0070482

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

COMPLETE COPY OF DATA PACKAGE TO:

RECEIVED
AUG 14 2006
EDMC

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 F1610 SAF-RC-051

Rad only X Chem only Rad & Chem

X Complete Partial

Waste Site: 100-D-48:2

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
F1610

Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford

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

ns indicates a non statistically significant result; ^{S}, indicates statistically significant at alpha (p) = 0.05; –, indicates no statistical test performed.

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

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

Report Amended July 19, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

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

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INTRODUCTION

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

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

METHODS AND MATERIALS

TEST METHODS

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

TEST ORGANISMS

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

CONTROL SOIL

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

HYDRATION WATER

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

TEST CONCENTRATIONS

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

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

SAMPLE COLLECTION

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

SAMPLE CROSS-REFERENCE TABLE

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

Table 1
Sample Cross-Reference

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

SAMPLE PREPARATION

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

TEST INITIATION

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

TEST MONITORING

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

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

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

TEST TERMINATION

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

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

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

DATA ANALYSIS

For each test chamber, the following endpoints were calculated:

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

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

RESULTS AND DISCUSSION

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

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

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

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

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

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

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

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

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

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

Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford

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

ns indicates a non statistically significant result; [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 Blade Height (mm)	Significantly different compared to Lab Control?	Bluegrass Average Root Length (mm)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Wet) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Dry) (mg)	Significantly different compared to Lab Control?
Tests initiated on May 13, 2009																			
Laboratory Control		84	--	80.3	--	93.1	--	31.9	--	5.25	--	45.4	--	1.76	--	77.3	--	7.01	--
BG1589-01	J11JT0	96	ns	69.6	E[5]	57.5	E[5]	18.0	E[5]	3.63	E[5]	14.2	E[5]	1.21	ns	32.3	E[5]	4.84	E[5]
BG1589-02	J11JV8	88	ns	72.1	E[5]	62.2	E[5]	18.1	E[5]	3.29	E[5]	14.7	E[5]	0.79	E[5]	32.8	E[5]	4.08	E[5]
BG1589-03	J11JY2	84	ns	65.7	E[5]	60.7	E[5]	16.1	E[5]	2.87	E[5]	13.6	E[5]	1.26	ns	29.7	E[5]	4.12	E[5]
BG1589-04	J11JW4	92	ns	88.6	ns	71.0	E[5]	27.5	ns	4.37	ns	24.1	E[5]	1.10	E[5]	51.6	ns	5.48	ns
BG1589-05	J11K46	76	ns	77.0	ns	73.8	ns	30.6	ns	4.46	ns	35.0	ns	1.55	ns	65.7	ns	6.02	ns
BG1589-06	J11K73	88	ns	78.5	ns	69.3	E[5]	24.0	ns	4.22	ns	19.5	E[5]	1.06	E[5]	43.5	E[5]	5.27	ns
BG1589-07	J11K67	100	ns	70.2	E[5]	70.3	E[5]	23.2	E[5]	4.32	ns	25.8	E[5]	1.23	ns	49.0	E[5]	5.55	ns
BG1589-08	J11K55	88	ns	82.2	ns	75.5	E[5]	32.7	ns	5.47	ns	29.6	ns	1.33	ns	62.3	ns	6.80	ns
BG1589-09	J11KC5	88	ns	69.5	ns	67.3	E[5]	22.0	ns	3.71	ns	28.5	ns	1.09	ns	50.5	ns	4.80	ns

CERTIFICATION STATEMENT

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

APPENDIX A
RAW DATA SHEETS

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: May 11, 2006

Day 0 (TP) Day 12 NT Day 14 NT Day 16 NT Day 20 DW Day 22 (TP) Day 23 — Day 27 3m Day 34 3m

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

CONC.	REPLICATE	# seeds germinated Emergence 12 days after planting (5-23)	14 days after planting (5-25)	16 days after planting (5-27)	20 days after planting (5-31)	22 days after planting (6-2)	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting) (6-7-06)	14-DAYS POST-EMERGENCE (34 days after planting) (6-14-06)	pH INITIAL (@ planting)	pH FINAL (@ 14 days Post-Emergence)
Control	A	7	7	7	7	7		7.75	5	6.8	7.4
	B	5	5	6	6	7		7.75	6		
	C	7	7	7	7	7		7.75	5		
	D	5	6	5	5	5		3	3		
	E	4	4	4	4	4		3	3		

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

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

Replicate B: 5 med G — removed: 2 Sm B

Replicate C: 5 med G — removed: 1 Med G, 1 Sm B

Replicate D: 3 med G — removed: 2 dead Sm

Replicate E: 3 med G — removed: 1 dead Sm

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

14-Days Post-Emergence: Describe shoot appearance:

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

Replicate B: 1 Lg G, 4 Med G

Replicate C: 3 Lg G, 2 Med G

Replicate D: 2 Lg G, 1 Med G

Replicate E: 2 Med G, 1 Med G w/ 1 B shoot

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	46 mm	66 mm	84 mm	95 mm	62 mm
Replicate B	155 mm	82 mm	71 mm	76 mm	89 mm
Replicate C	86 mm	107 mm	71 mm	70 mm	76 mm
Replicate D	57 mm	93 mm	106 mm	mm	mm
Replicate E	86 mm	57 mm	58 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1243.39	1365.8	1265.98
Replicate B	1237.50	1354.8	1256.25
Replicate C	1251.54	1455.2	1283.33
Replicate D	1237.52	1352.3	1255.06
Replicate E	1238.88	NT ~~1360.1~~ 1337.2	1255.91

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	51 mm	80 mm	127 mm	110 mm	84 mm
Replicate B	81 mm	96 mm	72 mm	58 mm	90 mm
Replicate C	80 mm	56 mm	177 mm	106 mm	124 mm
Replicate D	139 mm	55 mm	128 mm	mm	mm
Replicate E	101 mm	60 mm	78 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1258.76	1373.6	1264.82
Replicate B	1247.91	1411.7	1253.33
Replicate C	1253.79	1592.9	1266.27
Replicate D	1254.23	1458.1	1261.57
Replicate E	1254.07	1360.1	1258.71

Comments:

-11-

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: May 11, 2006

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 18 DW (20) Day 21 GP (22) Day 23 — Day 27 Bu Day 34 Bu

Bioassay Lab ID: BG 689-01 Sample No: 0115TO

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	18 days after planting (20)	21 days after planting (22)	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting) (6-7-06)	14-DAYS POST-EMERGENCE (34 days after planting)	pH INITIAL (@ planting)	pH FINAL (@ 14 days Post-Emergence)
Control	A	7	8	8	8	8		8.75	5	8.9	8.0
	B	7	7	7	7	7		7.5	5		
	C	4	5	5	5	6		6.75	6		
	D	7	7	7	7	7		8.25	5		
	E	3	4	4	4	4		4	4		

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

Replicate A: 3 Lg G, 2 Med G — removed: 2 Med G, 1 Sm B

Replicate B: 2 Lg G, 3 Med G — removed: 2 Med G

Replicate C: 2 Lg G, 2 Med G, 1 Sm G — removed: 1 Sm B

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

Replicate E: 3 Med G, 1 Sm G

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

14-Days Post-Emergence: Describe shoot appearance:

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

Replicate B: 5 Lg G all with some Browning on 1 shoot,

Replicate C: 2 Lg G, 3 Med G

Replicate D: 4 Med G, 1 Sm G

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

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

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

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

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

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

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

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

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

Comments:

-12-

CETIS Test Summary

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

Plant Bioassay - Chronic | CH2M Hill

Test No:	02-6257-1800	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	11 May-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	11 May-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	12-8157-6918	Code:	B1589-01	Client:	
Sample Date:	26 Apr-06 03:00 PM	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	14d 9h	Station:			

Comments: J11JT0

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-9301-7385	% Germination	100	> 100	N/A	22.99%	Equal Variance t Two-Sample
09-1193-3949	Average Height (mm)	< 100	100	N/A	12.68%	Equal Variance t Two-Sample
13-7203-7834	Average Length (mm)	< 100	100	N/A	21.36%	Equal Variance t Two-Sample
10-9036-6337	Average AG Wt (Wet, mg)	< 100	100	N/A	26.30%	Equal Variance t Two-Sample
06-6445-8715	Average AG Wt (Dry, mg)	< 100	100	N/A	26.72%	Equal Variance t Two-Sample
08-2540-9244	Average Root Wt. (Wet, mg	< 100	100	N/A	40.32%	Equal Variance t Two-Sample
02-3883-0849	Average Root Wt. (Dry, mg)	100	> 100	N/A	42.45%	Equal Variance t Two-Sample
06-7704-3860	Average Total Wt (Wet, mg	< 100	100	N/A	33.46%	Equal Variance t Two-Sample
06-5196-0793	Average Total Wt (Dry, mg)	< 100	100	N/A	29.67%	Equal Variance t Two-Sample

CETIS Test Summary

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

% Germination Summary

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

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	69.64	58.8	82.2	4.2121	9.4185	13.52%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	57.52	33.8	75.6	8.575	19.174	33.33%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	18.040	9.7575	25.758	2.8558	6.3859	35.40%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	3.62629	2.00748	5.41199	0.57623	1.28850	35.53%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	14.223	5.715	21.478	2.8241	6.3148	44.40%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.20970	0.56250	2.00601	0.26474	0.59197	48.94%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	32.263	15.472	47.236	5.6498	12.633	39.16%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	4.83599	2.56998	7.04397	0.81334	1.81868	37.61%

CETIS Test Summary

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

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		78	82.2	67.4000	63.8	58.8

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		75.6	75.2	41.6	61.4000	33.8

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		23.02	25.7580	15.3820	16.284	9.75748

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		4.30601	5.41199	3.12800	3.27798	2.00748

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		18.7120	21.4780	10.4720	14.7360	5.715

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		2.00601	1.63198	0.86401	0.98401	0.56250

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		41.7320	47.2360	25.8540	31.02	15.4725

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		6.31201	7.04397	3.99202	4.26199	2.56998

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

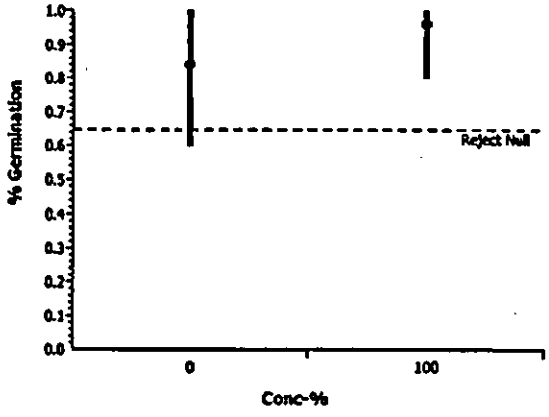
ANOVA Assumptions

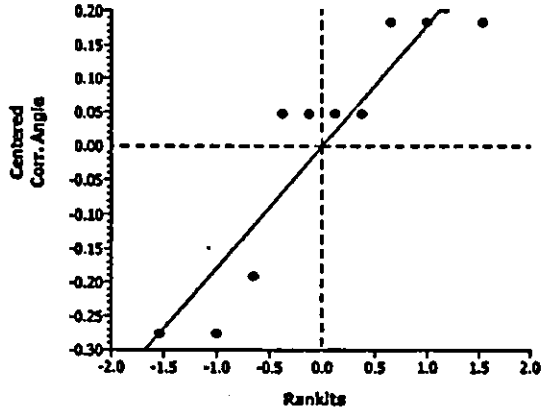
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.57779	23.15450	0.12462	Equal Variances
Distribution	Shapiro-Wilk W	0.82019		0.02548	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

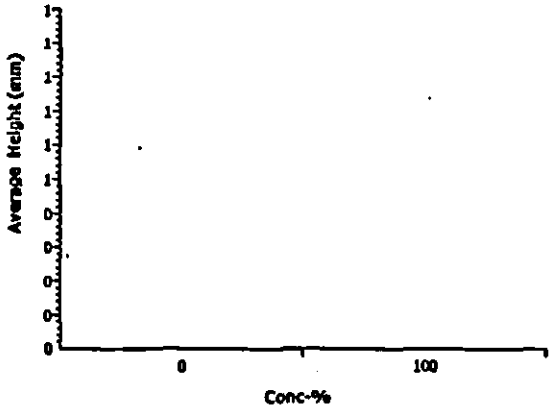
ANOVA Assumptions

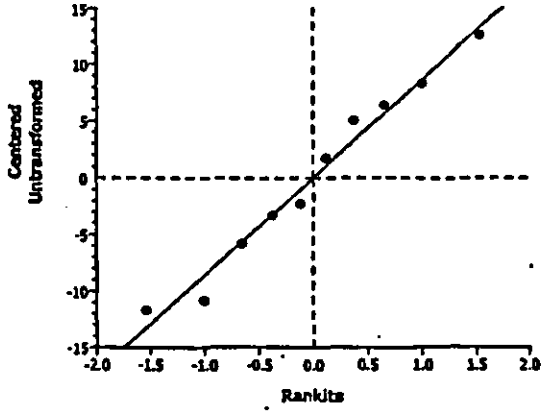
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.45090	23.15450	0.72715	Equal Variances
Distribution	Shapiro-Wilk W	0.96153		0.80320	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

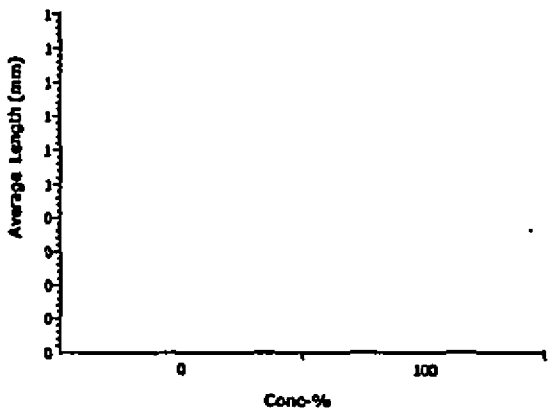
ANOVA Assumptions

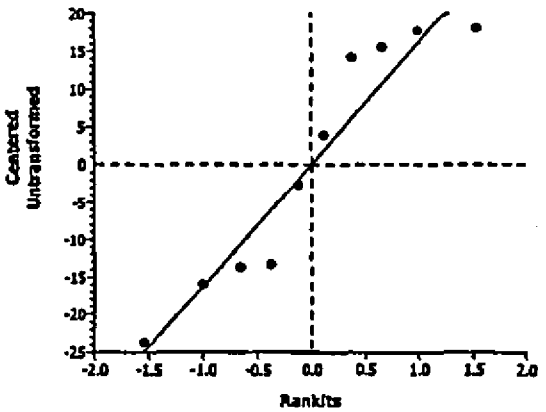
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.80127	23.15450	0.58264	Equal Variances
Distribution	Shapiro-Wilk W	0.88329		0.14231	Normal Distribution

Data Summary

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

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	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.30%

Group Comparisons

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

ANOVA Table

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

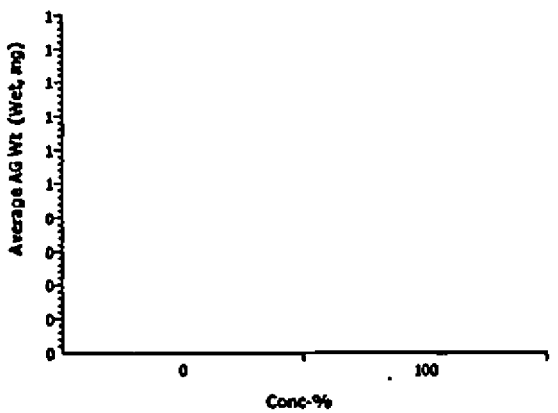
ANOVA Assumptions

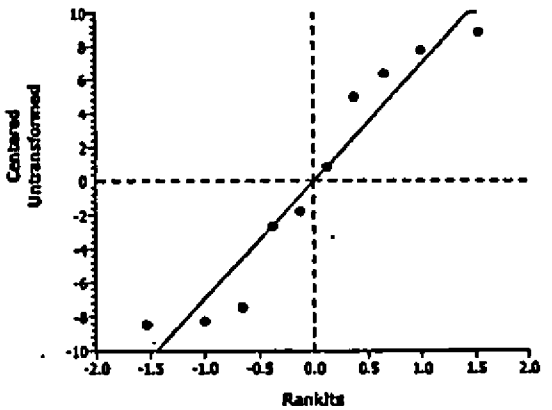
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.50303	23.15450	0.70260	Equal Variances
Distribution	Shapiro-Wilk W	0.89945		0.21609	Normal Distribution

Data Summary

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

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		17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

ANOVA Assumptions

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

Data Summary

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

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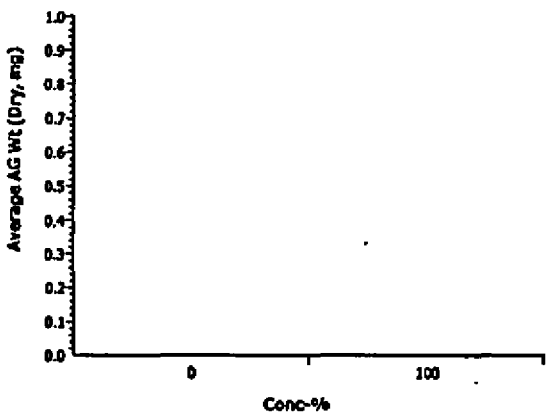

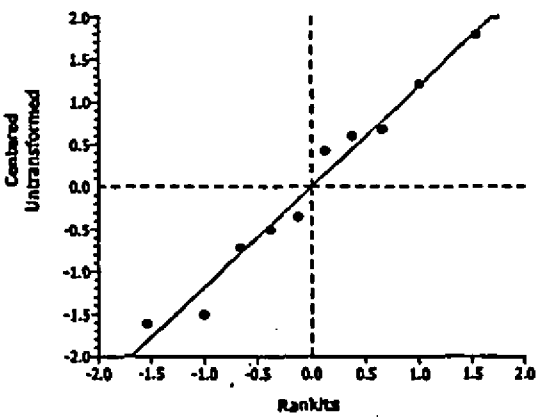

CETIS Analysis Detail

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	40.32%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	3.16642	1.85955	0.0066	18.2918	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2425.337	2425.337	1	10.03	0.01327	Significant Effect
Error	1935.202	241.9002	8			
Total	4360.53906	2667.2374	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	11.13251	23.15450	0.03852	Equal Variances
Distribution	Shapiro-Wilk W	0.94733		0.63707	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	14.223	5.715	21.478	6.3148				

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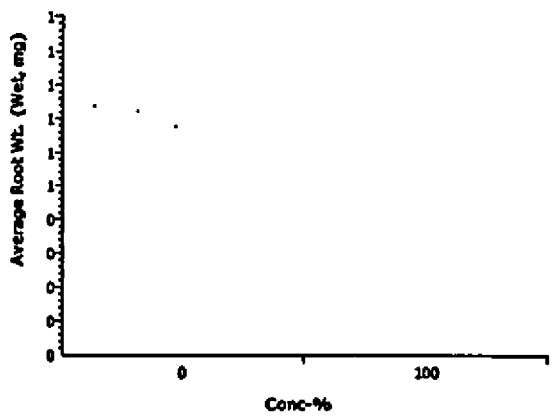
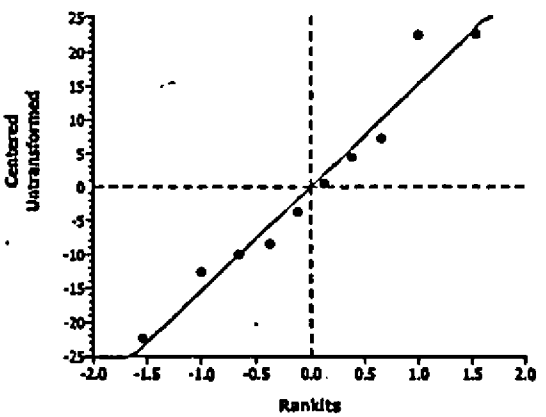




CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

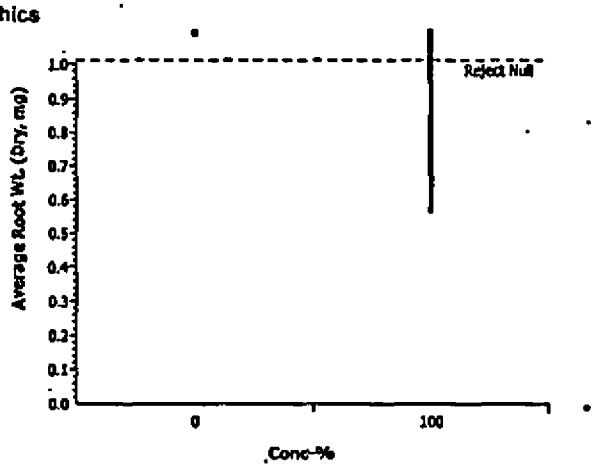
ANOVA Assumptions

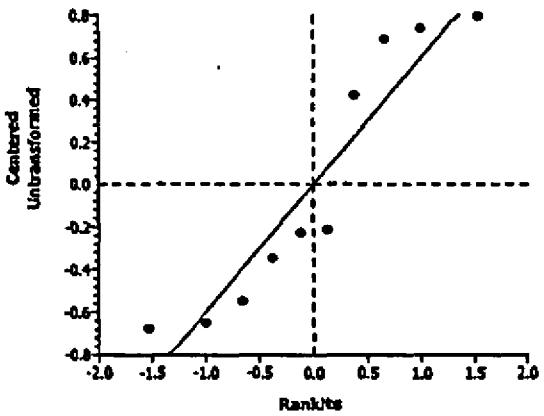
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.29552	23.15450	0.80796	Equal Variances
Distribution	Shapiro-Wilk W	0.85491		0.06643	Normal Distribution

Data Summary

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

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	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

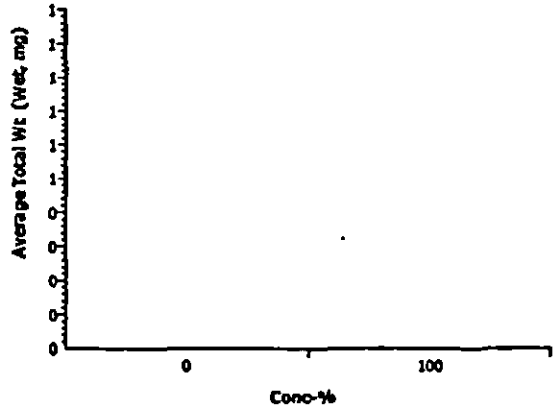
ANOVA Assumptions

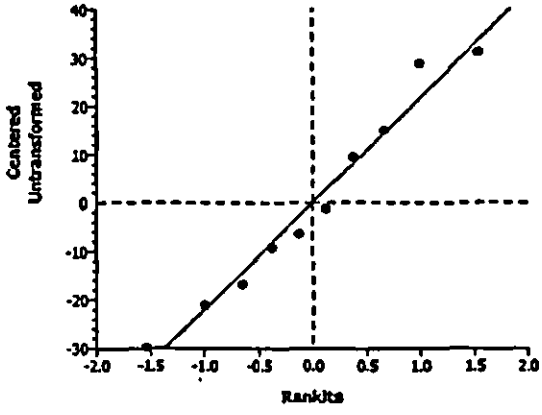
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.06207	23.15450	0.14532	Equal Variances
Distribution	Shapiro-Wilk W	0.95523		0.73036	Normal Distribution

Data Summary

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

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	17-8751-3308	17-8751-3308	19 Jul-06 1:07 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

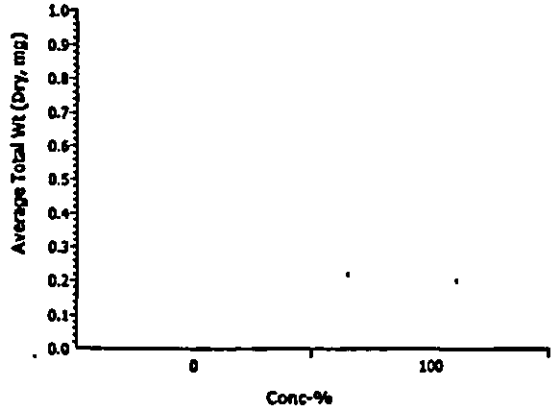
ANOVA Assumptions

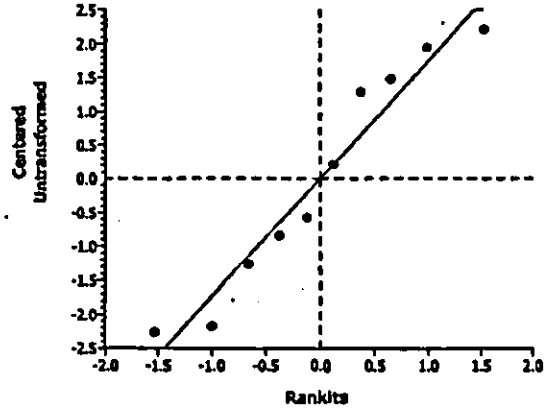
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.12177	23.15450	0.91401	Equal Variances
Distribution	Shapiro-Wilk W	0.92125		0.36748	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: May 11, 2006

Day 8 (TP) Day 12 NJ Day 14 NJ Day 16 NJ Day 18 (20) DW Day 21 (22) (TP) Day 23 — Day 27 Br Day 34 Br

Bioassay Lab ID: BG 1684-02 Sample No: J115V8

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	18 (20) days after planting	21 (22) days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting) 6-2-06	14-DAYS POST-EMERGENCE (34 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	6	7	7	9	9		8→6S	5	8.7	7.7
	B	5	5	6	6	6		6→5	5		
	C	4	5	5	5	6		6→5	5		
	D	1	1	3	4	4		3	2		
	E	6	6	6	7	6		6→5	5		

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

Replicate A: 5 med G — removed: 2 Sm G, 1 Med G, 1 dead Sm

Replicate B: 3 med G, 2 Sm G — removed: 1 Sm G

Replicate C: 4 med G, 1 med G w/ B tip — removed: 1 Sm G

Replicate D: 2 med G, 1 Sm w/ 1 shoot ½ G ½ B — removed: 1 dead Sm

Replicate E: 5 med G — removed: 1 Med G

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

14-Days Post-Emergence: Describe shoot appearance:

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

Replicate B: 3 med G, 2 Sm G

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

Replicate D: 2 med G — removed: 1 Sm dead

Replicate E: 3 med G, 2 med G w/ B shoots

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	64 mm	67 mm	81 mm	84 mm	71 mm
Replicate B	85 mm	45 mm	92 mm	68 mm	46 mm
Replicate C	73 mm	78 mm	61 mm	62 mm	70 mm
Replicate D	70 mm	75 mm	mm	mm	mm
Replicate E	67 mm	73 mm	66 mm	85 mm	64 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1251.88	1352.1	1272.46
Replicate B	1236.82	1316.4	1250.14
Replicate C	1241.21	1319.9	1254.08
Replicate D	1253.81	1287.2	1259.18
Replicate E	1248.61	1360.3	1270.77

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	96 mm	85 mm	72 mm	87 mm	40 mm
Replicate B	84 mm	77 mm	47 mm	22 mm	90 mm
Replicate C	26 mm	72 mm	37 mm	81 mm	56 mm
Replicate D	28 mm	82 mm	mm	mm	mm
Replicate E	48 mm	88 mm	80 mm	61 mm	31 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1221.47	1291.9	1226.00
Replicate B	1225.43	1286.1	1229.09
Replicate C	1251.03	1323.1	1254.24
Replicate D	1232.83	1261.6	1234.14
Replicate E	1226.20	1318.4	1231.17

Comments:

-25-

CETIS Test Summary

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

Plant Bioassay - Chronic | CH2M Hill

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

Comments: recalculated Height and Length data July 19, 2006

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

Comments: J11JV8

Comparison Summary

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

CETIS Test Summary

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

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	72.080	67.2	76	1.5781	3.5287	4.90%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	62.2	54.400	76	3.9161	8.7567	14.08%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	18.146	15.738	22.338	1.3048	2.9177	16.08%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	3.29420	2.57400	4.43201	0.40354	0.90234	27.39%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	14.692	12.134	18.440	1.0279	2.2984	15.64%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	0.78581	0.64199	0.99402	0.07017	0.15691	19.97%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	32.838	28.05	40.778	2.213	4.9483	15.07%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	4.08001	3.21599	5.42603	0.47229	1.05606	25.88%

CETIS Test Summary

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

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		73.4000	67.2	69.8000	74	76

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		76	64	54.4000	55	61.6

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		20.044	15.9160	15.7380	16.6949	22.3380

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		4.11599	2.66401	2.57400	2.68500	4.43201

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		14.0860	12.134	14.414	14.3850	18.4400

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44668	1.54667
100		0.90601	0.73198	0.64199	0.65503	0.99402

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	108.217	68.1167
100		34.1300	28.05	30.1520	31.08	40.7780

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		5.02200	3.39600	3.21599	3.34003	5.42603

CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

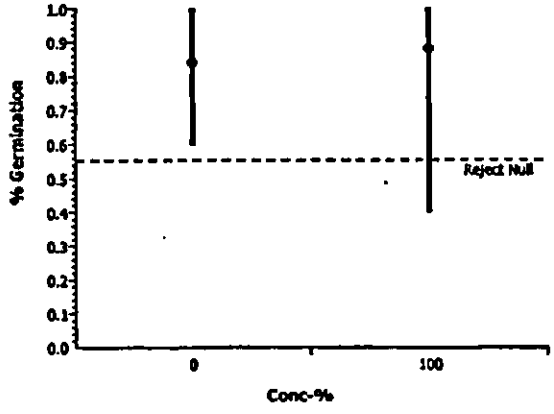
ANOVA Assumptions

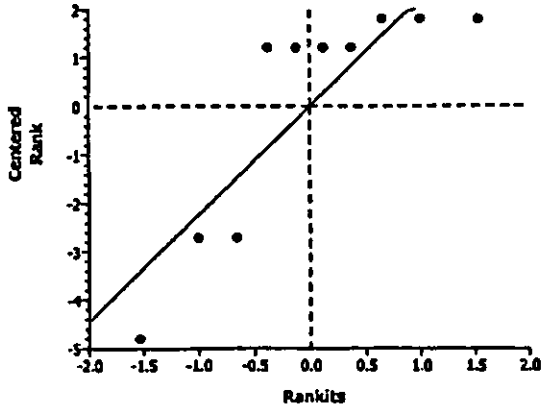
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.37951	23.15450	0.76279	Equal Variances
Distribution	Shapiro-Wilk W	0.71919		0.00151	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.21909	5.20000	2.50000	7.00000	2.46475
100		5	0.88000	0.40000	1.00000	0.26833	5.80000	1.00000	7.00000	2.68328

Graphics





CETIS Analysis Detail

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	8.88%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.14260	1.85955	0.0323	7.13408	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	168.921	168.921	1	4.59	0.06451	Non-Significant Effect
Error	294.3681	36.79601	8			
Total	463.289063	205.717	9			

