0069987

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

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

**COMMENTS:**

**SDG E2831 SAF-RC-051**

Rad only X Chem only Rad & Chem

X Complete Partial

## Waste Site: Upland Backfill Elevated 100-F-2

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

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

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2300 NW Walnut Boulevard
Corvallis, Oregon 97330

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

RC-051
E3331

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## INTRODUCTION

CH2M HILL conducted chronic screening bioassay tests using the Sandberg bluegrass (*Poa sandbergii*) on soil samples provided by the ELR Consulting for Washington Closure Hanford, Richland, Washington. The tests were conducted from April 5 through May 8, 2006.

## METHODS AND MATERIALS

### TEST METHODS

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

### TEST ORGANISMS

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

### CONTROL SOIL

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

### HYDRATION WATER

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

### TEST CONCENTRATIONS

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

## SAMPLE COLLECTION

Individual soil samples used during the testing were collected between October 31, 2005, and December 6, 2005, for the SDG number BG1542 and March 21, 2006 through April 3, 2006, for SDG number BG1566. The samples were stored in the dark at 4°C until the initiation of the initiation of the tests. Chain of Custody for sample collection is provided in Appendix C.

## SAMPLE CROSS-REFERENCE TABLE

Table 1 provides a cross-reference of the Client ID numbers, sampling dates, sampling locations, Bluegrass test sample identification (SDG) numbers, and Analytical Lab SDG numbers. The SDG 1542 samples were repeat tests from an earlier batch of tests due to a laboratory error on the test endpoint.

**Table 1**
**Sample Cross-Reference**

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

## SAMPLE PREPARATION

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

## TEST INITIATION

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

## TEST MONITORING

According to information provided by Native Grass Seed (seed supplier), germination should take place between 14 and 28 days. The number of seeds in each test chamber that had germinated was recorded on days 12, 14, 16, 19, 21, and 23. Germination was determined to have occurred on day 19.

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

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

## WATERING SCHEDULE

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

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

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

## TEST TERMINATION

Tests were terminated 14 days post germination (33 days after planting). The number of seedlings, shoot appearance and height (tallest shoot of each plant), and root appearance and length (longest recovered root of each plant) was recorded.

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

The wet and dry weight for the roots were obtained following the same procedure as described above.

## DATA ANALYSIS

For each test chamber, the following endpoints were calculated:

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

Statistical analysis for each endpoint listed comprised of entering the data obtained from each replicate chamber of a test soil and comparing the results to the data from the replicate chambers of the laboratory control. Comparisons were made as a single tailed t-test, evaluating for statistically significant reductions from the control value, using CETIS version 1.1.2. The Equal Variance t Two-Sample test was used. When the assumptions of equality

of variance or normality necessary for Equal Variance t Two-Sample test was not met, the Unequal Variance t Two-Sample test or Wilcoxon Rank Sum Two Sample test was used.

## RESULTS AND DISCUSSION

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

The results for sample J10DW4 indicated a statistically significant reduction in average stem (shoot) height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J10DV4 indicated a statistically significant reduction in average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

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

The results for sample J10LJ5 indicated a statistically significant reduction in average stem (shoot) height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

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

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

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

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

The results for sample J10JH4 indicated no statistically significant reduction when compared to the laboratory control.

**Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford**

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

ns indicates a non statistically significant result; [5], indicates statistically significant at alpha (p) = 0.05; --, indicates no statistical test performed.

| Lab ID: | Sample Number: | Bluegrass 14 day Germination Endpoint (%) | Significantly different compared to Lab Control? | Bluegrass Average Stem Height (mm) | Significantly different compared to Lab Control? | Bluegrass Average Root Length (mm) | Significantly different compared to Lab Control? | Average Above Ground Shoot Mass (Wet) (mg) | Significantly different compared to Lab Control? | Average Above Ground Shoot Mass (Dry) (mg) | Significantly different compared to Lab Control? | Average Root Mass (Wet) (mg) | Significantly different compared to Lab Control? | Average Root Mass (Dry) (mg) | Significantly different compared to Lab Control? | Average Total Mass (Shoots + Roots) (Wet) (mg) | Significantly different compared to Lab Control? | Average Total Mass (Shoots + Roots) (Dry) (mg) | Significantly different compared to Lab Control? |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tests initiated on April 8, 2009 | | | | | | | | | | | | | | | | | | | |
| Laboratory Control | | 94 | -- | 16.8 | -- | 21.2 | -- | 28.6 | -- | 4.08 | -- | 38.9 | -- | 1.92 | -- | 66.5 | -- | 6.56 | -- |
| BG1542-01 | J10DW4A | 89 | ns | 13.0 | E [5] | 11.5 | E [5] | 16.1 | E [5] | 2.71 | E [5] | 10.4 | E [5] | 0.95 | E [5] | 26.9 | E [5] | 3.66 | E [5] |
| BG1542-02 | J10DV4A | 83 | ns | 16.9 | ns | 10.8 | E [5] | 9.8 | W [5] | 1.88 | E [5] | 8.8 | E [5] | 0.88 | E [5] | 17.7 | E [5] | 2.65 | E [5] |
| BG1542-03 | J10DT8A | 100 | ns | 13.9 | E [5] | 11.4 | E [5] | 22.6 | ns | 3.55 | ns | 21.7 | E [5] | 1.38 | ns | 44.5 | ns | 4.94 | ns |
| BG1542-04 | J10LJ5A | 96 | ns | 10.9 | E [5] | 11.3 | E [5] | 16.0 | E [5] | 2.91 | E [5] | 23.0 | E [5] | 1.46 | ns | 39.0 | E [5] | 4.38 | E [5] |
| BG1566-01 | J11JB6 | 92 | ns | 12.9 | E [5] | 12.3 | E [5] | 27.8 | ns | 3.67 | ns | 33.7 | ns | 1.85 | ns | 61.5 | ns | 5.53 | ns |
| BG1566-02 | J11JB7 | 100 | ns | 10.8 | E [5] | 12.1 | E [5] | 18.6 | E [5] | 3.07 | E [5] | 28.5 | ns | 1.37 | ns | 47.1 | ns | 4.44 | ns |
| BG1566-03 | J11JH5 | 94 | ns | 25.9 | ns | 23.2 | ns | 23.6 | ns | 4.25 | ns | 32.5 | ns | 2.04 | ns | 56.1 | ns | 6.28 | ns |
| BG1566-04 | J11JH6 | 100 | ns | 13.0 | E [5] | 11.2 | E [5] | 24.9 | ns | 3.65 | ns | 30.8 | ns | 1.61 | ns | 55.7 | ns | 5.58 | ns |
| BG1566-05 | J11JH4 | 92 | ns | 14.6 | ns | 16.7 | ns | 23.1 | ns | 3.77 | ns | 31.7 | ns | 1.85 | ns | 54.9 | ns | 5.42 | ns |

**CERTIFICATION STATEMENT**

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

# APPENDIX A
# RAW DATA SHEETS

## BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

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

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

| CONC. | REPLICATE | # seeds germinated: Emergence 12 days after planting | 14 days after planting | 16 days after planting | 19 days after planting | 21 days after planting | 23 days after planting | 7-DAYS POST-EMERGENCE (26 days after planting) | 14-DAYS POST-EMERGENCE (33 days after planting) | pH: INITIAL (@ planting) | FINAL (@ 14 days Post-Emergence) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Control | A | 3 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 6.5 | 7.6 |
| | B | 5 | 6 | 5 | 5 | 5 | 5 | 5 | 5 | | |
| | C | 5 | 7 | 7 | 8 | 8 | 8 | 8-75 | 5 | | |
| | D | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | |
| | E | 4 | 6 | 6 | 6 | 6 | 6 | 5 | 5 | | |

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

Replicate A: 3 Lg G — removed: 1 sm brown/dead

Replicate B: 5 Lg G

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

Replicate D: 3 Lg G

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

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 Lg G

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

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

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

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

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 54 mm | 51 mm | 78 mm | mm | mm |
| Replicate B | 74 mm | 75 mm | 76 mm | 89 mm | 108 mm |
| Replicate C | 64 mm | 70 mm | 76 mm | 93 mm | 86 mm |
| Replicate D | 91 mm | 83 mm | 78 mm | mm | mm |
| Replicate E | 65 mm | 60 mm | 90 mm | 73 mm | 97 mm |

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

| | Tin Tare Wt. (mg) 1024.00 | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | ~~999.25~~ NT | 1062.5 | 1030.17 |
| Replicate B | 1022.87 | 1207.0 | 1053.13 |
| Replicate C | 991.36 | 1150.1 | 1017.66 |
| Replicate D | 971.26 | 1078.6 | 990.05 |
| Replicate E | 1011.00 | 1165.2 | 1036.85 |

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 88 mm | 40 mm | 22 mm | mm | mm |
| Replicate B | NG 121 mm | 133 mm | 133 mm | 107 mm | 93 mm |
| Replicate C | 122 mm | 88 mm | 104 mm | 63 mm | 122 mm |
| Replicate D | 90 mm | 101 mm | 69 mm | mm | mm |
| Replicate E | 132 mm | 100 mm | 122 mm | 70 mm | 87 mm |

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

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

Comments:

**BLUEGRASS GROWTH TEST**

Client: Washington Closure Hanford Project — Test Start Date: 4-5-06

Initials: Day 0 (NJ) Day 12 BM Day 15 NJ Day 18 (TD) Day 19 NJ Day 21 NJ Day 23 (BM) Day 26 BM Day 33 BM

Bioassay Lab ID: BM 81542-01 Sample No: J10 DW4

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

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

Replicate A: 1 Lg G, 1 Med G, 1 Sm G
Replicate B: 1 Lg G, 4 med G — removed: 1 Med w/ brown tip, 1 Sm G
Replicate C: 3 Med G, 1 Sm G
Replicate D: 1 Lg G, 2 Med G, 2 Sm G
Replicate E: 1 Lg G, 4 Med G — removed: 2 Sm G

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

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

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1005.22 | 1052.2 | 1013.32 |
| Replicate B | 977.34 | 1061.8 | 990.27 |
| Replicate C | 1043.72 | 1087.0 | 1052.91 |
| Replicate D | 1001.57 | 1052.6 | 1011.76 |
| Replicate E | 1021.25 | 1131.5 | 1040.89 |

Describe root appearance:

Replicate A:
Replicate B:
Replicate C:
Replicate D:
Replicate E:

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 12 mm | 48 mm | 38 mm | mm | mm |
| Replicate B | 66 mm | 52 mm | 38 mm | 44 mm | 68 mm |
| Replicate C | 10 mm | 38 mm | 38 mm | 51 mm | mm |
| Replicate D | 79 mm | 41 mm | 73 mm | 16 mm | 30 mm |
| Replicate E | 65 mm | 45 mm | 41 mm | 87 mm | 66 mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1033.44 | 1039.3 | 1036.39 |
| Replicate B | 1002.23 | 1030.3 | 1007.17 |
| Replicate C | 1024.73 ~~2015.490~~ | 1054.8 | 1027.42 |
| Replicate D | 990.71 | 1038.2 | 994.03 |
| Replicate E | 1025.14 | 1039.2 | 1032.21 |

Comments:

# CETIS Test Summary

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

**Plant Chronic test** — **CH2M Hill**

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

**Comments:** repeat test BG1542-01A

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

**Comments:** J10DW4, E274801

**Comparison Summary**

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

# CETIS Test Summary

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

**% Germination Summary**

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

**AG Average Dry Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 4.96040 | 2.05668 | 6.26333 | 0.75879 | 1.69222 | 34.11% |
| 100 | | 5 | 2.70991 | 2.03800 | 3.92800 | 0.32563 | 0.72814 | 26.87% |

**AG Average Height Summary**

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

**AG Average Wet Wt. Summary**

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

**Root Average Dry Wt. Summary**

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

**Root Average Length Summary**

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

**Root Average Wet Wt. Summary**

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

**Total Average Biomass Dry Wt. Summary**

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

**Total Average Biomass Wet Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 66.484 | 26.150 | 82.77 | 10.452 | 23.370 | 35.15% |
| 100 | | 5 | 25.941 | 18.338 | 34.293 | 3.2461 | 7.2584 | 27.98% |

# CETIS Test Summary

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

**% Germination Detail**

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

**AG Average Dry Wt. Detail**

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

**AG Average Height Detail**

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

**AG Average Wet Wt. Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 |
|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 12.8333 | 36.8260 | 31.748 | 35.78 | 30.84 |
| 100 | | 15.66 | 16.8920 | 10.8200 | 10.206 | 22.05 |

**Root Average Dry Wt. Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 |
|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 0.64667 | 1.92800 | 1.52800 | 2.06331 | 1.92001 |
| 100 | | 0.99666 | 0.98800 | 0.67252 | 0.66400 | 1.41399 |

**Root Average Length Detail**

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

**Root Average Wet Wt. Detail**

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

**Total Average Biomass Dry Wt. Detail**

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

**Total Average Biomass Wet Wt. Detail**

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

# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Germination | Comparison | 09-6405-2832 | 09-6405-2832 | 12 May-06 4:18 PM | CETISv1.1.2 |

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

**Group Comparisons**

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

**ANOVA Table**

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

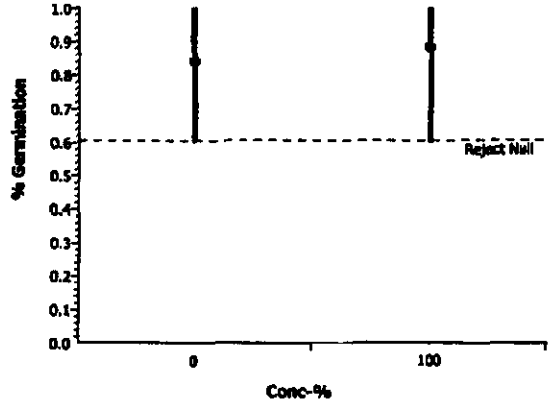
**ANOVA Assumptions**

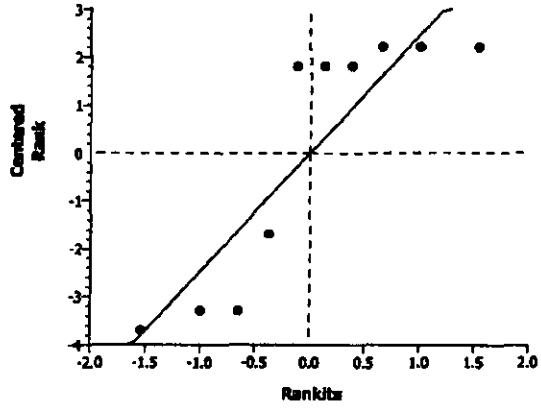
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.48569 | 23.15450 | 0.71064 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.76085 | | 0.00484 | Non-normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Dry Wt. | Comparison | 09-6405-2832 | 09-6405-2832 | 12 May-06 4:18 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 30.89% |

**Group Comparisons**

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

**ANOVA Table**

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

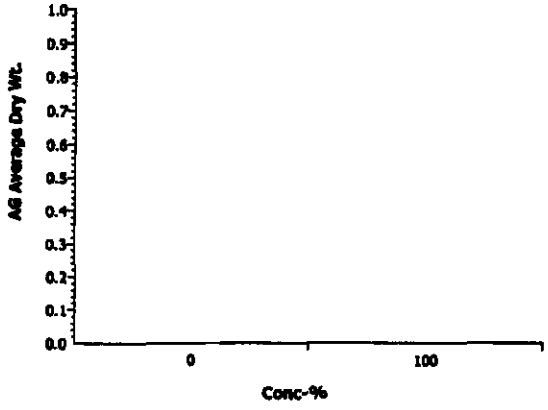
**ANOVA Assumptions**

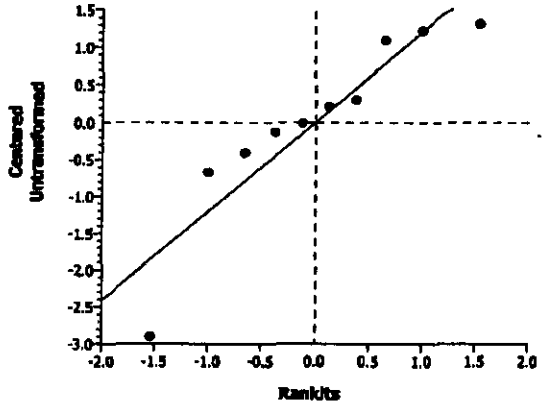
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 5.40119 | 23.15450 | 0.13118 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.86077 | | 0.07792 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 4.96040 | 2.05666 | 6.26333 | 1.69222 | | | | |
| 100 | | 5 | 2.70991 | 2.03800 | 3.92800 | 0.72814 | | | | |

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Height | Comparison | 09-6405-2832 | 09-6405-2832 | 12 May-06 4:18 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 22.72% |

**Group Comparisons**

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

**ANOVA Table**

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

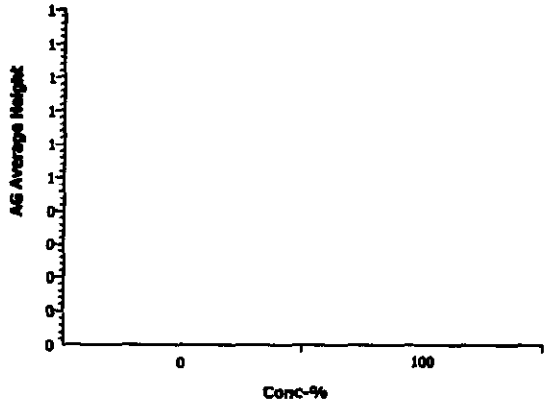
**ANOVA Assumptions**

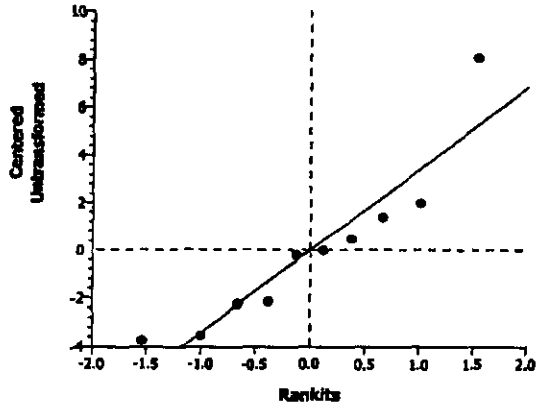
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 10.73659 | 23.15450 | 0.04108 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.87674 | | 0.11969 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| AG Average Wet WL | Comparison | 09-6405-2832 | 09-6405-2832 | 12 May-06 4:18 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 30.51% |

**Group Comparisons**

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

**ANOVA Table**

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

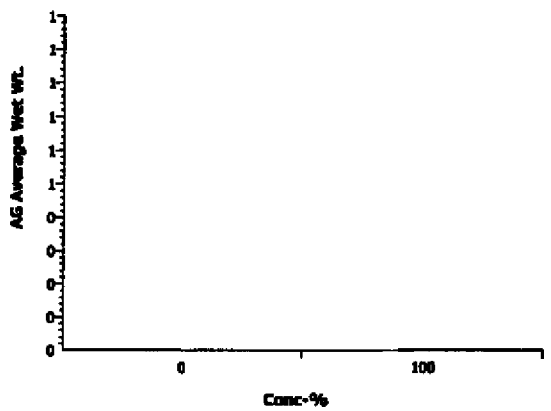
**ANOVA Assumptions**

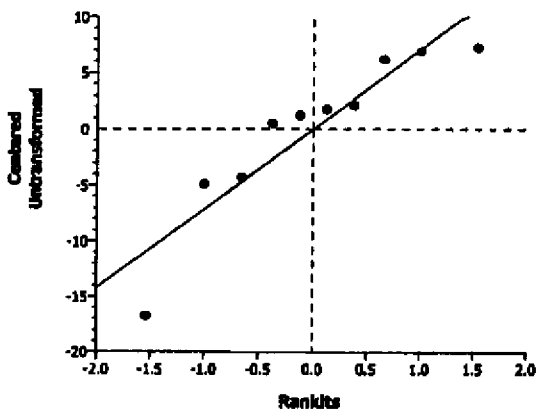
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 4.01387 | 23.15450 | 0.20694 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.85862 | | 0.07350 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Root Average Dry Wt. | Comparison | 09-6405-2832 | 09-6405-2832 | 12 May-06 4:18 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 33.67% |

**Group Comparisons**

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

**ANOVA Table**

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

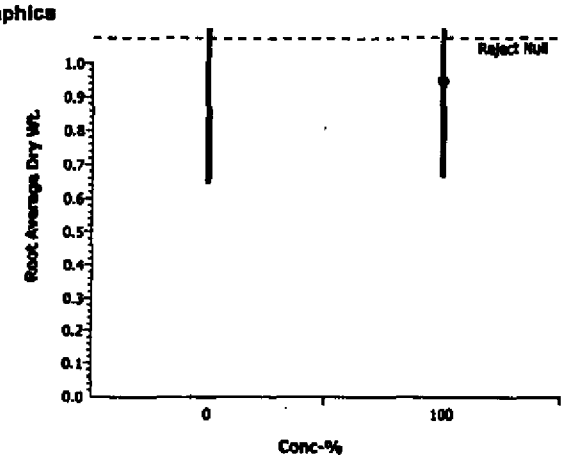
**ANOVA Assumptions**

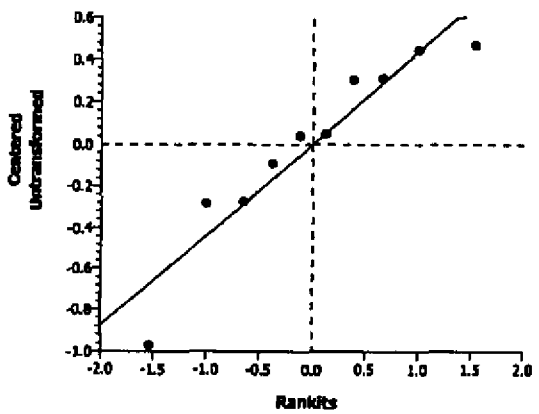
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 3.54078 | 23.15450 | 0.24827 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.89450 | | 0.19044 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Root Average Length | Comparison | 09-6405-2832 | 09-6405-2832 | 12 May-06 4:18 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 25.28% |

**Group Comparisons**

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

**ANOVA Table**

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

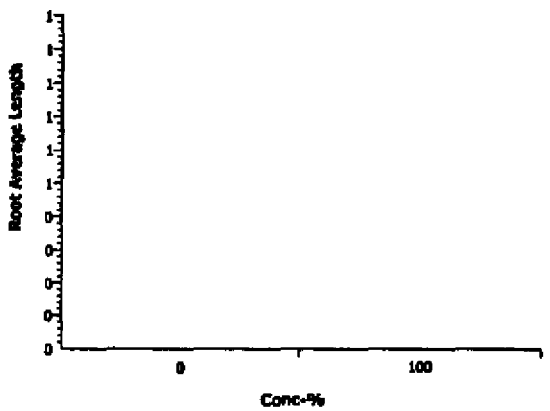
**ANOVA Assumptions**

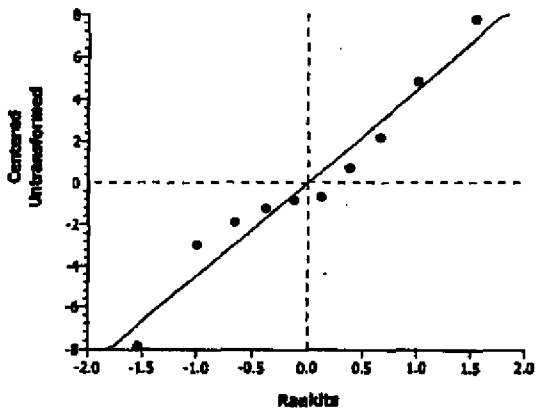
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 3.50853 | 23.15450 | 0.25153 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96501 | | 0.84114 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 21.227 | 13.333 | 29 | 5.693 | | | | |
| 100 | | 5 | 11.467 | 8.5 | 16.333 | 3.0393 | | | | |

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Root Average Wet Wt. | Comparison | 09-6405-2832 | 09-6405-2832 | 12 May-06 4:18 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 34.20% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Artificial Soil/Sedi | | 100 | 3.84256 | 1.85955 | 0.0025 | 12.6129 | Significant Effect |

**ANOVA Table**

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

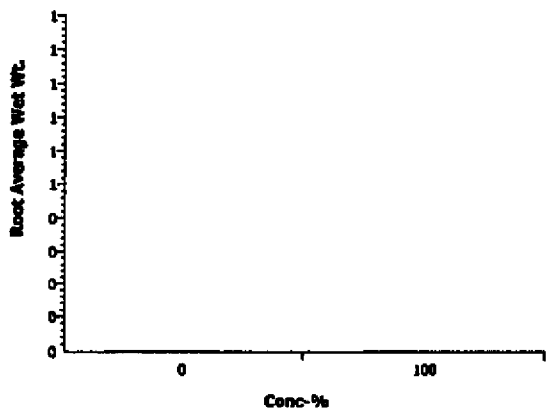
**ANOVA Assumptions**

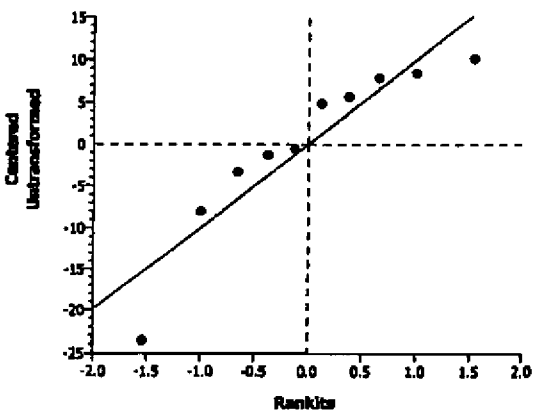
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 4.72166 | 23.15450 | 0.16192 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.86147 | | 0.07941 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 36.878 | 13.317 | 46.99 | 13.778 | | | | |
| 100 | | 5 | 10.815 | 2.812 | 18.633 | 6.3406 | | | | |

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Total Average Biomass Dry Wt. | Comparison | 09-6405-2832 | 09-6405-2832 | 12 May-06 4:18 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 31.34% |

**Group Comparisons**

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

**ANOVA Table**

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

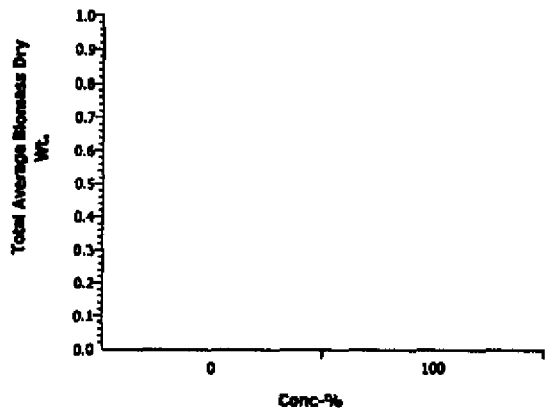
**ANOVA Assumptions**

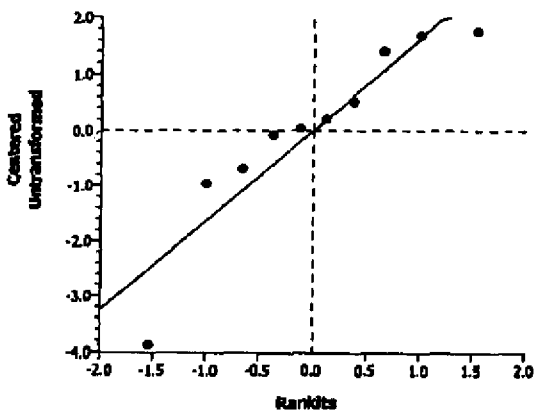
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 4.80730 | 23.15450 | 0.15749 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.86949 | | 0.09860 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Wet Wt. | Comparison | 09-6405-2832 | 09-6405-2832 | 12 May-06 4:18 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 30.61% |

**Group Comparisons**

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

**ANOVA Table**

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

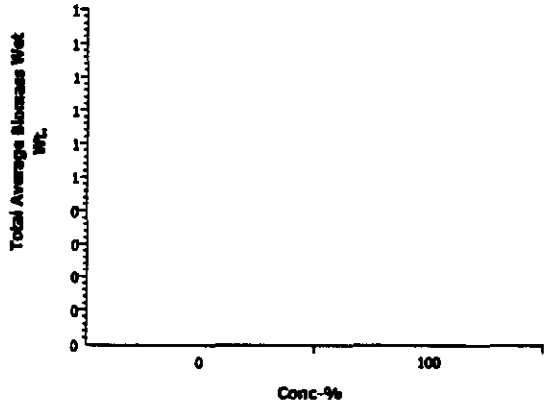
**ANOVA Assumptions**

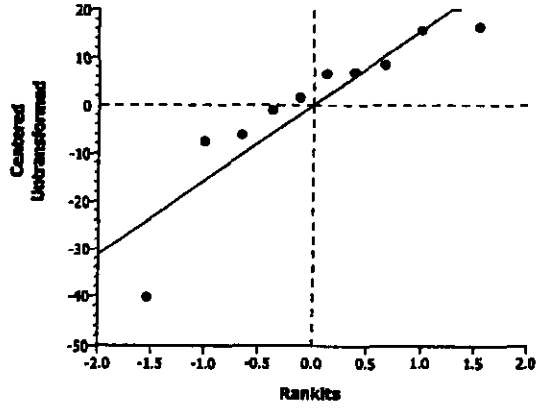
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 10.36698 | 23.15450 | 0.04371 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.82350 | | 0.02793 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 68.484 | 26.15 | 82.77 | 23.370 | | | | |
| 100 | | 5 | 25.941 | 18.338 | 34.293 | 7.2584 | | | | |

**Graphics**



**BLUEGRASS GROWTH TEST**

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

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

Bioassay Lab ID: [illegible] 3615V2-024 Sample No: J10DV4

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

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

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

Replicate B: 2 Mb, 1 Sm G

Replicate C: 2 Mb G

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

Replicate E: 2 Lg G, 3 mb G — removed: 1 mb G, 1 sm G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 Lg 3G shoots, 1 brown, 1 dark Green, 1 Sm 2 G shoots, 1 brown

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

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

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

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

Measure Shoot Height: Individual height of each seedling (above ground) → tallest shoot only

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 62 mm | 29 mm | mm | mm | mm |
| Replicate B | 96 ~~96~~ mm | 39 mm | 29 mm | mm | mm |
| Replicate C | 54 mm | 35 mm | mm | mm | mm |
| Replicate D | 46 mm | 31 mm | 19 mm | mm | mm |
| Replicate E | 59 mm | 37 mm | 39 mm | 64 mm | 32 mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1025.30 | 1045.2 | 1030.35 |
| Replicate B | 999.34 | 1025.6 | 1003.49 |
| Replicate C | 997.97 | 1016.2 | 1002.65 |
| Replicate D | 1004.87 | ~~1024~~ 1024.8 | 1008.49 |
| Replicate E | 987.22 | 1034.8 | 996.47 |

Describe root appearance:

Replicate A: thin, white, stringy

Replicate B:

Replicate C:

Replicate D:

Replicate E:

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 13 mm | 54 mm | mm | mm | mm |
| Replicate B | 50 mm | 21 mm | 10 mm | mm | mm |
| Replicate C | 29 mm | 16 mm | mm | mm | mm |
| Replicate D | 52 mm | 36 mm | 9 mm | mm | mm |
| Replicate E | 46 mm | 24 mm | 21 mm | 43 mm | 21 mm |

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

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

Comments:

# CETIS Test Summary

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

**Plant Chronic test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 08-3212-8496 | **Test Type:** | Plant Chronic test | **Duration:** | 33d 0h |
| **Start Date:** | 05 Apr-06 | **Protocol:** | ASTM E1963-02 (2002) | **Species:** | Poa sandbergii |
| **Ending Date:** | 08 May-06 | **Dil Water:** | | **Source:** | |
| **Setup Date:** | 05 Apr-06 12:00 AM | **Brine:** | | | |
| **Comments:** | repeat test BG1542-02A | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 07-3307-9513 | **Code:** | B1542-02 | **Client:** | |
| **Sample Date:** | 08 Nov-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 148d 0h | **Station:** | | | |
| **Comments:** | J10DV4, J10DV5, J10DV6, J10DV7, J10DV8. E280101 | | | | |

**Comparison Summary**

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

# CETIS Test Summary

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

**% Germination Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 0.84000 | 0.60000 | 1.00000 | 0.09798 | 0.21909 | 26.08% |
| 100 | | 5 | 0.60000 | 0.40000 | 1.00000 | 0.10954 | 0.24495 | 40.82% |

**AG Average Dry Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 4.96040 | 2.05668 | 6.28333 | 0.75679 | 1.69222 | 34.11% |
| 100 | | 5 | 1.86100 | 1.20667 | 2.52496 | 0.25756 | 0.57593 | 30.95% |

**AG Average Height Summary**

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

**AG Average Wet Wt. Summary**

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

**Root Average Dry Wt. Summary**

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

**Root Average Length Summary**

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

**Root Average Wet Wt. Summary**

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

**Total Average Biomass Dry Wt. Summary**

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

**Total Average Biomass Wet Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 66.484 | 26.150 | 82.77 | 10.452 | 23.370 | 35.15% |
| 100 | | 5 | 17.659 | 11.000 | 25.575 | 2.6359 | 5.894 | 33.38% |

# CETIS Test Summary

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

**% Germination Detail**

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

**AG Average Dry Wt. Detail**

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

**AG Average Height Detail**

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

**AG Average Wet Wt. Detail**

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

**Root Average Dry Wt. Detail**

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

**Root Average Length Detail**

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

**Root Average Wet Wt. Detail**

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

**Total Average Biomass Dry Wt. Detail**

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

**Total Average Biomass Wet Wt. Detail**

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

# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Germination | Comparison | 02-2678-4041 | 02-2678-4041 | 15 May-06 1:17 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Angular (Corrected) | | 100 | >100 | 1 | N/A | 32.24% |

**Group Comparisons**

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

**ANOVA Table**

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

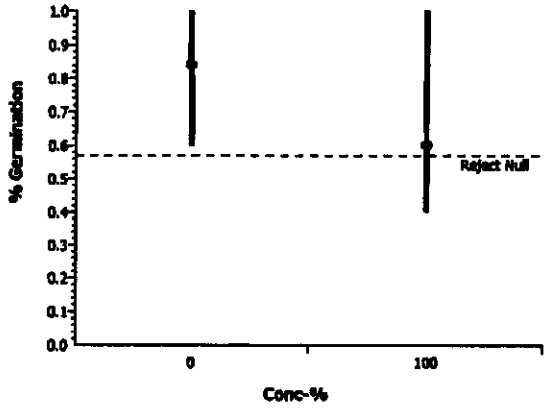
**ANOVA Assumptions**

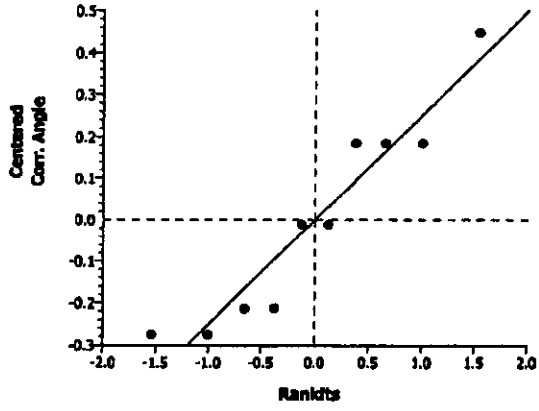
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.15127 | 23.15450 | 0.89470 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.89943 | | 0.21598 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 0.84000 | 0.60000 | 1.00000 | 0.21909 | 1.16160 | 0.88608 | 1.34528 | 0.25152 |
| 100 | | 5 | 0.60000 | 0.40000 | 1.00000 | 0.24495 | 0.89738 | 0.68472 | 1.34528 | 0.26987 |

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Dry Wt. | Comparison | 02-2678-4041 | 02-2678-4041 | 15 May-06 1:17 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 29.97% |

**Group Comparisons**

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

**ANOVA Table**

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

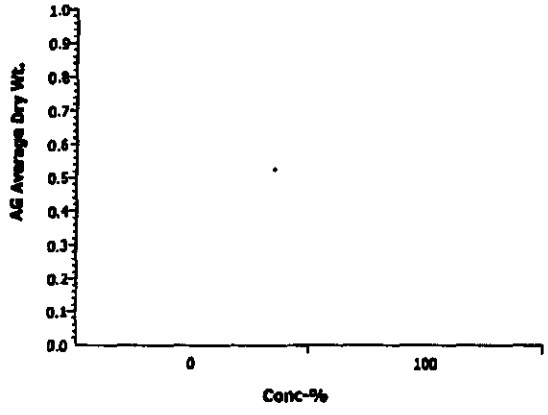
**ANOVA Assumptions**

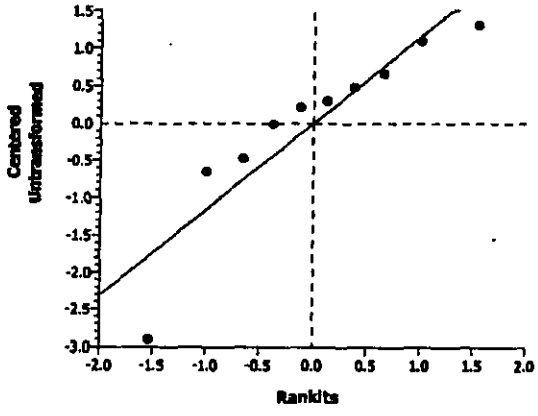
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 8.63338 | 23.15450 | 0.06018 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.85010 | | 0.05825 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Height | Comparison | 02-2678-4041 | 02-2678-4041 | 15 May-06 1:17 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 35.46% |

