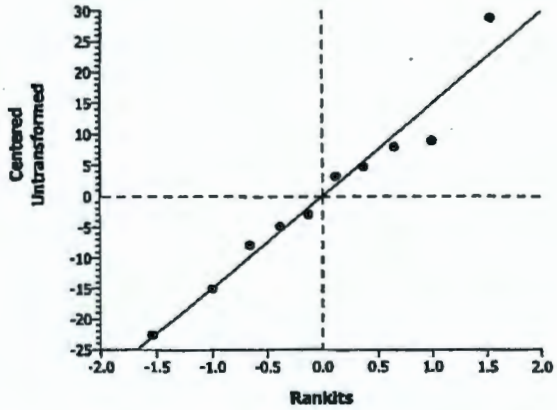
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.57181	23.15450	0.24520	Equal Variances
Distribution	Shapiro-Wilk W	0.96953		0.88643	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	29.183	14.135	38.110	10.028				

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	11-8811-6060	11-8811-6060	19 Jul-06 10:18 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	62.26%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.67709	1.85955	0.0660	0.95621	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.859257	1.859257	1	2.81	0.13205	Non-Significant Effect
Error	5.288322	0.661040	8			
Total	7.14757931	2.5202972	9			

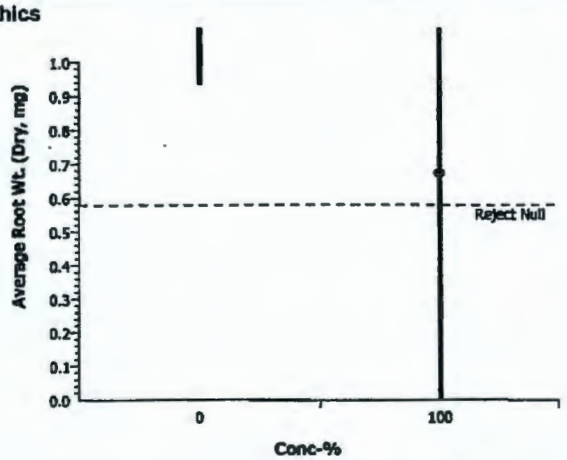
ANOVA Assumptions

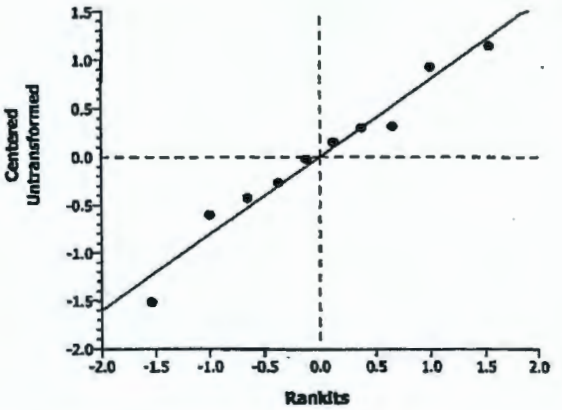
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.72351	23.15450	0.61089	Equal Variances
Distribution	Shapiro-Wilk W	0.96848		0.87637	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	0.67341	-0.8425	1.60002	0.91468				

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	11-8811-6060	11-8811-6060	19 Jul-06 10:18 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	42.48%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.88298	1.85955	0.2015	29.9212	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	504.6483	504.6483	1	0.78	0.40300	Non-Significant Effect
Error	5178.138	647.2672	8			
Total	5682.78604	1151.9156	9			

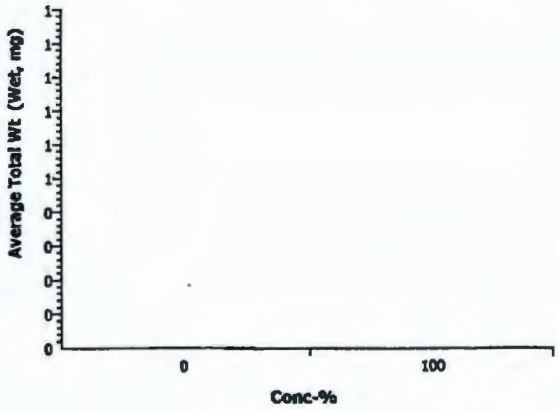
ANOVA Assumptions

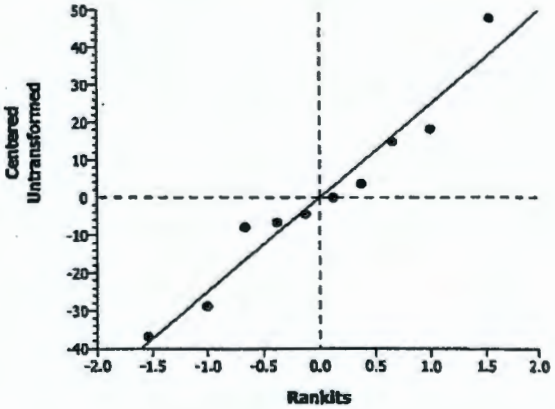
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.67346	23.15450	0.36394	Equal Variances
Distribution	Shapiro-Wilk W	0.95865		0.77041	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	56.231	27.392	74.545	18.772				

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	11-8811-6060	11-8811-6060	19 Jul-06 10:18 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	32.75%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.93912	1.85955	0.0442	2.48585	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	16.79911	16.79911	1	3.76	0.08847	Non-Significant Effect
Error	35.74092	4.467615	8			
Total	52.5400314	21.266726	9			

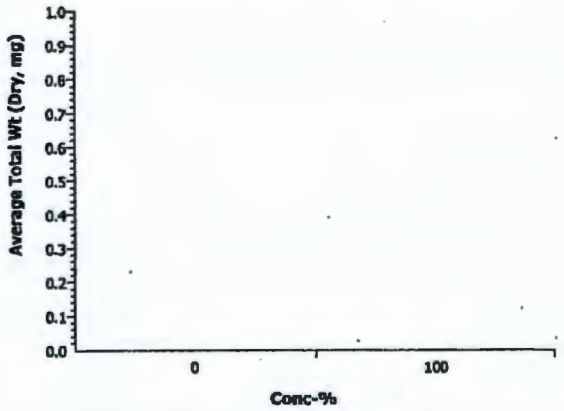
ANOVA Assumptions

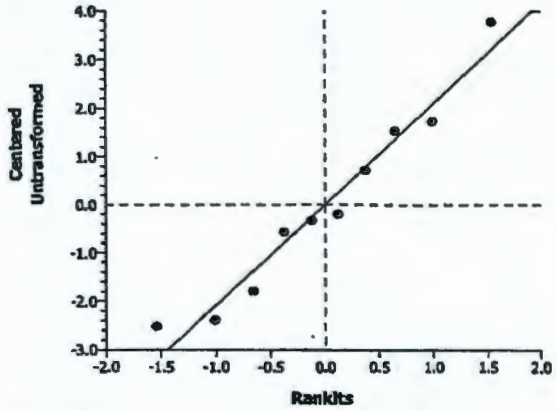
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.12204	23.15450	0.48412	Equal Variances
Distribution	Shapiro-Wilk W	0.95228		0.69553	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	4.9972	2.615	6.7275	1.6917				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 KH Day 12 ____ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 NJ Day 28 TP Day 35 [illegible]

Bioassay Lab ID: BG 1575-02 Sample No: J11JB5

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 (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		6	7	7	7	7	7 → 5	5	6.4	7.2
	B		2	3	5	5	5	5 → 5	5		
	C		1	1	2	2	4	4 → 4	4		
	D		3	4	4	5	6	6 → 5	5		
	E		NJ 3	3	4	4	4	4	4		

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

Replicate A: 4 Lg (G), 1 med (G) w/ (TP) — removed: 1 med (G) w/ 1 B shoot, 1 Small (G)

Replicate B: 2 Lg (G) 2w/B tips, 3 med (G)

Replicate C: 3 Lg (G) 2w/B tips, 1 med (G) (TP) 3 Sm. (G), 1 med (G) w/ B tips

Replicate D: 1 Lg (G), 4 Sm. 1 w/B shoot — removed: 1 Sm (G)

Replicate E: 3 Lg (G) 2w/B tips, 1 med (G)

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 5 Lg G

Replicate B: 2 Lg G, 3 med G

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

Replicate D: ~~1 Lg G~~, 4 med G 1 Sm G — 1 large plant (non-bluegrass, removed)

Replicate E: 3 Lg w/1B tips, 1 med G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	79 mm	107 mm	93 mm	105 mm	89 mm
Replicate B	79 mm	63 mm	78 mm	91 mm	125 mm
Replicate C	38 mm	34 mm	54 mm	84 mm	mm
Replicate D	51 mm	57 mm	39 mm	44 mm	12 mm
Replicate E	103 mm	92 mm	119 mm	109 mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1002.78	1242.2	1042.12
Replicate B	1243.18	1405.9	1269.41
Replicate C	1250.91	1303.8	1260.26
Replicate D	1254.41	1296.8	1258.58
Replicate E	1247.05	1449.9	1277.97

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	93 mm	84 mm	63 mm	70 mm	73 mm
Replicate B	114 mm	44 mm	96 mm	55 mm	67 mm
Replicate C	39 mm	47 mm	36 mm	71 mm	mm
Replicate D	30 mm	38 mm	31 mm	46 mm	34 mm
Replicate E	95 mm	86 mm	66 mm	94 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	999.21	1244.1	1016.41
Replicate B	1244.66	1385.9	1255.35
Replicate C	1260.50	1317.0	1264.27
Replicate D	NJ ~~18~~ 1255.49	1287.0	1257.40
Replicate E	1254.57	1448.3	1264.10

Comments:

MS

CETIS Test Summary

Report Date: 19 Jul-06 10:24 AM
Test Link: 08-1256-9051/B157502psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	10-6241-3668	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	04-4665-3490	**Code:**	B1574-02	**Client:**	
Sample Date:	10 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	16d 0h	**Station:**			

Comments: J11JB5

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
13-1608-0433	% Germination	100	> 100	N/A	25.39%	Wilcoxon Rank Sum Two-Sample
12-1277-2741	Average Height (mm)	100	> 100	N/A	31.66%	Equal Variance t Two-Sample
20-0606-3665	Average Length (mm)	< 100	100	N/A	19.05%	Equal Variance t Two-Sample
01-3471-5172	Average AG Wt (Wet, mg)	100	> 100	N/A	56.09%	Equal Variance t Two-Sample
08-2983-7307	Average AG Wt (Dry, mg)	100	> 100	N/A	50.12%	Equal Variance t Two-Sample
13-0827-0380	Average Root Wt. (Wet, mg	100	> 100	N/A	62.32%	Equal Variance t Two-Sample
02-7142-7008	Average Root Wt. (Dry, mg)	100	> 100	N/A	75.69%	Equal Variance t Two-Sample
15-8565-0097	Average Total Wt (Wet, mg	100	> 100	N/A	58.66%	Equal Variance t Two-Sample
12-4136-3872	Average Total Wt (Dry, mg)	100	> 100	N/A	54.62%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:24 AM
Test Link: 08-1256-9051/B157502psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	76.34	40.400	107	12.750	28.511	37.35%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	62.74	35.8	77.800	8.6846	19.419	30.95%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	30.418	6.4780	50.712	8.8001	19.678	64.69%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	4.80309	0.83398	7.86799	1.41403	3.16186	65.83%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	29.197	6.3020	48.978	8.6998	19.453	66.63%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	1.85700	0.38201	3.43999	0.54189	1.21170	65.25%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	59.615	12.780	99.145	17.474	39.073	65.54%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	6.6601	1.216	11.308	1.9379	4.3333	65.06%

CETIS Test Summary

Report Date: 19 Jul-06 10:24 AM
Test Link: 08-1256-9051/B157502psB

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		1.00000	1.00000	0.80000	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	78.6	91	67	90.8000	115.400
100		94.6	87.2	52.5	40.4000	107

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		76.6	75.2	48.3	35.8	77.8000

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		47.884	32.544	14.4725	6.47800	50.7125

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		7.86799	5.24600	2.33749	0.83398	7.72998

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		48.978	28.148	14.125	6.30200	48.4325

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		3.43999	2.13799	0.94250	0.38201	2.38251

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		96.862	60.692	28.5975	12.7800	99.1450

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		11.308	7.38398	3.28	1.21599	10.1125

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	08-1256-9051	08-1256-9051	19 Jul-06 10:24 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	25.39%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	26		0.4206	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0033965	0.003396	1	0.07	0.80499	Non-Significant Effect
Error	0.417125	0.052141	8			
Total	0.42052149	0.0555371	9			

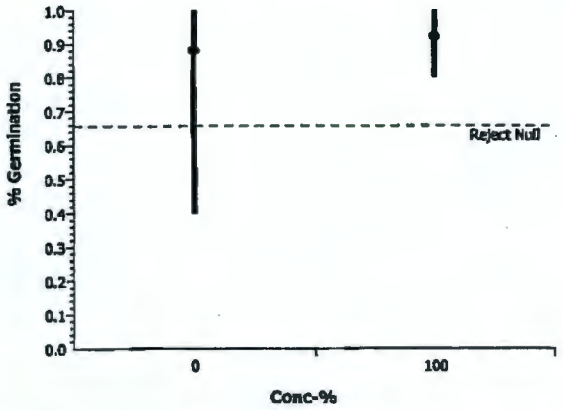
ANOVA Assumptions

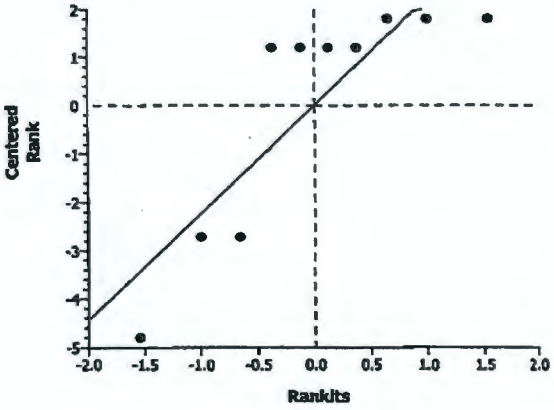
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.12973	23.15450	0.14232	Equal Variances
Distribution	Shapiro-Wilk W	0.68083		0.00052	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	5.80000	1.00000	7.00000	2.68328
100		5	0.92000	0.80000	1.00000	0.10954	5.20000	2.50000	7.00000	2.46475

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	08-1256-9051	08-1256-9051	19 Jul-06 10:24 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	31.66%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.81046	1.85955	0.2206	28.038	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	373.3211	373.3211	1	0.66	0.44112	Non-Significant Effect
Error	4546.824	568.353	8			
Total	4920.14481	941.67404	9			

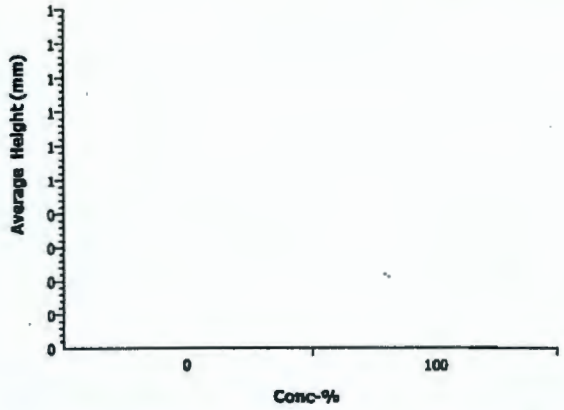
ANOVA Assumptions

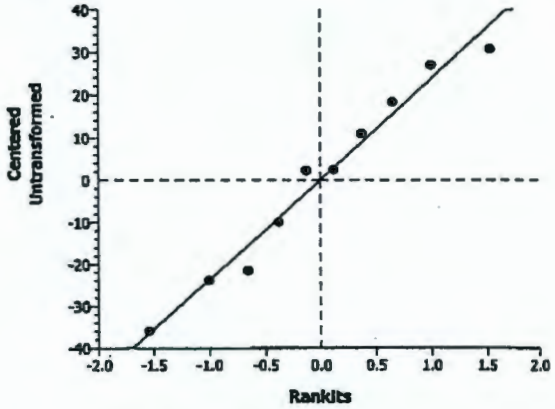
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.51000	23.15450	0.39451	Equal Variances
Distribution	Shapiro-Wilk W	0.95749		0.75697	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	76.34	40.4	107	28.511				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	08-1256-9051	08-1256-9051	19 Jul-06 10:24 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	19.05%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.00278	1.85955	0.0020	20.2550	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4752.4	4752.4	1	16.02	0.00393	Significant Effect
Error	2372.904	296.613	8			
Total	7125.30444	5049.0134	9			

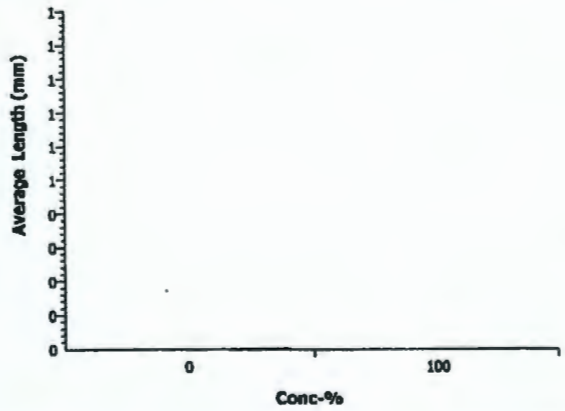
ANOVA Assumptions

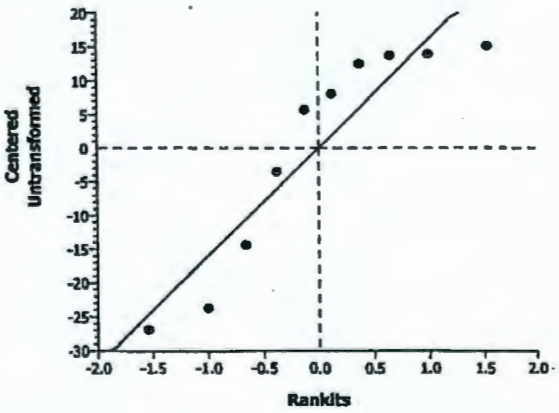
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.74492	23.15450	0.60292	Equal Variances
Distribution	Shapiro-Wilk W	0.83761		0.04131	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	62.74	35.8	77.8	19.419				

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	08-1256-9051	08-1256-9051	19 Jul-06 10:24 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	56.09%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.36633	1.85955	0.3618	19.1828	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	35.70236	35.70236	1	0.13	0.72362	Non-Significant Effect
Error	2128.333	266.0416	8			
Total	2164.03488	301.74393	9			

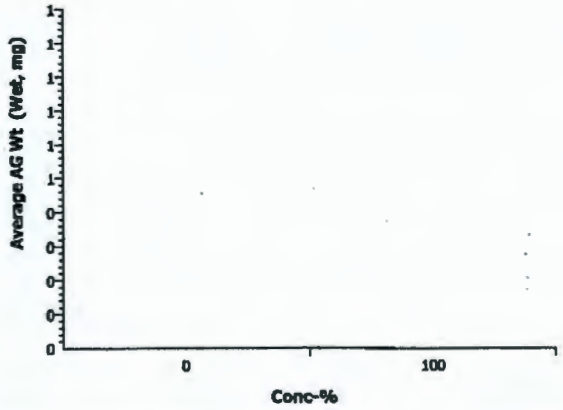
ANOVA Assumptions

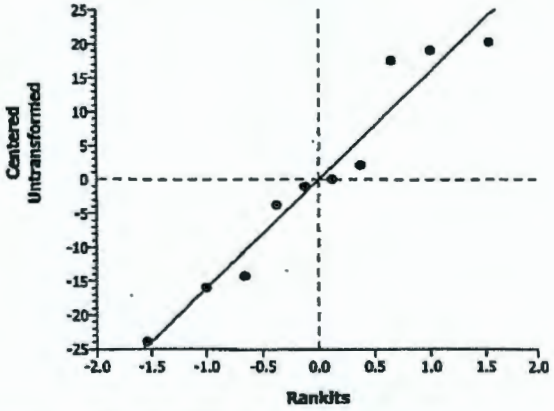
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.67268	23.15450	0.36408	Equal Variances
Distribution	Shapiro-Wilk W	0.92799		0.42844	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	30.418	6.4780	50.712	19.678				

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	08-1256-9051	08-1256-9051	19 Jul-06 10:24 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	50.12%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.76639	1.85955	0.2327	3.03423	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3.909493	3.909493	1	0.59	0.46546	Non-Significant Effect
Error	53.24924	6.656155	8			
Total	57.1587341	10.565648	9			

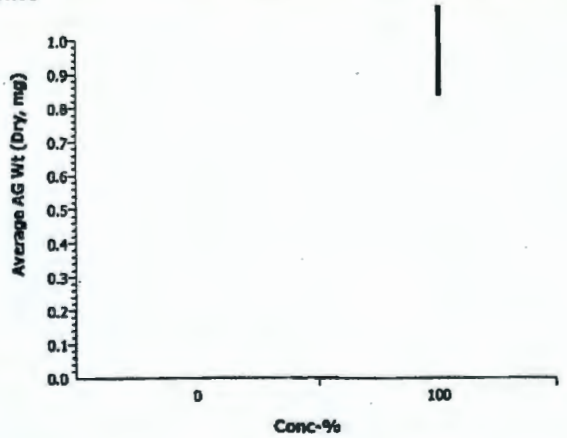
ANOVA Assumptions

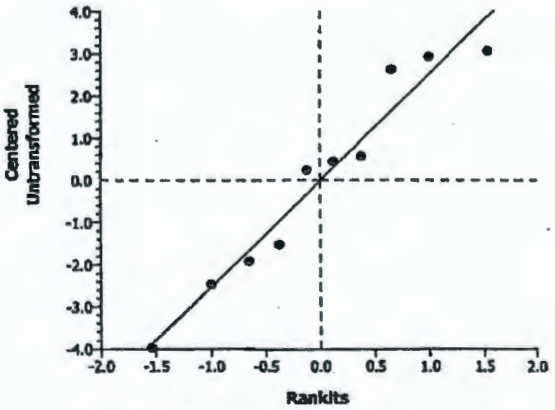
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.01584	23.15450	0.31028	Equal Variances
Distribution	Shapiro-Wilk W	0.93288		0.47676	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	4.80309	0.83398	7.86799	3.16186				

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	08-1256-9051	08-1256-9051	19 Jul-06 10:24 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	62.32%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	0.58002	1.85955	0.2889	22.5859	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	124.0767	124.0767	1	0.34	0.57786	Non-Significant Effect
Error	2950.449	368.8061	8			
Total	3074.52563	492.88277	9			

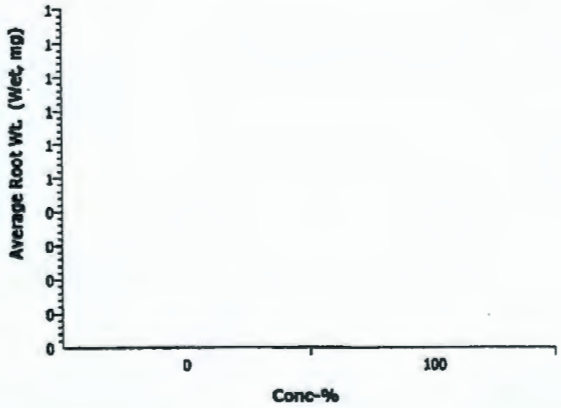
ANOVA Assumptions

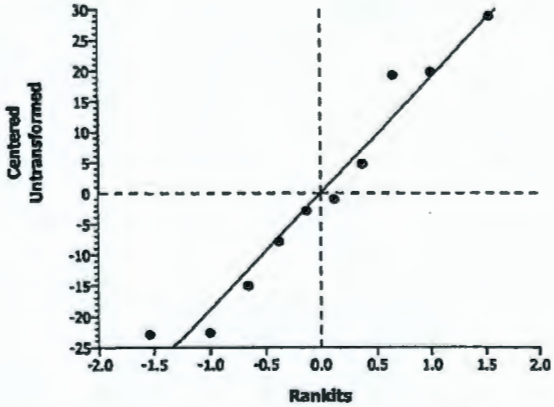
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.05362	23.15450	0.96085	Equal Variances
Distribution	Shapiro-Wilk W	0.93785		0.52939	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	29.197	6.3020	48.978	19.453				

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	08-1256-9051	08-1256-9051	19 Jul-06 10:24 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	75.69%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.5139	1.85955	0.6894	1.16237	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.2579373	0.257937	1	0.26	0.62124	Non-Significant Effect
Error	7.814606	0.976826	8			
Total	8.072543	1.234763	9			

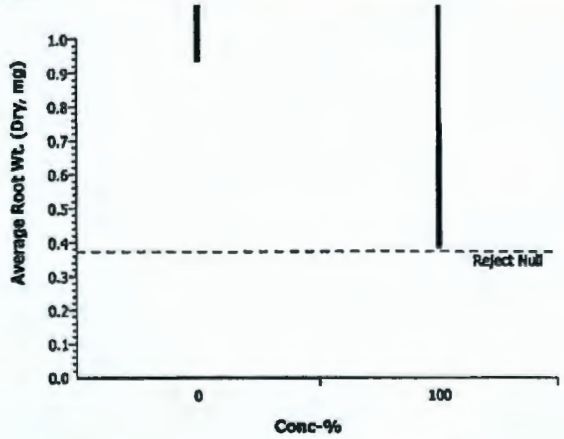
ANOVA Assumptions

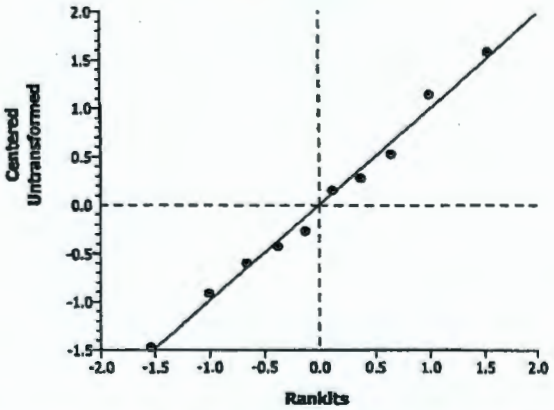
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.02456	23.15450	0.30907	Equal Variances
Distribution	Shapiro-Wilk W	0.98616		0.98959	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	1.85700	0.38201	3.43999	1.21170				

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	08-1256-9051	08-1256-9051	19 Jul-06 10:24 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	58.66%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.48711	1.85955	0.3196	41.3206	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	292.8929	292.8929	1	0.24	0.63925	Non-Significant Effect
Error	9875.252	1234.406	8			
Total	10168.1449	1527.2994	9			

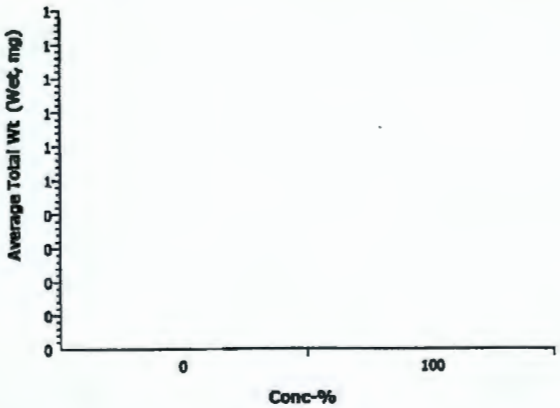
ANOVA Assumptions

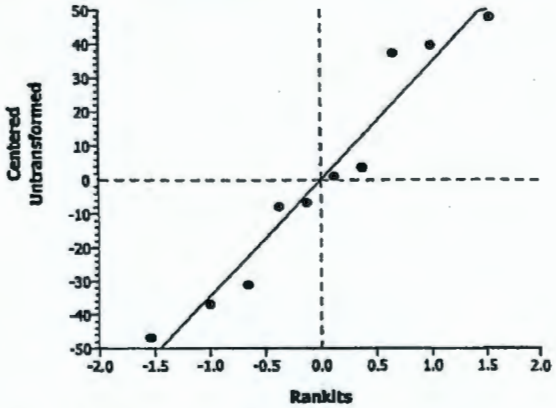
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.62045	23.15450	0.65148	Equal Variances
Distribution	Shapiro-Wilk W	0.92956		0.44353	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	59.615	12.78	99.145	39.073				

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	08-1256-9051	08-1256-9051	19 Jul-06 10:24 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	54.62%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.41685	1.85955	0.3439	4.14563	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.159032	2.159032	1	0.17	0.68775	Non-Significant Effect
Error	99.40231	12.42529	8			
Total	101.561338	14.584320	9			

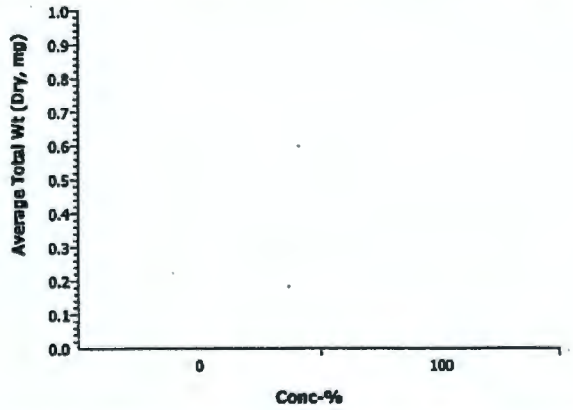
ANOVA Assumptions

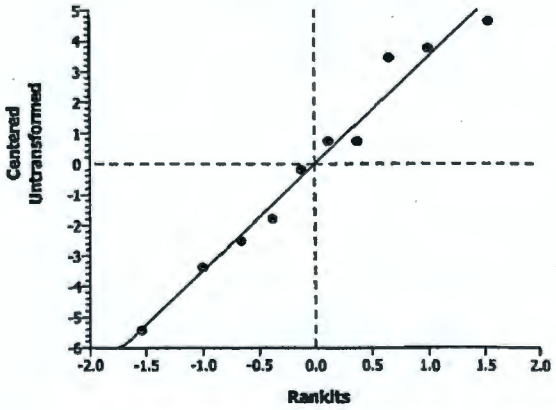
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.09181	23.15450	0.29997	Equal Variances
Distribution	Shapiro-Wilk W	0.95953		0.78055	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.6601	1.216	11.308	4.3333				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 (TP) Day 12 ____ Day 14 NJ Day 16 NJ Day 19 (TP) Day 21 NJ Day 23 NJ Day 28 (TP) Day 35 B