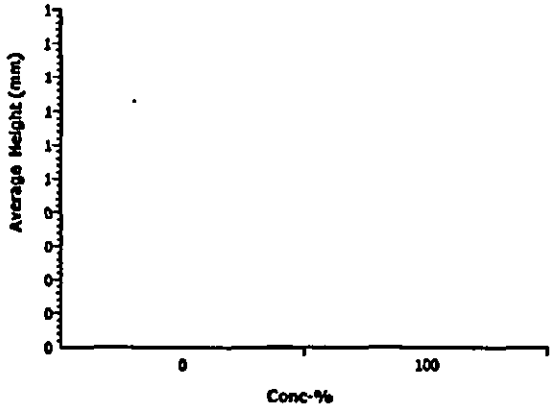
ANOVA Assumptions

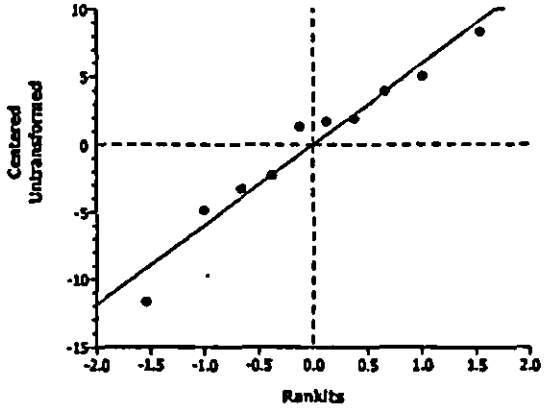
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.91005	23.15450	0.15240	Equal Variances
Distribution	Shapiro-Wilk W	0.95915		0.77614	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	80.3	68.6	88.6	7.8192				
100		5	72.080	67.2	76	3.5287				

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

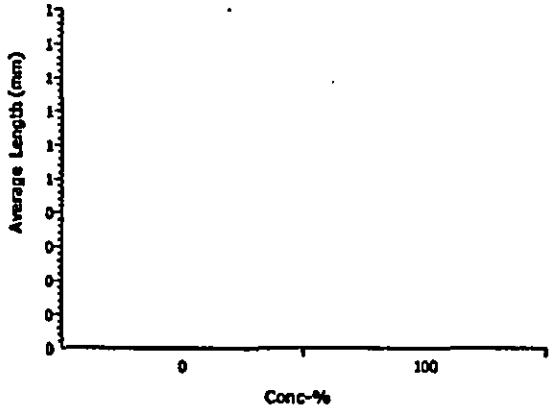
ANOVA Assumptions

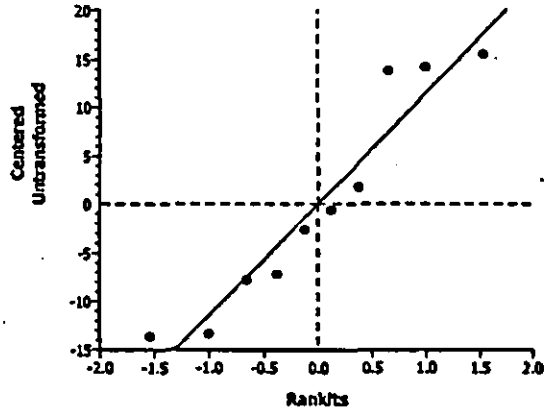
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.66180	23.15450	0.36600	Equal Variances
Distribution	Shapiro-Wilk W	0.89192		0.17819	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

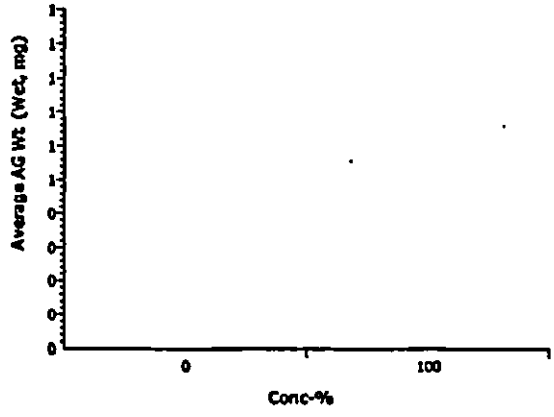
ANOVA Assumptions

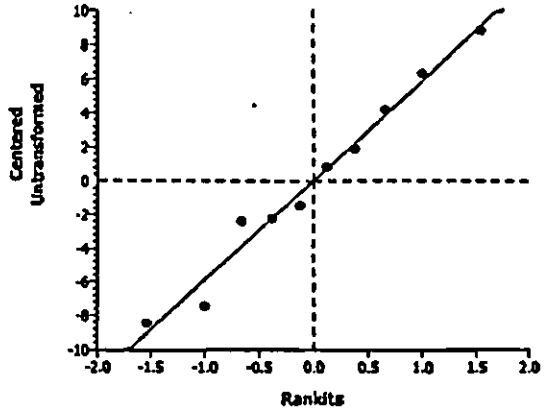
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.19983	23.15450	0.08198	Equal Variances
Distribution	Shapiro-Wilk W	0.96891		0.88053	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

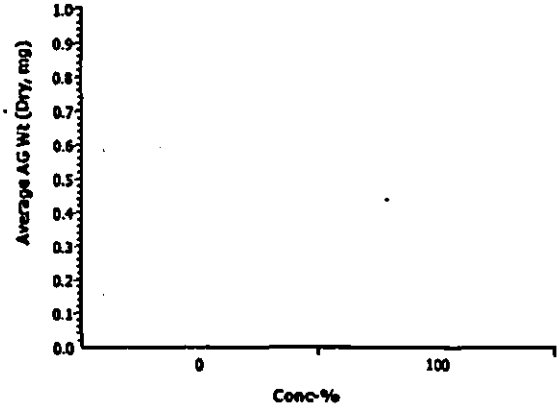
ANOVA Assumptions

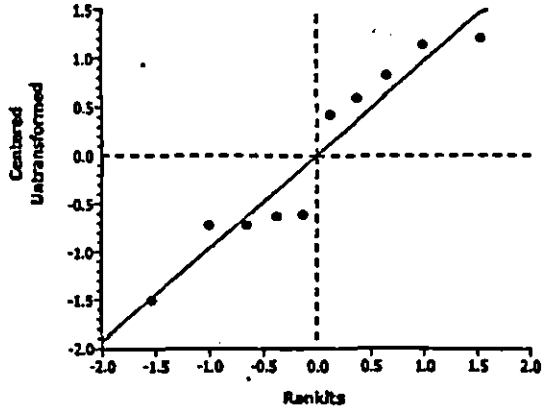
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.45973	23.15450	0.72291	Equal Variances
Distribution	Shapiro-Wilk W	0.90056		0.22224	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	10-2605-3685	10-2605-3685	19 Jul-08 1:10 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	38.85%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.23658	1.85955	0.0060	17.6257	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2352.818	2352.818	1	10.48	0.01194	Significant Effect
Error	1796.826	224.6033	8			
Total	4149.6438	2577.4209	9			

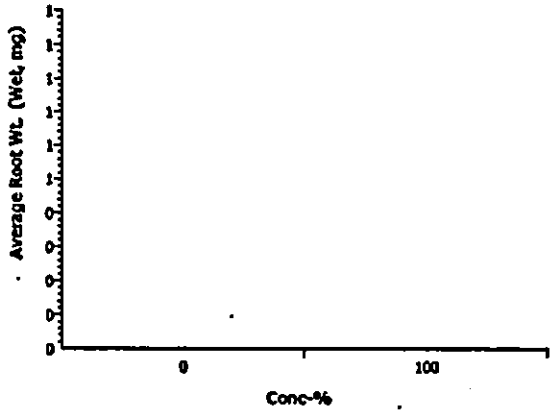
ANOVA Assumptions

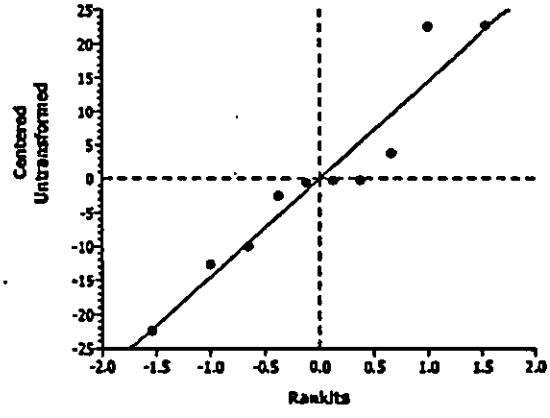
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	84.03751	23.15450	0.00082	Unequal Variances
Distribution	Shapiro-Wilk W	0.91693		0.33205	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	14.692	12.134	18.440	2.2984				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.74%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.13925	1.85955	0.0069	0.57533	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.358332	2.358332	1	9.85	0.01382	Significant Effect
Error	1.914449	0.239306	8			
Total	4.27278078	2.5976380	9			

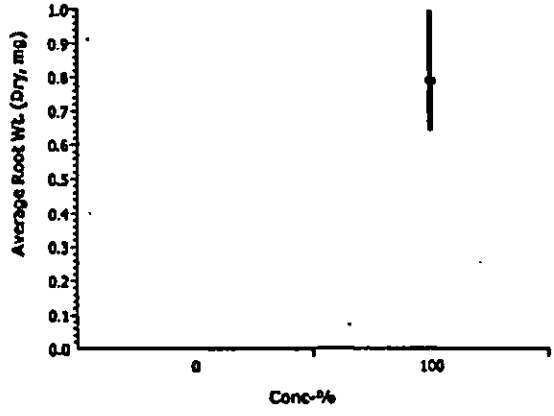
ANOVA Assumptions

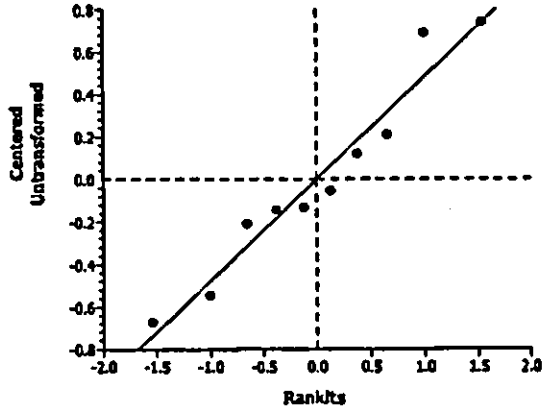
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	18.43950	23.15450	0.01533	Equal Variances
Distribution	Shapiro-Wilk W	0.94001		0.55310	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	0.78581	0.64199	0.99402	0.15691				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

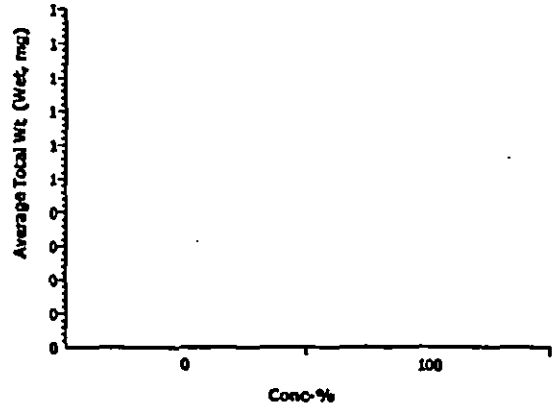
ANOVA Assumptions

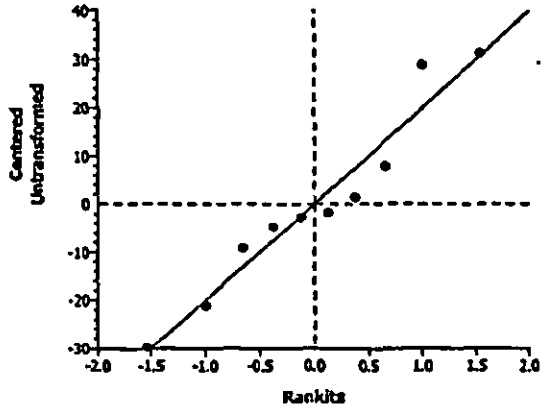
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	32.99450	23.15450	0.00509	Unequal Variances
Distribution	Shapiro-Wilk W	0.94020		0.55522	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

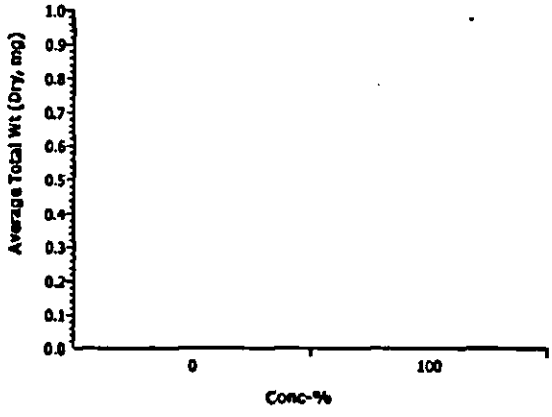
ANOVA Assumptions

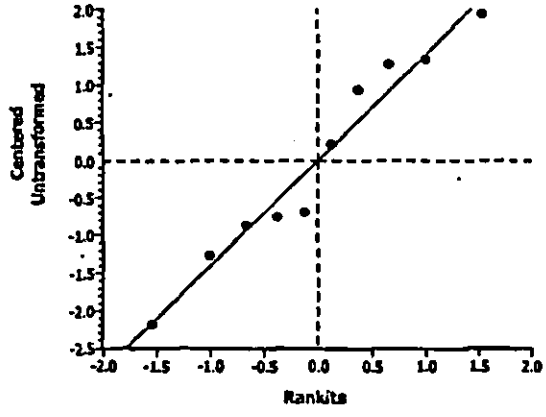
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.64381	23.15450	0.36922	Equal Variances
Distribution	Shapiro-Wilk W	0.94718		0.63530	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 18 DW Day 21 TP Day 23 — Day 27 Bm Day 34 Bm

62-06 Test Start Date: May 11, 2006

Bioassay Lab ID: BG 1589-03 Sample No: 0115Y2

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	18 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting)	14-DAYS POST-EMERGENCE (34 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	7	7	7	7	8		8→5	5	9.2	7.9
	B	6	6	7	7	8		8→5	5		
	C	2	3	3	3	3		3	3		
	D	3	3	3	5	5		6→5	5		
	E	4	4	4	4	4		only 3	3		

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

Replicate A: 5 Med G — removed: 3 Med G

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

Replicate C: 2 Med G, 1 Med w/ some yellowing on 1 shoot.

Replicate D: 2 Med G. — removed: 1 Sm G

Replicate E: 1 Lg G, 2 Med G — removed: 1 dead Sm

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 4 Med G, 1 Med G w/ 1 B shoot

Replicate B: 1 Extra Large G, 4 Lg G

Replicate C: 3 Med G

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

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	66 mm	69 mm	71 mm	69 mm	50 mm
Replicate B	120 mm	77 mm	58 mm	50 mm	77 mm
Replicate C	70 mm	71 mm	67 mm	mm	mm
Replicate D	82 mm	60 mm	56 mm	73 mm	43 mm
Replicate E	52 mm	73 mm	32 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	1236.00	1307.3	1242.09
Replicate B	1228.20	1363.3	1245.97
Replicate C	1237.84	1278.3	1245.38
Replicate D	1236.91	1279.6	1237.71
Replicate E	1234.33	1273.5	1242.98

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	58 mm	55 mm	144 mm	77 mm	53 mm
Replicate B	60 mm	64 mm	43 mm	88 mm	95 mm
Replicate C	79 mm	51 mm	50 mm	mm	mm
Replicate D	11 mm	102 mm	56 mm	24 mm	130 mm
Replicate E	15 mm	37 mm	69 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	1242.79	1320.3	1249.77
Replicate B	1246.94	1318.3	1254.41
Replicate C	1248.43	1287.6	1252.44
Replicate D	1251.22	1313.5	1255.43
Replicate E	1244.81	1282.7	1248.48

Comments:

CETIS Test Summary

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

Plant Bioassay - Chronic — **CH2M Hill**

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

Comments: recalculated Height and Length data July 19, 2006

Sample No:	03-4747-8128	Code:	B1589-03	Client:	
Sample Date:	01 May-06 05:00 PM	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	9d 7h	Station:			

Comments: J11JY2

Comparison Summary

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

CETIS Test Summary

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

% Germination Summary

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

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	65.700	54	76.400	3.7513	8.3881	12.77%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	60.740	40.3	76.800	6.2416	13.957	22.98%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	16.072	10.538	27.020	2.8835	6.4478	40.12%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	2.86573	2.15999	3.55400	0.24702	0.55235	19.27%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	13.583	12.456	15.502	0.5750	1.2858	9.47%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.25839	0.84202	1.49402	0.11295	0.25257	20.07%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	29.656	22.994	41.292	3.2377	7.2398	24.41%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	4.12413	3.00200	5.04802	0.34844	0.77913	18.89%

CETIS Test Summary

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

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		65	76.4000	70.3000	62.8	54

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		76.8000	70	60	56.6	40.3

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		16.2600	27.0200	13.4867	10.538	13.0567

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		3.21799	3.55400	2.51335	2.15999	2.88334

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		15.5020	14.2720	13.0566	12.4560	12.63

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		1.39600	1.49402	1.33663	0.84202	1.22331

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		31.7620	41.2920	26.5433	22.994	25.6866

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		4.61399	5.04802	3.84998	3.00200	4.10665

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

ANOVA Assumptions

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

Data Summary

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

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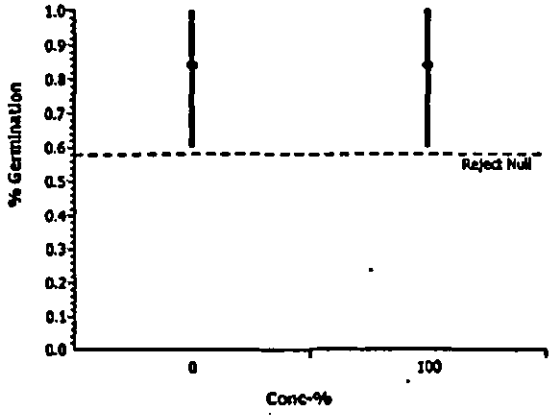
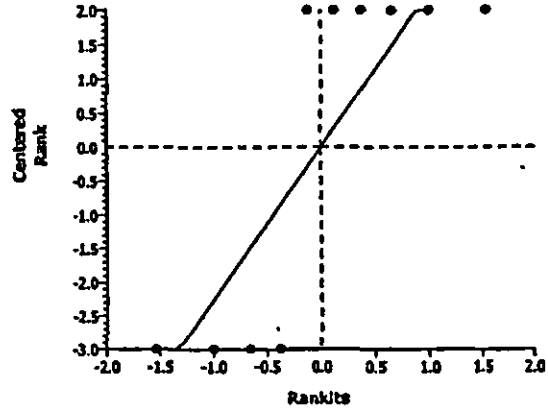




CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

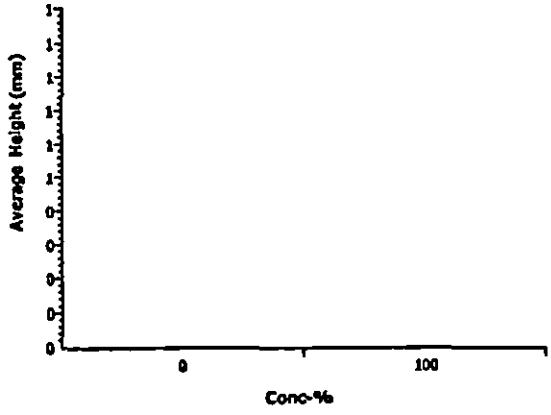
ANOVA Assumptions

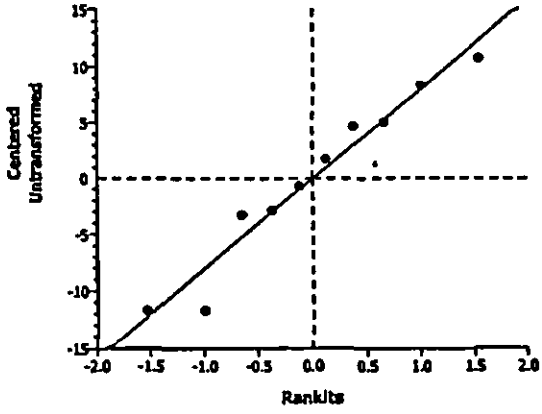
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.15080	23.15450	0.89500	Equal Variances
Distribution	Shapiro-Wilk W	0.93923		0.54443	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic | CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

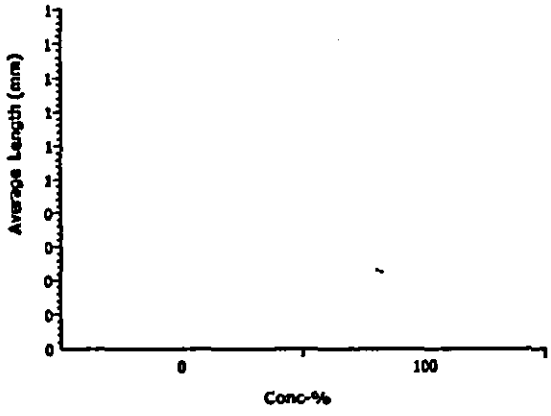
ANOVA Assumptions

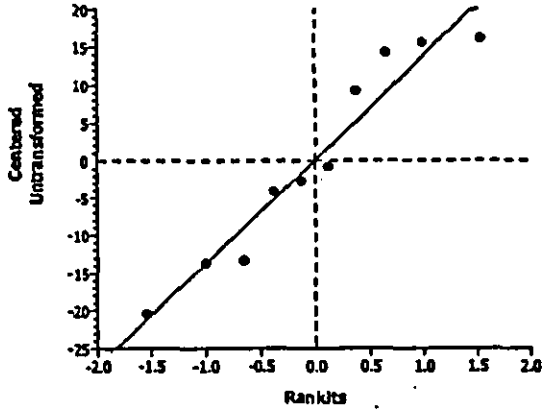
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.04784	23.15450	0.96496	Equal Variances
Distribution	Shapiro-Wilk W	0.91387		0.30863	Normal Distribution

Data Summary

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

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	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

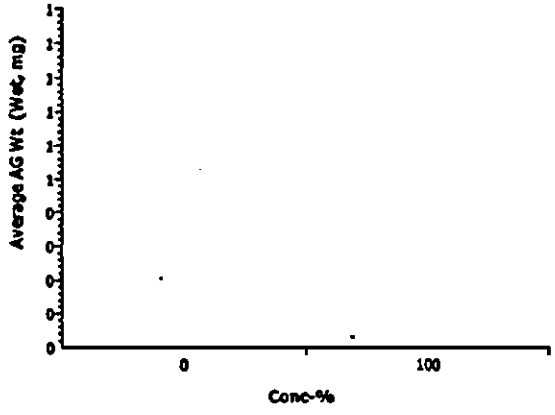
ANOVA Assumptions

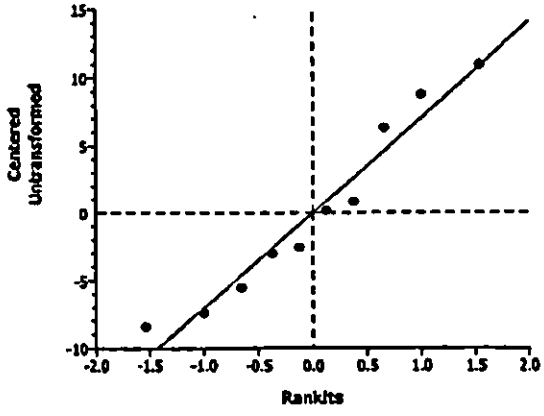
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.47430	23.15450	0.71599	Equal Variances
Distribution	Shapiro-Wilk W	0.93470		0.49573	Normal Distribution

Data Summary

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

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	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2	

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

Group Comparisons

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

ANOVA Table

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

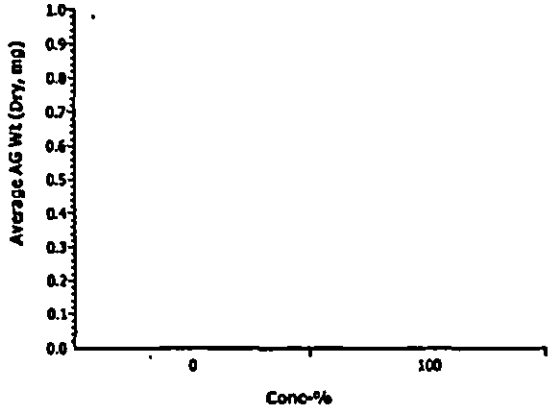
ANOVA Assumptions

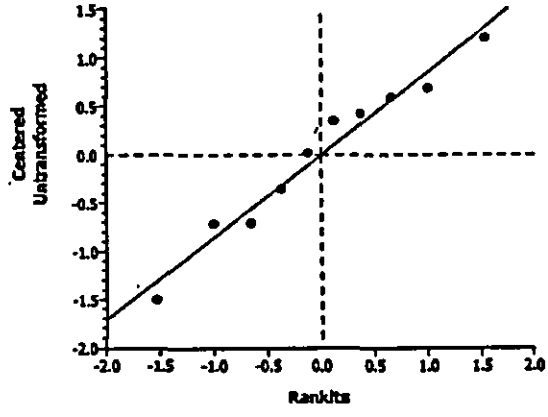
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.89569	23.15450	0.21625	Equal Variances
Distribution	Shapiro-Wilk W	0.96608		0.85233	Normal Distribution

Data Summary

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

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	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

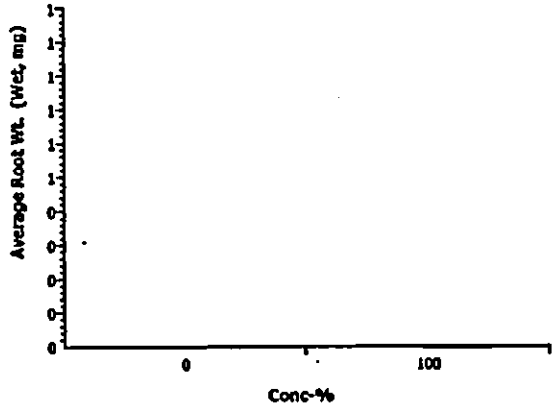
ANOVA Assumptions

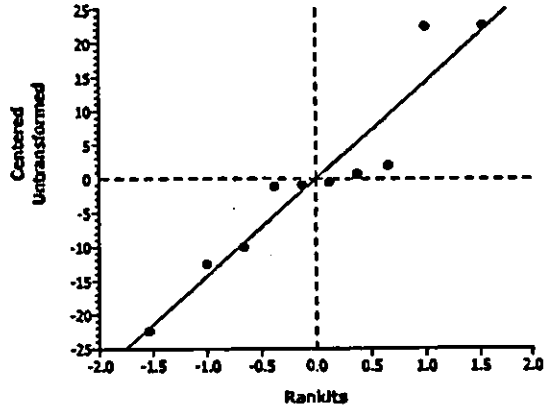
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	268.52560	23.15450	0.00008	Unequal Variances
Distribution	Shapiro-Wilk W	0.90428		0.24399	Normal Distribution

Data Summary

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

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	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

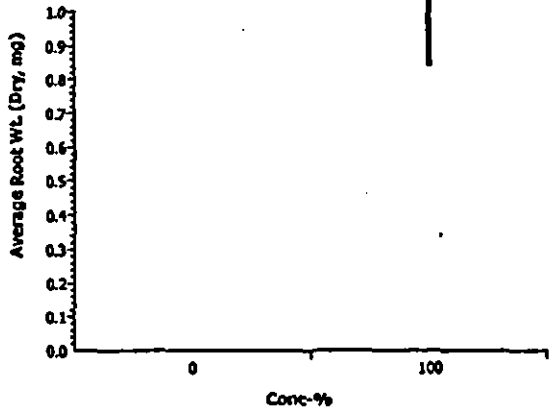
ANOVA Assumptions

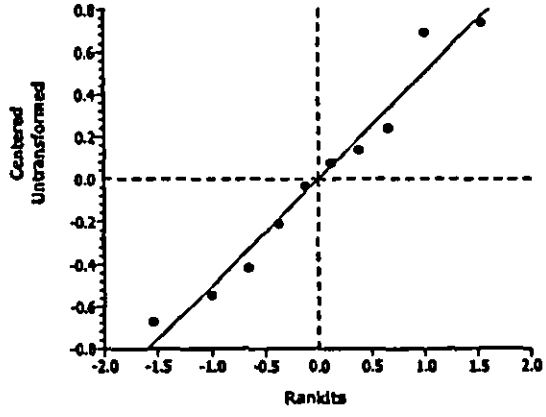
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.11655	23.15450	0.08360	Equal Variances
Distribution	Shapiro-Wilk W	0.95079		0.67786	Normal Distribution

Data Summary

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

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	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

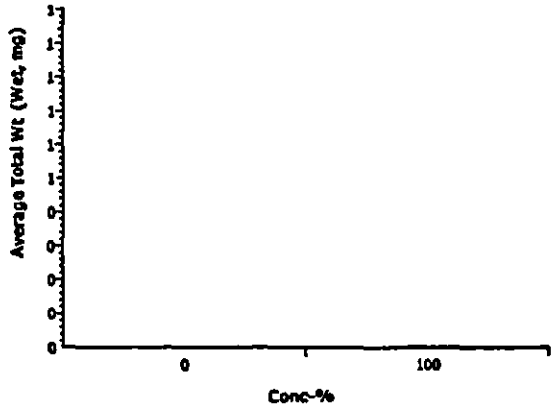
ANOVA Assumptions

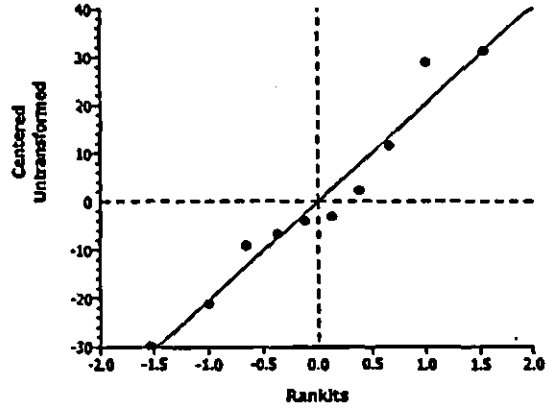
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	15.41355	23.15450	0.02137	Equal Variances
Distribution	Shapiro-Wilk W	0.94644		0.62666	Normal Distribution

Data Summary

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

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	11-6712-6994	11-6712-6994	19 Jul-06 1:13 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

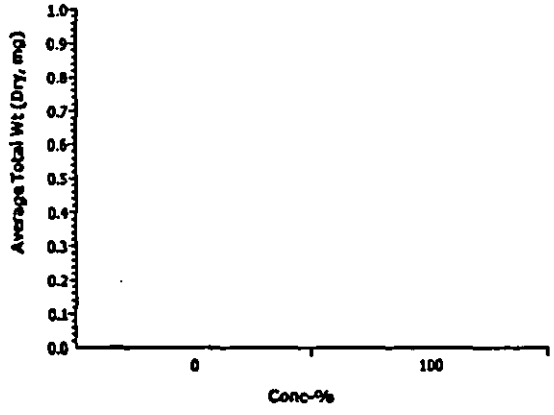
ANOVA Assumptions

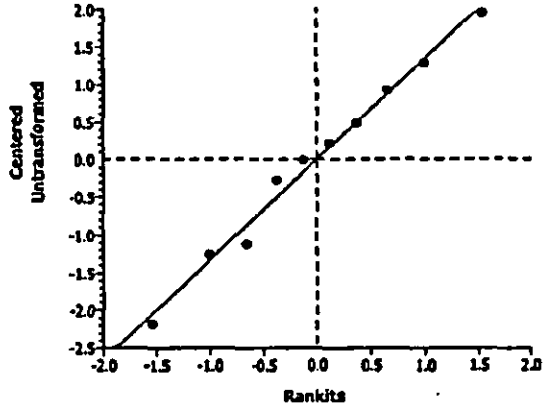
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.85723	23.15450	0.15498	Equal Variances
Distribution	Shapiro-Wilk W	0.98453		0.98479	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