**Group Comparisons**

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

**ANOVA Table**

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

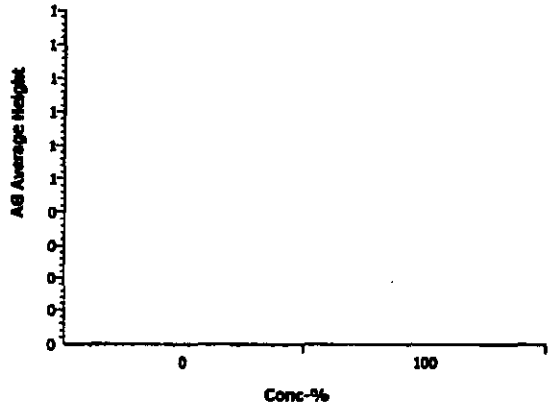
**ANOVA Assumptions**

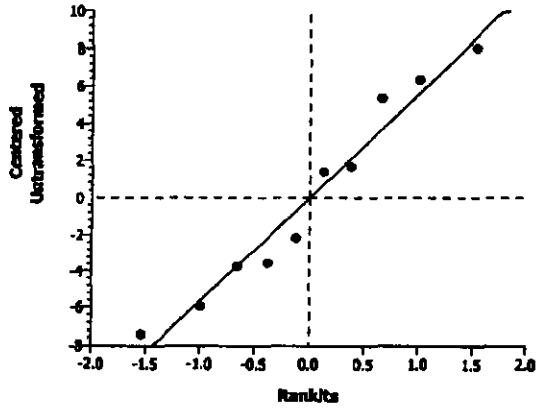
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.66403 | 23.15450 | 0.63386 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.94207 | | 0.57629 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Wet Wt. | Comparison | 02-2678-4041 | 02-2678-4041 | 15 May-06 1:17 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Wilcoxon Rank Sum Two-Sample | C > T | Rank | | <100 | 100 | | N/A | 27.53% |

**Group Comparisons**

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

**ANOVA Table**

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

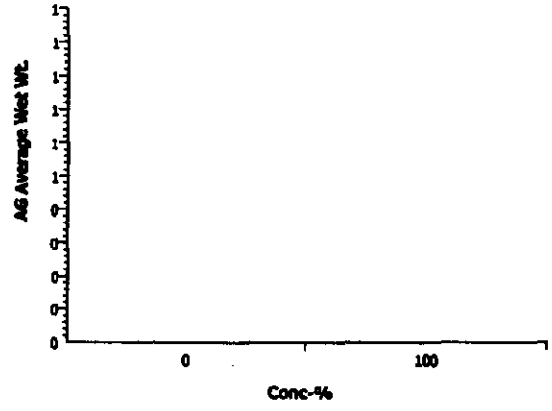
**ANOVA Assumptions**

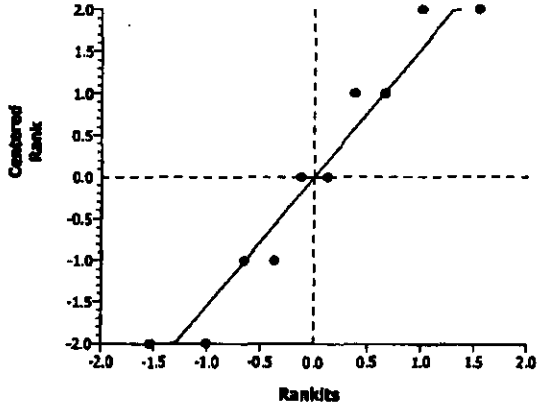
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 57.33263 | 23.15450 | 0.00174 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.76115 | | 0.00488 | Non-normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Root Average Dry Wt. | Comparison | 02-2678-4041 | 02-2678-4041 | 15 May-06 1:17 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 33.00% |

**Group Comparisons**

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

**ANOVA Table**

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

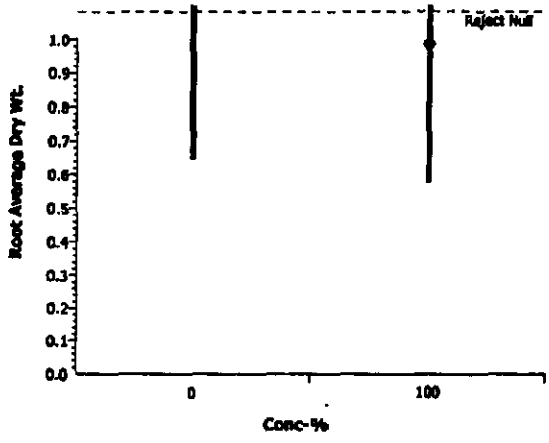
**ANOVA Assumptions**

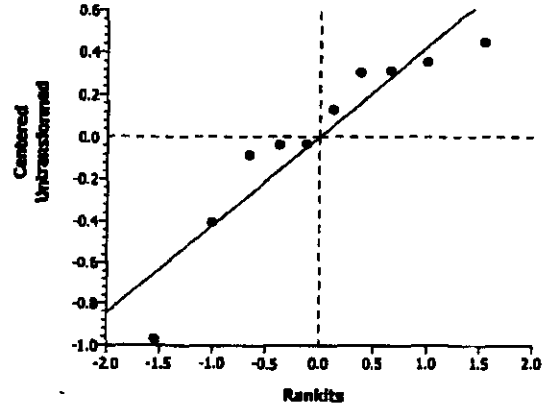
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 4.31054 | 23.15450 | 0.18604 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.87013 | | 0.10032 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Length | Comparison | 02-2678-4041 | 02-2678-4041 | 15 May-06 1:17 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 27.18% |

**Group Comparisons**

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

**ANOVA Table**

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

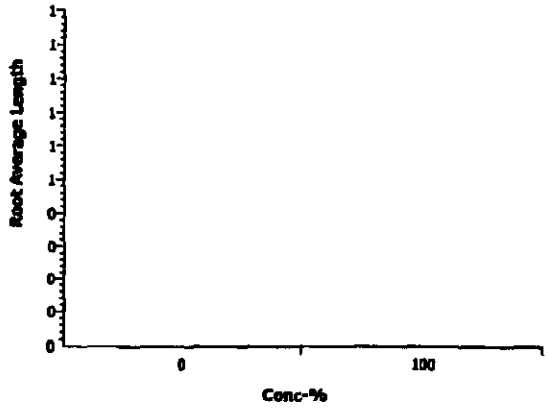
**ANOVA Assumptions**

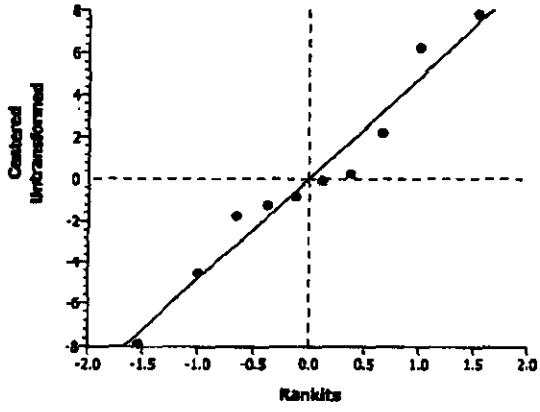
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.08125 | 23.15450 | 0.50082 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.95986 | | 0.78426 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Wet Wt. | Comparison | 02-2678-4041 | 02-2678-4041 | 15 May-06 1:17 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 33.13% |

**Group Comparisons**

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

**ANOVA Table**

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

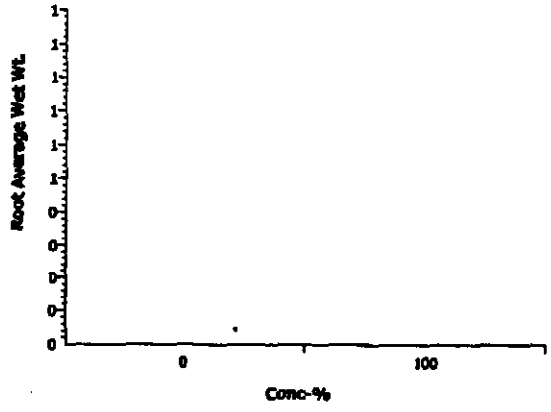
**ANOVA Assumptions**

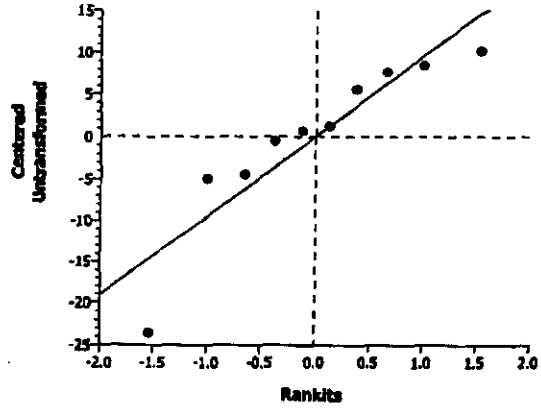
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 7.29820 | 23.15450 | 0.08013 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.84834 | | 0.05551 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Dry Wt. | Comparison | 02-2678-4041 | 02-2678-4041 | 15 May-06 1:17 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 29.82% |

**Group Comparisons**

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

**ANOVA Table**

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

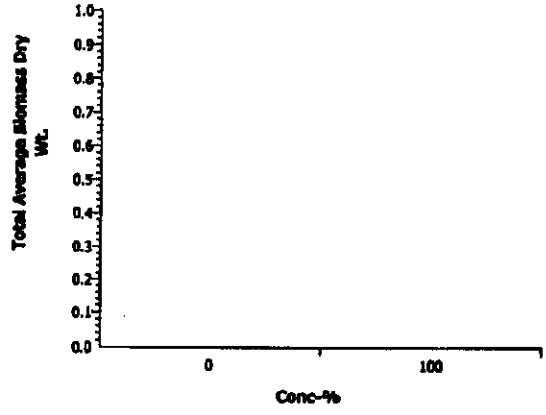
**ANOVA Assumptions**

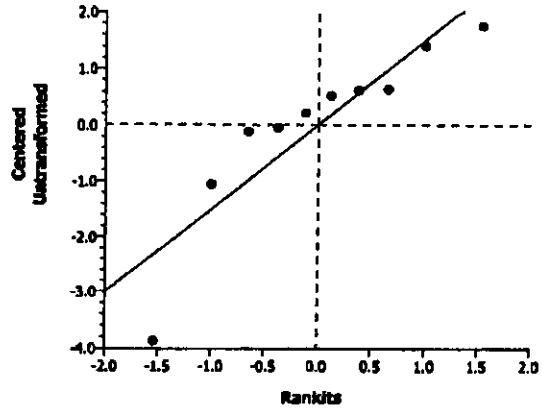
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 10.62648 | 23.15450 | 0.04184 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.82768 | | 0.03137 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Wet Wt. | Comparison | 02-2678-4041 | 02-2678-4041 | 15 May-06 1:17 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 30.15% |

**Group Comparisons**

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

**ANOVA Table**

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

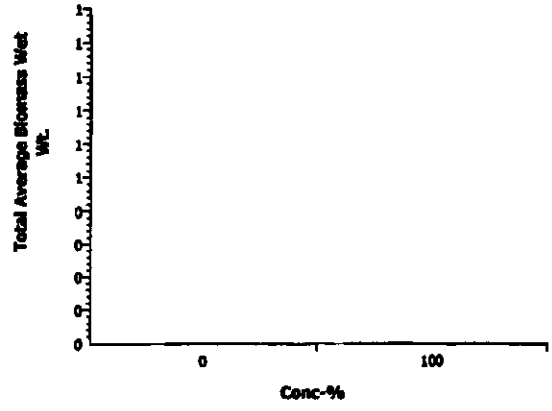
**ANOVA Assumptions**

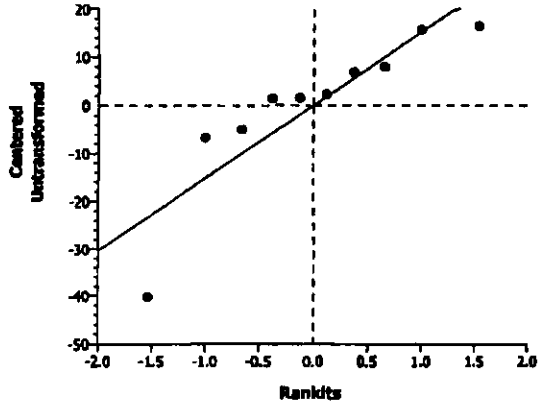
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 15.72240 | 23.15450 | 0.02060 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.80564 | | 0.01698 | Normal Distribution |

**Data Summary**

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

**Graphics**



## BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 [illegible] Day 14 15 NJ Day 16 TP Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 33 [illegible]

Bioassay Lab ID: BN 815420 3A Sample No: 510DT8

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

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

Replicate A: 5 Lg G — removed: 1 Sm G

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

Replicate C: 5 Lg G

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

Replicate E: 5 Lg G

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

Replicate C: 5 Lg/Md G

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

Replicate E: 3 Lg G, 2 Md G

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 55 mm | 66 mm | 67 mm | 86 mm | 108 mm |
| Replicate B | 77 mm | 49 mm | 89 mm | 86 mm | 87 mm |
| Replicate C | 55 mm | 76 mm | 59 mm | 52 mm | 61 mm |
| Replicate D | 81 mm | 75 mm | 68 mm | 69 mm | 86 mm |
| Replicate E | 77 mm | 35 mm | 34 mm | 69 mm | 66 mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1020.97 | 1167.1 | 1043.38 |
| Replicate B | ~~1000~~ 1001.95 | 1125.5 | 1022.29 |
| Replicate C | 1029.27 | 1111.2 | 1041.68 |
| Replicate D | 1040.36 | 1194.6 | 1064.64 |
| Replicate E | 998.51 | 1062.1 | 1008.55 |

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 54 mm | 79 mm | 53 mm | 56 mm | 42 mm |
| Replicate B | 35 mm | 67 mm | 85 mm | 59 mm | mm |
| Replicate C | 33 mm | 50 mm | 52 mm | 50 mm | 62 mm |
| Replicate D | 79 mm | 87 mm | 75 mm | 49 mm | 72 mm |
| Replicate E | 67 mm | 66 mm | 21 mm | 21 mm | 44 mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 996.85 | 1123.0 | ~~1007~~ 1003.77 |
| Replicate B | 1002.94 | 1125.1 | 1010.65 |
| Replicate C | 973.77 | 1049.9 | 979.66 |
| Replicate D | 1022.54 | 1181.3 | 1033.00 |
| Replicate E | 972.22 | 1031.3 | ~~979~~ 976.30 |

Comments:

# CETIS Test Summary

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

**Plant Chronic test** — **CH2M Hill**

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

**Comments:** repeat test BG1542-03A

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

**Comments:** J10DT8, E283101

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 03-8076-1014 | % Germination | 100 | > 100 | N/A | 20.96% | Equal Variance t Two-Sample |
| 08-6295-7792 | AG Average Dry Wt. | 100 | > 100 | N/A | 35.38% | Equal Variance t Two-Sample |
| 10-3029-3936 | AG Average Height | < 100 | 100 | N/A | 23.48% | Equal Variance t Two-Sample |
| 11-0749-8508 | AG Average Wet Wt. | 100 | > 100 | N/A | 35.26% | Equal Variance t Two-Sample |
| 08-1680-6695 | Root Average Dry Wt. | 100 | > 100 | N/A | 39.40% | Equal Variance t Two-Sample |
| 07-9801-3032 | Root Average Length | < 100 | 100 | N/A | 23.91% | Equal Variance t Two-Sample |
| 09-0174-2180 | Root Average Wet Wt. | < 100 | 100 | N/A | 36.01% | Equal Variance t Two-Sample |
| 01-3143-0252 | Total Average Biomass Dry | 100 | > 100 | N/A | 35.95% | Equal Variance t Two-Sample |
| 02-9227-5895 | Total Average Biomass Wet | 100 | > 100 | N/A | 35.37% | Equal Variance t Two-Sample |

# CETIS Test Summary

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

**% Germination Summary**

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

**AG Average Dry Wt. Summary**

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

**AG Average Height Summary**

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

**AG Average Wet Wt. Summary**

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

**Root Average Dry Wt. Summary**

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

**Root Average Length Summary**

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

**Root Average Wet Wt. Summary**

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

**Total Average Biomass Dry Wt. Summary**

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

**Total Average Biomass Wet Wt. Summary**

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

# CETIS Test Summary

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

**% Germination Detail**

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

**AG Average Dry Wt. Detail**

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

**AG Average Height Detail**

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

**AG Average Wet Wt. Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 |
|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 12.8333 | 36.8260 | 31.748 | 35.76 | 30.84 |
| 100 | | 29.2260 | 24.71 | 16.386 | 30.848 | 12.718 |

**Root Average Dry Wt. Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 |
|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 0.64667 | 1.92800 | 1.52800 | 2.08331 | 1.92001 |
| 100 | | 1.38401 | 1.54200 | 0.97799 | 2.09200 | 0.81600 |

**Root Average Length Detail**

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

**Root Average Wet Wt. Detail**

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

**Total Average Biomass Dry Wt. Detail**

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

**Total Average Biomass Wet Wt. Detail**

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

# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Germination | Comparison | 02-6445-8985 | 02-6445-8985 | 15 May-06 1:28 PM | CETISv1.1.2 |

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

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Artificial Soil/Sedi | | 100 | -1.833 | 1.85955 | 0.9294 | 0.20917 | Non-Significant Effect |

**ANOVA Table**

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

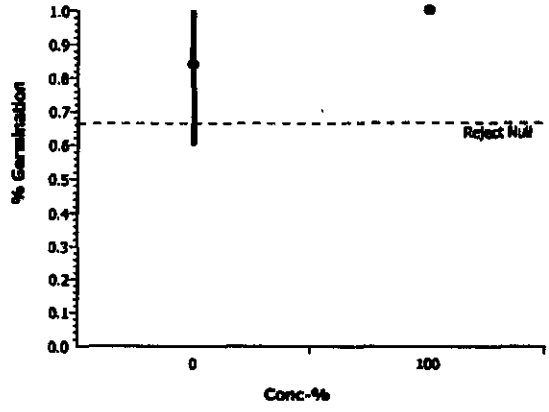
**ANOVA Assumptions**

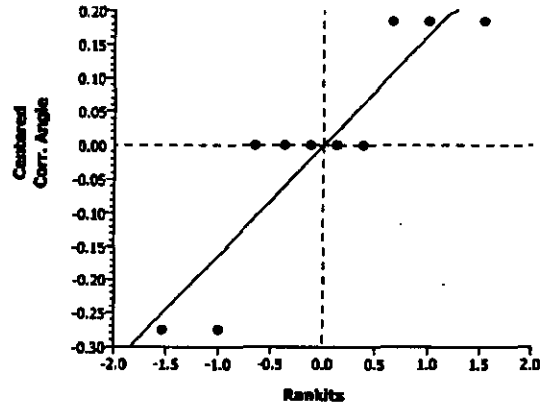
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Modified Levene | 4.80000 | 11.25862 | 0.05984 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.81415 | | 0.02153 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M HILL**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Dry Wt. | Comparison | 02-6445-8985 | 02-6445-8985 | 15 May-06 1:28 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 35.38% |

**Group Comparisons**

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

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 4.769275 | 4.769275 | 1 | 2.14 | 0.18145 | Non-Significant Effect |
| Error | 17.81121 | 2.226401 | 8 | | | |
| Total | 22.5804858 | 6.9958765 | 9 | | | |

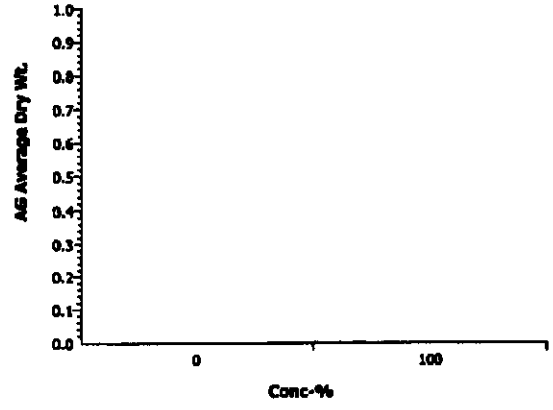
**ANOVA Assumptions**

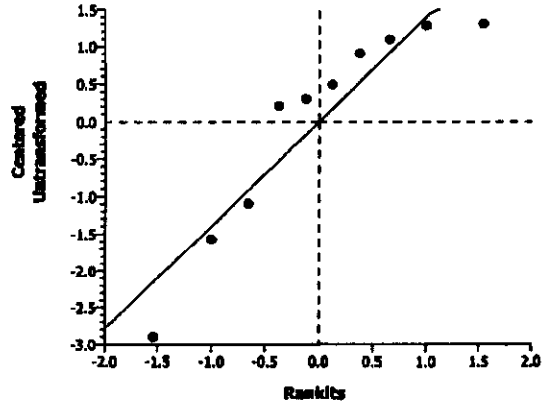
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.80195 | 23.15450 | 0.58241 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.85931 | | 0.07488 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Height | Comparison | 02-6445-8985 | 02-6445-8985 | 15 May-06 1:28 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 23.48% |

**Group Comparisons**

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

**ANOVA Table**

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

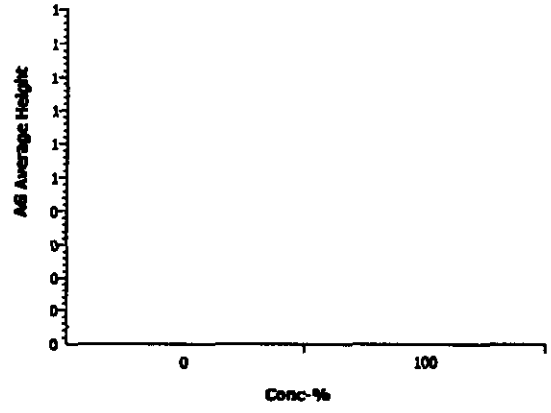
**ANOVA Assumptions**

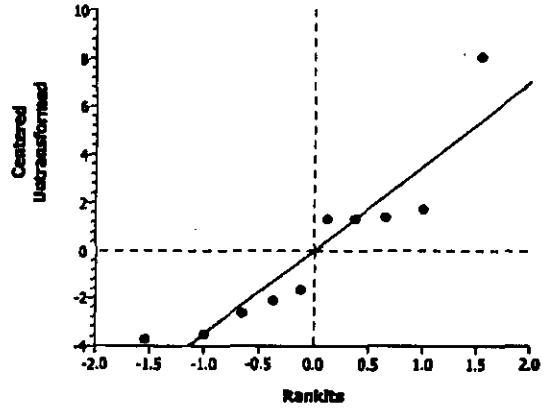
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 5.95839 | 23.15450 | 0.11205 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.85981 | | 0.07593 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Wet Wt. | Comparison | 02-6445-8985 | 02-6445-8985 | 15 May-06 1:28 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 35.26% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Artificial Soil/Sedi | | 100 | 1.21638 | 1.85955 | 0.1293 | 10.4381 | Non-Significant Effect |

**ANOVA Table**

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

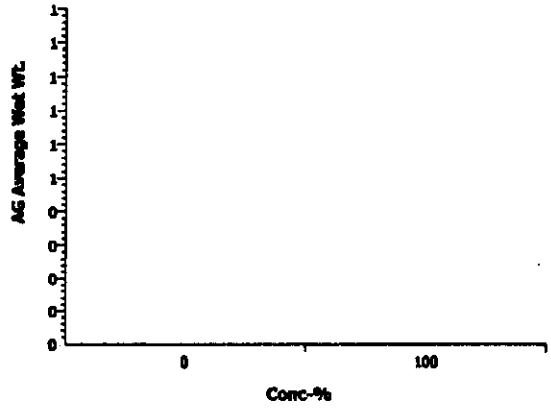
**ANOVA Assumptions**

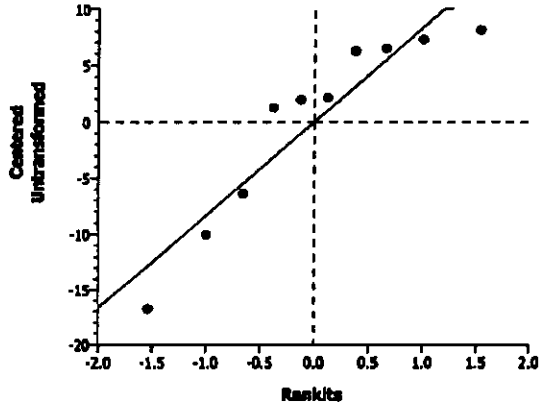
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.49579 | 23.15450 | 0.70595 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.86182 | | 0.08017 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | | CH2M Hill |
|---|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** | |
| Root Average Dry Wt. | Comparison | 02-6445-8985 | 02-6445-8985 | 15 May-06 1:28 PM | CETISv1.1.2 | |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 39.40% |

**Group Comparisons**

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

**ANOVA Table**

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

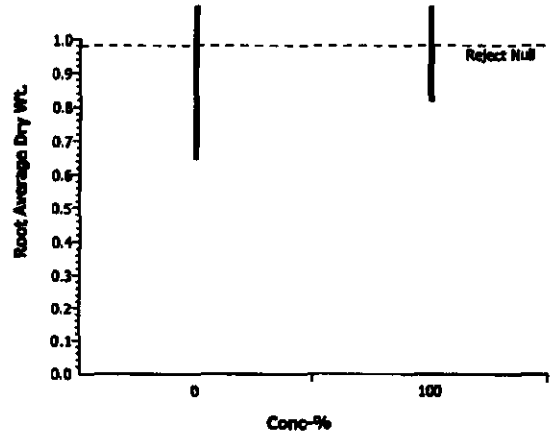
**ANOVA Assumptions**

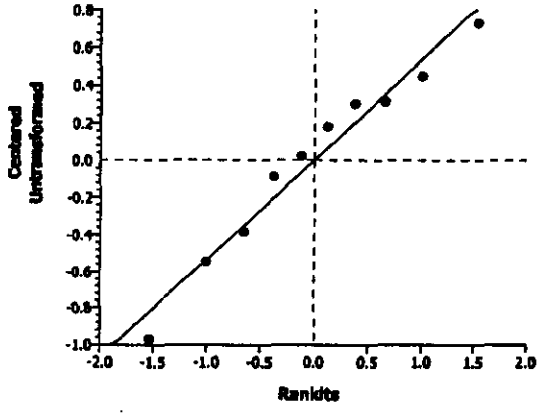
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.32217 | 23.15450 | 0.79323 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96492 | - | 0.84022 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Length | Comparison | 02-6445-8985 | 02-6445-8985 | 15 May-06 1:29 PM | CETISv1.1.2 |

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

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Artificial Soil/Sedi | | 100 | 3.61544 | 1.85955 | 0.0034 | 5.07478 | Significant Effect |

**ANOVA Table**

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

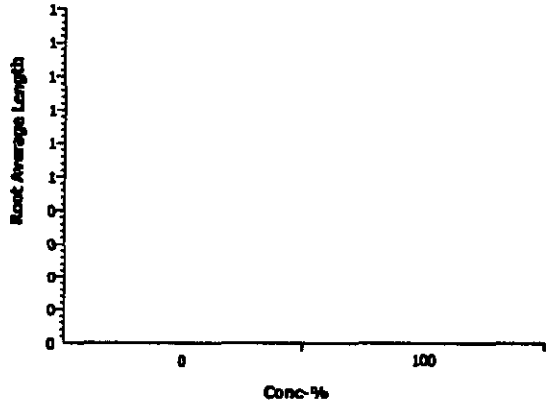
**ANOVA Assumptions**

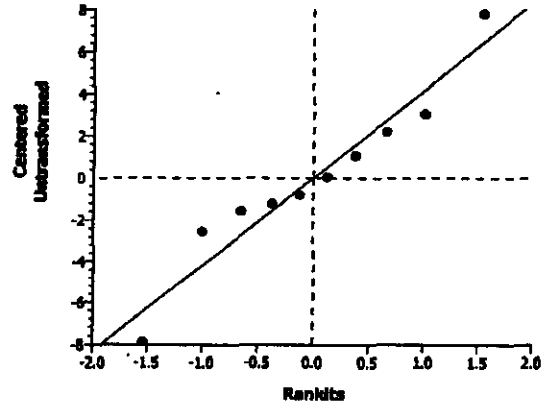
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 6.71297 | 23.15450 | 0.09214 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.95770 | | 0.75941 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Wet Wt. | Comparison | 02-6445-8985 | 02-6445-8985 | 15 May-06 1:29 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 36.01% |

**Group Comparisons**

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

**ANOVA Table**

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

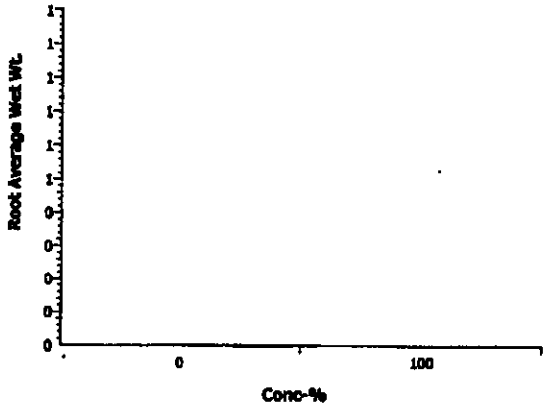
**ANOVA Assumptions**

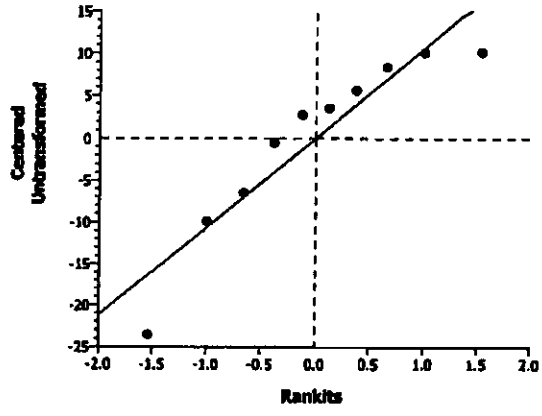
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.91398 | 23.15450 | 0.32495 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.87337 | | 0.10940 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Dry Wt. | Comparison | 02-6445-8985 | 02-6445-8985 | 15 May-06 1:29 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 35.95% |

**Group Comparisons**

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

**ANOVA Table**

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

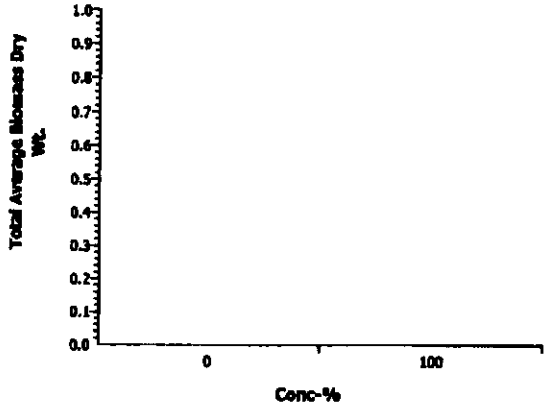
**ANOVA Assumptions**

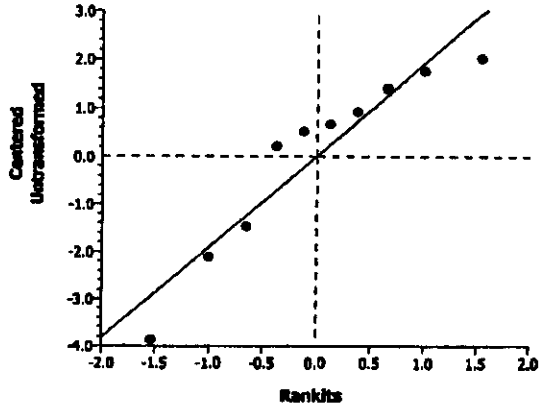
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.69432 | 23.15450 | 0.62201 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.88744 | | 0.15864 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Wet Wt. | Comparison | 02-6445-8985 | 02-6445-8985 | 15 May-06 1:29 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 35.37% |

**Group Comparisons**

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

**ANOVA Table**

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

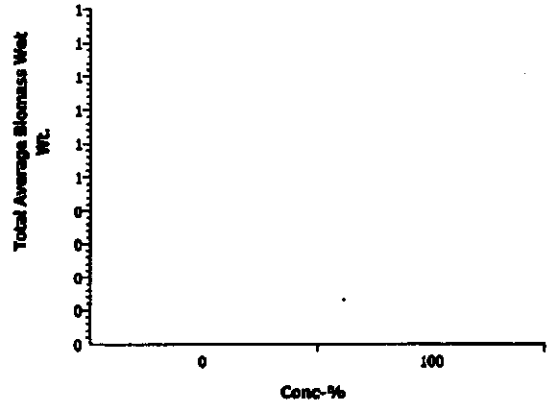
**ANOVA Assumptions**

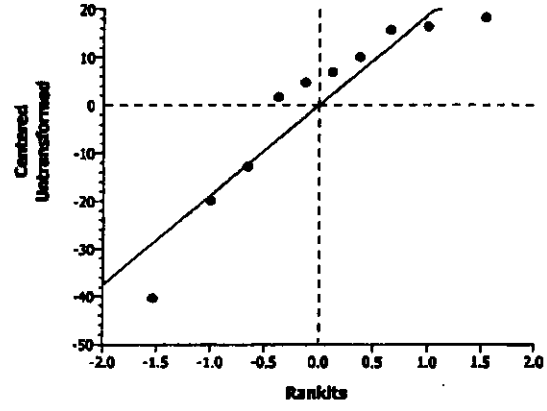
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.15865 | 23.15450 | 0.47497 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.86762 | | 0.09378 | Normal Distribution |

**Data Summary**

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

**Graphics**



## BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

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

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

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

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

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

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

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

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1024.21 | 1094.4 | 1037.13 |
| Replicate B | 1043.93 | 1091.8 | 1055.52 |
| Replicate C | 1019.24 | 1145.4 | 1038.84 |
| Replicate D | 988.02 | 1059.1 | 1001.26 |
| Replicate E | 1001.92 | 1073.7 | 1014.31 |

Describe root appearance:

- Replicate A
- Replicate B
- Replicate C
- Replicate D
- Replicate E

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 53 mm | 48 mm | 47 mm | 54 mm | 55 mm |
| Replicate B | 57 mm | 57 mm | 61 mm | 9 mm | 12 mm |
| Replicate C | 69 mm | 60 mm | 30 mm | 78 mm | 95 mm |
| Replicate D | 35 mm | 51 mm | 54 mm | 79 mm | 46 mm |
| Replicate E | 85 mm | 55 mm | 54 mm | 54 mm | — mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1011.97 | 1119.1 | 1018.86 |
| Replicate B | 998.58 | 1062.4 | 1003.81 |
| Replicate C | 981.26 | 1170.6 | 991.49 |
| Replicate D | 1005.89 | 1101.2 | 1012.80 |
| Replicate E | 1006.09 | 1101.5 | 1011.95 |

Comments:

# CETIS Test Summary

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

**Plant Chronic test** — CH2M Hill

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

**Comments:** repeat test BG1542-08A

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

**Comments:** J10LJ5, E289701

**Comparison Summary**

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

# CETIS Test Summary

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

**% Germination Summary**

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

**AG Average Dry Wt. Summary**

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

**AG Average Height Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 18.947 | 15.2 | 27 | 2.2136 | 4.9498 | 26.13% |
| 100 | | 5 | 10.87 | 8 | 13.75 | 1.0526 | 2.3536 | 21.65% |

**AG Average Wet Wt. Summary**

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

**Root Average Dry Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 1.61720 | 0.64667 | 2.06331 | 0.25857 | 0.57819 | 35.75% |
| 100 | | 5 | 1.46240 | 1.04600 | 2.04800 | 0.16241 | 0.36317 | 24.83% |

**Root Average Length Summary**

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

**Root Average Wet Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 36.878 | 13.317 | 46.99 | 6.1616 | 13.778 | 37.36% |
| 100 | | 5 | 22.994 | 12.764 | 37.888 | 4.1506 | 9.281 | 40.36% |

**Total Average Biomass Dry Wt. Summary**

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

**Total Average Biomass Wet Wt. Summary**

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

# CETIS Test Summary

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

**% Germination Detail**

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

**AG Average Dry Wt. Detail**

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

**AG Average Height Detail**

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

**AG Average Wet Wt. Detail**

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

**Root Average Dry Wt. Detail**

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

**Root Average Length Detail**

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

**Root Average Wet Wt. Detail**

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

**Total Average Biomass Dry Wt. Detail**

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

**Total Average Biomass Wet Wt. Detail**

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

# CETIS Analysis Detail

**Plant Chronic test** — CH2M HILL

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Germination | Comparison | 04-1720-8149 | 04-1720-8149 | 15 May-06 1:35 PM | CETISv1.1.2 |