Bioassay Lab ID: BG 1575- 03 Sample No: J11J H6

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 (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		2	3	4	4	4	5 -> 5	4 Live, 1 dead	6.4	7.2
	B		4	6	7	7	7	7 -> 5	5		
	C		4	4	5	6	6	6 -> 5	5		
	D		5	6	6	7	10	10 -> 5	4*		
	E		4	5	4	4	4	7 -> 5	5		

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

Replicate A 2 Lg (G) one w/B tip, 2 med. (G) 1 sm (G)

Replicate B 3 Lg (G), 1 med w/1 B shoot, 1 sm (G) removed: 2 sm (G)

Replicate C 2 Lg (G) one w/B tips, 3 med one w/B tip removed: 1 sm (G)

Replicate D 3 Lg (G), 1 med (G), 1 sm (G) removed: 5 sm (G)

Replicate E 1 Lg (G), 3 med (G) 2 w/B tip, 1 sm. (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, B+ 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 med G, 2 med w/ 1 B shoot each, dead plant removed - 1 broad leaf removed

Replicate B 3 Lg G, 1 Md G, 1 Md w/ 1 B shoot. - 1 broad leaf removed

Replicate C 3 Md G, 2 Sm G - 1 broad leaf removed

Replicate D 2 Lg G, 1 Lg w/ B tip 1 Med G - 1 Lg non bluegrass grass removed

Replicate E 2 Lg G, 1 Med G, 1 Med 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	80 mm	83 mm	97 mm	52 mm	mm
Replicate B	102 mm	75 mm	55 mm	39 mm	100 mm
Replicate C	63 mm	70 mm	64 mm	37 mm	34 mm
Replicate D	81 mm	100 mm	121 mm	34 mm	mm
Replicate E	94 mm	42 mm	76 mm	134 mm	34 mm

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

	Tin Tare WL (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	998.59	1105.4	1015.30
Replicate B	1246.32	1400.3	1272.13
Replicate C	1248.99	1322.1	1265.16
Replicate D	1248.60	1418.8	1275.82
Replicate E	1245.70	1352.6	1262.01

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	98 mm	47 mm	89 mm	105 mm	mm
Replicate B	77 mm	82 mm	122 mm	113 mm	89 mm
Replicate C	68 mm	60 mm	88 mm	75 mm	35 mm
Replicate D	108 mm	49 mm	114 mm	74 mm	mm
Replicate E	84 mm	130 mm	81 mm	53 mm	40 mm

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

	Tin Tare WL (mg)	Wet Wt (mg)	Dry WL (mg)
Replicate A	971.15	1133.9	977.71
Replicate B	1243.44	1447.3	1254.41
Replicate C	1243.10	1328.2	1249.44
Replicate D	1248.17	1482.0	1257.76
Replicate E	1247.31	1419.1	1254.46

Comments: replicate E on day 19 had a large broad leaf grass growing that was not bluegrass it was removed. (TP)

MS

* Rep D C Day 35 had 4 bluegrass + 1 Lg non bluegrass, w/10 germinated, reduce "stand count" to 4 (100% survival)

CETIS Test Summary

Report Date: 19 Jul-06 10:27 AM
Test Link: 12-0913-8299/B157503psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	11-7687-4905	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	07-1539-2463	**Code:**	B1574-03	**Client:**	
Sample Date:	11 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	15d 0h	**Station:**			

Comments: J11JH6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
01-7352-2374	% Germination	100	> 100	N/A	25.39%	Wilcoxon Rank Sum Two-Sample
03-6485-4811	Average Height (mm)	100	> 100	N/A	20.62%	Equal Variance t Two-Sample
09-2861-3832	Average Length (mm)	< 100	100	N/A	14.14%	Equal Variance t Two-Sample
04-1373-8415	Average AG Wt (Wet, mg)	100	> 100	N/A	38.84%	Equal Variance t Two-Sample
08-1399-0241	Average AG Wt (Dry, mg)	100	> 100	N/A	32.40%	Equal Variance t Two-Sample
11-5190-0443	Average Root Wt. (Wet, mg	100	> 100	N/A	55.30%	Equal Variance t Two-Sample
05-6327-9902	Average Root Wt. (Dry, mg)	100	> 100	N/A	46.09%	Equal Variance t Two-Sample
05-1038-8670	Average Total Wt (Wet, mg	100	> 100	N/A	46.90%	Equal Variance t Two-Sample
15-8056-4476	Average Total Wt (Dry, mg)	100	> 100	N/A	34.60%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:27 AM
Test Link: 12-0913-8299/B157503psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	75.16	53.6	84.2	5.6279	12.584	16.74%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	78.960	63.200	90.6	4.7060	10.523	13.33%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	27.210	14.622	42.550	4.6951	10.499	38.58%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	4.52810	3.23401	6.80499	0.67032	1.49889	33.10%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	38.259	17.02	58.457	6.6577	14.887	38.91%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	1.78590	1.26799	2.39749	0.21872	0.48908	27.39%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	65.469	31.642	101.01	11.276	25.213	38.51%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	6.314	4.5020	9.2025	0.8829	1.9742	31.27%

CETIS Test Summary

Report Date: 19 Jul-06 10:27 AM
Test Link: 12-0913-8299/B157503psB

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		0.80000	1.00000	1.00000	0.80000	1.00000

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	78.6	91	67	90.8000	115.400
100		78	84.2	53.6	84	76

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		77.3000	90.6	63.2000	86.3000	77.4000

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		26.7025	30.7960	14.622	42.5500	21.3800

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		4.17749	5.16201	3.23401	6.80499	3.26201

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		40.6875	40.7720	17.02	58.4575	34.358

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		1.64000	2.19402	1.26799	2.39749	1.42998

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		67.39	71.5680	31.642	101.008	55.738

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		5.81749	7.35603	4.50200	9.20248	4.69199

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	12-0913-8299	12-0913-8299	19 Jul-06 10:27 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	1	N/A	25.39%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	26		0.4206	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0033965	0.003396	1	0.07	0.80499	Non-Significant Effect
Error	0.417125	0.052141	8			
Total	0.42052149	0.0555371	9			

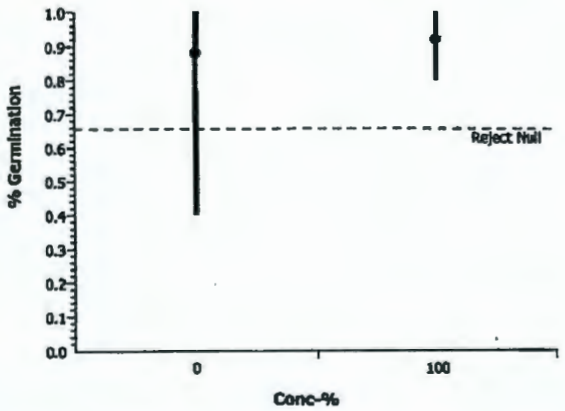
ANOVA Assumptions

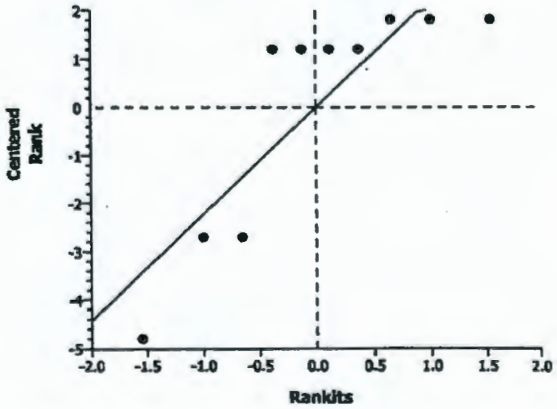
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.12973	23.15450	0.14232	Equal Variances
Distribution	Shapiro-Wilk W	0.68083		0.00052	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	5.80000	1.00000	7.00000	2.68328
100		5	0.92000	0.80000	1.00000	0.10954	5.20000	2.50000	7.00000	2.46475

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	12-0913-8299	12-0913-8299	19 Jul-06 10:27 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	1	N/A	20.62%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.36449	1.85955	0.1048	18.2618	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	448.9001	448.9001	1	1.86	0.20956	Non-Significant Effect
Error	1928.864	241.108	8			
Total	2377.76425	690.00813	9			

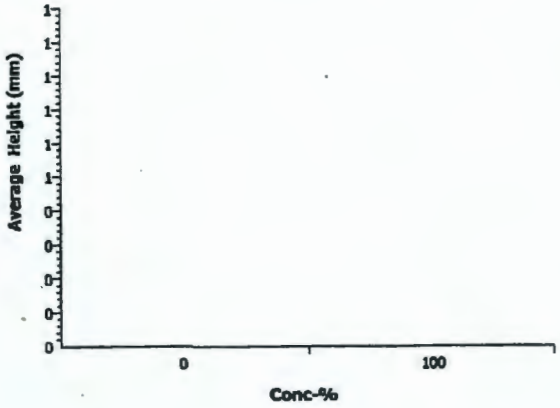
ANOVA Assumptions

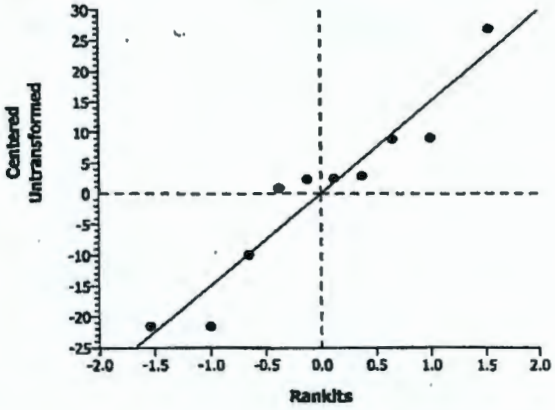
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.04491	23.15450	0.50546	Equal Variances
Distribution	Shapiro-Wilk W	0.91966		0.35411	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	75.16	53.6	84.2	12.584				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	12-0913-8299	12-0913-8299	19 Jul-06 10:27 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	14.14%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.38644	1.85955	0.0048	15.0348	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1874.161	1874.161	1	11.47	0.00955	Significant Effect
Error	1307.404	163.4255	8			
Total	3181.56482	2037.5864	9			

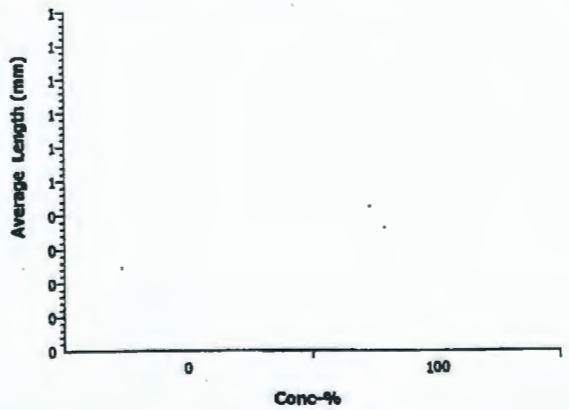
ANOVA Assumptions

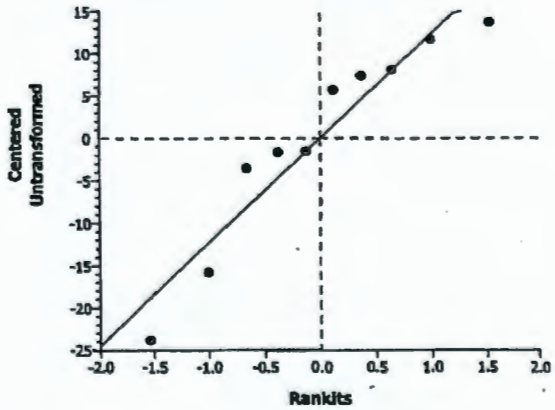
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.95170	23.15450	0.53312	Equal Variances
Distribution	Shapiro-Wilk W	0.90560		0.25211	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	78.960	63.2	90.6	10.523				

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	12-0913-8299	12-0913-8299	19 Jul-06 10:27 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	1	N/A	38.84%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.97821	1.85955	0.1783	13.2823	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	122.049	122.049	1	0.96	0.35662	Non-Significant Effect
Error	1020.383	127.5479	8			
Total	1142.43233	249.59689	9			

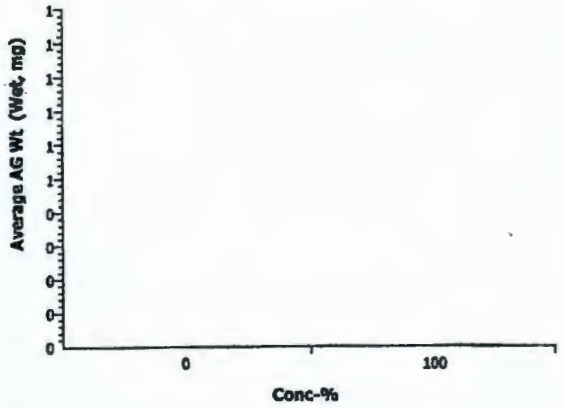
ANOVA Assumptions

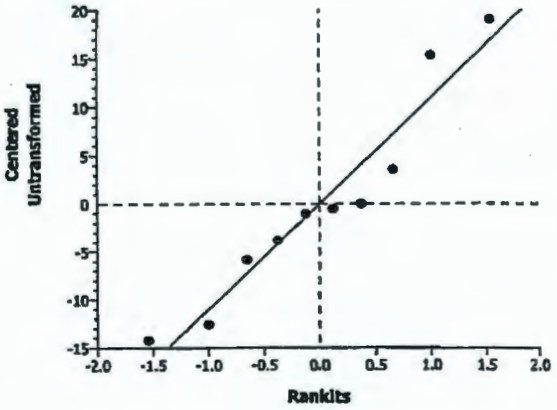
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.31442	23.15450	0.79747	Equal Variances
Distribution	Shapiro-Wilk W	0.92795		0.42805	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	27.210	14.622	42.550	10.499				

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	12-0913-8299	12-0913-8299	19 Jul-06 10:27 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	1	N/A	32.40%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.44643	1.85955	0.0930	1.96120	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5.817917	5.817917	1	2.09	0.18607	Non-Significant Effect
Error	22.24646	2.780807	8			
Total	28.0643730	8.5987239	9			

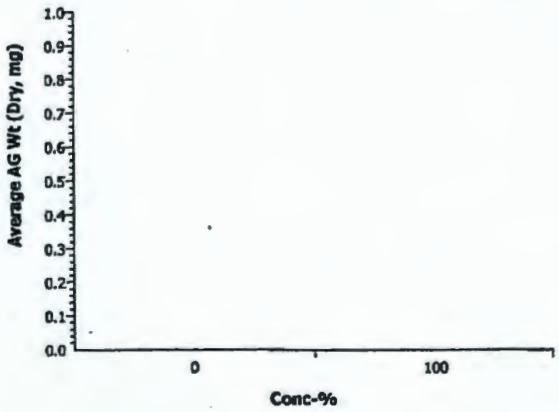
ANOVA Assumptions

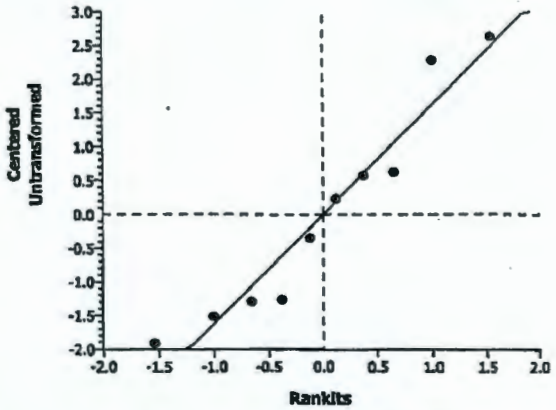
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.47550	23.15450	0.71542	Equal Variances
Distribution	Shapiro-Wilk W	0.91713		0.33365	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	4.52810	3.23401	6.80499	1.49889				

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	12-0913-8299	12-0913-8299	19 Jul-06 10:27 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	1	N/A	55.30%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	-0.1871	1.85955	0.5719	20.0418	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	10.17064	10.17064	1	0.04	0.85621	Non-Significant Effect
Error	2323.215	290.4018	8			
Total	2333.38524	300.57246	9			

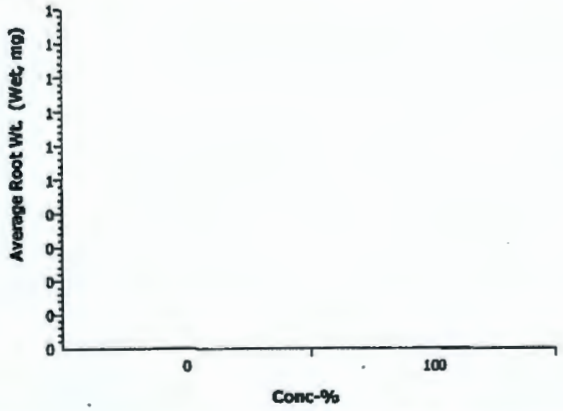
ANOVA Assumptions

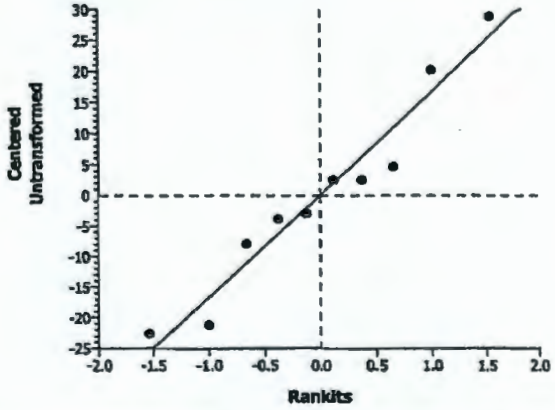
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.62064	23.15450	0.65140	Equal Variances
Distribution	Shapiro-Wilk W	0.94540		0.61452	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	38.259	17.02	58.457	14.887				

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	12-0913-8299	12-0913-8299	19 Jul-06 10:27 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	1	N/A	46.09%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.657	1.85955	0.7352	0.70791	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1563821	0.156382	1	0.43	0.52964	Non-Significant Effect
Error	2.898527	0.362316	8			
Total	3.05490872	0.5186979	9			

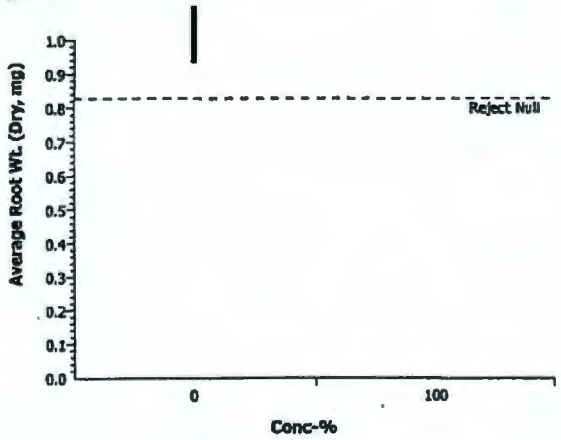
ANOVA Assumptions

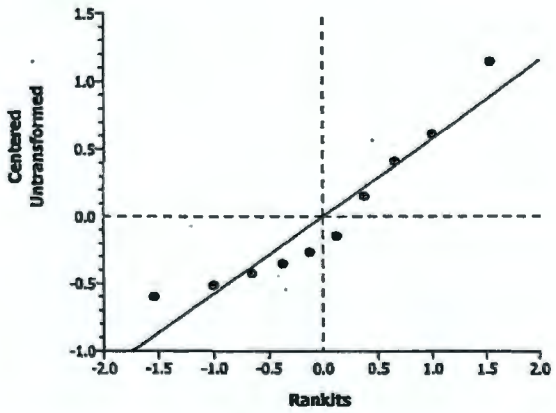
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.02940	23.15450	0.50991	Equal Variances
Distribution	Shapiro-Wilk W	0.90272		0.23460	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	1.78590	1.26799	2.39749	0.48908				

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	12-0913-8299	12-0913-8299	19 Jul-06 10:27 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	1	N/A	46.90%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.27978	1.85955	0.3934	33.0335	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	61.75508	61.75508	1	0.08	0.78674	Non-Significant Effect
Error	6311.363	788.9204	8			
Total	6373.11836	850.67549	9			

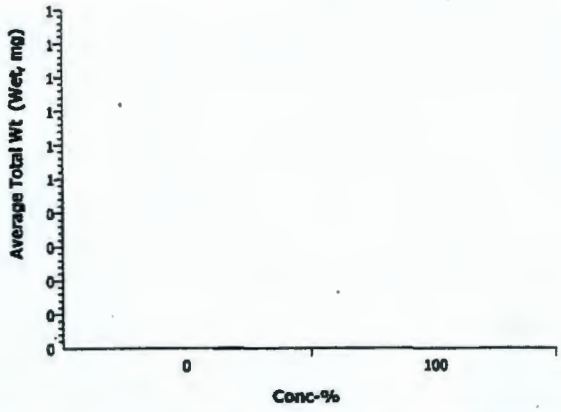
ANOVA Assumptions

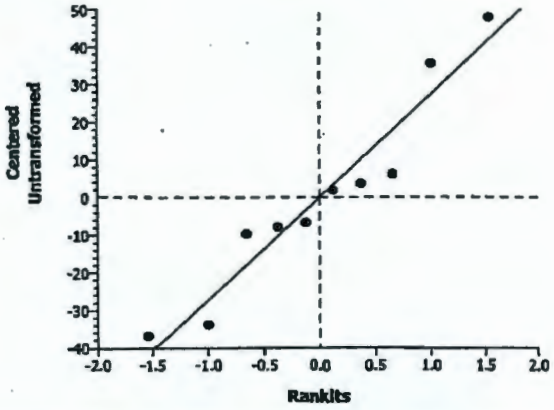
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.48202	23.15450	0.71236	Equal Variances
Distribution	Shapiro-Wilk W	0.92915		0.43960	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	65.469	31.642	101.01	25.213				

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	12-0913-8299	12-0913-8299	19 Jul-06 10:27 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	1	N/A	34.60%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.90317	1.85955	0.1964	2.62595	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4.066611	4.066611	1	0.82	0.39282	Non-Significant Effect
Error	39.88291	4.985364	8			
Total	43.9495225	9.0519748	9			

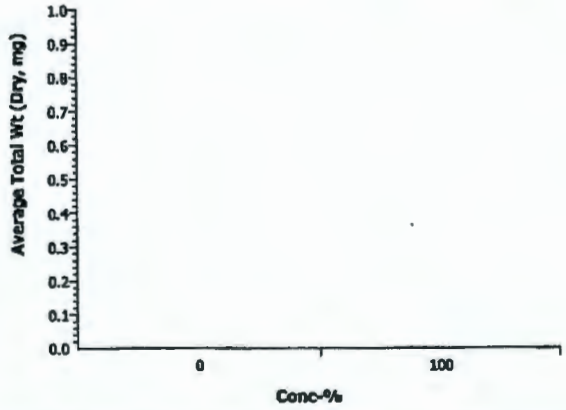
ANOVA Assumptions

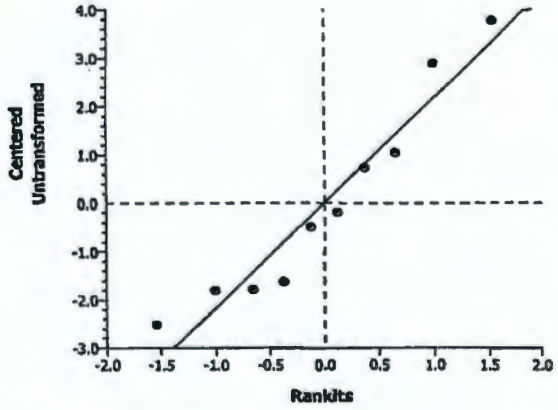
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.55825	23.15450	0.67787	Equal Variances
Distribution	Shapiro-Wilk W	0.92039		0.36024	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.314	4.5020	9.2025	1.9742				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 [illegible] Day 12 ____ Day 14 NJ Day 18 NJ Day 19 TP Day 21 NJ Day 23 ____ Day 28 TP Day 35 [illegible]

Bioassay Lab ID: BG 1575- 64 Sample No: JIIJJO

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	18 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		5	5	5	6	6	6->5	5	6.4	7.4
	B		6	6	8	8	8	9->5	5		
	C		3	3	3	4	4	4->4	4		
	D		4	4	5	5	5	5->5	5		
	E		5	6	6	6	7	8->5	5		

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: 1 med (G)

Replicate B: 1 Lg (G), 4 med (G) 1 w/B shoot — removed: 4 sm (G)

Replicate C: 1 Lg (G), 3 sm (G)

Replicate D: 2 med (G) 1 w/B shoot, 3 sm (G)

Replicate E: 4 Lg (G), 1 med (G) — removed: 3 sm (G)

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: ~~3 Lg G, 2 Md G Br~~ 2 Lg G, 3 Md G

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

Replicate C: 1 Md G 3 Sm G — 1 brown leaf plant removed

Replicate D: 2 Md each w/1 B shoot 3 Sm G

Replicate E: 2 Lg G, 1 Lg G w/1 B shoot, 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	110 ~~73~~ mm	93 ~~34~~ mm	48 ~~46~~ mm	90 ~~46~~ mm	86 ~~44~~ mm
Replicate B	75 mm	60 mm	95 mm	56 mm	67 mm
Replicate C	80 mm	25 mm	20 mm	20 mm	mm
Replicate D	64 mm	73 mm	44 mm	14 mm	12 mm
Replicate E	93 mm	51 mm	96 mm	86 mm	85 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	993.53	1157.5	1018.15
Replicate B	1246.04	1392.1	1265.64
Replicate C	1240.64	1346.7	1251.53
Replicate D	1248.45	1303.2	1256.43
Replicate E	1252.65	1400.1	1275.50

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	106 mm	47 mm	132 mm	78 mm	52 mm
Replicate B	104 mm	87 mm	73 mm	74 mm	55 mm
Replicate C	115 mm	38 mm	55 mm	51 mm	mm
Replicate D	10 mm	95 mm	71 mm	76 mm	33 mm
Replicate E	94 mm	40 mm	39 mm	95 mm	108 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	991.97	1189.5	1004.04
Replicate B	1248.55	1423.0	1259.01
Replicate C	1247.77	1355.4	1254.43
Replicate D	1242.68	1341.8	1247.85
Replicate E	1248.87	1467.4	1260.92

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 10:30 AM
Test Link: 17-7073-4826

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	14-1638-0563	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	07-9940-6935	**Code:**	B1574-04	**Client:**	
Sample Date:	12 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	14d 0h	**Station:**			

Comments: J11JJ0

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-9009-7717	% Germination	100	> 100	N/A	24.60%	Wilcoxon Rank Sum Two-Sample
15-9718-1812	Average Height (mm)	< 100	100	N/A	26.33%	Equal Variance t Two-Sample
06-1259-2004	Average Length (mm)	< 100	100	N/A	14.18%	Equal Variance t Two-Sample
02-3239-0201	Average AG Wt (Wet, mg)	100	> 100	N/A	35.96%	Equal Variance t Two-Sample
13-1142-1377	Average AG Wt (Dry, mg)	< 100	100	N/A	31.32%	Equal Variance t Two-Sample
07-3437-3041	Average Root Wt. (Wet, mg	100	> 100	N/A	48.78%	Equal Variance t Two-Sample
08-5764-6415	Average Root Wt. (Dry, mg)	100	> 100	N/A	49.22%	Equal Variance t Two-Sample
15-9803-2435	Average Total Wt (Wet, mg	100	> 100	N/A	41.74%	Equal Variance t Two-Sample
05-9277-8850	Average Total Wt (Dry, mg)	100	> 100	N/A	34.45%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:30 AM
Test Link: 17-7073-4826

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
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	88.560	67	115.40	8.048	17.996	20.32%
100		5	62.26	36.3	83.2	9.6176	21.506	34.54%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	71.72	57	83	4.75	10.621	14.81%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	25.792	10.95	32.794	3.8419	8.5908	33.31%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	3.54850	1.60601	4.92400	0.61356	1.37195	38.66%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	32.967	19.824	43.706	4.3084	9.6338	29.22%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	1.92300	1.03398	2.41400	0.26113	0.58389	30.36%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	58.759	30.774	73.196	7.8485	17.55	29.87%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	5.4715	2.64	7.338	0.8730	1.9522	35.68%

CETIS Test Summary

Report Date: 19 Jul-06 10:30 AM
Test Link: 17-7073-4826

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		1.00000	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	78.6	91	67	90.8000	115.400
100		78.8000	70.6	36.3	42.4000	83.2

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		83	78.6	64.8000	57	75.2

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		32.794	29.212	26.515	10.95	29.49

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		4.92400	3.92000	2.72250	1.60601	4.56999

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		39.5060	34.89	26.9075	19.824	43.7060

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		2.41400	2.09199	1.66501	1.03398	2.41001

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		72.3000	64.102	53.4225	30.774	73.196

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		7.33799	6.01199	4.38751	2.63999	6.98000

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	17-7073-4826	17-7073-4826	19 Jul-06 10:29 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	24.60%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	28		0.5000	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0178447	0.017845	1	0.36	0.56410	Non-Significant Effect
Error	0.3944419	0.049305	8			
Total	0.41228654	0.0671499	9			

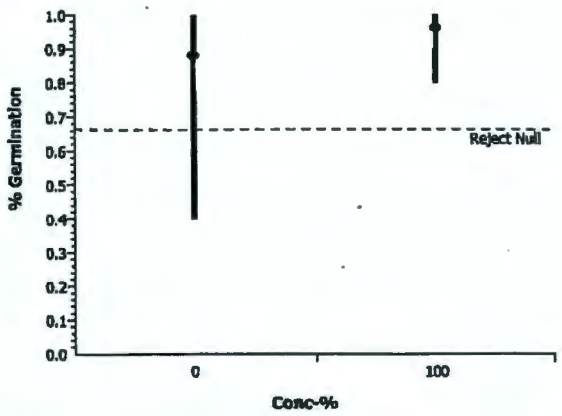
ANOVA Assumptions

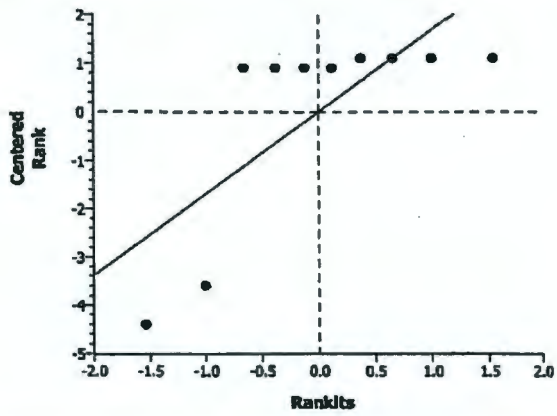
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.69460	23.15450	0.07328	Equal Variances
Distribution	Shapiro-Wilk W	0.66873		0.00037	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	5.40000	1.00000	6.50000	2.45967
100		5	0.96000	0.80000	1.00000	0.08944	5.60000	2.00000	6.50000	2.01246