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

Day 0 (initial) TT Day 12 NJ Day 14 NJ Day 18 NJ Day 20 DIN Day 22 TT Day 23 — Day 27 Bu Day 31 Bu

Bioassay Lab ID: BG 1589-04 Sample No: JIJW4

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	18 days after planting	20 days after planting	22 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (6-7-06 / 27 days after planting)	14-DAYS POST-EMERGENCE (54 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	5	5	5	5	5		5	5	8.1	7.5
	B	4	4	4	6	6		4	4		
	C	5	5	5	6	6		5	5		
	D	4	4	4	5	5		4	4		
	E	5	5	6	6	6		6→5	5		

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

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

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	103 mm	81 mm	76 mm	83 mm	58 mm
Replicate B	67 mm	85 mm	122 mm	105 mm	mm
Replicate C	93 mm	92 mm	70 mm	91 mm	76 mm
Replicate D	89 mm	74 mm	101 mm	114 mm	mm
Replicate E	75 mm	88 mm	96 mm	86 mm	95 mm

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

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

Describe root appearance:

Replicate A
Replicate B
Replicate C
Replicate D
Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	82 mm	74 mm	52 mm	52 mm	95 mm
Replicate B	56 mm	104 mm	87 mm	51 mm	mm
Replicate C	46 mm	90 mm	83 mm	86 mm	62 mm
Replicate D	67 mm	82 mm	86 mm	117 mm	mm
Replicate E	73 mm	17 mm	70 mm	47 mm	33 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1252.26	1338.9	1257.13
Replicate B	1246.48	1347.9	1257.29
Replicate C	1242.89	1368.2	1247.96
Replicate D	1263.97	1413.1	1269.65
Replicate E	1248.21	1326.1	1252.75

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 1:20 PM
Test Link: 08-7845-1822/B158904psB

Plant Bioassay - Chronic — CH2M Hill

Test No:	07-4891-1713	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	11 May-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	11 May-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	11-1984-5444	Code:	B1589-04	Client:	
Sample Date:	02 May-06 02:00 PM	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	8d 10h	Station:			

Comments: J11JW4

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
20-0020-1372	% Germination	100	> 100	N/A	23.96%	Equal Variance t Two-Sample
12-4539-1478	Average Height (mm)	100	> 100	N/A	10.34%	Equal Variance t Two-Sample
13-9817-5542	Average Length (mm)	< 100	100	N/A	18.16%	Equal Variance t Two-Sample
09-6602-1604	Average AG Wt (Wet, mg)	100	> 100	N/A	25.36%	Equal Variance t Two-Sample
09-9100-0647	Average AG Wt (Dry, mg)	100	> 100	N/A	21.94%	Equal Variance t Two-Sample
06-8388-0724	Average Root Wt. (Wet, mg	< 100	100	N/A	41.70%	Equal Variance t Two-Sample
19-3025-2502	Average Root Wt. (Dry, mg)	< 100	100	N/A	33.37%	Equal Variance t Two-Sample
10-5216-2248	Average Total Wt (Wet, mg	100	> 100	N/A	34.25%	Equal Variance t Two-Sample
01-2502-6544	Average Total Wt (Dry, mg)	100	> 100	N/A	23.94%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 1:20 PM
Test Link: 08-7845-1622/B158904psB

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	88.580	80.2	94.800	2.7786	6.2131	7.01%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	70.980	48	88	6.4653	14.457	20.37%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	27.473	21.878	36.375	2.5917	5.7952	21.09%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	4.37230	3.63201	5.75998	0.38264	0.85562	19.57%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	24.121	15.578	37.283	3.8390	8.5843	35.59%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.10370	0.90801	1.42001	0.09300	0.20796	18.84%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	51.594	37.456	73.658	6.4147	14.344	27.80%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	5.47600	4.54001	7.17999	0.47453	1.06108	19.38%

CETIS Test Summary

Report Date: 19 Jul-06 1:20 PM
Test Link: 08-7845-1822/B158904psB

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		80.2	94.8000	85.4000	94.5	88

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		71	74.5	73.4000	88	48

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		23.0060	29.31	26.796	36.375	21.8780

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		3.76401	4.55750	4.14800	5.75998	3.63201

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		17.3280	25.3550	25.062	37.2825	15.5780

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		0.97400	1.20251	1.01399	1.42001	0.90801

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	108.217	68.1167
100		40.3340	54.6650	51.858	73.6575	37.4560

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		4.73801	5.76001	5.16199	7.17999	4.54001

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

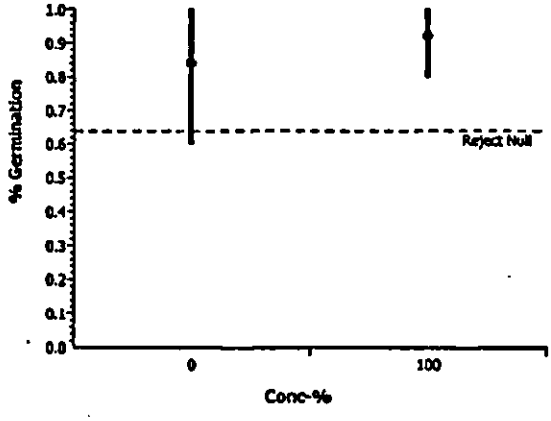
ANOVA Assumptions

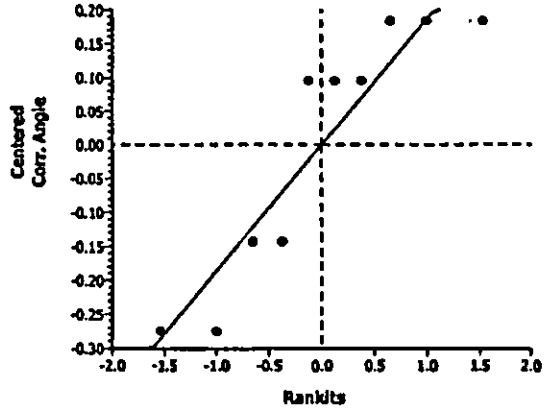
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.71853	23.15450	0.23141	Equal Variances
Distribution	Shapiro-Wilk W	0.82202		0.02681	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

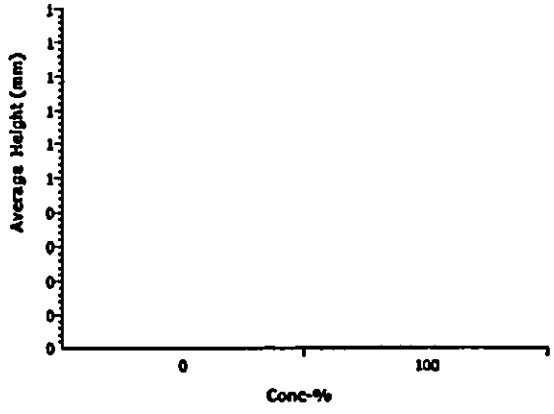
ANOVA Assumptions

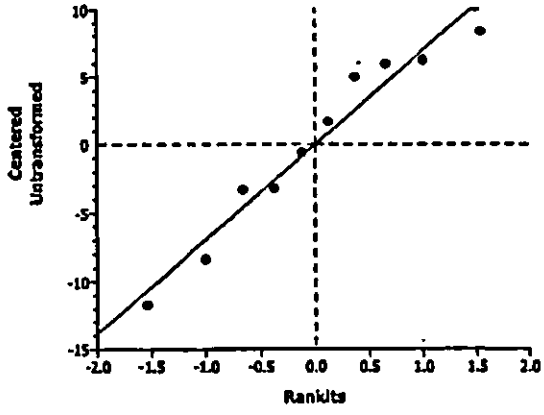
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.58386	23.15450	0.66682	Equal Variances
Distribution	Shapiro-Wilk W	0.93842		0.53555	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

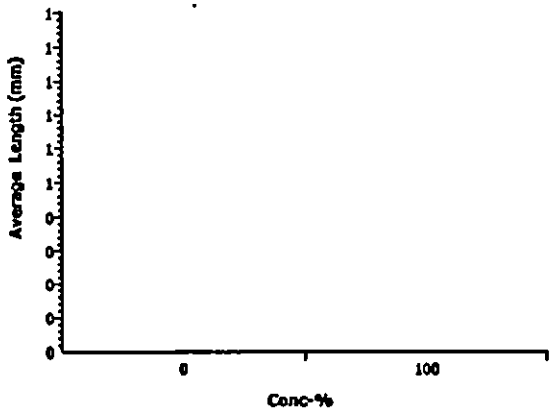
ANOVA Assumptions

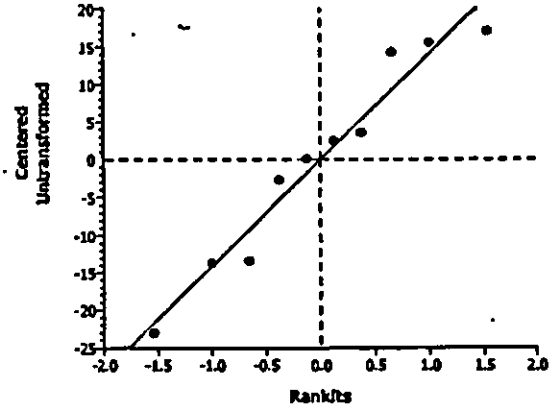
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.02398	23.15450	0.98223	Equal Variances
Distribution	Shapiro-Wilk W	0.93601		0.50953	Normal Distribution

Data Summary

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

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	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2	

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

Group Comparisons

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

ANOVA Table

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

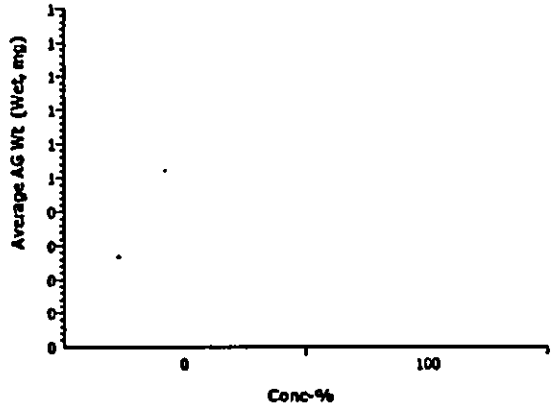
ANOVA Assumptions

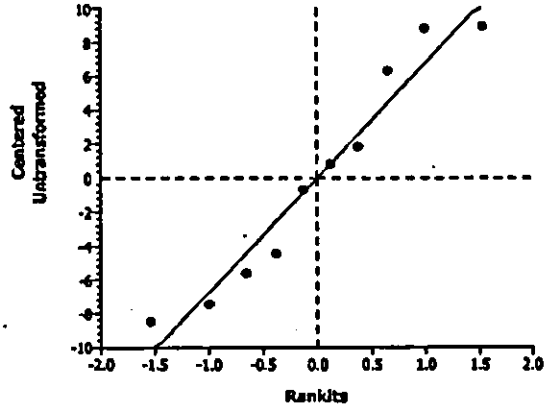
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.82504	23.15450	0.57439	Equal Variances
Distribution	Shapiro-Wilk W	0.92161		0.37060	Normal Distribution

Data Summary

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

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	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

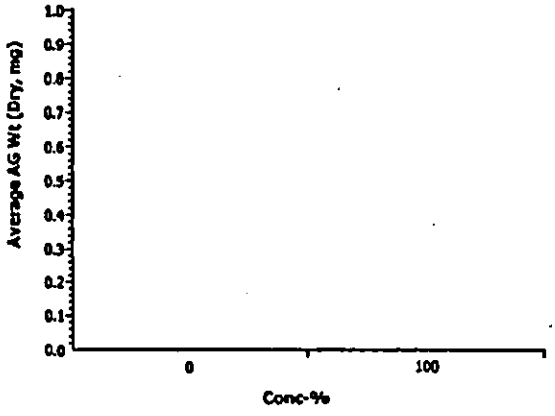
ANOVA Assumptions

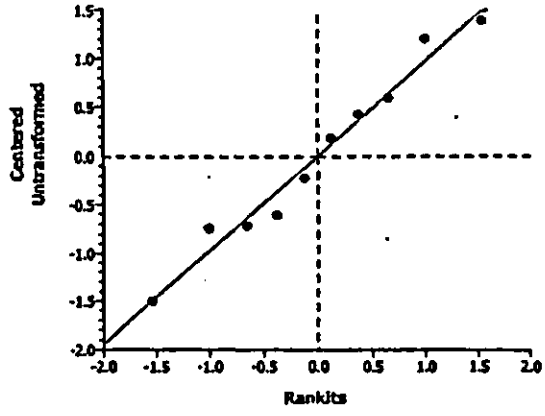
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.62353	23.15450	0.65021	Equal Variances
Distribution	Shapiro-Wilk W	0.96452		0.83591	Normal Distribution

Data Summary

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

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	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

ANOVA Assumptions

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

Data Summary

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

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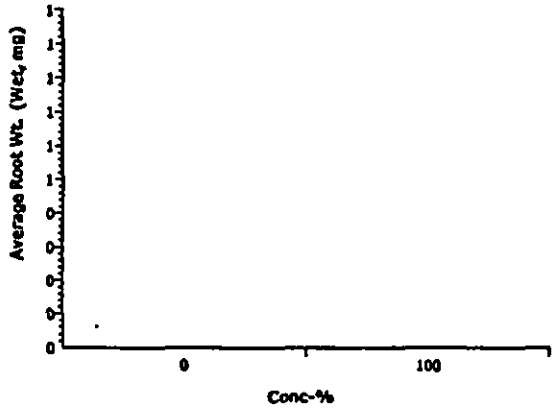
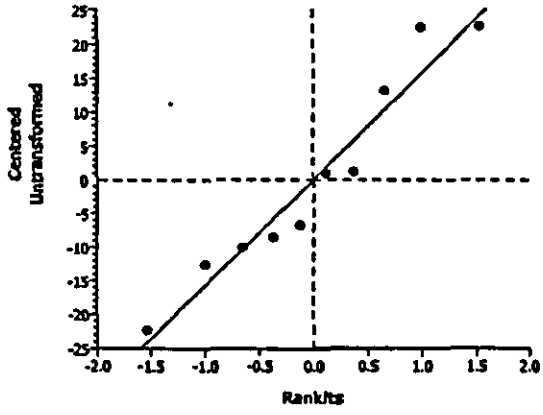




CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	33.37%

Group Comparisons

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

ANOVA Table

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

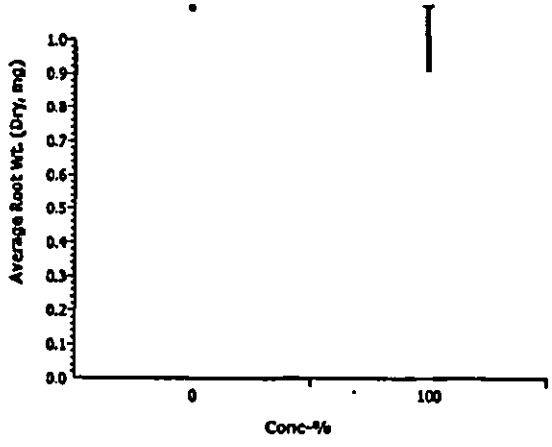
ANOVA Assumptions

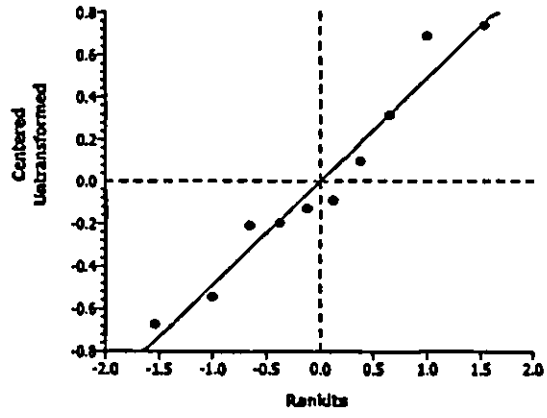
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.49787	23.15450	0.04275	Equal Variances
Distribution	Shapiro-Wilk W	0.93943		0.54668	Normal Distribution

Data Summary

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

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	08-7845-1822	08-7845-1822	19 Jul-06 1:20 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.25%

Group Comparisons

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

ANOVA Table

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

ANOVA Assumptions

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

Data Summary

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

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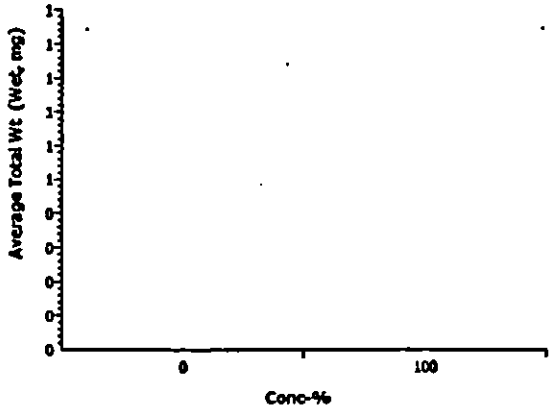
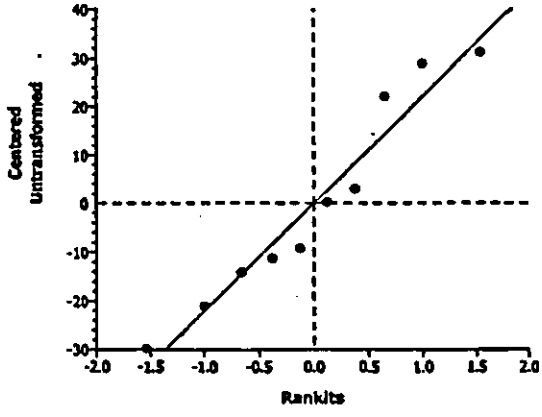




CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

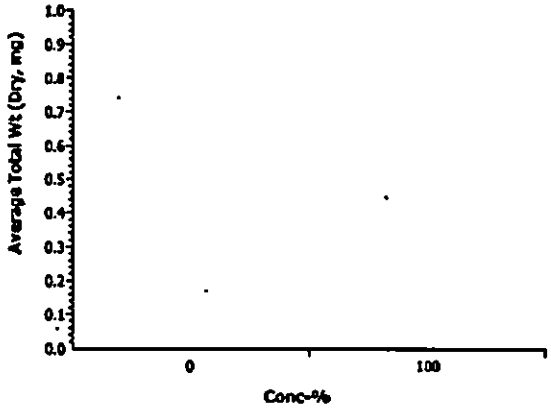
ANOVA Assumptions

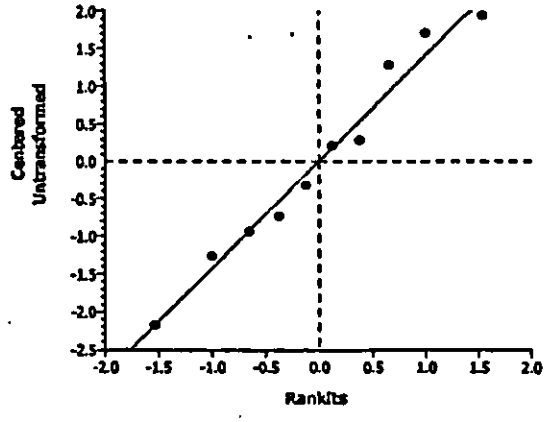
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.61887	23.15450	0.37375	Equal Variances
Distribution	Shapiro-Wilk W	0.96277		0.81692	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: May 11, 2006

Initials: Day 0 (TP) Day 12 NJ Day 14 NJ Day 16 NJ Day 18 (20) DW Day 21 (22) (TP) Day 23 — Day 27 Bm Day 31 Bm

Bioassay Lab ID: BG 1589-05 Sample No: J11K46

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	18 (20) days after planting	21 (22) days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting) 6-7-06	14-DAYS POST-EMERGENCE (31 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	2	2	2	2	2		2	2	7.2	6.9
	B	6	6	6	6	6		4 → 5	5		
	C	4	4	4	4	4		4	4		
	D	5	6	7	7	8		3 → 5	5		
	E	2	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: 2 Lg G
Replicate B: 5 med G — removed: 1 Med G
Replicate C: 2 med G, 1 Med G w/ B tip, 1 Sm G
Replicate D: 5 med G — removed: 2 Med G, 1 Sm B
Replicate E: 2 med G, 1 Sm G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 2 Lg G
Replicate B: 5 Lg G
Replicate C: 1 Lg G, 2 med G, 1 Sm G
Replicate D: 3 Lg G 2 med G
Replicate E: 2 med G, 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	98 mm	83 mm	mm	mm	mm
Replicate B	70 mm	76 mm	77 mm	57 mm	76 mm
Replicate C	78 mm	80 mm	83 mm	40 mm	mm
Replicate D	90 mm	79 mm	76 mm	65 mm	62 mm
Replicate E	96 mm	79 mm	36 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	1258.69	1370.4	1273.86
Replicate B	1245.05	1393.7	1266.88
Replicate C	1246.83	1323.0	1259.13
Replicate D	1248.86	1382.4	1269.31
Replicate E	1255.06	1320.6	1264.65

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	116 mm	97 mm	mm	mm	mm
Replicate B	64 mm	76 mm	73 mm	93 mm	79 mm
Replicate C	74 mm	56 mm	11 mm	59 mm	mm
Replicate D	94 mm	72 mm	72 mm	56 mm	83 mm
Replicate E	60 mm	50 mm	71 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	1237.88	1371.3	1243.22
Replicate B	1237.74	1418.8	1244.64
Replicate C	1254.81	1317.4	1257.93
Replicate D	1249.74	1418.0	1258.75
Replicate E	1230.24	1299.0	1233.64

Comments:

-64-

CETIS Test Summary

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

Plant Bioassay - Chronic — CH2M Hill

Test No:	02-8874-0620	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	11 May-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	11 May-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	10-1372-6560	Code:	B1589-05	Client:	
Sample Date:	02 May-06 05:37 PM	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	8d 6h	Station:			

Comments: J11K46

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
05-0814-8974	% Germination	100	> 100	N/A	33.67%	Equal Variance t Two-Sample
06-4527-7411	Average Height (mm)	100	> 100	N/A	12.65%	Equal Variance t Two-Sample
14-4375-6660	Average Length (mm)	100	> 100	N/A	22.98%	Equal Variance t Two-Sample
05-7021-4278	Average AG Wt (Wet, mg)	100	> 100	N/A	43.35%	Equal Variance t Two-Sample
07-7060-5007	Average AG Wt (Dry, mg)	100	> 100	N/A	33.74%	Equal Variance t Two-Sample
02-0026-0368	Average Root Wt. (Wet, mg	100	> 100	N/A	52.69%	Equal Variance t Two-Sample
17-4641-8711	Average Root Wt. (Dry, mg)	100	> 100	N/A	46.91%	Equal Variance t Two-Sample
02-4839-9766	Average Total Wt (Wet, mg	100	> 100	N/A	47.78%	Equal Variance t Two-Sample
03-0024-0421	Average Total Wt (Dry, mg)	100	> 100	N/A	36.25%	Equal Variance t Two-Sample

CETIS Test Summary

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

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.84000	0.60000	1.00000	0.09798	0.21909	26.08%
100		5	0.76000	0.40000	1.00000	0.11662	0.26077	34.31%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	66.6	88.6	3.4969	7.8192	9.74%
100		5	77.040	70.300	93	4.1986	9.3884	12.19%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	73.840	50	106.5	9.5676	21.394	28.97%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	30.636	19.043	55.855	6.5723	14.696	47.97%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	4.46254	3.07501	7.58502	0.81932	1.83205	41.05%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	35.028	15.647	66.710	8.7443	19.553	55.82%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.55307	0.78000	2.66998	0.32506	0.72685	46.80%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	65.665	34.690	122.57	15.268	34.14	51.99%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.0109	4.834	8.954	0.7679	1.7171	24.49%
100		5	6.0156	3.8550	10.255	1.1307	2.5283	42.03%

CETIS Test Summary

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

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		93	77.2	70.3000	74.4000	70.3000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		106.5	77	50	75.4000	60.3

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		55.8550	29.73	19.0425	26.7080	21.8466

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		7.58502	4.36599	3.07501	4.09001	3.19666

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		68.7100	36.2120	15.6475	33.6520	22.9200

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		2.66998	1.38000	0.78000	1.80200	1.13334

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		122.565	65.942	34.6900	60.3600	44.7666

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		10.2550	5.746	3.85501	5.89202	4.33

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

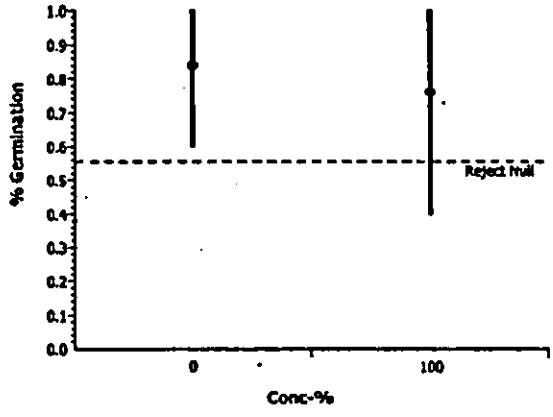
ANOVA Assumptions

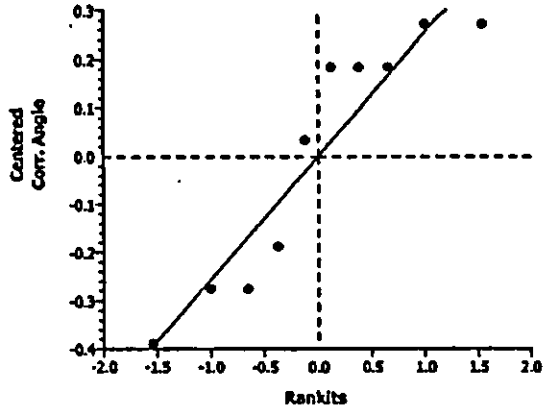
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.32444	23.15450	0.79199	Equal Variances
Distribution	Shapiro-Wilk W	0.85463		0.06594	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

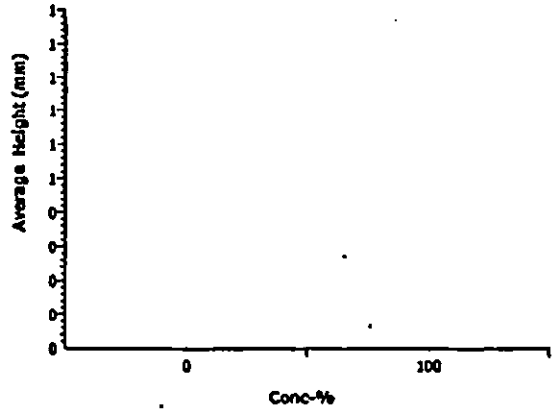
ANOVA Assumptions

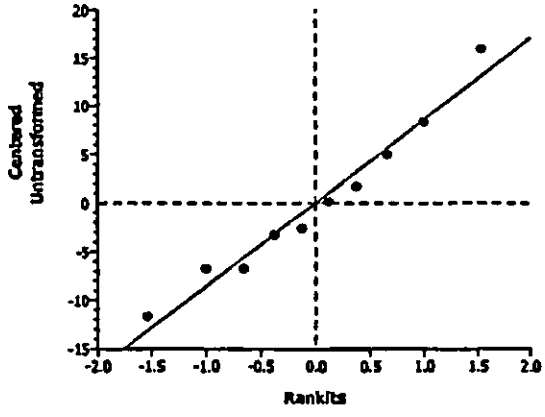
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.44166	23.15450	0.73163	Equal Variances
Distribution	Shapiro-Wilk W	0.96938		0.88508	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

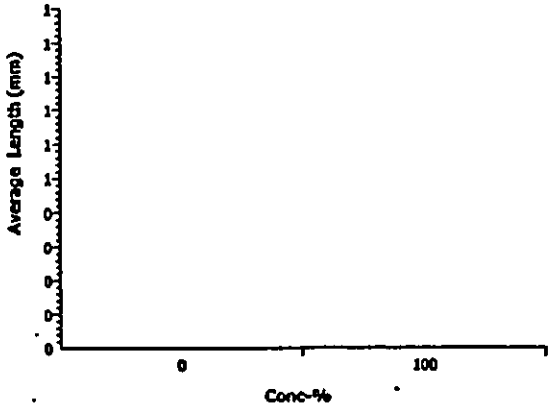
ANOVA Assumptions

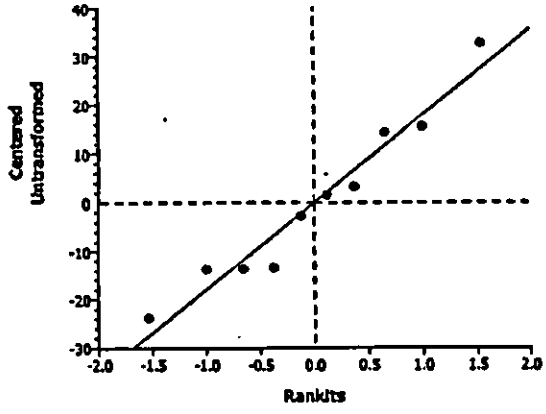
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.24242	23.15450	0.45337	Equal Variances
Distribution	Shapiro-Wilk W	0.95091		0.67922	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

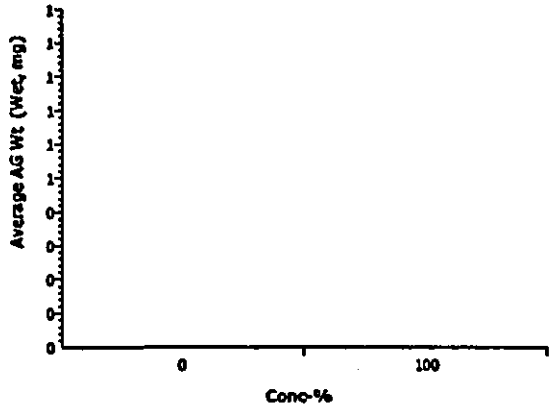
ANOVA Assumptions

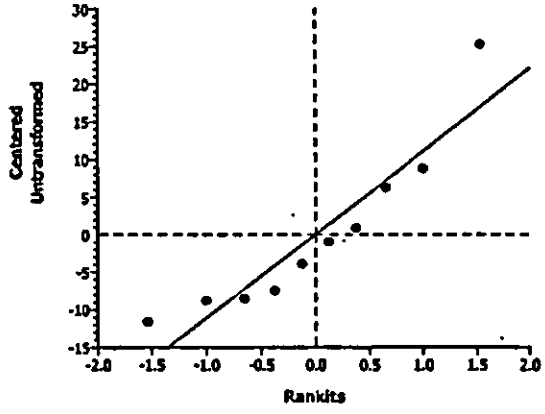
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.52373	23.15450	0.24999	Equal Variances
Distribution	Shapiro-Wilk W	0.87833		0.12483	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