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

**Group Comparisons**

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

**ANOVA Table**

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

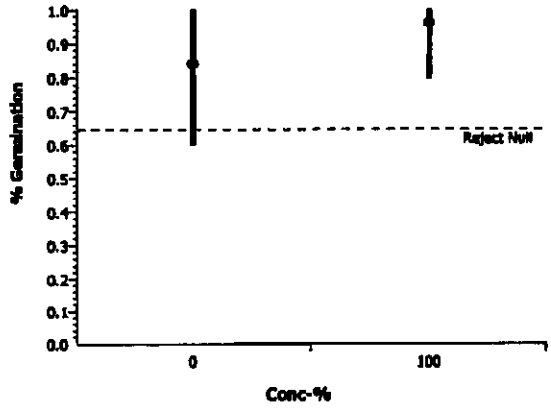
**ANOVA Assumptions**

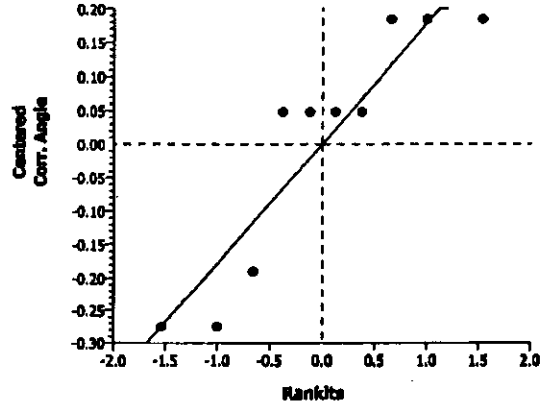
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 5.57779 | 23.15450 | 0.12462 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.82019 | | 0.02548 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M HILL

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Dry Wt. | Comparison | 04-1720-8149 | 04-1720-8149 | 15 May-06 1:35 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 30.26% |

**Group Comparisons**

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

**ANOVA Table**

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

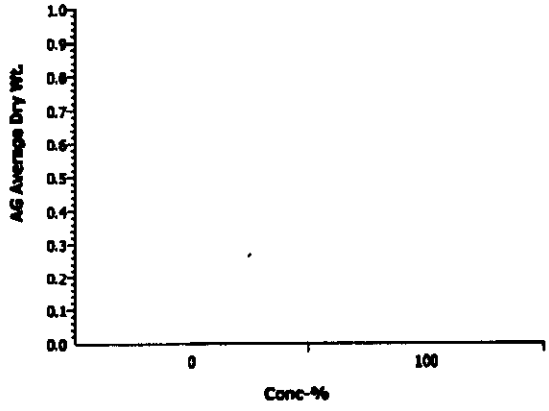
**ANOVA Assumptions**

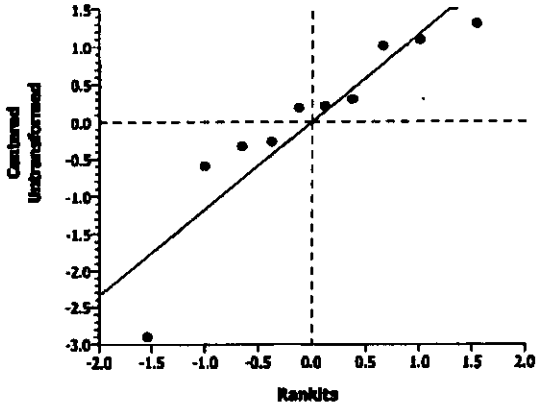
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 7.24704 | 23.15450 | 0.08109 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.84825 | | 0.05537 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M HILL**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Height | Comparison | 04-1720-8149 | 04-1720-8149 | 15 May-06 1:35 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 24.06% |

**Group Comparisons**

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

**ANOVA Table**

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

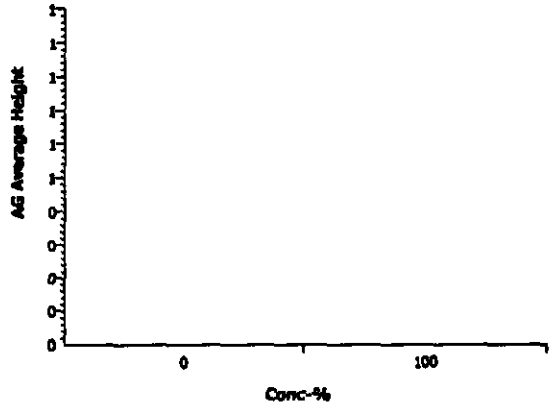
**ANOVA Assumptions**

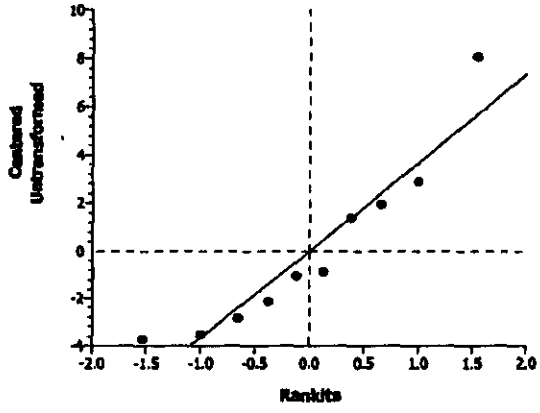
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 4.42294 | 23.15450 | 0.17894 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.89231 | | 0.18001 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | | CH2M Hill |
|---|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** | |
| AG Average Wet Wt. | Comparison | 04-1720-8149 | 04-1720-8149 | 15 May-06 1:35 PM | CETISv1.1.2 | |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 30.69% |

**Group Comparisons**

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

**ANOVA Table**

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

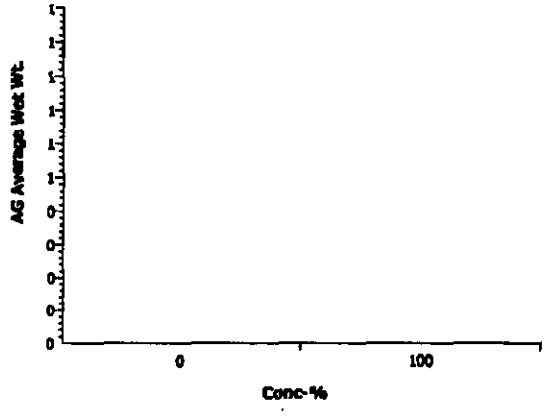
**ANOVA Assumptions**

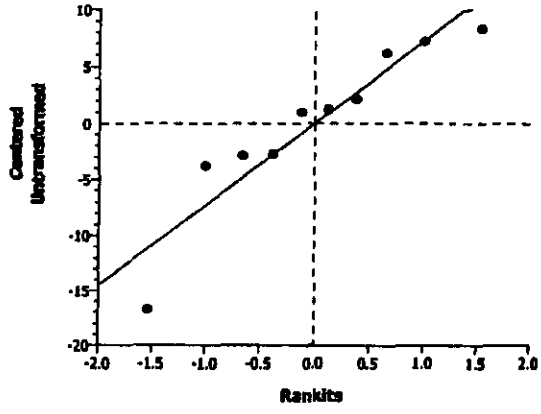
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 3.78474 | 23.15450 | 0.22556 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.88392 | | 0.14468 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Dry Wt. | Comparison | 04-1720-8149 | 04-1720-8149 | 15 May-06 1:35 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 35.11% |

**Group Comparisons**

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

**ANOVA Table**

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

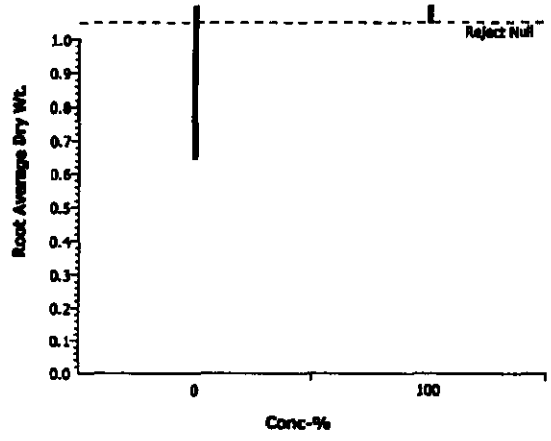
**ANOVA Assumptions**

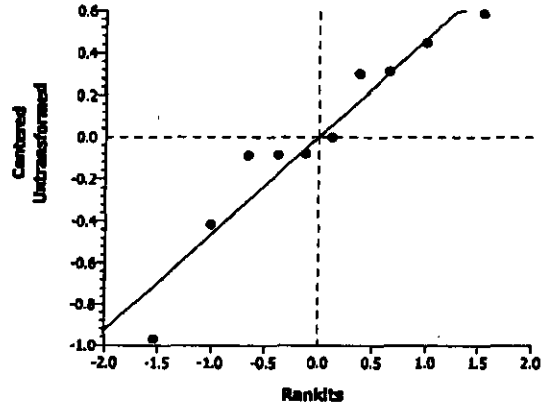
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.53463 | 23.15450 | 0.38967 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.92278 | | 0.38072 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Root Average Length | Comparison | 04-1720-8149 | 04-1720-8149 | 15 May-06 1:35 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | . | N/A | 24.97% |

**Group Comparisons**

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

**ANOVA Table**

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

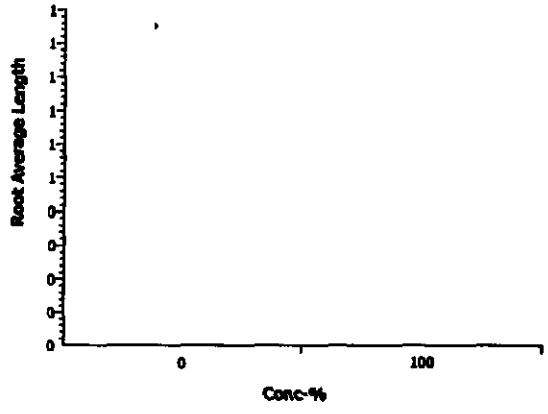
**ANOVA Assumptions**

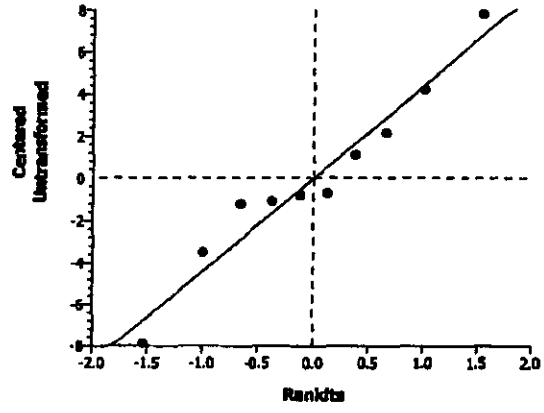
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 3.95247 | 23.15450 | 0.21170 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96578 | | 0.84922 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | | CH2M Hill |
|---|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Root Average Wet Wt. | Comparison | | 04-1720-8149 | 04-1720-8149 | 15 May-06 1:35 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 37.46% |

**Group Comparisons**

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

**ANOVA Table**

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

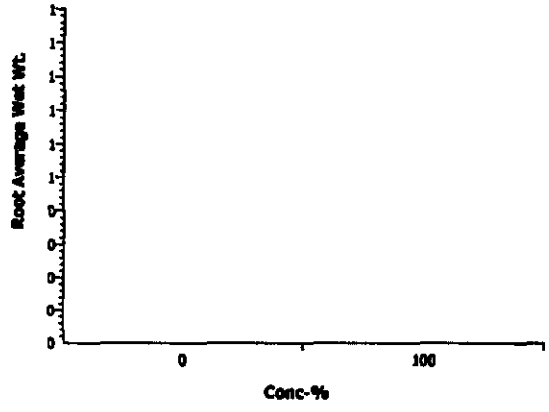
**ANOVA Assumptions**

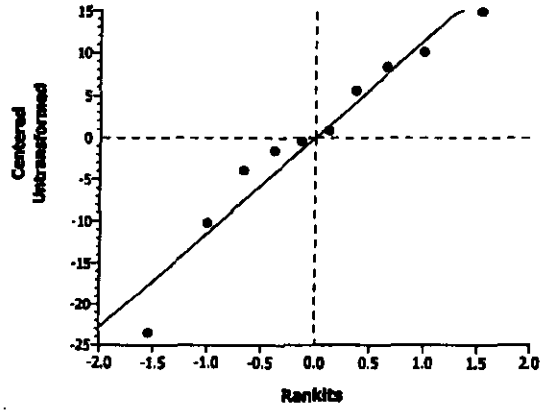
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.20379 | 23.15450 | 0.46291 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.94621 | | 0.62394 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Dry Wt. | Comparison | 04-1720-8149 | 04-1720-8149 | 15 May-06 1:35 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 31.11% |

**Group Comparisons**

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

**ANOVA Table**

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

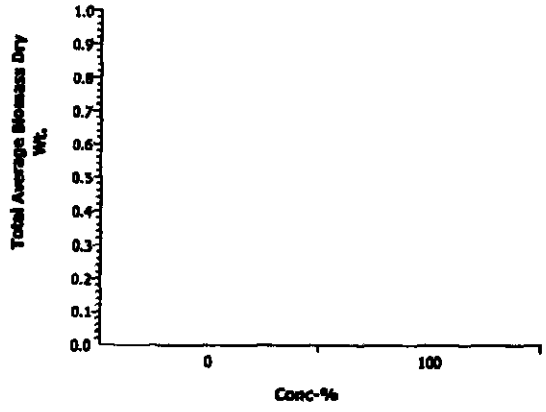
**ANOVA Assumptions**

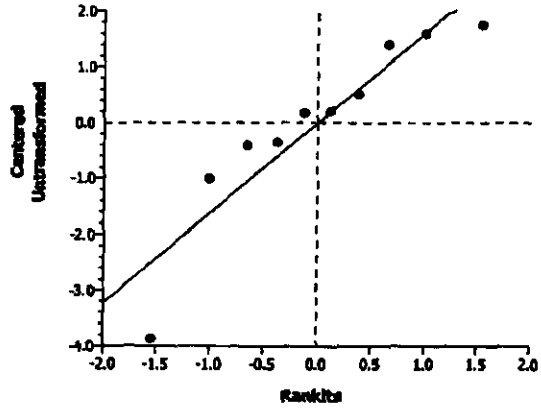
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 5.24797 | 23.15450 | 0.13730 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.86537 | | 0.08825 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Wet Wt. | Comparison | 04-1720-8149 | 04-1720-8149 | 15 May-06 1:35 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 34.17% |

**Group Comparisons**

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

**ANOVA Table**

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

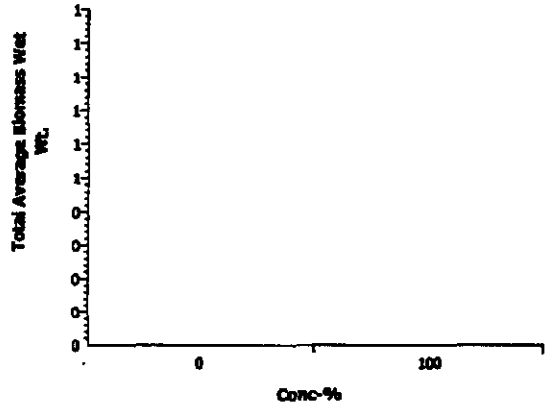
**ANOVA Assumptions**

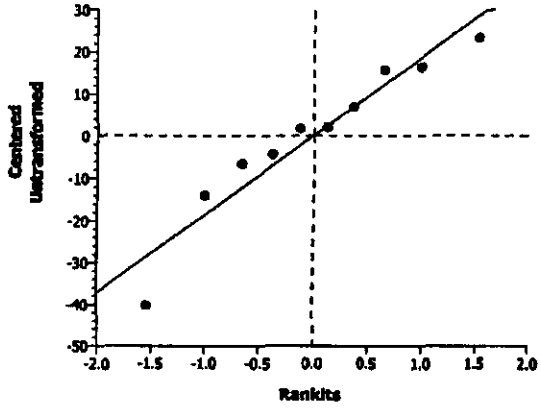
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.72986 | 23.15450 | 0.35420 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.92551 | | 0.40519 | Normal Distribution |

**Data Summary**

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

**Graphics**



**BLUEGRASS GROWTH TEST**

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

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

Bioassay Lab ID: BW B6 1566-01 Sample No: J11J B8

| CONC. | REPLICATE | # seeds germinated: Emergence 12 days after planting | 14 days after planting | 18 days after planting | 19 days after planting | 21 days after planting | 23 days after planting | 7-DAYS POST-EMERGENCE (26 days after planting) | 14-DAYS POST-EMERGENCE (33 days after planting) | pH INITIAL (@ planting) | pH FINAL (@ 14 days Post-Emergence) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Control | A | 8 | 8 | 8 | 8 | 8 | 8 | 8-75 | 5 | 6.2 | 7.7 |
| | B | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | | |
| | C | 7 | 8 | 8 | 8 | 8 | 8 | 8-75 | 5 | | |
| | D | 6 | 6 | 6 | 6 | 6 | 6 | 6-75 | 5 | | |
| | E | 6 | 7 | 7 | 7 | 6 | 6 | 5 | 5 | | |

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

Replicate A: 5 Lg G — removed: 1 Lg G, 2 Med G + 5 broadleaves

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

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

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

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

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

14-Days Post-Emergence: Describe shoot appearance:

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

Replicate B: 2 Lg G, 1 Sm G

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

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

Replicate E: 3 Lg G, 1 Lg G w/ 2 B tips, 1 Lg G w/ 1 B tip & 1 B shoot.

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 73 mm | 63 mm | 58 mm | 52 mm | 49 mm |
| Replicate B | 93 mm | 68 mm | 16 mm | mm | mm |
| Replicate C | 81 mm | 55 mm | 77 mm | 55 mm | 49 mm |
| Replicate D | 58 mm | 76 mm | 34 mm | 54 mm | 18 mm |
| Replicate E | 69 mm | 57 mm | 59 mm | 53 mm | 51 mm |

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

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

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 75 mm | 52 mm | 60 mm | 25 mm | 29 mm |
| Replicate B | 31 mm | 57 mm | 63 mm | mm | mm |
| Replicate C | 90 mm | 54 mm | 51 mm | 60 mm | 71 mm |
| Replicate D | 23 mm | 62 mm | 55 mm | 51 mm | 89 mm |
| Replicate E | 56 mm | 37 mm | 52 mm | 62 mm | 68 mm |

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

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

Comments:

# CETIS Test Summary

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

**Plant Chronic test** — CH2M Hill

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

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

**Comparison Summary**

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

# CETIS Test Summary

Report Date: 15 May-08 1:51 PM
Test Link: 02-4923-3771/BG156601ps

**% Germination Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 0.84000 | 0.60000 | 1.00000 | 0.09798 | 0.21909 | 26.08% |
| 100 | | 5 | 0.92000 | 0.60000 | 1.00000 | 0.08000 | 0.17889 | 19.44% |

**AG Average Dry Wt. Summary**

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

**AG Average Height Summary**

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

**AG Average Wet Wt. Summary**

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

**Root Average Dry Wt. Summary**

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

**Root Average Length Summary**

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

**Root Average Wet Wt. Summary**

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

**Total Average Biomass Dry Wt. Summary**

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

**Total Average Biomass Wet Wt. Summary**

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

# CETIS Test Summary

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

**% Germination Detail**

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

**AG Average Dry Wt. Detail**

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

**AG Average Height Detail**

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

**AG Average Wet Wt. Detail**

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

**Root Average Dry Wt. Detail**

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

**Root Average Length Detail**

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

**Root Average Wet Wt. Detail**

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

**Total Average Biomass Dry Wt. Detail**

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

**Total Average Biomass Wet Wt. Detail**

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

# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Germination | Comparison | 02-4923-3771 | 02-4923-3771 | 15 May-06 1:51 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Wilcoxon Rank Sum Two-Sample | C > T | Rank | | 100 | >100 | 1 | N/A | 27.93% |

**Group Comparisons**

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

**ANOVA Table**

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

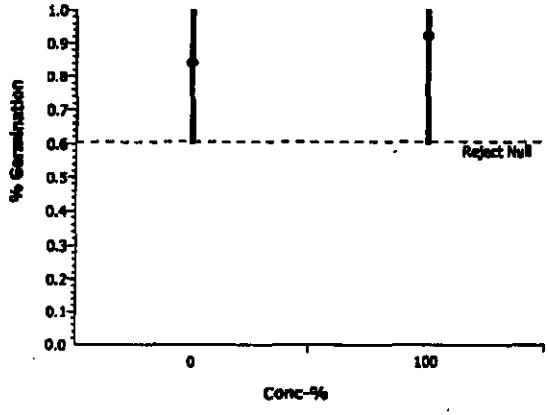
**ANOVA Assumptions**

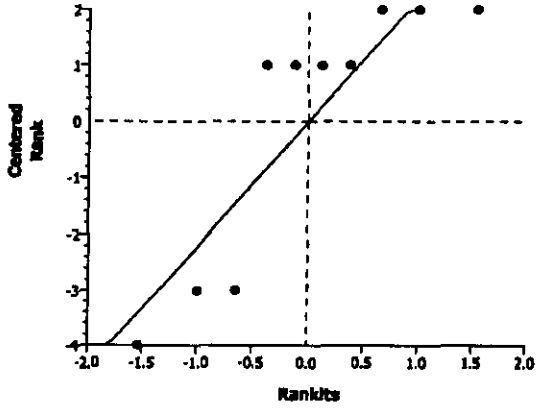
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.50000 | 23.15450 | 0.70400 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.75864 | | 0.00455 | Non-normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 0.84000 | 0.60000 | 1.00000 | 0.21909 | 5.00000 | 2.00000 | 7.00000 | 2.73861 |
| 100 | | 5 | 0.92000 | 0.60000 | 1.00000 | 0.17889 | 6.00000 | 2.00000 | 7.00000 | 2.23607 |

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Dry Wt. | Comparison | 02-4923-3771 | 02-4923-3771 | 15 May-06 1:51 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 28.98% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Artificial Soil/Sedi | | 100 | 1.66375 | 1.85955 | 0.0674 | 1.4375 | Non-Significant Effect |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 4.135365 | 4.135365 | 1 | 2.77 | 0.13473 | Non-Significant Effect |
| Error | 11.95166 | 1.493957 | 8 | | | |
| Total | 16.0870247 | 5.6293229 | 9 | | | |

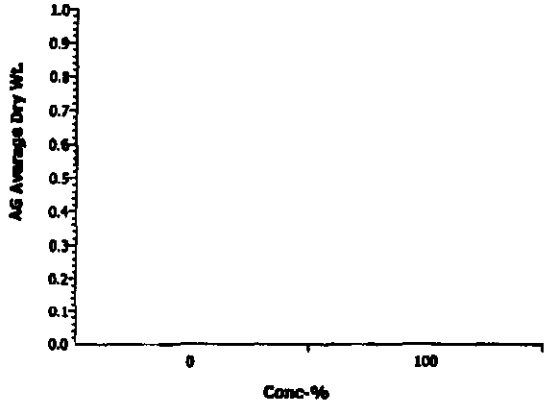
**ANOVA Assumptions**

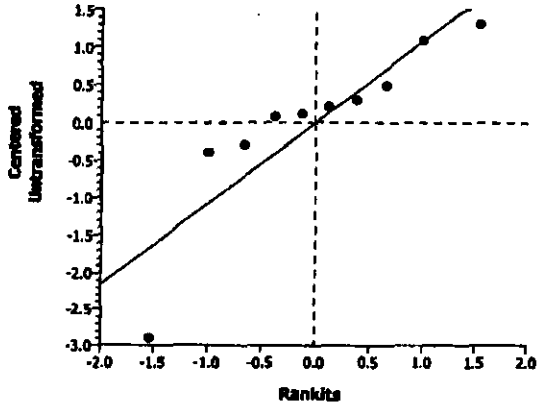
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 23.03905 | 23.15450 | 0.01009 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.80366 | | 0.01606 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Height | Comparison | 02-4923-3771 | 02-4923-3771 | 15 May-06 1:51 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 26.44% |

**Group Comparisons**

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

**ANOVA Table**

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

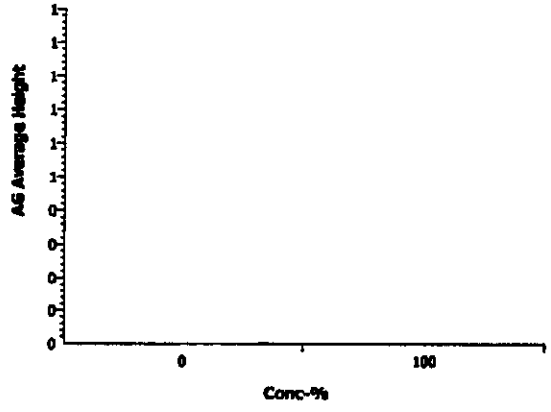
**ANOVA Assumptions**

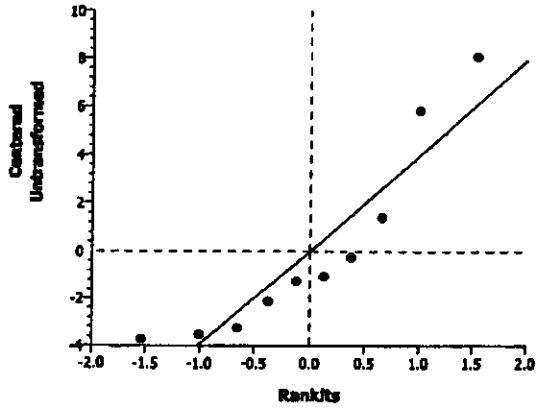
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.07971 | 23.15450 | 0.49566 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.84655 | | 0.05284 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Wet Wt. | Comparison | 02-4923-3771 | 02-4923-3771 | 15 May-06 1:51 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 34.28% |

**Group Comparisons**

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

**ANOVA Table**

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

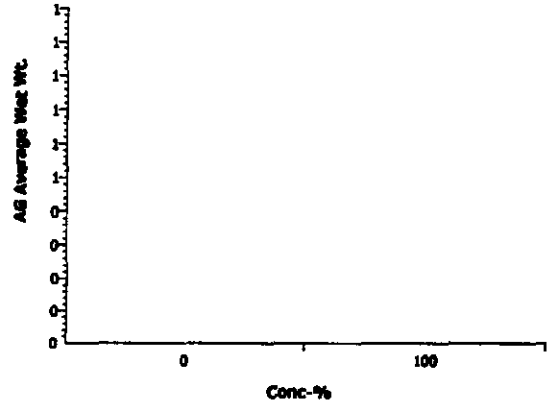
**ANOVA Assumptions**

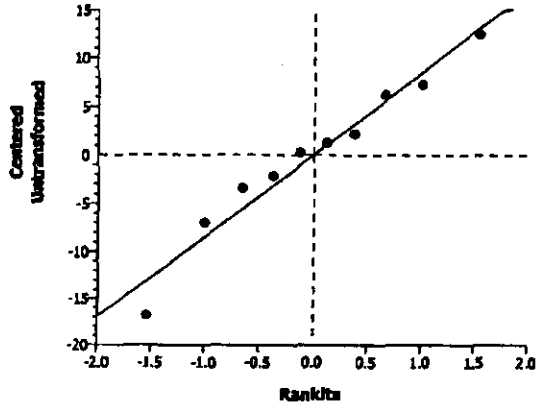
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.73128 | 23.15450 | 0.60798 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.96823 | | 0.87396 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Dry Wt. | Comparison | 02-4923-3771 | 02-4923-3771 | 15 May-06 1:51 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 35.48% |

**Group Comparisons**

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

**ANOVA Table**

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

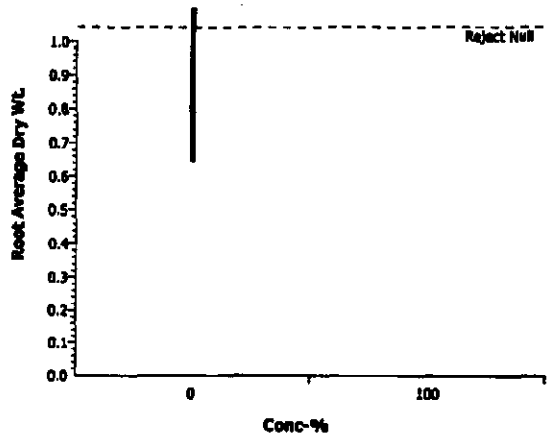
**ANOVA Assumptions**

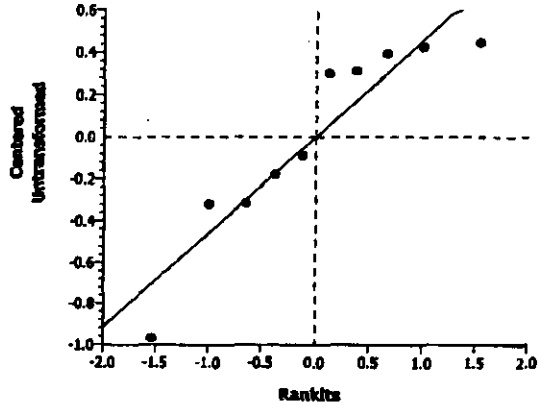
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.35752 | 23.15450 | 0.42657 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.86708 | | 0.09240 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Length | Comparison | 02-4923-3771 | 02-4923-3771 | 15 May-06 1:51 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 24.73% |

**Group Comparisons**

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

**ANOVA Table**

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

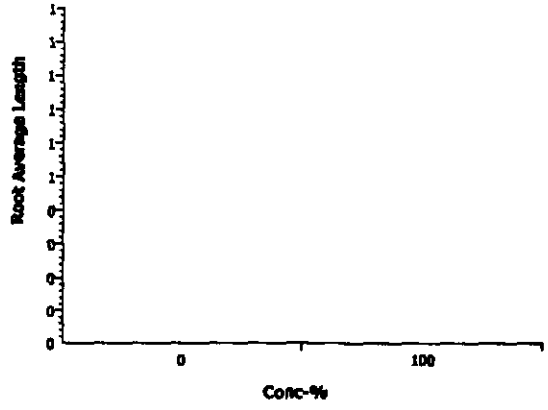
**ANOVA Assumptions**

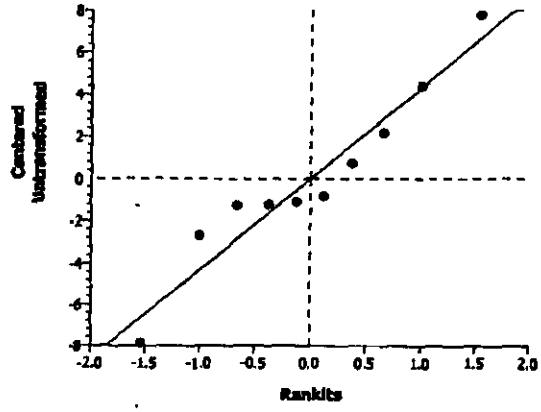
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 4.35804 | 23.15450 | 0.18299 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.94982 | | 0.66638 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | | CH2M Hill |
|---|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Root Average Wet Wt. | Comparison | | 02-4923-3771 | 02-4923-3771 | 15 May-06 1:51 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 40.92% |

**Group Comparisons**

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

**ANOVA Table**

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

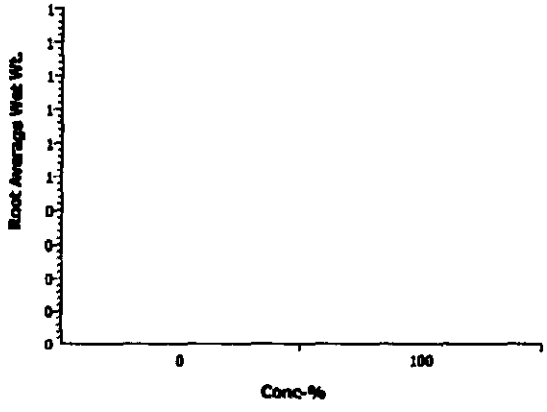
**ANOVA Assumptions**

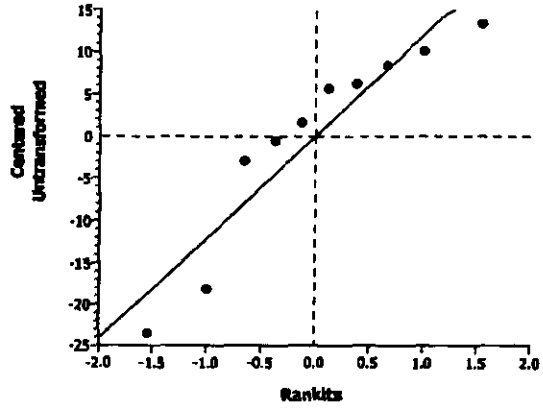
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.36097 | 23.15450 | 0.77245 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.87175 | | 0.10478 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Dry Wt. | Comparison | 02-4923-3771 | 02-4923-3771 | 15 May-06 1:51 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 29.78% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Artificial Soil/Sedi | | 100 | 0.99861 | 1.85855 | 0.1736 | 1.95875 | Non-Significant Effect |

**ANOVA Table**

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

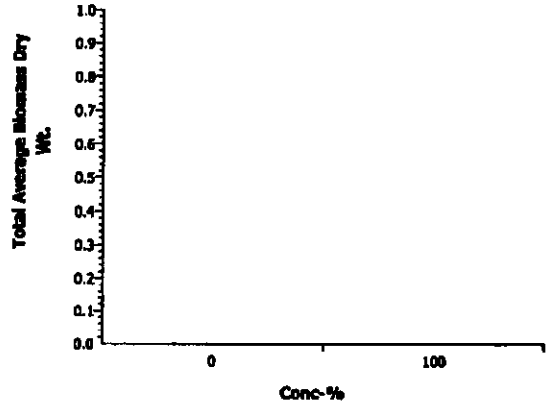
**ANOVA Assumptions**

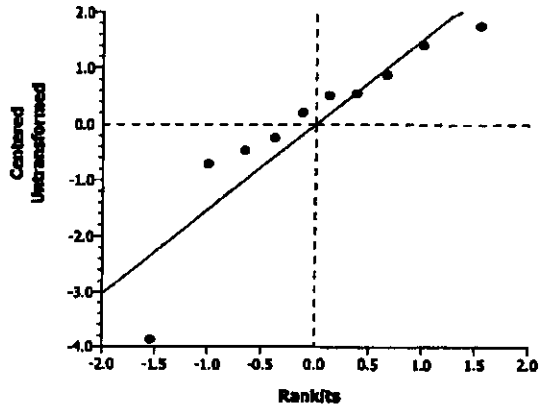
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 11.00706 | 23.15450 | 0.03931 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.84038 | | 0.04459 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Wet Wt. | Comparison | 02-4923-3771 | 02-4923-3771 | 15 May-06 1:51 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 30.99% |

**Group Comparisons**

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

**ANOVA Table**

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

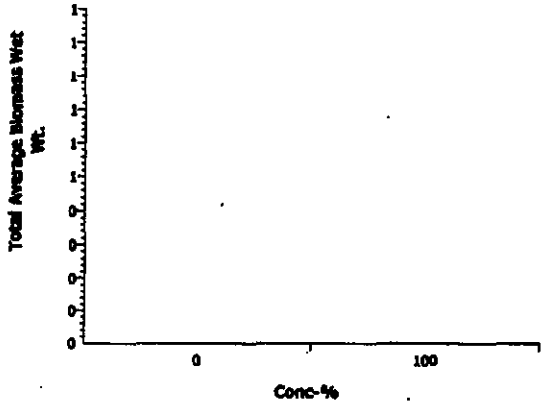
**ANOVA Assumptions**

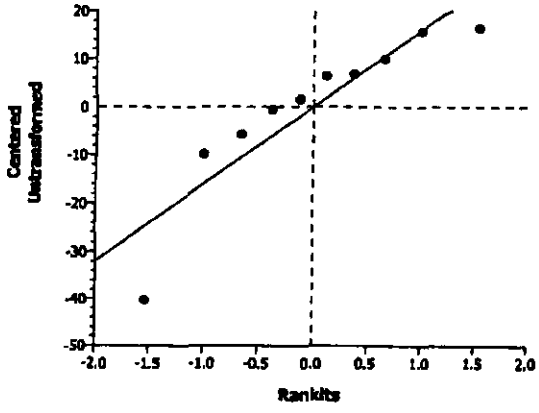
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 8.06740 | 23.15450 | 0.06761 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.83722 | | 0.04087 | Normal Distribution |

**Data Summary**

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

**Graphics**



## BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 [illegible] Day 14 15 NJ Day 16 [illegible] Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 [illegible] Day 33 [illegible]