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	17-7073-4826	17-7073-4826	19 Jul-06 10:29 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	26.33%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.09719	1.85955	0.0346	23.3199	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1729.225	1729.225	1	4.40	0.06924	Non-Significant Effect
Error	3145.344	393.168	8			
Total	4874.56909	2122.3931	9			

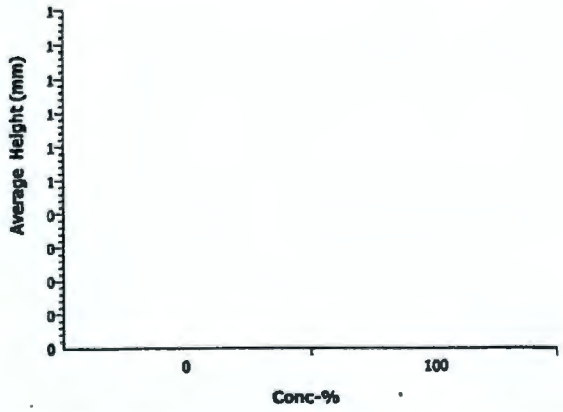
ANOVA Assumptions

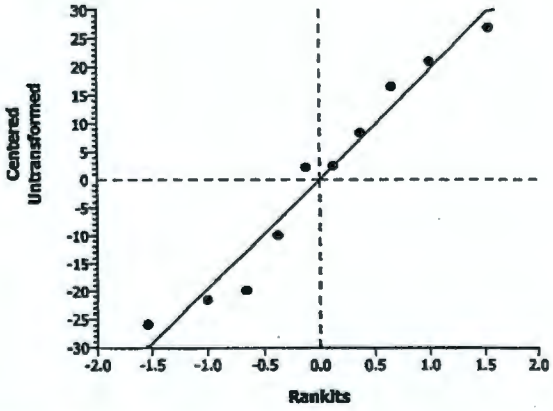
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.42810	23.15450	0.73827	Equal Variances
Distribution	Shapiro-Wilk W	0.93848		0.53619	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	62.26	36.3	83.2	21.506				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	17-7073-4826	17-7073-4826	19 Jul-06 10:29 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	14.18%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	4.26835	1.85955	0.0014	15.0825	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2996.361	2996.361	1	18.22	0.00273	Significant Effect
Error	1315.72	164.465	8			
Total	4312.0813	3160.8263	9			

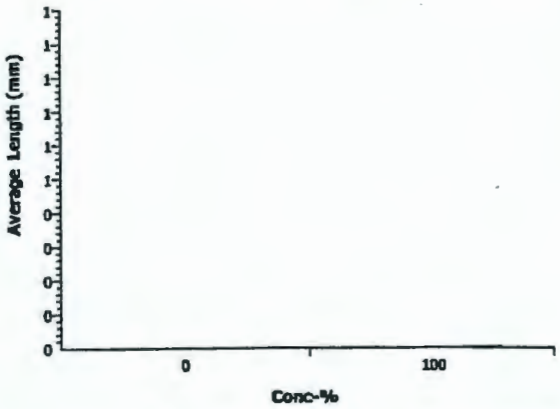
ANOVA Assumptions

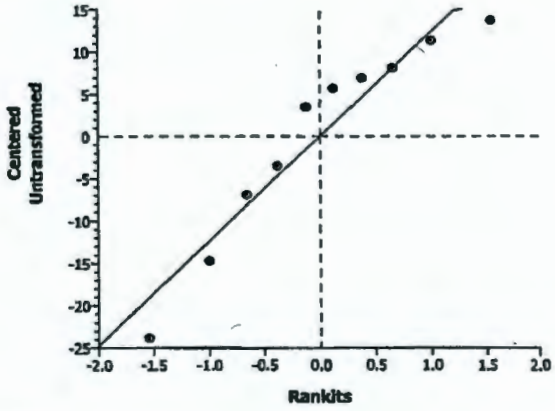
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.91574	23.15450	0.54439	Equal Variances
Distribution	Shapiro-Wilk W	0.91228		0.29699	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	71.72	57	83	10.621				

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	17-7073-4826	17-7073-4826	19 Jul-06 10:29 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	35.96%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.27093	1.85955	0.1197	12.2977	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	176.6108	176.6108	1	1.62	0.23946	Non-Significant Effect
Error	874.7104	109.3388	8			
Total	1051.32129	285.94965	9			

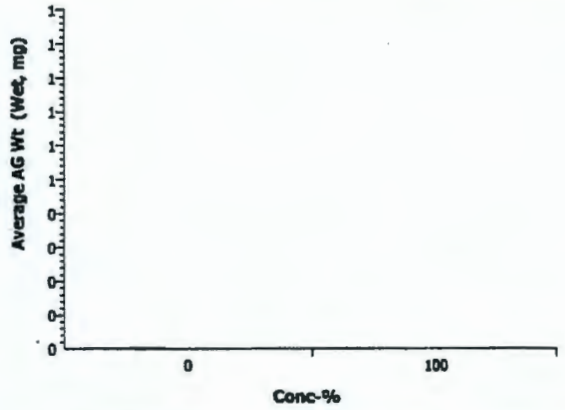
ANOVA Assumptions

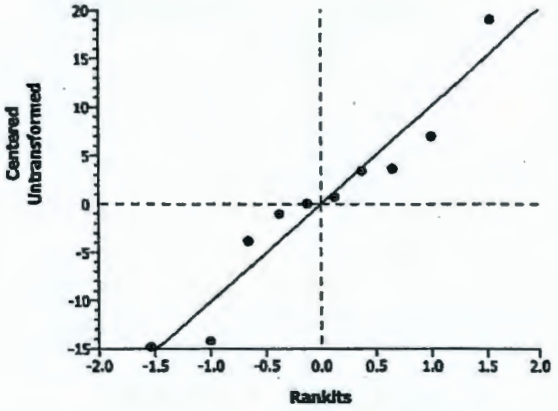
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.96304	23.15450	0.52964	Equal Variances
Distribution	Shapiro-Wilk W	0.93424		0.49090	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	25.792	10.95	32.794	8.5908				

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	17-7073-4826	17-7073-4826	19 Jul-06 10:29 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	31.32%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.45712	1.85955	0.0197	1.89586	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	15.68892	15.68892	1	6.04	0.03950	Significant Effect
Error	20.7888	2.5986	8			
Total	36.4777279	18.287525	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.76116	23.15450	0.59697	Equal Variances
Distribution	Shapiro-Wilk W	0.94233		0.57918	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	6.05361	4.14001	8.68201	1.82070				
100		5	3.54850	1.60601	4.92400	1.37195				

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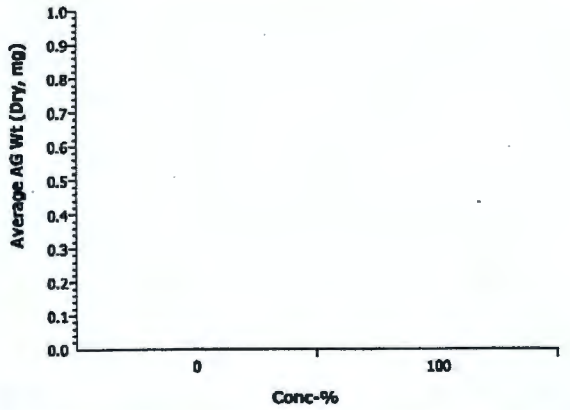

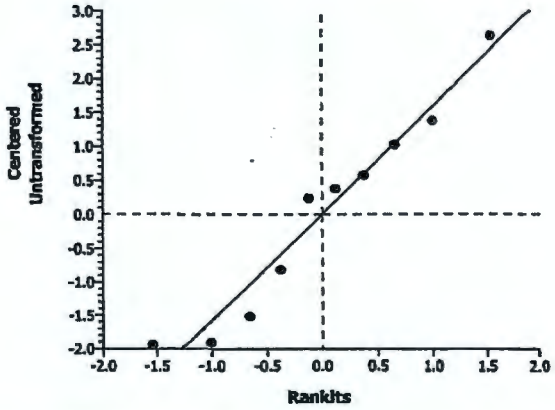

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	17-7073-4826	17-7073-4826	19 Jul-06 10:30 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	48.78%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.34449	1.85955	0.3697	17.6801	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	26.81907	26.81907	1	0.12	0.73936	Non-Significant Effect
Error	1807.948	225.9935	8			
Total	1834.76719	252.81259	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.87004	23.15450	0.21835	Equal Variances
Distribution	Shapiro-Wilk W	0.97563		0.93759	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	36.242	13.590	65.054	18.952				
100		5	32.967	19.824	43.706	9.6338				

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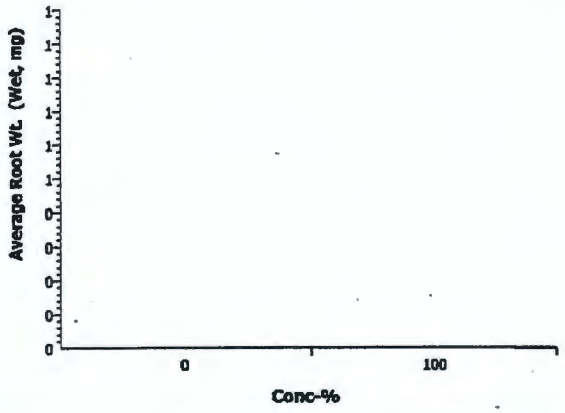

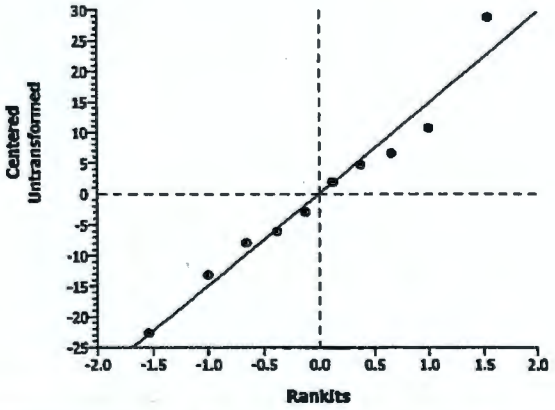

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	17-7073-4826	17-7073-4826	19 Jul-06 10:30 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	49.22%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.9525	1.85955	0.8156	0.75598	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.3748256	0.374826	1	0.91	0.36875	Non-Significant Effect
Error	3.305456	0.413182	8			
Total	3.68028203	0.7880077	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.42384	23.15450	0.74038	Equal Variances
Distribution	Shapiro-Wilk W	0.96959		0.88704	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	1.53579	0.93500	2.67798	0.69673				
100		5	1.92300	1.03398	2.41400	0.58389				

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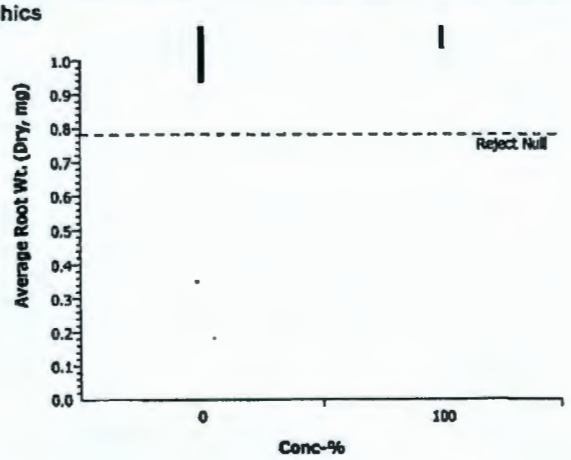

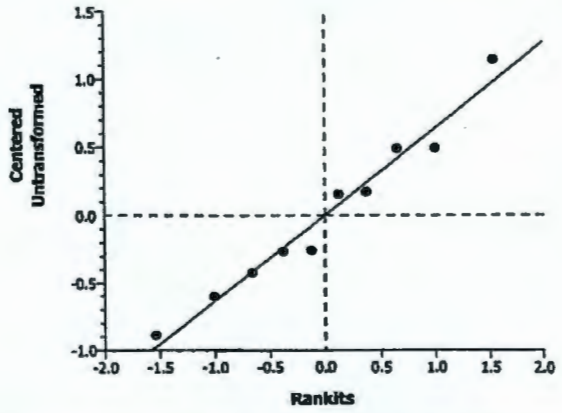

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	17-7073-4826	17-7073-4826	19 Jul-06 10:30 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	41.74%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.73869	1.85955	0.2406	29.4035	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	341.0749	341.0749	1	0.55	0.48120	Non-Significant Effect
Error	5000.502	625.0627	8			
Total	5341.57687	966.13766	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.05894	23.15450	0.30437	Equal Variances
Distribution	Shapiro-Wilk W	0.95186		0.69052	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	70.439	33.550	118.26	30.694				
100		5	58.759	30.774	73.196	17.55				

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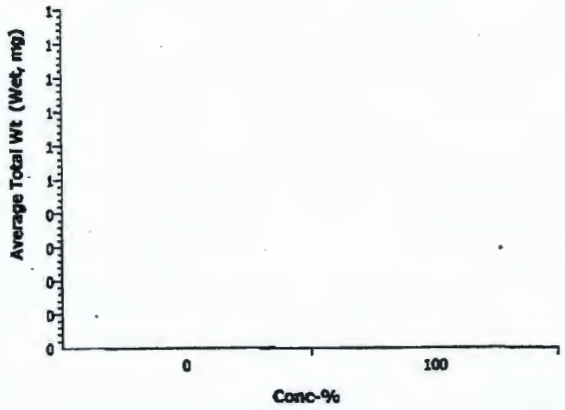
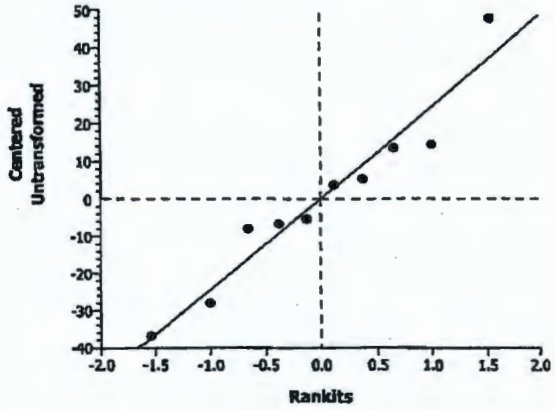




CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	17-7073-4826	17-7073-4826	19 Jul-06 10:30 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	34.45%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.50633	1.85955	0.0852	2.61453	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	11.21378	11.21378	1	2.27	0.17041	Non-Significant Effect
Error	39.53694	4.942118	8			
Total	50.7507219	16.155898	9			

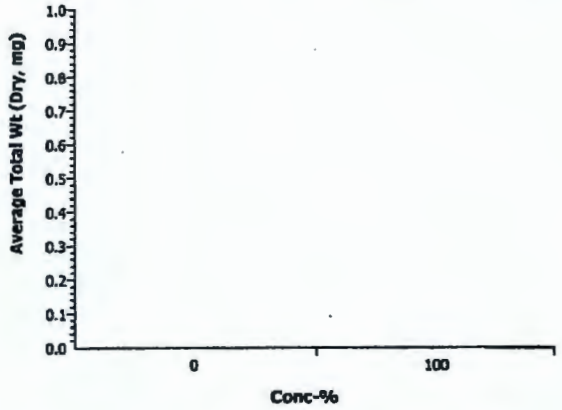
ANOVA Assumptions

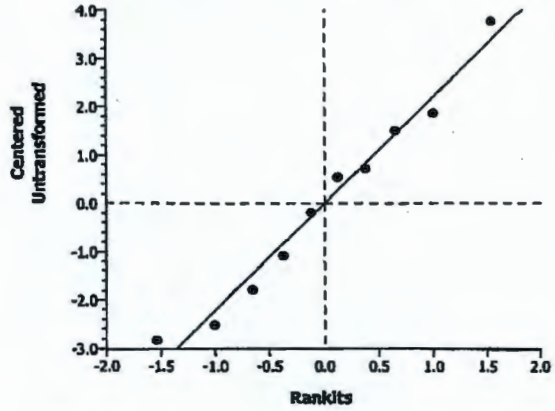
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.59361	23.15450	0.66268	Equal Variances
Distribution	Shapiro-Wilk W	0.96804		0.87208	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	5.4715	2.64	7.338	1.9522				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 (KB) Day 12 _____ Day 14 NJ Day 16 NJ Day 19 (TP) Day 21 NJ Day 23 NJ Day 28 NJ Day 35 Bm

Bioassay Lab ID: BG 1575- 05 Sample No: J11J149

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 (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		5	5	5	5	4	4	4	6.4	7.1
	B		4	5	6	7	7	5	5		
	C		2	3	3	3	4	4	4		
	D		2	2	2	2	2	3	3		
	E		4	4	4	4	4	4	3 live, 1 dead		

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

Replicate A: 2 lg G, 2 med G
Replicate B: 4 med G, 1 sm G Removed 2 sm G w/ B tip
Replicate C: 1 lg G w/ 1 B tip, 2 med G, 1 sm G
Replicate D: 1 lg G, 1 med G, 1 sm G
Replicate E: 1 lg G, 2 med G, 1 sm B

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	84 mm	112 mm	95 mm	74 mm	mm
Replicate B	87 mm	83 mm	52 mm	46 mm	32 mm
Replicate C	74 mm	86 mm	51 mm	33 mm	mm
Replicate D	74 mm	51 mm	15 mm	mm	mm
Replicate E	102 mm	92 mm	78 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	1029.66	1177.0	1054.19
Replicate B	1253.67	1363.3	1272.95
Replicate C	1250.91	1332.8	1264.48
Replicate D	1248.54	1302.5	1258.21
Replicate E	1243.07	1367.0	1264.01

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	97 mm	79 mm	57 mm	93 mm	mm
Replicate B	41 mm	31 mm	67 mm	89 mm	72 mm
Replicate C	98 mm	53 mm	36 mm	89 mm	mm
Replicate D	8 mm	57 mm	71 mm	mm	mm
Replicate E	92 mm	85 mm	98 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	981.54	1272.9	991.00
Replicate B	1253.38	1422.8	1265.06
Replicate C	~~1556.44~~ NJ	1434.9	1263.26
Replicate D	1247.10	1320.6	1251.39
Replicate E	1252.35	1422.1	1260.99

tare wt. C 1256.41 →

Comments:

MS

64

CETIS Test Summary

Report Date: 19 Jul-06 10:32 AM
Test Link: 08-9399-8188/B157505psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	17-9867-8011	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	06-5440-2928	**Code:**	B1574-05	**Client:**	
Sample Date:	13 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	13d 0h	**Station:**			

Comments: J11JH9

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
16-3373-6483	% Germination	100	> 100	N/A	28.01%	Equal Variance t Two-Sample
05-1922-2077	Average Height (mm)	100	> 100	N/A	24.84%	Equal Variance t Two-Sample
03-1617-1202	Average Length (mm)	< 100	100	N/A	18.25%	Equal Variance t Two-Sample
11-5956-3311	Average AG Wt (Wet, mg)	100	> 100	N/A	37.90%	Equal Variance t Two-Sample
11-2140-1017	Average AG Wt (Dry, mg)	100	> 100	N/A	34.42%	Equal Variance t Two-Sample
06-6375-4460	Average Root Wt. (Wet, mg	100	> 100	N/A	61.56%	Equal Variance t Two-Sample
10-3095-7414	Average Root Wt. (Dry, mg)	100	> 100	N/A	48.94%	Equal Variance t Two-Sample
01-6425-9390	Average Total Wt (Wet, mg	100	> 100	N/A	48.91%	Equal Variance t Two-Sample
07-6583-2798	Average Total Wt (Dry, mg)	100	> 100	N/A	36.49%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:32 AM
Test Link: 08-9399-8188/B157505psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.76000	0.60000	1.00000	0.07483	0.16733	22.02%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	69.440	46.700	90.7	8.6725	19.392	27.93%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	69.5	45.3	91.7	8.1024	18.118	26.07%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	28.406	19.987	41.310	4.4262	9.8973	34.84%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	4.71685	3.22331	6.98002	0.76979	1.72131	36.49%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	46.486	24.5	72.840	8.4916	18.988	40.85%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	2.14590	1.43001	2.88000	0.25746	0.57570	26.83%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	74.892	44.487	109.68	12.443	27.823	37.15%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	6.8628	4.6533	9.8600	1.0017	2.2399	32.64%

CETIS Test Summary

Report Date: 19 Jul-06 10:32 AM
Test Link: 08-9399-8188/B157505psB

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		0.80000	1.00000	0.80000	0.60000	0.60000

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	78.6	91	67	90.8000	115.400
100		88.8000	60	61	46.7000	90.7

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		81.5	60	69	45.3	91.7

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		36.835	21.9260	21.9725	19.9867	41.3100

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		6.13248	3.85598	3.39249	3.22331	6.98002

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		72.8400	33.8840	44.6225	24.5	56.5833

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		2.36501	2.34199	1.71249	1.43001	2.88000

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		109.675	55.8100	66.5950	44.4867	97.8933

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		8.49748	6.19797	5.10498	4.65332	9.86003

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	08-9399-8188	08-9399-8188	19 Jul-06 10:32 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	28.01%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.93308	1.85955	0.1890	0.29261	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0538927	0.053893	1	0.87	0.37808	Non-Significant Effect
Error	0.4952048	0.061901	8			
Total	0.54909748	0.1157933	9			

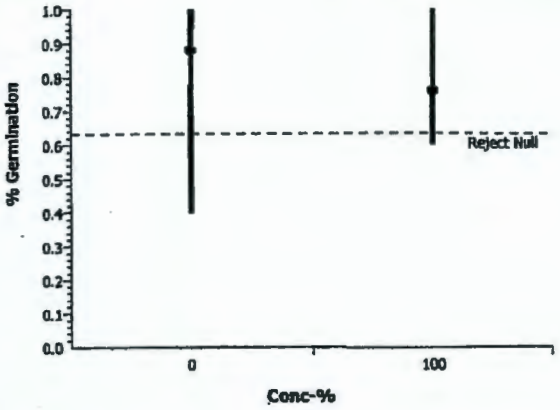
ANOVA Assumptions

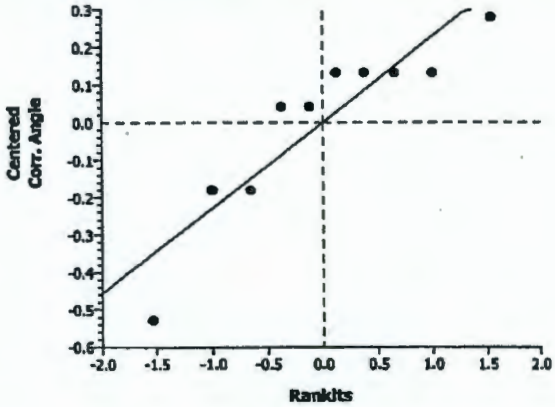
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.38881	23.15450	0.41968	Equal Variances
Distribution	Shapiro-Wilk W	0.84743		0.05414	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	1.21317	0.68472	1.34528	0.29541
100		5	0.76000	0.60000	1.00000	0.16733	1.06635	0.88608	1.34528	0.19113

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	08-9399-8188	08-9399-8188	19 Jul-06 10:32 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	24.84%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.61604	1.85955	0.0724	22.0011	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	913.936	913.936	1	2.61	0.14475	Non-Significant Effect
Error	2799.644	349.9555	8			
Total	3713.58008	1263.8915	9			

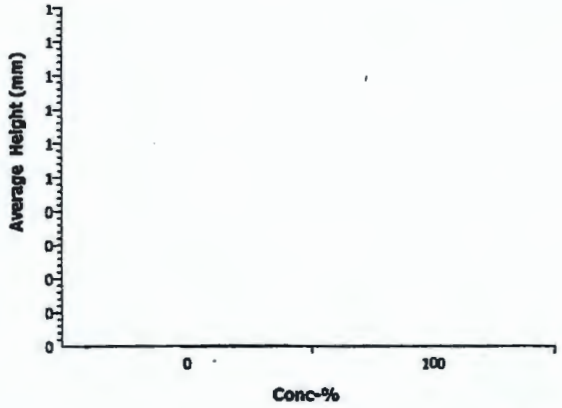
ANOVA Assumptions

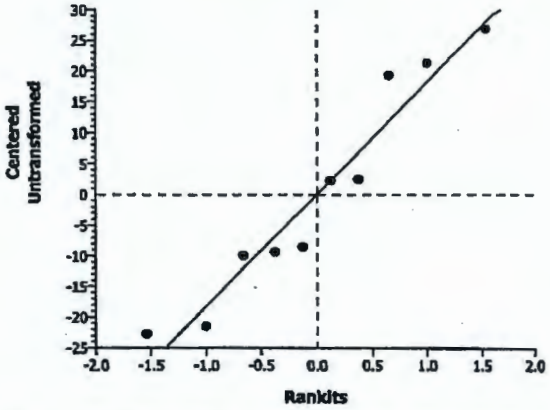
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.16123	23.15450	0.88830	Equal Variances
Distribution	Shapiro-Wilk W	0.91825		0.34262	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	69.440	46.7	90.7	19.392				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	08-9399-8188	08-9399-8188	19 Jul-06 10:32 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	18.25%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	3.5307	1.85955	0.0039	19.4029	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3392.964	3392.964	1	12.47	0.00772	Significant Effect
Error	2177.452	272.1815	8			
Total	5570.41626	3665.1458	9			

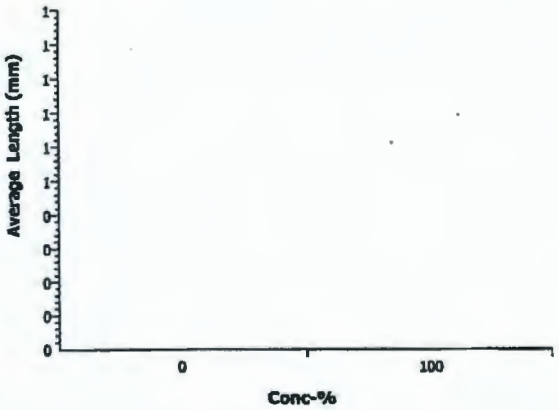
ANOVA Assumptions

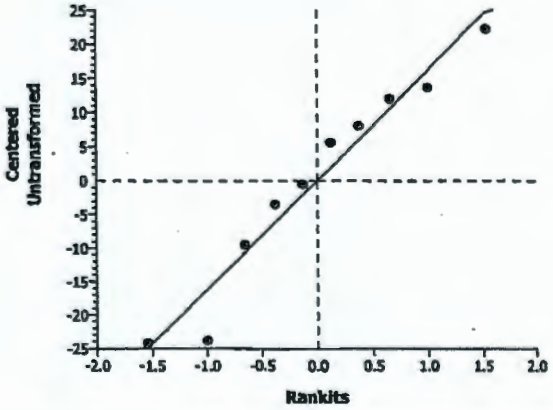
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.51882	23.15450	0.69540	Equal Variances
Distribution	Shapiro-Wilk W	0.93979		0.55067	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	69.5	45.3	91.7	18.118				

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	08-9399-8188	08-9399-8188	19 Jul-06 10:32 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	37.90%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.83099	1.85955	0.2150	12.9591	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	83.84431	83.84431	1	0.69	0.43008	Non-Significant Effect
Error	971.3306	121.4163	8			
Total	1055.17493	205.26064	9			

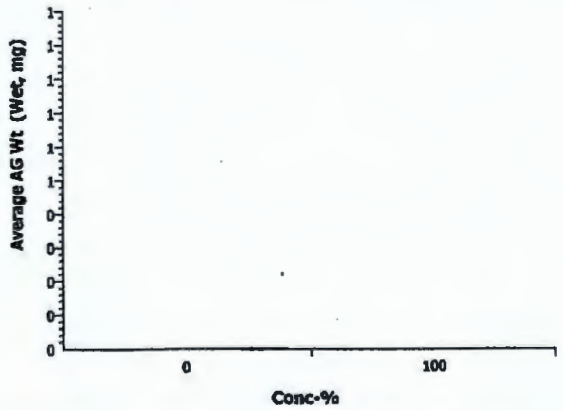
ANOVA Assumptions

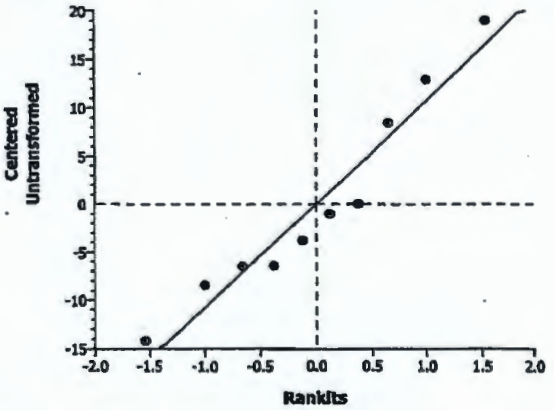
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.47898	23.15450	0.71378	Equal Variances
Distribution	Shapiro-Wilk W	0.93839		0.53521	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	28.406	19.987	41.310	9.8973				

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	08-9399-8188	08-9399-8188	19 Jul-06 10:32 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	34.42%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.19297	1.85955	0.1335	2.08367	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4.467277	4.467277	1	1.42	0.26706	Non-Significant Effect
Error	25.11144	3.13893	8			
Total	29.5787134	7.6062062	9			