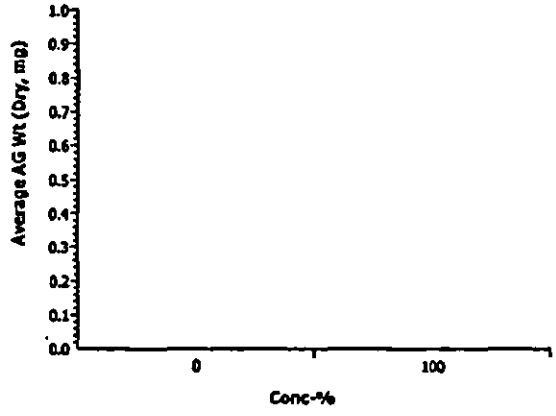
ANOVA Assumptions

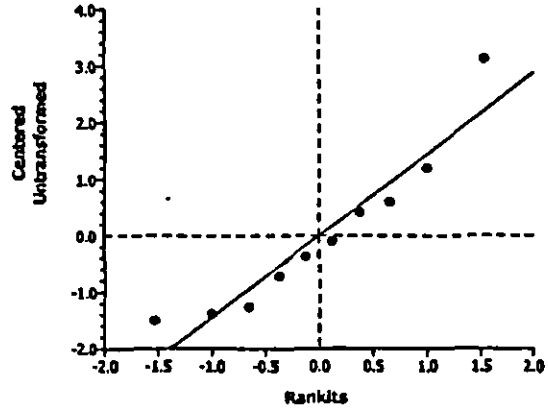
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.82397	23.15450	0.33878	Equal Variances
Distribution	Shapiro-Wilk W	0.90494		0.24802	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	13-4078-7643	13-4078-7643	19 Jul-08 1:28 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	267.3557	267.3557	1	0.65	0.44438	Non-Significant Effect
Error	3304.95	413.1187	8			
Total	3572.30568	680.47446	9			

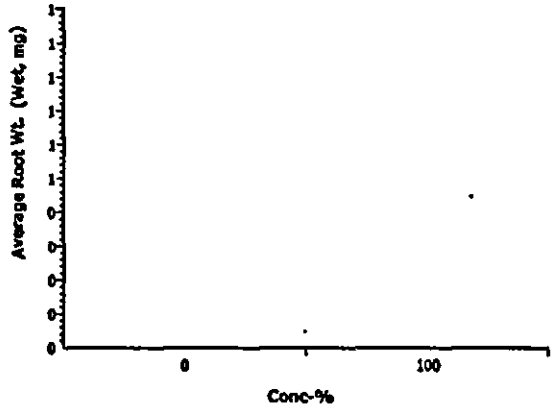
ANOVA Assumptions

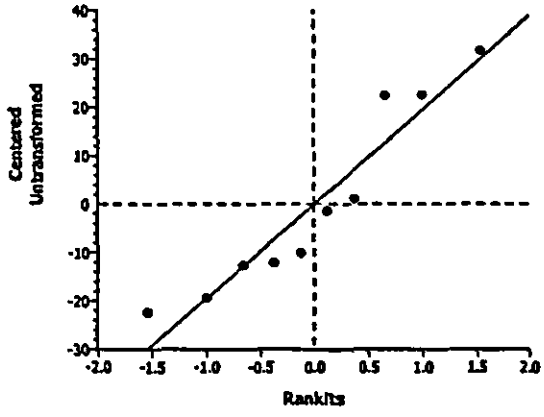
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.16115	23.15450	0.88838	Equal Variances
Distribution	Shapiro-Wilk W	0.89311		0.18377	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

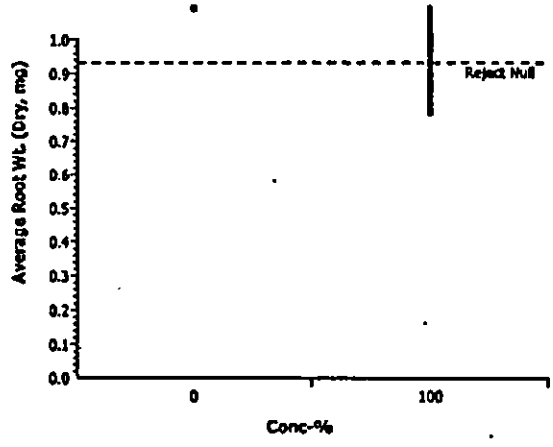
ANOVA Assumptions

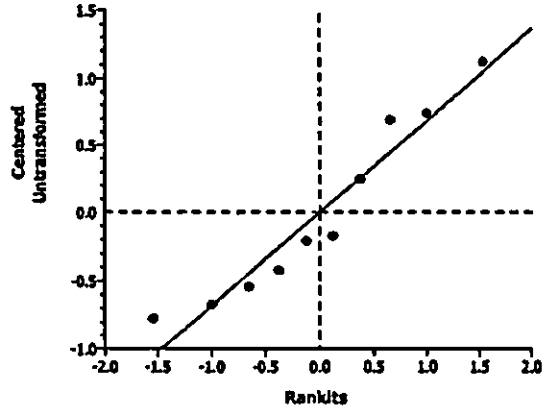
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.16369	23.15450	0.88674	Equal Variances
Distribution	Shapiro-Wilk W	0.91594		0.32430	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

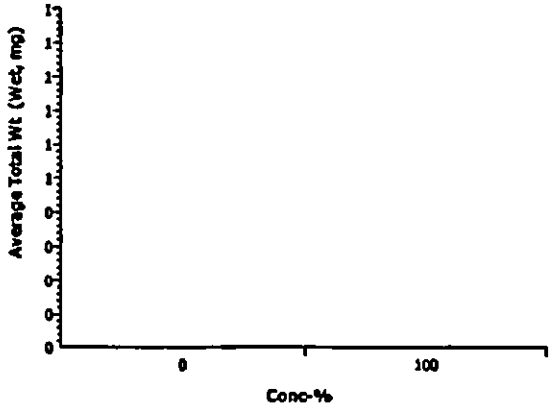
ANOVA Assumptions

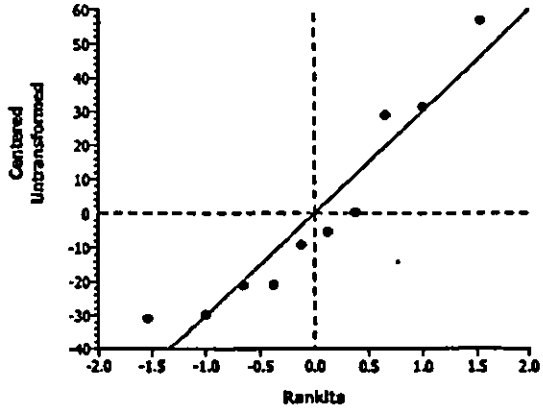
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.44264	23.15450	0.73116	Equal Variances
Distribution	Shapiro-Wilk W	0.89353		0.18578	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

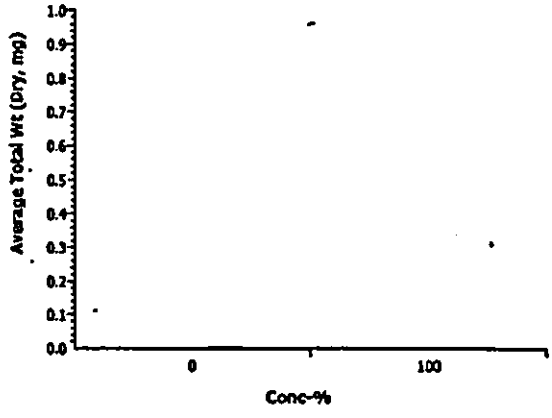
ANOVA Assumptions

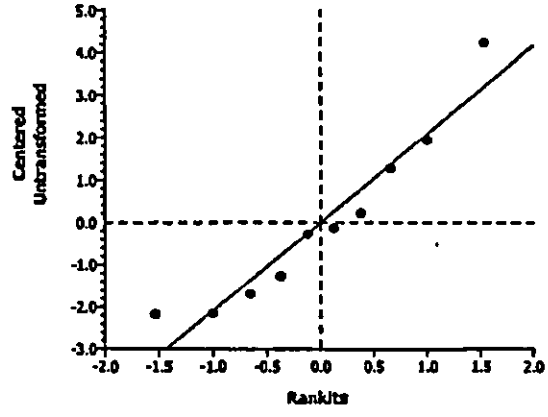
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.16800	23.15450	0.47203	Equal Variances
Distribution	Shapiro-Wilk W	0.91720		0.33418	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project — 6-2-06 — Test Start Date: May 11, 2006

Initials: Day 0 (TP) Day 12 NJT Day 14 NJT Day 18 NJT Day 20 DW Day 22 (TP) Day 23 — Day 27 B Day 34 Bm

Bioassay Lab ID: BG 1589-06. Sample No: J11K73

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	20 ~~18~~ days after planting	22 ~~21~~ days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting) 6-7-06	14-DAYS POST-EMERGENCE (34 days after planting) 6-14-06	pH INITIAL (@ planting)	pH FINAL (@ 14 days Post-Emergence)
Control	A	6	6	6	6	7		7→5	5	8.8	7.9
	B	6	6	6	6	6		6→5	5		
	C	2	2	2	3	3		3	3		
	D	4	5	5	5	6		4	4		
	E	4	6	9	9	9		9→5	5		

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

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

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest, 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: 4 Lg G, 1 med G
Replicate C: 3 med G
Replicate D: 2 Lg G, 2 med G
Replicate E: 5 Lg G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	81 mm	90 mm	96 mm	90 mm	82 mm
Replicate B	93 mm	91 mm	106 mm	79 mm	66 mm
Replicate C	59 mm	60 mm	73 mm	mm	mm
Replicate D	48 ~~[illegible]~~ mm	91 mm	93 mm	66 mm	mm
Replicate E	71 mm	73 mm	76 mm	84 mm	86 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1246.92	1387.4	1273.29
Replicate B	1247.56	1398.1	1272.35
Replicate C	1250.27	1297.4	1257.87
Replicate D	1245.18	1328.2	~~1272.35~~ 1260.09
Replicate E	1260.99	1386.5	1293.95

Describe root appearance:

Replicate A
Replicate B
Replicate C
Replicate D
Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	72 mm	88 mm	86 mm	52 mm	97 mm
Replicate B	62 mm	57 mm	83 mm	91 mm	70 mm
Replicate C	67 mm	56 mm	40 mm	mm	mm
Replicate D	69 mm	52 mm	83 mm	31 mm	mm
Replicate E	72 mm	63 mm	59 mm	73 mm	93 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1247.23	1365.9	1253.26
Replicate B	1250.18	1372.4	1256.45
Replicate C	1251.33	1292.9	1253.94
Replicate D	1233.88	1277.1	1236.99
Replicate E	1245.43	1348.8	1251.32

Comments:

-77-

CETIS Test Summary

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

Plant Bioassay - Chronic — CH2M Hill

Test No:	11-6821-8679	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	11 May-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	11 May-06	Brine:			

Comments: recalculated Height and Length data July 19, 2006

Sample No:	03-9367-5466	Code:	B1589-06	Client:	
Sample Date:	07 May-06 02:24 PM	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	82h	Station:			

Comments: J11K73

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
12-2088-9322	% Germination	100	> 100	N/A	27.99%	Wilcoxon Rank Sum Two-Sample
10-1013-1328	Average Height (mm)	100	> 100	N/A	12.99%	Equal Variance t Two-Sample
01-0369-5870	Average Length (mm)	< 100	100	N/A	15.17%	Equal Variance t Two-Sample
03-9916-7100	Average AG Wt (Wet, mg)	100	> 100	N/A	25.36%	Equal Variance t Two-Sample
05-1072-5650	Average AG Wt (Dry, mg)	100	> 100	N/A	24.57%	Equal Variance t Two-Sample
10-7463-9283	Average Root Wt. (Wet, mg	< 100	100	N/A	40.81%	Equal Variance t Two-Sample
10-8925-6724	Average Root Wt. (Dry, mg)	< 100	100	N/A	33.51%	Equal Variance t Two-Sample
03-7676-8228	Average Total Wt (Wet, mg	< 100	100	N/A	33.45%	Equal Variance t Two-Sample
15-2028-1520	Average Total Wt (Dry, mg)	100	> 100	N/A	25.49%	Equal Variance t Two-Sample

CETIS Test Summary

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

% Germination Summary

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

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	78.460	64	87.800	4.3888	9.8137	12.51%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	69.340	54.3	79	4.108	9.1857	13.25%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	23.954	15.710	30.108	2.5937	5.7996	24.21%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	4.21696	2.53333	5.27400	0.49403	1.10468	26.20%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	19.503	10.805	28.444	3.2152	7.1894	36.86%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.05709	0.77750	1.25398	0.09714	0.21722	20.55%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	43.457	29.567	58.552	5.6472	12.628	29.06%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	5.27405	3.40332	6.48000	0.57754	1.29142	24.49%

CETIS Test Summary

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

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		87.8000	87	64	74.5	79

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		79	72.6	54.3	68.8000	72

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		28.098	30.108	15.7100	20.755	25.1020

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		5.27400	4.95798	2.53333	3.72748	4.59199

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		23.7340	28.444	13.8567	10.805	20.674

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		1.20601	1.25398	0.87000	0.77750	1.17798

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		51.8300	58.552	29.5667	31.56	45.7760

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		6.48000	6.21196	3.40332	4.50497	5.76997

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

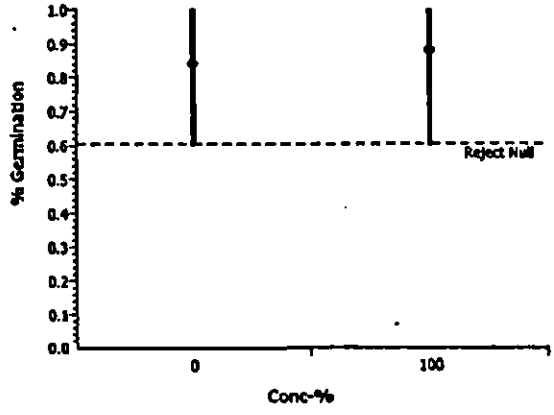
ANOVA Assumptions

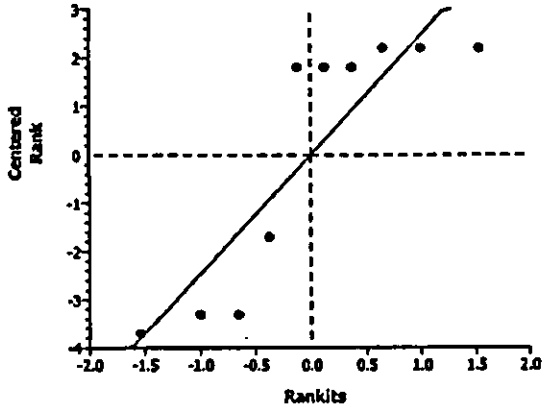
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.48569	23.15450	0.71064	Equal Variances
Distribution	Shapiro-Wilk W	0.76085		0.00484	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

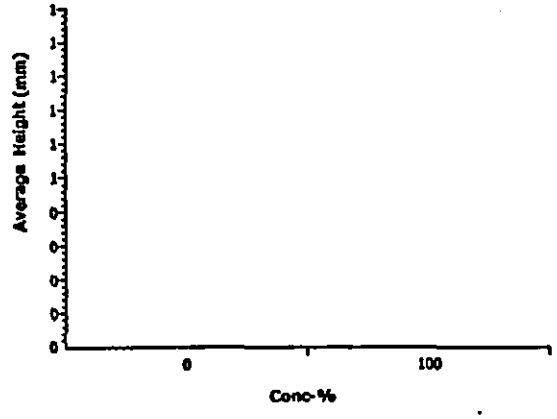
ANOVA Assumptions

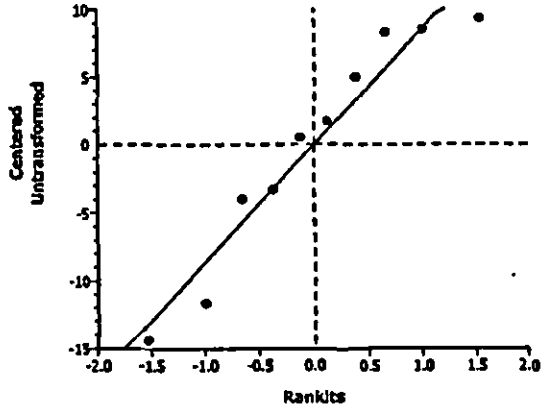
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.57520	23.15450	0.67053	Equal Variances
Distribution	Shapiro-Wilk W	0.91507		0.31767	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

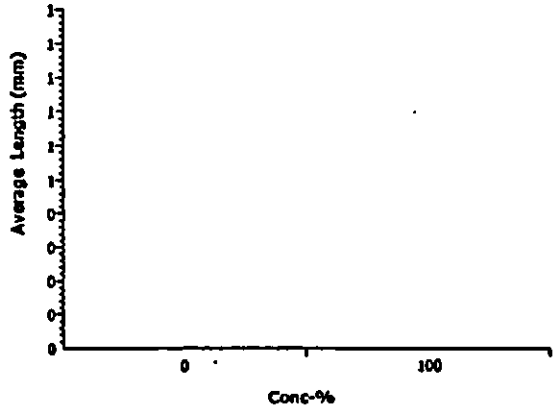
ANOVA Assumptions

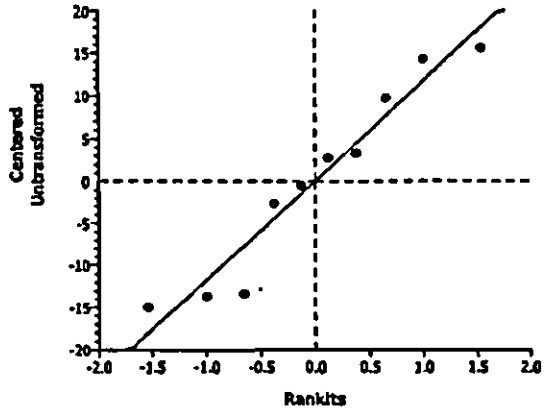
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.41896	23.15450	0.41320	Equal Variances
Distribution	Shapiro-Wilk W	0.91575		0.32287	Normal Distribution

Data Summary

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

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	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

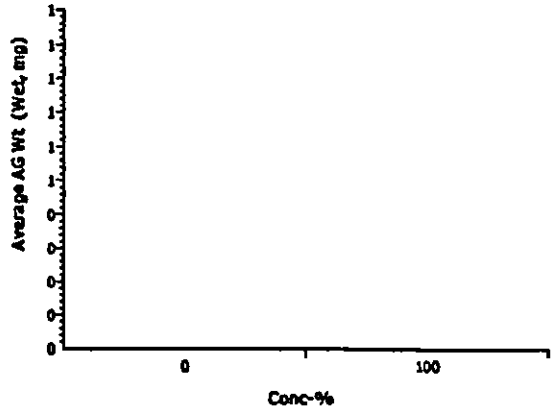
ANOVA Assumptions

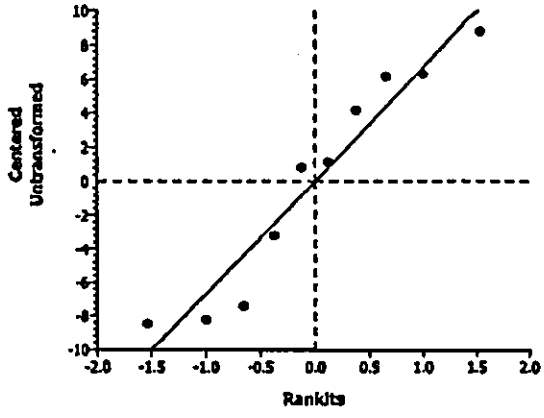
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.82224	23.15450	0.57535	Equal Variances
Distribution	Shapiro-Wilk W	0.90401		0.24231	Normal Distribution

Data Summary

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

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	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.687955	2.687955	1	2.23	0.17356	Non-Significant Effect
Error	9.635508	1.204438	8			
Total	12.3234608	3.8923934	9			

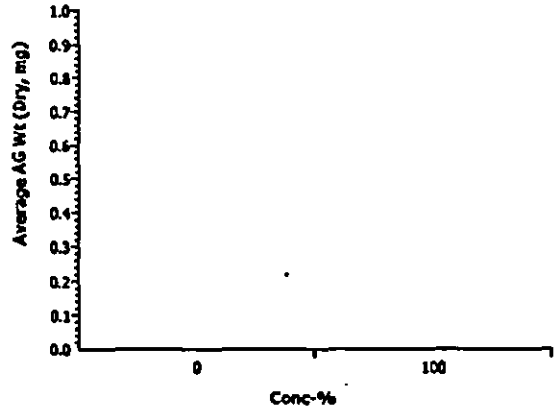
ANOVA Assumptions

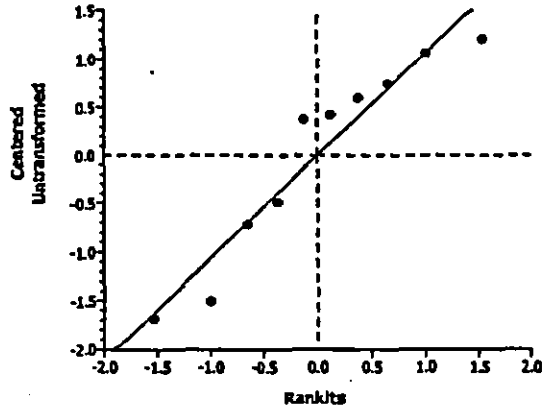
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.02674	23.15450	0.98021	Equal Variances
Distribution	Shapiro-Wilk W	0.90091		0.22418	Normal Distribution

Data Summary

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

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	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

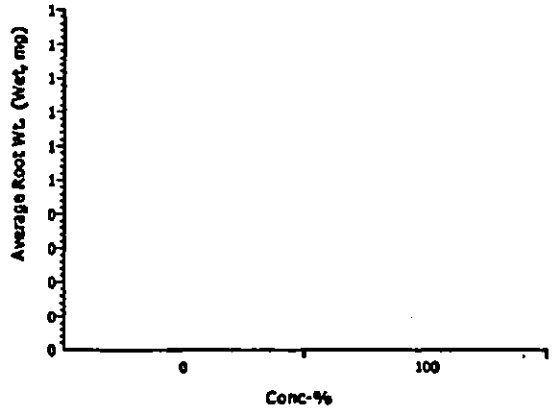
ANOVA Assumptions

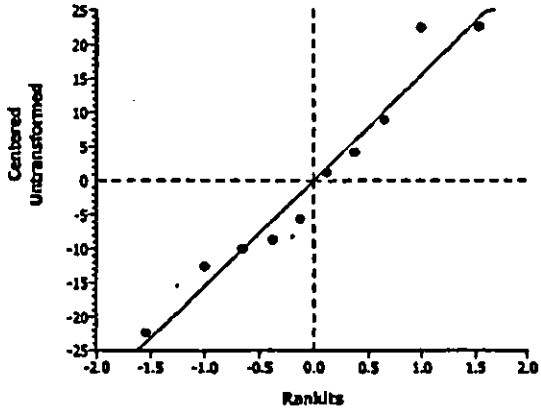
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.58861	23.15450	0.06072	Equal Variances
Distribution	Shapiro-Wilk W	0.94453		0.60444	Normal Distribution

Data Summary

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

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	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

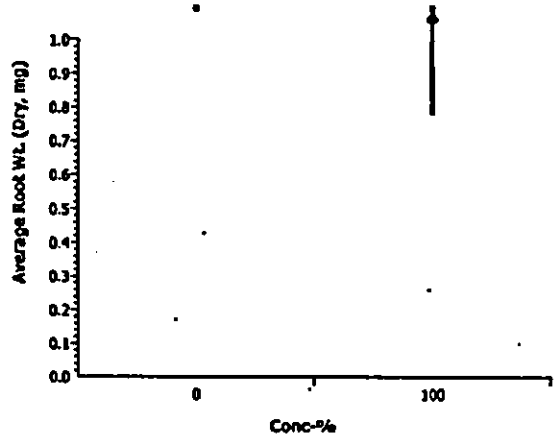
ANOVA Assumptions

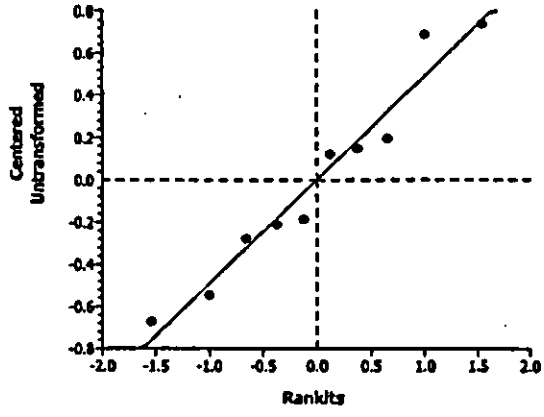
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	9.62191	23.15450	0.04984	Equal Variances
Distribution	Shapiro-Wilk W	0.94290		0.58576	Normal Distribution

Data Summary

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

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	01-7024-1633	01-7024-1633	19 Jul-06 1:35 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	33.45%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.43419	1.85955	0.0205	25.8652	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2865.933	2865.933	1	5.93	0.04093	Significant Effect
Error	3869.421	483.6777	8			
Total	6735.35400	3349.6103	9			

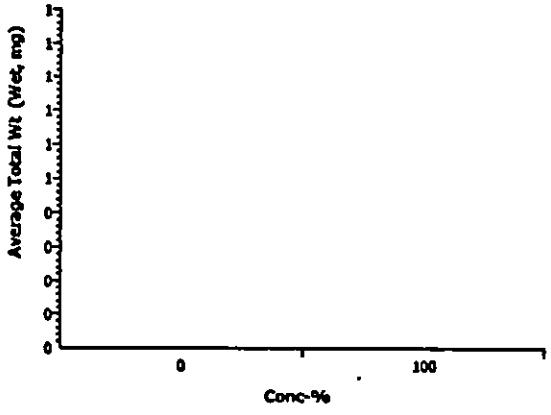
ANOVA Assumptions

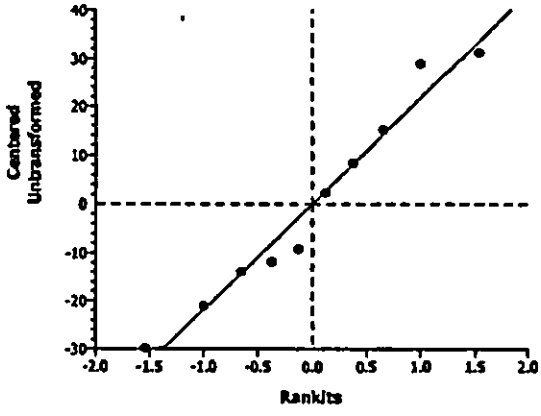
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.06660	23.15450	0.14511	Equal Variances
Distribution	Shapiro-Wilk W	0.95084		0.67848	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.315	47.47	108.55	28.424				
100		5	43.457	29.567	58.552	12.628				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

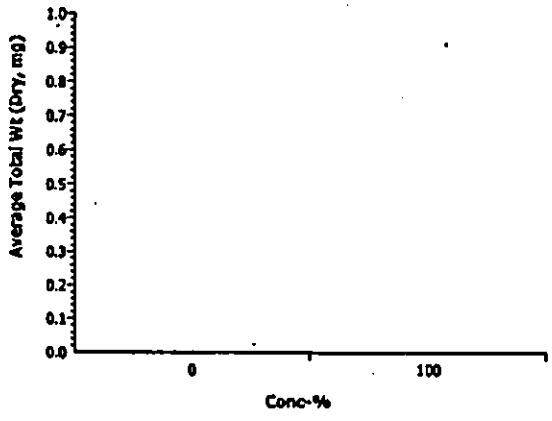
ANOVA Assumptions

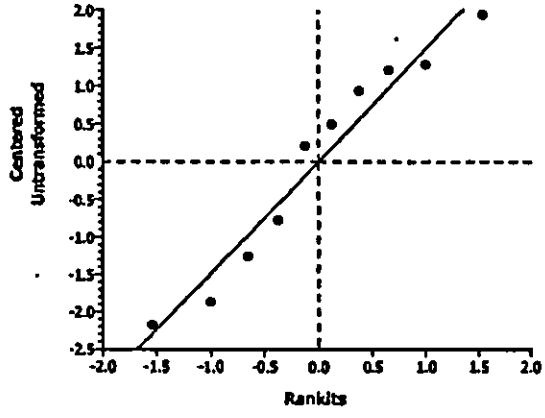
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.76797	23.15450	0.59451	Equal Variances
Distribution	Shapiro-Wilk W	0.93303		0.47832	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

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

Initials: Day 0 JP Day 12 NJ Day 14 NJ Day 16 NJ Day 18 20 DW Day 21 22 JP Day 23 — Day 27 BW Day 29 BW

Bioassay Lab ID: BG 1589-07 Sample No: J1K67

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	20 ~~18~~ days after planting	22 ~~20~~ days after planting	23 days after planting	6-7-06 7-DAYS POST-EMERGENCE (27 days after planting)	14-DAYS POST-EMERGENCE (34 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	5	5	5	5	5		5	5	8.2	7.3
	B	6	7	7	7	7		7->5	5		
	C	8	8	8	8	8		8->5	5		
	D	5	5	6	6	6		6->5	5		
	E	7	7	7	7	8		7->5	5		

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

Replicate A: 3 MedG, 2 SmG

Replicate B: 2 LgG, 3 MedG — removed: 1 MedG, 1 SmG

Replicate C: 3 LgG, 2 MedG — removed: 3 MedG

Replicate D: 5 MedG — removed: 1 SmG

Replicate E: 4 MedG, 1 MedG w/ 1 B shoot — removed: 2 SmG, 1 dead Sm

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 LgG w/ 1 B shoot, 2 MedG, 2 SmG

Replicate B: 3 MedG, 2 MedG w/ 1 B shoot

Replicate C: 3 MedG, 2 MedG w/ 1 B shoot

Replicate D: 5 MedG

Replicate E: 4 MedG, 1 MedG w/ 1 B shoot

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	66 mm	76 mm	77 mm	36 mm	30 mm
Replicate B	57 mm	61 mm	63 mm	75 mm	67 mm
Replicate C	73 mm	91 mm	73 mm	96 mm	80 mm
Replicate D	64 mm	70 mm	78 mm	79 mm	78 mm
Replicate E	71 mm	61 mm	69 mm	62 mm	86 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1247.21	1327.2	1261.48
Replicate B	1245.80	1367.2	1268.49
Replicate C	1245.97	1395.1	1273.63
Replicate D	1253.90	1376.7	1276.28
Replicate E	1240.67	1347.4	1261.73

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	4 mm	73 mm	110 mm	36 mm	63 mm
Replicate B	73 mm	65 mm	50 mm	44 mm	83 mm
Replicate C	89 mm	86 mm	83 mm	60 mm	85 mm
Replicate D	88 mm	76 mm	50 mm	80 mm	80 mm
Replicate E	84 mm	73 mm	86 mm	63 mm	73 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1246.94	1346.0	1250.97
Replicate B	1251.77	1394.0	1259.71
Replicate C	1255.51	1395.8	1261.91
Replicate D	1246.27	1394.1	1252.92
Replicate E	1247.76	1363.1	1253.43

Comments:

-90-

CETIS Test Summary

Report Date: 19 Jul-06 1:39 PM
Test Link: 11-5408-1697/B158907psC

Plant Bioassay - Chronic | CH2M Hill

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

Comments: recalculated Height and Length data July 19, 2006

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

Comments: J11K67

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-8550-8885	% Germination	100	> 100	N/A	20.96%	Equal Variance t Two-Sample
07-9361-1455	Average Height (mm)	< 100	100	N/A	11.24%	Equal Variance t Two-Sample
05-8004-9201	Average Length (mm)	< 100	100	N/A	15.46%	Equal Variance t Two-Sample
13-1560-7899	Average AG Wt (Wet, mg)	< 100	100	N/A	24.26%	Equal Variance t Two-Sample
10-2369-2621	Average AG Wt (Dry, mg)	100	> 100	N/A	23.01%	Equal Variance t Two-Sample
12-5537-6762	Average Root Wt. (Wet, mg	< 100	100	N/A	39.37%	Equal Variance t Two-Sample
20-3520-1333	Average Root Wt. (Dry, mg)	100	> 100	N/A	34.66%	Equal Variance t Two-Sample
08-6934-2329	Average Total Wt (Wet, mg	< 100	100	N/A	32.02%	Equal Variance t Two-Sample
11-6220-9813	Average Total Wt (Dry, mg)	100	> 100	N/A	24.74%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 1:39 PM
Test Link: 11-5408-1697/B158907psC

% Germination Summary

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

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	70.2	57	74.6	3.3657	7.526	10.72%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	70.280	57.200	80.6	4.3674	9.7659	13.90%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	23.202	15.998	29.826	2.2608	5.0553	21.79%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	4.32440	2.85400	5.53201	0.43009	0.96170	22.24%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	25.79	19.812	29.566	1.8655	4.1714	16.17%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.22760	0.80601	1.58799	0.12838	0.28708	23.38%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	48.992	35.810	57.884	3.9629	8.8613	18.09%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	5.55200	3.66001	6.81201	0.52913	1.18318	21.31%

CETIS Test Summary

Report Date: 19 Jul-06 1:39 PM
Test Link: 11-5408-1697/B158907psC

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	68.6	82	85.3000	77
100		57	74.6	74.6	73.8000	71

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		57.2000	63	80.6	74.8000	75.8000

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		15.998	24.28	29.8260	24.56	21.346

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		2.85400	4.53799	5.53201	4.47600	4.22200

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		19.8120	28.446	28.0580	29.566	23.068

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		0.80601	1.58799	1.28000	1.33000	1.13401

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		35.8100	52.726	57.8840	54.126	44.414

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		3.66001	6.12598	6.81201	5.80601	5.35601

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	20.96%

Group Comparisons

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

ANOVA Table

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

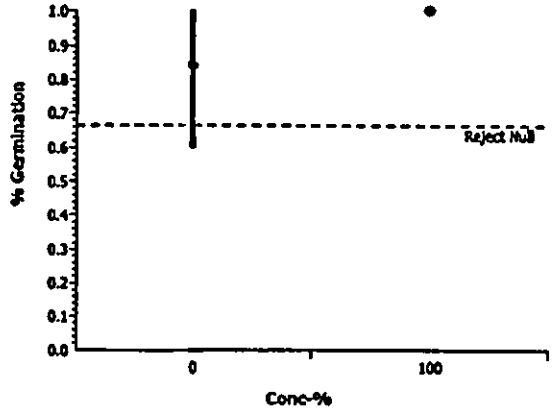
ANOVA Assumptions

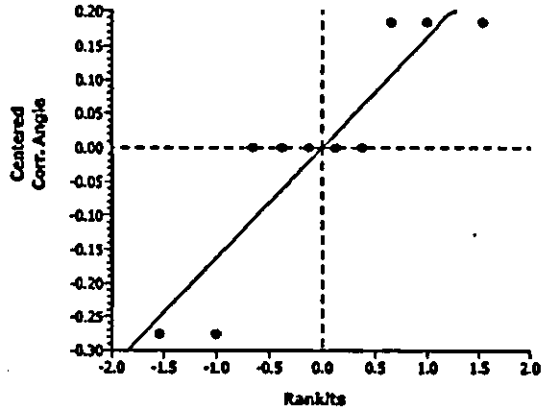
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	4.80000	11.25862	0.05984	Equal Variances
Distribution	Shapiro-Wilk W	0.81415		0.02153	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

ANOVA Assumptions

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

Data Summary

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

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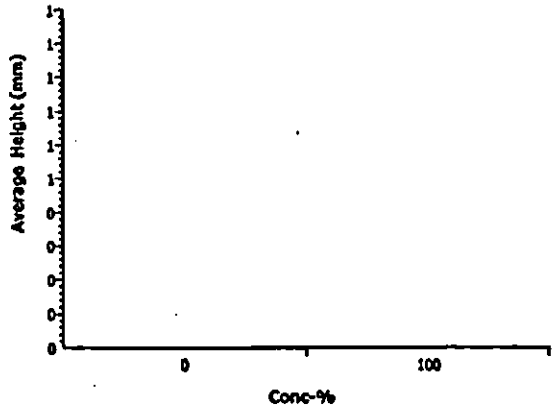
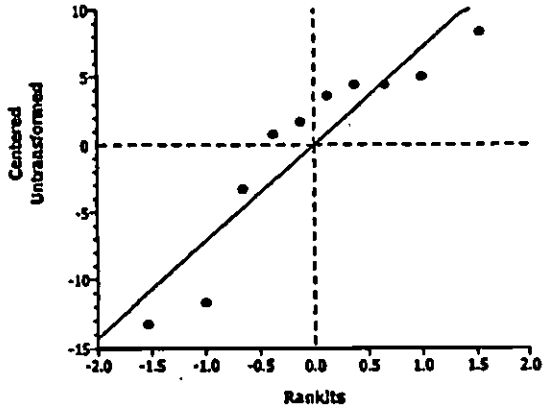




CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

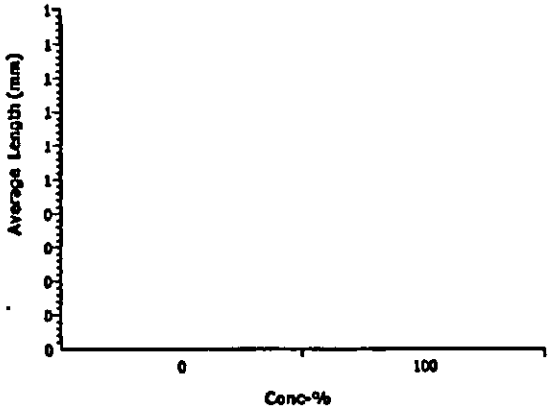
ANOVA Assumptions

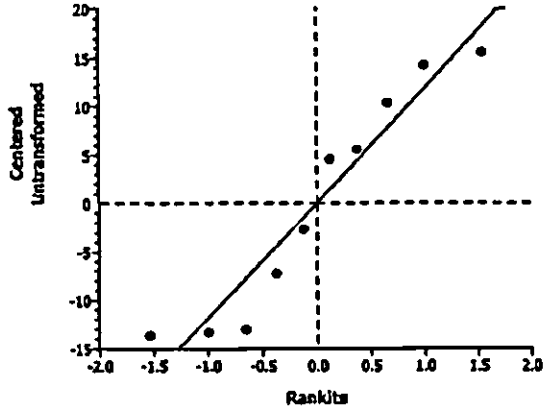
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.14011	23.15450	0.47931	Equal Variances
Distribution	Shapiro-Wilk W	0.89307		0.18358	Normal Distribution

Data Summary

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

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	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

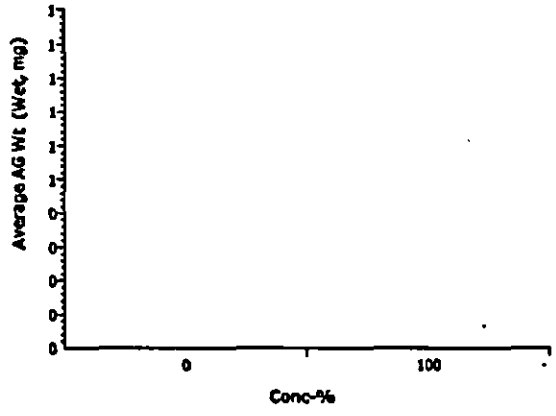
ANOVA Assumptions

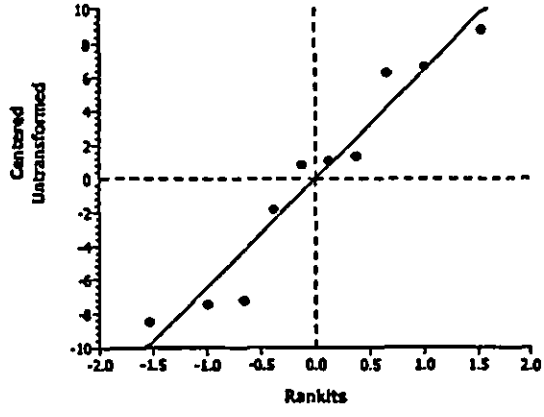
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.39831	23.15450	0.41762	Equal Variances
Distribution	Shapiro-Wilk W	0.91608		0.32540	Normal Distribution

Data Summary

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

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	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	23.01%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.42964	1.85955	0.0953	1.20897	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.159768	2.159768	1	2.04	0.19069	Non-Significant Effect
Error	8.453657	1.056707	8			
Total	10.6134255	3.2164755	9			

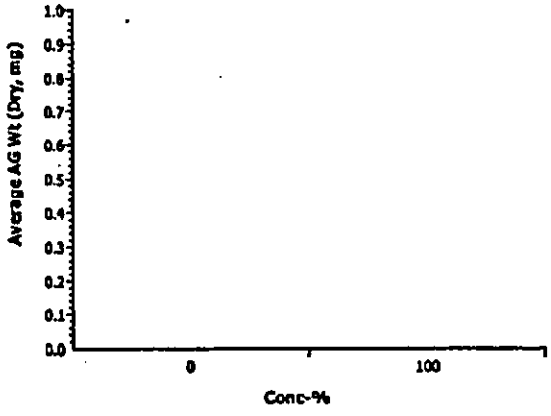
ANOVA Assumptions

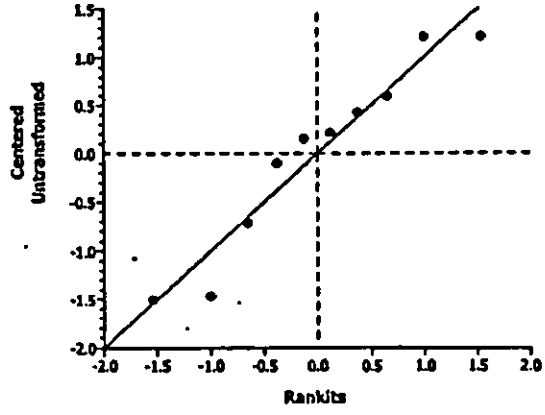
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.28510	23.15450	0.81382	Equal Variances
Distribution	Shapiro-Wilk W	0.91614		0.32590	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	4.32440	2.85400	5.53201	0.96170				

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	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

ANOVA Assumptions

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

Data Summary

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

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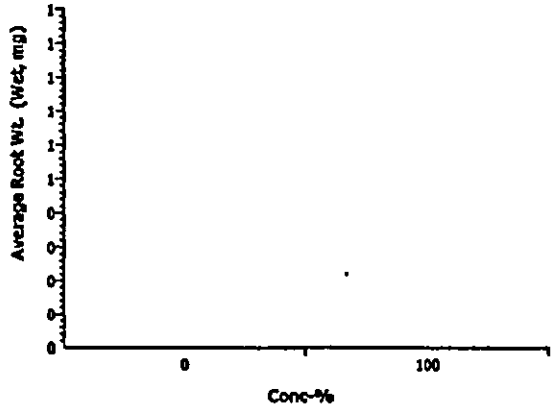
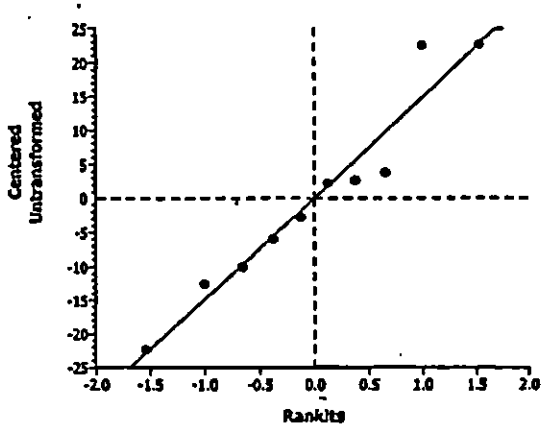




CETIS Analysis Detail

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.66%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.61649	1.85955	0.0723	0.60907	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.7008101	0.700810	1	2.61	0.14465	Non-Significant Effect
Error	2.14558	0.268198	8			
Total	2.84639013	0.9690076	9			

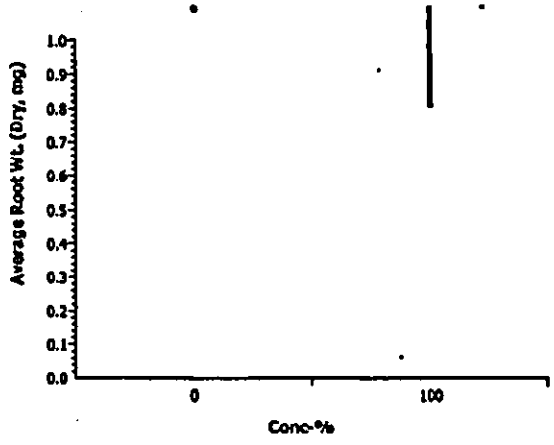
ANOVA Assumptions

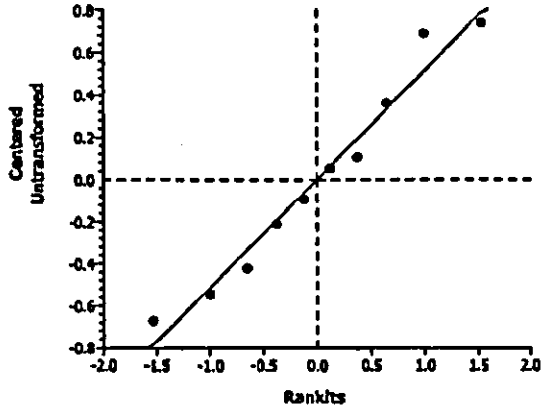
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.50938	23.15450	0.12710	Equal Variances
Distribution	Shapiro-Wilk W	0.95060		0.67555	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.22760	0.80601	1.58799	0.28706				

Graphics





CETIS Analysis Detail

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.02%

Group Comparisons

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

ANOVA Table

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

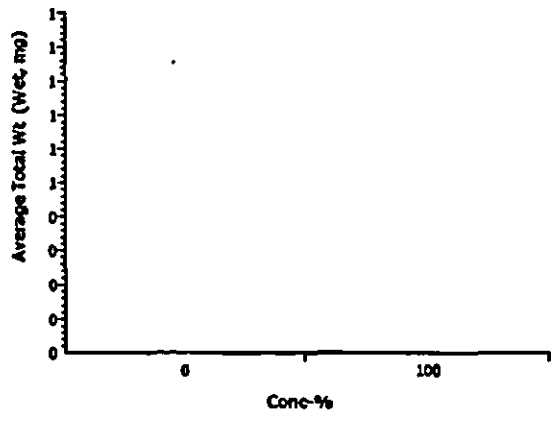
ANOVA Assumptions

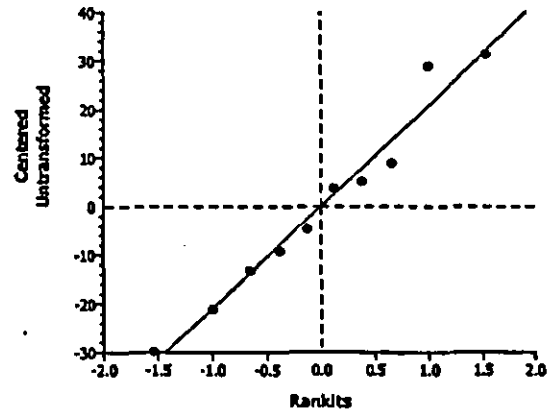
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.28872	23.15450	0.04430	Equal Variances
Distribution	Shapiro-Wilk W	0.95917		0.77640	Normal Distribution

Data Summary

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

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	11-5408-1697	11-5408-1697	19 Jul-06 1:39 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

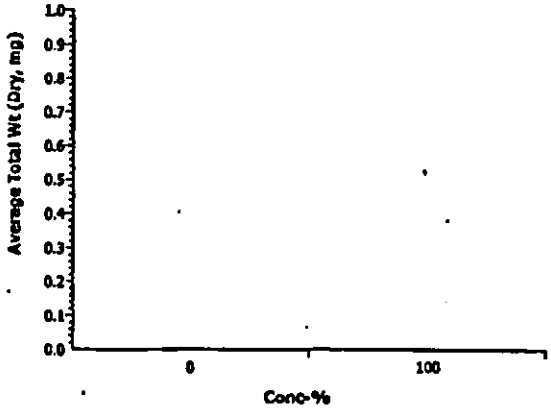
ANOVA Assumptions

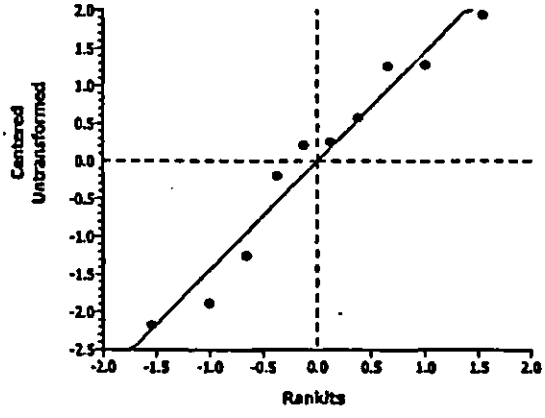
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.10625	23.15450	0.48838	Equal Variances
Distribution	Shapiro-Wilk W	0.94047		0.55831	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: May 11, 2006

Initials: Day 0 (TP) Day 12 NJ Day 14 NJ Day 16 NJ Day 18 (20) DW Day 21 (22) (TP) Day 23 — Day 27 (6-2-06) Day 34 (6-6)

Bioassay Lab ID: BG 1589-08 Sample No: JIIK55

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	18 days after planting (20)	21 days after planting (22)	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting) (6-2-06)	14-DAYS POST-EMERGENCE (34 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	6	6	6	6	6		6->5	5	7.6	7.2
	B	3	3	3	3	3		3	3		
	C	4	5	5	6	6		5	5		
	D	4	4	4	4	4		4	4		
	E	6	6	6	6	6		6->5	5		

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

Replicate A: 5 Med G — removed: 1 Med G

Replicate B: 3 Med G

Replicate C: 5 Med G — removed: 1 dark Sm

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

Replicate E: 1 Lg G, 4 Med G — removed: 1 Med G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 5 Lg G

Replicate B: 3 Lg G

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

Replicate D: 3 Med G, 1 Med G w/ 1 B shoot

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	80 mm	77 mm	81 mm	95 mm	104 mm
Replicate B	80 mm	79 mm	92 mm	mm	mm
Replicate C	81 mm	80 mm	77 mm	65 mm	105 mm
Replicate D	81 mm	59 mm	78 mm	81 mm	mm
Replicate E	103 mm	80 mm	93 mm	88 mm	64 mm

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

	Tin Tare Wt. (mg)	Wet Wt. (mg)	Dry Wt. (mg)
Replicate A	1242.78	1426.4	1271.58
Replicate B	1244.25	1355.8	1267.07
Replicate C	1266.08	1427.0	1292.04
Replicate D	1242.39	~~1337.4~~	1344.0 KM
Replicate E	1250.63	1410.0	1279.35

DRY WT = 1261.25

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

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

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

	Tin Tare Wt. (mg)	Wet Wt. (mg)	Dry Wt. (mg)
Replicate A	1253.28	1450.9	1260.91
Replicate B	1264.11	1359.2	1269.57
Replicate C	1252.91	1419.8	1260.46
Replicate D	1249.20	~~1293.1~~	1296.1 KM
Replicate E	1255.90	1414.2	1262.45

DRY WT = 1252.47

Comments:

-103-

CETIS Test Summary

Report Date: 19 Jul-06 1:42 PM
Test Link: 10-5075-5165/B158908psC

Plant Bioassay - Chronic — CH2M Hill

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

Comments: recalculated Height and Length data July 19, 2006

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

Comments: J11K55

Comparison Summary

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

CETIS Test Summary

Report Date: 19 Jul-06 1:42 PM
Test Link: 10-5075-5165/B158908psC

% Germination Summary

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

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	82.22	74.800	85.6	1.9896	4.4488	5.41%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	75.52	72	85	2.4229	5.4177	7.17%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	32.704	25.552	37.183	2.1015	4.6992	14.37%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	5.47019	4.71500	5.93998	0.22664	0.50679	9.26%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	29.597	11.725	39.524	4.6953	10.499	35.47%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.33003	0.81750	1.52600	0.13387	0.29933	22.51%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	62.300	37.277	76.248	6.6187	14.8	23.76%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	6.80022	5.53250	7.42664	0.33982	0.75985	11.17%

CETIS Test Summary

Report Date: 19 Jul-06 1:42 PM
Test Link: 10-5075-5165/B158908psC

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		85.4000	83.7	81.6	74.8000	85.6

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		85	73	72.6	72	75

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		36.724	37.1833	32.1840	25.5525	31.874

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		5.75999	5.93998	5.19202	4.71500	5.74399

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		39.524	31.6967	33.3780	11.7250	31.68

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		1.52600	1.48665	1.50999	0.81750	1.30999

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		76.2480	68.8800	65.5620	37.2775	63.534

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		7.28599	7.42664	6.70200	5.53250	7.05398

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

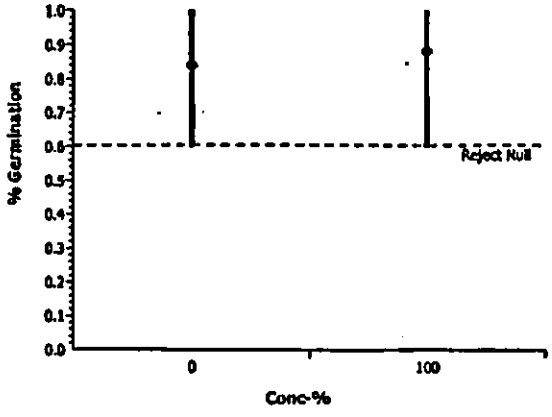
ANOVA Assumptions

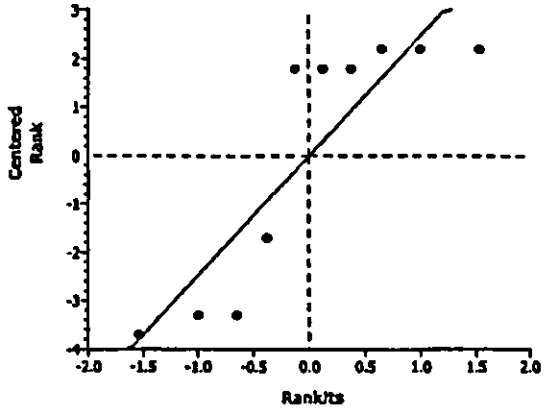
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.48569	23.15450	0.71064	Equal Variances
Distribution	Shapiro-Wilk W	0.76085		0.00484	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic | CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

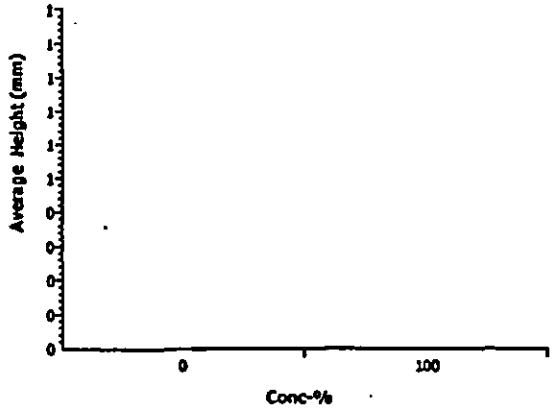
ANOVA Assumptions

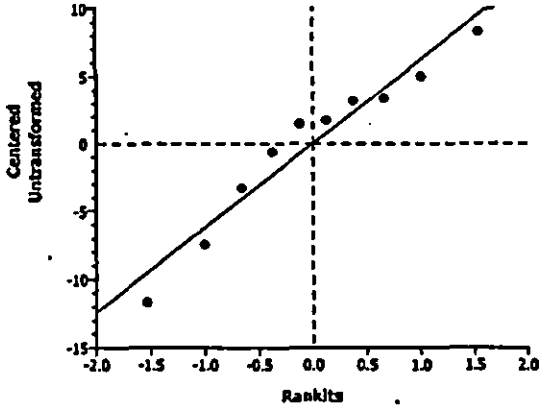
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.08913	23.15450	0.30033	Equal Variances
Distribution	Shapiro-Wilk W	0.94249		0.58100	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

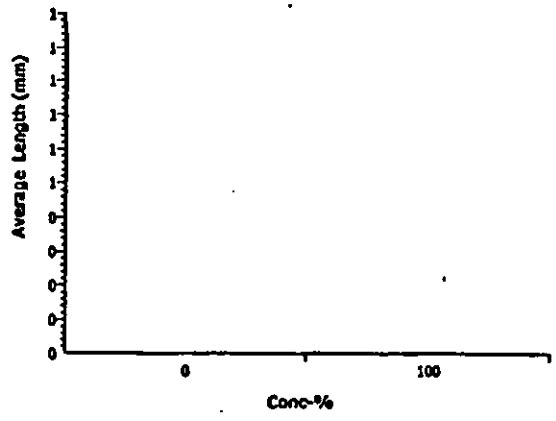
ANOVA Assumptions

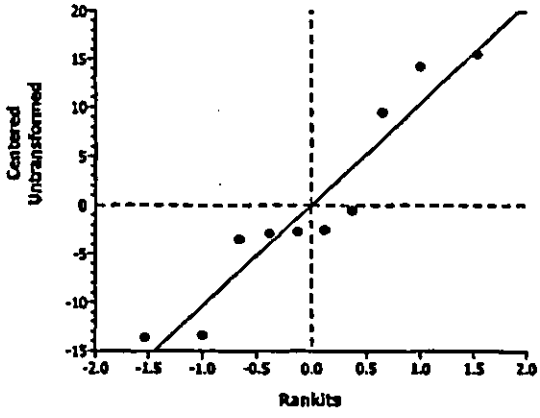
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.95377	23.15450	0.08689	Equal Variances
Distribution	Shapiro-Wilk W	0.89561		0.19592	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

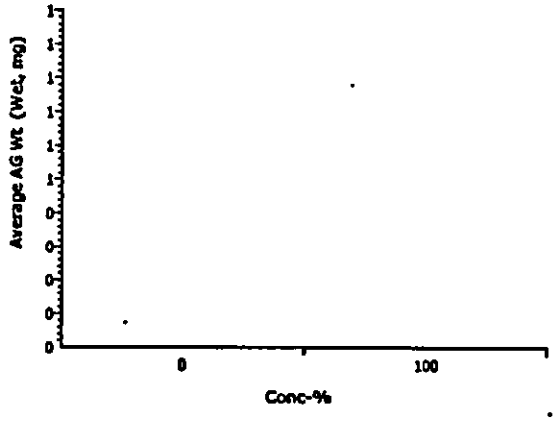
ANOVA Assumptions

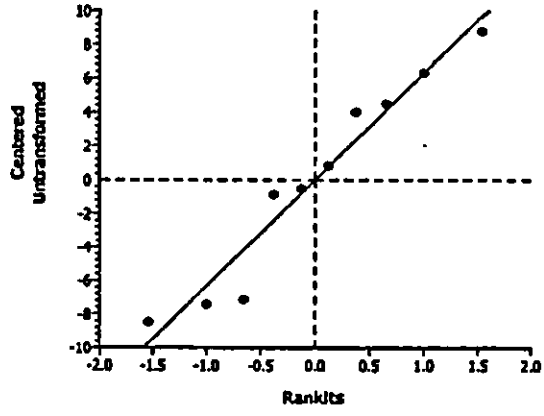
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.77566	23.15450	0.34657	Equal Variances
Distribution	Shapiro-Wilk W	0.92648		0.41414	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

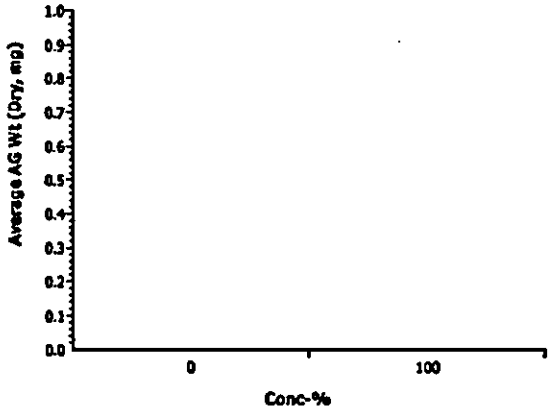
ANOVA Assumptions

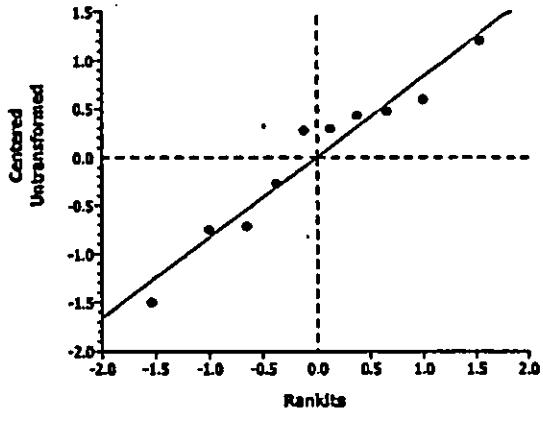
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.62761	23.15450	0.16701	Equal Variances
Distribution	Shapiro-Wilk W	0.94541		0.61457	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	43.15%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.49824	1.85955	0.0862	19.5766	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	621.9584	621.9584	1	2.24	0.17245	Non-Significant Effect
Error	2216.61	277.0763	8			
Total	2838.56873	899.03467	9			

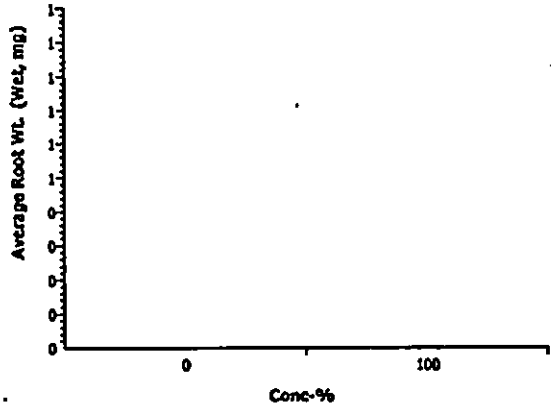
ANOVA Assumptions

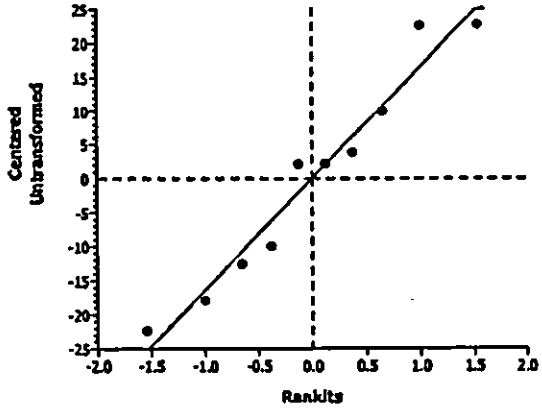
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.02731	23.15450	0.20592	Equal Variances
Distribution	Shapiro-Wilk W	0.93825		0.53374	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	29.597	11.725	39.524	10.499				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic | CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