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

| CONC. | REPLICATE | # seeds germinated: Emergence 12 days after planting | 14 days after planting | 16 days after planting | 19 days after planting | 21 days after planting | 23 days after planting | 7-DAYS POST-EMERGENCE (26 days after planting) | 14-DAYS POST-EMERGENCE (33 days after planting) | pH: INITIAL (@ planting) | FINAL (@ 14 days Post-Emergence) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Control | A | 6 | 7 | 7 | 7 | 7 | 7 | 7→5 | 5 | 6.2 | 7.6 |
| | B | 4 | 5 | 6 | 5 | 5 | 3 | 5 | 5 | | |
| | C | 2 | 4 | 4 | 7 | 8 | 8 | 9→5 | 5 | | |
| | D | 8 | 8 | 9 | 10 | 11 | 11* | 10→5 | 5 | | |
| | E | 6 | 6 | 6 | 6 | 6 | 6 | 6→5 | 5 | | |

* 10 Bluegrass + 1 broadleaf

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

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

Replicate B: 5 Lg G — removed: broadleaf

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

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

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

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

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

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

Replicate E:

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

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

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

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

Describe root appearance:

Replicate A:

Replicate B:

Replicate C:

Replicate D:

Replicate E:

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 41 mm | 79 mm | 63 mm | 64 mm | 77 mm |
| Replicate B | 55 mm | 66 mm | 79 mm | 37 mm | 79 mm |
| Replicate C | 32 mm | 31 mm | 52 mm | 63 mm | 47 mm |
| Replicate D | 64 mm | 67 mm | 72 mm | 59 mm | 66 mm |
| Replicate E | 54 mm | 71 mm | 73 mm | 89 mm | 35 mm |

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

| | Tin Tare Wt. (mg) | Wet Wt. (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 985.82 | 1169.3 | 995.24 |
| Replicate B | 1034.96 | 1144.4 | 1040.44 |
| Replicate C | 1001.76 | 1055.7 | 1005.03 |
| Replicate D | 1026.16 | 1235.0 | 1034.75 |
| Replicate E | 1016.36 | 1230 | 1023.77 |

Comments:

# CETIS Test Summary

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

**Plant Chronic test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 12-2756-8859 | **Test Type:** | Plant Chronic test | **Duration:** | 33d 0h |
| **Start Date:** | 05 Apr-06 | **Protocol:** | ASTM E1963-02 (2002) | **Species:** | Poa sandbergii |
| **Ending Date:** | 08 May-06 | **Dil Water:** | | **Source:** | |
| **Setup Date:** | 05 Apr-06 12:00 AM | **Brine:** | | | |
| **Comments:** | BG1566-02 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 06-7557-8523 | **Code:** | B1566-02 | **Client:** | |
| **Sample Date:** | 27 Mar-06 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 9d 0h | **Station:** | | | |
| **Comments:** | J11JB7 | | | | |

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 07-3049-9835 | % Germination | 100 | > 100 | N/A | 20.96% | Equal Variance t Two-Sample |
| 01-5840-9449 | AG Average Dry Wt. | < 100 | 100 | N/A | 33.96% | Equal Variance t Two-Sample |
| 04-1817-3375 | AG Average Height | < 100 | 100 | N/A | 23.91% | Equal Variance t Two-Sample |
| 06-1778-4905 | AG Average Wet Wt. | < 100 | 100 | N/A | 32.62% | Equal Variance t Two-Sample |
| 10-9034-6985 | Root Average Dry Wt. | 100 | > 100 | N/A | 39.19% | Equal Variance t Two-Sample |
| 10-5846-0601 | Root Average Length | < 100 | 100 | N/A | 23.34% | Equal Variance t Two-Sample |
| 07-1319-0997 | Root Average Wet Wt. | 100 | > 100 | N/A | 41.70% | Equal Variance t Two-Sample |
| 06-9688-5993 | Total Average Biomass Dry | 100 | > 100 | N/A | 34.99% | Equal Variance t Two-Sample |
| 10-6936-9311 | Total Average Biomass Wet | 100 | > 100 | N/A | 37.41% | Equal Variance t Two-Sample |

# CETIS Test Summary

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

**% Germination Summary**

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

**AG Average Dry Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 4.96040 | 2.05688 | 6.26333 | 0.75679 | 1.69222 | 34.11% |
| 100 | | 5 | 3.06959 | 1.35000 | 4.01200 | 0.49767 | 1.11283 | 36.25% |

**AG Average Height Summary**

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

**AG Average Wet Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 29.605 | 12.833 | 36.826 | 4.3456 | 9.717 | 32.82% |
| 100 | | 5 | 18.574 | 8.6660 | 24.688 | 2.8451 | 6.3618 | 34.25% |

**Root Average Dry Wt. Summary**

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

**Root Average Length Summary**

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

**Root Average Wet Wt. Summary**

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

**Total Average Biomass Dry Wt. Summary**

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

**Total Average Biomass Wet Wt. Summary**

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

# CETIS Test Summary

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

**% Germination Detail**

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

**AG Average Dry Wt. Detail**

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

**AG Average Height Detail**

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

**AG Average Wet Wt. Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 |
|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 12.8333 | 36.6260 | 31.748 | 35.78 | 30.84 |
| 100 | | 22.464 | 16.158 | 8.66602 | 24.688 | 20.8920 |

**Root Average Dry Wt. Detail**

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

**Root Average Length Detail**

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

**Root Average Wet Wt. Detail**

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

**Total Average Biomass Dry Wt. Detail**

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

**Total Average Biomass Wet Wt. Detail**

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

# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Germination | Comparison | 05-4012-6287 | 05-4012-6287 | 15 May-06 1:55 PM | CETISv1.1.2 |

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

**Group Comparisons**

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

**ANOVA Table**

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

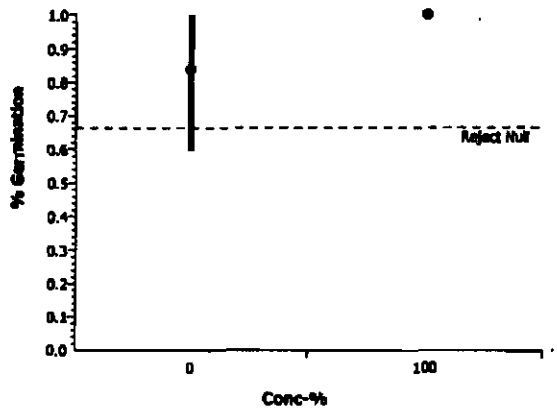
**ANOVA Assumptions**

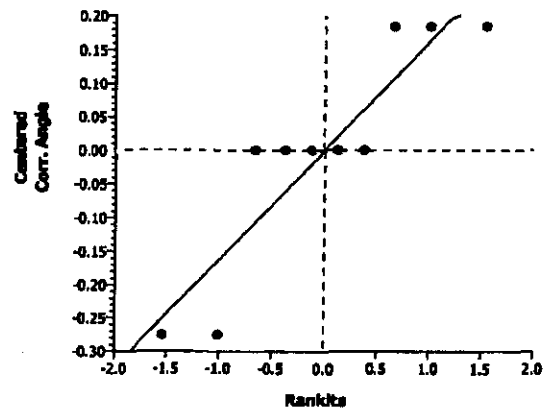
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Modified Levene | 4.80000 | 11.25862 | 0.05984 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.81415 | | 0.02153 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Dry Wt. | Comparison | 05-4012-6287 | 05-4012-6287 | 15 May-06 1:55 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 33.96% |

**Group Comparisons**

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

**ANOVA Table**

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

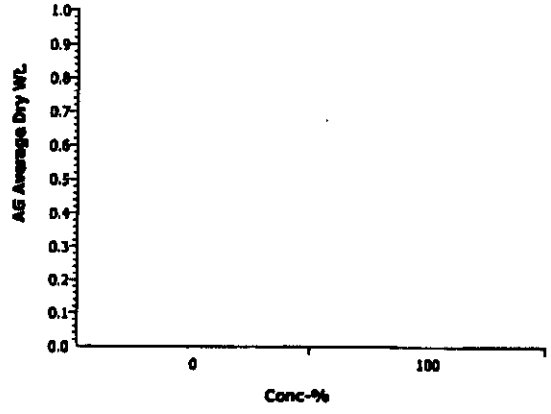
**ANOVA Assumptions**

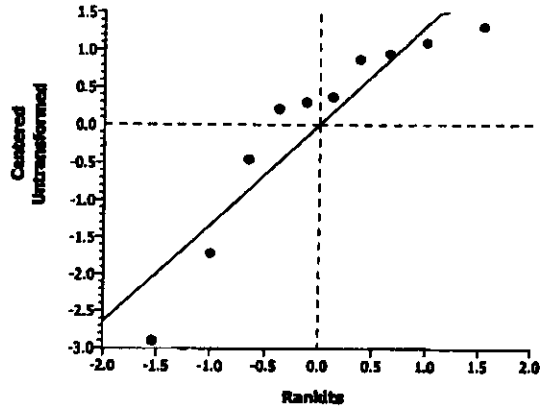
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.31238 | 23.15450 | 0.43679 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.84486 | | 0.05044 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Height | Comparison | 05-4012-6287 | 05-4012-6287 | 15 May-06 1:55 PM | CETISv1.1.2 |

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

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Artificial Soil/Sedi | | 100 | 3.36079 | 1.85955 | 0.0050 | 4.52974 | Significant Effect |

**ANOVA Table**

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

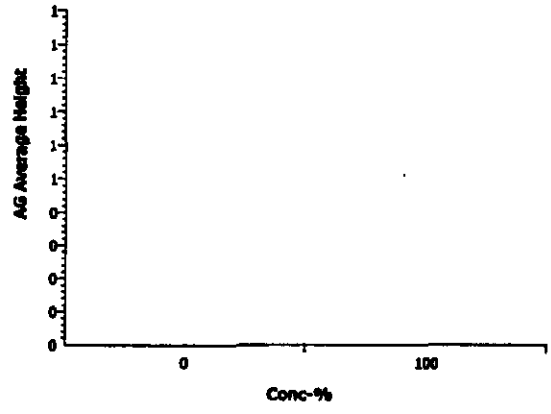
**ANOVA Assumptions**

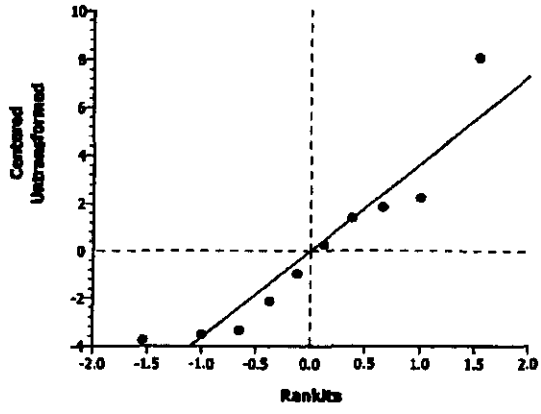
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 4.74088 | 23.15450 | 0.16091 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.88876 | | 0.16420 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Wet Wt. | Comparison | 05-4012-6287 | 05-4012-6287 | 15 May-06 1:55 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 32.62% |

**Group Comparisons**

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

**ANOVA Table**

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

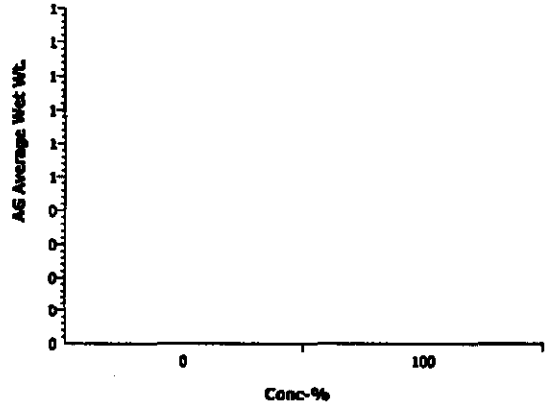
**ANOVA Assumptions**

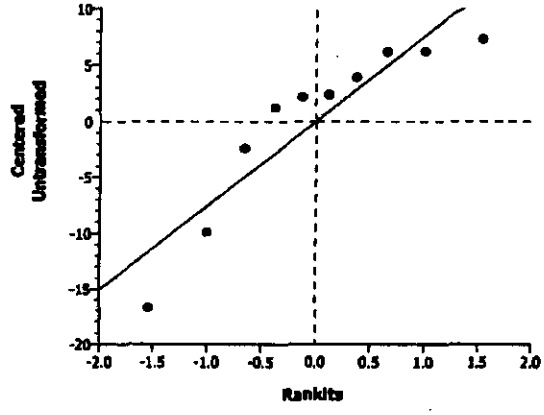
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.33292 | 23.15450 | 0.43209 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.83430 | | 0.03769 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Dry Wt. | Comparison | 05-4012-6287 | 05-4012-6287 | 15 May-06 1:55 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 39.19% |

**Group Comparisons**

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

**ANOVA Table**

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

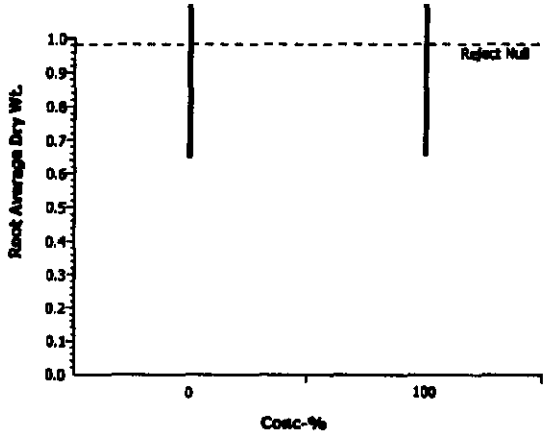
**ANOVA Assumptions**

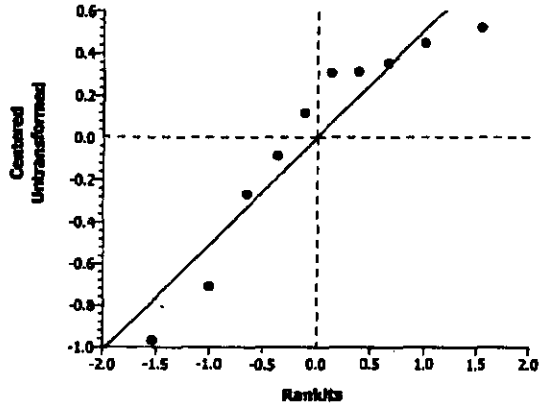
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.35685 | 23.15450 | 0.77462 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.87393 | | 0.11105 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Root Average Length | Comparison | 05-4012-6287 | 05-4012-6287 | 15 May-06 1:56 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 23.34% |

**Group Comparisons**

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

**ANOVA Table**

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

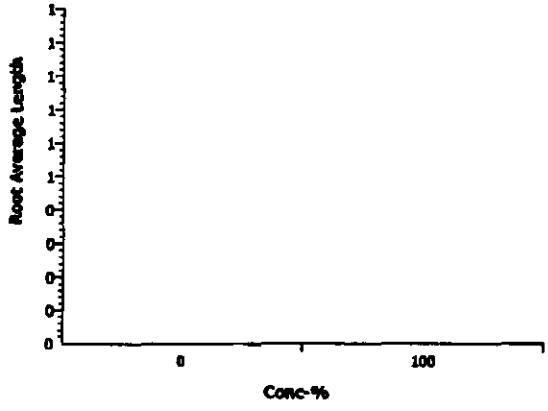
**ANOVA Assumptions**

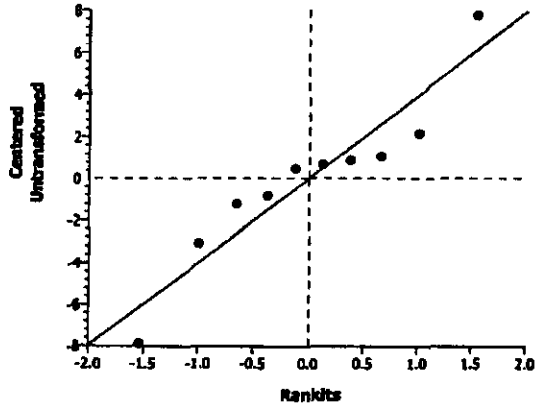
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 10.48196 | 23.15450 | 0.04267 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.92184 | | 0.37254 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Wet Wt. | Comparison | 05-4012-6287 | 05-4012-6287 | 15 May-06 1:56 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 41.70% |

**Group Comparisons**

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

**ANOVA Table**

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

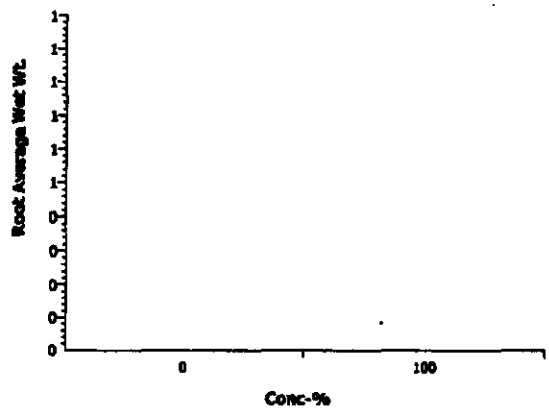
**ANOVA Assumptions**

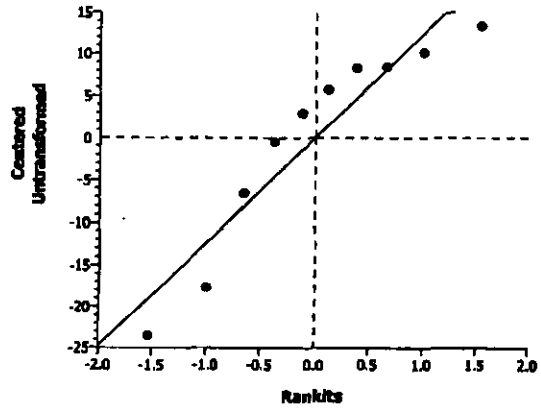
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.24753 | 23.15450 | 0.83546 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.87920 | | 0.12775 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Dry Wt. | Comparison | 05-4012-6287 | 05-4012-6287 | 15 May-06 1:56 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 34.99% |

**Group Comparisons**

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

**ANOVA Table**

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

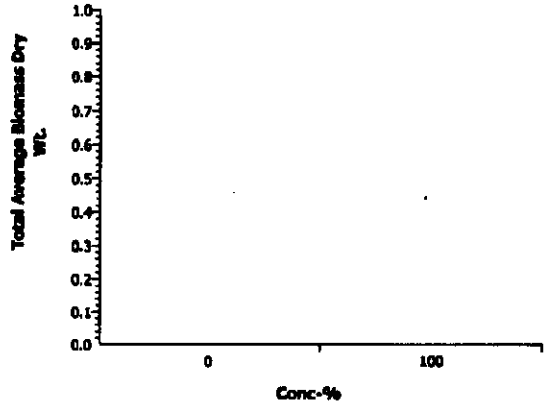
**ANOVA Assumptions**

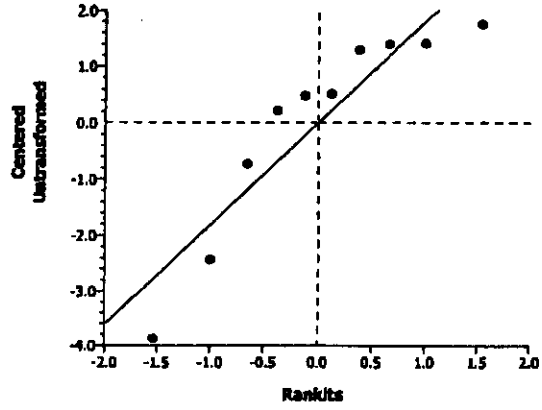
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.97707 | 23.15450 | 0.52538 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.84141 | | 0.04587 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M HILL**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Wet Wt. | Comparison | 05-4012-6287 | 05-4012-6287 | 15 May-06 1:56 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 37.41% |

**Group Comparisons**

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

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 942.4918 | 942.4918 | 1 | 2.11 | 0.18462 | Non-Significant Effect |
| Error | 3577.302 | 447.1627 | 8 | | | |
| Total | 4519.79327 | 1389.8544 | 9 | | | |

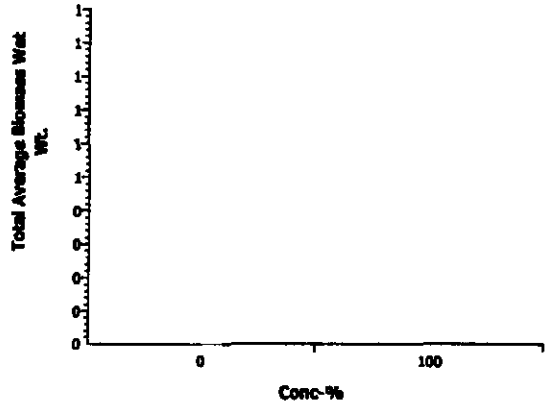
**ANOVA Assumptions**

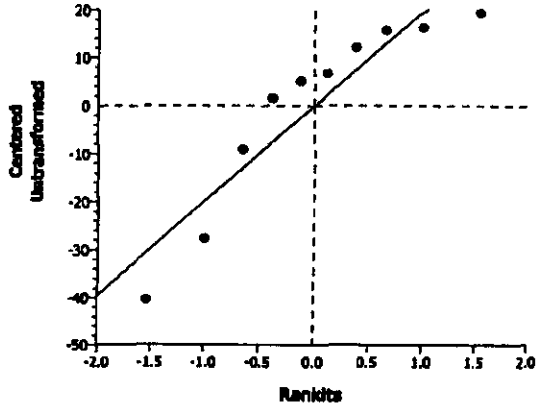
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.56883 | 23.15450 | 0.67328 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.85602 | | 0.06847 | Normal Distribution |

**Data Summary**

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

**Graphics**



## BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

Initials: Day 0 [illegible] Day 12 Bm Day 14 NJ Day 16 [illegible] Day 19 NJ Day 21 NJ Day 23 [illegible] Day 26 Bm Day 28 Bm

Bioassay Lab ID: PNR06 1566-03 Sample No: JIJHS

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

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

Replicate A: 5 Lg G; removed: 1 Lg G

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

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

Replicate D: 1 Lg G

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

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

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

Replicate D: 1 Lg w/ 2 B tips

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

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 49 mm | 51 mm | 77 mm | 51 mm | 87 mm |
| Replicate B | 67 mm | 68 mm | 34 mm | 47 mm | 59 mm |
| Replicate C | 90 mm | 85 mm | 56 mm | 97 mm | 38 mm |
| Replicate D | 83 mm | mm | mm | mm | mm |
| Replicate E | 86 mm | 67 mm | 45 mm | 26 mm | 41 mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1033.26 | 1133.8 | 1049.56 |
| Replicate B | 995.50 | 1051.3 | 1006.14 |
| Replicate C | 989.87 | 1132.0 | 1014.39 |
| Replicate D | 980.24 | 1023.3 | 988.75 |
| Replicate E | 973.52 | 1030.4 | 985.73 |

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 67 mm | 49 mm | 48 mm | 68 mm | 63 mm |
| Replicate B | 10 mm | 60 mm | 51 mm | 46 mm | 40 mm |
| Replicate C | 52 mm | 63 mm | 83 mm | 66 mm | 78 mm |
| Replicate D | 73 mm | mm | mm | mm | mm |
| Replicate E | 19 mm | 63 mm | 16 mm | 31 mm | 107 mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1016.26 | 1021.9 | 1022.22 |
| Replicate B | 1000.48 | 1058.2 | 1005.22 |
| Replicate C | 996.43 | 1119.2 | 1013.65 |
| Replicate D | 997.30 | 1067.9 | 1000.75 |
| Replicate E | 995.90 | 1088.7 | 1001.64 |

Comments:

# CETIS Test Summary

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

**Plant Chronic test** — CH2M Hill

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

**Comments:** BG1566-03

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

**Comments:** J11JH5

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 15-4902-9508 | % Germination | 100 | > 100 | N/A | 41.99% | Wilcoxon Rank Sum Two-Sample |
| 03-4255-8269 | AG Average Dry Wt. | 100 | > 100 | N/A | 52.20% | Equal Variance t Two-Sample |
| 16-2999-4225 | AG Average Height | 100 | > 100 | N/A | 142.17% | Wilcoxon Rank Sum Two-Sample |
| 14-3415-6893 | AG Average Wet Wt. | 100 | > 100 | N/A | 44.73% | Equal Variance t Two-Sample |
| 09-0554-6174 | Root Average Dry Wt. | 100 | > 100 | N/A | 72.74% | Equal Variance t Two-Sample |
| 15-4360-3201 | Root Average Length | 100 | > 100 | N/A | 111.63% | Wilcoxon Rank Sum Two-Sample |
| 07-7960-4753 | Root Average Wet Wt. | 100 | > 100 | N/A | 62.15% | Equal Variance t Two-Sample |
| 04-4976-7362 | Total Average Biomass Dry | 100 | > 100 | N/A | 55.73% | Equal Variance t Two-Sample |
| 01-2756-4511 | Total Average Biomass Wet | 100 | > 100 | N/A | 54.13% | Equal Variance t Two-Sample |

# CETIS Test Summary

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

**% Germination Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 0.84000 | 0.60000 | 1.00000 | 0.09798 | 0.21909 | 26.08% |
| 100 | | 5 | 0.84000 | 0.20000 | 1.00000 | 0.16000 | 0.35777 | 42.59% |

**AG Average Dry Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 4.96040 | 2.05668 | 6.26333 | 0.75679 | 1.69222 | 34.11% |
| 100 | | 5 | 4.24840 | 2.12800 | 8.51001 | 1.16886 | 2.61365 | 61.52% |

**AG Average Height Summary**

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

**AG Average Wet Wt. Summary**

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

**Root Average Dry Wt. Summary**

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

**Root Average Length Summary**

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

**Root Average Wet Wt. Summary**

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

**Total Average Biomass Dry Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 6.5776 | 2.7033 | 8.3267 | 1.0085 | 2.2551 | 34.29% |
| 100 | | 5 | 6.2848 | 3.0760 | 11.960 | 1.6937 | 3.7873 | 60.26% |

**Total Average Biomass Wet Wt. Summary**

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

# CETIS Test Summary

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

**% Germination Detail**

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

**AG Average Dry Wt. Detail**

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

**AG Average Height Detail**

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

**AG Average Wet Wt. Detail**

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

**Root Average Dry Wt. Detail**

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

**Root Average Length Detail**

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

**Root Average Wet Wt. Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 | Rep 4 | Rep 5 |
|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 13.3167 | 45.2540 | 36.3420 | 46.99 | 42.488 |
| 100 | | 21.1280 | 11.544 | 40.554 | 70.6000 | 18.56 |

**Total Average Biomass Dry Wt. Detail**

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

**Total Average Biomass Wet Wt. Detail**

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

# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Germination | Comparison | 11-7211-8663 | 11-7211-8663 | 15 May-06 2:01 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Wilcoxon Rank Sum Two-Sample | C > T | Rank | | 100 | >100 | 1 | N/A | 41.99% |

**Group Comparisons**

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

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0001352 | 0.000135 | 1 | 0.00 | 0.97281 | Non-Significant Effect |
| Error | 0.8748686 | 0.109359 | 8 | | | |
| Total | 0.87500388 | 0.1094938 | 9 | | | |

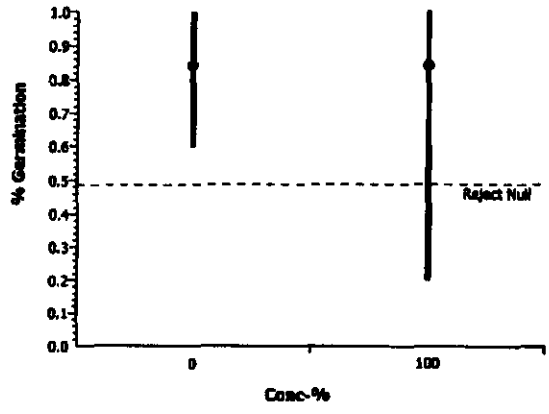
**ANOVA Assumptions**

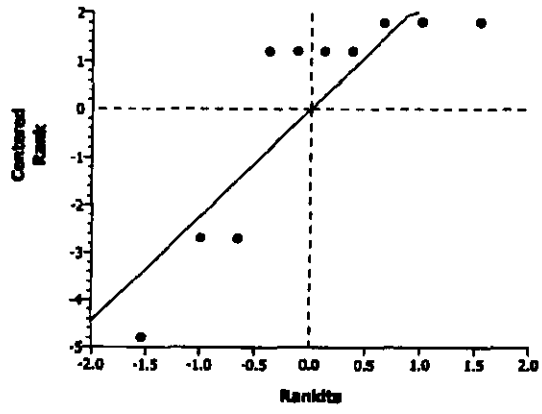
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.45738 | 23.15450 | 0.40516 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.65938 | | 0.00028 | Non-normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 0.84000 | 0.60000 | 1.00000 | 0.21909 | 5.20000 | 2.50000 | 7.00000 | 2.46475 |
| 100 | | 5 | 0.84000 | 0.20000 | 1.00000 | 0.35777 | 5.80000 | 1.00000 | 7.00000 | 2.68328 |

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| AG Average Dry Wt. | Comparison | 11-7211-8663 | 11-7211-8663 | 15 May-06 2:01 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 52.20% |

**Group Comparisons**

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

**ANOVA Table**

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

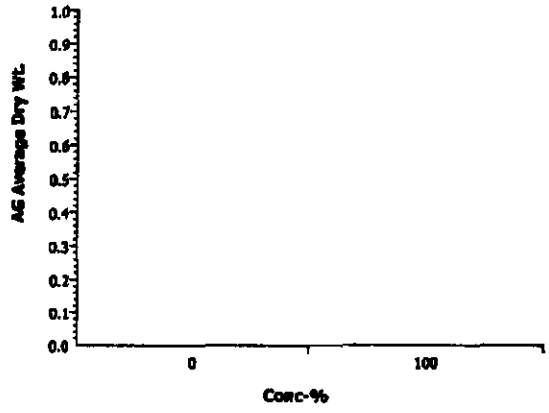
**ANOVA Assumptions**

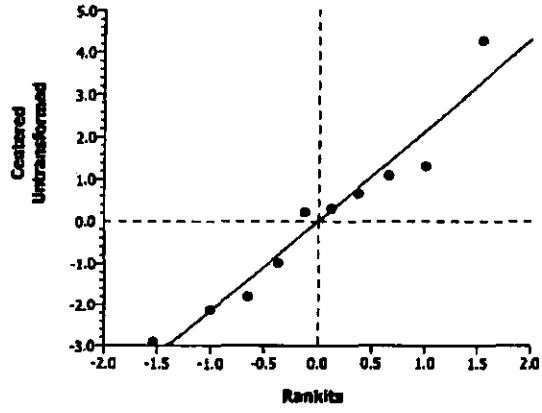
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.38550 | 23.15450 | 0.42040 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.94807 | | 0.64572 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Height | Comparison | 11-7211-8663 | 11-7211-8663 | 15 May-06 2:01 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Wilcoxon Rank Sum Two-Sample | C > T | Rank | | 100 | >100 | 1 | N/A | 142.17% |

**Group Comparisons**

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

**ANOVA Table**

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

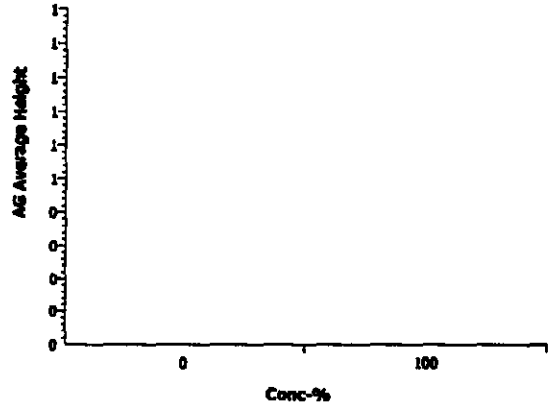
**ANOVA Assumptions**

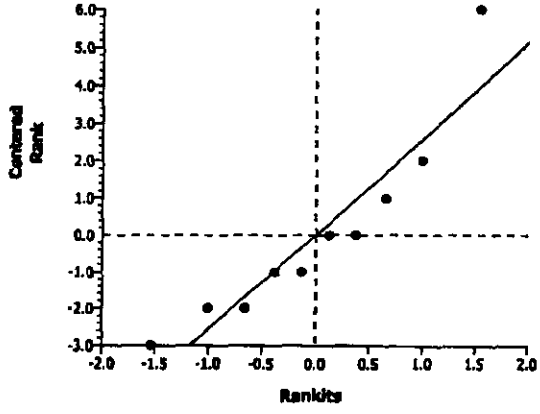
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 41.81857 | 23.15450 | 0.00322 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.71129 | | 0.00121 | Non-normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Wet Wt. | Comparison | 11-7211-8663 | 11-7211-8663 | 15 May-06 2:01 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 44.73% |

**Group Comparisons**

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

**ANOVA Table**

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

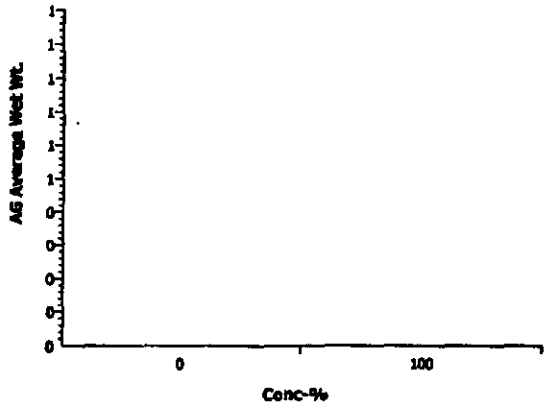
**ANOVA Assumptions**

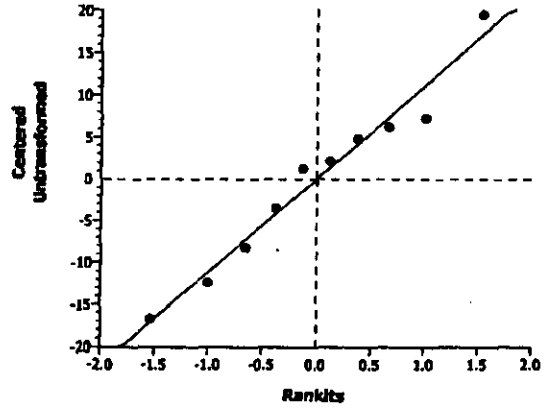
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.68545 | 23.15450 | 0.62545 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.97199 | | 0.90865 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Dry Wt. | Comparison | 11-7211-8663 | 11-7211-8663 | 15 May-06 2:01 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 72.74% |

**Group Comparisons**

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

**ANOVA Table**

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

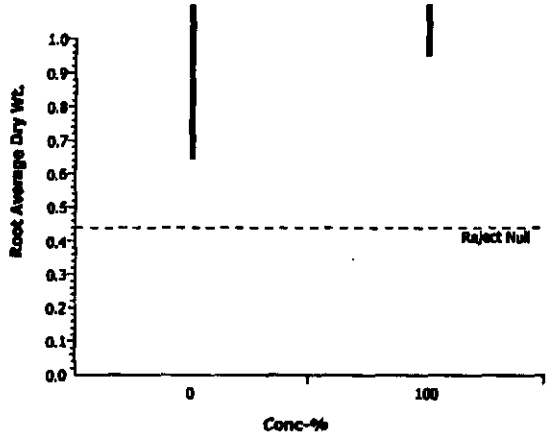
**ANOVA Assumptions**

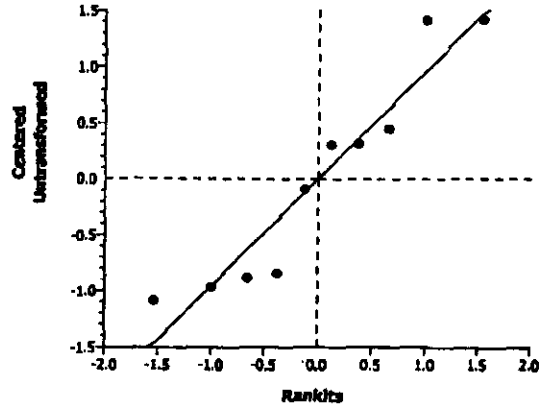
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 4.98547 | 23.15450 | 0.14882 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.88496 | | 0.14871 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Length | Comparison | 11-7211-8663 | 11-7211-8663 | 15 May-06 2:01 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Wilcoxon Rank Sum Two-Sample | C > T | Rank | | 100 | >100 | 1 | N/A | 111.63% |