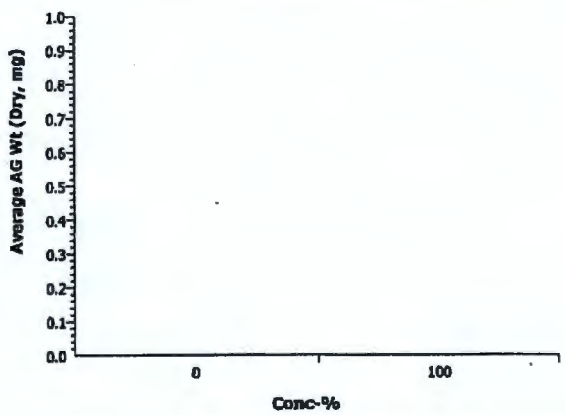
ANOVA Assumptions

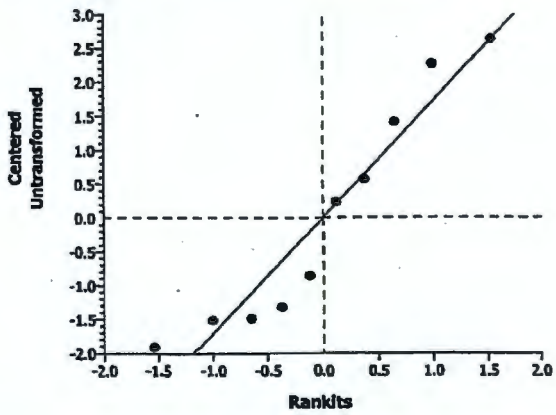
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.11881	23.15450	0.91597	Equal Variances
Distribution	Shapiro-Wilk W	0.89863		0.21165	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	4.71685	3.22331	6.98002	1.72131				

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	08-9399-8188	08-9399-8188	19 Jul-06 10:32 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	61.56%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.8538	1.85955	0.7910	22.3102	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	262.347	262.347	1	0.73	0.41803	Non-Significant Effect
Error	2878.866	359.8583	8			
Total	3141.21344	622.20529	9			

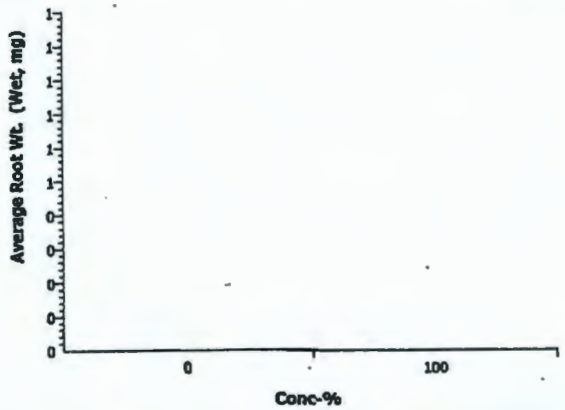
ANOVA Assumptions

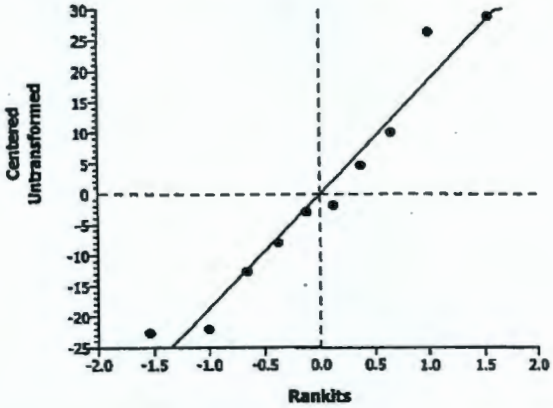
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00379	23.15450	0.99716	Equal Variances
Distribution	Shapiro-Wilk W	0.93515		0.50039	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	46.486	24.5	72.840	18.988				

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	08-9399-8188	08-9399-8188	19 Jul-06 10:32 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	48.94%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-1.5095	1.85955	0.9152	0.75162	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.9305882	0.930588	1	2.28	0.16962	Non-Significant Effect
Error	3.267433	0.408429	8			
Total	4.19802111	1.3390173	9			

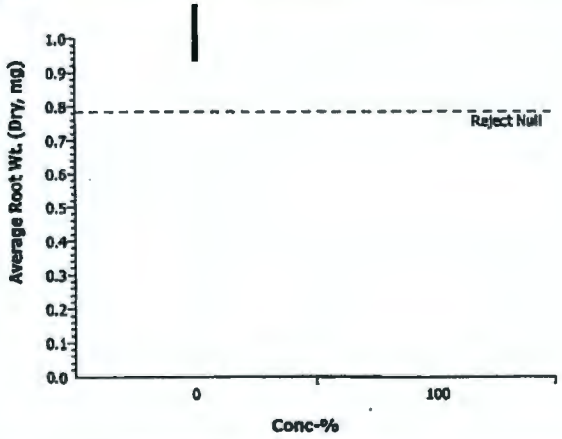
ANOVA Assumptions

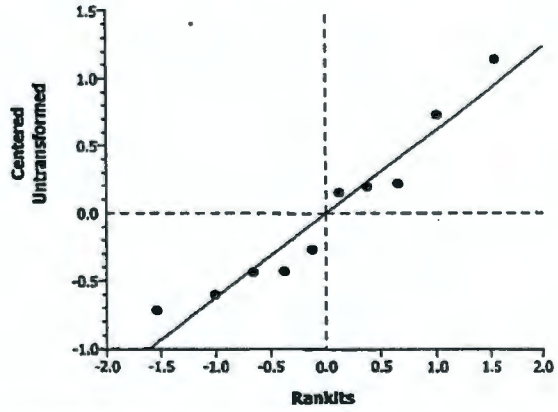
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.46468	23.15450	0.72055	Equal Variances
Distribution	Shapiro-Wilk W	0.92470		0.39778	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	2.14590	1.43001	2.88000	0.57570				

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	08-9399-8188	08-9399-8188	19 Jul-06 10:32 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	48.91%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.2403	1.85955	0.5919	34.4516	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	49.56828	49.56828	1	0.06	0.81611	Non-Significant Effect
Error	6864.897	858.1122	8			
Total	6914.46574	907.68046	9			

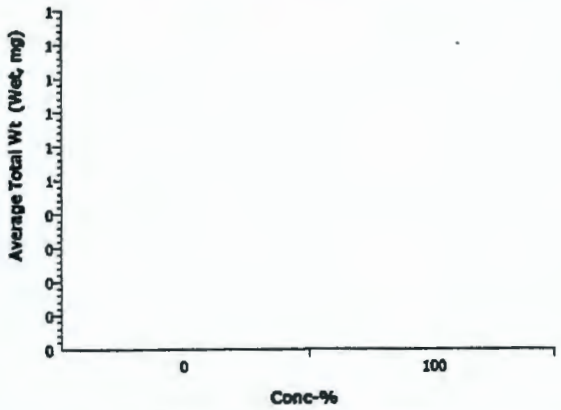
ANOVA Assumptions

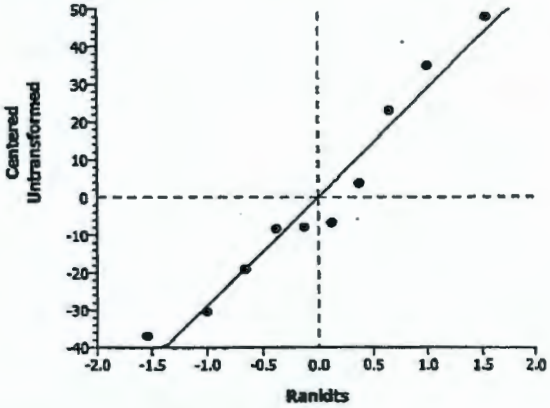
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.21708	23.15450	0.85360	Equal Variances
Distribution	Shapiro-Wilk W	0.94591		0.62044	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	74.892	44.487	109.68	27.823				

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	08-9399-8188	08-9399-8188	19 Jul-06 10:32 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	36.49%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.4879	1.85955	0.3194	2.76949	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.320024	1.320024	1	0.24	0.63871	Non-Significant Effect
Error	44.36225	5.545281	8			
Total	45.6822753	6.8653054	9			

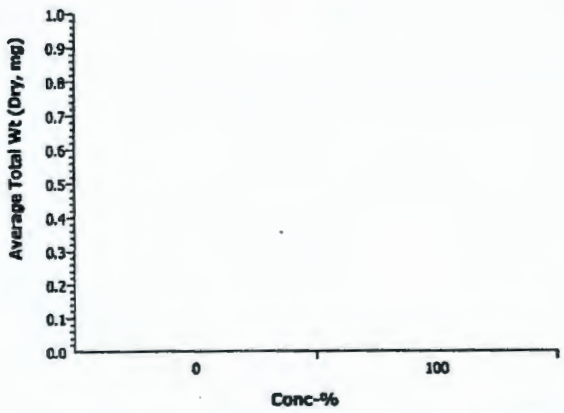
ANOVA Assumptions

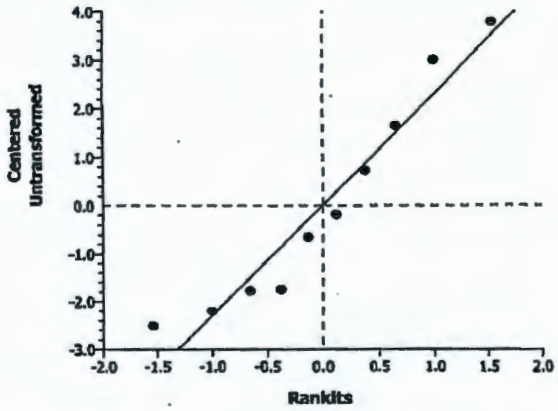
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.21046	23.15450	0.85762	Equal Variances
Distribution	Shapiro-Wilk W	0.91631		0.32720	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.8628	4.6533	9.8600	2.2399				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 [illegible] Day 12 ____ Day 14 NJ Day 16 NJ Day 19 [illegible] Day 21 NJ Day 23 NJ Day 28 [illegible] Day 35 DW

Bioassay Lab ID: BG 1575-06 Sample No: J11J B6

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 (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		3	3	3	4	4	5→5	5	6.6	7.2
	B		1	1	1	2	2	2→2	2		
	C		5	5	5	5	6	6→5	5		
	D		5	5	6	6	6	7→5	5		
	E		1	1	3	3	3	3→3	3		

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

Replicate A: 1Lg (G) w/B tip, 2 med (G), 2 sm (G)

Replicate B: 1 Lg (G), 1 med (G)

Replicate C: 4 Lg (G) w/B tips, 1 sm (G) removed 1 sm (B)

Replicate D: 3 Lg (G) 1 w/B tip, 2 sm (G) removed 2 sm (G)

Replicate E: 1 Lg (G) 2 med (G)

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 Lg G, 1 Sm G, 1 Sm w/ B tip

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

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

Replicate D: 2 Med G w/ B tip 1 Med G 2 Sm G

Replicate E: 1 Lg w/ 1 B shaft, 2 Med G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	104 mm	52 mm	59 mm	9 mm	11 mm
Replicate B	117 mm	58 mm	mm	mm	mm
Replicate C	76 mm	97 mm	90 mm	71 mm	26 mm
Replicate D	32 mm	62 mm	73 mm	83 mm	14 mm
Replicate E	67 mm	121 mm	74 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	1014.63	1097.98	1028.58
Replicate B	1249.53	1340.03	1262.79
Replicate C	1248.55	~~1476.07~~*	1273.85
Replicate D	1246.92	1456.10	1268.79
Replicate E	1242.53	1366.09	1261.62

* 1410.88 D.W.

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	42 mm	23 mm	15 mm	42 mm	71 mm
Replicate B	101 mm	40 mm	mm	mm	mm
Replicate C	118 mm	61 mm	79 mm	45 mm	26 mm
Replicate D	34 mm	21 mm	82 mm	69 mm	90 mm
Replicate E	88 mm	50 mm	62 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	1031.27	1118.90	1036.29
Replicate B	1249.32	1390.79	1254.73
Replicate C	1247.27	1476.07	1258.19
Replicate D	1246.96	1475.40	1254.32
Replicate E	1245.62	1388.22	1250.64

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 10:40 AM
Test Link: 08-5625-4031/B157506psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	16-0517-4753	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	16-8873-9688	**Code:**	B1580-05	**Client:**	
Sample Date:	19 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	7d 0h	**Station:**			

Comments: J11JB6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
15-4607-6345	% Germination	100	> 100	N/A	35.39%	Wilcoxon Rank Sum Two-Sample
18-7752-2627	Average Height (mm)	100	> 100	N/A	24.52%	Equal Variance t Two-Sample
20-6546-5938	Average Length (mm)	< 100	100	N/A	15.20%	Equal Variance t Two-Sample
11-6676-3410	Average AG Wt (Wet, mg)	100	> 100	N/A	40.52%	Equal Variance t Two-Sample
08-3990-5002	Average AG Wt (Dry, mg)	100	> 100	N/A	32.97%	Equal Variance t Two-Sample
05-0009-6638	Average Root Wt. (Wet, mg	100	> 100	N/A	61.36%	Equal Variance t Two-Sample
06-6844-5416	Average Root Wt. (Dry, mg)	100	> 100	N/A	51.83%	Equal Variance t Two-Sample
05-3404-7522	Average Total Wt (Wet, mg	100	> 100	N/A	50.41%	Equal Variance t Two-Sample
06-9252-1593	Average Total Wt (Dry, mg)	100	> 100	N/A	35.67%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:40 AM
Test Link: 08-5625-4031/B157506psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.80000	0.40000	1.00000	0.12649	0.28284	35.36%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	69.320	47	87.5	8.4619	18.921	27.30%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	60.16	38.6	70.5	5.6888	12.721	21.14%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	35.481	16.674	45.235	5.1521	11.521	32.47%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	5.04346	2.78999	6.63000	0.69949	1.56411	31.01%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	45.449	17.526	70.740	8.4374	18.867	41.51%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	1.80767	1.00400	2.70502	0.29355	0.65640	36.31%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	80.930	34.200	115.98	13.273	29.678	36.67%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	6.8511	3.794	9.3350	0.9509	2.1264	31.04%

CETIS Test Summary

Report Date: 19 Jul-06 10:40 AM
Test Link: 08-5625-4031/B157506psB

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		1.00000	0.40000	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	78.6	91	67	90.8000	115.400
100		47	87.5	72	52.8	87.3000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		38.6	70.5	65.8000	59.2000	66.7

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		16.674	45.235	32.47	41.836	41.19

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		2.78999	6.63000	5.05999	4.37400	6.36332

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		17.5260	70.7401	45.766	45.6880	47.5267

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		1.00400	2.70502	2.18398	1.47200	1.67334

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		34.2000	115.975	78.236	87.5240	88.7166

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		3.79399	9.33502	7.24397	5.846	8.03666

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	08-5625-4031	08-5625-4031	19 Jul-06 10:40 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	35.39%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	25.5		0.3452	4	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	0.23	0.64701	Non-Significant Effect
Error	0.7455132	0.093189	8			
Total	0.7666002	0.1142761	9			

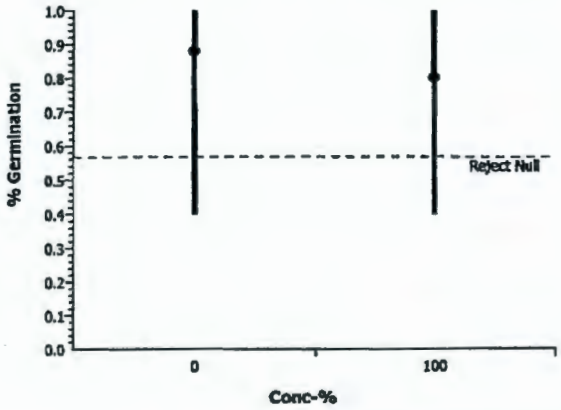
ANOVA Assumptions

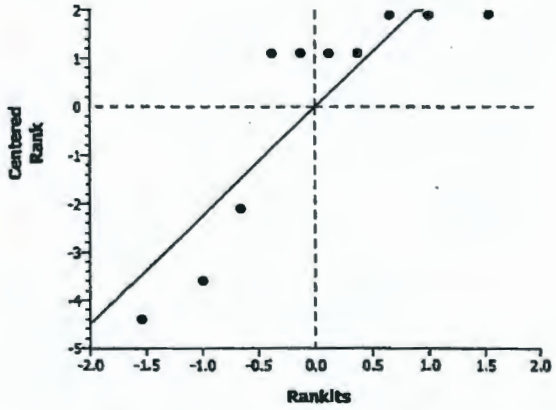
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.13568	23.15450	0.90483	Equal Variances
Distribution	Shapiro-Wilk W	0.74930		0.00350	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	5.90000	1.50000	7.00000	2.45967
100		5	0.80000	0.40000	1.00000	0.28284	5.10000	1.50000	7.00000	2.65518

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	08-5625-4031	08-5625-4031	19 Jul-06 10:40 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	24.52%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.64756	1.85955	0.0690	21.7156	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	925.444	925.444	1	2.71	0.13806	Non-Significant Effect
Error	2727.46	340.9325	8			
Total	3652.90424	1266.3766	9			

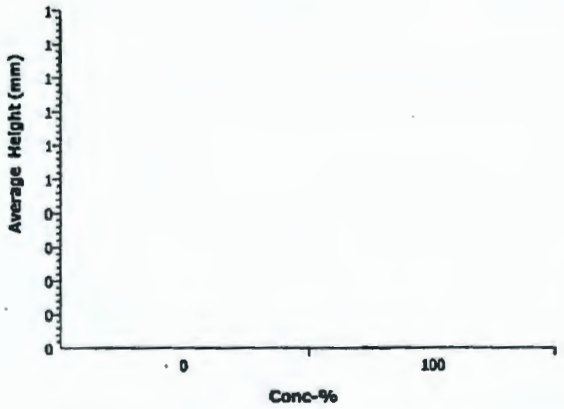
ANOVA Assumptions

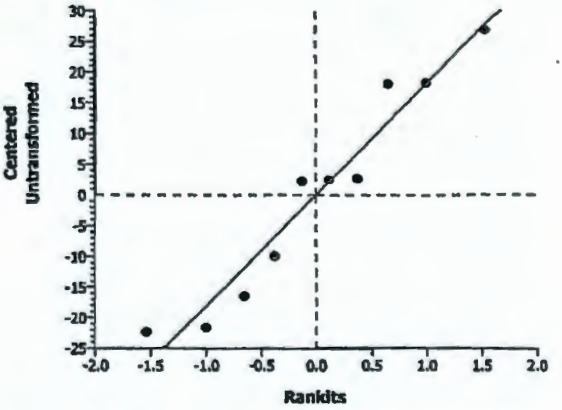
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.10551	23.15450	0.92490	Equal Variances
Distribution	Shapiro-Wilk W	0.92514		0.40180	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	69.320	47	87.5	18.921				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	08-5625-4031	08-5625-4031	19 Jul-06 10:40 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	15.20%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	5.31169	1.85955	0.0004	16.167	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5331.481	5331.481	1	28.21	0.00072	Significant Effect
Error	1511.724	188.9655	8			
Total	6843.20557	5520.447	9			

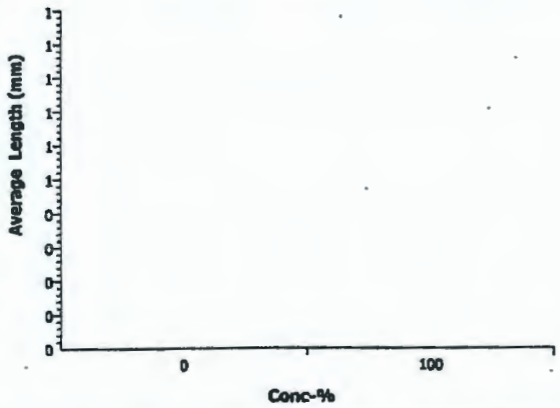
ANOVA Assumptions

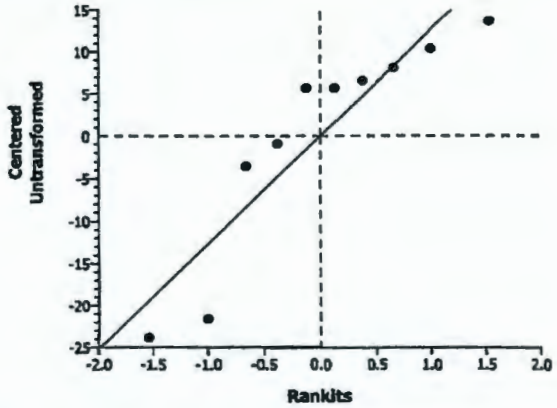
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.33560	23.15450	0.78595	Equal Variances
Distribution	Shapiro-Wilk W	0.82974		0.03322	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	60.16	38.6	70.5	12.721				

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	08-5625-4031	08-5625-4031	19 Jul-06 10:40 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	40.52%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	-0.1723	1.85955	0.5663	13.8558	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4.12023	4.12023	1	0.03	0.86749	Non-Significant Effect
Error	1110.391	138.7989	8			
Total	1114.51159	142.91915	9			

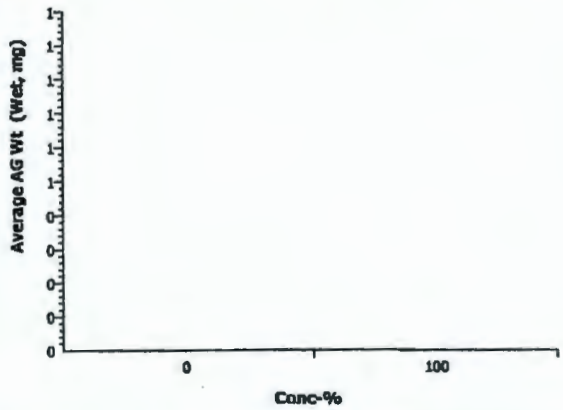
ANOVA Assumptions

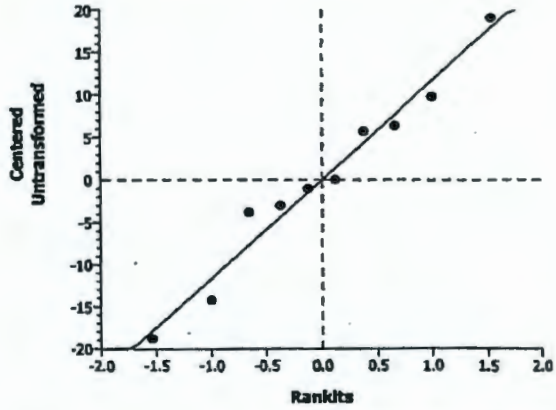
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.09157	23.15450	0.93437	Equal Variances
Distribution	Shapiro-Wilk W	0.97340		0.92046	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	35.481	16.674	45.235	11.521				

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	08-5625-4031	08-5625-4031	19 Jul-06 10:40 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	32.97%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.94104	1.85955	0.1871	1.99612	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.550998	2.550998	1	0.89	0.37423	Non-Significant Effect
Error	23.04553	2.880691	8			
Total	25.5965288	5.4316897	9			

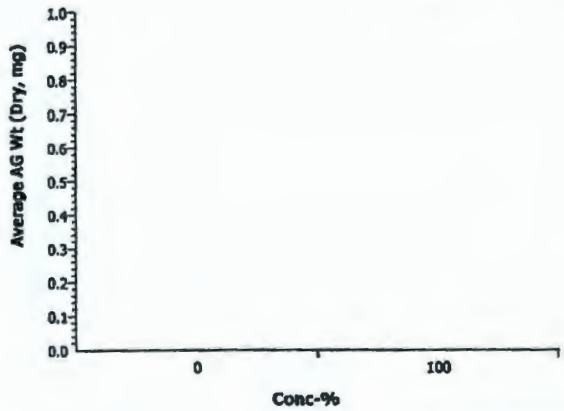
ANOVA Assumptions

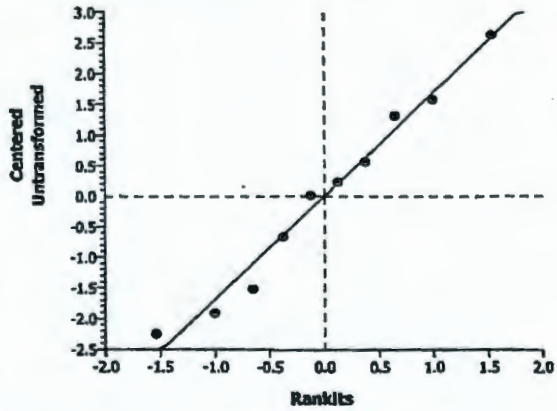
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.35501	23.15450	0.77559	Equal Variances
Distribution	Shapiro-Wilk W	0.96747		0.86646	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	5.04346	2.78999	6.63000	1.56411				

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	08-5625-4031	08-5625-4031	19 Jul-06 10:40 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	61.36%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.7699	1.85955	0.7683	22.239	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	211.9376	211.9376	1	0.59	0.46349	Non-Significant Effect
Error	2860.515	357.5644	8			
Total	3072.45245	569.50192	9			

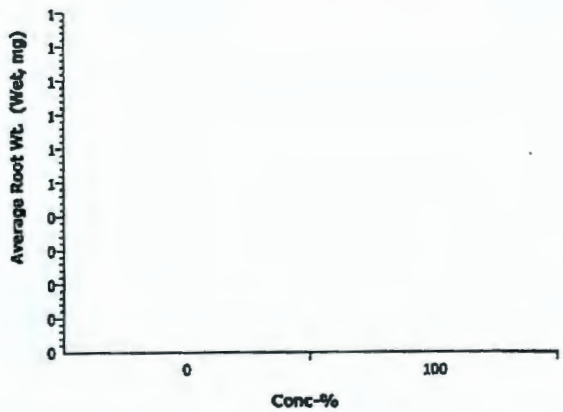
ANOVA Assumptions

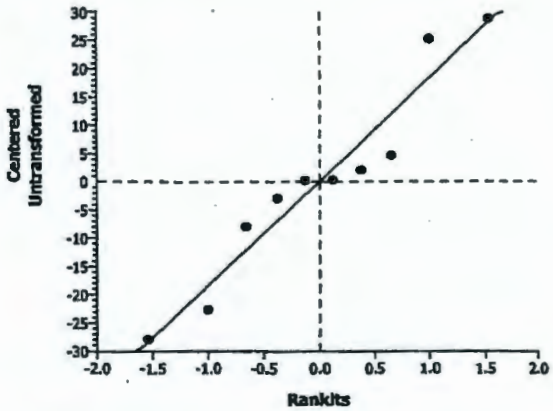
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00906	23.15450	0.99323	Equal Variances
Distribution	Shapiro-Wilk W	0.93238		0.47175	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	45.449	17.526	70.740	18.867				

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	08-5625-4031	08-5625-4031	19 Jul-06 10:40 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	51.83%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.6351	1.85955	0.7285	0.79605	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1847933	0.184793	1	0.40	0.54310	Non-Significant Effect
Error	3.665173	0.458147	8			
Total	3.84996636	0.6429399	9			

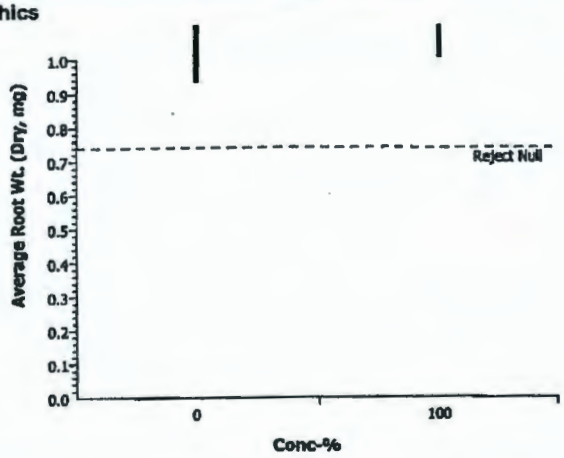
ANOVA Assumptions

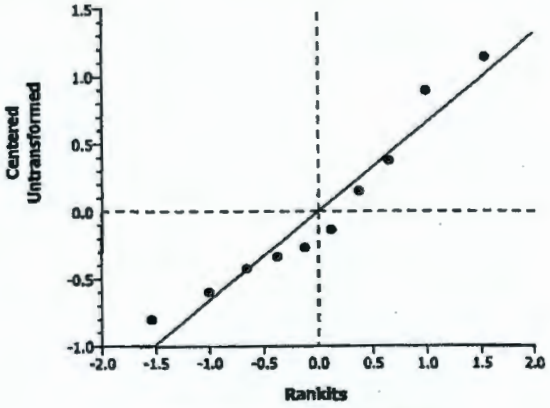
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.12666	23.15450	0.91077	Equal Variances
Distribution	Shapiro-Wilk W	0.93016		0.44943	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	1.80767	1.00400	2.70502	0.65640				

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	08-5625-4031	08-5625-4031	19 Jul-06 10:40 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	50.41%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.5494	1.85955	0.7011	35.5065	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	275.1588	275.1588	1	0.30	0.59770	Non-Significant Effect
Error	7291.748	911.4685	8			
Total	7566.90686	1186.6273	9			

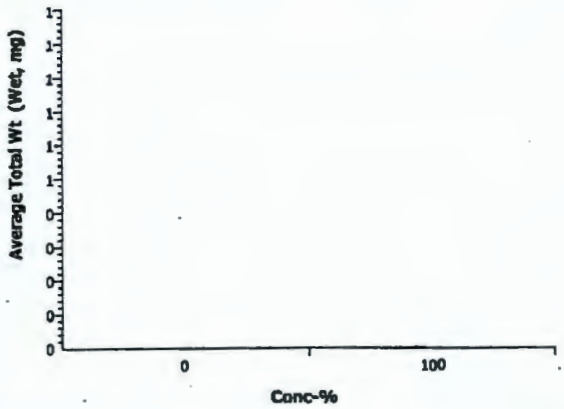
ANOVA Assumptions

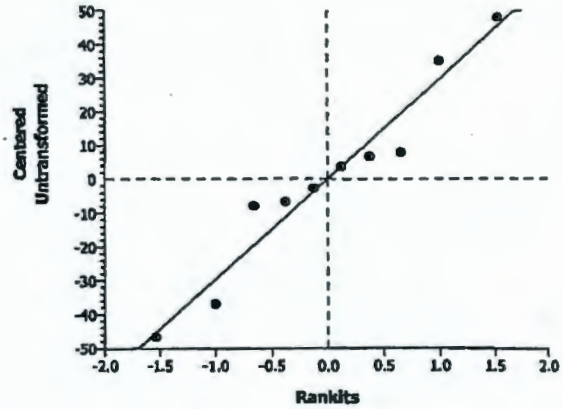
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.06963	23.15450	0.94956	Equal Variances
Distribution	Shapiro-Wilk W	0.94841		0.64969	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	80.930	34.2	115.98	29.678				

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	08-5625-4031	08-5625-4031	19 Jul-06 10:40 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	35.67%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.50717	1.85955	0.3129	2.70687	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.362608	1.362608	1	0.26	0.62572	Non-Significant Effect
Error	42.37888	5.297359	8			
Total	43.7414842	6.6599679	9			