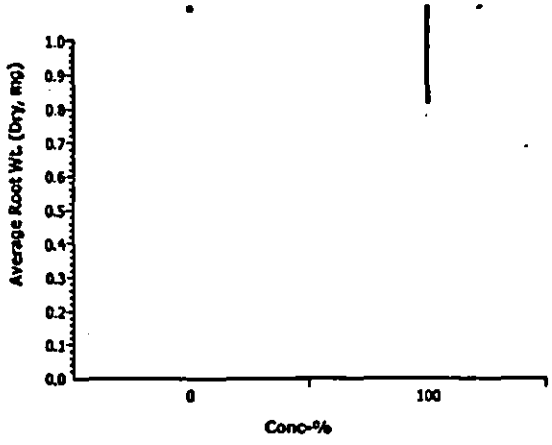
ANOVA Assumptions

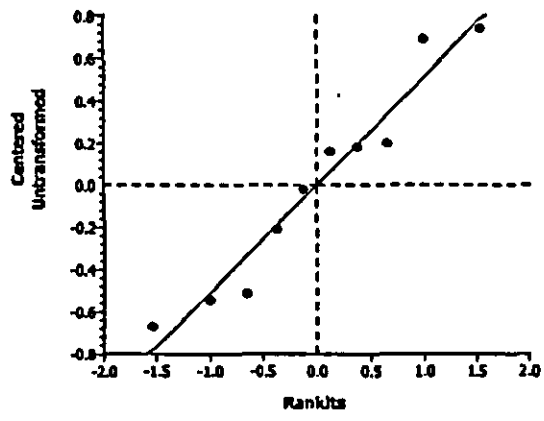
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.06682	23.15450	0.14510	Equal Variances
Distribution	Shapiro-Wilk W	0.93145		0.46235	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

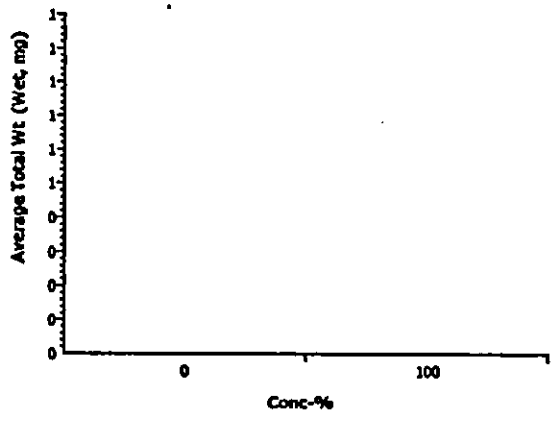
ANOVA Assumptions

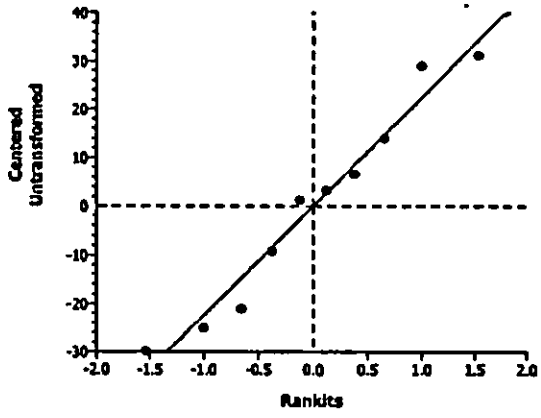
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.68848	23.15450	0.23414	Equal Variances
Distribution	Shapiro-Wilk W	0.94532		0.61362	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic	CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

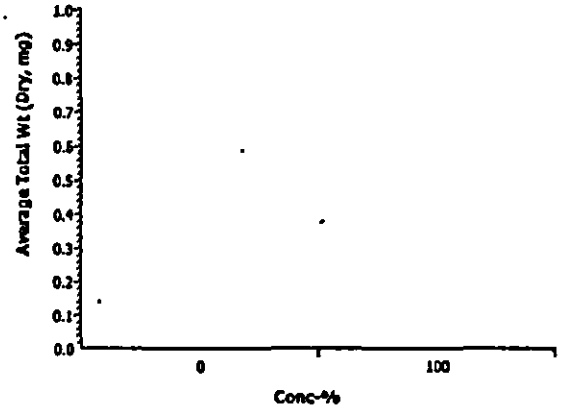
ANOVA Assumptions

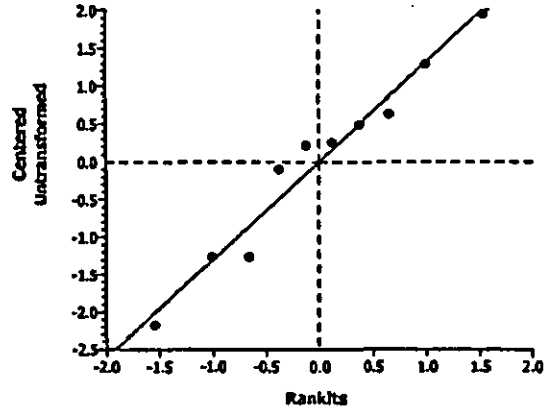
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.10679	23.15450	0.14332	Equal Variances
Distribution	Shapiro-Wilk W	0.96048		0.79133	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project — 6-2-06 — Test Start Date: May 11, 2006

Initials: Day 0 (TP) Day 12 NJ Day 14 NJ Day 16 NJ Day 18 (20) DW Day 21 (22) (TP) Day 23 — Day 27 Bu Day 34 Bu

Bioassay Lab ID: BG 1529-09 Sample No: J11KC5

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	18 (20) days after planting	21 (22) days after planting	23 days after planting	7-DAYS POST-EMERGENCE (27 days after planting) 6-7-06	14-DAYS POST-EMERGENCE (34 days after planting) 6-14-06	pH INITIAL (@ planting)	pH FINAL (@ 14 days Post-Emergence)
Control	A	0	1	1	1	2		3	3	7.6	6.9
	B	5	5	5	6	6		6→5	5		
	C	5	5	6	6	6		6→5	5		
	D	2	3	3	4	4		4	4		
	E	5	6	6	6	6		6→5	5		

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

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

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	64 mm	36 mm	40 mm	mm	mm
Replicate B	95 mm	117 mm	63 mm	60 mm	47 mm
Replicate C	67 mm	91 mm	88 mm	74 mm	71 mm
Replicate D	75 mm	59 mm	62 mm	57 mm	mm
Replicate E	77 mm	85 mm	84 mm	75 mm	86 mm

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

	Tin Tare Wt. (mg)	Wet Wt. (mg)	Dry Wt. (mg)
Replicate A	1250.70	1270.5	1253.55
Replicate B	1250.36	1357.1	~~1250.53~~ 1269.46
Replicate C	1245.09	1334.7	1272.51
Replicate D	1250.60	1311.8	1260.65
Replicate E	1248.26	1395.2	1277.08

Describe root appearance:

Replicate A
Replicate B
Replicate C
Replicate D
Replicate E

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

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

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

	Tin Tare Wt. (mg)	Wet Wt. (mg)	Dry Wt. (mg)
Replicate A	1245.98	1259.3	1247.20
Replicate B	1244.53	1425.4	1250.53
Replicate C	1248.62	1514.8	1256.85
Replicate D	1244.53	1289.8	1247.72
Replicate E	1240.166	1426.3	1247.73

Comments:

-116-

CETIS Test Summary

Report Date: 19 Jul-06 1:44 PM
Test Link: 18-2059-0600/B158909psC

Plant Bioassay - Chronic | CH2M Hill

Test No:	05-8395-3197	Test Type:	Plant Chronic	Duration:	N/A
Start Date:	11 May-06	Protocol:	ASTM E1963-02 (2002)	Species:	Poa sandbergii
Ending Date:		Dil Water:		Source:	
Setup Date:	11 May-06	Brine:			

Sample No:	11-1767-6848	Code:	B1589-09	Client:	
Sample Date:	09 May-06 02:00 PM	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	34h	Station:			

Comments: J11KC5

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
16-0306-6842	% Germination	100	> 100	N/A	27.99%	Wilcoxon Rank Sum Two-Sample
15-4864-0898	Average Height (mm)	100	> 100	N/A	16.79%	Equal Variance t Two-Sample
06-5789-3717	Average Length (mm)	< 100	100	N/A	22.76%	Equal Variance t Two-Sample
19-3035-4431	Average AG Wt (Wet, mg)	100	> 100	N/A	37.65%	Equal Variance t Two-Sample
06-0035-4435	Average AG Wt (Dry, mg)	100	> 100	N/A	36.43%	Equal Variance t Two-Sample
12-2775-1168	Average Root Wt. (Wet, mg	100	> 100	N/A	53.56%	Equal Variance t Two-Sample
11-0974-6226	Average Root Wt. (Dry, mg)	100	> 100	N/A	39.56%	Equal Variance t Two-Sample
04-7593-2673	Average Total Wt (Wet, mg	100	> 100	N/A	46.08%	Equal Variance t Two-Sample
11-8940-4265	Average Total Wt (Dry, mg)	100	> 100	N/A	36.08%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 1:44 PM
Test Link: 18-2059-0600/B158909psC

% Germination Summary

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

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	80.3	68.6	88.6	3.4969	7.8192	9.74%
100		5	69.500	46.700	81.400	6.3515	14.202	20.44%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	93.080	79.400	108.6	6.3892	14.287	15.35%
100		5	67.340	43.3	87.6	9.4343	21.096	31.33%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	31.945	23.460	40.732	3.5012	7.8289	24.51%
100		5	21.992	6.6000	37.922	5.4392	12.163	55.31%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	0.48755	1.09021	20.75%
100		5	3.70611	0.95003	5.76399	0.90635	2.02668	54.68%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	45.37	22.968	67.957	9.4226	21.07	46.44%
100		5	28.539	4.4400	53.636	9.0534	20.244	70.93%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.30133	0.67379	38.35%
100		5	1.09283	0.40668	1.64600	0.22121	0.49464	45.26%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.315	47.47	108.55	12.711	28.424	36.76%
100		5	50.531	11.040	91.558	14.337	32.058	63.44%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.01092	4.83398	8.95398	0.76793	1.71714	24.49%
100		5	4.79893	1.35669	7.17798	1.12269	2.51041	52.31%

CETIS Test Summary

Report Date: 19 Jul-06 1:44 PM
Test Link: 18-2059-0600/B158909psC

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	68.6	88.6	82	85.3000	77
100		46.7000	76.4000	78.2	64.8000	81.4000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	90.4000	79.4000	108.6	107.300	79.7
100		43.3	72.8000	87.6	47	86

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	24.5020	23.4600	40.732	38.2600	32.7733
100		6.60002	20.748	37.922	15.3000	29.388

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53799	3.75000	6.45798	5.84668	5.67668
100		0.95003	3.82000	5.48401	2.51251	5.76399

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	22.968	32.758	67.822	67.9567	35.3433
100		4.44002	36.174	53.6360	11.3175	37.1280

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.21199	1.08398	2.49600	2.44666	1.54667
100		0.40666	1.20000	1.64600	0.79749	1.41399

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	47.47	56.218	108.554	106.217	68.1167
100		11.0400	56.922	91.5580	26.6175	66.516

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.74998	4.83398	8.95398	8.29333	7.22335
100		1.35669	5.02000	7.13000	3.31000	7.17798

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

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

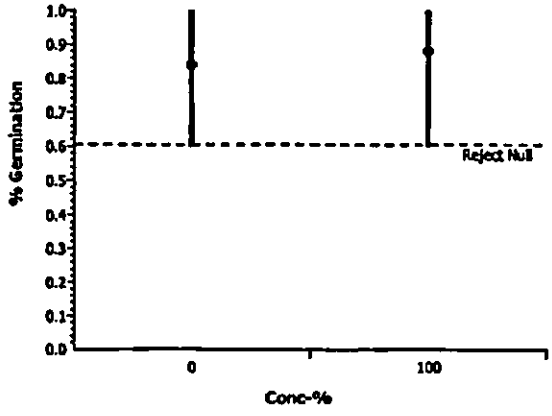
ANOVA Assumptions

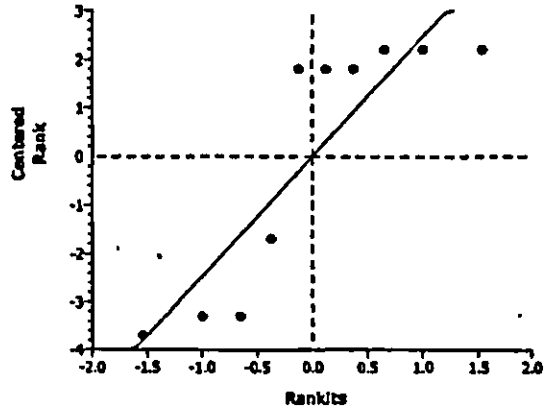
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.48569	23.15450	0.71064	Equal Variances
Distribution	Shapiro-Wilk W	0.76085		0.00484	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

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

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

Group Comparisons

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

ANOVA Table

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

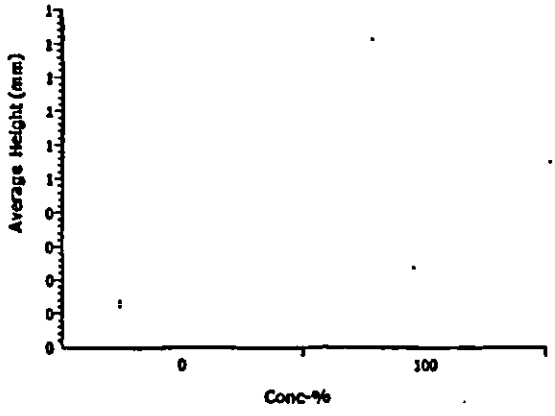
ANOVA Assumptions

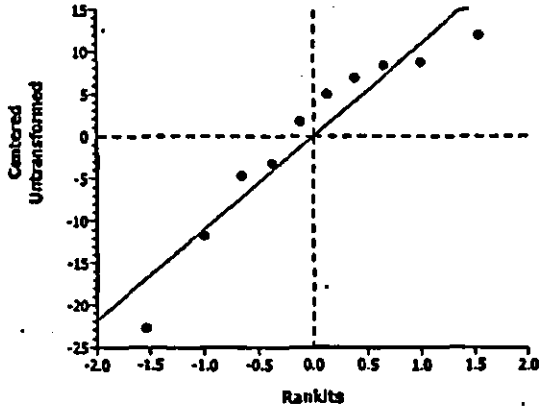
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.29915	23.15450	0.27429	Equal Variances
Distribution	Shapiro-Wilk W	0.90169		0.22863	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	22.76%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.25905	1.85955	0.0269	21.188	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1656.369	1656.369	1	5.10	0.05380	Non-Significant Effect
Error	2596.54	324.5675	8			
Total	4252.90906	1980.9365	9			

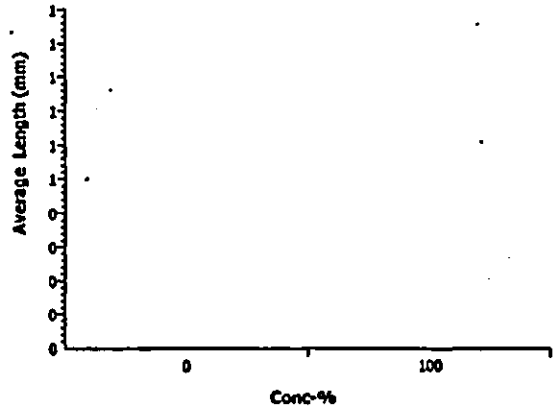
ANOVA Assumptions

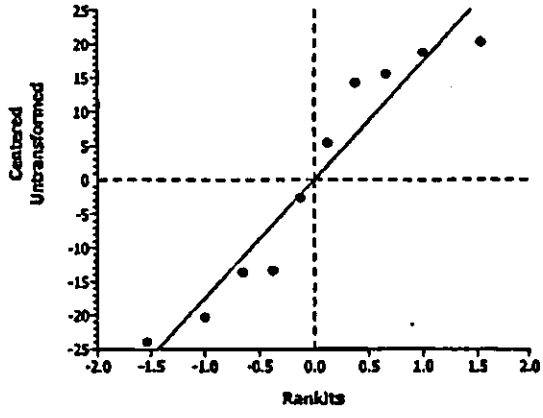
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.18037	23.15450	0.46885	Equal Variances
Distribution	Shapiro-Wilk W	0.89548		0.19528	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	93.080	79.4	108.6	14.287				
100		5	67.340	43.3	87.6	21.096				

Graphics





CETIS Analysis Detail

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	37.65%

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	247.6984	247.6984	1	2.37	0.16242	Non-Significant Effect
Error	836.8788	104.6098	8			
Total	1084.57697	352.30819	9			

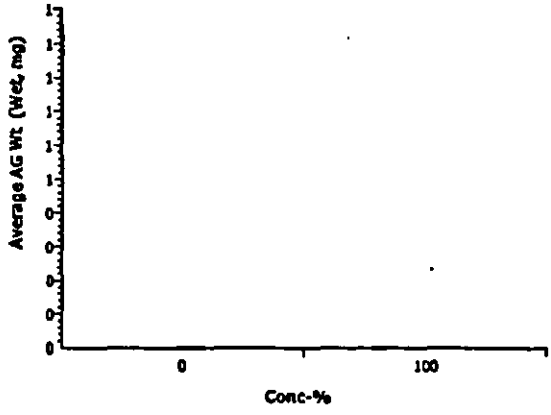
ANOVA Assumptions

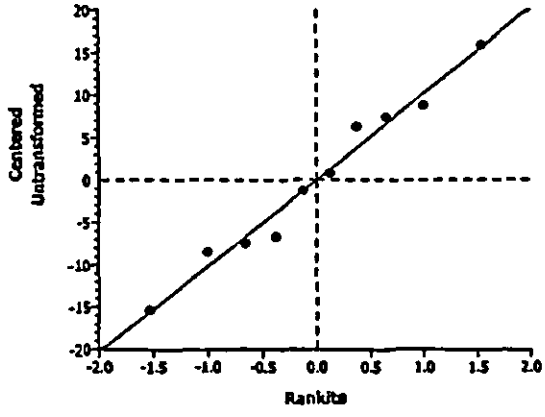
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.41347	23.15450	0.41437	Equal Variances
Distribution	Shapiro-Wilk W	0.97144		0.90391	Normal Distribution

Data Summary

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

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	18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	36.43%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.5039	1.85955	0.0855	1.91378	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5.988886	5.988886	1	2.26	0.17102	Non-Significant Effect
Error	21.18359	2.647949	8			
Total	27.1724763	8.6368351	9			

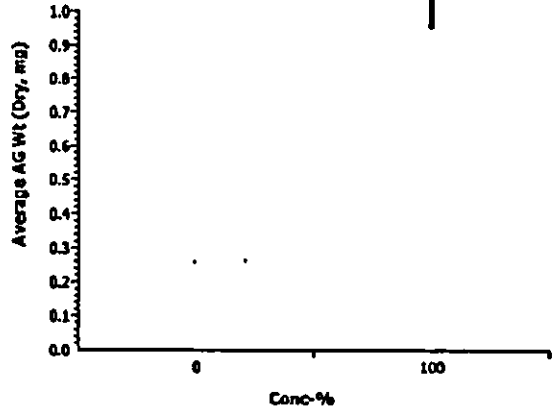
ANOVA Assumptions

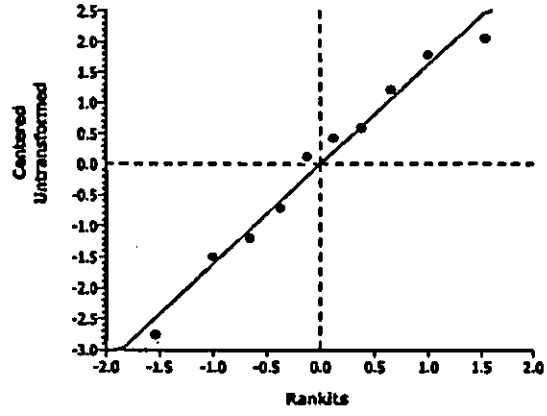
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.45577	23.15450	0.25699	Equal Variances
Distribution	Shapiro-Wilk W	0.96808		0.87231	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.25387	3.75000	6.45798	1.09021				
100		5	3.70611	0.95003	5.76399	2.02666				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	53.56%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.28801	1.85955	0.1169	24.2988	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	708.1634	708.1634	1	1.66	0.23375	Non-Significant Effect
Error	3414.961	426.8701	8			
Total	4123.12457	1135.0335	9			

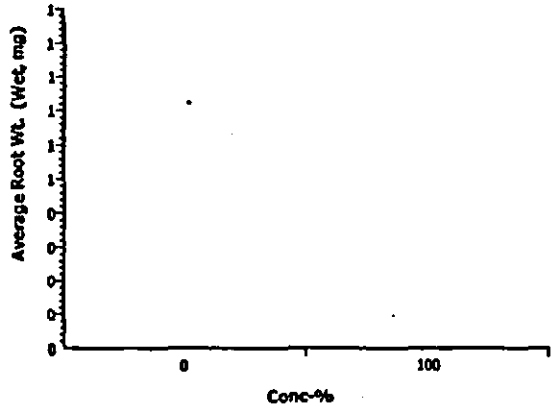
ANOVA Assumptions

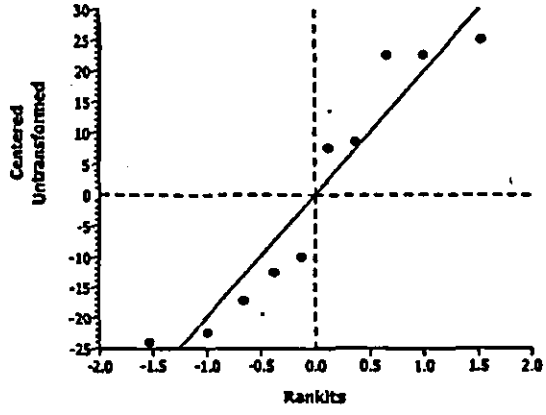
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.08323	23.15450	0.94011	Equal Variances
Distribution	Shapiro-Wilk W	0.88065		0.13276	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	45.37	22.968	67.957	21.07				
100		5	28.539	4.4400	53.636	20.244				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

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

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

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.103015	1.103015	1	3.18	0.11348	Non-Significant Effect
Error	2.79465	0.349331	8			
Total	3.89766467	1.4523461	9			

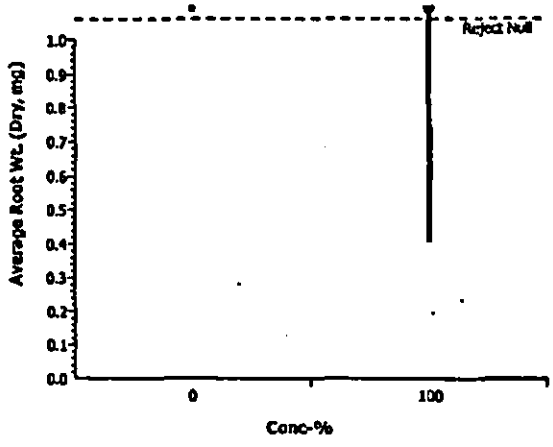
ANOVA Assumptions

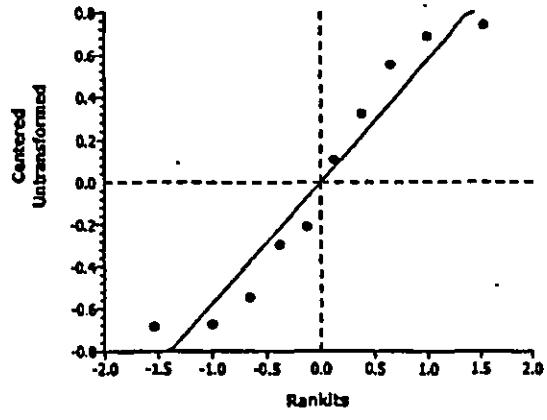
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.85552	23.15450	0.56404	Equal Variances
Distribution	Shapiro-Wilk W	0.90430		0.24411	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.75706	1.08398	2.49600	0.67379				
100		5	1.09283	0.40666	1.64600	0.49464				

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	18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2	

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

Group Comparisons

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

ANOVA Table

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

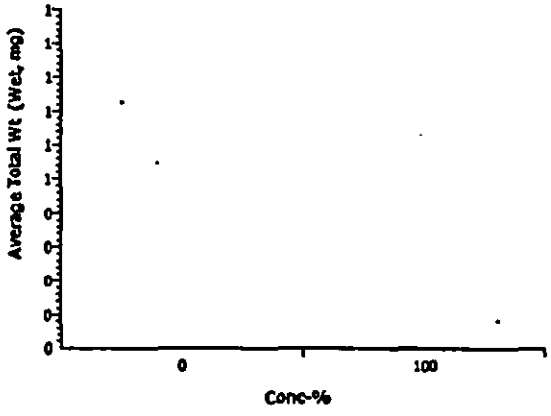
ANOVA Assumptions

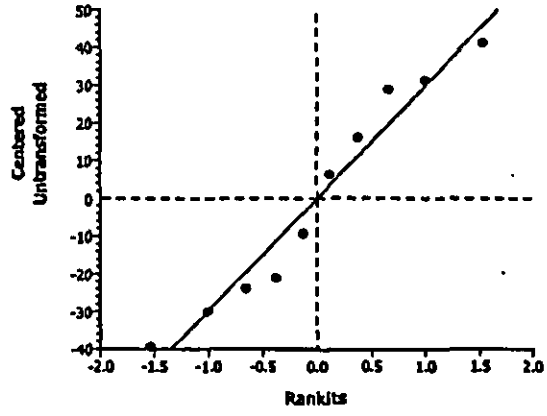
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.27212	23.15450	0.82121	Equal Variances
Distribution	Shapiro-Wilk W	0.93345		0.48264	Normal Distribution

Data Summary

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

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	18-2059-0600	18-2059-0600	19 Jul-06 1:44 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

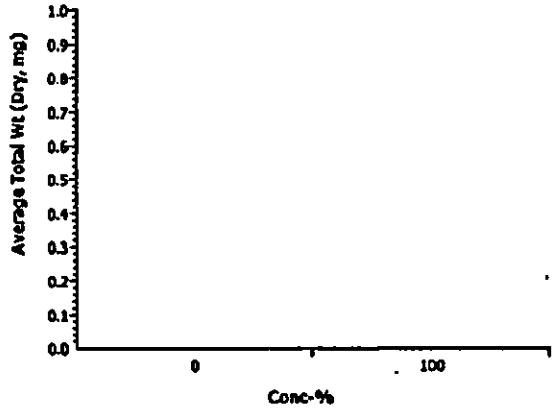
ANOVA Assumptions

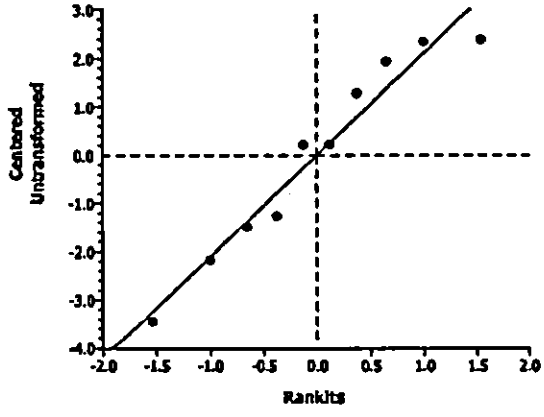
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.13737	23.15450	0.48004	Equal Variances
Distribution	Shapiro-Wilk W	0.93153		0.46311	Normal Distribution

Data Summary

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

Graphics





APPENDIX B
CHAIN OF CUSTODY

F 1610

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-138	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-48:2		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.

SAMPLE ANALYSIS													
Preservation				None	None								
Type of Container				G/P	P/G								
No. of Container(s)				1	1								
Volume				1000g	4000g								
				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172								
Sample No.	Matrix *	Sample Date	Sample Time										
JJJT0	SOIL	4-26-06	1500	1	1								

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Bill Lettkeman Jeffs	4-26-06 1530	Received By/Stored In: Nancy Hilbert CH2M HILL	4-26-06 1530
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 forms. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

BG 1589-01 Blanks

Matrix *

SoSoil
SEsSediment
SOsSolid
SlsSludge
W = Water
O=Oil
AsAir
DSsDrum Solids
DLsDrum Liquids
TsTissue
WisWipe
LsLiquid
VsVegetation
XsOther

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

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

F1630

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-156	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-49-2		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								
J11J[illegible]	SOIL	4-30-06	1420	1	1						

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From Elizabeth Tiffe	9:00A 5-1-06	Received By/Stored In Doug Hubbard CH2M HILL	5-1-06 0846
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

B61529-02 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
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)

F1636

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-180	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Data Turnaround 45 Days Air Quality ☐
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 1607-D2:1	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	

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										
J16JY2	SOIL	5-1-06	1700	1	1								

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 5-2-06	Received By/Stored In	Date/Time 5-2-06
Elizabeth M. Tepper	0900	Diane Hubbard CH2M HILL	09:57
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~~

BG1529-03 Bluegrass

Matrix *

SoSoil
SEnSediment
SOnSolid
SlnSludge
WnWater
OnOil
AnAir
DSnDrum Solids
DLnDrum Liquids
TnTissue
WnWipe
LnLiquid
VnVegetation
XnOther

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

BHCEE-011 (08/29/2005)

F1645

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-162	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Data Turnaround 45 Days Air Quality ☐
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 116-F-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	

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									
J1TJW4	SOIL	5-2-06	14:00	1	1							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 1630	Received By/Stored In	Date/Time 5-2-06
Elizabeth M Tepps	~~5-2-06~~	Chrissy Hubbard CH2M HILL	1608
Relinquished By/Removed From	Date/Time 5-2-06	Received By/Stored In	Date/Time
ET			
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

36 1529-04 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
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)

F1648

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-234	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality ☐
Data Turnaround 45 Days				
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600--208		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	

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquating, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11K46	SOIL	5-2-06	17:37										

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth Y Tyler	0900 5-3-06	Daisy Hubbard CH2M HILL	5-3-06 9:05

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

BG1589-05 Bluegrass

Matrix *
Sa=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
Ts=Tissue
Wi=Wipe
Li=Liquid
Ve=Vegetation
X=Other

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

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

F11690

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-258	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location YAKIMA RIDGE II		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										
J11K68	SOIL	5-7-06	1424	1	1								1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M. Tapp	5-8-06 1111	Doing Hallard CH2M HILL	5-8-06 1220
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

36 1659-06 Bluegrass

Matrix *

SeSoil
SDSediment
SOSolid
SlSludge
W = Water
OtOil
AtAir
DSDrum Solids
DLDrum Liquids
TsTissue
WiWipe
LiLiquid
VtVegetation
XtOther

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

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

F1691

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-252	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600-171		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									
J11K87	SOIL	5-8-06	1600	1	1							

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tyree	1600 5-8-06	Darrin Hubbard CH2M HILL	5-8-06 14:30

SPECIAL INSTRUCTIONS

* These marks indicate that unless fined out, analytes to be included with Strontium-89,90 – Total Sr analysis fraction.

~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

BG 1589-07 Blossess

Matrix *

S=Soil
SB=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
Am=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)

F1700

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-240	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600-181		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									
J11K55	SOIL	5-8-06	1955	1	1							

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Angela M Tyree	5-9-06 10:20	Received By/Stored In: Diane Clubbard CH2MHILL	5-9-06 10:45
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.

^ 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 1599-08 Bluegrass

Matrix *

S=Soil
SS=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)

F1705

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-276	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location SADDLE MOUNTAIN		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									
J11K55	SOIL	5-9-06	1400	1	1							

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tipton	1405 5-9-06	Dwight Hilbert CH2MHILL	5-9-06 1415

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 1589-09 Bluegrass

Matrix *

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

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

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

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

CH2MHILL
Applied Sciences Laboratory

RECEIVED
JUN 2006

May 31, 2006

ELR Consulting
2328 S. Garfield Street
Kennewick, WA 99337

RE: Laboratory Report for ELR Consulting
Applied Sciences Laboratory Reference No. F1610

Dear Emmett Richards:

On April 26, 2006, CH2M HILL Applied Sciences Laboratory received one sample with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

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

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

Sincerely,

Mark Bos
Analytical Manager

Enclosures

CLIENT SAMPLE CROSS-REFERENCE

CH2M HILL Applied Sciences Laboratory Reference No. F1610

Sample ID	Client Sample ID	Date Collected	Time Collected
F161001	J11JT0	04/26/2006	15:00

Table of Contents
CH2M HILL Laboratory Reference No. F1610

Page

Ammonia Analysis by Method EPA350.3 5
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QC Summary 10

Anions Analysis by Method EPA300.0 19
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QC Summary 24

Moisture Analysis by Method ASTM D2216 36

Particle Size Analysis by Method D422 38

pH Analysis by Method SW9045C 40

Total Kjeldahl Nitrogen Analysis by Method EPA351.4 42
Sample Data Summary 44
QC Summary 47

Total Organic Carbon Analysis by Method ASTM E777 56
Sample Data Summary 58
QC Summary 61

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Applied Sciences Laboratory

Organic CLP and CLP Like Data Qualifiers

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

Inorganic CLP and CLP Like Data Qualifiers

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

AMMONIA
METHOD EPA 350.3

CASE NARRATIVE
AMMONIA

Analytical Method: EPA 350.3 | Batch No.: F1610

Lab Name: CH2M HILL Applied Sciences Lab | Contract #.: 920842.OTC

Project Name: ELR Consulting | Prime Contractor.: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)
All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Duplicate Sample(s):
All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

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

Reported by: Elizabeth M. Tuggs | Date: 5-30-06

Reviewed by: Douglas A. Zetendy | Date: 5/31/06

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JT0

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Matrix: SOIL

Lab Sample ID: F161001

% Moisture: 1

Date Received: 04/26/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7664-41-7	Ammonia-N	1.20	4.51	3.59	B	mg/kg	1	0.4477 G	E350.3	05/24/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0524

SDG No.: F1610

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0524

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7664-41-7	Ammonia-N	0.534	2.00	2.00	U	mg/kg	1	1 G	E350.3	05/24/06

QC DATA SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 05/24/06 09:30

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 052406NH3

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Ammonia-N	0.10	163	1.0	108	10.0	54.3	100	-0.10						

Comments:

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 05/24/06 09:30

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 052406NH3

Analyte	Curve Type	r	Q
Ammonia-N	LNR	1.0000	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Second Source ID: ICV-0524

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 052406NH3

Analyte	Expected	Found	%D	Q
Ammonia-N	1	1.03	3.3	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Analytical Lot ID: 052406NH3

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 052406NH3

CCV #1 ID: CV1-0524 CCV #2 ID: CV2-0524 CCV #3 ID: CV3-0524

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Ammonia-N	1	0.999	-0.1		10	9.95	-0.5		10	9.02	-9.8	

Comments:

ET060530-10:05-F1610-W

FORM II-A GEN CHEM

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0524

SDG No.: F1610

Analysis Method: E350.3

Initial Cal ID: 052406NH3

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0524

Date Analyzed: 05/24/06

Time Analyzed: 1021

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
08	BS1S0524	BS1S0524	05/24/06	0955
15	J11JT0	F161001	05/24/06	1037

COMMENTS: _____

ET060530-10:03-F1610-W

FORM III GEN CHEM

E350.3

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

LCS ID: BS1S0524

Initial Cal ID: 052406NH3

Date Analyzed: 05/24/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 0955

Instrument: NONE

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Ammonia-N	20	20.7	103	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 052406NH3

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	LEVEL 1	LEVEL 1	05/24/06	0930
02	LEVEL 2	LEVEL 2	05/24/06	0935
03	LEVEL 3	LEVEL 3	05/24/06	0940
04	LEVEL 4	LEVEL 4	05/24/06	0947
05	CV1-0524	CV1-0524	05/24/06	0947
06	CV2-0524	CV2-0524	05/24/06	0950
07	ICV-0524	ICV-0524	05/24/06	0955
08	BS1S0524	BS1S0524	05/24/06	0955
10	SB1-0524	SB1-0524	05/24/06	1021
15	J11JT0	F161001	05/24/06	1037
22	CV3-0524	CV3-0524	05/24/06	1101

COMMENTS: _____

CH2MHILL
Applied Sciences Laboratory

CH2M HILL
Applied Sciences Labortory (ASL)
2300 NW Walnut Blvd.
P.O. Box 428
Corvallis, OR 97330-0428
Telephone: 541-752-4271
Fax: 541-752-0278

05/30/06

MDL Study Report

Analytical Method: E350.3

Instrument ID: NONE

Matrix: Soil

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Ammonia	08/05/05	2	2.18	1.70	1.73	1.70	1.73	1.74	1.81		0.170	0.534

ANIONS BY METHOD EPA300.0A

CASE NARRATIVE
ANIONS

Analytical Method: EPA300.0 Batch No.: F1610

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 920842.OTC

Base/Command: ELR Consulting Prime Contractor.: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

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

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Analytical Exception:
None.

F. Other:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

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

Reported by: _____ Date: 5/19/06

Reviewed by: _____ Date: 5/24/06

AFCEE FORM I-1

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JT0

SDG No.: F1610

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F161001

Date Received: 04/26/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.0588	0.484	0.573		mg/kg	1	5.218 G	E300.0A	05/09/06
16984-48-8	Fluoride	0.0525	0.484	0.0819	B	mg/kg	1	5.218 G	E300.0A	05/09/06
14797-55-8	Nitrate-N	0.0454	0.484	1.05		mg/kg	1	5.218 G	E300.0A	05/09/06
14797-65-0	Nitrite-N	0.0434	0.484	0.270	B	mg/kg	1	5.218 G	E300.0A	05/09/06
14808-79-8	Sulfate	0.0780	0.484	4.07		mg/kg	1	5.218 G	E300.0A	05/09/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0509

SDG No.: F1610

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0509

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.0607	0.500	0.500	U	mg/kg	1	5 G	E300.0A	05/09/06
16984-48-8	Fluoride	0.0543	0.500	0.500	U	mg/kg	1	5 G	E300.0A	05/09/06
14797-55-8	Nitrate-N	0.0469	0.500	0.500	U	mg/kg	1	5 G	E300.0A	05/09/06
14797-65-0	Nitrite-N	0.0449	0.500	0.500	U	mg/kg	1	5 G	E300.0A	05/09/06
14808-79-8	Sulfate	0.0806	0.500	0.0900	B	mg/kg	1	5 G	E300.0A	05/09/06

QC DATA SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 01/30/06 18:27

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Chloride	0.020	0.0032	0.050	0.0041	0.10	0.023	0.50	0.050	1.0	0.11	5.0	0.67	10.0	1.5
Fluoride					0.10	0.0085	0.50	0.046	1.0	0.13	5.0	0.85	10.0	1.8
Nitrate-N	0.020	0.0059	0.050	0.012	0.10	0.067	0.50	0.14	1.0	0.32	5.0	1.8	10.0	4.1
Nitrite-N	0.020	0.0067	0.050	0.012	0.10	0.050	0.50	0.10	1.0	0.25	5.0	1.4	10.0	3.0
Sulfate	0.060	0.0065	0.15	0.014	0.30	0.059	1.5	0.13	3.0	0.27	15.0	1.5	30.0	3.2

Comments:

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 01/30/06 18:27

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

Analyte	Curve Type	r	Q
Chloride	LNR	0.9985	
Fluoride	LNR	0.9988	
Nitrate-N	LNR	0.9983	
Nitrite-N	LNR	0.9988	
Sulfate	LNR	0.9991	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Second Source ID: ICV-0130

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

Analyte	Expected	Found	%D	Q
Chloride	5	5.06	1.2	
Fluoride	5	4.57	-8.6	
Nitrate-N	7.19	7.13	-0.8	
Nitrite-N	1.13	1.02	-9.4	
Sulfate	5	5.14	2.8	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Analytical Lot ID: 005090603

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

CCV #1 ID: CV1-0509 CCV #2 ID: CV2-0509 CCV #3 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Chloride	5	4.53	-9.5		2.5	2.34	-6.3					
Fluoride	5	4.74	-5.2		2.5	2.43	-2.7					
Nitrate-N	5	4.65	-6.9		2.5	2.50	-0.2					
Nitrite-N	5	5.15	3.1		2.5	2.37	-5.0					
Sulfate	15	14.3	-4.4		7.5	7.04	-6.1					

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0509

SDG No.: F1610

Analysis Method: E300.0A

Initial Cal ID: 300A-013006

Matrix: (Soil/Water) SOIL

Instrument: ICQ

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0509

Date Analyzed: 05/09/06

Time Analyzed: 1801

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
16	BS1S0509	BS1S0509	05/09/06	1653
17	BS2S0509	BS2S0509	05/09/06	1712
18	BS3S0509	BS3S0509	05/09/06	1732
23	J11JT0	F161001	05/09/06	2055

COMMENTS: _____

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS1S0509

Initial Cal ID: 300A-013006

Date Analyzed: 05/09/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1653

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Chloride	25	25.4	102	90-110	
Fluoride	25	24.3	97.1	90-110	
Sulfate	25	26.9	108	90-110	

* Values outside of QC limits

Comments:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS2S0509

Initial Cal ID: 300A-013006

Date Analyzed: 05/09/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1712

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Nitrite-N	5.65	6.14	109	90-110	

* Values outside of QC limits

Comments:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS3S0509

Initial Cal ID: 300A-013006

Date Analyzed: 05/09/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1732

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R*	QC Limits %R	Q
Nitrate-N	35.95	39.6	110	90-110	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 300A-013006

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	LEVEL1	LEVEL1	01/30/06	1729
03	LEVEL2	LEVEL2	01/30/06	1739
04	LEVEL3	LEVEL3	01/30/06	1749
05	LEVEL4	LEVEL4	01/30/06	1758
06	LEVEL5	LEVEL5	01/30/06	1808
07	LEVEL6	LEVEL6	01/30/06	1818
08	LEVEL7	LEVEL7	01/30/06	1827
10	ICV-0130	ICV-0130	01/30/06	1846
11	ICV-0130	ICV-0130	01/30/06	1856
13	ICV-0130	ICV-0130	01/30/06	1916

COMMENTS: _____

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 0050906Q3

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
15	CV1-0509	CV1-0509	05/09/06	1643
16	BS1S0509	BS1S0509	05/09/06	1653
17	BS2S0509	BS2S0509	05/09/06	1712
18	BS3S0509	BS3S0509	05/09/06	1732
19	SB1-0509	SB1-0509	05/09/06	1801
23	J11JT0	F161001	05/09/06	2055
28	CV2-0509	CV2-0509	05/09/06	2144

COMMENTS: _____

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05/19/06

MDL Study Report

Analytical Method: E300.0A
Matrix: Soil

Instrument ID: ICQ
Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Nitrate	11/01/05	0.25	0.225	0.250	0.215	0.240	0.245	0.225	0.255		0.0149	0.0469
Nitrite-N	11/01/05	0.25	0.230	0.270	0.270	0.260	0.270	0.260	0.265		0.0143	0.0449
Sulfate	11/01/05	0.75	0.790	0.735	0.730	0.795	0.775	0.750	0.760		0.0256	0.0806
Chloride	11/01/05	0.25	0.315	0.315	0.340	0.340	0.290	0.300	0.330		0.0193	0.0607
Fluoride	11/02/05	0.5	0.505	0.480	0.500	0.470	0.490	0.485	0.455		0.0173	0.0543

PERCENT MOISTURE
ASTM D2216

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JT0

SDG No.: F1610

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F161001

Date Received: 04/26/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
MOISTURE	Moisture	0.00	0.00	0.462		%	1	8.2553 G	ASTM D2216	04/27/06

ET060427-19:09-F1610-W

FORM I GEN CHEM

PARTICLE SIZE
METHOD 422

Hanford

Particle Size

500.0 g sample used

Weight retained is the weight of material ON each sieve

ANALYST: KRM 04/28/2006

Lab I.D.	Client I.D.	Sieve #	Sieve Size (um)	Sieve Size (mm)	Weight Retained (g)	Weight Retained (%)	Cumulative Coarser (%)	Cumulative Finer (%)
F161001	J11JT0	8	2362	2.362	0.00	0.00	0.00	100.00
		16	1180	1.180	26.90	5.37	5.37	94.63
		30	600	0.600	131.50	26.25	31.62	68.38
		50	500	0.500	127.50	25.45	57.07	42.93
		100	147	0.147	77.90	15.55	72.61	27.39
		200	75	0.075	108.00	21.56	94.17	5.83
		pan			29.20	5.83	100.00	0.00
		total			501.0			

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Tel 541.752.4271 Fax 541.752.0276

pH
METHOD SW9045C

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JT0

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Matrix: SOIL

Lab Sample ID: F161001

% Moisture: 1

Date Received: 04/26/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
pH	pH	0.00	0.00	8.87		pH	1	20 G	SW9045C	04/27/06

ET060427-19:08-F1610-W

FORM I GEN CHEM

TKN
METHOD EPA 351.4

CASE NARRATIVE.
TKN

Analytical Method: EPA 351.4 | Batch No.: F1610

Lab Name: CH2M HILL Applied Sciences Lab | Contract #.: 920842.OTC

Project Name: ELR Consulting | Prime Contractor.:

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)
All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Duplicate Sample(s):
All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

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

Reported by: Elizabeth A. Tyson | Date: 5-30-06

Reviewed by: Douglas A. Hanby | Date: 5/30/06

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JT0

SDG No.: F1610

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F161001

Date Received: 04/26/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	53.8	197	134	B	mg/kg	1	0.5117 G	E351.4	05/05/06

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0505

SDG No.: F1610

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0505

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	27.3	100	61.3	B	mg/kg	1	1 G	E351.4	05/05/06

QC DATA SUMMARY

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 05/05/06 1040

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 050506TKN

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Total Kjeldahl Nitrogen	2.0	167	20.0	112	200	55.7	2000	-2.2						

Comments:

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 05/05/06 1040

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 050506TKN

Analyte	Curve Type	r	Q
Total Kjeldahl Nitrogen as N	LNR	0.9998	

Comments:

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Second Source ID: ICV-0505

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 050506TKN

Analyte	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	28.4	30.5	7.5	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Analytical Lot ID: 050506TKN

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 050506TKN

CCV #1 ID: CV1-0505 CCV #2 ID: CV2-0505 CCV #3 ID: CV3-0505

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	2	2.06	3.1		20	19.4	-2.8		20	17.3	-13.3	

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0505

SDG No.: F1610

Analysis Method: E351.4

Initial Cal ID: 050506TKN

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0505

Date Analyzed: 05/05/06

Time Analyzed: 1129

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
09	BS1S0505	BS1S0505	05/05/06	1129
18	J11JT0	F161001	05/05/06	1150

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

LCS ID: BS1S0505

Initial Cal ID: 050506TKN

Date Analyzed: 05/05/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1129

Instrument: NONE

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Kjeldahl Nitrogen as N	1420	1530	108	.75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 050506TKN

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	LEVEL 1	LEVEL 1	05/05/06	1040
02	LEVEL 2	LEVEL 2	05/05/06	1045
03	LEVEL 3	LEVEL 3	05/05/06	1050
04	LEVEL 4	LEVEL 4	05/05/06	1055
05	CV1-0505	CV1-0505	05/05/06	1122
06	CV2-0505	CV2-0505	05/05/06	1122
07	ICV-0505	ICV-0505	05/05/06	1127
09	BS1S0505	BS1S0505	05/05/06	1129
11	SB1-0505	SB1-0505	05/05/06	1129
18	J11JT0	F161001	05/05/06	1150
22	CV3-0505	CV3-0505	05/05/06	1322

COMMENTS: _____

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05/30/06

MDL Study Report

Analytical Method: E351.4
Matrix: Soil

Instrument ID: NONE
Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Total Kjeldahl Nitrogen	03/13/06	100	168	154	161	147	152	161	171		8.67	27.3

TOTAL ORGANIC CARBON
BY ASTM E777

CASE NARRATIVE
TOC SOILS

Analytical Method: ASTM E-777 | Batch No.: F1610

Lab Name: CH2M HILL Applied Sciences Lab | Contract #: 920842.OTC

Project Name: ELR Consulting | Prime Contractor: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)
All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Duplicate Sample(s):
All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:
All acceptance criteria were met.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

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

Reported by: _____ Date: 5-30-06

Reviewed by: _____ Date: 5/31/06

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JT0

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Matrix: SOIL

Lab Sample ID: F161001

% Moisture: 0

Date Received: 04/26/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	135	387	3700		mg/kg	1	0.2585 G	ASTM E777	05/16/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0516

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Matrix: SOIL

Lab Sample ID: SB1-0516

% Moisture: 0

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	35.0	100	100	U	mg/kg	1	1 G	ASTM E777	05/16/06

QC SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Initial Calibration Date: 10/14/05 11:48

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Total Organic Carbon	100	737000	200	1600000	1000	6840000	4000	2.48E+7	8000	4.79E+7				

Comments:

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Initial Calibration Date: 10/14/05 11:48

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

Analyte	Curve Type	r	Q
Total Organic Carbon	LNR	0.9997	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Second Source ID: ICV-1014

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

Analyte	Expected	Found	%D	Q
Total Organic Carbon	6430	6680	3.9	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Analytical Lot ID: 051606TOCS

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

CCV #1 ID: CV1-0516 CCV #2 ID: CV2-0516 CCV #3 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Organic Carbon	4000	4230	5.9		4000	4180	4.4					

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0516

SDG No.: F1610

Analysis Method: ASTM E777

Initial Cal ID: 101405S1

Matrix: (Soil/Water) SOIL

Instrument: TOC Skalar

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0516

Date Analyzed: 05/16/06

Time Analyzed: 1049

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	BS1S0516	BS1S0516	05/16/06	1038
07	J11JT0	F161001	05/16/06	1126

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

LCS ID: BS1S0516

Initial Cal ID: 101405S1

Date Analyzed: 05/16/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1038

Instrument: TOC Skalar

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Organic Carbon	8840	9450	107	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Code: CVO

Instrument: TOC SKALAR

Analytical Lot ID: 101405TOCS

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	LEVEL1	LEVEL1	10/14/05	1148
03	LEVEL2	LEVEL2	10/14/05	1158
04	LEVEL3	LEVEL3	10/14/05	1208
05	LEVEL4	LEVEL4	10/14/05	1218
06	LEVEL5	LEVEL5	10/14/05	1228
07	ICV-1014	ICV-1014	10/14/05	1252

COMMENTS: _____

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1610

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Code: CVO

Instrument: TOC Skalar

Analytical Lot ID: 051606TOCS

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	CV1-0516	CV1-0516	05/16/06	1022
02	BS1S0516	BS1S0516	05/16/06	1038
03	SB1-0516	SB1-0516	05/16/06	1049
07	J11JT0	F161001	05/16/06	1126
14	CV2-0516	CV2-0516	05/16/06	1246

COMMENTS: _____

CH2MHILL
Applied Sciences Laboratory

CH2M HILL
Applied Sciences Labortory (ASL)
2300 NW Walnut Blvd.
P.O. Box 428
Corvallis, OR 97330-0428
Telephone: 541-752-4271
Fax: 541-752-0278

05/25/06

MDL Study Report

Analytical Method: ASTM E777

Instrument ID: TOC Skalar

Matrix: Soil

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Total Organic Carbon	08/17/05	140	31.0	14.4	8.89	29.4	32.4	27.1	6.37		11.1	35.0

CHAIN OF CUSTODY/SHIPPING DOCUMENTS

F 1610

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-138	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-48:2		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										
J11JT0	SOIL	4-26-06	1500	1	1								-01

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Dale M Topp	Date/Time 1530 4-26-06	Received By/Stored In Albert Hubbard CH2M HILL	Date/Time 4-26-06 1530
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

Matrix *

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

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

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

CH2MHILL
Analytical Services

Sample Receipt Record

Batch Number: F1610 Date received: 4-26-06

Client/Project ELR Consulting

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation	YES	NO
Radiological Screening for AFCEE		X
Were custody seals intact and on the outside of the cooler?		HD
If yes, Where? Front____ Rear____ Lt Side____ Rt Side____		
Type of packing material: Ice Blue Ice Bubble wrap		HD
Was the Chain of Custody inside the cooler?		HD
Was the Chain of Custody properly filled out?	X	
Were the sample containers in good condition?	X	
Containers supplied by ASL?	X	
Any sample with < 1/2 holding time remaining? If so contact LPM		X
Was there ice in the cooler? Enter temp. 21.6 C		X
All VOCs free of air bubbles ?		NA

VERIFICATION OF SAMPLE PRESERVATION

Sample No	Nutrients pH <2	Metals pH <2	Volatiles pH <2	Cyanides pH >12	TOC pH <2	TOX pH <2	Other (specify)	NA (soils/sinpres)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								

LOGIN AND pH VERIFICATIONS PERFORMED BY

Diana Hubbard 4/26/06 15:41
Date/Time

Date/Time

Rev 11/05/2003-recptrcd.xls

VersionCo	LabName	SDG	FieldID	NativeID	QAQCTyp	LRType	Matrix	LabSampl	AnalysisM	ExtractionI	SampleDa	SampleTim	ReceiveDa	ExtractDat	ExtractTim	AnalysisDa	AnalysisTi	PercentSo	LabLotCtl	CAS	ParamID	Analyte	Result
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	ASTM D22	NONE	4/26/2006	15:00	4/26/2006			4/27/2006	10:39	99.54		MOISTURI	MOIST	Moisture	0.462
4.00EPAC	CHMC	F1610	BS1S0516	BS1S0516	BS		SOIL	BS1S0516	ASTM E77	NONE						5/16/2006	10:38	100		TOC	TOC	Total Orga	9450
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	ASTM E77	NONE	4/26/2006	15:00	4/26/2006			5/16/2006	11:26	99.54		TOC	TOC	Total Orga	3700
4.00EPAC	CHMC	F1610	SB1-0516	SB1-0516	LB		SOIL	SB1-0516	ASTM E77	NONE						5/16/2006	10:49	100		TOC	TOC	Total Orga	100
4.00EPAC	CHMC	F1610	BS1S0509	BS1S0509	BS		SOIL	BS1S0509	E300.0A	METHOD				5/9/2006	16:53	5/9/2006	16:53	100	SB1-0509	16887-00-4	CL	Chloride	25.4
4.00EPAC	CHMC	F1610	BS1S0509	BS1S0509	BS		SOIL	BS1S0509	E300.0A	METHOD				5/9/2006	16:53	5/9/2006	16:53	100	SB1-0509	16984-48-4	F	Fluoride	24.3
4.00EPAC	CHMC	F1610	BS1S0509	BS1S0509	BS		SOIL	BS1S0509	E300.0A	METHOD				5/9/2006	16:53	5/9/2006	16:53	100	SB1-0509	14808-79-4	SO4	Sulfate	26.9
4.00EPAC	CHMC	F1610	BS2S0509	BS2S0509	BS		SOIL	BS2S0509	E300.0A	METHOD				5/9/2006	17:12	5/9/2006	17:12	100	SB1-0509	14797-65-4	NO2N	Nitrite-N	6.14
4.00EPAC	CHMC	F1610	BS3S0509	BS3S0509	BS		SOIL	BS3S0509	E300.0A	METHOD				5/9/2006	17:32	5/9/2006	17:32	100	SB1-0509	14797-55-4	NO3N	Nitrate-N	39.6
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	E300.0A	METHOD	4/26/2006	15:00	4/26/2006	5/9/2006	8:00	5/9/2006	20:55	99.54	SB1-0509	14808-79-4	SO4	Sulfate	4.07
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	E300.0A	METHOD	4/26/2006	15:00	4/26/2006	5/9/2006	8:00	5/9/2006	20:55	99.54	SB1-0509	16887-00-4	CL	Chloride	0.573
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	E300.0A	METHOD	4/26/2006	15:00	4/26/2006	5/9/2006	8:00	5/9/2006	20:55	99.54	SB1-0509	16984-48-4	F	Fluoride	0.0819
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	E300.0A	METHOD	4/26/2006	15:00	4/26/2006	5/9/2006	8:00	5/9/2006	20:55	99.54	SB1-0509	14797-55-4	NO3N	Nitrate-N	1.05
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	E300.0A	METHOD	4/26/2006	15:00	4/26/2006	5/9/2006	8:00	5/9/2006	20:55	99.54	SB1-0509	14797-65-4	NO2N	Nitrite-N	0.27
4.00EPAC	CHMC	F1610	SB1-0509	SB1-0509	LB		SOIL	SB1-0509	E300.0A	METHOD				5/9/2006	8:00	5/9/2006	18:01	100	SB1-0509	16887-00-4	CL	Chloride	0.5
4.00EPAC	CHMC	F1610	SB1-0509	SB1-0509	LB		SOIL	SB1-0509	E300.0A	METHOD				5/9/2006	8:00	5/9/2006	18:01	100	SB1-0509	16984-48-4	F	Fluoride	0.5
4.00EPAC	CHMC	F1610	SB1-0509	SB1-0509	LB		SOIL	SB1-0509	E300.0A	METHOD				5/9/2006	8:00	5/9/2006	18:01	100	SB1-0509	14797-55-4	NO3N	Nitrate-N	0.5
4.00EPAC	CHMC	F1610	SB1-0509	SB1-0509	LB		SOIL	SB1-0509	E300.0A	METHOD				5/9/2006	8:00	5/9/2006	18:01	100	SB1-0509	14797-65-4	NO2N	Nitrite-N	0.5
4.00EPAC	CHMC	F1610	SB1-0509	SB1-0509	LB		SOIL	SB1-0509	E300.0A	METHOD				5/9/2006	8:00	5/9/2006	18:01	100	SB1-0509	14808-79-4	SO4	Sulfate	0.09
4.00EPAC	CHMC	F1610	BS1S0524	BS1S0524	BS		SOIL	BS1S0524	E350.3	METHOD				5/24/2006	9:55	5/24/2006	9:55	100	SB1-0524	7664-41-7	NH3N	Ammonia-I	20.7
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	E350.3	METHOD	4/26/2006	15:00	4/26/2006	5/24/2006	10:37	5/24/2006	10:37	99.54	SB1-0524	7664-41-7	NH3N	Ammonia-I	3.59
4.00EPAC	CHMC	F1610	SB1-0524	SB1-0524	LB		SOIL	SB1-0524	E350.3	METHOD				5/24/2006	10:21	5/24/2006	10:21	100	SB1-0524	7664-41-7	NH3N	Ammonia-I	2
4.00EPAC	CHMC	F1610	BS1S0505	BS1S0505	BS		SOIL	BS1S0505	E351.4	METHOD				5/5/2006	11:29	5/5/2006	11:29	100	SB1-0505	7727-37-9	KN	Total Kjeld	1530
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	E351.4	METHOD	4/26/2006	15:00	4/26/2006	5/5/2006	11:50	5/5/2006	11:50	99.54	SB1-0505	7727-37-9	KN	Total Kjeld	134
4.00EPAC	CHMC	F1610	SB1-0505	SB1-0505	LB		SOIL	SB1-0505	E351.4	METHOD				5/5/2006	11:29	5/5/2006	11:29	100	SB1-0505	7727-37-9	KN	Total Kjeld	61.3
4.00EPAC	CHMC	F1610	J11JT0	J11JT0	N		SOIL	F161001	SW9045C	METHOD	4/26/2006	15:00	4/26/2006	4/27/2006	11:05	4/27/2006	11:05	99.54	SB1-0427	pH	PH	pH	8.87

ExpectedV	Units	Dilution	MDL	RL	LabQualifi	Surrogate	Comments	ParValUnc	Recovery	LowerCont	UpperCont	Basis	ConcQual	MDLAdjust	RLAdjuste	SampleDe	LeachMeth	LeachDate	LeachTime	LeachLot	AnalysisLo	CalRefID
	PERCENT	1	0	0		N						D	=	0	0	J11JT0	NONE				042706MC	NONE
8840	MG/KG	1	68	194		N			107	75	125	D	=	68	194		NONE				SB1-0516	101405S1
	MG/KG	1	135	387		N						D	=	135	387	J11JT0	NONE				SB1-0516	101405S1
0	MG/KG	1	35	100	U	N						D	U	35	100		NONE				SB1-0516	101405S1
25	MG/KG	1	0.0607	0.5		N			102	90	110	D	=	0.0607	0.5		NONE				050906Q3	300A-013006
25	MG/KG	1	0.0543	0.5		N			97.1	90	110	D	=	0.0543	0.5		NONE				050906Q3	300A-013006
25	MG/KG	1	0.0806	0.5		N			108	90	110	D	=	0.0806	0.5		NONE				050906Q3	300A-013006
5.65	MG/KG	1	0.0449	0.5		N			109	90	110	D	=	0.0449	0.5		NONE				050906Q3	300A-013006
36	MG/KG	1	0.0469	0.5		N			110	90	110	D	=	0.0469	0.5		NONE				050906Q3	300A-013006
	MG/KG	1	0.0773	0.479		N						D	=	0.078	0.484	J11JT0	NONE				050906Q3	300A-013006
	MG/KG	1	0.0582	0.479		N						D	=	0.0588	0.484	J11JT0	NONE				050906Q3	300A-013006
	MG/KG	1	0.052	0.479	B	N						D	J	0.0525	0.484	J11JT0	NONE				050906Q3	300A-013006
	MG/KG	1	0.045	0.479		N						D	=	0.0454	0.484	J11JT0	NONE				050906Q3	300A-013006
	MG/KG	1	0.043	0.479	B	N						D	J	0.0434	0.484	J11JT0	NONE				050906Q3	300A-013006
0	MG/KG	1	0.0607	0.5	U	N						D	U	0.0607	0.5		NONE				050906Q3	300A-013006
0	MG/KG	1	0.0543	0.5	U	N						D	U	0.0543	0.5		NONE				050906Q3	300A-013006
0	MG/KG	1	0.0469	0.5	U	N						D	U	0.0469	0.5		NONE				050906Q3	300A-013006
0	MG/KG	1	0.0449	0.5	U	N						D	U	0.0449	0.5		NONE				050906Q3	300A-013006
0	MG/KG	1	0.0806	0.5	B	N						D	J	0.0806	0.5		NONE				050906Q3	300A-013006
20	MG/KG	1	0.534	2		N			103	75	125	D	=	0.534	2		NONE				052406NH	052406NH3
	MG/KG	1	1.19	4.47	B	N						D	J	1.2	4.51	J11JT0	NONE				052406NH	052406NH3
0	MG/KG	1	0.534	2	U	N						D	U	0.534	2		NONE				052406NH	052406NH3
1420	MG/KG	2	54.5	200		N			108	75	125	D	=	54.5	200		NONE				050506KN	050506TKN
	MG/KG	1	53.3	195	B	N						D	J	53.8	197	J11JT0	NONE				050506KN	050506TKN
0	MG/KG	1	27.3	100	B	N						D	J	27.3	100		NONE				050506KN	050506TKN
	PH UNITS	1	0	0		N						D	=	0	0	J11JT0	NONE				042706PH	NONE

RECEIVED
JUN 2006

BIOASSAY REPORT
ACUTE SCREENING BIOASSAYS
Conducted May 11 through 12, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD
RICHLAND, WASHINGTON

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

June 1, 2006
Lab I.D. Nos. BN1584-01 thru -05
SDG Number BN1584

RC-051
F1610

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APPENDIX A. RAW DATA SHEETS
APPENDIX B. REFERENCE TOXICANT RAW DATA SHEETS
APPENDIX C. CHAIN OF CUSTODY

INTRODUCTION

CH2M HILL conducted acute screening bioassay tests using the nematode (*Caenorhabditis elegans*) on soil samples provided by the ELR Consulting for the Washington Closure Hanford project, Richland, Washington. The tests were conducted from May 11 through 12, 2006.

METHODS AND MATERIALS

TEST METHODS

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

TEST ORGANISMS

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

CONTROL SOIL

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

HYDRATION WATER

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

TEST CONCENTRATIONS

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

SAMPLE COLLECTION

The soil samples were collected from April 25, 2006, through May 2, 2006. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

SAMPLE CROSS-REFERENCE TABLE

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

Table 1
Sample Cross-Reference

Client ID	Sample Date	Sample Location	Nematode test SDG	Analytical Lab SDG
J11JX6	04/25/2006	300-49	BN1584-01	F1600
J11JT0	04/26/2006	100-D-48:2	BN1584-02	F1610
J11JV8	04/30/2006	100-D-49-2	BN1584-03	F1630
J11JY2	05/01/2006	1607-D2:1	BN1584-04	F1636
J11JW4	05/02/2006	EL-1596-1	BN1584-05	F1645

SAMPLE PREPARATION

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

TEST INITIATION

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

TEST TERMINATION

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

TEST ACCEPTABILITY CRITERIA

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

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

MONITORING OF BIOASSAYS

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

DATA ANALYSIS

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

RESULTS AND DISCUSSION

ACUTE RESULTS

Table 2 summarizes the survival data for the nematode acute test initiated on May 11, 2006.

Table 2
***Caenorhabditis elegans* Results**
Test initiated on May 11, 2006

Client ID	Percent Survival	Percent Recovered
Control	93.3	93.3
J11JX6	90.0	90.0
J11JT0	96.7	96.7
J11JV8	96.7	96.7
J11JY2	90.0	90.0
J11JW4	100	100

The nematode results indicated no statistically significant reduction in survival in the J11JX5, J11JT0, J11JV8, J11JY2, and J11JW4 samples when compared to the control.

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

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

REFERENCE TOXICANT TEST

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

Table 4
Chronic Reference Toxicant Tests (ug/L)

Species (test)	LC_{50}	Control Chart Limits
Caenorhabditis elegans (survival)	110	41 to 125

CERTIFICATION STATEMENT

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

APPENDIX A
RAW DATA SHEETS

CH2M HILL *TOXICITY TEST ORGANISM AND WATER QUALITY DATA*

Client: Washington Closure Hanford — Test Initiation: Date 5-11-06 — Test Termination: Date 5-12-06

Contact: — Technician: Nalisha Johnson

Test Species/ID: *Caenorhabditis elegans* / Nem 013 / /

Sample ID Number	Field ID	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Dechlor.	Ammonia NH_3-N mg/l	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$
BN1584-01	J11JX6	4-26-06	–	– / –	–	–	–
BN1584-02	J11JT0	4-26-06	–	– / –	–	–	–
BN1584-03	J11JV8	4-30-06	–	– / –	–	–	–
BN1584-04	J11JY2	5-1-06	–	– / –	–	–	–
BN1584-05	J11JW4	5-2-06	–	– / –	–	–	–
				/			
				/			
				/			
				/			
				/			
				/			
				/			
				/			

Test Species Information	ID# Nem 013	ID#	ID#	ID#
	Acute			
Organism Age at Initiation	4 days			
	—			
Test Container Size	15 mm petri			
Test Volume	2.33 g dry wt.			
Feeding: Type	none			
Amount	—			
Aeration: Began	none			
Amount	—			
Dilution Water ID#	Milli-Q Equiv.			
Acclimation Period	4 days			
Test Location	#7			
Organism Source	In house			
Size (mm)	–	–	–	–
Loading Rate	–	–	–	–

Dilution Water	ID#	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$	Initial pH
Milli-Q equivalent Water	NA	0	0	NA

Comments: ☑ Indicates the following action was taken, (☐ Indicates action not taken):

Water Quality Meters Used/ID#

Dissolved Oxygen #2 pH #3 Conductivity #2

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client: EU - WASH. CLOSURE
Sample Description: Lab ID#: B
Test Species: *Caenorhabditis elegans* ID#: Nem 013

Beginning Date: 5-11-06 Time: 0955
Ending Date: 5-12-06 Time: 0930

Test Initiation: Tech: Tech: NJ Time: 0955

Test Termination: Tech: Tech: BW/NJ Time: 0930

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

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

CH2M HILL TODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client: Washington Closure Hanford
Sample Description: see below
Test Specie: *Caenorhabditis elegans* ID#: Nem 613

Tech. 0 Hrs NJ 24 Hrs NJ/BM
Time 0 Hrs 0955 24 Hrs 0930

Beginning, Date 5-11-06 Time 0955
Ending, Date 5-12-06 Time 0930

Lab ID	Soil pH 0 hr	Soil pH 24 hr	Soil % Moisture 0 hr	Soil Temperature (°C) 0 hr	Soil Temperature (°C) 24 hr	Comments:
Lab Control	7.2	7.2		21.1	20.3	Each test chamber has 2.33 g dry wt. soil + 0.93 ml Milli-Q water (40% of dry wt.)
BN1584-01	7.8	8.0		21.1	20.3	Samples hydrated 7 days prior to test initiation.
BN1584-02	7.8	7.8		21.1	20.3	
BN1584-03	8.1	8.1		21.1	20.3	All test soils were dried during sampling process.
BN1584-04	8.2	8.2		21.1	20.3 ~~20.2~~ NJ	
BN1584-05	7.3	7.3		21.1	20.3	

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	Artificial Soil	A	18	BN1584-04	J11JY2	A	3				
Lab Control	Artificial Soil	B	17	BN1584-04	J11JY2	B	5				
Lab Control	Artificial Soil	C	2	BN1584-04	J11JY2	C	10				
BN1584-01	J11JX6	A	8	BN1584-05	J11JW4	A	7				
BN1584-01	J11JX6	B	15	BN1584-05	J11JW4	B	11				
BN1584-01	J11JX6	C	16	BN1584-05	J11JW4	C	13				
BN1584-02	J11JT0	A	6								
BN1584-02	J11JT0	B	12								
BN1584-02	J11JT0	C	14								
BN1584-03	J11JV8	A	1								
BN1584-03	J11JV8	B	4								
BN1584-03	J11JV8	C	9								

CETIS Test Summary

Report Date: 15 May-06 3:46 PM
Test Link: 08-1644-9161/BN158401ce

Nematode 24 hour Acute test — CH2M Hill

Test No:	16-0847-6411	Test Type:	Nematode Survival	Duration:	24h
Start Date:	11 May-06 09:55 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	12 May-06 09:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	11 May-06 09:55 AM	Brine:			
Comments:	J11JX6				

Sample No:	12-7590-7138	Code:	B1584-01	Client:	
Sample Date:	26 Apr-06	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	15d 9h	Station:	-		
Comments:	J11JX6				

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
17-2624-8595	% Survival	100	> 100	N/A	16.41%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Silica Sand	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.90000	0.80000	1.00000	0.05774	0.10000	11.11%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Silica Sand	0.90000	1.00000	0.90000
100		0.90000	0.80000	1.00000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	08-1644-9161	08-1644-9161	15 May-06 3:46 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	16.41%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Silica Sand		100	0.45707	2.13185	0.3357	0.22061	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0033558	0.003356	1	0.21	0.67134	Non-Significant Effect
Error	0.0642523	0.016063	4			
Total	0.0676081	0.0194189	5			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.62880	199.00000	0.55115	Equal Variances
Distribution	Shapiro-Wilk W	0.94141		0.67061	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Silica Sand	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.90000	0.80000	1.00000	0.10000	1.25607	1.10715	1.41202	0.15256

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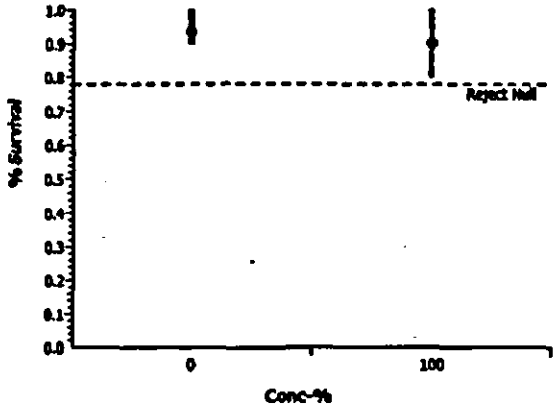

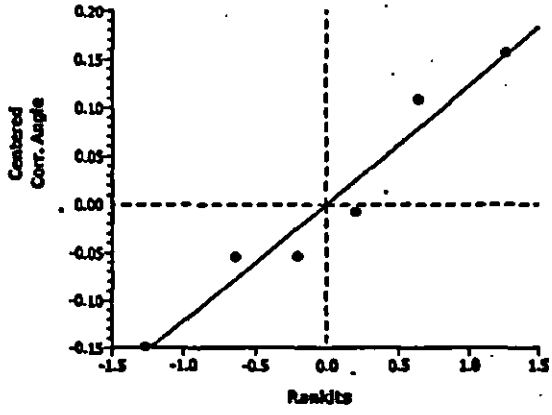

CETIS Test Summary

Report Date: 15 May-06 3:47 PM
Test Link: 15-7080-8856/BN158402ce

Nematode 24 hour Acute test — CH2M Hill

Test No:	05-0804-5906	Test Type:	Nematode Survival	Duration:	24h
Start Date:	11 May-06 09:55 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	12 May-06 09:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	11 May-06 09:55 AM	Brine:			

Sample No:	12-9143-8981	Code:	B1584-02	Client:	
Sample Date:	26 Apr-06	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	15d 9h	Station:			

Comments: J11JT0

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-6227-6082	% Survival	100	> 100	N/A	11.57%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Silica Sand	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.96667	0.90000	1.00000	0.03333	0.05774	5.97%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Silica Sand	0.90000	1.00000	0.90000
100		1.00000	1.00000	0.90000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	15-7080-8856	15-7080-8856	15 May-06 3:47 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	11.57%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Silica Sand		100	-0.7071	2.13185	0.7407	0.16378	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0044266	0.004427	1	0.50	0.51852	Non-Significant Effect
Error	0.0354124	0.008853	4			
Total	0.039839	0.0132797	5			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00000	199.00000	1.00000	Equal Variances
Distribution	Shapiro-Wilk W	0.91291		0.45579	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Silica Sand	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.96667	0.90000	1.00000	0.05773	1.35769	1.24905	1.41202	0.09409

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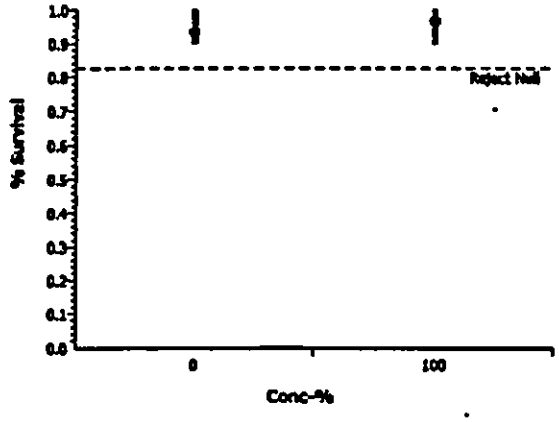
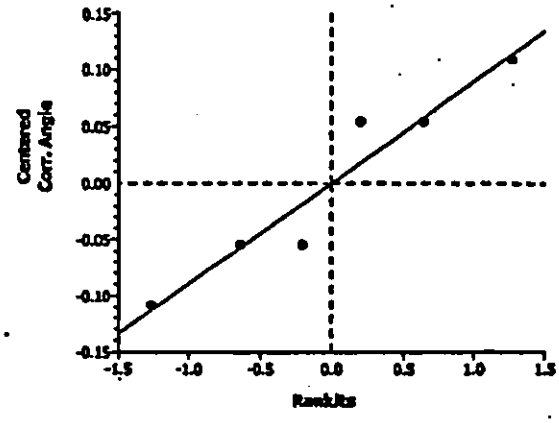




CETIS Test Summary

Report Date: 15 May-06 3:48 PM
Test Link: 07-3235-9970/BN158403ce

Nematode 24 hour Acute test — CH2M Hill

Test No:	19-3031-9644	Test Type:	Nematode Survival	Duration:	24h
Start Date:	11 May-06 09:55 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	12 May-06 09:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	11 May-06 09:55 AM	Brine:			

Sample No:	19-2406-6538	Code:	B1584-03	Client:	
Sample Date:	01 May-06	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	10d 9h	Station:			

Comments: J11JV8

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
12-8116-1190	% Survival	100	> 100	N/A	11.57%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Silica Sand	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.96667	0.90000	1.00000	0.03333	0.05774	5.97%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Silica Sand	0.90000	1.00000	0.90000
100		0.90000	1.00000	1.00000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	07-3235-9970	07-3235-9970	15 May-06 3:48 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	11.57%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Silica Sand		100	-0.7071	2.13185	0.7407	0.16378	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0044266	0.004427	1	0.50	0.51852	Non-Significant Effect
Error	0.0354124	0.008853	4			
Total	0.039839	0.0132797	5			

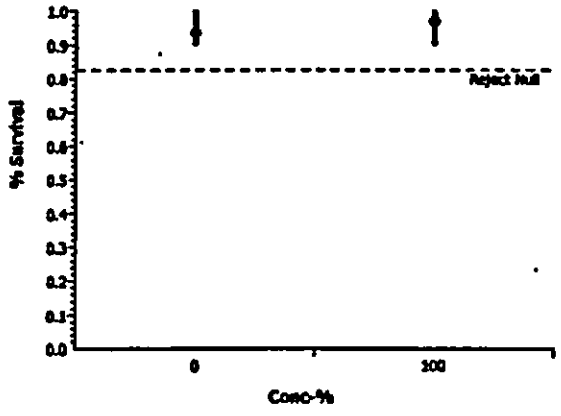
ANOVA Assumptions

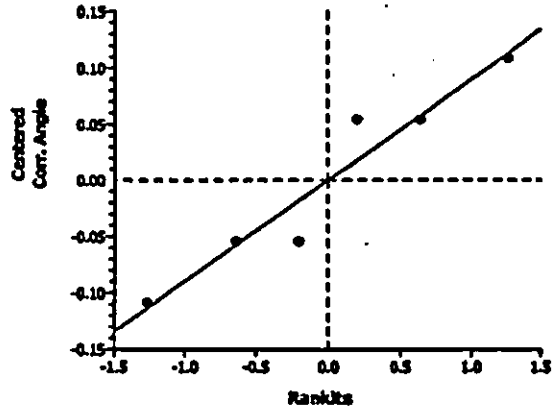
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00000	199.00000	1.00000	Equal Variances
Distribution	Shapiro-Wilk W	0.91291		0.45579	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Silica Sand	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.96667	0.90000	1.00000	0.05773	1.35769	1.24905	1.41202	0.09409

Graphics





CETIS Test Summary

Report Date: 15 May-06 3:49 PM
Test Link: 12-3088-1739/BN158404ce

Nematode 24 hour Acute test — CH2M Hill

Test No:	12-7939-0109	Test Type:	Nematode Survival	Duration:	24h
Start Date:	11 May-06 09:55 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	12 May-06 09:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	11 May-06 09:55 AM	Brine:			

Sample No:	10-6198-4046	Code:	B1584-04	Client:	
Sample Date:	02 May-06	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	9d 9h	Station:			

Comments: J11JY2

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
18-0657-5610	% Survival	100	> 100	N/A	7.84%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Silica Sand	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Silica Sand	0.90000	1.00000	0.90000
100		0.90000	0.90000	0.90000

CETIS Analysis Detail

Nematode 24 hour Acute test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
% Survival	Comparison	12-3088-1739	12-3088-1739	15 May-06 3:49 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	7.84%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Silica Sand		100	1	2.13185	0.1870	0.11581	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0044266	0.004427	1	1.00	0.37390	Non-Significant Effect
Error	0.0177062	0.004427	4			
Total	0.02213278	0.0088531	5			

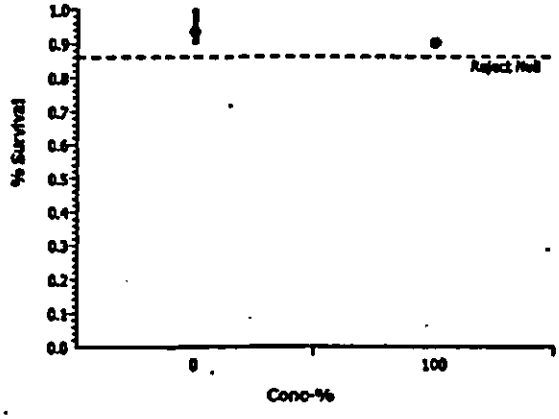
ANOVA Assumptions

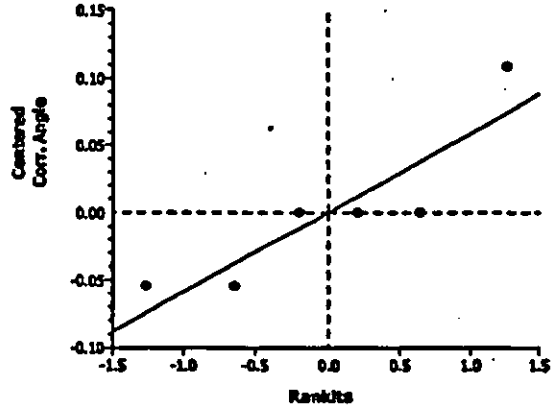
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2991045000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.81374		0.07784	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Silica Sand	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016

Graphics





CETIS Test Summary

Report Date: 15 May-06 3:50 PM
Test Link: 20-2162-6516/BN158405ce

Nematode 24 hour Acute test — CH2M Hill

Test No:	10-4924-7385	Test Type:	Nematode Survival	Duration:	24h
Start Date:	11 May-06 09:55 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	12 May-06 09:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	11 May-06 09:55 AM	Brine:			

Sample No:	19-0894-7516	Code:	B1584-05	Client:	
Sample Date:	02 May-06	Material:	Soil	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	9d 9h	Station:			

Comments: J11JW4

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
03-5279-4192	% Survival	100	> 100	N/A	7.84%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Silica Sand	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Silica Sand	0.90000	1.00000	0.90000
100		1.00000	1.00000	1.00000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	20-2162-6516	20-2162-6516	15 May-06 3:50 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	7.84%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Silica Sand		100	-2	2.13185	0.9419	0.11581	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0177062	0.017706	1	4.00	0.11612	Non-Significant Effect
Error	0.0177062	0.004427	4			
Total	0.03541244	0.0221328	5			

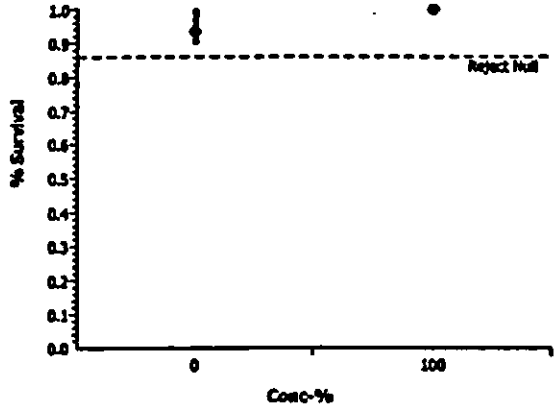
ANOVA Assumptions

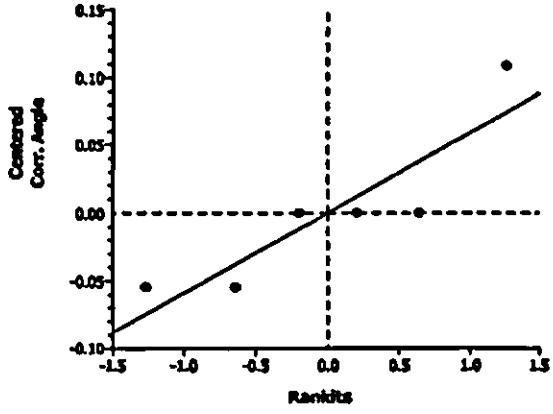
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	2.66667	21.19769	0.17781	Equal Variances
Distribution	Shapiro-Wilk W	0.81374		0.07784	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Silica Sand	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	1.00000	1.00000	1.00000	0.00000	1.41202	1.41202	1.41202	0.00029

Graphics





APPENDIX B
REFERENCE TOXICANT DATA SHEETS

CH2MHILL NEMATODE TOXICITY TEST SURVIVAL DATA

Client QA/QC
Sample Description Cu as $CuCl_2xH_2O$ Lab ID#: B-18-05
Test Species: *Caenorhabditis elegans* ID#: Nem 014

Beginning, Date 5-18-06 Time 0900
Ending, Date 5-19-06 Time ~~0945~~ 0920 NJ

Test Initiation: Tech: Tech: NJ Time: 0900 Test Termination: Tech: Tech: NJ / B Time: 0920

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

Endpoint	LC50	Cusum Chart Limits
Survival	110 mg/L	41 to 125

Task Manager

Project Manager

QA Officer

CH2M HILL TODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client QA / QC
Sample Description see below
Test Species *Caenorhabditis elegans* ID#: Nem 014

Tech. 0 Hrs NJ 24 Hrs NJ / [illegible]
Time 0 Hrs 0900 24 Hrs 0920

Beginning, Date 5-18-06 Time 0900
Ending, Date 5-19-06 Time 0920

Lab ID	K-Medium pH 0 hr	K-Medium pH 24 hr	% Moisture 0 hr	Temperature (°C) 0 hr	Temperature (°C) 24 hr	Comments:
Lab Control	6.6		NA	21.3	20.8	
10 mg/L Cu	5.5		NA	21.3	20.8	
50 mg/L Cu	5.4		NA	21.3	20.8	
100 mg/L Cu	5.2		NA	21.3	20.8	
250 mg/L Cu	5.0		NA	21.3	20.8	

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	K-medium	A	9	250 mg/L Cu		A	7				
Lab Control	K-medium	B	3	250 mg/L Cu		B	1				
Lab Control	K-medium	C	15	250 mg/L Cu		C	2				
10 mg/L Cu		A	13								
10 mg/L Cu		B	11								
10 mg/L Cu		C	14								
50 mg/L Cu		A	10								
50 mg/L Cu		B	12								
50 mg/L Cu		C	8								
100 mg/L Cu		A	5								
100 mg/L Cu		B	6								
100 mg/L Cu		C	4								

CETIS Test Summary

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

Nematode 24 hour Acute test — CH2M Hill

Test No:	10-9243-8639	Test Type:	Nematode Survival	Duration:	24h
Start Date:	18 May-06 09:00 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	19 May-06 09:20 AM	Dil Water:		Source:	In-House Culture
Setup Date:	18 May-06 09:00 AM	Brine:			

Sample No:	15-1457-1183	Code:	1B048-05	Client:	
Sample Date:	16 May-06	Material:	Copper	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	57h	Station:			

Comments: in K medium

Point Estimate Summary

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

% Survival Summary

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

% Survival Detail

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

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Linear Regression	17-1623-5361	17-1623-5361	19 May-06 11:18 AM	CETISv1.1.2

Linear Regression Options

Model Function	Threshold Option	Threshold	Threshold Opt	Reweighted	Pooled Groups	Het Corr
Log-Normal [NED=A+B*log(X)]	Control Threshold	0	Yes	Yes	No	Yes

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G	Chi-Sq	Critical	P-Value	Decision(0.05)
5	-48.13368	-0.11105	0.38609	0.61289	36.80609	18.30704	0.00006	Significant Heterogeneity

Point Estimates

% Effect	Conc-mg/L	95% LCL	95% UCL
50	110.0226	51.11752	306.4394

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P-Value	Decision(0.05)
Slope	2.590097	0.9100504	0.5623779	4.617815	2.846	0.01737	Significant
Intercept	-0.2876353	1.846492	-4.401875	3.826605	-0.156	0.87931	Not Significant

Residual Analysis

Attribute	Method	Statistic	Critical	P-Value	Decision(0.05)
Variances	Modified Levene	1.514036	4.06618	0.28357	Equal Variances
Distribution	Shapiro-Wilk W	0.8021035		0.00990	Non-normal Distribution

Data Summary

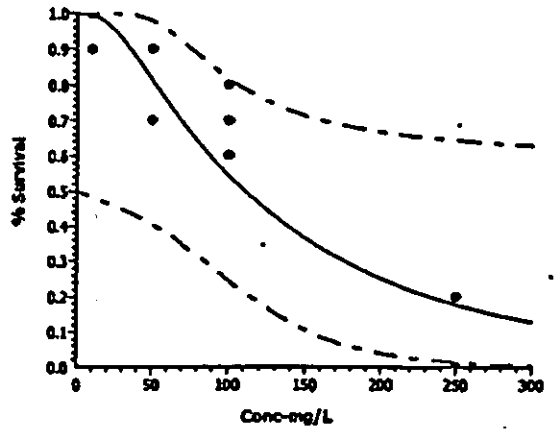
Conc-mg/	Control Type	Count	Calculated Variate(A/B) Mean	Minimum	Maximum	SE	SD	A	B
0	Dilution Water	3	1.00000	1.00000	1.00000	0.00000	0.00000	30	30
10		3	0.96667	0.90000	1.00000	0.01179	0.05773	29	30
50		3	0.83333	0.70000	0.90000	0.02357	0.11547	25	30
100		3	0.70000	0.60000	0.80000	0.02041	0.10000	21	30
250		3	0.06667	0.00000	0.20000	0.02357	0.11547	2	30

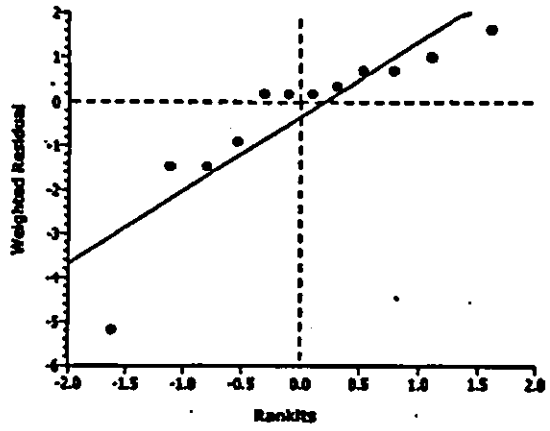
Data Detail

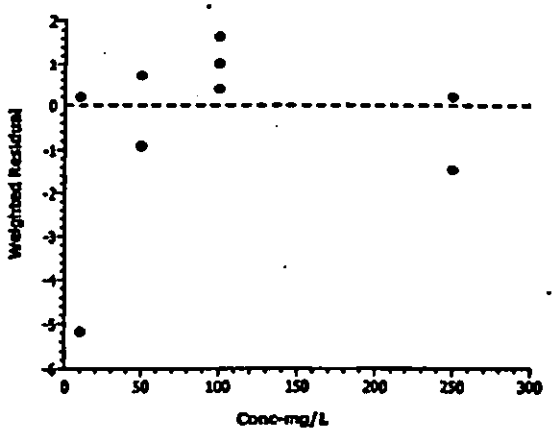
Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1.00000	1.00000	1.00000							
10		1.00000	1.00000	0.90000							
50		0.70000	0.90000	0.90000							
100		0.60000	0.70000	0.80000							
250		0.00000	0.00000	0.20000							

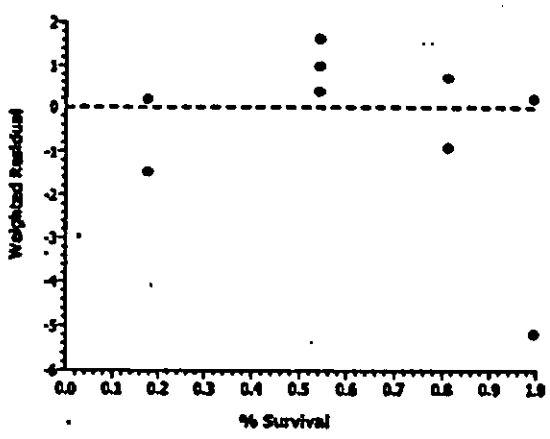
CETIS Analysis Detail

Graphics









APPENDIX C
CHAIN OF CUSTODY

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	1400	1	1	-01

CHAIN OF POSSESSION	Date/Time	Sign/Print Names	Date/Time
Relinquished By/Removed From Elizabeth M Tepper	4-25-06 1430	Received By/Stored In Darcy Hubbard 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, analyses to be included with Strontium-89,90 – Total Sr analysis fraction.

^– These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

3H1584-01 - nematodes

Matrix *

Se=Soil
Sl=Sediment
SO=Solid
Sa=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
Le=Leipd
Ve=Vegetation
X=Other

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

BHI-EE-011 (08/28/2005)

H 1610

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-138	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-48:2		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									
J11JT0	SOIL	4-26-06	1500	1	1							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 1530	Received By/Stored In	Date/Time 4-26-06
Dalton M Tiffe	4-26-06	Nancy Hubbard CH2M HILL	1532
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

BN 1584-02

Matrix *

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

BHCEE-011 (08/29/2005)

F1630

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-156	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-49-2		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/O									
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								
J11JV8	SOIL	4-30-06	1420	1	1						

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth Tiffe	5-1-06 9:00 AM	Doug Hubbard CH2M HILL	5-1-06 0846

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

BH 1584-03

Matrix *

S=Soil
SE=Sediment
SO=Solid
Bio=Biology
W = Water
O=Oil
Air=Air
DS=Drum Solids
DL=Drum Liquids
Tu=Tissue
Wi=Wipe
Lq=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)

F1636

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-180	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 1607-D2:1		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									
J11JY2	SOIL	5-1-06	1700	1	1							

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M. Teppen	5-2-06 0900	Diane Hubbard CH2M HILL	5-2-06 09:57

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~~

BN 1534-04

Matrix *

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

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

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

F1645

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-162	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 116-F-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									
J11JW4	SOIL	5-2-06	14:00	1	1							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 16:30	Received By/Stored In	Date/Time 5-2-06
Elizabeth M Tepps	5-2-06	Shirley Hulsford CH2M HILL	1608
Relinquished By/Removed From	Date/Time 5-2-06	Received By/Stored In	Date/Time
ET			
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

BN 1584-05

Matrix *

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

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

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