**Group Comparisons**

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

**ANOVA Table**

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

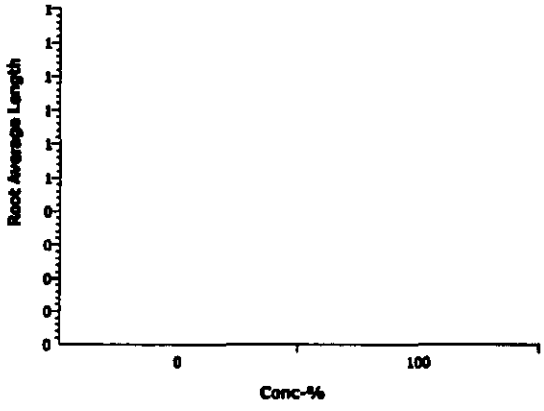
**ANOVA Assumptions**

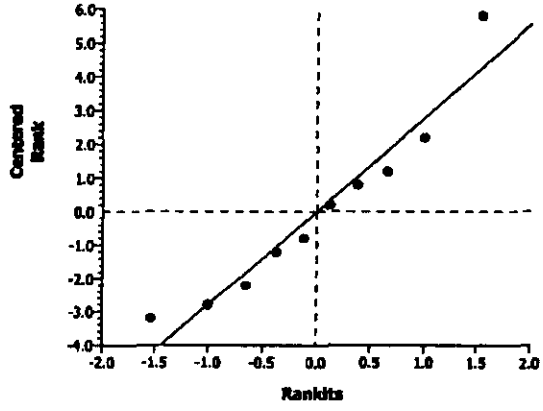
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 24.04797 | 23.15450 | 0.00931 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.72521 | | 0.00178 | Non-normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Wet Wt. | Comparison | 11-7211-8663 | 11-7211-8663 | 15 May-06 2:01 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 62.15% |

**Group Comparisons**

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

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 48.42056 | 48.42056 | 1 | 0.13 | 0.73029 | Non-Significant Effect |
| Error | 3038.583 | 379.8229 | 8 | | | |
| Total | 3087.00358 | 428.24343 | 9 | | | |

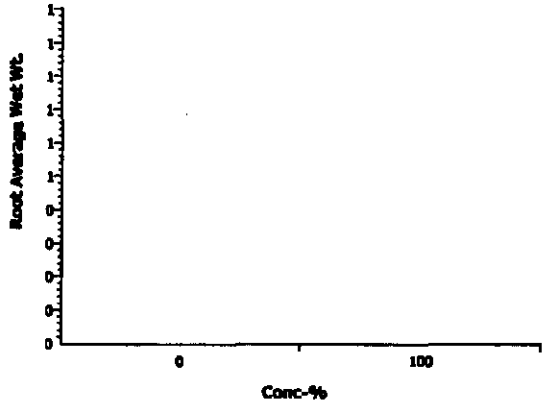
**ANOVA Assumptions**

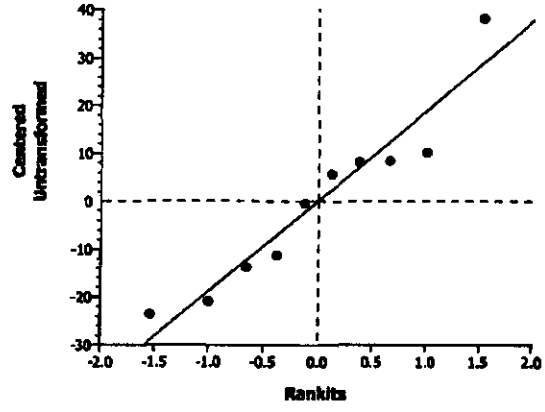
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 3.00179 | 23.15450 | 0.31225 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.92487 | | 0.39940 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Dry Wt. | Comparison | 11-7211-8663 | 11-7211-8663 | 15 May-06 2:01 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 55.73% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Artificial Soil/Sedi | | 100 | 0.14854 | 1.65955 | 0.4428 | 3.66564 | Non-Significant Effect |

**ANOVA Table**

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

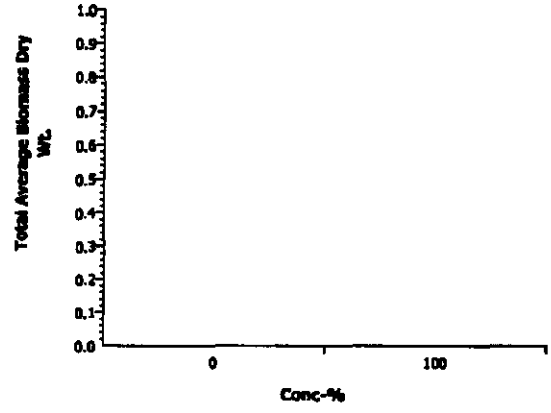
**ANOVA Assumptions**

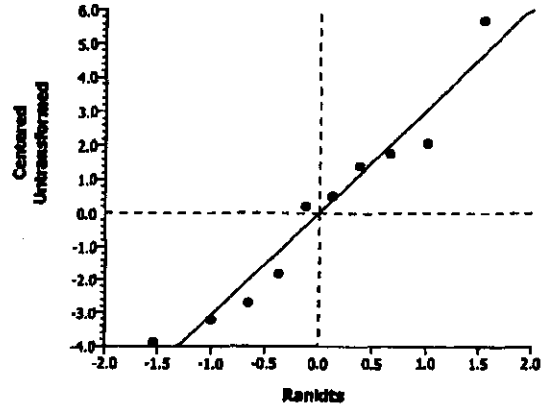
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.82040 | 23.15450 | 0.33935 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.94597 | | 0.62111 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Wet Wt. | Comparison | 11-7211-8663 | 11-7211-8663 | 15 May-06 2:01 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 54.13% |

**Group Comparisons**

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

**ANOVA Table**

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

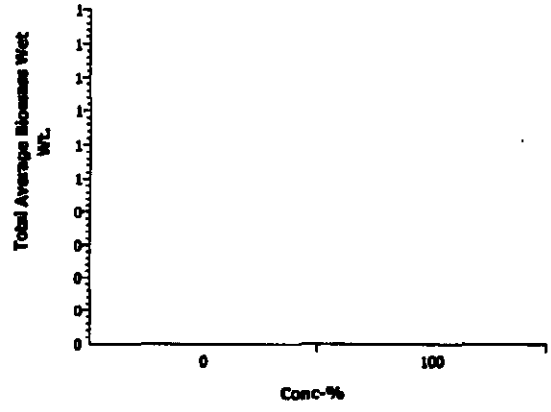
**ANOVA Assumptions**

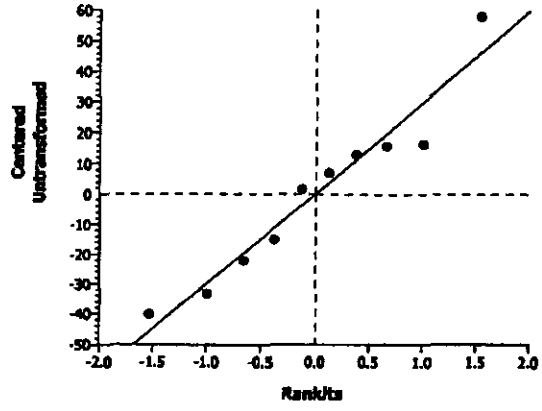
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.42893 | 23.15450 | 0.41109 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.94678 | | 0.63064 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 66.484 | 26.15 | 82.77 | 23.370 | | | | |
| 100 | | 5 | 56.103 | 22.704 | 113.66 | 36.423 | | | | |

**Graphics**



## BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

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

Bioassay Lab ID: PN 06/566-04 Sample No: JIJH8

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

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

Replicate A: 5 Lg G, 1 md 1 1 sm G removed

Replicate B: 1 Lg G, 4 md G, 1 sm G removed

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

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

Replicate E: 5 Lg G Removed: 1 Lg, 3 md, 1 sm G

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

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

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

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

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 64 mm | 74 mm | 55 mm | 64 mm | 55 mm |
| Replicate B | 55 mm | 83 mm | 74 mm | 64 mm | 74 mm |
| Replicate C | 95 mm | 79 mm | 53 mm | 74 mm | 74 mm |
| Replicate D | 95 mm | 60 mm | 78 mm | 53 mm | 32 mm |
| Replicate E | 100 mm | 90 mm | 72 mm | 75 mm | 68 mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1019.94 | 1139.6 | 1040.64 |
| Replicate B | 1010.34 | 1062.1 | ~~1016.25~~ NJ 1016.20 |
| Replicate C | 1010.95 | 1160.5 | 1034.42 |
| Replicate D | 985.24 | 1112.5 | 1006.14 |
| Replicate E | 992.61 | 1166.4 | 1020.46 |

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 47 mm | 67 mm | 65 mm | 67 mm | 41 mm |
| Replicate B | 13 mm | 25 mm | 28 mm | 53 mm | 53 mm |
| Replicate C | 67 mm | 56 mm | 68 mm | 49 mm | 55 mm |
| Replicate D | 92 mm | 24 mm | 74 mm | 42 mm | 82 mm |
| Replicate E | 71 mm | 64 mm | 58 mm | 58 mm | 73 mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 1000.61 | 1164.2 | 1008.50 |
| Replicate B | 1020.23 | 1042.8 | 1021.95 |
| Replicate C | 1025.29 | 1223.0 | 1034.51 |
| Replicate D | 1010.78 | 1153.6 | 1018.08 |
| Replicate E | ~~104~~ NJ 1039.98 | 1284.4 | 1054.10 |

Comments:

# CETIS Test Summary

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

**Plant Chronic test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 20-3747-5618 | **Test Type:** | Plant Chronic test | **Duration:** | 33d 0h |
| **Start Date:** | 05 Apr-06 | **Protocol:** | ASTM E1963-02 (2002) | **Species:** | Poa sandbergii |
| **Ending Date:** | 08 May-06 | **Dil Water:** | | **Source:** | |
| **Setup Date:** | 05 Apr-06 12:00 AM | **Brine:** | | | |
| **Comments:** | BG1566-04 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 11-8681-3426 | **Code:** | B1566-04 | **Client:** | |
| **Sample Date:** | 04 Apr-06 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 24h | **Station:** | | | |
| **Comments:** | J11JH8 | | | | |

**Comparison Summary**

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

# CETIS Test Summary

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

**% Germination Summary**

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

**AG Average Dry Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 4.96040 | 2.05668 | 6.26333 | 0.75679 | 1.69222 | 34.11% |
| 100 | | 5 | 3.95120 | 1.17200 | 5.57001 | 0.74109 | 1.65713 | 41.94% |

**AG Average Height Summary**

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

**AG Average Wet Wt. Summary**

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

**Root Average Dry Wt. Summary**

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

**Root Average Length Summary**

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

**Root Average Wet Wt. Summary**

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

**Total Average Biomass Dry Wt. Summary**

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

**Total Average Biomass Wet Wt. Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 66.484 | 26.150 | 82.77 | 10.452 | 23.370 | 35.15% |
| 100 | | 5 | 55.725 | 14.866 | 83.642 | 11.491 | 25.695 | 46.11% |

# CETIS Test Summary

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

**% Germination Detail**

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

**AG Average Dry Wt. Detail**

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

**AG Average Height Detail**

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

**AG Average Wet Wt. Detail**

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

**Root Average Dry Wt. Detail**

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

**Root Average Length Detail**

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

**Root Average Wet Wt. Detail**

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

**Total Average Biomass Dry Wt. Detail**

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

**Total Average Biomass Wet Wt. Detail**

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

# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Germination | Comparison | 09-5382-7322 | 09-5382-7322 | 15 May-06 2:08 PM | CETISv1.1.2 |

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

**Group Comparisons**

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

**ANOVA Table**

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

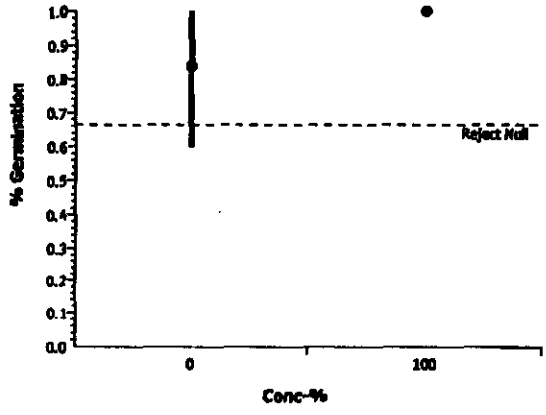
**ANOVA Assumptions**

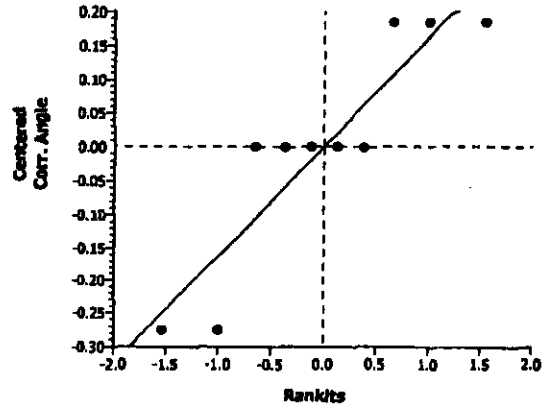
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Modified Levene | 4.80000 | 11.25862 | 0.05984 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.81415 | | 0.02153 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Dry Wt. | Comparison | 09-5382-7322 | 09-5382-7322 | 15 May-06 2:08 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Wilcoxon Rank Sum Two-Sample | C > T | Rank | | 100 | >100 | 1 | N/A | 39.71% |

**Group Comparisons**

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

**ANOVA Table**

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

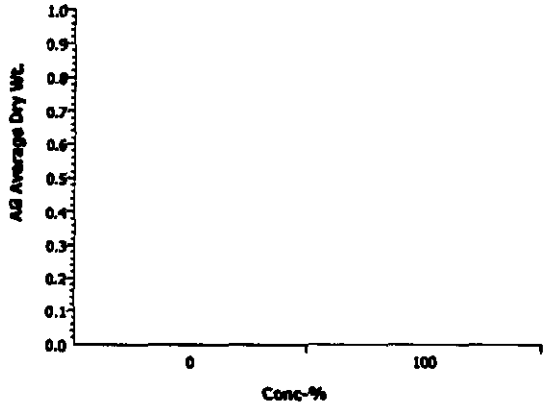
**ANOVA Assumptions**

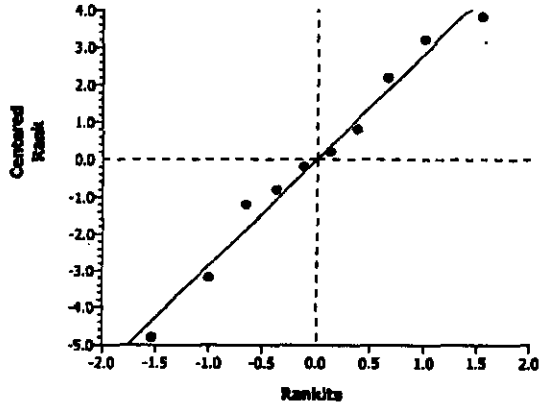
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.04281 | 23.15450 | 0.96857 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.78590 | | 0.00977 | Non-normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 4.96040 | 2.05668 | 6.26333 | 1.69222 | 6.80000 | 2.00000 | 10.0000 | 3.11448 |
| 100 | | 5 | 3.95120 | 1.17200 | 5.57001 | 1.65713 | 4.20000 | 1.00000 | 8.00000 | 2.58844 |

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Height | Comparison | 09-5382-7322 | 09-5382-7322 | 15 May-06 2:08 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 24.83% |

**Group Comparisons**

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

**ANOVA Table**

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

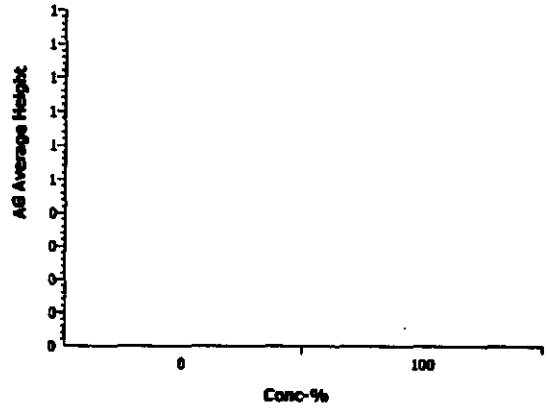
**ANOVA Assumptions**

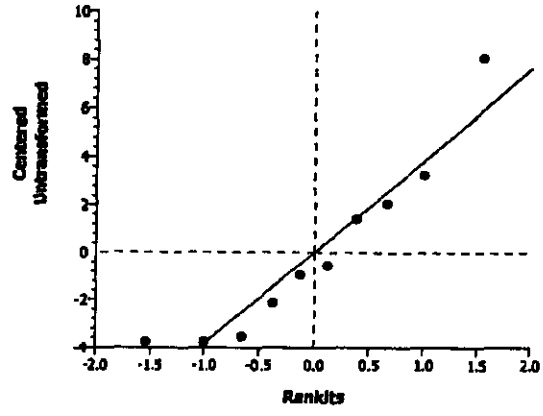
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 3.26330 | 23.15450 | 0.27849 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.89810 | | 0.20879 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Wet Wt. | Comparison | 09-5382-7322 | 09-5382-7322 | 15 May-06 2:08 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 37.50% |

**Group Comparisons**

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

**ANOVA Table**

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

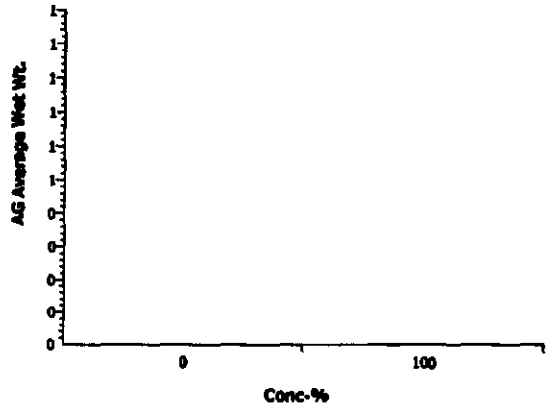
**ANOVA Assumptions**

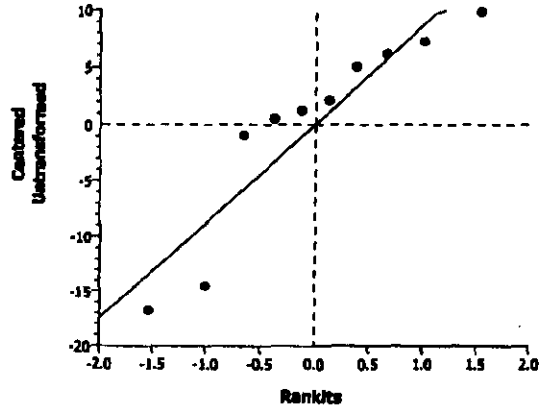
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.12685 | 23.15450 | 0.91064 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.84581 | | 0.05178 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | | CH2M Hill |
|---|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** | |
| Root Average Dry Wt. | Comparison | 09-5382-7322 | 09-5382-7322 | 15 May-06 2:08 PM | CETISv1.1.2 | |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 54.49% |

**Group Comparisons**

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

**ANOVA Table**

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

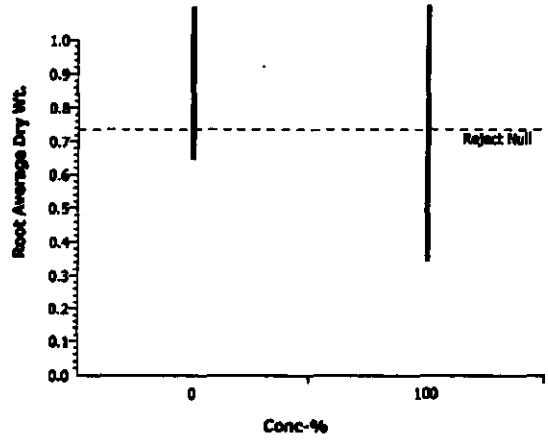
**ANOVA Assumptions**

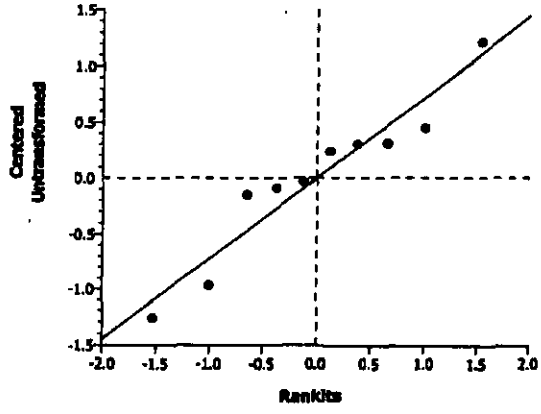
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.35927 | 23.15450 | 0.42618 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.93226 | | 0.47069 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Length | Comparison | 09-5382-7322 | 09-5382-7322 | 15 May-06 2:08 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | <100 | 100 | | N/A | 24.22% |

**Group Comparisons**

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

**ANOVA Table**

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

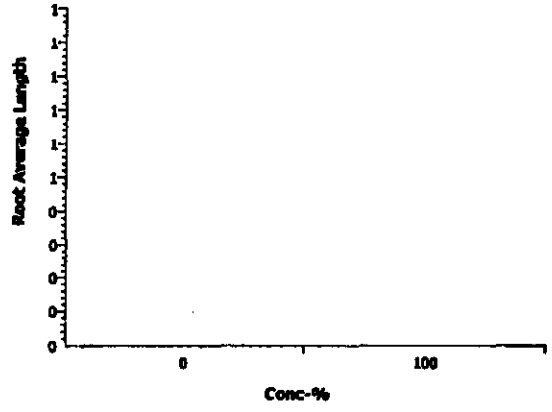
**ANOVA Assumptions**

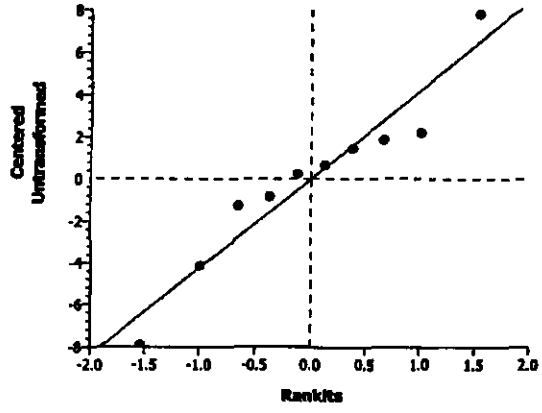
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 5.58027 | 23.15450 | 0.12453 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.94563 | | 0.61720 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Wet Wt. | Comparison | 09-5382-7322 | 09-5382-7322 | 15 May-06 2:08 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 48.66% |

**Group Comparisons**

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

**ANOVA Table**

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

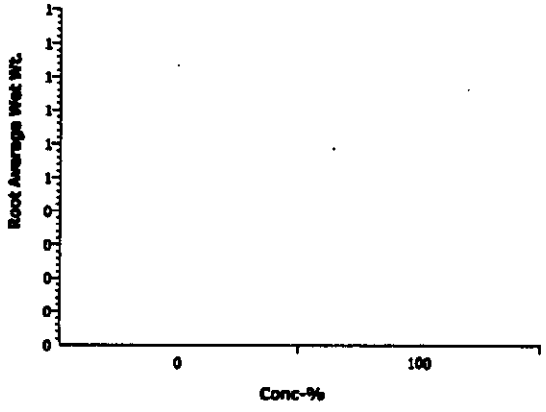
**ANOVA Assumptions**

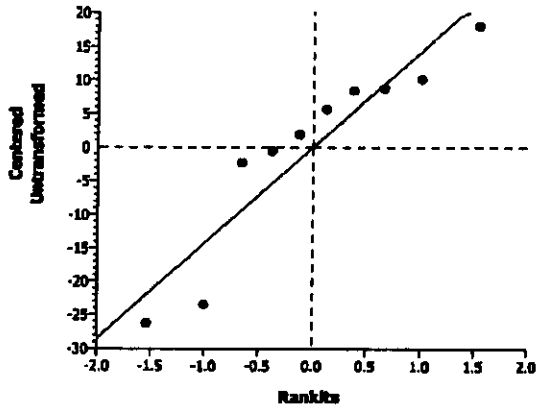
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.45274 | 23.15450 | 0.72627 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.86473 | | 0.08673 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 36.878 | 13.317 | 46.99 | 13.778 | | | | |
| 100 | | 5 | 30.844 | 4.5140 | 48.884 | 16.606 | | | | |

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | CH2M Hill |
|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Total Average Biomass Dry Wt. | Comparison | 09-5382-7322 | 09-5382-7322 | 15 May-06 2:08 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 42.74% |

**Group Comparisons**

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

**ANOVA Table**

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

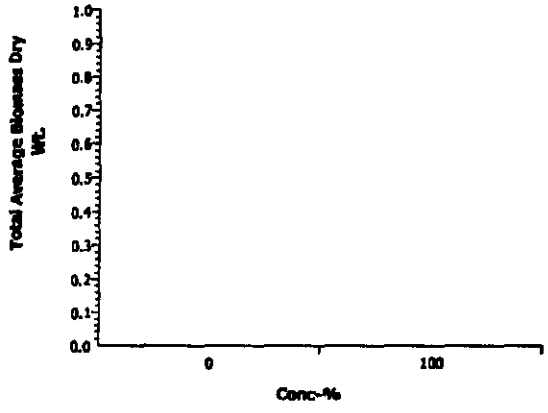
**ANOVA Assumptions**

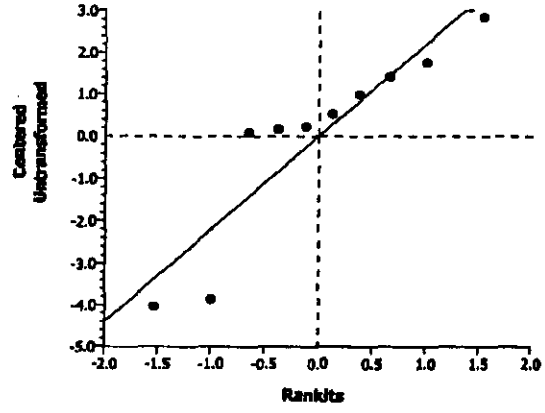
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.24729 | 23.15450 | 0.83561 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.83879 | | 0.04267 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M HIII**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Wet Wt. | Comparison | 09-5382-7322 | 09-5382-7322 | 15 May-06 2:09 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 43.45% |

**Group Comparisons**

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

**ANOVA Table**

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

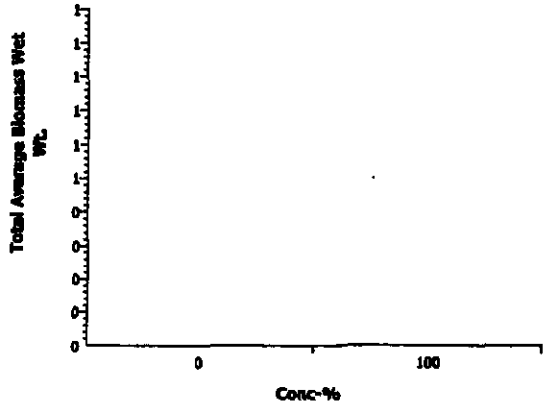
**ANOVA Assumptions**

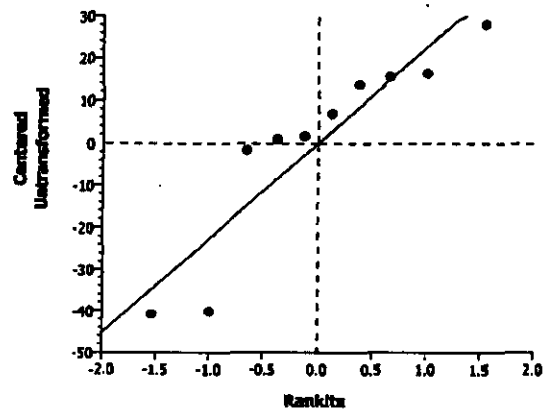
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.20886 | 23.15450 | 0.85859 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.83756 | | 0.04125 | Normal Distribution |

**Data Summary**

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

**Graphics**



# BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-5-06

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

Bioassay Lab ID: BW BC 1506 - 05 Sample No: JJLJH4

| CONC. | REPLICATE | # seeds germinated: Emergence 12 days after planting | 14 days after planting | 18 days after planting | 19 days after planting | 21 days after planting | 23 days after planting | 7-DAYS POST-EMERGENCE (26 days after planting) | 14-DAYS POST-EMERGENCE (33 days after planting) | pH: INITIAL (@ planting) | FINAL (@ 14 days Post-Emergence) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Control | A | 6 | 6 | 6 | 6 | 7 | 7 | 8→5 | 5 | 6.2 | 7.3 |
| | B | 6 | 7 | 7 | 8 | 8 | 8 | 8→5 | 5 | | |
| | C | 4 | 6 | 6 | 7 | 8 | 8 | 8→5 | 5 | | |
| | D | 8 | 8 | 8 | 9 | 9 | 9 | 9→5 | 5 | | |
| | E | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | | |

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

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

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

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

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

Replicate E: 2 Lg G, 1 Lg w/ brown tip — removed: 1 brown/dead

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 2 Lg G, 3 Med G - 1 brown/dead plant noted

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

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

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

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

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 51 mm | 68 mm | 41 mm | 105 mm | 41 mm |
| Replicate B | 65 mm | 71 mm | 78 mm | 66 mm | 41 mm |
| Replicate C | 59 mm | 62 mm | 79 mm | 53 mm | 57 mm |
| Replicate D | 70 mm | 71 mm | 64 mm | 94 mm | 67 mm |
| Replicate E | 52 mm | 75 mm | 61 mm | mm | mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 982.33 | 1052.4 | 993.94 |
| Replicate B | 978.83 | 1103.7 | 998.37 |
| Replicate C | 999.11 | 1099.7 | 1015.08 |
| Replicate D | 996.59 | 1130.7 | 1018.80 |
| Replicate E | 1027.91 | 1117.3 | 1042.81 |

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

| | 1st Seedling | 2nd Seedling | 3rd Seedling | 4th Seedling | 5th Seedling |
|---|---|---|---|---|---|
| Replicate A | 43 mm | 51 mm | 42 mm | 85 mm | 49 mm |
| Replicate B | 86 mm | 49 mm | 78 mm | 83 mm | 87 mm |
| Replicate C | 51 mm | 62 mm | 83 mm | 101 mm | 78 mm |
| Replicate D | 80 mm | 85 mm | 67 mm | 95 mm | 71 mm |
| Replicate E | 102 mm | 75 mm | 60 mm | mm | mm |

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

| | Tin Tare Wt. (mg) | Wet Wt (mg) | Dry Wt. (mg) |
|---|---|---|---|
| Replicate A | 987.41 | 1089.1 | 992.69 |
| Replicate B | 1022.79 | 1232.0 | 1032.17 |
| Replicate C | 1019.29 | 1150.9 | 1026.90 |
| Replicate D | 1029.43 | 1200.0 | ~~1018.80~~ 1039.60 |
| Replicate E | 1026.48 | 1134.7 | 1031.84 |

Comments:

# CETIS Test Summary

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

**Plant Chronic test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 10-9161-4520 | **Test Type:** | Plant Chronic test | **Duration:** | 33d 0h |
| **Start Date:** | 05 Apr-06 | **Protocol:** | ASTM E1963-02 (2002) | **Species:** | Poa sandbergii |
| **Ending Date:** | 08 May-06 | **Dil Water:** | | **Source:** | |
| **Setup Date:** | 05 Apr-06 12:00 AM | **Brine:** | | | |
| **Comments:** | BG1566-05 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 14-5469-5117 | **Code:** | B1566-05 | **Client:** | |
| **Sample Date:** | 04 Apr-06 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 24h | **Station:** | | | |
| **Comments:** | J11JH4 | | | | |

**Comparison Summary**

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

# CETIS Test Summary

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

**% Germination Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Artificial Soil/S | 5 | 0.84000 | 0.60000 | 1.00000 | 0.09798 | 0.21909 | 26.08% |
| 100 | | 5 | 0.92000 | 0.60000 | 1.00000 | 0.08000 | 0.17889 | 19.44% |

**AG Average Dry Wt. Summary**

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

**AG Average Height Summary**

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

**AG Average Wet Wt. Summary**

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

**Root Average Dry Wt. Summary**

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

**Root Average Length Summary**

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

**Root Average Wet Wt. Summary**

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

**Total Average Biomass Dry Wt. Summary**

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

**Total Average Biomass Wet Wt. Summary**

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

# CETIS Test Summary

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

**% Germination Detail**

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

**AG Average Dry Wt. Detail**

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

**AG Average Height Detail**

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

**AG Average Wet Wt. Detail**

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

**Root Average Dry Wt. Detail**

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

**Root Average Length Detail**

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

**Root Average Wet Wt. Detail**

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

**Total Average Biomass Dry Wt. Detail**

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

**Total Average Biomass Wet Wt. Detail**

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

# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Germination | Comparison | 02-6435-3225 | 02-6435-3225 | 15 May-06 2:15 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Wilcoxon Rank Sum Two-Sample | C > T | Rank | | 100 | >100 | 1 | N/A | 27.93% |

**Group Comparisons**

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

**ANOVA Table**

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

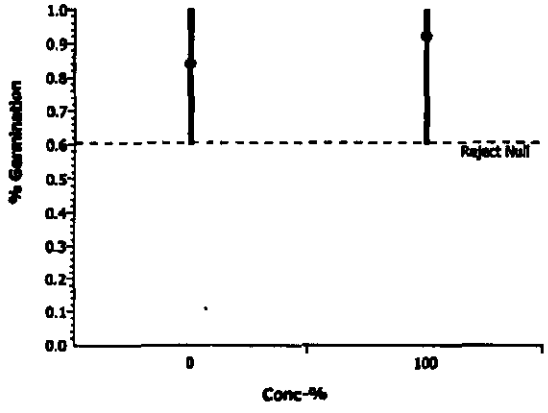
**ANOVA Assumptions**

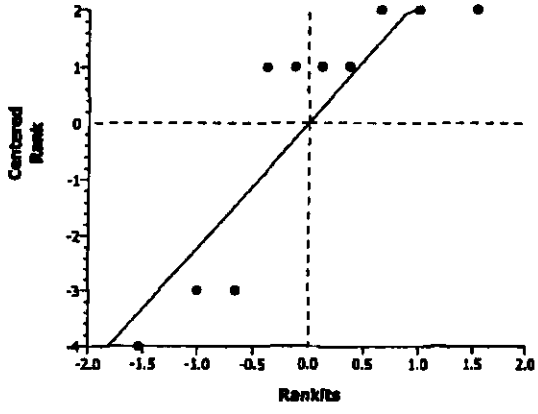
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.50000 | 23.15450 | 0.70400 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.75864 | | 0.00455 | Non-normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 0.84000 | 0.60000 | 1.00000 | 0.21909 | 5.00000 | 2.00000 | 7.00000 | 2.73861 |
| 100 | | 5 | 0.92000 | 0.60000 | 1.00000 | 0.17889 | 6.00000 | 2.00000 | 7.00000 | 2.23607 |

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Dry Wt. | Comparison | 02-8435-3225 | 02-8435-3225 | 15 May-06 2:15 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 33.30% |

**Group Comparisons**

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

**ANOVA Table**

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

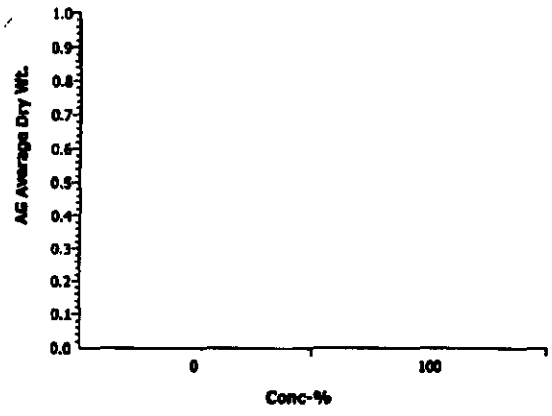
**ANOVA Assumptions**

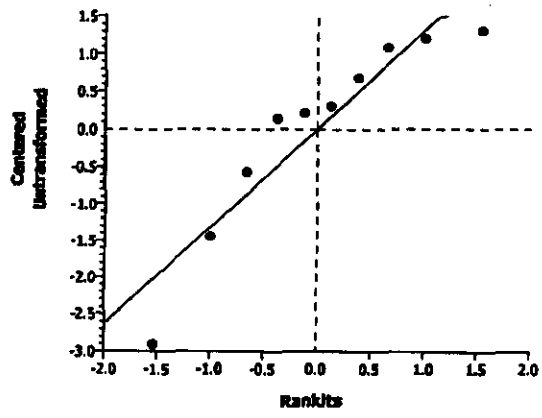
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.64472 | 23.15450 | 0.36905 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.87162 | | 0.10441 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Height | Comparison | 02-6435-3225 | 02-6435-3225 | 15 May-06 2:15 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 27.13% |