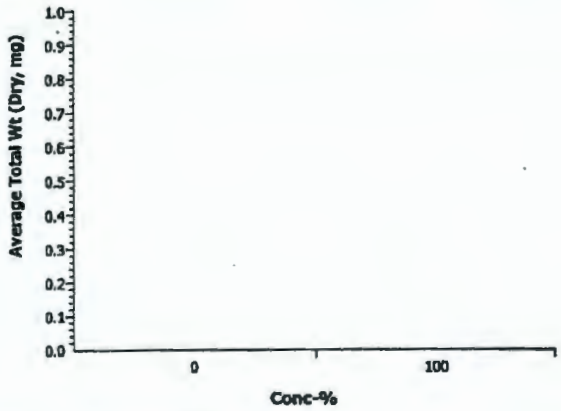
ANOVA Assumptions

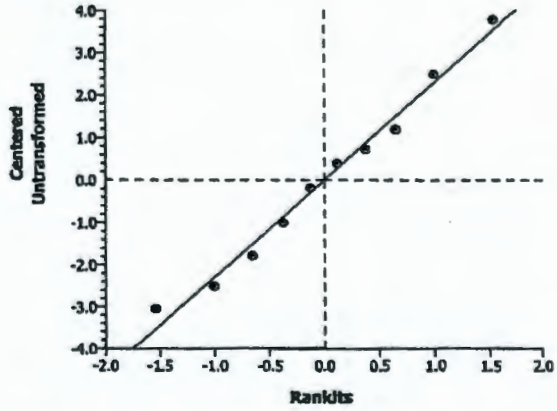
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.34320	23.15450	0.78187	Equal Variances
Distribution	Shapiro-Wilk W	0.97689		0.94641	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.8511	3.794	9.3350	2.1264				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 DW Day 12 _____ Day 14 NJ Day 16 NJ Day 19 GP Day 21 NJ Day 23 NJ Day 28 NJ Day 30 DW

Bioassay Lab ID: BG 1575- 07 Sample No: J11K 34

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 (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		5	5	5	5	5	5	~~5~~ 4L, 1dead	7.9	7.2
	B		2	2	2	2	2	2	1L, 1dead		
	C		5	6	6	6	7	5	4L, 1dead		
	D		4	4	4	5	5	5	4L, 1dead		
	E		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: 1Lg G, 3mdG, 1smB

Replicate B: 2 md G, one Brown tip

Replicate C: 3lg G, 3md G - one brown tip Removed 1md w/ brown tip

Replicate D: 3lg G, 1sm G

Replicate E: 3md G, 2 NS sm

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 4 med w/ B shoots, 1 sm dead removed

Replicate B: 1 med w/ 1 B shoot removed: 1 med dead

Replicate C: 2 Med G, 2 Med w/ B shoots removed: 1 Med dead

Replicate D: 3 Med w/ B shoots 1 Sm G removed: 1 Sm dead

Replicate E: 2 Med G, 2 Med w/ B shoots, 1 Sm w/ B shoots

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	89 mm	87 mm	59 mm	73 mm	mm
Replicate B	79 mm	mm	mm	mm	mm
Replicate C	57 mm	49 mm	75 mm	51 mm	mm
Replicate D	73 mm	65 mm	67 mm	65 mm	mm
Replicate E	74 mm	58 mm	31 mm	107 mm	40 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1011.02	1104.90	1027.39
Replicate B	1248.66	1269.20	1251.62
Replicate C	1254.45	1310.42	1264.83
Replicate D	1239.00	1305.91	1252.42
Replicate E	1233.11	1280.37	1241.57

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	83 mm	54 mm	61 mm	71 mm	mm
Replicate B	68 mm	mm	mm	mm	mm
Replicate C	49 mm	89 mm	106 mm	75 mm	mm
Replicate D	18 mm	64 mm	82 mm	71 mm	mm
Replicate E	24 mm	22 mm	48 mm	98 mm	56 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1008.93	1068.90	1011.51
Replicate B	1239.51	1252.35	1239.88
Replicate C	1243.09	1304.50	1245.08
Replicate D	1246.25	1327.57	1248.43
Replicate E	1247.92	1289.25	1249.56

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 10:37 AM
Test Link: 09-3204-9748/B157507psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	06-1366-1686	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	03-3122-0322	**Code:**	B1580-01	**Client:**	
Sample Date:	19 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	7d 0h	**Station:**			

Comments: J11K34

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
07-0572-9254	% Germination	100	> 100	N/A	36.50%	Wilcoxon Rank Sum Two-Sample
12-1229-8837	Average Height (mm)	< 100	100	N/A	19.69%	Equal Variance t Two-Sample
18-0210-6223	Average Length (mm)	< 100	100	N/A	14.49%	Equal Variance t Two-Sample
03-3936-1757	Average AG Wt (Wet, mg)	< 100	100	N/A	32.17%	Equal Variance t Two-Sample
07-8222-1220	Average AG Wt (Dry, mg)	< 100	100	N/A	27.85%	Equal Variance t Two-Sample
17-4034-7881	Average Root Wt. (Wet, mg	< 100	100	N/A	44.63%	Equal Variance t Two-Sample
04-9425-8317	Average Root Wt. (Dry, mg)	< 100	100	N/A	38.24%	Equal Variance t Two-Sample
11-5277-6375	Average Total Wt (Wet, mg	< 100	100	N/A	37.55%	Equal Variance t Two-Sample
06-0742-0043	Average Total Wt (Dry, mg)	< 100	100	N/A	29.16%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:37 AM
Test Link: 09-3204-9748/B157507psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.72000	0.20000	1.00000	0.13565	0.30332	42.13%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	66.46	56.3	79	4.8116	10.759	16.19%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	64.700	49.6	79.800	5.0422	11.275	17.43%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	16.836	9.4580	23.470	2.4524	5.4838	32.57%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	2.93889	1.69199	4.09250	0.39859	0.89127	30.33%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	14.37	8.2760	20.337	1.9531	4.3672	30.39%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	0.49710	0.32800	0.64500	0.05172	0.11565	23.27%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	31.206	17.734	38.463	3.7207	8.3198	26.66%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	3.436	2.02	4.7375	0.4490	1.0040	29.22%

CETIS Test Summary

Report Date: 19 Jul-06 10:37 AM
Test Link: 09-3204-9748/B157507psB

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		0.80000	0.20000	0.80000	0.80000	1.00000

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	78.6	91	67	90.8000	115.400
100		77	79	58	56.3	62

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		67.3000	68	79.8000	58.8	49.6

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		23.4700	20.5399	13.9875	16.7250	9.45801

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		4.09250	2.95996	2.59500	3.35501	1.69199

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		14.9925	12.8900	15.3525	20.3375	8.27600

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		0.64500	0.46997	0.49750	0.54501	0.32800

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		38.4625	33.4299	29.3400	37.0625	17.7340

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		4.73750	3.42993	3.0925	3.90002	2.02

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	09-3204-9748	09-3204-9748	19 Jul-06 10:37 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	36.50%

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	0.0875112	0.087511	1	0.89	0.37321	Non-Significant Effect
Error	0.7870126	0.098377	8			
Total	0.87452383	0.1858878	9			

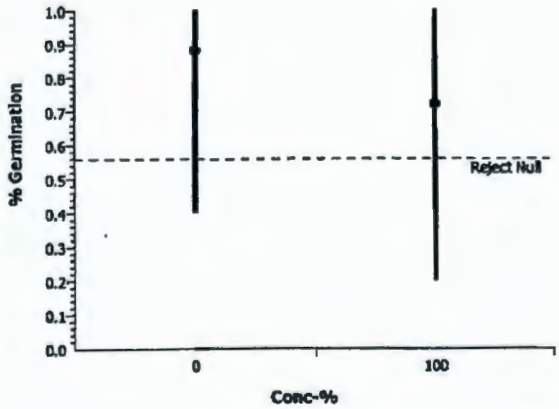
ANOVA Assumptions

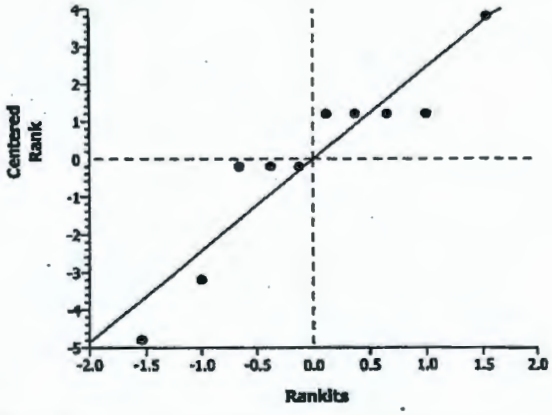
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.25456	23.15450	0.83135	Equal Variances
Distribution	Shapiro-Wilk W	0.70025		0.00089	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	6.80000	2.00000	8.00000	2.68328
100		5	0.72000	0.20000	1.00000	0.30332	4.20000	1.00000	8.00000	2.48998

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	09-3204-9748	09-3204-9748	19 Jul-06 10:37 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	19.69%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedl		100	2.35692	1.85955	0.0231	17.4363	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1221.025	1221.025	1	5.56	0.04618	Significant Effect
Error	1758.424	219.803	8			
Total	2979.44922	1440.8280	9			

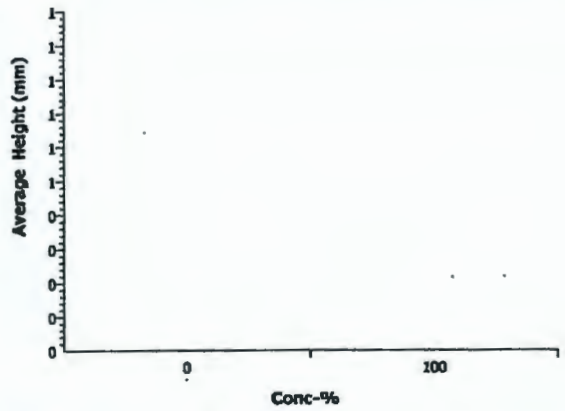
ANOVA Assumptions

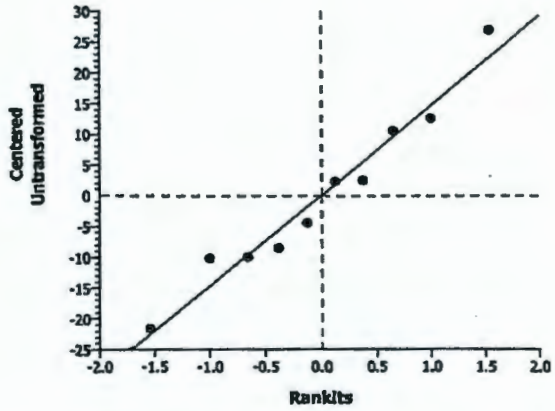
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.79763	23.15450	0.34300	Equal Variances
Distribution	Shapiro-Wilk W	0.96703		0.86206	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	66.46	56.3	79	10.759				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	09-3204-9748	09-3204-9748	19 Jul-06 10:37 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	14.49%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	5.02572	1.85955	0.0005	15.4071	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4334.724	4334.724	1	25.26	0.00102	Significant Effect
Error	1372.952	171.619	8			
Total	5707.67627	4506.3431	9			

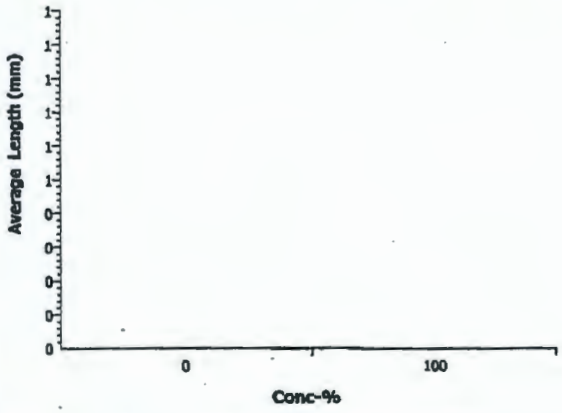
ANOVA Assumptions

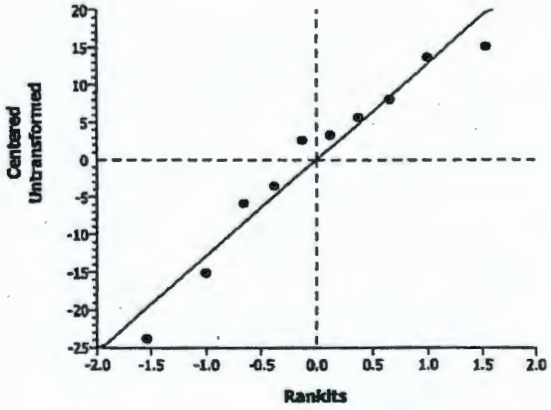
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.70011	23.15450	0.61978	Equal Variances
Distribution	Shapiro-Wilk W	0.94142		0.56891	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	64.700	49.6	79.8	11.275				

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	09-3204-9748	09-3204-9748	19 Jul-06 10:37 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	32.17%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.935	1.85955	0.0094	10.9996	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	753.5212	753.5212	1	8.61	0.01885	Significant Effect
Error	699.7933	87.47417	8			
Total	1453.31451	840.99535	9			

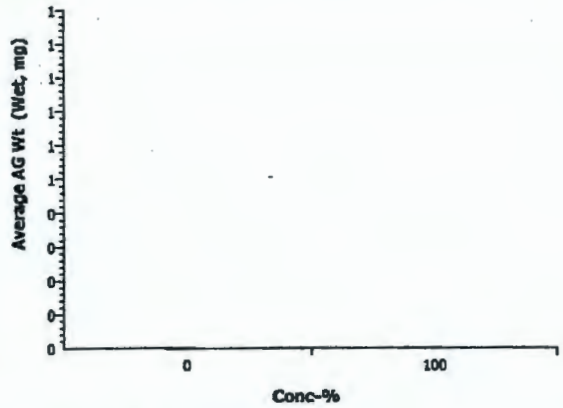
ANOVA Assumptions

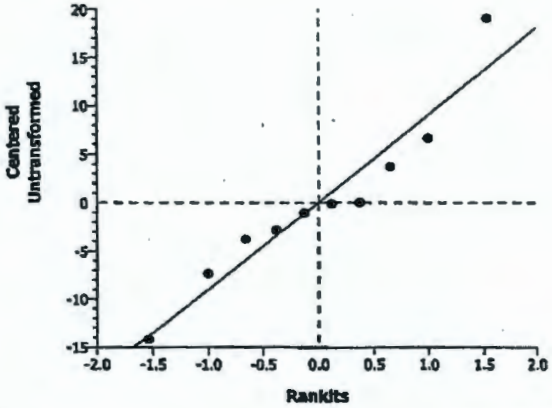
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.81756	23.15450	0.15697	Equal Variances
Distribution	Shapiro-Wilk W	0.94246		0.58070	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	16.836	9.4580	23.47	5.4838				

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	09-3204-9748	09-3204-9748	19 Jul-06 10:37 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	27.85%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.43573	1.85955	0.0044	1.68580	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	24.25363	24.25363	1	11.80	0.00888	Significant Effect
Error	16.43722	2.054652	8			
Total	40.6908531	26.308286	9			

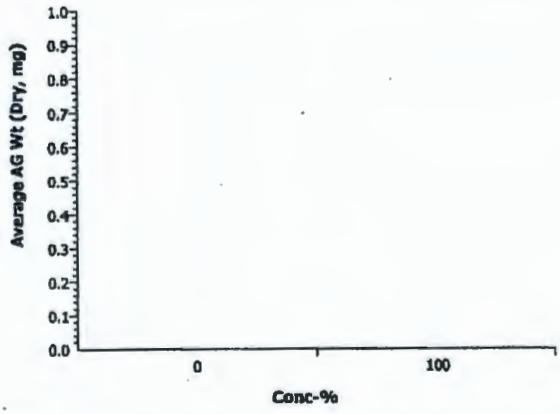
ANOVA Assumptions

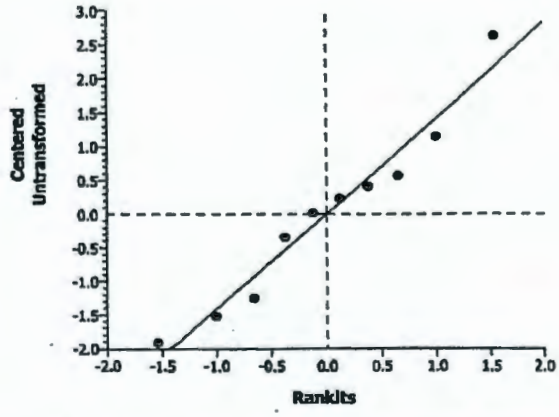
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.17312	23.15450	0.19531	Equal Variances
Distribution	Shapiro-Wilk W	0.96206		0.80903	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	2.93889	1.69199	4.09250	0.89127				

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	09-3204-9748	09-3204-9748	19 Jul-06 10:37 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	44.63%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.51472	1.85955	0.0181	16.1738	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1195.994	1195.994	1	6.32	0.03610	Significant Effect
Error	1513	189.1251	8			
Total	2708.99438	1385.119	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	18.83196	23.15450	0.01474	Equal Variances
Distribution	Shapiro-Wilk W	0.90354		0.23952	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	36.242	13.590	65.054	18.952				
100		5	14.37	8.2760	20.337	4.3672				

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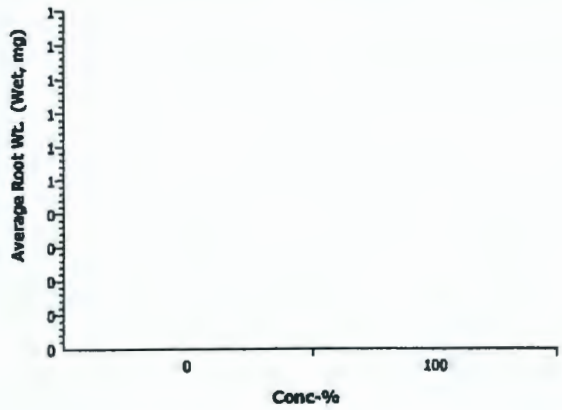
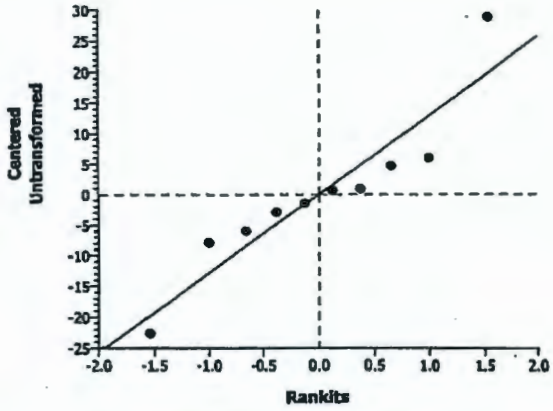




CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	09-3204-9748	09-3204-9748	19 Jul-06 10:37 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	38.24%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.28856	1.85955	0.0055	0.58734	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.697209	2.697209	1	10.81	0.01105	Significant Effect
Error	1.99523	0.249404	8			
Total	4.6924392	2.9466129	9			

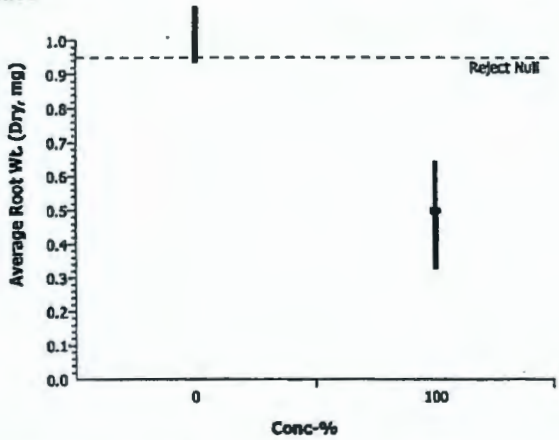
ANOVA Assumptions

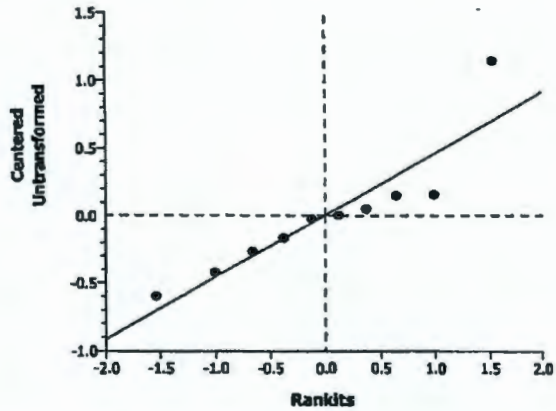
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	36.29308	23.15450	0.00424	Unequal Variances
Distribution	Shapiro-Wilk W	0.85613		0.06869	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	0.49710	0.32800	0.64500	0.11565				

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	09-3204-9748	09-3204-9748	19 Jul-06 10:37 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	37.55%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.75861	1.85955	0.0124	26.4468	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3848.153	3848.153	1	7.61	0.02473	Significant Effect
Error	4045.408	505.676	8			
Total	7893.56152	4353.8293	9			

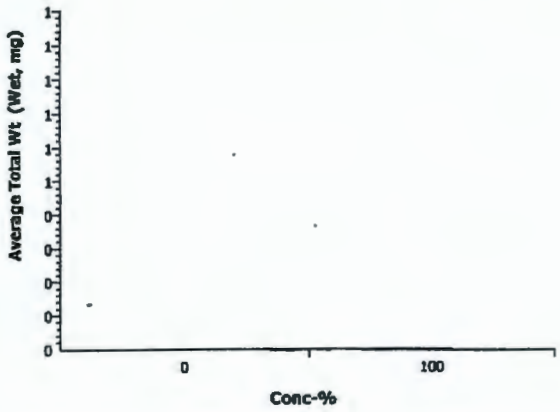
ANOVA Assumptions

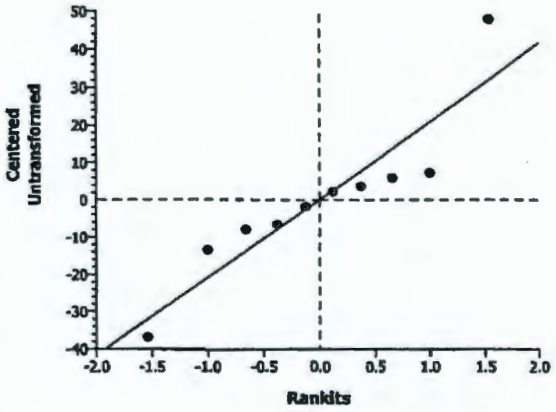
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	13.61081	23.15450	0.02682	Equal Variances
Distribution	Shapiro-Wilk W	0.88411		0.14541	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	31.206	17.734	38.463	8.3198				

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	09-3204-9748	09-3204-9748	19 Jul-06 10:37 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	29.16%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.49006	1.85955	0.0041	2.21299	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	43.12701	43.12701	1	12.18	0.00820	Significant Effect
Error	28.3253	3.540663	8			
Total	71.4523125	46.667673	9			

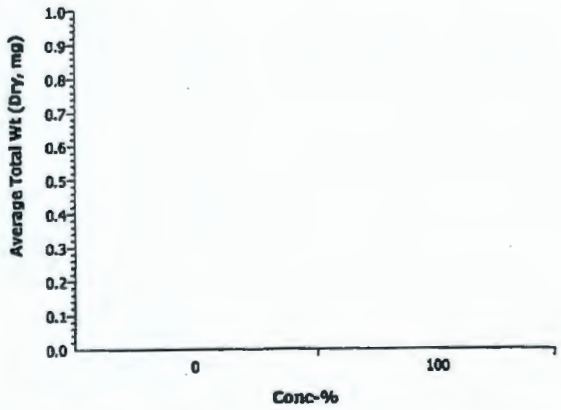
ANOVA Assumptions

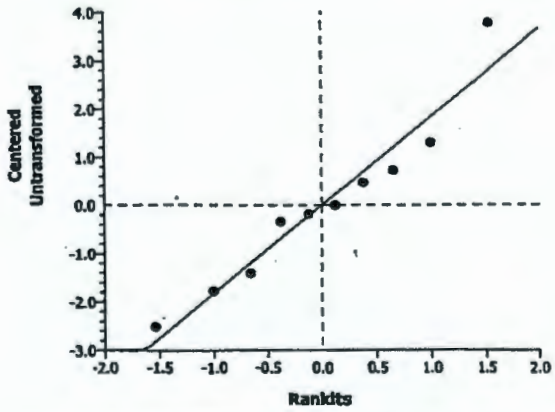
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.02455	23.15450	0.11005	Equal Variances
Distribution	Shapiro-Wilk W	0.94983		0.66648	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	3.436	2.02	4.7375	1.0040				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 9 KP Day 12 _____ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 NJ Day 28 NJ Day 35 BL

Bioassay Lab ID: BG 1575- 08 Sample No: JIIK 28

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 (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		0	0	1	1	1	1	1	7.6	7.4
	B		2	3	3	3	3	3	3		
	C		0	0	1	1	1	1	1		
	D		5	5	6	6	6	5	5		
	E		0	1	1	1	1	1	1		

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

Replicate A: 1 md G

Replicate B: 2 md G, 1 sm G

Replicate C: 1 sm G

Replicate D: 2 lg G, 3 md G Removed 1 sm G

Replicate E: 1 md 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 md G

Replicate B: 2 med G, 1 md w/ 3 B shoots

Replicate C: 1 med G

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

Replicate E: 1 Md G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	65 mm	mm	mm	mm	mm
Replicate B	72 mm	53 mm	62 mm	mm	mm
Replicate C	54 mm	mm	mm	mm	mm
Replicate D	91 mm	91 mm	63 mm	66 mm	78 mm
Replicate E	60 mm	mm	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	1046.42	1059.2	1048.53
Replicate B	1248.24	1289.3	1256.82
Replicate C	1251.57	1260.0	1252.72
Replicate D	1245.92	1356.7	1270.28
Replicate E	1256.67	1265.9	1253.83

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	mm	mm	mm	mm
Replicate B	64 mm	45 mm	48 mm	mm	mm
Replicate C	45 mm	mm	mm	mm	mm
Replicate D	73 mm	72 mm	70 mm	49 mm	54 mm
Replicate E	80 mm	mm	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	1025.38	1033.4	1026.87
Replicate B	1249.64	1280.4	1253.32
Replicate C	1248.09	1253.7	1248.21
Replicate D	1250.63	1324.2	1255.78
Replicate E	1247.86	1254.8	1248.49

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 10:43 AM
Test Link: 16-4458-6532/B157508psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	01-8480-3393	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	01-3222-3250	**Code:**	B1580-02	**Client:**	
Sample Date:	20 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	6d 0h	**Station:**			

Comments: J11K28

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
16-1061-0186	% Germination	< 100	100	N/A	40.98%	Equal Variance t Two-Sample
16-9419-6903	Average Height (mm)	< 100	100	N/A	18.81%	Equal Variance t Two-Sample
14-4652-5120	Average Length (mm)	< 100	100	N/A	15.66%	Equal Variance t Two-Sample
03-6501-2715	Average AG Wt (Wet, mg)	< 100	100	N/A	32.14%	Equal Variance t Two-Sample
04-0840-3706	Average AG Wt (Dry, mg)	< 100	100	N/A	31.49%	Equal Variance t Two-Sample
17-3741-6870	Average Root Wt. (Wet, mg	< 100	100	N/A	44.25%	Equal Variance t Two-Sample
13-5476-1322	Average Root Wt. (Dry, mg)	< 100	100	N/A	44.60%	Equal Variance t Two-Sample
07-2282-6336	Average Total Wt (Wet, mg	< 100	100	N/A	37.76%	Equal Variance t Two-Sample
18-0405-9774	Average Total Wt (Dry, mg)	< 100	100	N/A	33.12%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:43 AM
Test Link: 16-4458-6532/B157508psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.44000	0.20000	1.00000	0.16000	0.35777	81.31%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	63.820	54	77.800	3.9381	8.8058	13.80%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	58.78	45	80	6.0779	13.591	23.12%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	13.257	8.4301	22.156	2.4405	5.4571	41.17%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	2.63038	1.15002	4.87200	0.62294	1.39294	52.96%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	9.1075	5.61	14.714	1.5947	3.5658	39.15%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	0.69933	0.12000	1.22664	0.19643	0.43922	62.61%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	22.364	14.040	36.87	4.0187	8.9862	40.18%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	3.3297	1.2700	5.9020	0.7828	1.7504	52.57%

CETIS Test Summary

Report Date: 19 Jul-06 10:43 AM
Test Link: 16-4458-6532/B157508psB

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		0.20000	0.60000	0.20000	1.00000	0.20000

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	78.6	91	67	90.8000	115.400
100		65	62.3	54	77.8000	60

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		53	52.3	45	63.6	80

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		12.7799	13.6867	8.43005	22.156	9.22998

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		2.10999	2.85999	1.15002	4.87200	2.15991

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		8.02002	10.2533	5.60999	14.714	6.94006

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		0.48999	1.22664	0.12000	1.03000	0.63000

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		20.7999	23.9400	14.0400	36.87	16.1700

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		2.59998	4.08663	1.27002	5.90200	2.78992

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	16-4458-6532	16-4458-6532	19 Jul-06 10:43 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		N/A	40.98%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.22522	1.85955	0.0284	0.4084	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.5970927	0.597093	1	4.95	0.05672	Non-Significant Effect
Error	0.964686	0.120586	8			
Total	1.56177872	0.7176784	9			

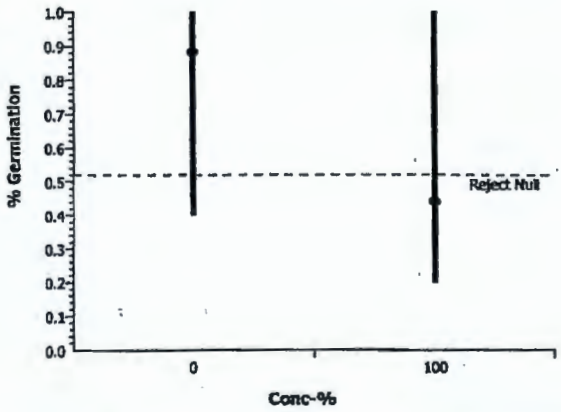
ANOVA Assumptions

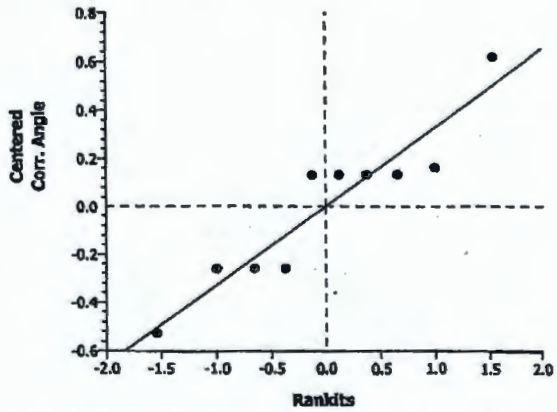
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.76355	23.15450	0.59611	Equal Variances
Distribution	Shapiro-Wilk W	0.89809		0.20874	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	1.21317	0.68472	1.34528	0.29541
100		5	0.44000	0.20000	1.00000	0.35777	0.72446	0.46365	1.34528	0.39230

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	16-4458-6532	16-4458-6532	19 Jul-06 10:43 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	18.81%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.76122	1.85955	0.0123	16.6612	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1530.169	1530.169	1	7.62	0.02463	Significant Effect
Error	1605.56	200.695	8			
Total	3135.72925	1730.8641	9			

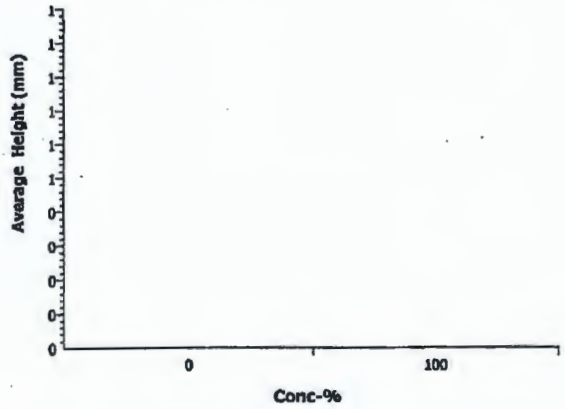
ANOVA Assumptions

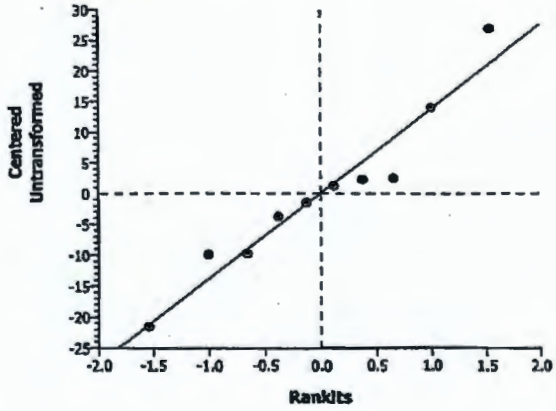
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.17642	23.15450	0.19508	Equal Variances
Distribution	Shapiro-Wilk W	0.95335		0.70816	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	63.820	54	77.8	8.8058				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	16-4458-6532	16-4458-6532	19 Jul-06 10:43 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	15.66%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	5.31193	1.85955	0.0004	16.6493	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5654.884	5654.884	1	28.22	0.00072	Significant Effect
Error	1603.28	200.41	8			
Total	7258.16431	5855.2943	9			

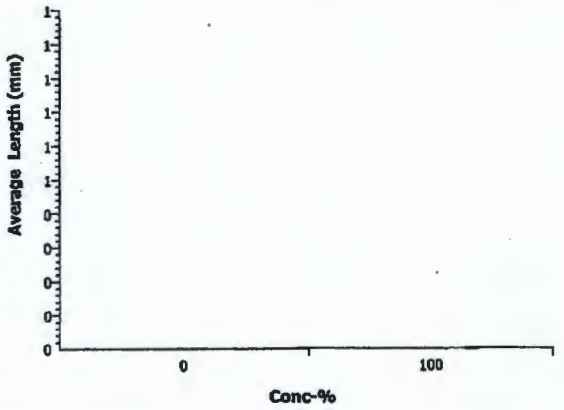
ANOVA Assumptions

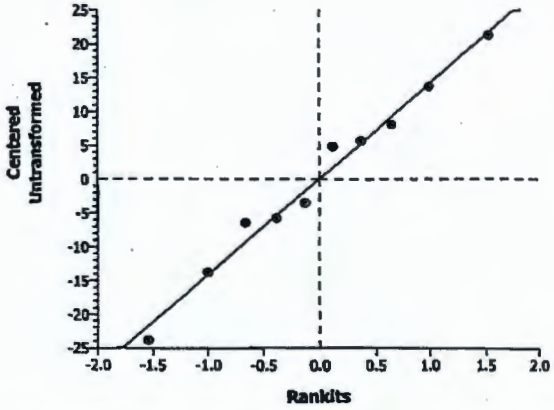
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.17009	23.15450	0.88267	Equal Variances
Distribution	Shapiro-Wilk W	0.98478		0.98557	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	58.78	45	80	13.591				

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	16-4458-6532	16-4458-6532	19 Jul-06 10:43 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	32.14%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.54311	1.85955	0.0038	10.9904	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1096.281	1096.281	1	12.55	0.00759	Significant Effect
Error	698.6238	87.32798	8			
Total	1794.90485	1183.609	9			

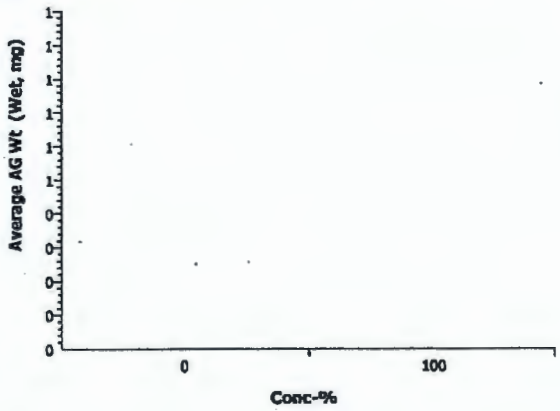
ANOVA Assumptions

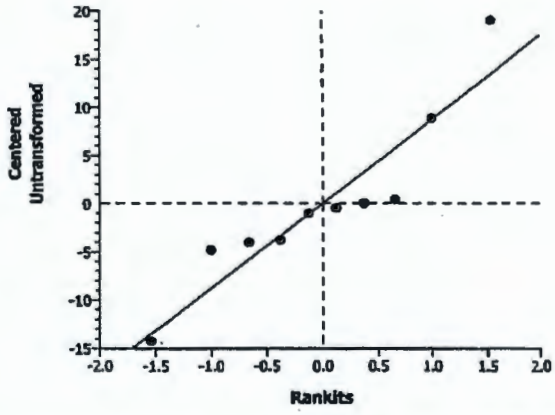
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.86485	23.15450	0.15461	Equal Variances
Distribution	Shapiro-Wilk W	0.89729		0.20454	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	13.257	8.4301	22.156	5.4571				

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	16-4458-6532	16-4458-6532	19 Jul-06 10:43 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	31.49%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.33906	1.85955	0.0051	1.90642	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	29.29622	29.29622	1	11.15	0.01025	Significant Effect
Error	21.02096	2.62762	8			
Total	50.3171787	31.923839	9			

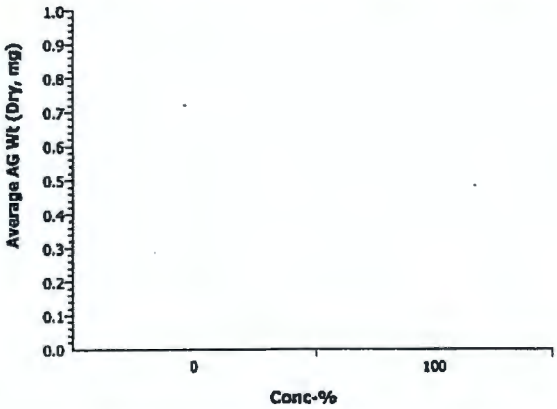
ANOVA Assumptions

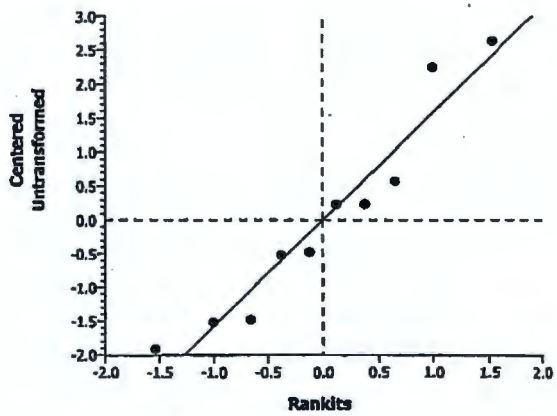
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.70848	23.15450	0.61658	Equal Variances
Distribution	Shapiro-Wilk W	0.92243		0.37770	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	2.63038	1.15002	4.87200	1.39294				

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	16-4458-6532	16-4458-6532	19 Jul-06 10:43 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	44.25%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	3.14629	1.85955	0.0068	16.0373	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1840.706	1840.706	1	9.90	0.01367	Significant Effect
Error	1487.568	185.946	8			
Total	3328.27454	2026.6524	9			

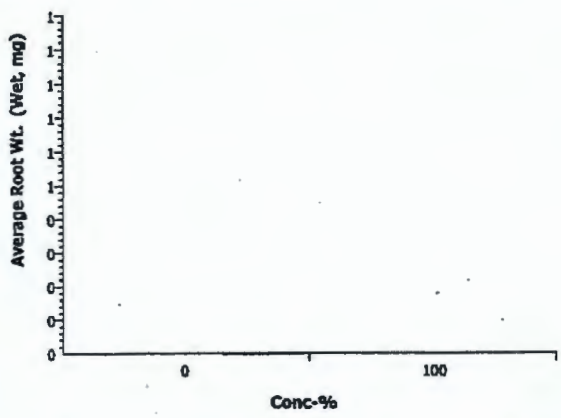
ANOVA Assumptions

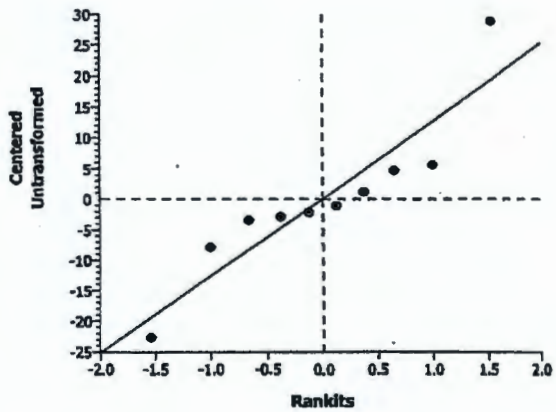
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	28.24906	23.15450	0.00685	Unequal Variances
Distribution	Shapiro-Wilk W	0.88470		0.14770	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	9.1075	5.61	14.714	3.5658				

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	16-4458-6532	16-4458-6532	19 Jul-06 10:43 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	44.60%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.27094	1.85955	0.0264	0.68493	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.749177	1.749177	1	5.16	0.05281	Non-Significant Effect
Error	2.713392	0.339174	8			
Total	4.46256924	2.0883508	9			

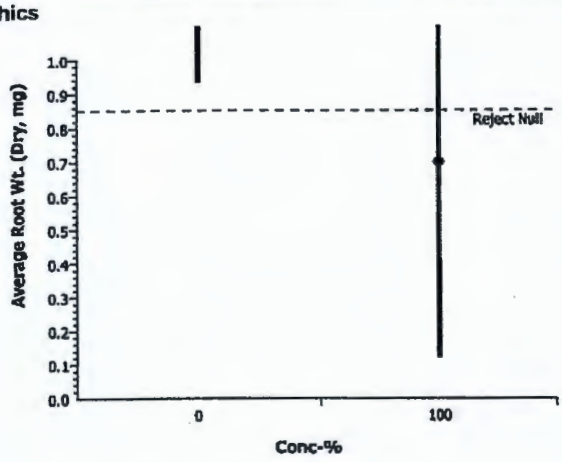
ANOVA Assumptions

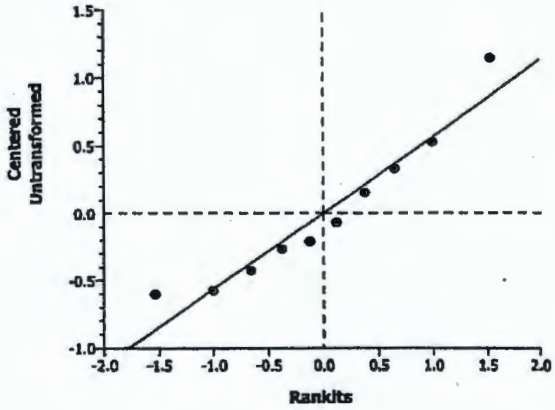
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.51629	23.15450	0.39326	Equal Variances
Distribution	Shapiro-Wilk W	0.92395		0.39107	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	0.69933	0.12000	1.22664	0.43922				

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	16-4458-6532	16-4458-6532	19 Jul-06 10:43 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	37.76%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.36119	1.85955	0.0050	26.5972	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5778.066	5778.066	1	11.30	0.00991	Significant Effect
Error	4091.537	511.4421	8			
Total	9869.60303	6289.5081	9			

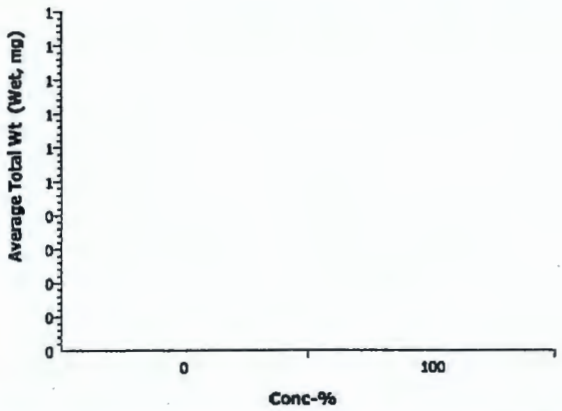
ANOVA Assumptions

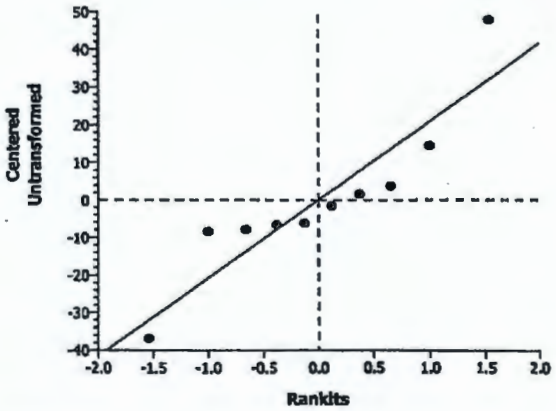
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	11.66703	23.15450	0.03543	Equal Variances
Distribution	Shapiro-Wilk W	0.87375		0.11052	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	22.364	14.040	36.87	8.9862				

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	16-4458-6532	16-4458-6532	19 Jul-06 10:43 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	33.12%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.15106	1.85955	0.0068	2.51379	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	45.36241	45.36241	1	9.93	0.01358	Significant Effect
Error	36.5488	4.5686	8			
Total	81.9112129	49.931012	9			

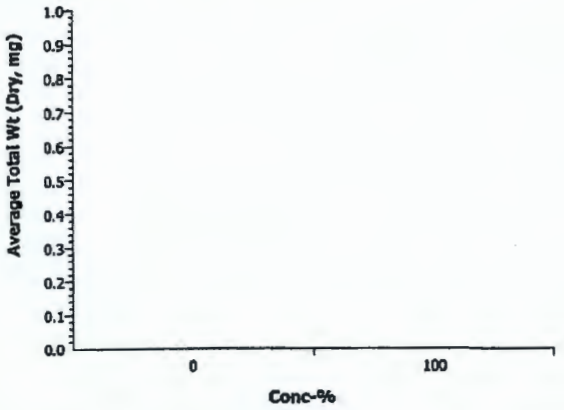
ANOVA Assumptions

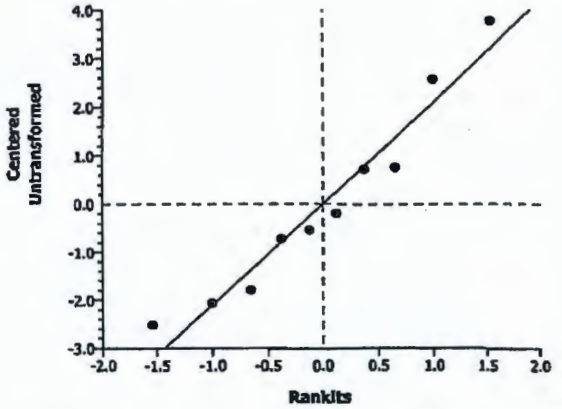
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.98216	23.15450	0.52384	Equal Variances
Distribution	Shapiro-Wilk W	0.94188		0.57406	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	3.3297	1.2700	5.9020	1.7504				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 (LW) Day 12 _____ Day 14 NJ Day 16 NJ Day 19 (TP) Day 21 NJ Day 23 NJ Day 28 (TP) Day 35 DW

Bioassay Lab ID: BG 1575- 09 Sample No: J11K61

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 (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		3	3	5	5	6	6 -> 5	5	7.6	7.5
	B		5	5	5	5	5	5 -> 5	5		
	C		2	3	3	3	3	3 -> 3	3		
	D		4	5	5	5	5	5 -> 5	5		
	E		1	1	2	2	2	2 -> 2	2		

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

Replicate A: 2Lg (G) 1 w/B tip, 3 med w/B tips removed, 1sm (G)

Replicate B: 2Lg (G) w/B shoots, 3 med 1 w/B Tip

Replicate C: 1Lg (G), 1 med w/B Tip, 1sm (G)

Replicate D: 3Lg (G) w/B tips, 2 med (G)

Replicate E: 2 Med w/B Tips

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 each w 1 B shoot, 1 Md w/ B shoot, 1 Md G

Replicate B: 3 Lg w/ B shoots, 2 Md G

Replicate C: 1 Md w/ 1 B shoot, 2 Md w/ B tips

Replicate D: 1 Lg G, 3 Md G, 1 Md w/ 2 B shoots

Replicate E: 1 Lg G, 1 Lg w/ B tip (141 mm plant w/ only 3 shoots)

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	80 mm	95 mm	102 mm	96 mm	72 mm
Replicate B	91 mm	101 mm	84 mm	111 mm	132 mm
Replicate C	84 mm	54 mm	75 mm	mm	mm
Replicate D	81 mm	69 mm	82 mm	107 mm	66 mm
Replicate E	141 mm	102 mm	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	1029.31	1210.46	1059.05
Replicate B	1249.78	1443.66	1284.26
Replicate C	1254.19	1325.90	1266.45
Replicate D	1250.36	1433.61	1281.67
Replicate E	1255.70	1328.16	1266.78

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

Measure Root Length: Individual length of the longest root from each seedling

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	126 mm	77 mm	64 mm	96 mm	122 mm
Replicate B	81 mm	69 mm	94 mm	116 mm	86 mm
Replicate C	76 mm	96 mm	62 mm	DW mm	mm
Replicate D	80 mm	80 mm	111 mm	76 mm	87 mm
Replicate E	97 mm	92 mm	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	988.24	1170.22	994.99
Replicate B	1242.04	1497.40	1251.33
Replicate C	1260.94	1344.10	1262.86
Replicate D	1245.99	1434.96	1251.49
Replicate E	1247.50	1332.49	1249.84

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 10:46 AM
Test Link: 12-9834-0775/B157509psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	08-5612-0296	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	12-9621-5455	**Code:**	B1580-03	**Client:**	
Sample Date:	24 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	48h	**Station:**			

Comments: J11K61

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
03-0657-1184	% Germination	100	> 100	N/A	35.39%	Wilcoxon Rank Sum Two-Sample
11-5656-4800	Average Height (mm)	100	> 100	N/A	25.14%	Equal Variance t Two-Sample
09-3085-4123	Average Length (mm)	< 100	100	N/A	12.88%	Equal Variance t Two-Sample
08-8767-5701	Average AG Wt (Wet, mg)	100	> 100	N/A	32.64%	Equal Variance t Two-Sample
19-7714-3866	Average AG Wt (Dry, mg)	100	> 100	N/A	28.89%	Equal Variance t Two-Sample
12-3870-1618	Average Root Wt. (Wet, mg	100	> 100	N/A	47.72%	Equal Variance t Two-Sample
06-5691-4930	Average Root Wt. (Dry, mg)	100	> 100	N/A	45.74%	Equal Variance t Two-Sample
05-2112-4308	Average Total Wt (Wet, mg	100	> 100	N/A	39.79%	Equal Variance t Two-Sample
05-3755-9845	Average Total Wt (Dry, mg)	100	> 100	N/A	31.57%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:46 AM
Test Link: 12-9834-0775/B157509psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.80000	0.40000	1.00000	0.12649	0.28284	35.36%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0.	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	93.260	71	121.5	8.8672	19.828	21.26%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	89.1	78	97	3.3172	7.4175	8.32%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	34.365	23.903	38.784	2.6575	5.9424	17.29%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	5.74654	4.08667	6.89600	0.47039	1.05183	18.30%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	39.097	27.720	51.072	3.8302	8.5646	21.91%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	1.24360	0.64001	1.95798	0.21354	0.47750	38.40%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	73.462	51.623	89.856	6.2262	13.922	18.95%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	6.9901	4.7267	8.854	0.6674	1.4924	21.35%

CETIS Test Summary

Report Date: 19 Jul-06 10:46 AM
Test Link: 12-9834-0775/B157509psB

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	78.6	91	67	90.8000	115.400
100		89	103.800	71	81	121.5

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		97	89.2	78	86.8000	94.5

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		36.238	38.784	23.9034	36.648	36.25

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		5.94800	6.89600	4.08667	6.26201	5.54004

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		36.392	51.072	27.7200	37.8020	42.5

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		1.35000	1.95798	0.64001	1.10000	1.16998

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		72.63	89.856	51.6234	74.45	78.75

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		7.298	8.85398	4.72668	7.36201	6.71002

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	12-9834-0775	12-9834-0775	19 Jul-06 10:46 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	35.39%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	25.5		0.3452	4	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	0.23	0.64701	Non-Significant Effect
Error	0.7455132	0.093189	8			
Total	0.7666002	0.1142761	9			

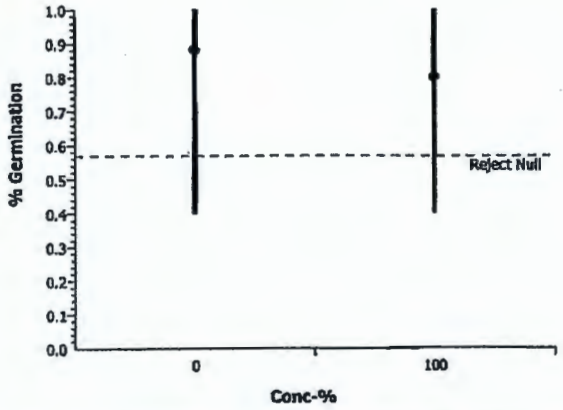
ANOVA Assumptions

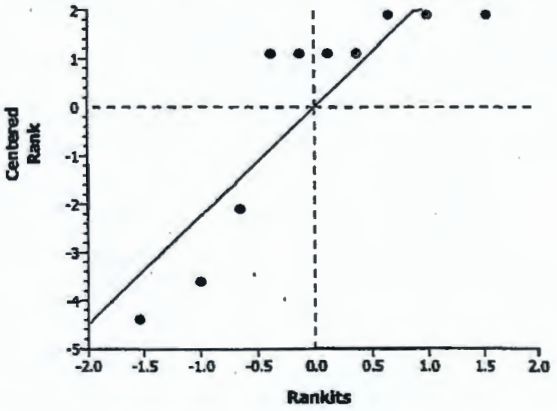
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.13568	23.15450	0.90483	Equal Variances
Distribution	Shapiro-Wilk W	0.74930		0.00350	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	5.90000	1.50000	7.00000	2.45967
100		5	0.80000	0.40000	1.00000	0.28284	5.10000	1.50000	7.00000	2.65518

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	12-9834-0775	12-9834-0775	19 Jul-06 10:46 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	25.14%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.3925	1.85955	0.6475	22.2678	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	55.225	55.225	1	0.15	0.70495	Non-Significant Effect
Error	2867.944	358.493	8			
Total	2923.16909	413.71801	9			

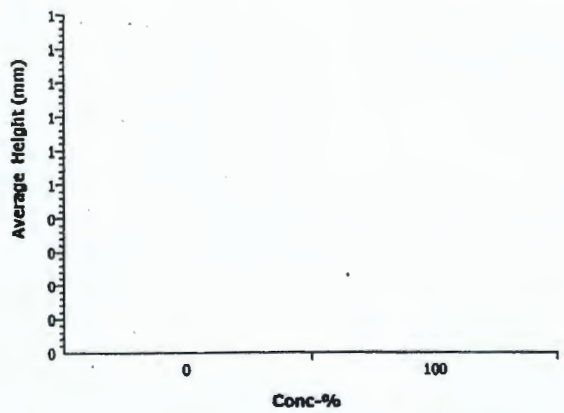
ANOVA Assumptions

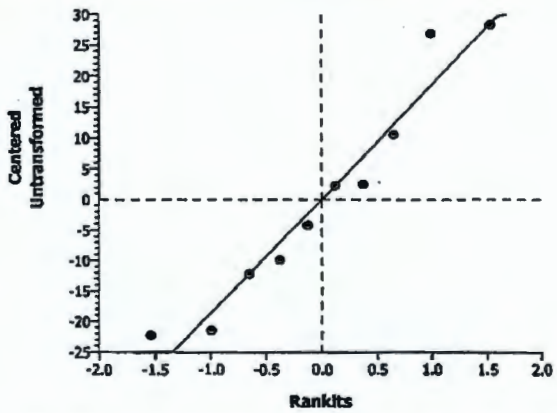
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.21396	23.15450	0.85549	Equal Variances
Distribution	Shapiro-Wilk W	0.92713		0.42027	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	93.260	71	121.5	19.828				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	12-9834-0775	12-9834-0775	19 Jul-06 10:46 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	12.88%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.34114	1.85955	0.0237	13.6936	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	743.0441	743.0441	1	5.48	0.04733	Significant Effect
Error	1084.552	135.569	8			
Total	1827.59607	878.61307	9			

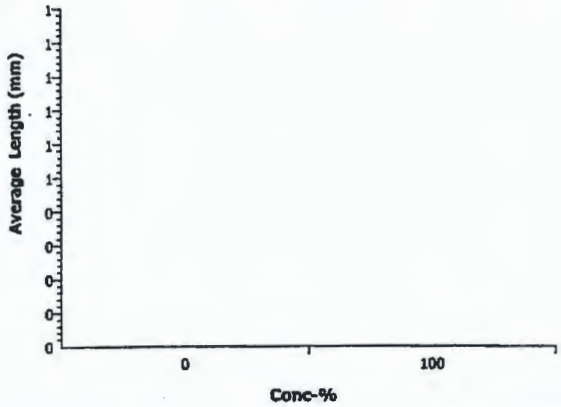
ANOVA Assumptions

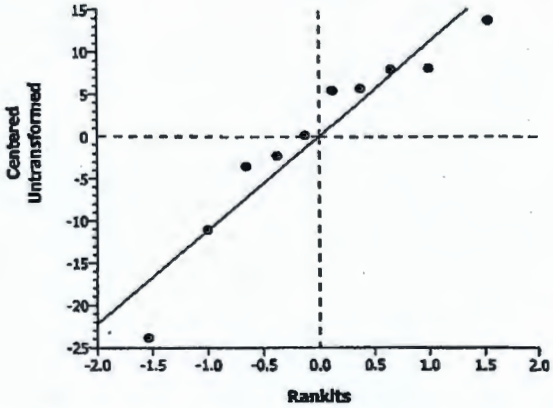
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.92799	23.15450	0.21364	Equal Variances
Distribution	Shapiro-Wilk W	0.91254		0.29888	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	89.1	78	97	7.4176				

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	12-9834-0775	12-9834-0775	19 Jul-06 10:46 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	32.64%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.0279	1.85955	0.5108	11.1631	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0701045	0.070104	1	0.00	0.97843	Non-Significant Effect
Error	720.7501	90.09377	8			
Total	720.820227	90.16387	9			

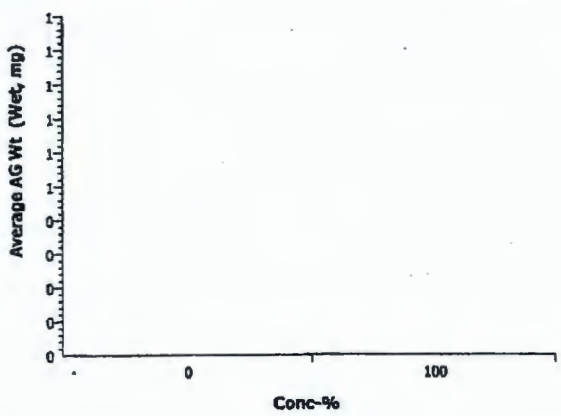
ANOVA Assumptions

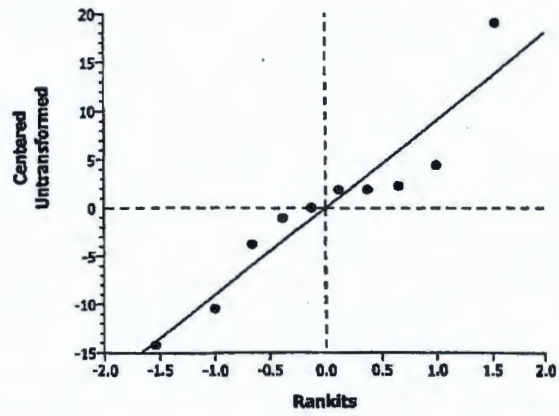
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.10277	23.15450	0.20032	Equal Variances
Distribution	Shapiro-Wilk W	0.91656		0.32912	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	34.365	23.903	38.784	5.9424				

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	12-9834-0775	12-9834-0775	19 Jul-06 10:46 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	28.89%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.32654	1.85955	0.3762	1.74863	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.235723	0.235723	1	0.11	0.75239	Non-Significant Effect
Error	17.68515	2.210644	8			
Total	17.9208732	2.4463668	9			

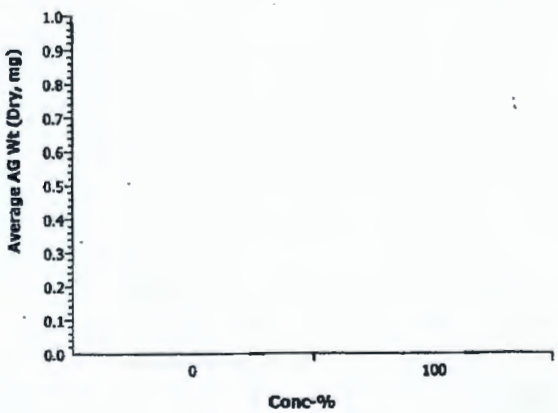
ANOVA Assumptions

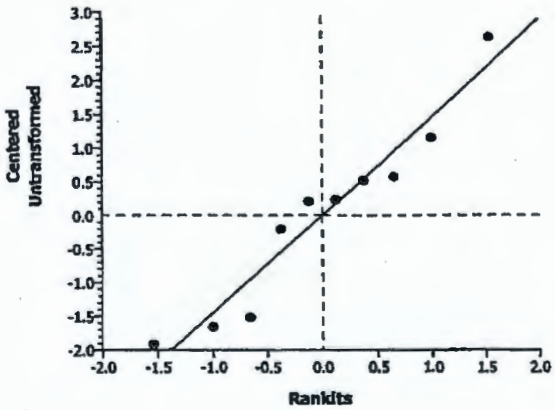
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.99632	23.15450	0.31302	Equal Variances
Distribution	Shapiro-Wilk W	0.93571		0.50637	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	5.74654	4.08667	6.89600	1.05183				

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	12-9834-0775	12-9834-0775	19 Jul-06 10:46 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	47.72%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.307	1.85955	0.6167	17.2954	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	20.38033	20.38033	1	0.09	0.76670	Non-Significant Effect
Error	1730.12	216.2651	8			
Total	1750.50082	236.64539	9			

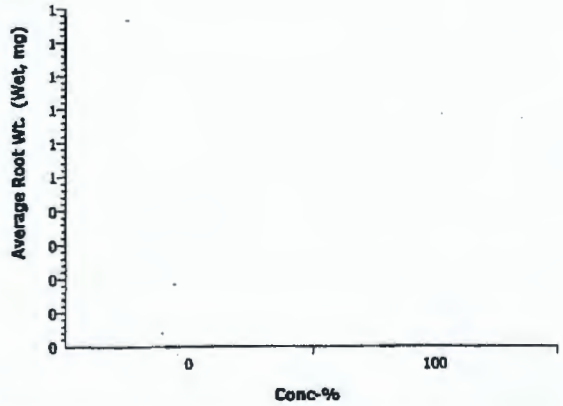
ANOVA Assumptions

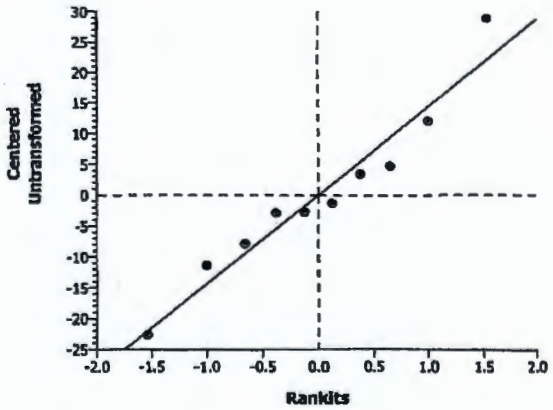
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.89658	23.15450	0.15305	Equal Variances
Distribution	Shapiro-Wilk W	0.95962		0.78153	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	39.097	27.720	51.072	8.5646				

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	12-9834-0775	12-9834-0775	19 Jul-06 10:46 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	45.74%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.77353	1.85955	0.2307	0.70243	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.2134445	0.213445	1	0.60	0.46145	Non-Significant Effect
Error	2.853749	0.356719	8			
Total	3.06719357	0.5701632	9			

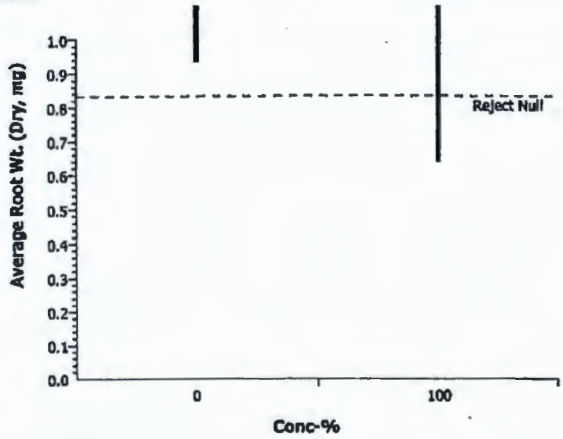
ANOVA Assumptions

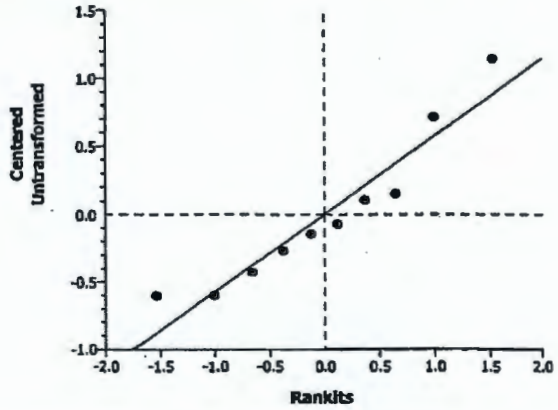
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.12904	23.15450	0.48225	Equal Variances
Distribution	Shapiro-Wilk W	0.90479		0.24709	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	1.24360	0.64001	1.95798	0.47750				

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	12-9834-0775	12-9834-0775	19 Jul-06 10:46 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	39.79%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.2005	1.85955	0.5770	28.0288	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	22.84103	22.84103	1	0.04	0.84607	Non-Significant Effect
Error	4543.85	567.9813	8			
Total	4566.69113	590.8223	9			

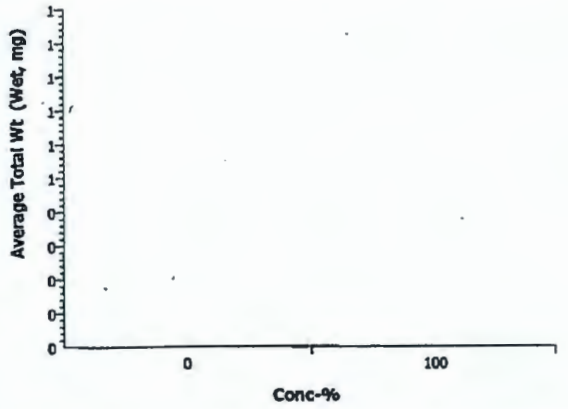
ANOVA Assumptions

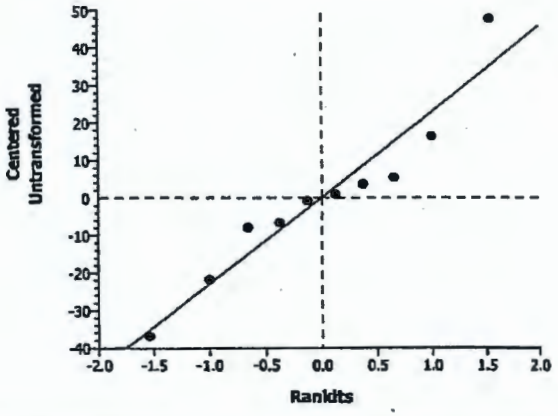
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.86062	23.15450	0.15482	Equal Variances
Distribution	Shapiro-Wilk W	0.93987		0.55153	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	73.462	51.623	89.856	13.922				

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	12-9834-0775	12-9834-0775	19 Jul-06 10:46 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	31.57%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.46510	1.85955	0.3271	2.39592	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.8977821	0.897782	1	0.22	0.65425	Non-Significant Effect
Error	33.20163	4.150204	8			
Total	34.0994155	5.0479863	9			

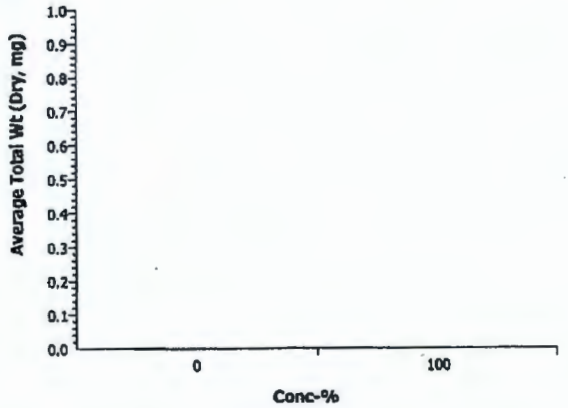
ANOVA Assumptions

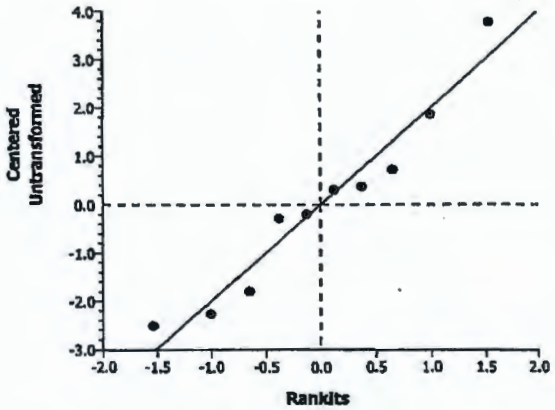
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.72689	23.15450	0.35470	Equal Variances
Distribution	Shapiro-Wilk W	0.94508		0.61078	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.9901	4.7267	8.854	1.4924				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 VB Day 12 _____ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 NJ Day 28 NJ Day 30 BM

Bioassay Lab ID: BG 1575- 10 Sample No: J11K40

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 (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		3	3	3	3	3	4	4	6.4	6.9
	B		1	2	3	3	3	3	3		
	C		5	5	6	6	6	5	5		
	D		3	5	8	8	8	5	5		
	E		2	2	3	3	3	3	3		

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

Replicate A 1lg G, 2 md G w/1 brown shoot, 1sm G

Replicate B 2lg G, 1md G

Replicate C 4lg G, 1 lmd G Removed-1md G

Replicate D 1lg G, 4md G · Removed- 2md G + 1sm G w/1B tip

Replicate E 2lg G w/1B tip, 1md 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 w/ 3 B shoots, 2 md G, 1 Sm G

Replicate B 2 Lg G, 1 Md G

Replicate C 2 Lg G w/ 1 B shoot 3 Lg G

Replicate D 1 Lg w/ 1B shoot, 1 med 1 1B shoot, 3 med G

Replicate E 1 Lg w/ 2 B shoots, 2 med G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	52 mm	84 mm	52 mm	106 mm	mm
Replicate B	111 mm	64 mm	95 mm	mm	mm
Replicate C	83 mm	84 mm	95 mm	100 mm	110 mm
Replicate D	85 mm	69 mm	70 mm	88 mm	133 mm
Replicate E	71 mm	89 mm	86 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	1018.85	1109.9	1034.61
Replicate B	989.91	1069.9	1002.57
Replicate C	1009.75	1193.7	1039.62
Replicate D	995.16	1169.8	1024.80
Replicate E	995.56	1182.8	1015.03

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	116 mm	31 mm	30 mm	mm
Replicate B	70 mm	82 mm	51 mm	mm	mm
Replicate C	66 mm	87 mm	116 mm	132 mm	66 mm
Replicate D	80 mm	110 mm	64 mm	48 mm	75 mm
Replicate E	152 mm	116 mm	59 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	995.71	1082.0	999.71
Replicate B	989.80	1060.3	993.16
Replicate C	1003.94	1199.5	1012.74
Replicate D	991.11	1201.5	998.96
Replicate E	1242.74	1383.7	1251.42

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 10:55 AM
Test Link: 04-5366-5275/B157510psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	16-5408-0141	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	02-2878-1148	**Code:**	B1580-04	**Client:**	
Sample Date:	25 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	24h	**Station:**			

Comments: J11K40

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
11-8667-5158	% Germination	100	> 100	N/A	30.05%	Equal Variance t Two-Sample
21-3036-3807	Average Height (mm)	100	> 100	N/A	18.76%	Equal Variance t Two-Sample
16-3471-0962	Average Length (mm)	< 100	100	N/A	20.06%	Equal Variance t Two-Sample
12-6467-2807	Average AG Wt (Wet, mg)	100	> 100	N/A	47.70%	Equal Variance t Two-Sample
02-2964-9778	Average AG Wt (Dry, mg)	100	> 100	N/A	29.58%	Equal Variance t Two-Sample
06-1575-1703	Average Root Wt. (Wet, mg	100	> 100	N/A	50.78%	Equal Variance t Two-Sample
16-6561-4323	Average Root Wt. (Dry, mg)	100	> 100	N/A	55.54%	Equal Variance t Two-Sample
14-3220-8722	Average Total Wt (Wet, mg	100	> 100	N/A	47.40%	Equal Variance t Two-Sample
12-5776-1422	Average Total Wt (Dry, mg)	100	> 100	N/A	33.67%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 10:55 AM
Test Link: 04-5366-5275/B157510psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.80000	0.60000	1.00000	0.08944	0.20000	25.00%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	86.380	73.5	95.400	3.8787	8.6731	10.04%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	80.3	56	109	9.4036	21.027	26.19%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	36.711	22.763	62.413	6.9257	15.486	42.18%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	5.31041	3.94000	6.49001	0.51382	1.14894	21.64%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	34.65	21.572	46.987	5.1119	11.430	32.99%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	1.66867	1.00000	2.89335	0.33661	0.75268	45.11%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	71.361	44.335	109.4	11.574	25.880	36.27%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	6.9791	4.9400	9.3834	0.8205	1.8347	26.29%

CETIS Test Summary

Report Date: 19 Jul-06 10:55 AM
Test Link: 04-5366-5275/B157510psB

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		0.80000	0.60000	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	78.6	91	67	90.8000	115.400
100		73.5	90	95.4000	91	82

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		56	67.7	93.4000	75.4000	109

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		22.7625	26.6634	36.79	34.9280	62.4133

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		3.94000	4.22001	5.97400	5.92802	6.49001

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		21.5725	23.5000	39.112	42.0780	46.9867

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		1.00000	1.12000	1.76000	1.57001	2.89335

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		44.3350	50.1633	75.902	77.0060	109.4

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		4.94000	5.34001	7.734	7.49802	9.38338

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	04-5366-5275	04-5366-5275	19 Jul-06 10:54 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	30.05%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.59281	1.85955	0.2848	0.31116	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0245998	0.0246	1	0.35	0.56968	Non-Significant Effect
Error	0.5600038	0.070000	8			
Total	0.58460358	0.0946003	9			

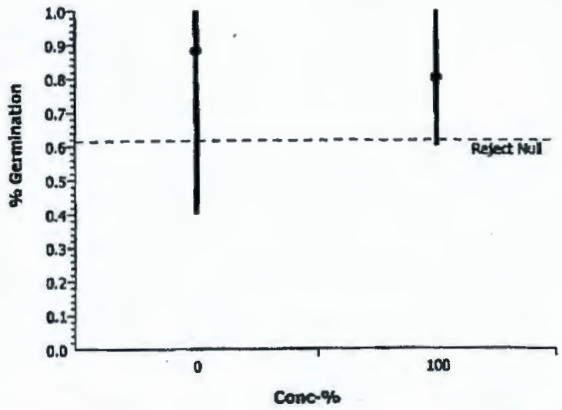
ANOVA Assumptions

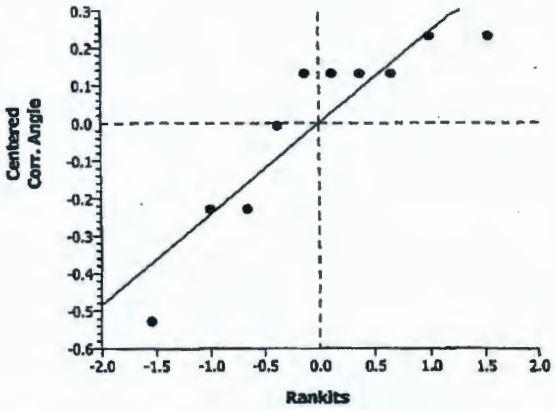
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.65495	23.15450	0.63747	Equal Variances
Distribution	Shapiro-Wilk W	0.82857		0.03216	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	1.21317	0.68472	1.34528	0.29541
100		5	0.80000	0.60000	1.00000	0.20000	1.11397	0.88608	1.34528	0.22963

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	04-5366-5275	04-5366-5275	19 Jul-06 10:55 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	1	N/A	18.76%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.24402	1.85955	0.4067	16.613	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	11.881	11.881	1	0.06	0.81336	Non-Significant Effect
Error	1596.28	199.535	8			
Total	1608.16115	211.41602	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.30523	23.15450	0.18639	Equal Variances
Distribution	Shapiro-Wilk W	0.95713		0.75277	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	88.560	67	115.4	17.996				
100		5	86.380	73.5	95.4	8.6731				

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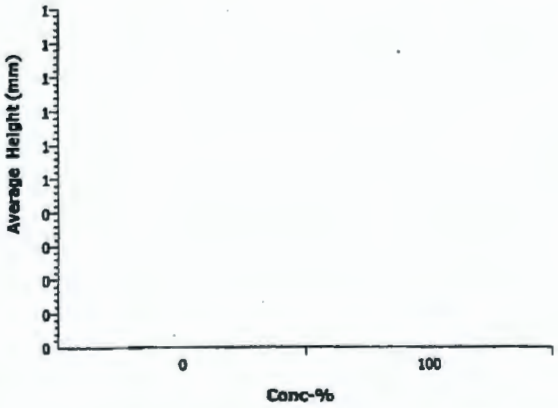
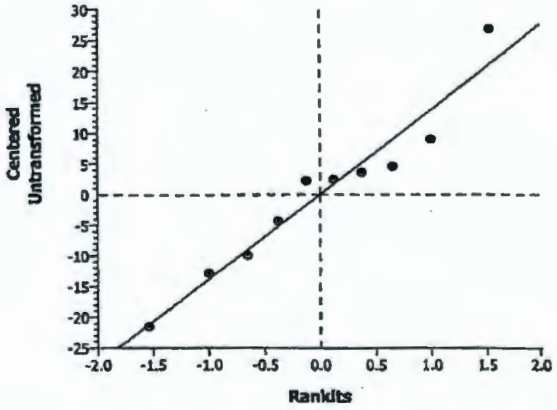




CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	04-5366-5275	04-5366-5275	19 Jul-06 10:55 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	20.06%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.26949	1.85955	0.0265	21.3364	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1695.204	1695.204	1	5.15	0.05293	Non-Significant Effect
Error	2633.032	329.129	8			
Total	4328.23633	2024.3331	9			

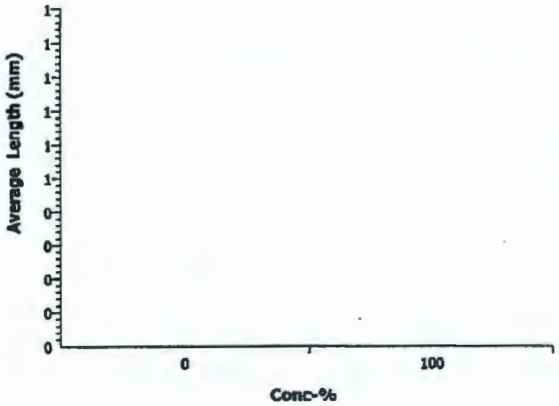
ANOVA Assumptions

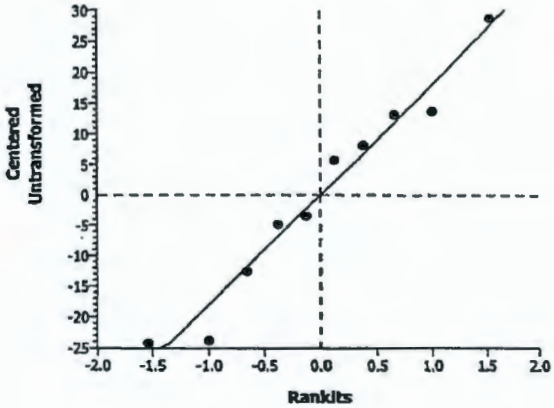
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.04563	23.15450	0.50520	Equal Variances
Distribution	Shapiro-Wilk W	0.95755		0.75764	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	80.3	56	109	21.027				

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	04-5366-5275	04-5366-5275	19 Jul-06 10:55 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	1	N/A	47.70%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.2866	1.85955	0.6092	16.3112	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	15.80343	15.80343	1	0.08	0.78168	Non-Significant Effect
Error	1538.815	192.3519	8			
Total	1554.61837	208.15530	9			

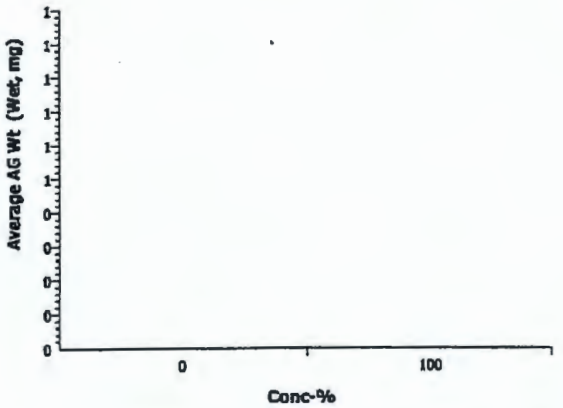
ANOVA Assumptions

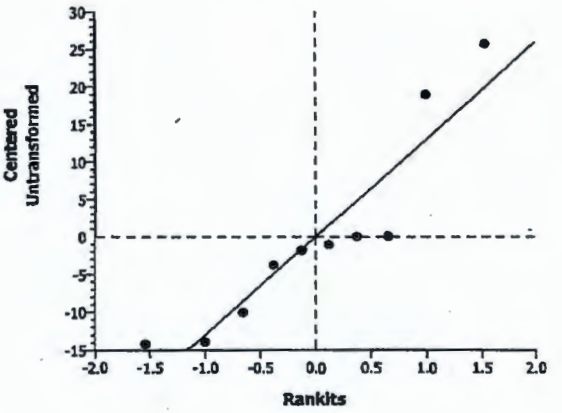
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.65540	23.15450	0.63729	Equal Variances
Distribution	Shapiro-Wilk W	0.86232		0.08125	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	36.711	22.763	62.413	15.486				

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	04-5366-5275	04-5366-5275	19 Jul-06 10:55 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	1	N/A	29.58%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.77191	1.85955	0.2312	1.79039	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.380868	1.380868	1	0.60	0.46236	Non-Significant Effect
Error	18.54002	2.317503	8			
Total	19.9208920	3.6983712	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.51121	23.15450	0.39427	Equal Variances
Distribution	Shapiro-Wilk W	0.93026		0.45041	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	6.05361	4.14001	8.68201	1.82070				
100		5	5.31041	3.94000	6.49001	1.14894				

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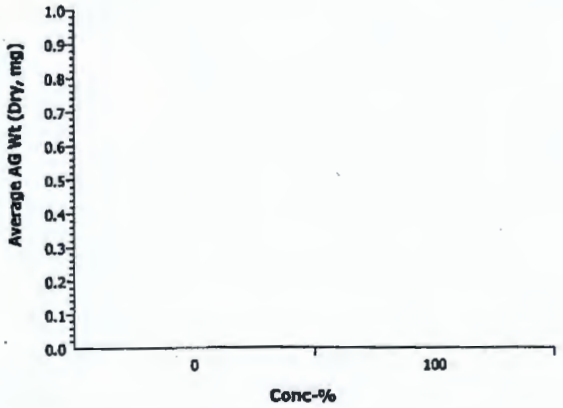

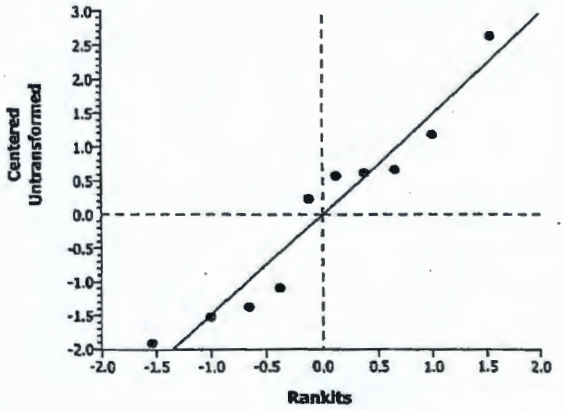

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	04-5366-5275	04-5366-5275	19 Jul-06 10:55 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	1	N/A	50.78%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.16086	1.85955	0.4381	18.4054	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	6.337531	6.337531	1	0.03	0.87619	Non-Significant Effect
Error	1959.33	244.9163	8			
Total	1965.66785	251.25382	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.74905	23.15450	0.35097	Equal Variances
Distribution	Shapiro-Wilk W	0.97530		0.93521	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	36.242	13.590	65.054	18.952				
100		5	34.65	21.572	46.987	11.430				

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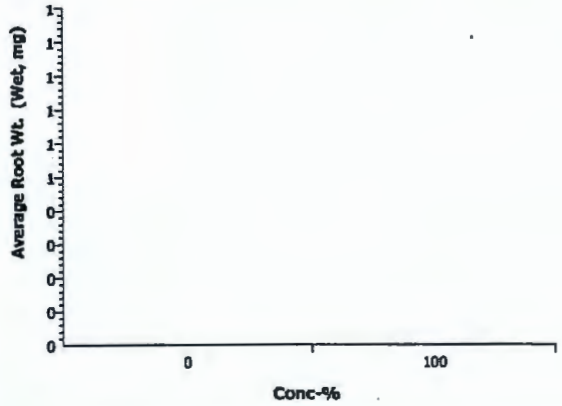
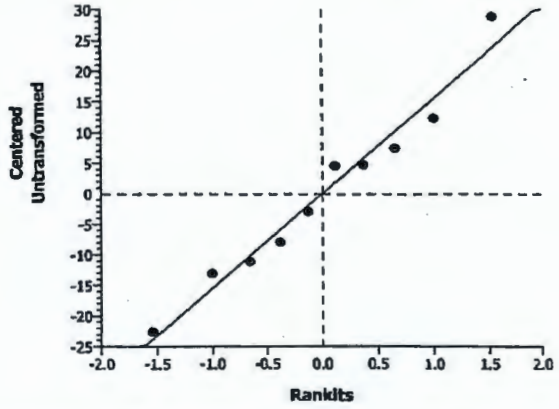




CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	04-5366-5275	04-5366-5275	19 Jul-06 10:55 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	1	N/A	55.54%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.2897	1.85955	0.6103	0.85294	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0441422	0.044142	1	0.08	0.77941	Non-Significant Effect
Error	4.207812	0.525977	8			
Total	4.25195407	0.5701187	9			

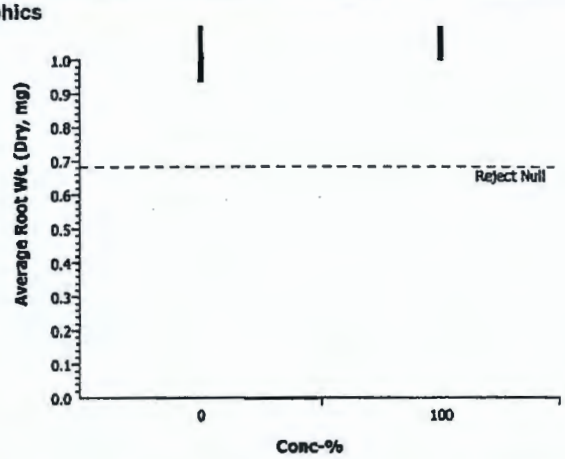
ANOVA Assumptions

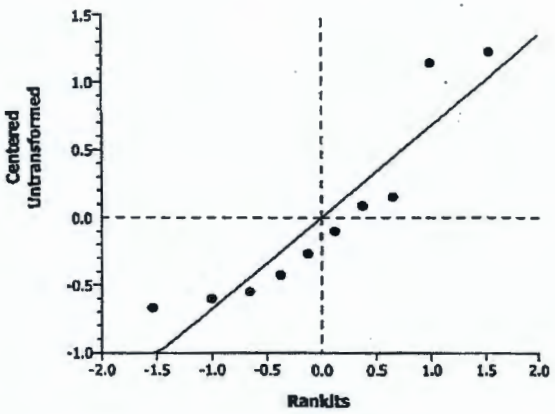
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.16704	23.15450	0.88460	Equal Variances
Distribution	Shapiro-Wilk W	0.84009		0.04423	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	1.66867	1.00000	2.89335	0.75268				

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	04-5366-5275	04-5366-5275	19 Jul-06 10:55 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	1	N/A	47.40%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	-0.0514	1.85955	0.5198	33.3884	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.125471	2.125471	1	0.00	0.96030	Non-Significant Effect
Error	6447.727	805.9658	8			
Total	6449.85203	808.09129	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.40659	23.15450	0.74899	Equal Variances
Distribution	Shapiro-Wilk W	0.93638		0.51346	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	70.439	33.550	118.26	30.694				
100		5	71.361	44.335	109.4	25.880				

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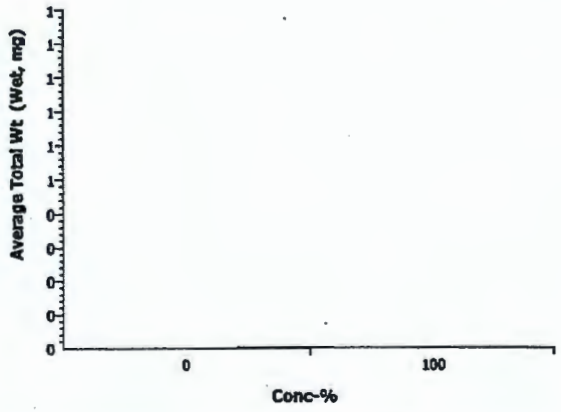

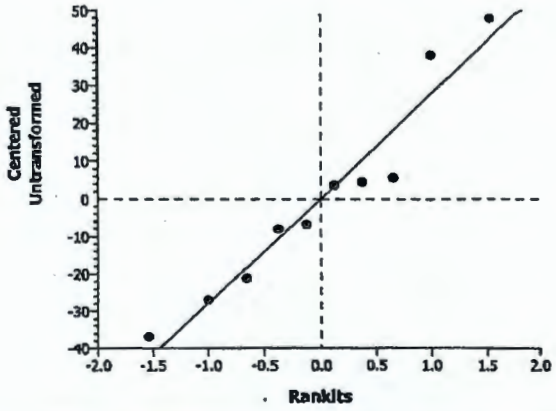

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	04-5366-5275	04-5366-5275	19 Jul-06 10:55 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	1	N/A	33.67%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.44419	1.85955	0.3343	2.55501	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.9312184	0.931218	1	0.20	0.66867	Non-Significant Effect
Error	37.75724	4.719655	8			
Total	38.6884587	5.6508734	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.80426	23.15450	0.58160	Equal Variances
Distribution	Shapiro-Wilk W	0.93163		0.46414	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.9791	4.9400	9.3834	1.8347				

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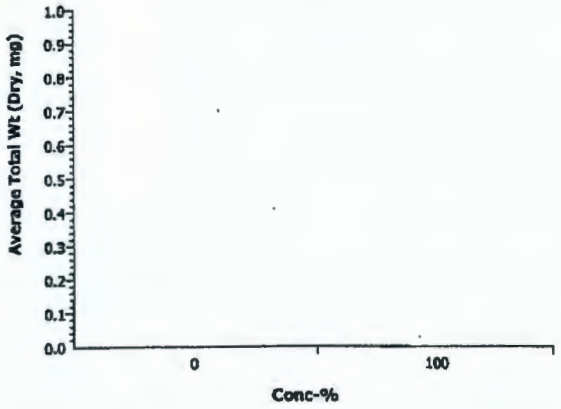
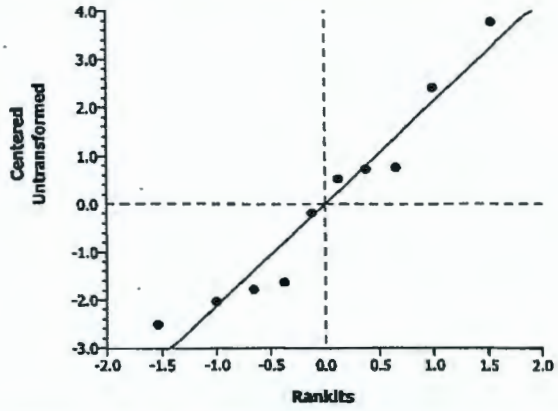




BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 (illegible) Day 12 _____ Day 14 NJ Day 16 NJ Day 19 (illegible) Day 21 NJ Day 23 NJ Day 28 NJ Day 35 DW

Bioassay Lab ID: BG 1575- 11 Sample No: J115X6

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 (29 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		4	5	6	6	6	5	5	8.1	7.6
	B		1	1	1	1	1	1	1		
	C		3	3	4	4	4	4	4		
	D		2	3	4	4	4	4	4		
	E		1	1	3	3	3	3	3		

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

Replicate A: 3 lg G, 2 md G Removed 1 md G

Replicate B: 1 Kg G

Replicate C: 1 lg G, 2 md G, 1 sm G

Replicate D: 1 lg G, 2 md G, 1 sm G

Replicate E: 1 lg G, 2 md G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 Lg G, 1 Md G, 1 Med w 1 B tip

Replicate B: 1 Lg G

Replicate C: 2 lg G, 2 med G

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

Replicate E: 1 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	72 mm	84 mm	96 mm	96 mm	111 mm
Replicate B	90 mm	mm	mm	mm	mm
Replicate C	87 mm	108 mm	67 mm	40 mm	mm
Replicate D	75 mm	34 mm	90 mm	73 mm	mm
Replicate E	57 mm	69 mm	105 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	1006.97	1188.01	1038.49
Replicate B	1236.50	1272.62	1243.36
Replicate C	1256.52	1361.96	1272.57
Replicate D	1246.56	1310.54	1256.27
Replicate E	1249.55	1311.90	1260.30

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	121 ~~134~~ mm	105 mm	93 mm	117 mm	73 mm
Replicate B	135 mm	mm	mm	mm	mm
Replicate C	21 mm	59 mm	122 mm	93 mm	mm
Replicate D	82 mm	51 mm	25 mm	46 mm	mm
Replicate E	131 mm	77 mm	43 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	1004.84	1256.70	1016.55
Replicate B	1241.52	1282.70	1243.55
Replicate C	1247.82	1410.42	1255.03
Replicate D	1249.26	1373.10	1252.52
Replicate E	1247.43	1308.10	1253.53

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 11:03 AM
Test Link: 20-6118-5633/B157511psB

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	02-3118-3841	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	12-7590-7138	**Code:**	B1584-01	**Client:**	
Sample Date:	26 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	N/A	**Station:**			

Comments: J11JX6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
00-3402-1654	% Germination	100	> 100	N/A	36.59%	Wilcoxon Rank Sum Two-Sample
06-5850-7386	Average Height (mm)	100	> 100	N/A	19.40%	Equal Variance t Two-Sample
13-9496-2061	Average Length (mm)	100	> 100	N/A	27.22%	Equal Variance t Two-Sample
12-9427-6780	Average AG Wt (Wet, mg)	100	> 100	N/A	36.63%	Equal Variance t Two-Sample
16-6961-7138	Average AG Wt (Dry, mg)	100	> 100	N/A	35.93%	Equal Variance t Two-Sample
06-2987-4159	Average Root Wt. (Wet, mg	100	> 100	N/A	50.84%	Equal Variance t Two-Sample
03-7634-3813	Average Root Wt. (Dry, mg)	100	> 100	N/A	49.28%	Equal Variance t Two-Sample
02-9373-0181	Average Total Wt (Wet, mg	100	> 100	N/A	42.91%	Equal Variance t Two-Sample
18-7094-8075	Average Total Wt (Dry, mg)	100	> 100	N/A	37.34%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 11:03 AM
Test Link: 20-6118-5633/B157511psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.68000	0.20000	1.00000	0.13565	0.30332	44.61%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	88.560	67	115.40	8.048	17.996	20.32%
100		5	80.460	68	91.800	4.5356	10.142	12.60%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	106.34	82.5	120	6.5745	14.701	13.82%
100		5	89.060	51	135	14.112	31.555	35.43%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	27.089	15.985	36.206	4.0490	9.0539	33.42%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	4.63746	2.42749	6.85999	0.83972	1.87768	40.49%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	36.676	20.223	50.372	5.1331	11.478	31.30%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	1.80457	0.81500	2.34199	0.26184	0.58550	32.45%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	63.765	41.007	86.578	8.7020	19.458	30.52%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	6.4420	3.2425	8.8900	1.0527	2.3538	36.54%

CETIS Test Summary

Report Date: 19 Jul-06 11:03 AM
Test Link: 20-6118-5633/B157511psB

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		1.00000	0.20000	0.80000	0.80000	0.60000

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	78.6	91	67	90.8000	115.400
100		91.8000	90	75.5	68	77

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	102.800	114.400	82.5	112	120
100		101.800	135	73.8000	51	83.7

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		36.2060	36.1	26.37	15.985	20.7833

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		6.30400	6.85999	4.01248	2.42749	3.58333

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		50.372	41.1799	40.6450	30.96	20.2233

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		2.34199	2.03003	1.80252	0.81500	2.03333

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		86.578	77.2799	67.0150	46.945	41.0066

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		8.64601	8.89001	5.81500	3.24249	5.61666

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	20-6118-5633	20-6118-5633	19 Jul-06 11:02 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	36.59%

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	0.1337598	0.13376	1	1.35	0.27810	Non-Significant Effect
Error	0.7902647	0.098783	8			
Total	0.92402454	0.2325429	9			

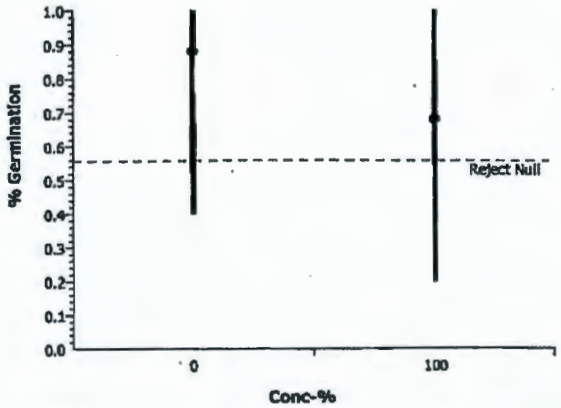
ANOVA Assumptions

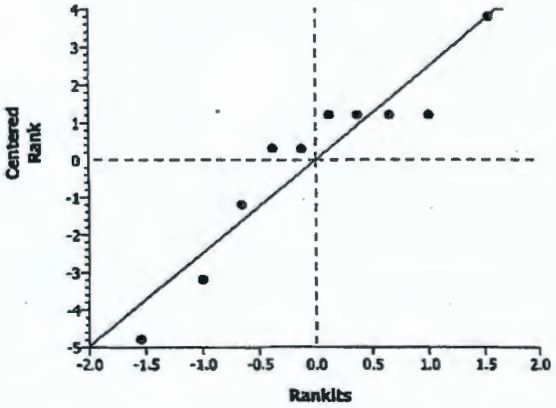
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.26388	23.15450	0.82595	Equal Variances
Distribution	Shapiro-Wilk W	0.76117		0.00488	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	6.80000	2.00000	8.00000	2.68328
100		5	0.68000	0.20000	1.00000	0.30332	4.20000	1.00000	8.00000	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	20-6118-5633	20-6118-5633	19 Jul-06 11:03 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	19.40%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.87681	1.85955	0.2031	17.1786	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	164.025	164.025	1	0.77	0.40615	Non-Significant Effect
Error	1706.824	213.353	8			
Total	1870.84921	377.37802	9			

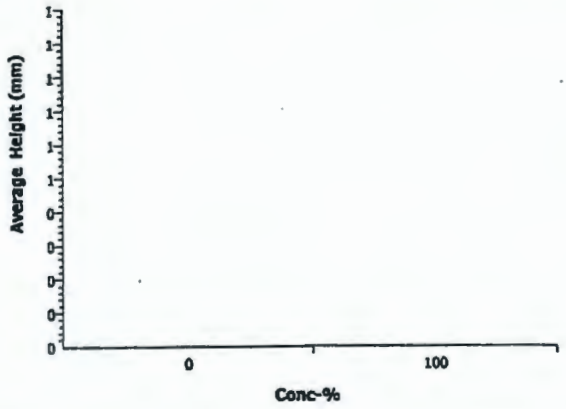
ANOVA Assumptions

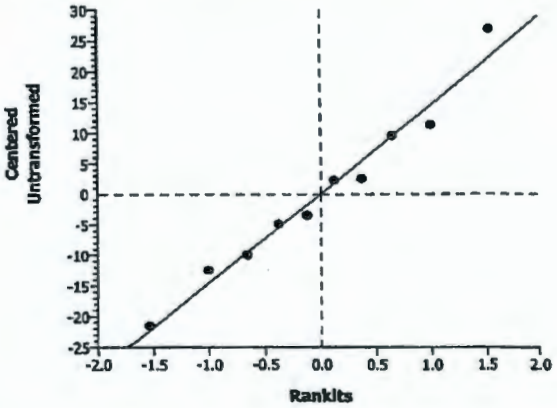
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.14850	23.15450	0.29261	Equal Variances
Distribution	Shapiro-Wilk W	0.98075		0.96908	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	88.560	67	115.4	17.996				
100		5	80.460	68	91.8	10.142				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	20-6118-5633	20-6118-5633	19 Jul-06 11:03 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	27.22%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.10995	1.85955	0.1496	28.95	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	746.496	746.496	1	1.23	0.29927	Non-Significant Effect
Error	4847.424	605.928	8			
Total	5593.91986	1352.4240	9			

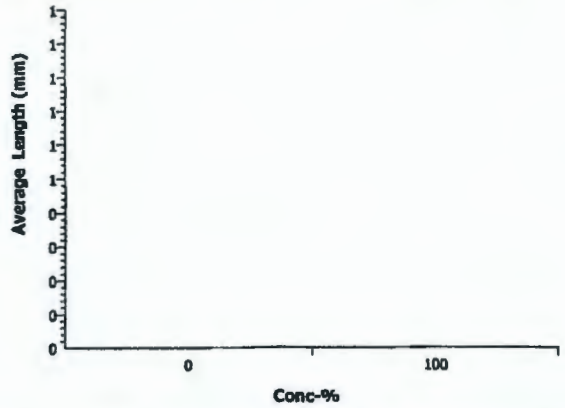
ANOVA Assumptions

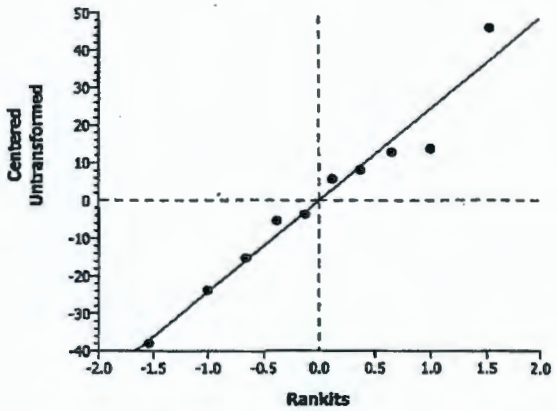
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.60738	23.15450	0.16814	Equal Variances
Distribution	Shapiro-Wilk W	0.96931		0.88440	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	106.34	82.5	120	14.701				
100		5	89.060	51	135	31.555				

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	20-6118-5633	20-6118-5633	19 Jul-06 11:03 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	36.63%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.05532	1.85955	0.1611	12.5254	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	126.3217	126.3217	1	1.11	0.32210	Non-Significant Effect
Error	907.3985	113.4248	8			
Total	1033.72018	239.74649	9			

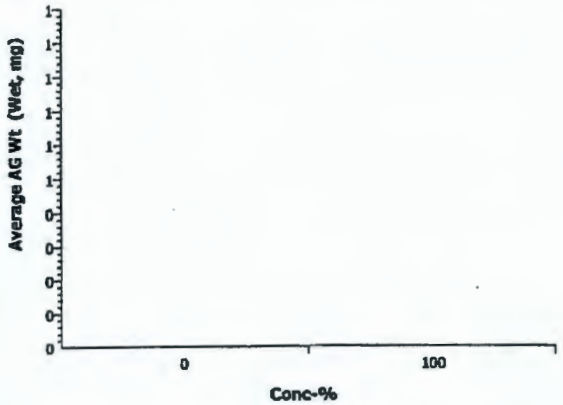
ANOVA Assumptions

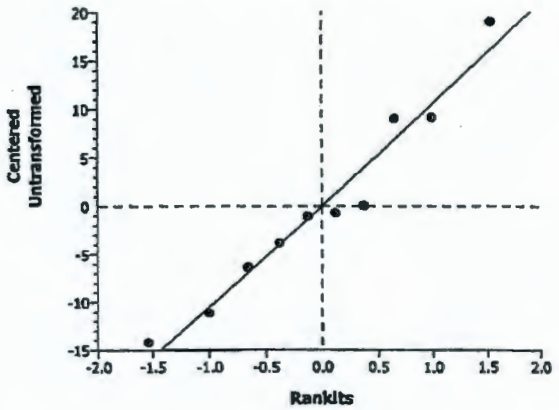
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.76734	23.15450	0.59473	Equal Variances
Distribution	Shapiro-Wilk W	0.95855		0.76923	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	27.089	15.985	36.206	9.0539				

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	20-6118-5633	20-6118-5633	19 Jul-06 11:03 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	35.93%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.21073	1.85955	0.1303	2.17506	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5.013699	5.013699	1	1.47	0.26055	Non-Significant Effect
Error	27.36253	3.420316	8			
Total	32.3762269	8.4340150	9			

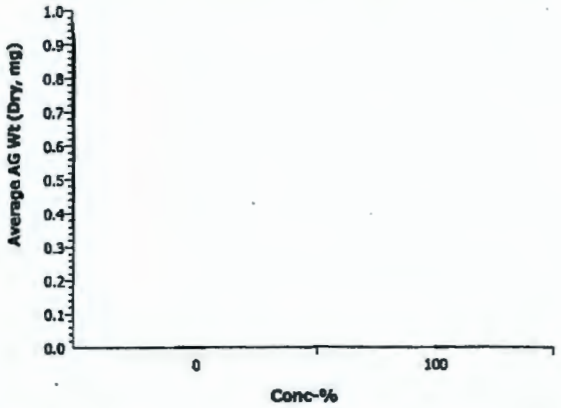
ANOVA Assumptions

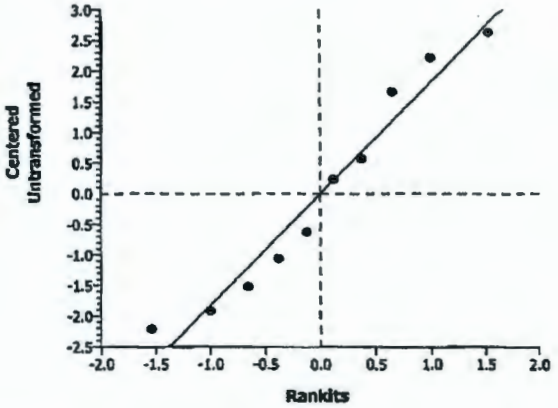
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.06357	23.15450	0.95380	Equal Variances
Distribution	Shapiro-Wilk W	0.93327		0.48081	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	4.63746	2.42749	6.85999	1.87768				

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	20-6118-5633	20-6118-5633	19 Jul-06 11:03 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	50.84%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.0438	1.85955	0.5169	18.4259	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.4709786	0.470979	1	0.00	0.96613	Non-Significant Effect
Error	1963.692	245.4615	8			
Total	1964.16287	245.93247	9			

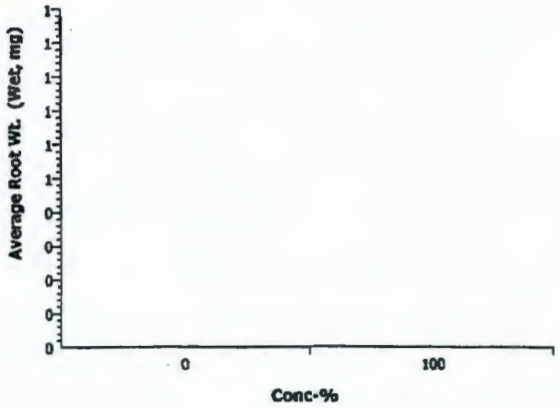
ANOVA Assumptions

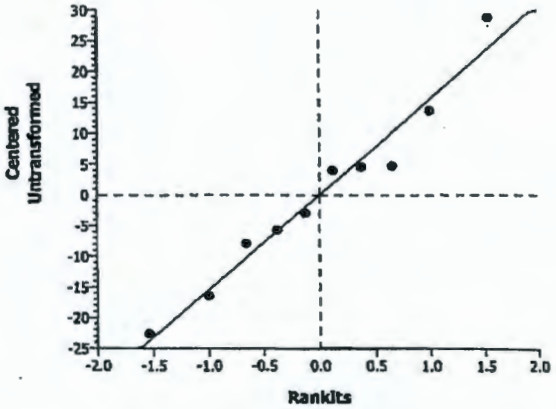
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.72629	23.15450	0.35480	Equal Variances
Distribution	Shapiro-Wilk W	0.97165		0.90569	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	36.676	20.223	50.372	11.478				

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	20-6118-5633	20-6118-5633	19 Jul-06 11:03 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	49.28%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.6604	1.85955	0.7362	0.75683	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1806107	0.180611	1	0.44	0.52755	Non-Significant Effect
Error	3.31296	0.41412	8			
Total	3.49357083	0.5947307	9			

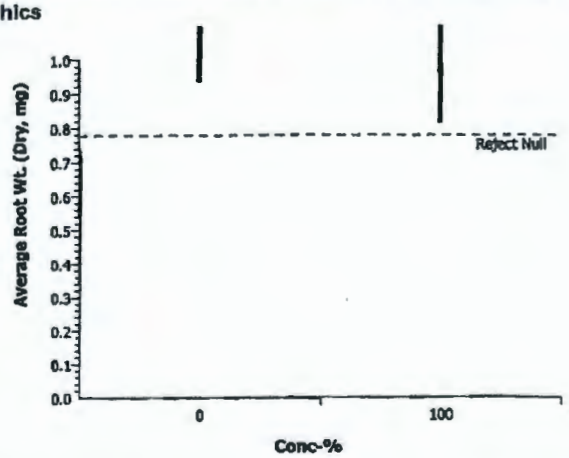
ANOVA Assumptions

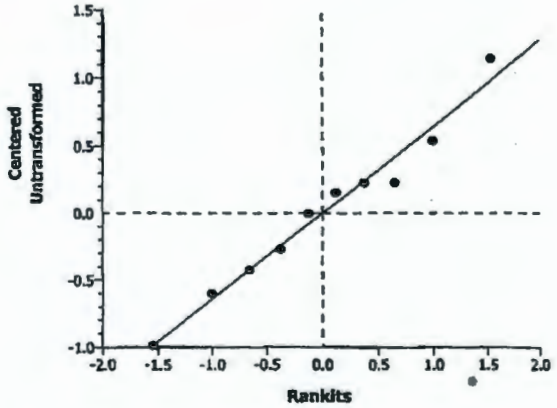
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.41605	23.15450	0.74425	Equal Variances
Distribution	Shapiro-Wilk W	0.98289		0.97873	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	1.80457	0.81500	2.34199	0.58550				

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	20-6118-5633	20-6118-5633	19 Jul-06 11:03 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	42.91%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.41066	1.85955	0.3461	30.2228	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	111.3661	111.3661	1	0.17	0.69210	Non-Significant Effect
Error	5283.035	660.3793	8			
Total	5394.40076	771.74543	9			

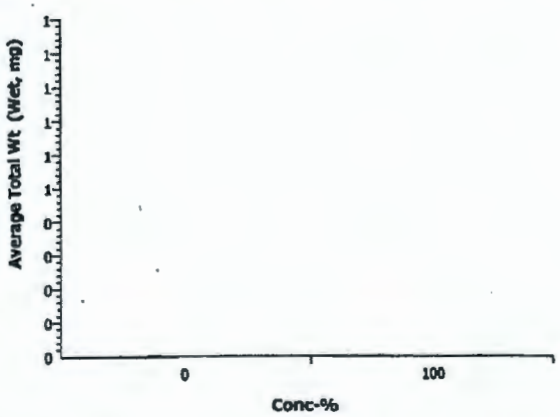
ANOVA Assumptions

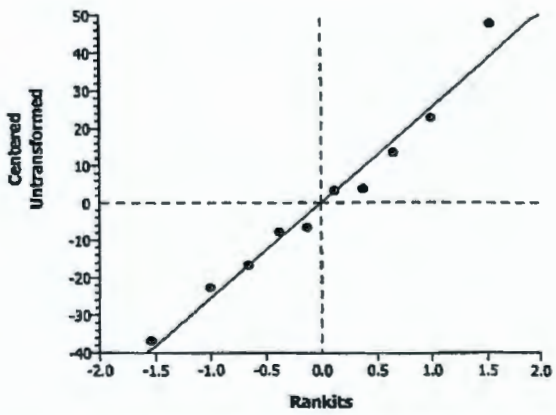
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.48829	23.15450	0.39885	Equal Variances
Distribution	Shapiro-Wilk W	0.97888		0.95892	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	63.765	41.007	86.578	19.458				

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	20-6118-5633	20-6118-5633	19 Jul-06 11:03 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	37.34%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.75284	1.85955	0.2366	2.83404	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3.29111	3.29111	1	0.57	0.47312	Non-Significant Effect
Error	46.45456	5.80682	8			
Total	49.7456732	9.0979304	9			

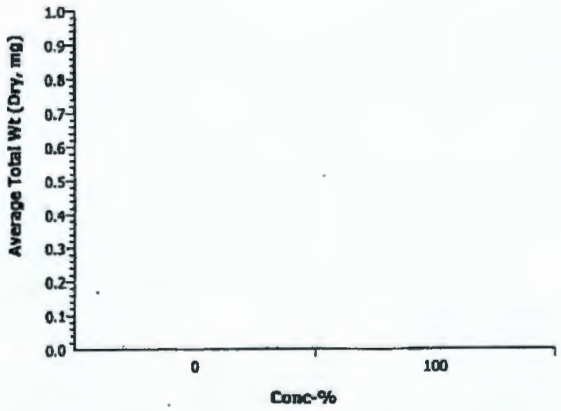
ANOVA Assumptions

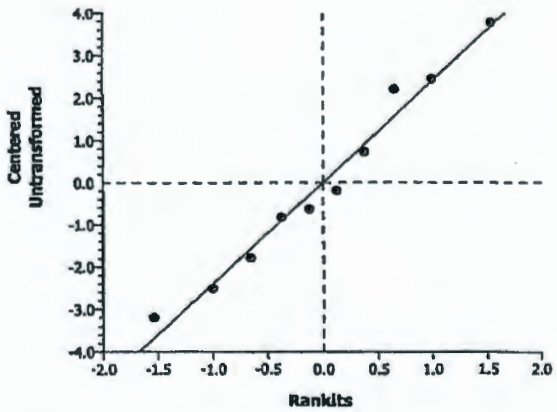
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.09617	23.15450	0.93123	Equal Variances
Distribution	Shapiro-Wilk W	0.96471		0.83795	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.4420	3.2425	8.8900	2.3538				

Graphics





APPENDIX B
CHAIN OF CUSTODY

F1493

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-65	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality ☐	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-H RIPARIAN #1		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.		

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										
J11JB4	SOIL	4-5-06	18:00	1	1								-1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth M. Tapia	Date/Time 10:30 4-6-06	Received By/Stored In Dayna Kaufman	Date/Time 10:30 4-6-06
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
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 fractions.

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

F1493C1-5011

DH 1574-01 Nematode
BG 1575-01 Bioassays

Matrix *
SoSoil
SEsediment
SOsolid
SlsSludge
W = Water
OsOil
AsAir
DSsDrum Solids
DLsDrum Liquids
TsTissue
WIsWipe
LsLiquid
VsVegetative
XsOther

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

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

E 1508

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-66	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-D RIPARIAN #2		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 Ladine/Air Bill No.

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Llonville.

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									
J11JB5	SOIL	4-9-06	15:30	1	1							~1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From CH2MHILL	Date/Time 10:30	Received By/Stored In	Date/Time
Elizabeth M Tepper 4-10-06		Kathy McKinley	4/10/06 1035
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

* 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

This is a composite of all 5 samples from 1 Investigation Area F150801-SW2

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sh=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
Ti=Tissue
Wi=Wipe
Li=Liquid
Vi=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
		BN1574-02 Nematode	361575-02 3.6.
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

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

E1514-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-97	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-H RIPARIAN #9		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 — 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 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										
J11JH6	SOIL	4-10-06	16:00	1	1								1

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From Elizabeth Ty-ing	Date/Time 10:30 4-11-06	Received By/Stored In Clairy Hubbard CH2M HILL	Date/Time 4/11/06 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
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

B1574-03 Nematode

B1575-03 B.G.

Matrix *

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

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

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

F1518-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-101	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	Air Quality ☐	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location UPPER RIPARIAN #16		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BES RAS 6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JJ0	SOIL	4-11-06	16:00	1	1								

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth M Tepper		Received By/Stored In: CH2M Hill	
Relinquished By/Removed From: Elizabeth M Tepper	Date/Time 10:30 4-12-06	Received By/Stored In: Nancy D Hallsland CH2M Hill	Date/Time 4-12-06 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

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^~ 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

B1574-04 Nematode

B1575-04 B.G.

Matrix *

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

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

F1522-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-100	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 #14		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										
J11JH9	SOIL	4-12-06	16:30	1	1								1

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From CH2M Elizabeth M Tyler	10:30 4-13-06	Received By/Stored In Darin Dethlefsen CH2M HILL	Date/Time 4-13-06 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
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

Nematode BN 1574-05

BG 1575-05 BG.

Matrix *

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

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

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

E1548-1

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-67	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	Air Quality ☐	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 300-A RIPARIAN #6		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.

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									
J11JB6	SOIL	4-17-06	1530	1	1							

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth M. Tipper	Date/Time 10:30 4-18-06	Received By/Stored In Daisy D. Hubbard CH2M HILL	Date/Time 4-18-06 8:55
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

` These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

^~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; ~~Percent Solids~~

BG 1575-06 Bluegrass

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-EF-011 (08/29/2005)

F1556-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-222	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600--139		SAF No. RC-051	Air Quality ☐	
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
J11K34	SOIL	4-18-06	16:00	1	1							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 10:30	Received By/Stored In	Date/Time 4-19-06
Elizabeth M Tepper 4-19-06		Daisy D. Hubbard CH2M HILL	9:02
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

These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

~~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

BG 1575-07

Matrix *

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

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

F1504-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-216	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 600-132/600-190		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

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									
J11K28	SOIL	4-19-06	16:00	1	1							

—01

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth W Tyree	4-20-06 0930	Dorian Hubbard CH2M HILL	4-20-06 10:20

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~~

DG 1575-08

Matrix *

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

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

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

F15860-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-246	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 628-1		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

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										
J11K61	SOIL	4-24-06	14:00	1	1								-01

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
CH2M Elizabeth N. Tepray	14:20 4-24-06	Daisy Hibbard CH2M HILL	4-24-06 14:40

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

36 1575-09

Matrix *

SoSoil
SESediment
SOeSolid
SlSludge
W = Water
OeOil
AeAir
DSeDrum Solids
DLeDrum Liquids
TeTissue
WIeWipe
LeLiquid
VeVegetation
XeOther

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

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

F15-88-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-228	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 600--204		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

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										
J11K40	SOIL	4-24-06	1722	1	1								1

CHAIN OF POSSESSION	Sign/Print Names	
Relinquished By/Removed From Elizabeth M Terry	Date/Time 9:00 4-25-06	Received By/Stored In Larry Hubbard CH2M HILL
Relinquished By/Removed From	Date/Time	Received By/Stored In
Relinquished By/Removed From	Date/Time	Received By/Stored In
Relinquished By/Removed From	Date/Time	Received By/Stored In
Relinquished By/Removed From	Date/Time	Received By/Stored In
Relinquished By/Removed From	Date/Time	Received By/Stored In

Date/Time 4/25/06 9:00

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~~

36 1575-10

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)

F1600-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-174	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 300-49		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

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										
J11JX6	SOIL	4-25-06	1430	1	1								-01

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth M Tepper 4-25-06	1430	Received By/Stored In: Dawn Halstead CH2M HILL	4-25-06 16:45
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

* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

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(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; ~~Percent Solids~~

BG 1575-11

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
Vn=Vegetation
X=Other

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

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