**Group Comparisons**

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

**ANOVA Table**

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

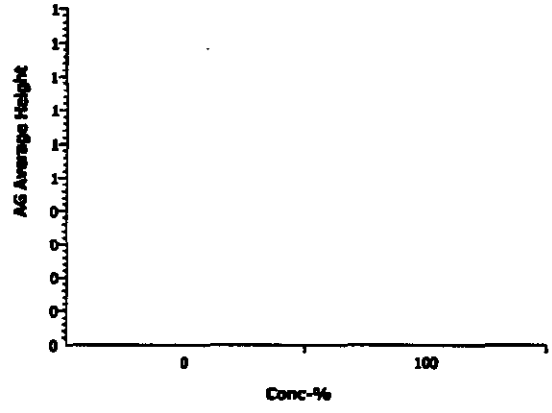
**ANOVA Assumptions**

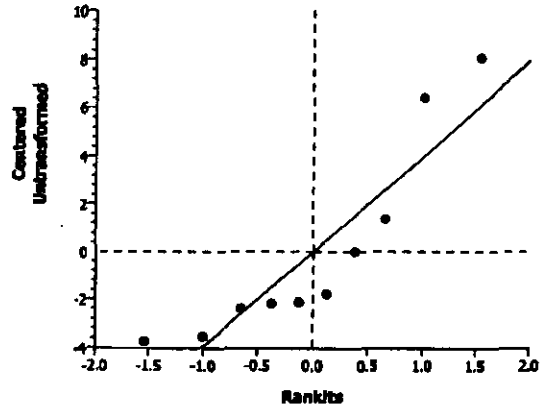
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.78839 | 23.15450 | 0.58719 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.81182 | | 0.02017 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| AG Average Wet Wt. | Comparison | 02-6435-3225 | 02-6435-3225 | 15 May-06 2:15 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 32.37% |

**Group Comparisons**

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

**ANOVA Table**

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

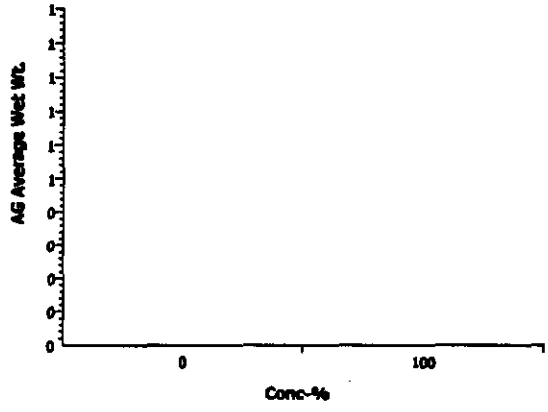
**ANOVA Assumptions**

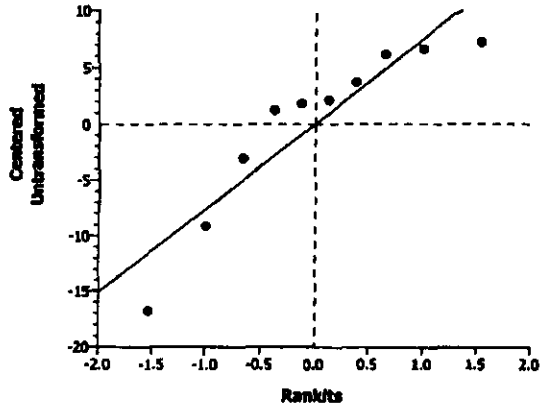
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.45808 | 23.15450 | 0.40501 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.84922 | | 0.05686 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | | CH2M Hill |
|---|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| Root Average Dry Wt. | Comparison | | 02-6435-3225 | 02-6435-3225 | 15 May-06 2:15 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 35.66% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Artificial Soil/Sedi | | 100 | -0.1217 | 1.85955 | 0.5469 | 0.57668 | Non-Significant Effect |

**ANOVA Table**

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

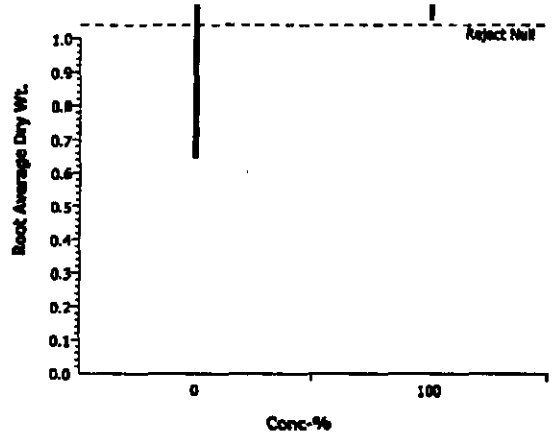
**ANOVA Assumptions**

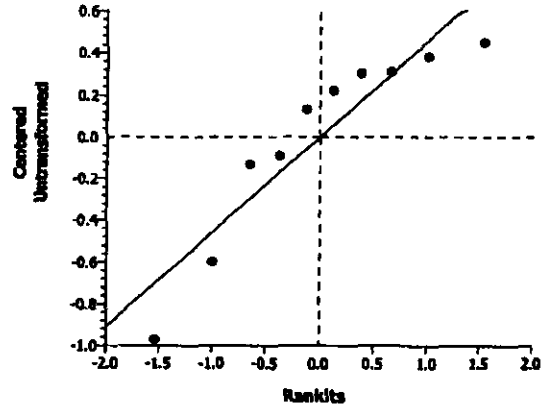
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.28077 | 23.15450 | 0.44417 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.85352 | | 0.06397 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Root Average Length | Comparison | 02-6435-3225 | 02-6435-3225 | 15 May-06 2:15 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 31.77% |

**Group Comparisons**

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

**ANOVA Table**

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

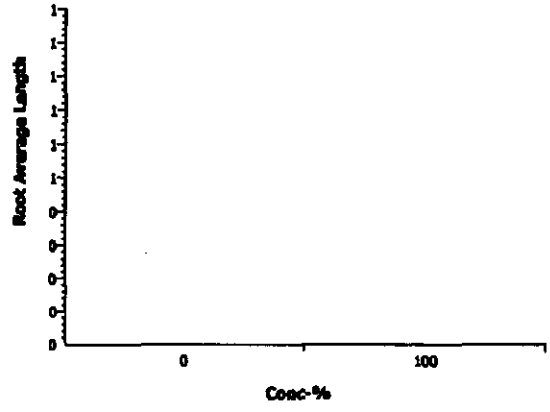
**ANOVA Assumptions**

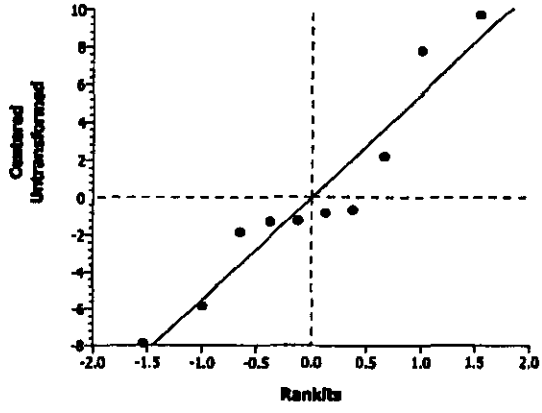
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.02896 | 23.15450 | 0.97859 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.91541 | | 0.32023 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

| Plant Chronic test | | | | | | CH2M Hill |
|---|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** | |
| Root Average Wet Wt. | Comparison | 02-6435-3225 | 02-6435-3225 | 15 May-06 2:15 PM | CETISv1.1.2 | |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 36.45% |

**Group Comparisons**

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

**ANOVA Table**

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

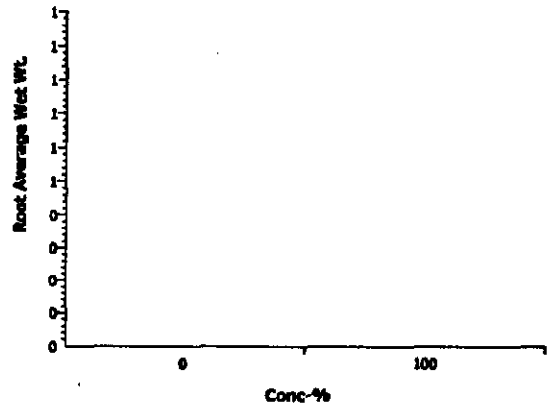
**ANOVA Assumptions**

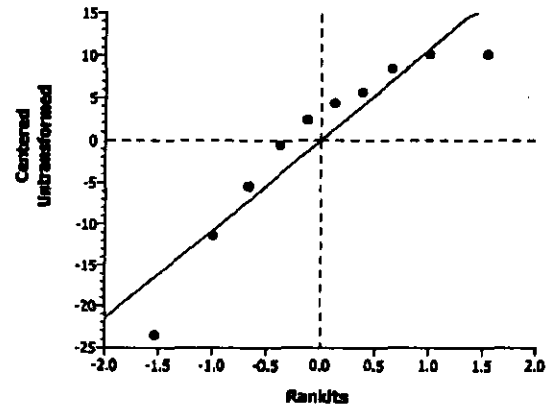
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.65655 | 23.15450 | 0.36694 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.87165 | | 0.10448 | Normal Distribution |

**Data Summary**

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

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Dry Wt. | Comparison | 02-6435-3225 | 02-6435-3225 | 15 May-06 2:15 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 33.47% |

**Group Comparisons**

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

**ANOVA Table**

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

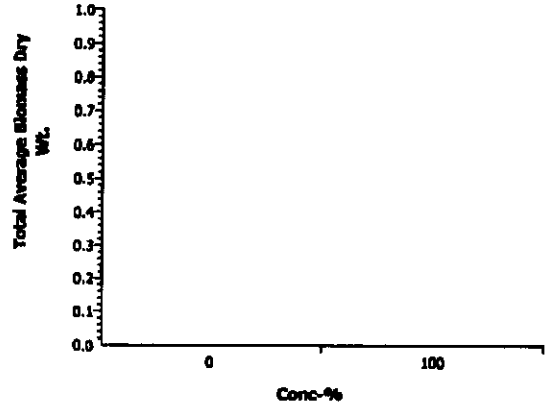
**ANOVA Assumptions**

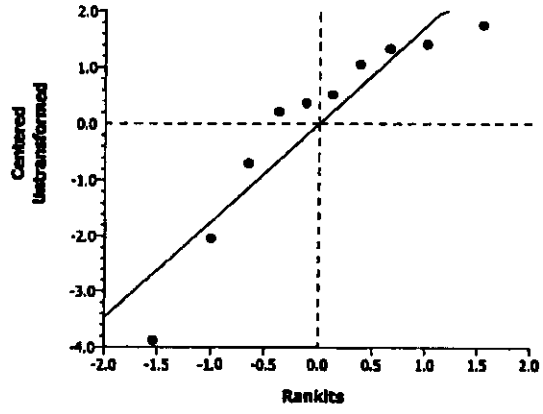
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.64510 | 23.15450 | 0.36899 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.85862 | | 0.07350 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Artificial Soil/S | 5 | 6.57761 | 2.70335 | 8.32866 | 2.25514 | | | | |
| 100 | | 5 | 5.42147 | 3.37800 | 6.75334 | 1.38660 | | | | |

**Graphics**



# CETIS Analysis Detail

**Plant Chronic test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| Total Average Biomass Wet Wt. | Comparison | 02-6435-3225 | 02-6435-3225 | 15 May-06 2:15 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Untransformed | | 100 | >100 | 1 | N/A | 34.13% |

**Group Comparisons**

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

**ANOVA Table**

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

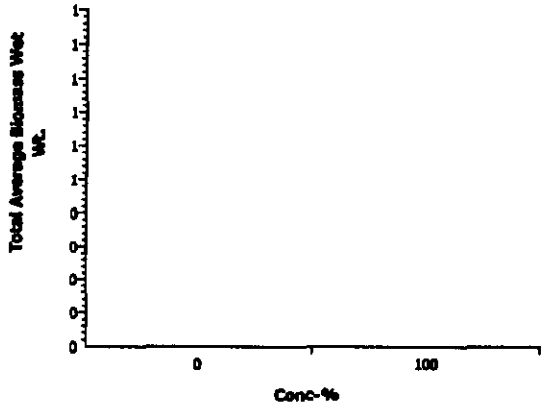
**ANOVA Assumptions**

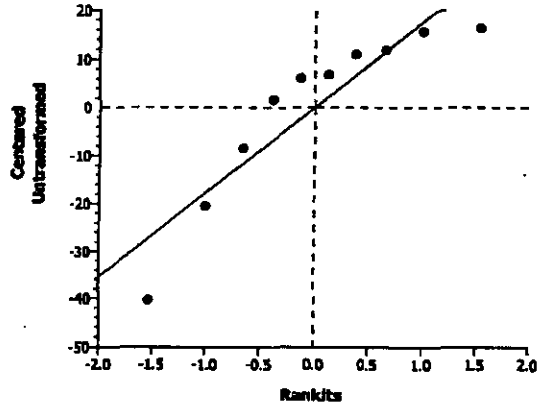
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2.75655 | 23.15450 | 0.34972 | Equal Variances |
| Distribution | Shapiro-Wilk W | 0.83700 | | 0.04061 | Normal Distribution |

**Data Summary**

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

**Graphics**



# APPENDIX B
# CHAIN OF CUSTODY

E 2748

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

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*NONE*

**Special Handling and/or Storage**

*NONE*

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

11-1-05 LRC.

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ~~J10DV9~~ J10DW4 | SOIL | 10-31-05 | 1530 | X | X | | | | | | | | |
| ~~J10DW0~~ | SOIL | | | | | | | | | | | | |
| ~~J10DW1~~ | SOIL | | | | | | | | | | | | |
| ~~J10DW2~~ | SOIL | | | | | | | | | | | | |
| ~~J10DW3~~ | SOIL | | | | | | | | | | | | |

| CHAIN OF POSSESSION | Sign/Print Names | | |
|---|---|---|---|
| Relinquished By/Removed From | Date/Time 11-1-05 1028 | Received By/Stored In | Date/Time 11-1-05 10-3 |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

**SPECIAL INSTRUCTIONS**

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Biocassay ID = B1542-01

Matrix *
S=Soil
SD=Sediment
SO=Solid
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)

E 2801

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-4 | Page 1 of 1 |
|---|---|---|---|
| Collector: L. COLLOM | Company Contact: JOAN KESSNER; Telephone No.: 375-4688 | Project Coordinator: KESSNER, JH | Price Code: 8L; Data Turnaround: 45 Days |
| Project Designation: 100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location: PIT 23 | SAF No.: RC-051 | Air Quality |
| Ice Chest No. | Field Logbook No.: EL-1596; COA: BESRAS6520 | Method of Shipment | |
| Shipped To: CH2MHILL | Offsite Property No.: A060151 | Bill of Lading/Air Bill No. | |

POSSIBLE SAMPLE HAZARDS/REMARKS

*NONE*

Special Handling and/or Storage

*NONE*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | None | None | | | | | | | | | |
| Type of Container | G/P | P/G | | | | | | | | | |
| No. of Container(s) | 1 | 1 | | | | | | | | | |
| Volume | 1000g | ~~3000g~~ 1000g | 2 T 5 11-8 | | | | | | | | |
| SAMPLE ANALYSIS | See item (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 | | | | | | | | | |

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J10DV4 | SOIL | 11-8-05 | 16:00 | 1 | 1 | | | | | | | | -1 |
| J10DV5 | SOIL | | | | | | | | | | | | |
| J10DV6 | SOIL | | | | | | | | | | | | |
| J10DV7 | SOIL | | | | | | | | | | | | |
| J10DV8 | SOIL | | | | | | | | | | | | |

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

SPECIAL INSTRUCTIONS

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

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

-1 ST
11/10/05
As per Rich Walsh

Bioassay ID = B1542-02

Matrix *

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

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

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

E.2P31

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

POSSIBLE SAMPLE HAZARDS/REMARKS

*Potentially Radioactive.*

Special Handling and/or Storage

*NONE*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | None | None | | | | | | | | | |
| Type of Container | G/P | P/G | | | | | | | | | |
| No. of Container(s) | 1 | 1 | | | | | | | | | |
| Volume | 1000g | 400g | | | | | | | | | |
| SAMPLE ANALYSIS | See item (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 | | | | | | | | | |
| Sample No. / Matrix * / Sample Date / Sample Time | | | | | | | | | | | |
| 10DT8 / SOIL / 11/14/05 / 17:21 | 1 | 1 | | | | | | | | | |

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

SPECIAL INSTRUCTIONS

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-03

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

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

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

E2897 E2897

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

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

POSSIBLE SAMPLE HAZARDS/REMARKS
*NONE*

Special Handling and/or Storage
*NONE*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | None | None | | | | | | | | | |
| Type of Container | G/P | P/G | | | | | | | | | |
| No. of Container(s) | 1 | 1 | | | | | | | | | |
| Volume | 1000g | 4000g | | | | | | | | | |
| SAMPLE ANALYSIS | See note (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 | | | | | | | | | |

CT 11-28-05

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J10LJ5 | SOIL | 11-28-05 | ~~16:19~~ 16:19 | 1 | 1 | | | | | | | | -1 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| CHAIN OF POSSESSION | Sign/Print Names | | |
|---|---|---|---|
| Relinquished By/Removed From: CH2MHILL — Date/Time: 16:25 11-28-05 — Elizabeth Tepper | Received By/Stored In: Nicky Dudley | Date/Time: 11-28-05 16:25 | |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

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

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-08

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

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

BHI-EE-0 (3/29/2005)

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-69 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>STANKOVICH, M. | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>100-K RIPARIAN #5 | | SAF No.<br>RC-051 |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment<br>GROUND TRANSPORT |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>~~A060151~~ PLE 3-16-06 A060380 | | Bill of Lading/Air Bill No. |

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*NONE*

**Special Handling and/or Storage**

*Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | None | None | | | | | | | | | |
| Type of Container | G/P | P/G | | | | | | | | | |
| No. of Container(s) | 1 | 1 | | | | | | | | | |
| Volume | 1000g | 4000g | | | | | | | | | |
| **SAMPLE ANALYSIS** | See item (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 | | | | | | | | | |
| **Sample No.** / **Matrix *** / **Sample Date** / **Sample Time** | | | | | | | | | | | |
| J11JB8 / SOIL / 3-21-06 / 16:00 | ✓ | ✓ | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

**CHAIN OF POSSESSION** — Sign/Print Names

| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
|---|---|---|---|
| Elizabeth M Tepper | | CH2M Hill | |
| Elizabeth M Tepper | 3-22-06 11:30 | Lynn Kaumann | 3/22/06 11:30 |
| | | | |
| | | | |
| | | | |
| | | | |

**SPECIAL INSTRUCTIONS**

* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

^ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

F1349-01-Seq 2

BIOASSY Copy

**Matrix ***

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

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

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

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-68 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>STANKOVICH, M. | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH | Price Code 8L<br>Air Quality ☐ | Data Turnaround<br>45 Days |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>100-K RIPARIAN #4 | | SAF No.<br>RC-051 | | |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment<br>GROUND TRANSPORT | | |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No. | | |

POSSIBLE SAMPLE HAZARDS/REMARKS

*NONE*

**Special Handling and/or Storage**

*Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.*

| | | |
|---|---|---|
| Preservation | None | None |
| Type of Container | G/P | P/G |
| No. of Container(s) | 1 | 1 |
| Volume | 1000g | 4000g |

SAMPLE ANALYSIS

| Sample No. | Matrix * | Sample Date | Sample Time | See item (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 |
|---|---|---|---|---|---|
| J11JB7 | SOIL | 3-26-06 | 14:30 | ✓ | ✓ |

CHAIN OF POSSESSION — Sign/Print Names

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

SPECIAL INSTRUCTIONS

These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

^-- These marks indicate that this is a non-analysis used to property format COC form.

Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

F14Z01-S012

Batch #2 Copy

Matrix *

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

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

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

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-96 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>STANKOVICH, M. | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>100-H RIPARIAN #8 | | SAF No.<br>RC-051 |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment<br>GROUND TRANSPORT |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No.<br>SEE OSPC |

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*NONE*

**Special Handling and/or Storage**

*Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.*

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

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J11JH5 | SOIL | 3-28-06 | 15:00 | 1 | 1 | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

**CHAIN OF POSSESSION** — **Sign/Print Names**

| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
|---|---|---|---|
| Elizabeth M Tepper | | CH2M Hill | |
| Elizabeth M Tepper | 3-29-06 11:30 | [illegible] | 3/29/06 11:30 |
| | | | |
| | | | |
| | | | |
| | | | |

**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

Batch # 3

F1H30-1012

Matrix *

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

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

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

F1470

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-99 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>STANKOVICH, M. | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>UPPER RIPARIAN #12 | | SAF No.<br>RC-051 |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment<br>GROUND TRANSPORT |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No.<br>SEE OSPC |

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*NONE*

**Special Handling and/or Storage**

*Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.*

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

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J11JH8 | SOIL | 4-3-06 | 18:45 | 1 | 1 | | | | | | | | 1 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| CHAIN OF POSSESSION | Date/Time | Sign/Print Names: Received By/Stored In | Date/Time |
|---|---|---|---|
| Relinquished By/Removed From: Elizabeth M Tepper | | Received By/Stored In: CH2M Hill | |
| Relinquished By/Removed From: Elizabeth M Tepper | 4-4-06 10:30 | Received By/Stored In: Fed | |
| Relinquished By/Removed From | | Received By/Stored In: [illegible] | 4/4/06 10:30 |
| Relinquished By/Removed From | | Received By/Stored In | |
| Relinquished By/Removed From | | Received By/Stored In | |
| Relinquished By/Removed From | | Received By/Stored In | |

**SPECIAL INSTRUCTIONS**

* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

^-- These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; ~~Dissolved Solids~~

CT 4-3-06

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquid
T=Tissue
Wi=Wipe
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)

F1471

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-95 | Page 1 of 1 |
|---|---|---|---|
| Collector ~~STANKOVICH,M.~~ L. Cellon 3-24-06 | Company Contact JOAN KESSNER; Telephone No. 375-4688 | Project Coordinator KESSNER, JH | Price Code 8L; Data Turnaround 45 Days |
| Project Designation 100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location 100-F RIPARIAN #7 | SAF No. RC-051 | Air Quality ☐ |
| Ice Chest No. | Field Logbook No. EL-1596; COA BESRAS6520 | Method of Shipment GROUND TRANSPORT | |
| Shipped To CH2M HILL | Offsite Property No. A060151 | Bill of Lading/Air Bill No. SEE OSPC | |

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*NONE*

**Special Handling and/or Storage**

*Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.*

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | | | None | None | | | | | | | | |
| Type of Container | | | G/P | P/G | | | | | | | | |
| No. of Container(s) | | | 1 | 1 | | | | | | | | |
| Volume | | | 1000g | 4000g | | | | | | | | |
| SAMPLE ANALYSIS | | | See item (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 | | | | | | | | |
| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | |
| J11JH4 | SOIL | 4-3-06 | 19:00 | 1 | 1 | | | | | | | -2 |

**CHAIN OF POSSESSION** — Sign/Print Names

| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
|---|---|---|---|
| Elizabeth M Tepper | | CH2M Hill | |
| Elizabeth M Tepper | 4-4-06 10:30 | | |
| | | [illegible] | 4/4/06 |
| | | | |
| | | | |
| | | | |

**SPECIAL INSTRUCTIONS**

' These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

^~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; ~~Percent Solids~~ ET 4-3-06

Matrix *: SaSoil; SlSoil/Sediment; SOSolid; SlSludge; WaWater; OiOil; AiAir; DSDrum Solid; DLDrum Liquid; TaTissue; WIWipe; LiLiquid; VaVegetation; OtOther

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

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

139

# BIOASSAY REPORT
## ACUTE SCREENING BIOASSAYS
**Conducted February 2 through 3**
**and February 13 though 14, 2006**

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

March 3, 2006
Lab I.D. Nos. BN1542-01 thru 09
SDG Number BN1542

E2831

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APPENDIX A. RAW DATA SHEETS
APPENDIX B. REFERENCE TOXICANT RAW DATA SHEETS
APPENDIX C. CHAIN OF CUSTODY

## INTRODUCTION

CH2M HILL conducted acute screening bioassay tests using the nematode (*Caenorhabditis elegans*) on soil samples provided by the ELR Consulting for the Washington Closure Hanford project. The tests were conducted in two rounds from February 2 through 3, 2006, and February 13 through 14, 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 October 31, 2005, through December 6, 2005. 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 |
|---|---|---|---|---|
| J10DW4 | 10/31/2005 | 600-131 | BN1542-01 | E2748 |
| J10DV4 | 11/08/2005 | PIT 23 | BN1542-02 | E2801 |
| J10DT8 | 11/14/2005 | Upland Backfill Elevated-100-F-2 | BN1542-03 | E2831 |
| J10DV2 | 11/15/2005 | Upland Native Reference-Central Plateau | BN1542-04 | E2846 |
| J10DV1 | 11/15/2005 | Upland Backfill Low-116-DR-1&2 | BN1542-05 | E2847 |
| J10DV3 | 11/16/2005 | Upland Native Elevated-JA Jones | BN1542-06 | E2857 |
| J10DV0 | 11/21/2005 | Riparian Elevated-Site #3 Upriver 100-D | BN1542-07 | E2877 |
| J10LJ5 | 11/28/2005 | Riparin Low-Site #10 Downriver 100-D | BN1542-08 | E2897 |
| J10DT9 | 12/06/2005 | Riparian Reference-Site #13 Vernita Bridge | BN1542-09 | E2953 |

## 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 February 2, 2006.

**Table 2**
***Caenorhabditis elegans* Results**
**Test initiated on February 2, 2006**

| Client ID | Percent Survival | Percent Recovered |
|---|---|---|
| Control | 90.0 | 100 |
| J10DV1 | 63.3 [a] | 86.7 |
| J10DV3 | 90.0 | 97.7 |
| J10DV0 | 56.7 [a] | 90.0 |
| J10LJ5 | 80.0 | 96.7 |
| J10DT9 | 76.7 | 93.3 |

[a] Indicates a statistically significant reduction when compared to the control at the p equal to 0.05 level using Equal Variance t Two Sample Test.

The nematode results indicated no statistically significant reduction in survival in the J10DV3, J10LJ5, and J10DT9 samples and a statistically significant reduction in survival in the J10DV1 and J10DV0 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.

Table 3 summarizes the survival data for the nematode acute test initiated on February 13, 2006.

| Table 3<br>*Caenorhabditis elegans* Results<br>Test initiated on February 13, 2006 | | |
|---|---|---|
| **Client ID** | **Percent Survival** | **Percent Recovered** |
| Control | 90.0 | 96.7 |
| J10DW4 | 90.0 | 93.3 |
| J10DV4 | 83.3 | 86.7 |
| J10DT8 | 73.3 [a] | 83.3 |
| J10DV2 | 83.3 | 93.3 |
| [a] Indicates a statistically significant reduction when compared to the control at the p equal to 0.05 level using Equal Variance t Two Sample Test. | | |

The nematode results indicated no statistically significant reduction in survival in the J10DW4, J10DV4, and J10DV2 samples and a statistically significant reduction in survival in the J10DT8 sample 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 January 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) | 98.2 | 52.3 to 120.1 |

## 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. NEMATODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client Hanford | Tech. 0 Hrs NJ 24 Hrs NJ | Beginning, Date 2-2-06 Time 0850
Sample Description see below | Time 0 Hrs 0850 24 Hrs 0835 | Ending, Date 2-3-06 Time 0835
Test Species *Caenorhabditis elegans* ID#: Nem007

| Lab ID | Soil pH 0 hr | Soil pH 24 hr | Soil % Moisture 0 hr | Soil Temperature (°C) 0 hr | Soil Temperature (°C) 24 hr | Comments: All test soils were dried during sampling process. |
|---|---|---|---|---|---|---|
| Lab Control | | | | 19.3 | 21.3 | Each test chamber has 2.33 g dry wt. soil + 0.93 ml Milli-Q water (40% of sry wt.). |
| E284701 | | | | 19.5 | 21.3 | Samples hydrated 7 days prior to test initiation. |
| E285701 | | | | 19.3 | 21.3 | * SAMPLES HAD ADDITIONAL 0.50 ml Milli-Q water on 1-31 / |
| E287701 | | | | 19.3 | 21.3 | covered edges w/ Parafilm. Noted samples almost dry. |
| E289701 | | | | 19.3 | 21.3 | |
| E295301 | | | | 19.3 | 21.3 | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Lab ID | Field ID | Replicate | Chamber # | Lab ID | Field ID | Replicate | Chamber # | Lab ID | Field ID | Replicate | Chamber # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Control | 70 grade Silica sand | A | 8 | E289701 | J10L55 | A | 11 | | | | 0 |
| Lab Control | 70 grade Silica sand | B | 18 | E289701 | 31542-03 | B | 13 | | | | 0 |
| Lab Control | 70 grade Silica sand | C | 3 | E289701 | | C | 4 | | | | 0 |
| E284701 | J10DV1 | A | 15 | E295301 | J10DT9 | A | 17 | | | | 0 |
| E284701 | 31542-05 | B | 14 | E295301 | 31542-09 | B | 9 | | | | 0 |
| E284701 | | C | 16 | E295301 | | C | 7 | | | | 0 |
| E285701 | J10DV3 | A | 2 | | | | 0 | | | | 0 |
| E285701 | 31542-06 | B | 5 | | | | 0 | | | | 0 |
| E285701 | | C | 6 | | | | 0 | | | | 0 |
| E287701 | J10DV0 | A | 1 | | | | 0 | | | | 0 |
| E287701 | 31542-07 | B | 12 | | | | 0 | | | | 0 |
| E287701 | | C | 10 | | | | 0 | | | | 0 |

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client: Hanford
ample Description: Lab ID#: see Assignment Data sheet
Test Species: *Caenorhabditis elegans* ID#: Nem 007

Beginning, Date 2-2-06 Time 0850
Ending, Date 2-3-06 Time 0835

Test Initiation: Tech: Tech: NJT Time: 0850

Test Termination: Tech: Tech: NJT Time: 0835

| Chamber Number | Start Count 0 | # alive found 24 hr | # dead found 24 hr | Comments: |
|---|---|---|---|---|
| 1 | 10 | 6 | 4 | long, thin nematode |
| 2 | 10 | 8 | 2 | found in both #1 and #2 |
| 3 | 10 | 9 | 1 | #4, #9, #11 – 9 foreign |
| 4 | 10 | 9 | 1 | nematodes found & not |
| 5 | 10 | 10 | 0 | included in final |
| 6 | 10 | 9 | 0 | counts of nematodes |
| 7 | 10 | 9 | 0 | if not |
| 8 | 10 | 9 | 1 | |
| 9 | 10 | 8 | 1 | |
| 10 | 10 | 7 | 1 | |
| 11 | 10 | 7 | 2 | |
| 12 | 10 | 4 | 5 | |
| 13 | 10 | 8 | 2 | |
| 14 | 10 | 7 | 3 | |
| 15 | 10 | 7 | 0 | |

| Chamber Number | Start Count 0 | # alive found 24 hr | # dead found 24 hr | Comments: |
|---|---|---|---|---|
| 16 | 10 | 5 | 4 | |
| 17 | 10 | 6 | 4 | |
| 18 | 10 | 9 | 1 | |
| 19 | 10 | | | |
| 20 | 10 | | | |
| 21 | 10 | | | |
| 22 | 10 | | | |
| 23 | 10 | | | |
| 24 | 10 | | | |
| 25 | 10 | | | |
| 26 | 10 | | | |
| 27 | 10 | | | |
| 28 | 10 | | | |
| 29 | 10 | | | |
| 30 | 10 | | | |

# CETIS Test Summary

Report Date: 16 Feb-06 3:05 PM
Test Link: 09-9781-8693/B154205cea

**Nematode 24 hour Acute test** — CH2M Hill

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 17-4335-2950 | **Test Type:** | Nematode Survival | **Duration:** | 24h |
| **Start Date:** | 02 Feb-06 08:50 AM | **Protocol:** | ASTM E2172-01 (2001) | **Species:** | Caenorhabditis elegans |
| **Ending Date:** | 03 Feb-06 08:35 AM | **Dil Water:** | | **Source:** | In-House Culture |
| **Setup Date:** | 02 Feb-06 08:50 AM | **Brine:** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 06-5742-9955 | **Code:** | B1542-05 | **Client:** | |
| **Sample Date:** | 15 Nov-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 79d 8h | **Station:** | | | |

**Comments:** J10DV1, E284701

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 04-1973-5798 | % Survival | < 100 | 100 | N/A | 11.50% | Equal Variance t Two-Sample |

**% Survival Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00000 | 0.00000 | 0.00% |
| 100 | | 3 | 0.63333 | 0.50000 | 0.70000 | 0.06667 | 0.11547 | 18.23% |

**% Survival Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 |
|---|---|---|---|---|
| 0 | Control Sed | 0.90000 | 0.90000 | 0.90000 |
| 100 | | 0.70000 | 0.70000 | 0.50000 |

✓ bm

# CETIS Analysis Detail

**Nematode 24 hour Acute test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Survival | Comparison | 09-9781-8693 | 09-9781-8693 | 16 Feb-06 3:05 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Angular (Corrected) | | <100 | 100 | | N/A | 11.50% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Control Sed | | 100 | 4.76008 | 2.13185 | 0.0045 | 0.14622 | Significant Effect |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.1598792 | 0.159879 | 1 | 22.66 | 0.00890 | Significant Effect |
| Error | 0.0282244 | 0.007056 | 4 | | | |
| Total | 0.18810356 | 0.1669353 | 5 | | | |

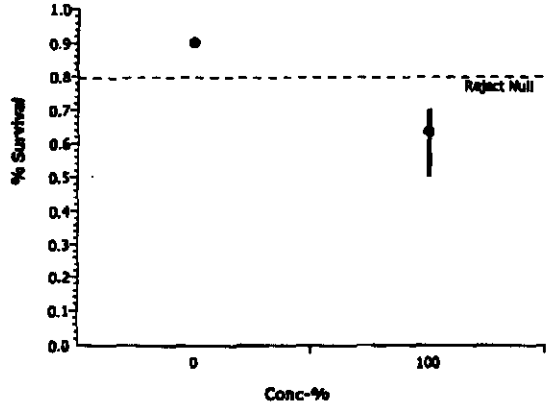
**ANOVA Assumptions**

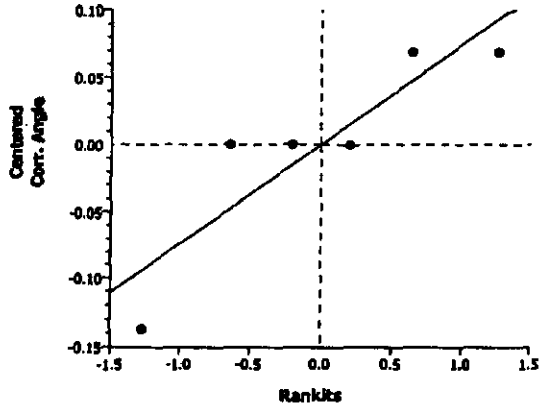
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 4767834000 | 199.00000 | 0.00000 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.81374 | | 0.07784 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |
| 100 | | 3 | 0.63333 | 0.50000 | 0.70000 | 0.11547 | 0.92257 | 0.78540 | 0.99116 | 0.11879 |

**Graphics**



# CETIS Test Summary

Report Date: 16 Feb-06 3:25 PM
Test Link: 11-9227-7826/B154206cea

**Nematode 24 hour Acute test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 09-5017-4566 | **Test Type:** | Nematode Survival | **Duration:** | 24h |
| **Start Date:** | 02 Feb-06 08:50 AM | **Protocol:** | ASTM E2172-01 (2001) | **Species:** | Caenorhabditis elegans |
| **Ending Date:** | 03 Feb-06 08:35 AM | **Dil Water:** | | **Source:** | In-House Culture |
| **Setup Date:** | 02 Feb-06 08:50 AM | **Brine:** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 09-1115-2498 | **Code:** | B1542-06 | **Client:** | |
| **Sample Date:** | 16 Nov-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 78d 8h | **Station:** | | | |

**Comments:** J10DV3, E285701

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 10-3091-8870 | % Survival | 100 | > 100 | N/A | 15.32% | Equal Variance t Two-Sample |

**% Survival Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00000 | 0.00000 | 0.00% |
| 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 | Control Sed | 0.90000 | 0.90000 | 0.90000 |
| 100 | | 0.80000 | 1.00000 | 0.90000 |

✓ Bw

# CETIS Analysis Detail

**Nematode 24 hour Acute test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Survival | Comparison | 11-9227-7826 | 11-9227-7826 | 16 Feb-06 3:07 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 | 15.32% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Control Sed | | 100 | -0.0798 | 2.13185 | 0.5299 | 0.18777 | Non-Significant Effect |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 7.401E-05 | 7.40E-05 | 1 | 0.01 | 0.94026 | Non-Significant Effect |
| Error | 0.0465461 | 0.011637 | 4 | | | |
| Total | 0.04662009 | 0.0117105 | 5 | | | |

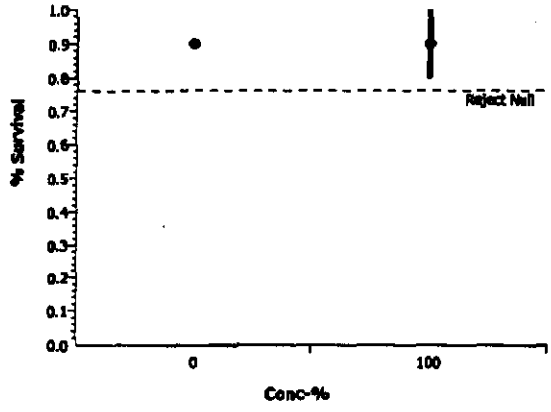
**ANOVA Assumptions**

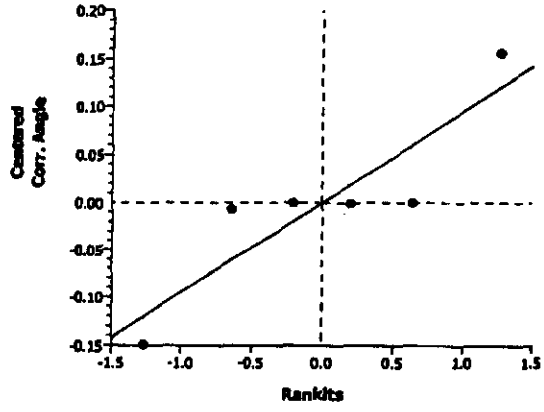
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 7862854000 | 199.00000 | 0.00000 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.84220 | | 0.13594 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |
| 100 | | 3 | 0.90000 | 0.80000 | 1.00000 | 0.10000 | 1.25607 | 1.10715 | 1.41202 | 0.15256 |

**Graphics**



# CETIS Test Summary

Report Date: 16 Feb-06 3:08 PM
Test Link: 10-4312-1695/B154207cea

**Nematode 24 hour Acute test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 10-7374-9443 | **Test Type:** | Nematode Survival | **Duration:** | 24h |
| **Start Date:** | 02 Feb-06 08:50 AM | **Protocol:** | ASTM E2172-01 (2001) | **Species:** | Caenorhabditis elegans |
| **Ending Date:** | 03 Feb-06 08:30 AM | **Dil Water:** | | **Source:** | In-House Culture |
| **Setup Date:** | 02 Feb-06 08:50 AM | **Brine:** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 05-1608-3151 | **Code:** | B1542-07 | **Client:** | |
| **Sample Date:** | 21 Nov-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 73d 8h | **Station:** | | | |

**Comments:** J10DV0, E287701

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 02-6442-2122 | % Survival | < 100 | 100 | N/A | 15.69% | Equal Variance t Two-Sample |

**% Survival Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00000 | 0.00000 | 0.00% |
| 100 | | 3 | 0.56667 | 0.40000 | 0.70000 | 0.08819 | 0.15275 | 26.96% |

**% Survival Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 |
|---|---|---|---|---|
| 0 | Control Sed | 0.90000 | 0.90000 | 0.90000 |
| 100 | | 0.60000 | 0.40000 | 0.70000 |

# CETIS Analysis Detail

**Nematode 24 hour Acute test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Survival | Comparison | 10-4312-1695 | 10-4312-1695 | 16 Feb-06 3:08 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Angular (Corrected) | | <100 | 100 | | N/A | 15.69% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Control Sed | | 100 | 4.39424 | 2.13185 | 0.0059 | 0.19166 | Significant Effect |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.2341103 | 0.234110 | 1 | 19.31 | 0.01174 | Significant Effect |
| Error | 0.0484969 | 0.012124 | 4 | | | |
| Total | 0.2826072 | 0.2462346 | 5 | | | |

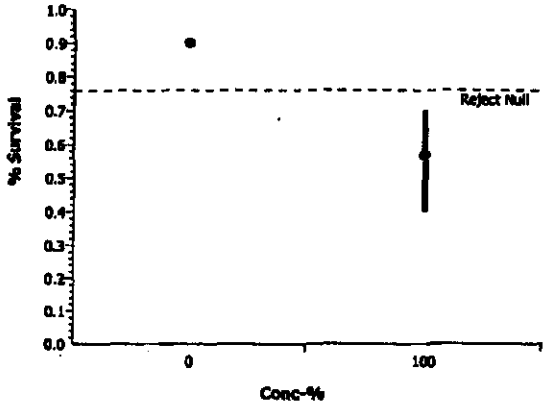
**ANOVA Assumptions**

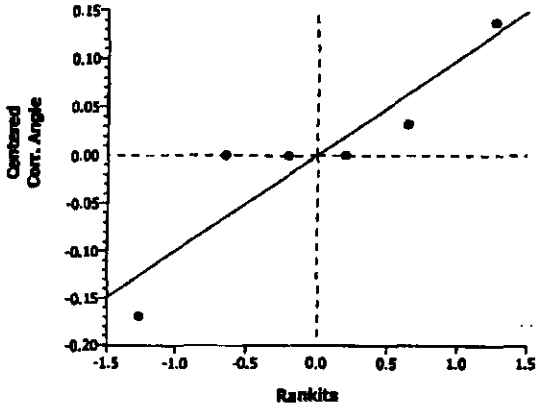
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 8192392000 | 199.00000 | 0.00000 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.87536 | | 0.24842 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |
| 100 | | 3 | 0.56667 | 0.40000 | 0.70000 | 0.15275 | 0.85398 | 0.68472 | 0.99116 | 0.15572 |

**Graphics**



# CETIS Test Summary

Report Date: 16 Feb-06 3:09 PM
Test Link: 01-8258-7180/B154208cea

**Nematode 24 hour Acute test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 18-5411-2771 | **Test Type:** | Nematode Survival | **Duration:** | 24h |
| **Start Date:** | 02 Feb-06 08:50 AM | **Protocol:** | ASTM E2172-01 (2001) | **Species:** | Caenorhabditis elegans |
| **Ending Date:** | 03 Feb-06 08:35 AM | **Dil Water:** | | **Source:** | In-House Culture |
| **Setup Date:** | 02 Feb-06 08:50 AM | **Brine:** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 15-5450-5055 | **Code:** | B1542-08 | **Client:** | |
| **Sample Date:** | 28 Nov-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 66d 8h | **Station:** | | | |

**Comments:** J10LJ5, E289701

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 17-2393-1486 | % Survival | 100 | > 100 | N/A | 12.65% | Equal Variance t Two-Sample |

**% Survival Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00000 | 0.00000 | 0.00% |
| 100 | | 3 | 0.80000 | 0.70000 | 0.90000 | 0.05774 | 0.10000 | 12.50% |

**% Survival Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 |
|---|---|---|---|---|
| 0 | Control Sed | 0.90000 | 0.90000 | 0.90000 |
| 100 | | 0.70000 | 0.80000 | 0.90000 |

✓ Bm





Analyst: Bm Approval: _____

# CETIS Analysis Detail

**Nematode 24 hour Acute test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Survival | Comparison | 01-8258-7180 | 01-8258-7180 | 16 Feb-06 3:09 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 | 12.65% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Control Sed | | 100 | 1.78704 | 2.13185 | 0.0742 | 0.15897 | Non-Significant Effect |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0266382 | 0.026638 | 1 | 3.19 | 0.14846 | Non-Significant Effect |
| Error | 0.0333653 | 0.008341 | 4 | | | |
| Total | 0.06000343 | 0.0349795 | 5 | | | |

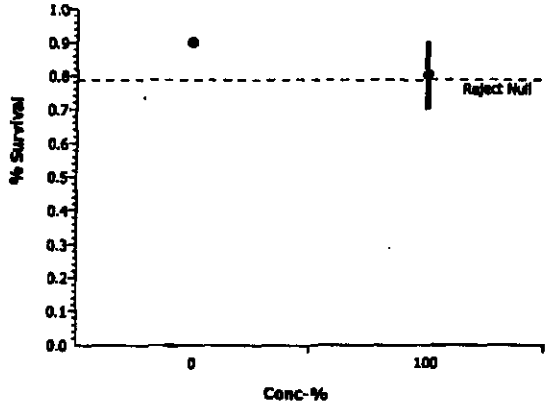
**ANOVA Assumptions**

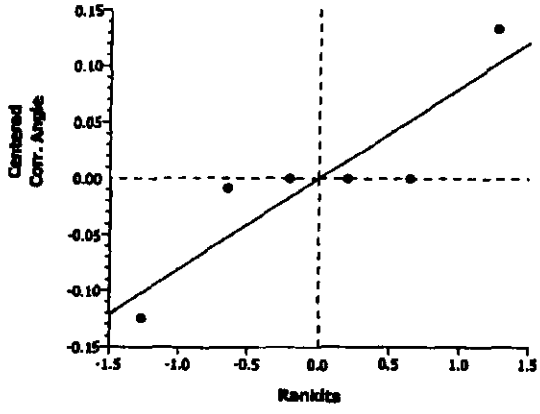
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 5636268000 | 199.00000 | 0.00000 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.84832 | | 0.15255 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |
| 100 | | 3 | 0.80000 | 0.70000 | 0.90000 | 0.10000 | 1.11578 | 0.99116 | 1.24905 | 0.12916 |

**Graphics**



# CETIS Test Summary

Report Date: 16 Feb-06 3:11 PM
Test Link: 03-7488-5492/B154209cea

**Nematode 24 hour Acute test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 16-2208-0421 | **Test Type:** | Nematode Survival | **Duration:** | 24h |
| **Start Date:** | 02 Feb-06 08:50 AM | **Protocol:** | ASTM E2172-01 (2001) | **Species:** | Caenorhabditis elegans |
| **Ending Date:** | 03 Feb-06 08:35 AM | **Dil Water:** | | **Source:** | In-House Culture |
| **Setup Date:** | 02 Feb-06 08:50 AM | **Brine:** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 07-3184-0122 | **Code:** | B1542-09 | **Client:** | |
| **Sample Date:** | 06 Dec-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 58d 8h | **Station:** | | | |

**Comments:** J10DT9, E295301

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 04-5863-3854 | % Survival | 100 | > 100 | N/A | 18.94% | Equal Variance t Two-Sample |

**% Survival Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00000 | 0.00000 | 0.00% |
| 100 | | 3 | 0.76667 | 0.60000 | 0.90000 | 0.08819 | 0.15275 | 19.92% |

**% Survival Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 |
|---|---|---|---|---|
| 0 | Control Sed | 0.90000 | 0.90000 | 0.90000 |
| 100 | | 0.60000 | 0.80000 | 0.90000 |

# CETIS Analysis Detail

**Nematode 24 hour Acute test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Survival | Comparison | 03-7488-5492 | 03-7488-5492 | 16 Feb-06 3:11 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Angular (Corrected) | | 100 | >100 | 1 | N/A | 18.94% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Control Sed | | 100 | 1.59353 | 2.13185 | 0.0931 | 0.22514 | Non-Significant Effect |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0424816 | 0.042482 | 1 | 2.54 | 0.18626 | Non-Significant Effect |
| Error | 0.0669179 | 0.016729 | 4 | | | |
| Total | 0.10939945 | 0.0592110 | 5 | | | |

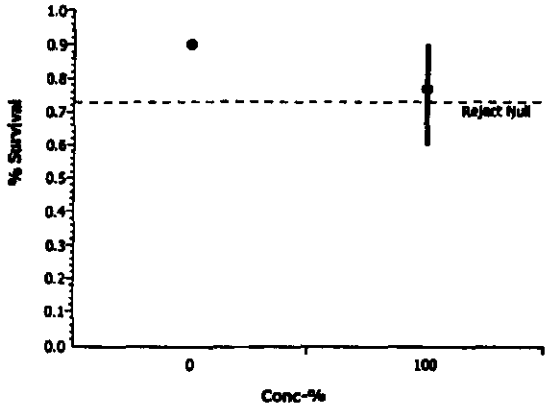
**ANOVA Assumptions**

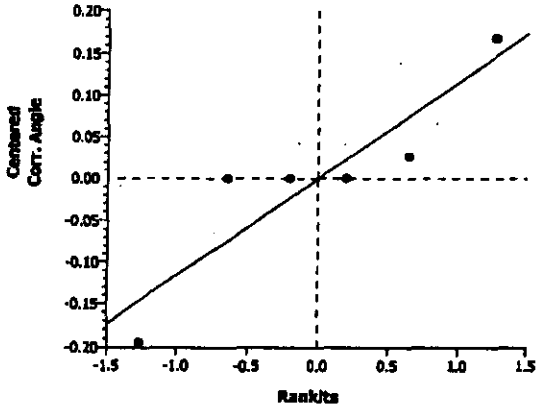
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1130419000 | 199.00000 | 0.00000 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.86641 | | 0.21226 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |
| 100 | | 3 | 0.76667 | 0.60000 | 0.90000 | 0.15275 | 1.08076 | 0.88608 | 1.24905 | 0.18292 |

**Graphics**



# CH2M. ,//TODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client Hanford | Tech. 0 Hrs NJ 24 Hrs NJ | Beginning, Date 2-13-06 Time 0830
Sample Description see below | Time 0 Hrs 0830 24 Hrs 0830 | Ending, Date 2-14-06 Time 0830
Test Specie *Caenorhabditis elegans* ID#: Nem 008

| Lab ID | Soil pH 0 hr | Soil pH 24 hr | Soil % Moisture 0 hr | Soil Temperature (°C) 0 hr | Soil Temperature (°C) 24 hr | Comments: All test soils were dried during sampling process. |
|---|---|---|---|---|---|---|
| Lab Control | 7.1 | | | 21.4 | 20.8 | Each test chamber has 2.33 g dry wt. soil + 0.93 ml Milli-Q water (40% of sry wt.). |
| E274801 | 7.6 | | | 21.4 | 20.8 | Samples hydrated 7 days prior to test initiation. |
| E280101 | 7.5 | | | 21.4 | 20.8 | |
| E283101 | 7.2 | | | 21.4 | 20.8 | |
| E284601 | 6.5 | | | 21.4 | 20.8 | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Lab ID | Field ID | Replicate | Chamber # | Lab ID | Field ID | Replicate | Chamber # | Lab ID | Field ID | Replicate | Chamber # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Control | 70 grade Silica sand | A | 1 | E284601 | J10DV2 | A | 13 | | | 0 | |
| Lab Control | 70 grade Silica sand | B | 14 | E284601 | B1542-04 | B | 8 | | | | |
| Lab Control | 70 grade Silica sand | C | 4 | E284601 | | C | 10 | | | | |
| E274801 | J10DW4 | A | 11 | | | | | | | | |
| E274801 | B1542-01 | B | 15 | | | | | | | | |
| E274801 | | C | 3 | | | | | | | | |
| E280101 | J10DV4, J10DV5, J10DV6, | A | 2 | | | | | | | | |
| E280101 | J10DV7, J10DV8 | B | 5 | | | | | | | | |
| E280101 | B1542-02 | C | 6 | | | | | | | | |
| E283101 | J10DT8 | A | 12 | | | | | | | | |
| E283101 | B1542-03 | B | 7 | | | | | | | | |
| E283101 | | C | 9 | | | | | | | | |

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client Hanford

Sample Description Lab ID#: see Assignment Data sheet

Test Species: *Caenorhabditis elegans* ID#: Nem 008

Beginning, Date 2-13-06 Time 0830

Ending, Date 2-14-06 Time 0830

Test Initiation: Tech: Tech: NJ Time: 0830

Test Termination: Tech: Tech: NJ Time: 0830

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

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

# CETIS Test Summary

Report Date: 16 Feb-06 2:52 PM
Test Link: 04-9550-2436/B154201cea

**Nematode 24 hour Acute test** — CH2M Hill

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 05-4016-1968 | **Test Type:** | Nematode Survival | **Duration:** | 24h |
| **Start Date:** | 13 Feb-06 08:30 AM | **Protocol:** | ASTM E2172-01 (2001) | **Species:** | Caenorhabditis elegans |
| **Ending Date:** | 14 Feb-06 08:30 AM | **Dil Water:** | | **Source:** | In-House Culture |
| **Setup Date:** | 30 Jan-06 10:30 AM | **Brine:** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 18-1426-8954 | **Code:** | B1542-01 | **Client:** | |
| **Sample Date:** | 31 Oct-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 91d 10h | **Station:** | | | |

**Comments:** J10DW4, E274801

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 16-8964-2763 | % Survival | 100 | > 100 | N/A | 0.00% | Equal Variance t Two-Sample |

**% Survival Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00000 | 0.00000 | 0.00% |
| 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 | Control Sed | 0.90000 | 0.90000 | 0.90000 |
| 100 | | 0.90000 | 0.90000 | 0.90000 |

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# CETIS Analysis Detail

**Nematode 24 hour Acute test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Survival | Comparison | 04-9550-2436 | 04-9550-2436 | 16 Feb-06 2:52 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 | 0.00% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Control Sed | | 100 | 0 | 2.13185 | 0.5000 | 3E-08 | 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 | 1.776E-15 | 4.44E-16 | 4 | | | |
| Total | 1.7764E-15 | 4.441E-16 | 5 | | | |

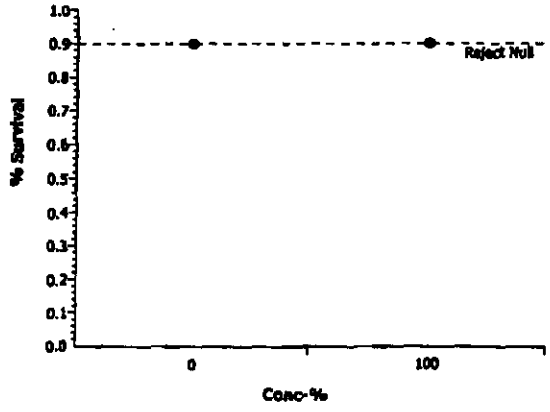
**ANOVA Assumptions**

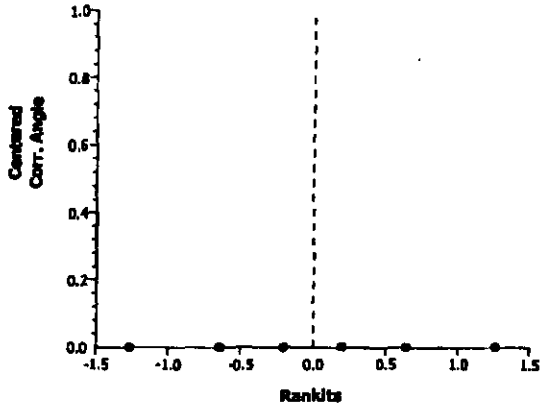
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1.00000 | 199.00000 | 1.00000 | Equal Variances |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |
| 100 | | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |

**Graphics**



# CETIS Test Summary

Report Date: 16 Feb-06 2:55 PM
Test Link: 07-1342-3910/B154202cea

**Nematode 24 hour Acute test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 10-6949-0572 | **Test Type:** | Nematode Survival | **Duration:** | 24h |
| **Start Date:** | 13 Feb-06 08:30 AM | **Protocol:** | ASTM E2172-01 (2001) | **Species:** | Caenorhabditis elegans |
| **Ending Date:** | 14 Feb-06 08:30 AM | **Dil Water:** | | **Source:** | In-House Culture |
| **Setup Date:** | 13 Feb-06 08:30 AM | **Brine:** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 07-3307-9513 | **Code:** | B1542-02 | **Client:** | |
| **Sample Date:** | 08 Nov-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 97d 8h | **Station:** | | | |

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

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 01-5013-5976 | % Survival | 100 | > 100 | N/A | 7.58% | Equal Variance t Two-Sample |

**% Survival Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00000 | 0.00000 | 0.00% |
| 100 | | 3 | 0.83333 | 0.80000 | 0.90000 | 0.03333 | 0.05774 | 6.93% |

**% Survival Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 |
|---|---|---|---|---|
| 0 | Control Sed | 0.90000 | 0.90000 | 0.90000 |
| 100 | | 0.80000 | 0.90000 | 0.80000 |

# CETIS Analysis Detail

**Nematode 24 hour Acute test** — **CH2M Hill**

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Survival | Comparison | 07-1342-3910 | 07-1342-3910 | 16 Feb-06 2:55 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Angular (Corrected) | | 100 | >100 | 1 | N/A | 7.58% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Control Sed | | 100 | 2 | 2.13185 | 0.0581 | 0.10083 | Non-Significant Effect |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0134232 | 0.013423 | 1 | 4.00 | 0.11612 | Non-Significant Effect |
| Error | 0.0134232 | 0.003356 | 4 | | | |
| Total | 0.02684637 | 0.016779 | 5 | | | |

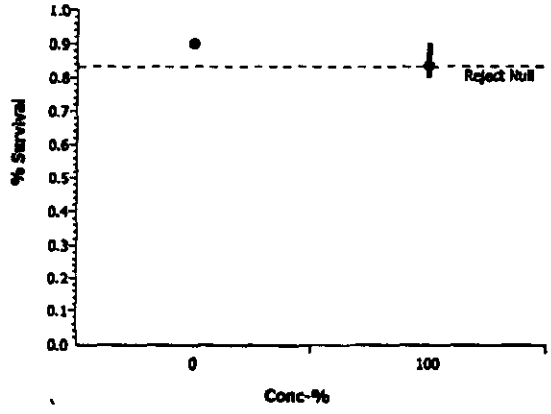
**ANOVA Assumptions**

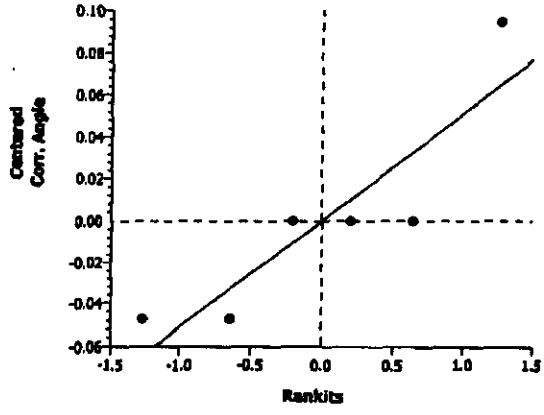
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2267528000 | 199.00000 | 0.00000 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.81374 | | 0.07784 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |
| 100 | | 3 | 0.83333 | 0.80000 | 0.90000 | 0.05774 | 1.15445 | 1.10715 | 1.24905 | 0.08192 |

**Graphics**



# CETIS Test Summary

Report Date: 16 Feb-06 3:00 PM
Test Link: 01-6976-7512/B154203cea

**Nematode 24 hour Acute test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 13-3323-9275 | **Test Type:** | Nematode Survival | **Duration:** | 24h |
| **Start Date:** | 13 Feb-06 08:30 AM | **Protocol:** | ASTM E2172-01 (2001) | **Species:** | Caenorhabditis elegans |
| **Ending Date:** | 14 Feb-06 08:30 AM | **Dil Water:** | | **Source:** | In-House Culture |
| **Setup Date:** | 13 Feb-06 08:30 AM | **Brine:** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 15-5457-5144 | **Code:** | B1542-03 | **Client:** | |
| **Sample Date:** | 14 Nov-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 91d 8h | **Station:** | | | |

**Comments:** J10DT8, E283101

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 05-2471-0884 | % Survival | < 100 | 100 | N/A | 6.07% | Equal Variance t Two-Sample |

**% Survival Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00000 | 0.00000 | 0.00% |
| 100 | | 3 | 0.73333 | 0.70000 | 0.80000 | 0.03333 | 0.05774 | 7.87% |

**% Survival Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 |
|---|---|---|---|---|
| 0 | Control Sed | 0.90000 | 0.90000 | 0.90000 |
| 100 | | 0.70000 | 0.80000 | 0.70000 |

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# CETIS Analysis Detail

| Nematode 24 hour Acute test | | | | | | CH2M Hill |
|---|---|---|---|---|---|---|
| **Endpoint** | **Analysis Type** | | **Sample Link** | **Control Link** | **Date Analyzed** | **Version** |
| % Survival | Comparison | | 01-6976-7512 | 01-6976-7512 | 16 Feb-06 3:00 PM | CETISv1.1.2 |

| Method | Alt H | Data Transform | Zeta | NOEL | LOEL | Toxic Units | ChV | PMSD |
|---|---|---|---|---|---|---|---|---|
| Equal Variance t Two-Sample | C > T | Angular (Corrected) | | <100 | 100 | | N/A | 6.07% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Control Sed | | 100 | 5.67000 | 2.13185 | 0.0024 | 0.08243 | Significant Effect |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0720895 | 0.072089 | 1 | 32.15 | 0.00477 | Significant Effect |
| Error | 0.0089694 | 0.002242 | 4 | | | |
| Total | 0.08105894 | 0.0743319 | 5 | | | |

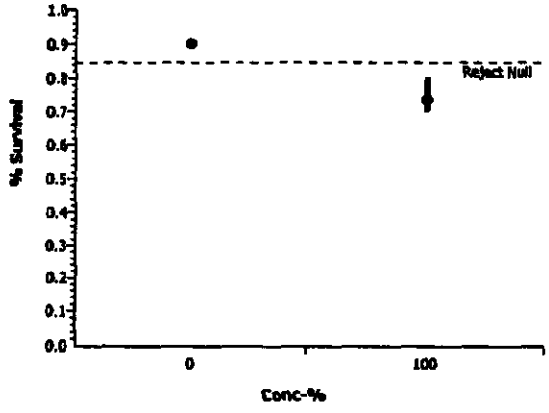
**ANOVA Assumptions**

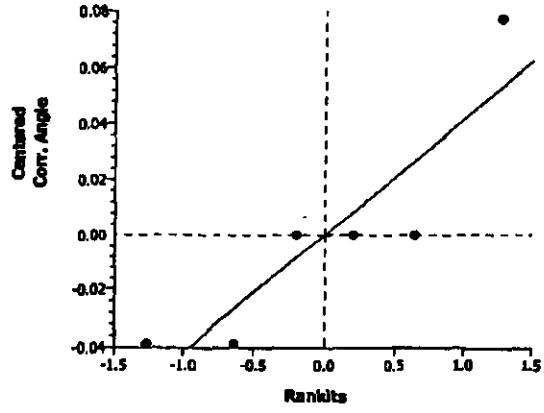
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 1515175000 | 199.00000 | 0.00000 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.81374 | | 0.07784 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |
| 100 | | 3 | 0.73333 | 0.70000 | 0.80000 | 0.05774 | 1.02982 | 0.99116 | 1.10715 | 0.06697 |

**Graphics**



# CETIS Test Summary

Report Date: 16 Feb-06 3:02 PM
Test Link: 10-6481-1341/B154204cea

**Nematode 24 hour Acute test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| **Test No:** | 04-3389-1423 | **Test Type:** | Nematode Survival | **Duration:** | 24h |
| **Start Date:** | 13 Feb-06 08:30 AM | **Protocol:** | ASTM E2172-01 (2001) | **Species:** | Caenorhabditis elegans |
| **Ending Date:** | 14 Feb-06 08:30 AM | **Dil Water:** | | **Source:** | In-House Culture |
| **Setup Date:** | 13 Feb-06 08:30 AM | **Brine:** | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Sample No:** | 09-5315-2344 | **Code:** | B1542-04 | **Client:** | |
| **Sample Date:** | 15 Nov-05 | **Material:** | Soil | **Project:** | |
| **Receive Date:** | | **Source:** | Hanford | | |
| **Sample Age:** | 90d 8h | **Station:** | | | |

**Comments:** J10DV2, E284601

**Comparison Summary**

| Analysis | Endpoint | NOEL | LOEL | ChV | PMSD | Method |
|---|---|---|---|---|---|---|
| 09-5921-2719 | % Survival | 100 | > 100 | N/A | 7.58% | Equal Variance t Two-Sample |

**% Survival Summary**

| Conc-% | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00000 | 0.00000 | 0.00% |
| 100 | | 3 | 0.83333 | 0.80000 | 0.90000 | 0.03333 | 0.05774 | 6.93% |

**% Survival Detail**

| Conc-% | Control Type | Rep 1 | Rep 2 | Rep 3 |
|---|---|---|---|---|
| 0 | Control Sed | 0.90000 | 0.90000 | 0.90000 |
| 100 | | 0.80000 | 0.80000 | 0.90000 |

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# CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Survival | Comparison | 10-6481-1341 | 10-6481-1341 | 16 Feb-06 3:02 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 | 7.58% |

**Group Comparisons**

| Control | vs | Conc-% | Statistic | Critical | P-Value | MSD | Decision(0.05) |
|---|---|---|---|---|---|---|---|
| Control Sed | | 100 | 2 | 2.13185 | 0.0581 | 0.10083 | Non-Significant Effect |

**ANOVA Table**

| Source | Sum of Squares | Mean Square | DF | F Statistic | P-Value | Decision(0.05) |
|---|---|---|---|---|---|---|
| Between | 0.0134232 | 0.013423 | 1 | 4.00 | 0.11612 | Non-Significant Effect |
| Error | 0.0134232 | 0.003356 | 4 | | | |
| Total | 0.02684637 | 0.016779 | 5 | | | |

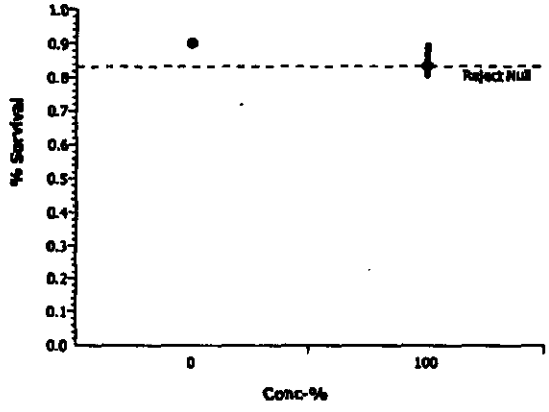
**ANOVA Assumptions**

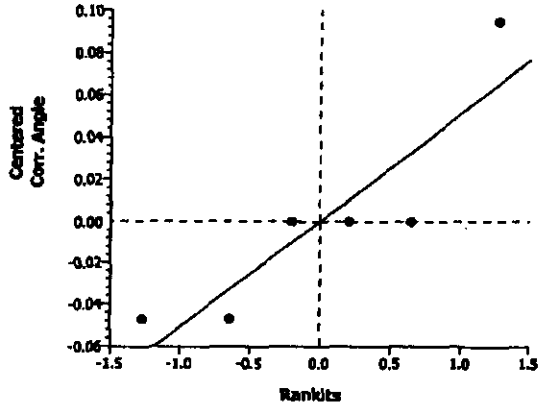
| Attribute | Test | Statistic | Critical | P-Value | Decision(0.01) |
|---|---|---|---|---|---|
| Variances | Variance Ratio F | 2267528000 | 199.00000 | 0.00000 | Unequal Variances |
| Distribution | Shapiro-Wilk W | 0.81374 | | 0.07784 | Normal Distribution |

**Data Summary**

| | | | Original Data | | | | Transformed Data | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Conc-% | Control Type | Count | Mean | Minimum | Maximum | SD | Mean | Minimum | Maximum | SD |
| 0 | Control Sed | 3 | 0.90000 | 0.90000 | 0.90000 | 0.00015 | 1.24905 | 1.24905 | 1.24905 | 0.00016 |
| 100 | | 3 | 0.83333 | 0.80000 | 0.90000 | 0.05774 | 1.15445 | 1.10715 | 1.24905 | 0.06192 |

**Graphics**



# WASHINGTON HANFORD CLOSURE CROSS REFERENCE

| DATE | SDG | CLIENT ID | SAMPLING LOCATION |
|---|---|---|---|
| 10/31/2005 | E2748 | J10DW4 | 600-131 |
| 11/08/2005 | E2801 | J10DV4 | PIT 23 |
| 11/14/2005 | E2831 | J10DT8 | Upland Backfill Elevated-100-F-2 |
| 11/15/2005 | E2846 | J10DV2 | Upland Native Reference-Central Plateau |
| 11/15/2005 | E2847 | J10DV1 | Upland Backfill Low-116-DR-1&2 |
| 11/16/2005 | E2857 | J10DV3 | Upland Native Elevated-JA Jones |
| 11/21/2005 | E2877 | J10DV0 | Riparian Elevated-Site # 3 Upriver 100-D |
| 11/28/2005 | E2897 | J10LJ5 | Riparian Low-Site # 10 Downriver 100-D |
| 12/06/2005 | E2953 | J10DT9 | Riparian Reference-Site # 13 Vernita Bridge |

# APPENDIX B
# REFERENCE TOXICANT DATA SHEETS

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client QA / QC — Beginning, Date 1-23-06 Time 1330

Sample Description Cu as $CuCl_2xH_2O$ Lab ID#: B 033-08 — Ending, Date 1-24-06 Time 11:30

Species: *Caenorhabditis elegans* ID#: Nem 065

Test Initiation: Tech: Tech: NJ Time: 1330 Test Termination: Tech: Tech: NJ Time: 1130

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

Comments:

| Endpoint | LC50 | Cusum Chart Limits |
|---|---|---|
| Survival | 98.2 | 52.3 to 120.1 |

Task Manager Natisha Johnson

Project Manager [signature]

QA Officer [signature]

CH2M ODE TOXICITY TEST SOIL QUALITY AND TEST CHAM R ASSIGNMENT DATA

Client QA / QC | Tech. 0 Hrs NJ | 24 Hrs NJ | Beginning, Date 1-23-06 | Time 1530

Sample Description see below | Time 0 Hrs 1330 | 24 Hrs 1130 | Ending, Date 1-24-06 | Time 1130

Test Speci *Caenorhabditis elegans* | ID#: Nem

| Lab ID | K-Medium pH | | % Moisture | Temperature (°C) | | Comments: |
|---|---|---|---|---|---|---|
| | 0 hr | 24 hr | 0 hr | 0 hr | 24 hr | |
| Lab Control | 5.5 | 5.7 | NA | 19.9 | | |
| 10 mg/L Cu | 5.2 | 5.0 | NA | 19.9 | | |
| 50 mg/L Cu | 5.2 | 4.8 | NA | 20.0 | | |
| 100 mg/L Cu | 5.1 | 4.8 | NA | 20.1 | | |
| 250 mg/L Cu | 4.8 | 4.~~8~~4 | NA | 20.1 | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Lab ID | Field ID | Replicate | Chamber # | Lab ID | Field ID | Replicate | Chamber # | Lab ID | Field ID | Replicate | Chamber # |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lab Control | K-medium | A | 15 | 250 mg/L Cu | | A | 7 | | | | |
| Lab Control | K-medium | B | 10 | 250 mg/L Cu | | B | 13 | | | | |
| Lab Control | K-medium | C | 4 | 250 mg/L Cu | | C | 8 | | | | |
| 10 mg/L Cu | | A | 5 | | | | | | | | |
| 10 mg/L Cu | | B | 14 | | | | | | | | |
| 10 mg/L Cu | | C | 1 | | | | | | | | |
| 50 mg/L Cu | | A | 2 | | | | | | | | |
| 50 mg/L Cu | | B | 3 | | | | | | | | |
| 50 mg/L Cu | | C | 6 | | | | | | | | |
| 100 mg/L Cu | | A | 11 | | | | | | | | |
| 100 mg/L Cu | | B | 9 | | | | | | | | |
| 100 mg/L Cu | | C | 12 | | | | | | | | |

# CETIS Test Summary

Report Date: 26 Jan-06 2:57 PM
Test Link: 18-9490-9699/rcaa005

**Nematode 24 hour Acute test** — **CH2M Hill**

| | | | | | |
|---|---|---|---|---|---|
| Test No: | 03-9544-7078 | Test Type: | Nematode Survival | Duration: | 22h |
| Start Date: | 23 Jan-06 01:30 PM | Protocol: | ASTM E2172-01 (2001) | Species: | Caenorhabditis elegans |
| Ending Date: | 24 Jan-06 11:30 AM | Dil Water: | | Source: | In-House Culture |
| Setup Date: | 23 Jan-06 01:30 PM | Brine: | | | |

| | | | | | |
|---|---|---|---|---|---|
| Sample No: | 13-1507-4495 | Material: | Copper | Client: | |
| Sample Date: | 23 Jan-06 | Code: | 1B033-08 | Project: | |
| Receive Date: | 26 Jan-06 02:55 PM | Source: | Reference Toxicant | | |
| Sample Age: | 14h | Station: | | | |

Comments: as CuSO4x5H2O

**Point Estimate Summary**

| Analysis | Endpoint | % Effect | Conc-mg/L | 95% LCL | 95% UCL | Method |
|---|---|---|---|---|---|---|
| 07-3093-8444 | % Survival | 50 | 98.16186 | 67.39882 | 142.9662 | Trimmed Spearman-Karber |

**% Survival Summary**

| Conc-mg/L | Control Type | Reps | Mean | Minimum | Maximum | SE | SD | CV |
|---|---|---|---|---|---|---|---|---|
| 0 | Dilution Water | 3 | 0.96667 | 0.90000 | 1.00000 | 0.03333 | 0.05774 | 5.97% |
| 10 | | 3 | 1.00000 | 1.00000 | 1.00000 | 0.00000 | 0.00000 | 0.00% |
| 50 | | 3 | 0.63333 | 0.60000 | 0.70000 | 0.03333 | 0.05774 | 9.12% |
| 100 | | 3 | 0.56667 | 0.50000 | 0.60000 | 0.03333 | 0.05774 | 10.19% |
| 250 | | 3 | 0.20000 | 0.00000 | 0.40000 | 0.11547 | 0.20000 | 100.00 |

**% Survival Detail**

| Conc-mg/L | Control Type | Rep 1 | Rep 2 | Rep 3 |
|---|---|---|---|---|
| 0 | Dilution Water | 1.00000 | 0.90000 | 1.00000 |
| 0 | | 1.00000 | 1.00000 | 1.00000 |
| 50 | | 0.60000 | 0.60000 | 0.70000 |
| 100 | | 0.60000 | 0.60000 | 0.50000 |
| 250 | | 0.00000 | 0.40000 | 0.20000 |

# CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

| Endpoint | Analysis Type | Sample Link | Control Link | Date Analyzed | Version |
|---|---|---|---|---|---|
| % Survival | Trimmed Spearman-Karber | 18-9490-9699 | 18-9490-9699 | 26 Jan-06 2:57 PM | CETISv1.1.1 |

**Spearman-Karber Options**

| Threshold Option | Lower Threshold | Trim | μ | σ |
|---|---|---|---|---|
| Control Threshold | 0.03333334 | 20.34% | 1.991943 | 0.08164523 |

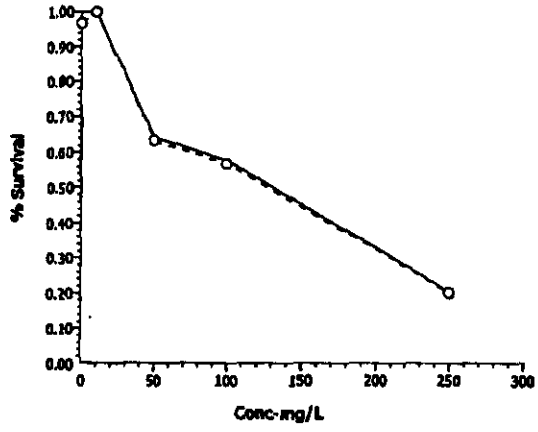
**Point Estimates**

| EC50/LC50 | 95% LCL | 95% UCL |
|---|---|---|
| 98.16186 | 67.39882 | 142.96620 |

**Data Summary**

| Conc-mg/ | Control Type | Count | Calculated Variate(A/B) Mean | Minimum | Maximum | SE | SD | A | B |
|---|---|---|---|---|---|---|---|---|---|
| 0 | Dilution Water | 3 | 0.96667 | 0.90000 | 1.00000 | 0.01179 | 0.05773 | 29 | 30 |
| 10 | | 3 | 1.00000 | 1.00000 | 1.00000 | 0.00000 | 0.00000 | 30 | 30 |
| 50 | | 3 | 0.63333 | 0.60000 | 0.70000 | 0.01179 | 0.05773 | 19 | 30 |
| 100 | | 3 | 0.56667 | 0.50000 | 0.60000 | 0.01179 | 0.05773 | 17 | 30 |
| 250 | | 3 | 0.20000 | 0.00000 | 0.40000 | 0.04082 | 0.20000 | 6 | 30 |

**Graphics**



# APPENDIX C
# CHAIN OF CUSTODY

E 2748

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-3 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>L. COLLOM | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH | Price Code 8L<br>Air Quality [ ] | Data Turnaround<br>45 Days |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>600-131 | | SAF No.<br>RC-051 | | |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment | | |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No. | | |

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*NONE*

**Special Handling and/or Storage**

*NONE*

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

11-1-05 LRC

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

**CHAIN OF POSSESSION** — **Sign/Print Names**

| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
|---|---|---|---|
| [signature] | 11-1-05 @ 1063 | [signature] | 11-1-05 10:3[illegible] |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**SPECIAL INSTRUCTIONS**

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-01

**Matrix ***

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

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

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

E 2801

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

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

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*NONE*

**Special Handling and/or Storage**

*NONE*

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | None | None | | | | | | | | | | |
| Type of Container | G/P | P/G | | | | | | | | | | |
| No. of Container(s) | 1 | 1 | | | | | | | | | | |
| Volume | 1000g | ~~3000g~~ 1000g | ST 11-8-5 | | | | | | | | | |
| SAMPLE ANALYSIS | See item (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 | | | | | | | | | | |

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J10DV4 | SOIL | 11-8-05 | 16:00 | 1 | 1 | | | | | | | | -1 |
| J10DV5 | SOIL | | | | | | | | | | | | |
| J10DV6 | SOIL | | | | | | | | | | | | |
| J10DV7 | SOIL | | | | | | | | | | | | |
| J10DV8 | SOIL | | | | | | | | | | | | |

| CHAIN OF POSSESSION | | Sign/Print Names | |
|---|---|---|---|
| Relinquished By/Removed From<br>Elizabeth M Tolfs | Date/Time<br>11-9-05 12:00 | Received By/Stored In<br>[signature] | Date/Time<br>11-9-05 12:30 |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

**SPECIAL INSTRUCTIONS**

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

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

J ST 11/10/05 As per Rich Weiss

Bioassay ID = B1542-02

Matrix *

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

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

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

E2P31

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-9 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>L. COLLOM | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH |
| Price Code 8L | Data Turnaround<br>45 Days | | |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>Upland Backfill Elevated-100-F-2 | | SAF No.<br>RC-051 |
| Air Quality | | | |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No. |

POSSIBLE SAMPLE HAZARDS/REMARKS

*Potentially Radioactive.*

Special Handling and/or Storage

*NONE*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | None | None | | | | | | | | | |
| Type of Container | G/P | P/G | | | | | | | | | |
| No. of Container(s) | 1 | 1 | | | | | | | | | |
| Volume | 1000g | 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 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J10DT8 | SOIL | 11/14/05 | 17:21 | 1 | 1 | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| CHAIN OF POSSESSION | | Sign/Print Names | |
|---|---|---|---|
| Relinquished By/Removed From<br>Elizabeth Tepper | Date/Time 11/15/05 11:20 | Received By/Stored In<br>Dayna Kaumann | Date/Time 11/15/05 11:01 |
| Relinquished By/Removed From<br>Elizabeth Tepper | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

SPECIAL INSTRUCTIONS

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-03

Matrix *

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

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

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

E 2846

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-15 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>L. COLLOM | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>Upland Native Reference-Central Plateau | | SAF No.<br>RC-051 |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No. |

Price Code 8L

Air Quality

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

*NONE*

Special Handling and/or Storage

*NONE*

SAMPLE ANALYSIS

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | | | | None | None | | | | | | | | |
| Type of Container | | | | G/P | P/G | | | | | | | | |
| No. of Container(s) | | | | 1 | 1 | | | | | | | | |
| Volume | | | | 1000g | 400g | | | | | | | | |
| SAMPLE ANALYSIS | | | | See item (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 | | | | | | | | |
| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
| J10DV2 | SOIL | 11-15-05 | 20:00 | 1 | 1 | | | | | | | | 1 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| CHAIN OF POSSESSION | | Sign/Print Names | |
|---|---|---|---|
| Relinquished By/Removed From<br>CH2M Hill<br>Elizabeth Tepper | Date/Time<br>14:30 | Received By/Stored In<br>NA | Date/Time |
| Relinquished By/Removed From<br>Elizabeth Tepper | Date/Time<br>11-16-05 | Received By/Stored In<br>Nancy Hansen CH2MHILL | Date/Time<br>11/16/05 14:31 |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

SPECIAL INSTRUCTIONS

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

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-04

Matrix *

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

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

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

E 2847

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-12 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>L. COLLOM | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>Upland Backfill Low-116-DR-1&2 | | SAF No.<br>RC-051 |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No. |

Price Code 8L — Air Quality

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

*NONE*

Special Handling and/or Storage

*NONE*

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | | | None | None | | | | | | | | |
| Type of Container | | | G/P | P/G | | | | | | | | |
| No. of Container(s) | | | 1 | 1 | | | | | | | | |
| Volume | | | 1000g | 4000g | | | | | | | | |
| SAMPLE ANALYSIS | | | See item (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 | | | | | | | | |
| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | |
| J10DV1 | SOIL | 11-15-05 | 2005 | 1 | 1 | | | | | | | -1 |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

| CHAIN OF POSSESSION | Sign/Print Names | | |
|---|---|---|---|
| Relinquished By/Removed From<br>CH2MHill<br>Elizabeth Tepper | Date/Time<br>14:30 | Received By/Stored In<br>NP | Date/Time |
| Relinquished By/Removed From<br>Elizabeth Tepper | Date/Time<br>11-16-05 | Received By/Stored In<br>Michael Lumsden CH2MHill | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time 11/16/05 14:31 |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

SPECIAL INSTRUCTIONS

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

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-05

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
L=Liquid
V=Vegetation
X=Other

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

BHI-EP-7011 (08/29/2005)

E2851

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-16 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>L. COLLOM | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>Upland Native Elevated-JA Jones | | SAF No.<br>RC-051 |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No. |

Price Code 8L

Air Quality

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

*NONE*

Special Handling and/or Storage

*NONE*

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

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J10DV3 | SOIL | 11/16/05 | 15:27 | 1 | 1 | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| CHAIN OF POSSESSION | | Sign/Print Names | |
|---|---|---|---|
| Relinquished By/Removed From<br>Elizabeth Tepper | Date/Time<br>11/17/05 10:00 | Received By/Stored In<br>NA | Date/Time |
| Relinquished By/Removed From<br>Elizabeth Tepper CH2MHill | Date/Time | Received By/Stored In<br>[illegible] | Date/Time<br>11-17-05 10:15 |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

SPECIAL INSTRUCTIONS

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

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-06

Matrix.*

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

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

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

E287

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-11 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>L. COLLOM | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH | Price Code 8L<br>Air Quality | Data Turnaround<br>45 Days |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>Riparian Elevated-Site #3 Upriver 100-D | | SAF No.<br>RC-051 | | |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment | | |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No. | | |

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*NONE*

**Special Handling and/or Storage**

*NONE*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | None | None | | | | | | | | | |
| Type of Container | G/P | P/G | | | | | | | | | |
| No. of Container(s) | 1 | 1 | | | | | | | | | |
| Volume | 1000g | ~~3000g~~ 4000g | RT 11-21-05 | | | | | | | | |
| SAMPLE ANALYSIS | See item (1) in Special Instructions. | Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172 | | | | | | | | | |

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J10DV0 | SOIL | 11-21-05 | 16:00 | 1 | 1 | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| CHAIN OF POSSESSION | | Sign/Print Names | |
|---|---|---|---|
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Elizabeth Tepper CH2MHill | | [illegible] | |
| Relinquished By/Removed From | Date/Time 9:30 | Received By/Stored In | Date/Time |
| Elizabeth Tepper | 11/22/05 | [illegible] | 11/22/05 |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time 9:01 |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

**SPECIAL INSTRUCTIONS**

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

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-07

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

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

BHI-EE-01 (9/29/2005)

E2897 E 397

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

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

POSSIBLE SAMPLE HAZARDS/REMARKS

*NONE*

Special Handling and/or Storage

*NONE*

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

CT 11-28-05

| Sample No. | Matrix * | Sample Date | Sample Time | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J10LJ5 | SOIL | 11-28-05 | ~~16:19~~ 16:19 | 1 | 1 | | | | | | | | -1 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | |

| CHAIN OF POSSESSION | Sign/Print Names | | |
|---|---|---|---|
| Relinquished By/Removed From<br>CH2MHILL Elizabeth Tepper | Date/Time<br>11-28-05 16:25 | Received By/Stored In<br>Nikky Buchan | Date/Time<br>11-28-05 16:25 |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

SPECIAL INSTRUCTIONS

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

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-08

Matrix *

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

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

BHI-EE-0 3/29/2005)

E2900 EZ 53

| Washington Closure Hanford | CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST | RC-051-6 | Page 1 of 1 |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Collector<br>L. COLLOM | Company Contact<br>JOAN KESSNER | Telephone No.<br>375-4688 | Project Coordinator<br>KESSNER, JH | Price Code 8L<br>Air Quality ☐ | Data Turnaround<br>45 Days |
| Project Designation<br>100 & 300 Area Component of the RCBRA - Incremental So | Sampling Location<br>Riparian Reference-Site #13 Vernita Bridge | | SAF No.<br>RC-051 | | |
| Ice Chest No. | Field Logbook No.<br>EL-1596 | COA<br>BESRAS6520 | Method of Shipment | | |
| Shipped To<br>CH2MHILL | Offsite Property No.<br>A060151 | | Bill of Lading/Air Bill No. | | |

**POSSIBLE SAMPLE HAZARDS/REMARKS**

*NONE*

**Special Handling and/or Storage**

*NONE*

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Preservation | None | None | | | | | | | | | |
| Type of Container | G/P | P/G | | | | | | | | | |
| No. of Container(s) | 1 | 1 | ET 12 | | | | | | | | |
| Volume | 1000g | ~~5000g~~ 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 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J10DT9 | SOIL | 12-6-05 | 16:00 | X | X | | | | | | | | -1 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |

| CHAIN OF POSSESSION | | Sign/Print Names | |
|---|---|---|---|
| Relinquished By/Removed From<br>Elizabeth Tepper | Date/Time | Received By/Stored In<br>CH2M Hill | Date/Time |
| Relinquished By/Removed From<br>Elizabeth M Tepper | Date/Time<br>12/6/05 16:00 | Received By/Stored In<br>[illegible] | Date/Time<br>12-6-05 16:15 |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |
| Relinquished By/Removed From | Date/Time | Received By/Stored In | Date/Time |

**SPECIAL INSTRUCTIONS**

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

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Bioassay ID = B1542-09

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

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

BHI-EE-0 (9/29/2005)

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

January 31, 2006

Washington Closure Hanford

334247.AO.ZZ

RE: Laboratory Report for Washington Closure Hanford
Applied Sciences Laboratory Reference No. E2831

Joan Kessner/WCH:

On November 15, 2005, 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 Elizabeth Tepper at (541) 758-0235, extension 3127.

Sincerely,

Elizabeth M Tepper

Elizabeth Tepper
Analytical Manager

Enclosures

RECEIVED
FEB 2006

## CLIENT SAMPLE CROSS-REFERENCE

## CH2M HILL Applied Sciences Laboratory Reference No. E2831

| Sample ID | Client Sample ID | Date Collected | Time Collected |
|---|---|---|---|
| E283101 | J10DT8 | 11/14/2005 | 17:21 |

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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.: E2831

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 334247.AO.Z Z

Project Name: Washington Closure Hanford 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 Tapper Date: 1/19/06

Reviewed by: Amber Taylor Date: 1/23/06

**SAMPLE DATA**
**SUMMARY**

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DT8

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E283101

Date Received: 11/15/05

| CAS No. | Analyte | MDL | PQL | Result | Q | Units | DF | Sample Amount | Analysis Method | Date Analyzed |
|---|---|---|---|---|---|---|---|---|---|---|
| 7664-41-7 | Ammonia-N | 0.507 | 1.90 | 1.14 | B | mg/kg | 1 | 1.0751 G | E350.3 | 11/29/05 |

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

**SB1-1129**

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1129

Date Received: / /

| CAS No. | Analyte | MDL | PQL | Result | Q | Units | DF | Sample Amount | Analysis Method | Date Analyzed |
|---|---|---|---|---|---|---|---|---|---|---|
| 7664-41-7 | Ammonia-N | 0.534 | 2.00 | 1.09 | B | mg/kg | 1 | 1 G | E350.3 | 11/29/05 |

# QC DATA
# SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 11/29/05 11:30

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112905NH3

| 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 | 149 | 1.0 | 95.1 | 10.0 | 39.9 | 100 | -13 | | | | | | |

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 11/29/05 11:30

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112905NH3

| Analyte | Curve Type | r | Q |
|---|---|---|---|
| Ammonia-N | LNR | 0.9999 | |

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112905NH3

Second Source ID: ICV-1129

| Analyte | Expected | Found | %D | Q |
|---|---|---|---|---|
| Ammonia-N | 1 | 1.07 | 7.0 | |
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Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112905NH3

Analytical Lot ID: 112905NH3

CCV #1 ID: CV1-1129 CCV #2 ID: CV2-1129 CCV #3 ID: CV3-1129

| Analyte | Expected | Found | %D | Q | Expected | Found | %D | Q | Expected | Found | %D | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonia-N | 0.1 | 0.0997 | -0.3 | | 1 | 0.989 | -1.1 | | 1 | 0.845 | -15.5 | |

COMMENTS:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-1129

SDG No.: E2831

Analysis Method: E350.3

Initial Cal ID: 112905NH3

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1129

Date Analyzed: 11/29/05

Time Analyzed: 1226

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

| | CLIENT SAMPLE ID | LAB SAMPLE ID | DATE ANALYZED | TIME ANALYZED |
|---|---|---|---|---|
| 04 | BS1S1129 | BS1S1129 | 11/29/05 | 1222 |
| 16 | J10DT8 | E283101 | 11/29/05 | 1317 |

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

LCS ID: BS1S1129

Initial Cal ID: 112905NH3

Date Analyzed: 11/29/05

Matrix: (Soil/Water) SOIL

Time Analyzed: 1222

Instrument: NONE

Concentration Units: mg/kg

| Analyte | Expected | Found | %R | QC Limits %R | Q |
|---|---|---|---|---|---|
| Ammonia-N | 20 | 21.4 | 107.2 | 80-120 | |

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 112905NH3

| | CLIENT SAMPLE ID | LAB SAMPLE ID | DATE ANALYZED | TIME ANALYZED |
|---|---|---|---|---|
| 01 | CV1-1129 | CV1-1129 | 11/29/05 | 1218 |
| 02 | CV2-1129 | CV2-1129 | 11/29/05 | 1218 |
| 04 | BS1S1129 | BS1S1129 | 11/29/05 | 1222 |
| 06 | SB1-1129 | SB1-1129 | 11/29/05 | 1226 |
| 16 | J10DT8 | E283101 | 11/29/05 | 1317 |
| 17 | CV3-1129 | CV3-1129 | 11/29/05 | 1328 |
| 25 | ICV-1129 | ICV-1129 | 11/29/05 | 1130 |

COMMENTS:

CH2MHILL
Applied Sciences Laboratory

CH2M HILL
Applied Sciences Labortory (ASL)
2300 NW Walnut Blvd.
P.O. Box 428
Corvallis, OR 97330-0428
Telephone: 541-752-4271
Fax: 541-752-0276

01/23/06

# MDL Study Report

Analytical Method: E350.3
Matrix: Soil

Instrument ID: NONE
Concentration Units: mg/kg

| Analyte | Analysis Date | Amt. Spiked | Replicates 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Std. Dev. | MDL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ammonia | 08/05/05 | 2 | 2.18 | 1.70 | 1.73 | 1.70 | 1.73 | 1.74 | 1.81 | | 0.170 | 0.534 |



ET060123-15:27-E2831-W

## ANIONS BY METHOD EPA300.0

# CASE NARRATIVE
## ANIONS

Analytical Method: EPA300.0 Batch No.: E2831

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 334247.AO.ZZ

Base/Command: Washington Closure 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: 1/26/06

Reviewed by: Date: 1/30/06

AFCEE FORM I-1

**SAMPLE DATA**
**SUMMARY**

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DT8

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E283101

Date Received: 11/15/05

| CAS No. | Analyte | MDL | PQL | Result | Q | Units | DF | Sample Amount | Analysis Method | Date Analyzed |
|---|---|---|---|---|---|---|---|---|---|---|
| 16887-00-6 | Chloride | 0.0318 | 0.654 | 2.22 | | mg/kg | 1 | 1.95 G | E300.0A | 11/23/05 |
| 16984-48-8 | Fluoride | 0.0284 | 0.654 | 0.222 | B | mg/kg | 1 | 1.95 G | E300.0A | 11/23/05 |
| 14797-55-8 | Nitrate-N | 0.0246 | 0.654 | 8.89 | | mg/kg | 1 | 1.95 G | E300.0A | 11/23/05 |
| 14797-65-0 | Nitrite-N | 0.0235 | 0.654 | 1.93 | | mg/kg | 1 | 1.95 G | E300.0A | 11/23/05 |
| 14808-79-8 | Sulfate | 0.0422 | 0.654 | 15.0 | | mg/kg | 1 | 1.95 G | E300.0A | 11/23/05 |

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-1123

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1123

Date Received: / /

| CAS No. | Analyte | MDL | PQL | Result | Q | Units | DF | Sample Amount | Analysis Method | Date Analyzed |
|---|---|---|---|---|---|---|---|---|---|---|
| 16887-00-6 | Chloride | 0.0121 | 0.250 | 0.0350 | B | mg/kg | 1 | 5 G | E300.0A | 11/23/05 |
| 16984-48-8 | Fluoride | 0.0109 | 0.250 | 0.250 | U | mg/kg | 1 | 5 G | E300.0A | 11/23/05 |
| 14797-55-8 | Nitrate-N | 0.00939 | 0.250 | 0.250 | U | mg/kg | 1 | 5 G | E300.0A | 11/23/05 |
| 14797-65-0 | Nitrite-N | 0.00898 | 0.250 | 0.250 | U | mg/kg | 1 | 5 G | E300.0A | 11/23/05 |
| 14808-79-8 | Sulfate | 0.0161 | 0.250 | 0.250 | U | mg/kg | 1 | 5 G | E300.0A | 11/23/05 |

# QC DATA SUMMARY

# GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 07/08/05 11:53

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-070805

| 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 | 0.0061 | 0.10 | 0.015 | 0.50 | 0.083 | 1.0 | 0.14 | 5.0 | 0.78 | 10.0 | 1.8 | | |
| Fluoride | | | 0.10 | 0.0031 | 0.50 | 0.050 | 1.0 | 0.13 | 5.0 | 1.0 | 10.0 | 2.3 | | |
| Nitrate-N | 0.020 | 0.010 | 0.10 | 0.034 | 0.50 | 0.17 | 1.0 | 0.36 | 5.0 | 2.1 | 10.0 | 4.7 | | |
| Nitrite-N | 0.020 | 0.0031 | 0.10 | 0.018 | 0.50 | 0.10 | 1.0 | 0.22 | 5.0 | 1.3 | 10.0 | 2.7 | | |
| Sulfate | 0.060 | 0.0066 | 0.30 | 0.028 | 1.5 | 0.15 | 3.0 | 0.30 | 15.0 | 1.7 | 30.0 | 3.7 | | |

# GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 07/08/05 11:53

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-070805

| Analyte | Curve Type | r | Q |
|---|---|---|---|
| Chloride | LNR | 0.9985 | |
| Fluoride | LNR | 0.9976 | |
| Nitrate-N | LNR | 0.9985 | |
| Nitrite-N | LNR | 0.9997 | |
| Sulfate | LNR | 0.9990 | |

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Instrument Name: ICQ

Concentration Units: MG/L

Initial Calibration ID: 300A-070805

Second Source ID: ICV-0708

| Analyte | Expected | Found | %D | Q |
|---|---|---|---|---|
| Chloride | 5 | 4.78 | -4.4 | |
| Fluoride | 5 | 5.21 | 4.1 | |
| Nitrate-N | 32.9 | 31.3 | -5.0 | |
| Nitrite-N | 2.86 | 3.13 | 9.5 | |
| Sulfate | 5 | 4.96 | -0.9 | |

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Instrument Name: ICQ

Concentration Units: MG/L

Initial Calibration ID: 300A-070805

Analytical Lot ID: 112305Q3

CCV #1 ID: CV1-1123 CCV #2 ID: CV2-1123 CCV #3 ID:

| Analyte | Expected | Found | %D | Q | Expected | Found | %D | Q | Expected | Found | %D | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Chloride | 5 | 4.54 | -9.2 | | 5 | 4.55 | -9.1 | | | | | |
| Fluoride | 5 | 4.51 | -9.7 | | 5 | 4.53 | -9.4 | | | | | |
| Nitrate-N | 5 | 4.85 | -3.0 | | 5 | 4.87 | -2.6 | | | | | |
| Nitrite-N | 5 | 5.12 | 2.3 | | 5 | 5.13 | 2.5 | | | | | |
| Sulfate | 15 | 14.6 | -2.6 | | 15 | 14.4 | -4.1 | | | | | |

COMMENTS:

# SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-1123

SDG No.: E2831

Analysis Method: E300.0A

Initial Cal ID: 300A-070805

Matrix: (Soil/Water) SOIL

Instrument: ICQ

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1123

Date Analyzed: 11/23/05

Time Analyzed: 1546

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

| | CLIENT SAMPLE ID | LAB SAMPLE ID | DATE ANALYZED | TIME ANALYZED |
|---|---|---|---|---|
| 15 | BS1S1123 | BS1S1123 | 11/23/05 | 1514 |
| 16 | BS2S1123 | BS2S1123 | 11/23/05 | 1535 |
| 24 | J10DT8 | E283101 | 11/23/05 | 1639 |

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS1S1123

Initial Cal ID: 300A-070805

Date Analyzed: 11/23/05

Matrix: (Soil/Water) SOIL

Time Analyzed: 1514

Instrument: ICQ

Concentration Units: MG/KG

| Analyte | Expected | Found | %R | QC Limits %R | Q |
|---|---|---|---|---|---|
| Chloride | 215 | 242 | 112.5 | 70-130 | |
| Fluoride | 306 | 269 | 87.9 | 70-130 | |
| Nitrate-N | 243 | 214 | 87.8 | 70-130 | |
| Sulfate | 314 | 223 | 71.1 | 70-130 | |

* Values outside of QC limits

Comments:

# GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2831

Analysis Method: E300.0A

Initial Cal ID: 300A-070805

Matrix: (Soil/Water) SOIL

Instrument: ICQ

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS2S1123

Date Analyzed: 11/23/05

Time Analyzed: 1535

Concentration Units: MG/KG

| Analyte | Expected | Found | %R | QC Limits %R | Q |
|---|---|---|---|---|---|
| Nitrite-N | 2.86 | 2.91 | 101.6 | 70-130 | |

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 300A-070805

| | CLIENT SAMPLE ID | LAB SAMPLE ID | DATE ANALYZED | TIME ANALYZED |
|---|---|---|---|---|
| 02 | LEVEL1 | LEVEL1 | 07/08/05 | 1049 |
| 03 | LEVEL2 | LEVEL2 | 07/08/05 | 1102 |
| 04 | LEVEL3 | LEVEL3 | 07/08/05 | 1115 |
| 05 | LEVEL4 | LEVEL4 | 07/08/05 | 1127 |
| 06 | LEVEL5 | LEVEL5 | 07/08/05 | 1140 |
| 07 | LEVEL6 | LEVEL6 | 07/08/05 | 1153 |
| 09 | ICV-0708 | ICV-0708 | 07/08/05 | 1218 |
| 10 | ICV-0708 | ICV-0708 | 07/08/05 | 1231 |
| 12 | ICV-0708 | ICV-0708 | 07/08/05 | 1421 |

COMMENTS: _____

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 112305Q3

| | CLIENT SAMPLE ID | LAB SAMPLE ID | DATE ANALYZED | TIME ANALYZED |
|---|---|---|---|---|
| 14 | CV1-1123 | CV1-1123 | 11/23/05 | 1503 |
| 15 | BS1S1123 | BS1S1123 | 11/23/05 | 1514 |
| 16 | BS2S1123 | BS2S1123 | 11/23/05 | 1535 |
| 19 | SB1-1123 | SB1-1123 | 11/23/05 | 1546 |
| 24 | J10DT8 | E283101 | 11/23/05 | 1639 |
| 29 | CV2-1123 | CV2-1123 | 11/23/05 | 1805 |

COMMENTS:

CH2MHILL
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Fax: 541-752-0276

01/27/06

# 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 |



YL060127-16:04-E2831-W

**PERCENT MOISTURE**
**ASTM D2216**

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

**J10DT8**

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E283101

Date Received: 11/15/05

| CAS No. | Analyte | MDL | PQL | Result | Q | Units | DF | Sample Amount | Analysis Method | Date Analyzed |
|---|---|---|---|---|---|---|---|---|---|---|
| MOISTURE | Moisture | 0.00 | 0.00 | 1.89 | | % | 1 | 25.6425 G | ASTM D2216 | 11/17/05 |

**PARTICLE SIZE**
**METHOD 422**

*Hanford*

**Particle Size**

493.3 **g sample used**

**Weight retained is the weight of material ON each sieve**

**ANALYST:** **KH** **11/17/2005**

| Lab I.D. | Client I.D. | Sieve # | Sieve Size (um) | Sieve Size (mm) | Weight Retained (g) | Weight Retained (%) | Cumulative Coarser (%) | Cumulative Finer (%) |
|---|---|---|---|---|---|---|---|---|
| E283101 | J10DT8 | 8 | 2362 | 2.362 | 0.00 | 0.00 | 0.00 | 100.00 |
| | | 16 | 1180 | 1.180 | 0.00 | 0.00 | 0.00 | 100.00 |
| | | 30 | 600 | 0.600 | 51.30 | 10.45 | 10.45 | 89.55 |
| | | 50 | 500 | 0.500 | 103.20 | 21.02 | 31.47 | 68.53 |
| | | 100 | 147 | 0.147 | 67.80 | 13.81 | 45.27 | 54.73 |
| | | 200 | 75 | 0.075 | 144.10 | 29.35 | 74.62 | 25.38 |
| | | 325 | 45 | 0.045 | 54.50 | 11.10 | 85.72 | 14.28 |
| | | pan | | | 70.10 | 14.28 | 100.00 | 0.00 |
| | | total | | | 491.0 | | | |



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Tel 541.752.4271 Fax 541.752.0276

**pH**
**METHOD SW9045C**

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DT8

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E283101

Date Received: 11/15/05

| CAS No. | Analyte | MDL | PQL | Result | Q | Units | DF | Sample Amount | Analysis Method | Date Analyzed |
|---|---|---|---|---|---|---|---|---|---|---|
| pH | pH | 0.00 | 0.00 | 7.97 | | pH | 1 | 20 G | SW9045C | 11/17/05 |

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

**SB1-1117**

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1117

Date Received: / /

| CAS No. | Analyte | MDL | PQL | Result | Q | Units | DF | Sample Amount | Analysis Method | Date Analyzed |
|---|---|---|---|---|---|---|---|---|---|---|
| pH | pH | 0.00 | 0.00 | 5.73 | | pH | 1 | 20 G | SW9045C | 11/17/05 |

**TKN**
**METHOD EPA 351.4**

**CASE NARRATIVE**
**TKN**

Analytical Method: EPA 351.4 Batch No.: E2831

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 334247.AO.Z Z

Project Name: Washington Closure Hanford 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 Tepper Date: 1/19/06

Reviewed by: Amber Taylor Date: 1/24/06

**SAMPLE DATA**
**SUMMARY**

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J10DT8

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E283101

Date Received: 11/15/05

| CAS No. | Analyte | MDL | PQL | Result | Q | Units | DF | Sample Amount | Analysis Method | Date Analyzed |
|---|---|---|---|---|---|---|---|---|---|---|
| 7727-37-9 | Total Kjeldahl Nitrogen as N | 21.3 | 102 | 710 | | mg/kg | 1 | 1.0035 G | E351.4 | 11/22/05 |

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

**SB1-1122**

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1122

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 | 21.0 | 100 | 68.5 | B | mg/kg | 1 | 1 G | E351.4 | 11/22/05 |

# QC DATA SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 11/22/05 13:00

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

| 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 | 148 | 20.0 | 93.9 | 200 | 40.0 | 2000 | -17 | | | | | | |

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 11/22/05 13:00

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

| Analyte | Curve Type | r | Q |
|---|---|---|---|
| Total Kjeldahl Nitrogen as N | LNR | 0.9998 | |

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

Second Source ID: ICV-1122

| Analyte | Expected | Found | %D | Q |
|---|---|---|---|---|
| Total Kjeldahl Nitrogen as N | 13.6 | 13.7 | 0.7 | |
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Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

Analytical Lot ID: 112205TKN

CCV #1 ID: CV1-1122 CCV #2 ID: CV2-1122 CCV #3 ID: CV3-1122

| Analyte | Expected | Found | %D | Q | Expected | Found | %D | Q | Expected | Found | %D | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Kjeldahl Nitrogen as N | 2 | 2.05 | 2.7 | | 20 | 19.7 | -1.6 | | 200 | 182 | -8.9 | |

COMMENTS: _____

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 112205TKN

Analytical Lot ID: 112205TKN

CCV #4 ID: CV4-1122 CCV #5 ID: CCV #6 ID:

| Analyte | Expected | Found | %D | Q | Expected | Found | %D | Q | Expected | Found | %D | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Kjeldahl Nitrogen as N | 20 | 19.1 | -4.5 | | | | | | | | | |

COMMENTS:

# SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-1122

SDG No.: E2831

Analysis Method: E351.4

Initial Cal ID: 112205TKN

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1122

Date Analyzed: 11/22/05

Time Analyzed: 1316

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

| | CLIENT SAMPLE ID | LAB SAMPLE ID | DATE ANALYZED | TIME ANALYZED |
|---|---|---|---|---|
| 05 | BS1S1122 | BS1S1122 | 11/22/05 | 1307 |
| 26 | J10DT8 | E283101 | 11/22/05 | 1443 |

COMMENTS: _____

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2831

Analysis Method: E351.4

Initial Cal ID: 112205TKN

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS1S1122

Date Analyzed: 11/22/05

Time Analyzed: 1307

Concentration Units: mg/kg

| Analyte | Expected | Found | %R | QC Limits %R | Q |
|---|---|---|---|---|---|
| Total Kjeldahl Nitrogen as N | 680 | 685 | 100.6 | 75-125 | |

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 112205TKN

| | CLIENT SAMPLE ID | LAB SAMPLE ID | DATE ANALYZED | TIME ANALYZED |
|---|---|---|---|---|
| 01 | CV1-1122 | CV1-1122 | 11/22/05 | 1304 |
| 02 | CV1-1122 | CV2-1122 | 11/22/05 | 1304 |
| 03 | ICV-1122 | ICV-1122 | 11/22/05 | 1307 |
| 05 | BS1S1122 | BS1S1122 | 11/22/05 | 1307 |
| 07 | SB1-1122 | SB1-1122 | 11/22/05 | 1316 |
| 18 | CV3-1122 | CV3-1122 | 11/22/05 | 1358 |
| 26 | J10DT8 | E283101 | 11/22/05 | 1443 |
| 27 | CV4-1122 | CV4-1122 | 11/22/05 | 1447 |

COMMENTS: _____

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01/19/06

# 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 | 03/17/05 | 100 | 100 | 109 | 113 | 103 | 101 | 116 | 99.8 | | 6.66 | 21.0 |

# TOTAL ORGANIC CARBON BY METHOD SW9060

# CASE NARRATIVE
# TOC SOIL

CLIENT/PROJECT: Washington Closure Hanford

LABORATORY: CH2M HILL Applied Sciences Laboratory PROJECT NO.: 334247.AO.ZZ

SDG NO: E2831

LAB CODE: CVO LAB BATCH NO: E2831

I. RECEIPT

A. Date Received:
November 15, 2005

B. Sample Information:

| LAB SAMPLE ID | CLIENT SAMPLE ID | SAMPLE MATRIX | DATE SAMPLED | DATE ANALYZED |
|---|---|---|---|---|
| E280101 | J10DT8 | Soil | 11/14/2005 | 11/16/2005 |

II. Holding Times:
All holding times were met.

III. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike Sample(s):
Analysis performed in accordance with standard operating procedure.

D. Duplicate Sample(s):
Analysis performed in accordance with standard operating procedure.

E. Lab Control Sample(s):
All acceptance criteria were met.

F. Other:
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: 1-24-06

Reviewed By : _____ DATE: 1/24/06

# SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

**J10DT8**

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: E283101

Date Received: 11/15/05

| CAS No. | Analyte | MDL | PQL | Result | Q | Units | DF | Sample Amount | Analysis Method | Date Analyzed |
|---|---|---|---|---|---|---|---|---|---|---|
| TOC | Total Organic Carbon | 97.5 | 279 | 11000 | | mg/kg | 1 | 0.3584 G | SW9060 | 11/16/05 |

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-1116

SDG No.: E2831

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-1116

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 | SW9060 | 11/16/05 |

# QC SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

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 | | | | |

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

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 | |
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2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

Second Source ID: ICV-1014

| Analyte | Expected | Found | %D | Q |
|---|---|---|---|---|
| Total Organic Carbon | 6430 | 6680 | 3.9 | |
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Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

Analytical Lot ID: 111605TOCS

CCV #1 ID: CV1-1116 CCV #2 ID: CV2-1116 CCV #3 ID:

| Analyte | Expected | Found | %D | Q | Expected | Found | %D | Q | Expected | Found | %D | Q |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Organic Carbon | 4000 | 3910 | -2.3 | | 4000 | 4290 | 7.2 | | | | | |

COMMENTS:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-1116

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

Lab Sample ID: SB1-1116

Initial Cal ID: 101405S1

Date Analyzed: 11/16/05

Matrix: (Soil/Water) SOIL

Time Analyzed: 1002

Instrument: TOC Skalar

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

| | CLIENT SAMPLE ID | LAB SAMPLE ID | DATE ANALYZED | TIME ANALYZED |
|---|---|---|---|---|
| 02 | BS1S1116 | BS1S1116 | 11/16/05 | 0946 |
| 08 | J10DT8 | E283101 | 11/16/05 | 1100 |

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: E2831

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: SW9060

LCS ID: BS1S1116

Initial Cal ID: 101405S1

Date Analyzed: 11/16/05

Matrix: (Soil/Water) SOIL

Time Analyzed: 0946

Instrument: TOC Skalar

Concentration Units: mg/kg

| Analyte | Expected | Found | %R | QC Limits %R | Q |
|---|---|---|---|---|---|
| Total Organic Carbon | 6430 | 6660 | 103.6 | 80-120 | |

* Values outside of QC limits

Comments: