0070435

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

COMPLETE COPY OF DATA PACKAGE TO:

Jill Thomson	H0-23	KW 7/26/06 INITIAL/DATE
Jackie Queen	H0-23	KW 7/26/06 INITIAL/DATE
Jeanette Duncan	H9-02	KW 7/26/06 INITIAL/DATE

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EDMC

COMMENTS:

SDG F1886 SAF-RC-051

Rad only X Chem only Rad & Chem

X Complete Partial

Waste Site: 116-N-3

RECEIVED
JUL 2006

BIOASSAY REPORT
ACUTE SCREENING BIOASSAYS
Conducted May 31 through June 1, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD
RICHLAND, WASHINGTON

Prepared by

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June 13, 2006
Lab I.D. Nos. BN1599-01 thru -05
SDG Number BN1599

RC-051
F1886

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INTRODUCTION

CH2M HILL conducted acute screening bioassay tests using the nematode (*Caenorhabditis elegans*) on soil samples provided by the ELR Consulting for the Washington Closure Hanford project, Richland, Washington. The tests were conducted from May 31 through June 1, 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 May 16 through 22, 2006. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

SAMPLE CROSS-REFERENCE TABLE

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

Table 1
Sample Cross-Reference

Client ID	Sample Date	Sample Location	Nematode test SDG	Analytical Lab SDG
J11K97	05/17/2006	McGEE RANCH	BN1599-01	F1793
J11JT6	05/22/2006	1607-H2	BN1599-02	F1816
J11JV2	05/22/2006	116-N-3	BN1599-03	F1886
J11K10	05/16/2006	BORROW PIT 18	BN1599-04	F1779
J11K04	05/17/2006	BORROW PIT 14	BN1599-05	F1788

SAMPLE PREPARATION

Test soils and control soil were dried and homogenized prior to use. For each replicate, 2.33 g dry weight of soil was added to each test chamber. The soils were then hydrated to 40 percent of the dry weight by addition of hydration water (0.93 ml) and test chambers were then covered. In addition, 23.3 g of soil was added to a surrogate chamber and hydrated to provide for pH measurements. All test chambers were allowed to equilibrate at test conditions for seven days prior to test initiation.

TEST INITIATION

Tests were initiated by the addition of 10 test organisms to each test chamber. Organisms were added to test chambers in random order.

TEST TERMINATION

Tests were terminated after 24 hours. The contents of the test chambers were added to a centrifuge tube, 10 ml of Ludox-AM silica solution added, and each tube was hand shaken to suspend the nematodes into the Ludox solution. The tubes were then centrifuged to concentrate the soil and the supernatant transferred to a 15 cm petri dish and allowed to sit for 15 minutes. The petri dish was then placed under a dissecting microscope and the nematodes were retrieved and inspected. The recovered test organisms were recorded as alive (responded with independent movement to tactile stimulation) or dead. Missing or un-recovered test organisms are scored as dead during data analysis.

TEST ACCEPTABILITY CRITERIA

The test must meet the following two test acceptability criteria to be considered valid:

- A minimum of 80 percent of test organisms must be recovered, both in the control and each test concentration tested.
- The controls must achieve a minimum 90 percent survival.

MONITORING OF BIOASSAYS

The soil pH was measured from surrogate test chambers at test initiation. Temperature was monitored in the test incubator at test initiation and termination.

DATA ANALYSIS

The endpoints measured during the nematode test included survival over the 24 hour exposure period. The statistical analyses performed were those outlined in *Standard Guide for Conducting Laboratory Soil Toxicity Tests with the Nematode Caenorhabditis elegans*, ASTM E 2172-01, using CETIS version 1.1.2. Equal Variance t Two-Sample Test was used to compare the survival data between the control and each test soil. When the assumptions of normality or homogeneity of variance necessary for Equal variance t Two-Sample Test could not be met, Unequal Variance t Two-Sample Test was used to analyze the data.

RESULTS AND DISCUSSION

ACUTE RESULTS

Table 2 summarizes the survival data for the nematode acute test initiated on May 11, 2006.

Table 2
***Caenorhabditis elegans* Results**
Test initiated on May 11, 2006

Client ID	Percent Survival	Percent Recovered
Control	93.3	100
J11K97	90.0	90.0
J11JT6	76.7 [a]	83.3
J11JV2	63.3 [a]	80.0
J11K10	76.7 [a]	86.7
J11K04	96.7	96.7

[a] Indicates a statistically significant reduction from control at p equal to 0.05 using Equal Variance t Two-Sample test.

The nematode results indicated no statistically significant reduction in survival in the J11K97 and J11K04 samples when compared to the control.

The nematode results indicated a statistically significant reduction in survival in the J11JT6, J11JV2, and J11K10 samples when compared to the control.

Test acceptability criteria was met with control survival of 90.0 percent and recovery of test organisms was greater than 80 percent in all test concentrations.

Test temperatures remained at 20±1°C. The tests proceeded without interruption or incidents that could have affected test results.

REFERENCE TOXICANT TEST

The results of the reference toxicant test conducted in May with cupric chloride indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1994). The LC_{50} value and control chart limits are listed in the table below.

Table 4
Chronic Reference Toxicant Tests (ug/L)

Species (test)	LC_{50}	Control Chart Limits
Caenorhabditis elegans (survival)	110	41 to 125

CERTIFICATION STATEMENT

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

APPENDIX A
RAW DATA SHEETS

CH2M HILL *TOXICITY TEST ORGANISM AND WATER QUALITY DATA*

Client: ELR - Washington Closure Hanford — Test Initiation: Date 5-31-06 — Test Termination: Date 6-1-06

Contact: — Technician: NS

Test Species/ID: *Caenorhabditis elegans* / Nem 015 / /

Sample Information								Test Species Information	ID# Nem 015	ID#	ID#	ID#
Sample ID Number	Field ID	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Dechlor.	Ammonia NH_3-N mg/l	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$		Acute			
								Organism Age at Initiation	4 days			
BN1599-01	J11K97	5-17-06	-	- / -	-	-	-		—			
BN1599-02	J11JT6	5-22-06	-	- / -	-	-	-	Test Container Size	15 mm petri			
BN1599-03	J11JV2	5-23-06	-	- / -	-	-	-	Test Volume	2.33 g dry wt.			
BN1599-04	J11K10	5-16-06	-	- / -	-	-	-	Feeding: Type	none			
BN1599-05	J11K04	5-17-06	-	- / -	-	-	-	Amount	—			
				/				Aeration: Began	none			
				/				Amount	—			
				/				Matrix	NGA			
				/				Acclimation Period	4 days			
				/				Test Location	#7			
				/				Organism Source	In-house			
				/				Size (mm)	-	-	-	-
				/				Loading Rate	-	-	-	-

Dilution Water	ID#	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$	Initial pH
Milli-Q equivalent Water	NA	0	0	NA

Comments: ☑ Indicates the following action was taken, (☐ Indicates action not taken):

Water Quality Meters Used/ID#

Dissolved Oxygen #2 pH #3 Conductivity #2

CH2M HILL NEMATODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client ELR - Washington Closure Hanford
Sample Description see below
Test Species *Caenorhabditis elegans* ID#: Nem 015

Tech. 0 Hrs NJ 24 Hrs NJ
Time 0 Hrs 0845 24 Hrs 1130

Beginning, Date 5-31-06 Time 0845
Ending, Date 6-1-06 Time 1130

Lab ID	Soil pH 0 hr	Soil pH 24 hr	Soil % Moisture 0 hr	Soil Temperature (°C) 0 hr	Soil Temperature (°C) 24 hr	Comments:
Lab Control	7.1			19.8	21.9	Each test chamber has 2.33 g dry wt. soil + 0.93 ml Milli-Q water (40% of dry wt.).
BN1599-01	7.6			19.8	21.9	Samples hydrated 7 days prior to test initiation.
BN1599-02	7.8			19.8	21.9	
BN1599-03	7.6			19.8	21.9	All test soils were dried during sampling process.
BN1599-04	7.8			19.8	21.9	
BN1599-05	7.9			19.8	21.9	

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	Silica Sand	A	10	BN1599-04	J11K10	A	16				
Lab Control	Silica Sand	B	12	BN1599-04	J11K10	B	4				
Lab Control	Silica Sand	C	18	BN1599-04	J11K10	C	6				
BN1599-01	J11K97	A	1	BN1599-05	J11K04	A	2				
BN1599-01	J11K97	B	9	BN1599-05	J11K04	B	14				
BN1599-01	J11K97	C	5	BN1599-05	J11K04	C	13				
BN1599-02	J11JT6	A	15								
BN1599-02	J11JT6	B	17								
BN1599-02	J11JT6	C	11								
BN1599-03	J11JV2	A	3								
BN1599-03	J11JV2	B	7								
BN1599-03	J11JV2	C	8								

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client: ELR - Washington Closure Hanford
Sample Description: Lab ID#: BN1599
Test Species: *Caenorhabditis elegans* ID#: Nem 015

Beginning, Date: 5-31-06 Time: 0845
Ending, Date: 6-1-06 Time: 1130

Test Initiation: Tech: Tech: NJ Time: 0845

Test Termination: Tech: Tech: NJ Time: 1130

Chamber Number	Start Count 0	# alive found 24 hr	total # found 24 hr	Comments:
1	10	9	9	
2	10	10	10	
3	10	5	8	
4	10	8	8	
5	10	9	9	
6	10	8	10	
7	10	7	8	
8	10	7	8	
9	10	9	9	
10	10	9	10	
11	10	8	8	
12	10	9	10	
13	10	9	9	
14	10	10	10	
15	10	7	8	

Chamber Number	Start Count 0	# alive found 24 hr	total # found 24 hr	Comments:
16	10	7	8	
17	10	8	9	
18	10	10	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: 02 Jun-06 10:30 AM
Test Link: 16-7857-1224/B159901cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	11-9993-9017	**Test Type:**	Nematode Survival	**Duration:**	27h
Start Date:	31 May-06 08:45 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	01 Jun-06 11:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	31 May-06 08:45 AM	**Brine:**			

Sample No:	06-1725-9520	**Code:**	B1599-01	**Client:**	
Sample Date:	17 May-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	14d 8h	**Station:**			

Comments: J11K97

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
16-8996-4680	% Survival	100	> 100	N/A	7.84%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.90000	0.90000	0.90000	0.00000	0.00000	0.00%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Artificial Soil/S	0.90000	0.90000	1.00000
100		0.90000	0.90000	0.90000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	16-7857-1224	16-7857-1224	02 Jun-06 10:30 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	7.84%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1	2.13185	0.1870	0.11581	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0044266	0.004427	1	1.00	0.37390	Non-Significant Effect
Error	0.0177062	0.004427	4			
Total	0.02213278	0.0088531	5			

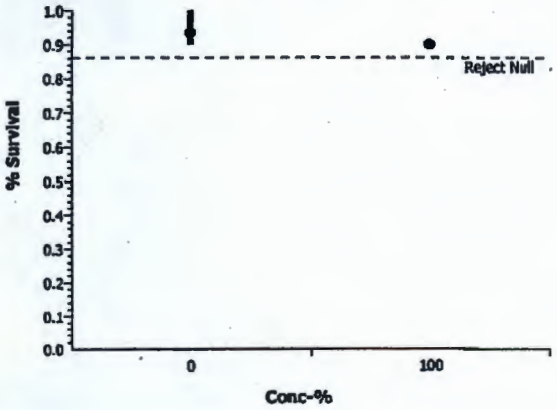
ANOVA Assumptions

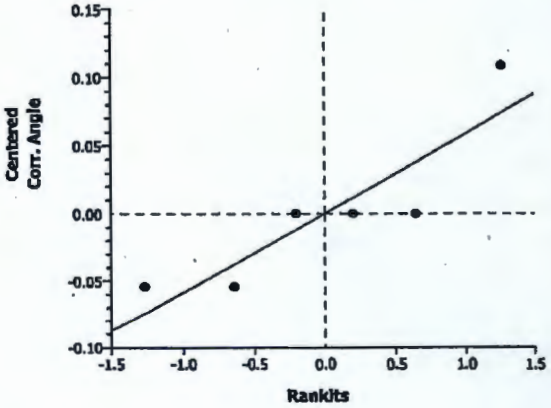
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2991045000	199.00000	0.00000	Unequal Variances
Distribution	Shapiro-Wilk W	0.81374		0.07784	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.90000	0.90000	0.90000	0.00015	1.24905	1.24905	1.24905	0.00016

Graphics





CETIS Test Summary

Report Date: 02 Jun-06 10:32 AM
Test Link: 00-6816-4943/B159902cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	05-2338-7953	**Test Type:**	Nematode Survival	**Duration:**	27h
Start Date:	31 May-06 08:45 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	01 Jun-06 11:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	31 May-06 08:45 AM	**Brine:**			

Sample No:	02-3220-5478	**Code:**	B1599-02	**Client:**	
Sample Date:	22 May-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	9d 8h	**Station:**			

Comments: J11JT6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
12-4573-2893	% Survival	< 100	100	N/A	9.85%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.76667	0.70000	0.80000	0.03333	0.05774	7.53%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Artificial Soil/S	0.90000	0.90000	1.00000
100		0.70000	0.80000	0.80000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	00-6816-4943	00-6816-4943	02 Jun-06 10:32 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	9.85%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.52267	2.13185	0.0122	0.14215	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0827561	0.082756	1	12.41	0.02439	Significant Effect
Error	0.0266757	0.006669	4			
Total	0.1094318	0.0894250	5			

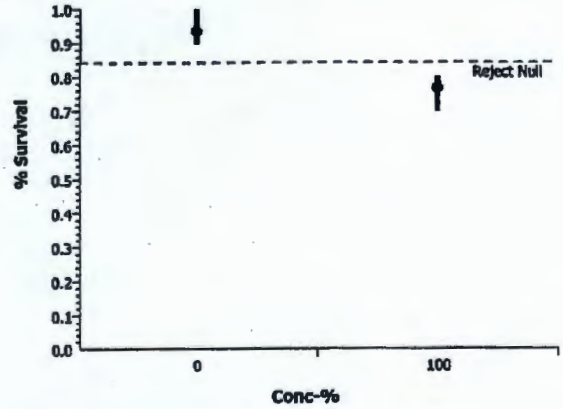
ANOVA Assumptions

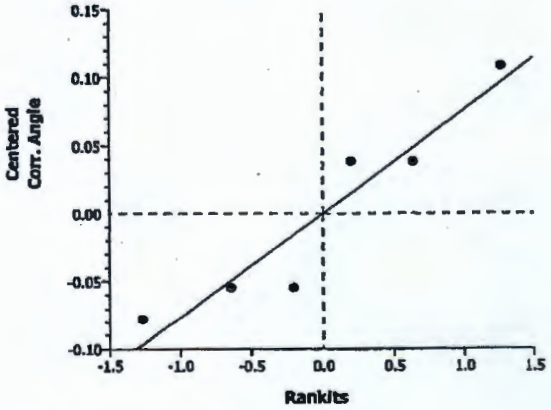
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.97406	199.00000	0.67248	Equal Variances
Distribution	Shapiro-Wilk W	0.88773		0.30647	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.76667	0.70000	0.80000	0.05774	1.06848	0.99116	1.10715	0.06697

Graphics





CETIS Test Summary

Report Date: 02 Jun-06 10:36 AM
Test Link: 14-8643-4508/B159903cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	13-1262-6860	**Test Type:**	Nematode Survival	**Duration:**	27h
Start Date:	31 May-06 08:45 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	01 Jun-06 11:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	31 May-06 08:45 AM	**Brine:**			

Sample No:	08-6739-4160	**Code:**	B1599-03	**Client:**	
Sample Date:	23 May-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	8d 8h	**Station:**			

Comments: J11JV2

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
06-8910-5519	% Survival	< 100	100	N/A	13.46%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
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	Artificial Soil/S	0.90000	0.90000	1.00000
100		0.50000	0.70000	0.70000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	14-8643-4508	14-8643-4508	02 Jun-06 10:36 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	13.46%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.35231	2.13185	0.0061	0.18652	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.2175116	0.217512	1	18.94	0.01214	Significant Effect
Error	0.0459306	0.011483	4			
Total	0.26344214	0.2289942	5			

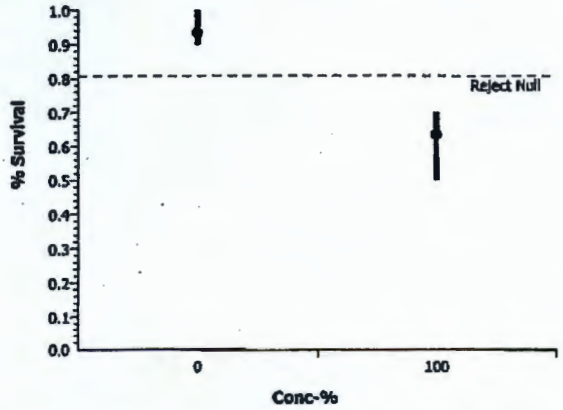
ANOVA Assumptions

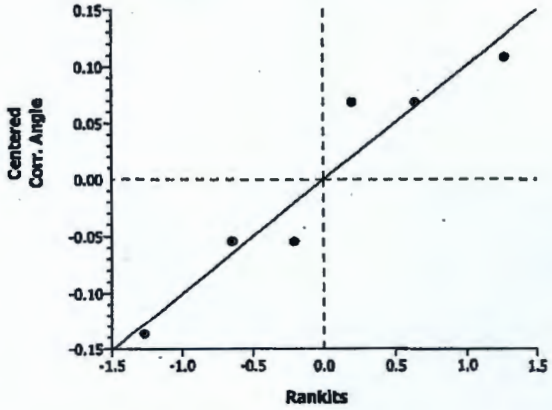
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.59404	199.00000	0.77100	Equal Variances
Distribution	Shapiro-Wilk W	0.90078		0.37854	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.63333	0.50000	0.70000	0.11547	0.92257	0.78540	0.99116	0.11879

Graphics





CETIS Test Summary

Report Date: 02 Jun-06 10:43 AM
Test Link: 02-8358-7803/B159904cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	01-5524-4982	**Test Type:**	Nematode Survival	**Duration:**	27h
Start Date:	31 May-06 08:45 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	01 Jun-06 11:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	31 May-06 08:45 AM	**Brine:**			

Sample No:	20-5853-9946	**Code:**	B1599-04	**Client:**	
Sample Date:	16 May-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	15d 8h	**Station:**			

Comments: J11K10

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
07-3563-5274	% Survival	< 100	100	N/A	9.85%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.76667	0.70000	0.80000	0.03333	0.05774	7.53%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Artificial Soil/S	0.90000	0.90000	1.00000
100		0.70000	0.80000	0.80000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	02-8358-7803	02-8358-7803	02 Jun-06 10:37 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	9.85%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.52267	2.13185	0.0122	0.14215	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0827561	0.082756	1	12.41	0.02439	Significant Effect
Error	0.0266757	0.006669	4			
Total	0.1094318	0.0894250	5			

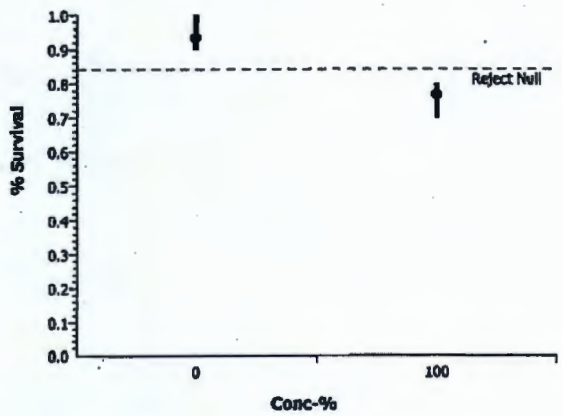
ANOVA Assumptions

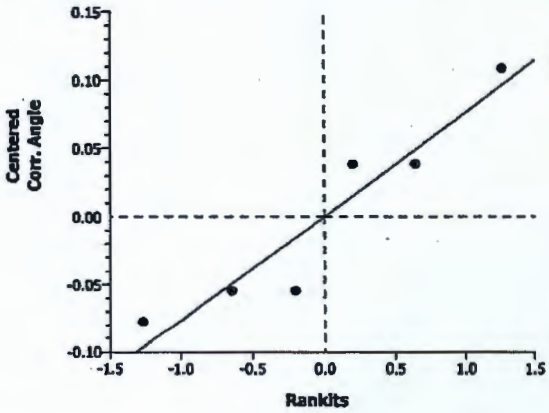
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.97406	199.00000	0.67248	Equal Variances
Distribution	Shapiro-Wilk W	0.88773		0.30647	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.76667	0.70000	0.80000	0.05774	1.06848	0.99116	1.10715	0.06697

Graphics





CETIS Test Summary

Report Date: 02 Jun-06 10:39 AM
Test Link: 17-0467-7544/B159905cea

Nematode 24 hour Acute test — **CH2M Hill**

Test No:	04-2289-8565	**Test Type:**	Nematode Survival	**Duration:**	27h
Start Date:	31 May-06 08:45 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	01 Jun-06 11:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	31 May-06 08:45 AM	**Brine:**			

Sample No:	04-8677-6720	**Code:**	B1599-05	**Client:**	
Sample Date:	17 May-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	14d 8h	**Station:**			

Comments: J11K04

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
09-0333-7347	% Survival	100	> 100	N/A	11.57%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.96667	0.90000	1.00000	0.03333	0.05774	5.97%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Artificial Soil/S	0.90000	0.90000	1.00000
100		1.00000	1.00000	0.90000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	17-0467-7544	17-0467-7544	02 Jun-06 10:39 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	11.57%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.7071	2.13185	0.7407	0.16378	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0044266	0.004427	1	0.50	0.51852	Non-Significant Effect
Error	0.0354124	0.008853	4			
Total	0.039839	0.0132797	5			

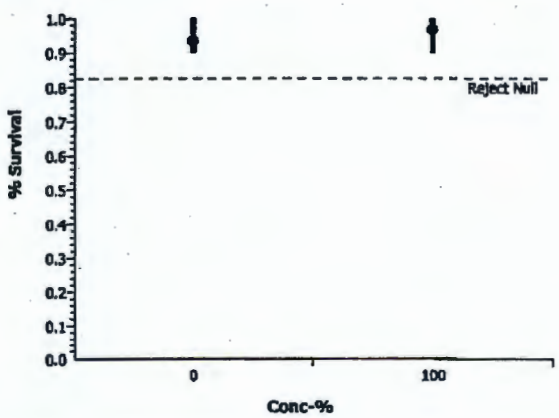
ANOVA Assumptions

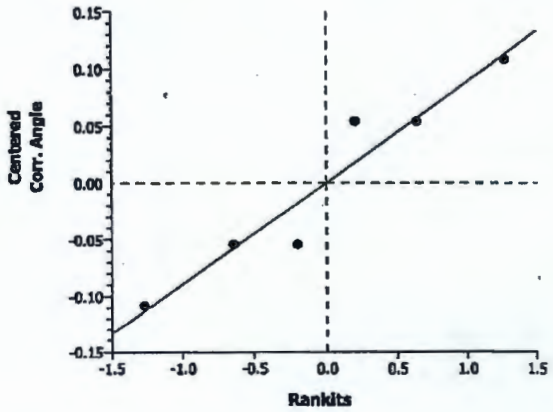
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00000	199.00000	1.00000	Equal Variances
Distribution	Shapiro-Wilk W	0.91291		0.45579	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.96667	0.90000	1.00000	0.05773	1.35769	1.24905	1.41202	0.09409

Graphics





APPENDIX B
REFERENCE TOXICANT DATA SHEETS

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client QA / QC

Sample Description Cu as $CuCl_2xH_2O$ Lab ID#: B>48-05

Test Species: *Caenorhabditis elegans* ID#: Nem 014

Beginning, Date 5-18-06 Time 0900

Ending, Date 5-19-06 Time ~~0945~~ 0920 NJ

Test Initiation: Tech: Tech: NJ Time: 0900

Test Termination: Tech: Tech: NJ / B Time: 0920

Chamber Number	Start Count 0	# alive found 24 hr	total # found 24 hr
1	10	0	10
2	10	2	10
3	10	10	10
4	10	8	10
5	10	6	10
6	10	7	10
7	10	0	10
8	10	9	10
9	10	~~9~~ 10	10
10	10	7	10
11	10	10	10
12	10	9	10
13	10	10	10
14	10	9	10
15	10	10	10

Comments:

Endpoint	LC50	Cusum Chart Limits
Survival	110 mg/L	41 to 125

Task Manager

Project Manager

QA Officer

CH2M HILL NEMATODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client QA / QC
Sample Description see below
Test Species *Caenorhabditis elegans* ID#: Nem 014

Tech. 0 Hrs NJ 24 Hrs NJ / BW
Time 0 Hrs 0900 24 Hrs 0920

Beginning, Date 5-18-06 Time 0900
Ending, Date 5-19-06 Time 0920

Lab ID	K-Medium pH		% Moisture	Temperature (°C)		Comments:
	0 hr	24 hr	0 hr	0 hr	24 hr	
Lab Control	6.6		NA	21.3	20.8	
10 mg/L Cu	5.5		NA	21.3	20.8	
50 mg/L Cu	5.4		NA	21.3	20.8	
100 mg/L Cu	5.2		NA	21.3	20.8	
250 mg/L Cu	5.0		NA	21.3	20.8	

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	K-medium	A	9	250 mg/L Cu		A	7				
Lab Control	K-medium	B	3	250 mg/L Cu		B	1				
Lab Control	K-medium	C	15	250 mg/L Cu		C	2				
10 mg/L Cu		A	13								
10 mg/L Cu		B	11								
10 mg/L Cu		C	14								
50 mg/L Cu		A	10								
50 mg/L Cu		B	12								
50 mg/L Cu		C	8								
100 mg/L Cu		A	5								
100 mg/L Cu		B	6								
100 mg/L Cu		C	4								

CETIS Test Summary

Report Date: 19 May-06 11:18 AM
Test Link: 17-1623-5361/rcea014

Nematode 24 hour Acute test — CH2M Hill

Test No:	10-9243-8639	Test Type:	Nematode Survival	Duration:	24h
Start Date:	18 May-06 09:00 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	19 May-06 09:20 AM	Dil Water:		Source:	In-House Culture
Setup Date:	18 May-06 09:00 AM	Brine:			

Sample No:	15-1457-1183	Code:	1B048-05	Client:	
Sample Date:	16 May-06	Material:	Copper	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	57h	Station:			

Comments: in K medium

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-mg/L	95% LCL	95% UCL	Method
04-9941-0734	% Survival	50	110.0226	51.11752	306.4394	Linear Regression

% Survival Summary

Conc-mg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
10		3	0.96667	0.90000	1.00000	0.03333	0.05774	5.97%
50		3	0.83333	0.70000	0.90000	0.06667	0.11547	13.86%
100		3	0.70000	0.60000	0.80000	0.05774	0.10000	14.29%
250		3	0.06667	0.00000	0.20000	0.06667	0.11547	173.21

% Survival Detail

Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1.00000	1.00000	1.00000
10		1.00000	1.00000	0.90000
50		0.70000	0.90000	0.90000
100		0.60000	0.70000	0.80000
250		0.00000	0.00000	0.20000

CETIS Analysis Detail

Nematode 24 hour Acute test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Linear Regression	17-1623-5361	17-1623-5361	19 May-06 11:18 AM	CETISv1.1.2

Linear Regression Options

Model Function	Threshold Option	Threshold	Threshold Opt	Reweighted	Pooled Groups	Het Corr
Log-Normal [NED=A+B*log(X)]	Control Threshold	0	Yes	Yes	No	Yes

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G	Chi-Sq	Critical	P-Value	Decision(0.05)
5	-48.13368	-0.11105	0.38609	0.61289	36.80609	18.30704	0.00006	Significant Heterogeneity

Point Estimates

% Effect	Conc-mg/L	95% LCL	95% UCL
50	110.0226	51.11752	306.4394

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P-Value	Decision(0.05)
Slope	2.590097	0.9100504	0.5623779	4.617815	2.846	0.01737	Significant
Intercept	-0.2876353	1.846492	-4.401875	3.826605	-0.156	0.87931	Not Significant

Residual Analysis

Attribute	Method	Statistic	Critical	P-Value	Decision(0.05)
Variances	Modified Levene	1.514036	4.06618	0.28357	Equal Variances
Distribution	Shapiro-Wilk W	0.8021035		0.00990	Non-normal Distribution

Data Summary

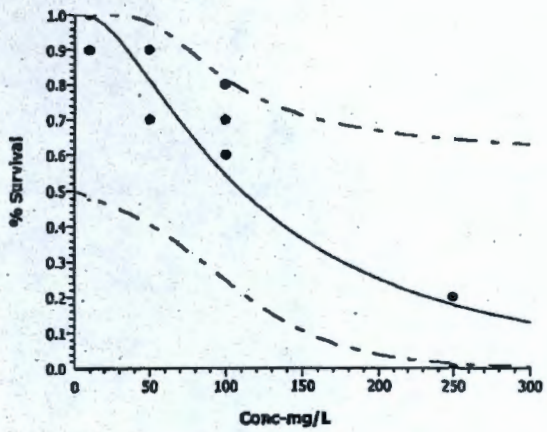
			Calculated Variate(A/B)						
Conc-mg/	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Dilution Water	3	1.00000	1.00000	1.00000	0.00000	0.00000	30	30
10		3	0.96667	0.90000	1.00000	0.01179	0.05773	29	30
50		3	0.83333	0.70000	0.90000	0.02357	0.11547	25	30
100		3	0.70000	0.60000	0.80000	0.02041	0.10000	21	30
250		3	0.06667	0.00000	0.20000	0.02357	0.11547	2	30

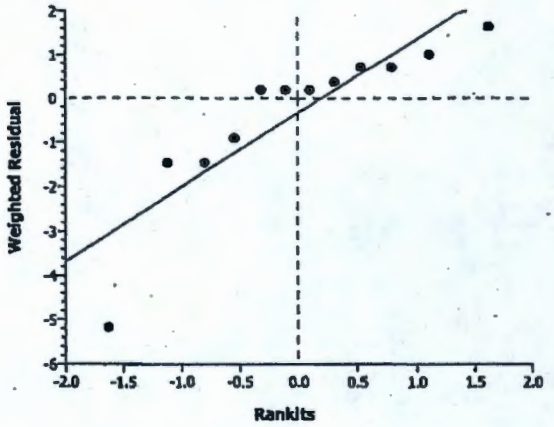
Data Detail

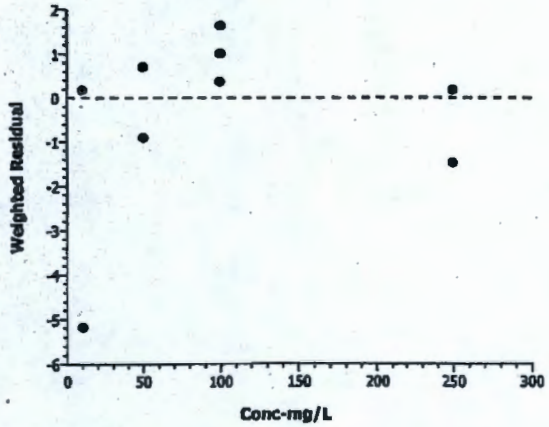
Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1.00000	1.00000	1.00000							
10		1.00000	1.00000	0.90000							
50		0.70000	0.90000	0.90000							
100		0.60000	0.70000	0.80000							
250		0.00000	0.00000	0.20000							

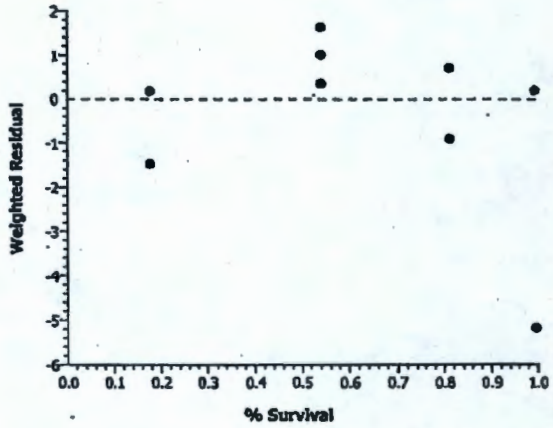
CETIS Analysis Detail

Graphics









APPENDIX C
CHAIN OF CUSTODY

F1793

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-270	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location McGEE RANCH		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
J11K97	SOIL	5-17-06	1757	1	1							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 0900 5-18-06	Received By/Stored In Dawn Hubbard CH2M HILL	Date/Time 5-18-06 09:45
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

' These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

~~RES~~ BN 1599-01

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)

F1816

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-144	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location ~~100-H-24~~ 1607-42		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment FED EX
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JT6	SOIL	5-22-06	1400	1	1								-0'

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth W Tyree	1500 5-22-06	Darion Hubbard CH2M HILL	5-22-06 15:40

SPECIAL INSTRUCTIONS

* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

^~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

BN 1599-02

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)

F1886

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-150	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality ☐
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 116-N-3		SAF No. RC-051	Data Turnaround 45 Days
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT	
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JV2	SOIL	5 22-06	1706	1	1								-1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From	Date/Time 1710	Received By/Stored In	Date/Time 5/23/06
Relinquished By/Removed From	Date/Time 5-22-06	Received By/Stored In	Date/Time 11:30
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.3; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

BN 1599-03

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
Ve=Vegetation
X=Other

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

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

F1779

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-198	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location BORROW PIT 18		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Ladine/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11K10	SOIL	5-16-06	1600	1	1								-01

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth M Tiffs	Date/Time 1600 5-16-06	Received By/Stored In Marian Hallard CH2MHILL	Date/Time 5-16-06 17:00
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

' These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

Nematode Soil Test - 5-31-06

B1599 B1599-01

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)

F1788

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-192	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location BORROW PIT 14		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
J11K04	SOIL	5-17-06	1257	1	1							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 1257	Received By/Stored In	Date/Time 5-17-06
Elizabeth A. Tepper	5-17-06	Jeremy Hubbard CH2MHILL	15:00
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

* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

^ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

BN 1599-05

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

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

CH2MHILL
Applied Sciences Laboratory

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

RECEIVED
JUL 2006

June 28, 2006

ELR Consulting
2328 S. Garfield Street
Kennewick, WA 99337

RE: Laboratory Report for ELR Consulting
Applied Sciences Laboratory Reference No. F1886

Dear Emmett Richards:

On May 23, 2006, CH2M HILL Applied Sciences Laboratory received one sample with a request for analysis of selected parameters. All analyses were performed by CH2M HILL unless otherwise indicated below.

The analytical results and associated quality control data are enclosed. Any unusual difficulties encountered during the analysis of your samples are discussed in the case narrative. This data package meets standards requested by client and is not intended or implied to meet any other standard.

CH2M HILL Applied Sciences Laboratory appreciates your business and looks forward to serving your analytical needs again. If you should have any questions concerning the data, or if you need additional information, please call Mark Bos at (541) 758-0235, extension 3135.

Sincerely,

Mark Bos
Analytical Manager

Enclosures

CLIENT SAMPLE CROSS-REFERENCE

CH2M HILL Applied Sciences Laboratory Reference No. F1886

Sample ID	Client Sample ID	Date Collected	Time Collected
F188601	J11JV2	05/22/2006	17:06

Table of Contents
CH2M HILL Laboratory Reference No. F1886

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QC Summary 10

Anions Analysis by Method EPA300.0 19
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QC Summary 24

Moisture Analysis by Method ASTM D2216 36

Particle Size Analysis by Method D422 38

pH Analysis by Method SW9045C 40

Total Kjeldahl Nitrogen Analysis by Method EPA351.4 42
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QC Summary 47

Total Organic Carbon Analysis by Method ASTM E777 56
Sample Data Summary 58
QC Summary 61

Chain of Custody/Shipping Documents 71

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.: F1886

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 920842.OTC

Project Name: ELR Consulting Prime Contractor.:

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)
All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Duplicate Sample(s):
All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: Elizabeth M Tepp Date: 6-8-06

Reviewed by: Date: 13 June 2006

SAMPLE DATA
SUMMARY

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JV2

SDG No.: F1886

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F188601

Date Received: 05/23/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7664-41-7	Ammonia-N	0.822	3.08	1.35	B	mg/kg	1	0.6561 G	E350.3	06/06/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0606

SDG No.: F1886

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0606

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	0.604	B	mg/kg	1	1 G	E350.3	06/06/06

QC DATA SUMMARY

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 06/06/06 1340

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 060606NH32

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	167	1.0	116	10.0	59.8	100	1.3						

Comments:

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 06/06/06 1340

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 060606NH32

Analyte	Curve Type	r	Q
Ammonia-N	LNR	0.9991	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Second Source ID: ICV-0606

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 060606NH32

Analyte	Expected	Found	%D	Q
Ammonia-N	10	9.21	-7.9	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Analytical Lot ID: 060606NH32

Instrument Name: NONE

Concentration Units: mg/kg

Initial Calibration ID: 060606NH32

CCV #1 ID: CV1-0606 CCV #2 ID: CV2-0606 CCV #3 ID: CV3-0606

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Ammonia-N	1	0.915	-8.5		10	9.41	-5.9		10	10.4	3.5	

Comments:

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0606

SDG No.: F1886

Analysis Method: E350.3

Initial Cal ID: 060606NH32

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0606

Date Analyzed: 06/06/06

Time Analyzed: 1418

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
08	BS1S0606	BS1S0606	06/06/06	1413
15	J11JV2	F188601	06/06/06	1446

COMMENTS:

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1886

Analysis Method: E350.3

Initial Cal ID: 060606NH32

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS1S0606

Date Analyzed: 06/06/06

Time Analyzed: 1413

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Ammonia-N	200	184	92.1	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 060606NH32

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	LEVEL 1	LEVEL 1	06/06/06	1340
02	LEVEL 2	LEVEL 2	06/06/06	1345
03	LEVEL 3	LEVEL 3	06/06/06	1350
04	LEVEL 4	LEVEL 4	06/06/06	1355
05	CV1-0606	CV1-0606	06/06/06	1408
06	CV2-0606	CV2-0606	06/06/06	1410
07	ICV-0606	ICV-0606	06/06/06	1413
08	BS1S0606	BS1S0606	06/06/06	1413
09	SB1-0606	SB1-0606	06/06/06	1418
15	J11JV2	F188601	06/06/06	1446
20	CV3-0606	CV3-0606	06/06/06	1519

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

06/10/06

MDL Study Report

Analytical Method: E350.3

Instrument ID: NONE

Matrix: Soil

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Ammonia	08/05/05	2	2.18	1.70	1.73	1.70	1.73	1.74	1.81		0.170	0.534

ET060610-13:04-F1886-W

ANIONS BY METHOD EPA300.0A

CASE NARRATIVE
ANIONS

Analytical Method: EPA300.0 Batch No.: F1886

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 920842.OTC

Base/Command: ELR Consulting Prime Contractor.: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate Sample(s):
Samples were analyzed in accordance with SOP.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Analytical Exception:
None.

F. Other:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: _____ Date: 8/26/06

Reviewed by: _____ Date: 6/27/06

SAMPLE DATA
SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JV2

SDG No.: F1886

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F188601

Date Received: 05/23/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.0542	0.446	0.986		mg/kg	1	5.658 G	E300.0A	05/31/06
16984-48-8	Fluoride	0.0484	0.446	0.312	B	mg/kg	1	5.658 G	E300.0A	05/31/06
14797-55-8	Nitrate-N	0.0419	0.446	0.241	B	mg/kg	1	5.658 G	E300.0A	05/31/06
14797-65-0	Nitrite-N	0.0401	0.446	0.183	B	mg/kg	1	5.658 G	E300.0A	05/31/06
14808-79-8	Sulfate	0.0720	0.446	1.65		mg/kg	1	5.658 G	E300.0A	05/31/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0530

SDG No.: F1886

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0530

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.0607	0.500	0.500	U	mg/kg	1	5 G	E300.0A	05/31/06
16984-48-8	Fluoride	0.0543	0.500	0.500	U	mg/kg	1	5 G	E300.0A	05/31/06
14797-55-8	Nitrate-N	0.0469	0.500	0.500	U	mg/kg	1	5 G	E300.0A	05/31/06
14797-65-0	Nitrite-N	0.0449	0.500	0.500	U	mg/kg	1	5 G	E300.0A	05/31/06
14808-79-8	Sulfate	0.0806	0.500	0.500	U	mg/kg	1	5 G	E300.0A	05/31/06

QC DATA SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 01/30/06 18:27

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Chloride	0.020	0.0032	0.050	0.0041	0.10	0.023	0.50	0.050	1.0	0.11	5.0	0.67	10.0	1.5
Fluoride					0.10	0.0085	0.50	0.046	1.0	0.13	5.0	0.85	10.0	1.8
Nitrate-N	0.020	0.0059	0.050	0.012	0.10	0.067	0.50	0.14	1.0	0.32	5.0	1.8	10.0	4.1
Nitrite-N	0.020	0.0067	0.050	0.012	0.10	0.050	0.50	0.10	1.0	0.25	5.0	1.4	10.0	3.0
Sulfate	0.060	0.0065	0.15	0.014	0.30	0.059	1.5	0.13	3.0	0.27	15.0	1.5	30.0	3.2

Comments:

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Initial Calibration Date: 01/30/06 18:27

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

Analyte	Curve Type	r	Q
Chloride	LNR	0.9985	
Fluoride	LNR	0.9988	
Nitrate-N	LNR	0.9983	
Nitrite-N	LNR	0.9988	
Sulfate	LNR	0.9991	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Second Source ID: ICV-0130

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

Analyte	Expected	Found	%D	Q
Chloride	5	5.06	1.2	
Fluoride	5	4.57	-8.6	
Nitrate-N	7.19	7.13	-0.8	
Nitrite-N	1.13	1.02	-9.4	
Sulfate	5	5.14	2.8	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Analytical Lot ID: 053006Q3

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

CCV #1 ID: CV1-0530 CCV #2 ID: CV2-0530 CCV #3 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Chloride	5	4.96	-0.9		2.5	2.62	4.8					
Fluoride	5	4.87	-2.6		2.5	2.33	-6.7					
Nitrate-N	5	4.50	-9.9		2.5	2.37	-5.3					
Nitrite-N	5	4.91	-1.8		2.5	2.48	-1.0					
Sulfate	15	13.7	-8.4		7.5	6.88	-8.2					

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0530

SDG No.: F1886

Analysis Method: E300.0A

Initial Cal ID: 300A-013006

Matrix: (Soil/Water) SOIL

Instrument: ICQ

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0530

Date Analyzed: 05/31/06

Time Analyzed: 0026

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
16	BS1S0530	BS1S0530	05/30/06	1747
19	BS2S0530	BS2S0530	05/30/06	1857
22	BS3S0530	BS3S0530	05/30/06	2008
33	J11JV2	F188601	05/31/06	0508

COMMENTS: _____

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS1S0530

Initial Cal ID: 300A-013006

Date Analyzed: 05/30/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1747

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Chloride	25	25.0	99.9	90-110	
Fluoride	25	24.4	97.6	90-110	
Sulfate	25	26.6	106	90-110	

* Values outside of QC limits

Comments:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS2S0530

Initial Cal ID: 300A-013006

Date Analyzed: 05/30/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1857

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Nitrite-N	5.65	5.63	99.6	90-110	

* Values outside of QC limits

Comments:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS3S0530

Initial Cal ID: 300A-013006

Date Analyzed: 05/30/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 2008

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Nitrate-N	35.95	38.0	106	90-110	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 300A-013006

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	LEVEL1	LEVEL1	01/30/06	1729
03	LEVEL2	LEVEL2	01/30/06	1739
04	LEVEL3	LEVEL3	01/30/06	1749
05	LEVEL4	LEVEL4	01/30/06	1758
06	LEVEL5	LEVEL5	01/30/06	1808
07	LEVEL6	LEVEL6	01/30/06	1818
08	LEVEL7	LEVEL7	01/30/06	1827
10	ICV-0130	ICV-0130	01/30/06	1846
11	ICV-0130	ICV-0130	01/30/06	1856
13	ICV-0130	ICV-0130	01/30/06	1916

COMMENTS: _____

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 053006Q3

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
15	CV1-0530	CV1-0530	05/30/06	1723
16	BS1S0530	BS1S0530	05/30/06	1747
19	BS2S0530	BS2S0530	05/30/06	1857
22	BS3S0530	BS3S0530	05/30/06	2008
26	SB1-0530	SB1-0530	05/31/06	0026
33	J11JV2	F188601	05/31/06	0508
36	CV2-0530	CV2-0530	05/31/06	0956

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

06/26/06

MDL Study Report

Analytical Method: E300.0A

Matrix: Soil

Instrument ID: ICQ

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Nitrate	11/01/05	0.25	0.225	0.250	0.215	0.240	0.245	0.225	0.255		0.0149	0.0469
Nitrite-N	11/01/05	0.25	0.230	0.270	0.270	0.260	0.270	0.260	0.265		0.0143	0.0449
Sulfate	11/01/05	0.75	0.790	0.735	0.730	0.795	0.775	0.750	0.760		0.0256	0.0806
Chloride	11/01/05	0.25	0.315	0.315	0.340	0.340	0.290	0.300	0.330		0.0193	0.0607
Fluoride	11/02/05	0.5	0.505	0.480	0.500	0.470	0.490	0.485	0.455		0.0173	0.0543

PERCENT MOISTURE
ASTM D2216

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JV2

SDG No.: F1886

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F188601

Date Received: 05/23/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
MOISTURE	Moisture	0.00	0.00	0.953		%	1	11.4132 G	ASTM D2216	06/02/06

ET060605-12:43-F1886-W

FORM I GEN CHEM

PARTICLE SIZE
METHOD 422

Hanford

Particle Size

503.0 **g sample used**

Weight retained is the weight of material ON each sieve

ANALYST: **KRM** 6/7/2006

Lab I.D.	Client I.D.	Sieve #	Sieve Size (um)	Sieve Size (mm)	Weight Retained (g)	Weight Retained (%)	Cumulative Coarser (%)	Cumulative Finer (%)
F188601	J11JV2	8	2362	2.362	0.00	0.00	0.00	100.00
		16	1180	1.180	55.60	11.08	11.08	88.92
		30	600	0.600	136.20	27.15	38.24	61.76
		50	500	0.500	96.00	19.14	57.38	42.62
		100	147	0.147	79.20	15.79	73.17	26.83
		200	75	0.075	116.90	23.31	96.47	3.53
		pan			17.70	3.53	100.00	0.00
		total			501.6			

CH2M HILL
Applied Sciences Group

2300 NW Walnut Blvd., Corvallis, OR 97330-3538
P.O. Box 428, Corvallis, OR 97339-0428
Tel 541.752.4271 Fax 541.752.0276

pH
METHOD SW9045C

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JV2

SDG No.: F1886

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F188601

Date Received: 05/23/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
pH	pH	0.00	0.00	8.27		pH	1	20 G	SW9045C	06/02/06

TKN
METHOD EPA 351.4

CASE NARRATIVE
TKN

Analytical Method: EPA 351.4 Batch No.: F1886

Lab Name: CH2M HILL Applied Sciences Lab Contract #.: 920842.OTC

Project Name: ELR Consulting Prime Contractor.: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)
All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Duplicate Sample(s):
All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: Elizabeth M Tyree Date: 6-8-06

Reviewed by: [signature] Date: 13 June 2006

SAMPLE DATA
SUMMARY

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JV2

SDG No.: F1886

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F188601

Date Received: 05/23/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	50.0	183	348		mg/kg	1	0.5513 G	E351.4	06/05/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0605

SDG No.: F1886

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0605

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	27.3	100	92.1	B	mg/kg	1	1 G	E351.4	06/05/06

QC DATA
SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 06/05/06 1600

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 060506TKN

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	190	20.0	137	200	79.3	2000	20.9						

Comments:

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 06/05/06 1600

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 060506TKN

Analyte	Curve Type	r	Q
Total Kjeldahl Nitrogen as N	LNR	0.9995	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Second Source ID: ICV-0605

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 060506TKN

Analyte	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	28.4	32.1	13.2	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Analytical Lot ID: 060506TKN

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 060506TKN

CCV #1 ID: CV1-0605 CCV #2 ID: CV2-0605 CCV #3 ID: CV3-0605

Analyte.	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	20	18.6	-7.1		200	193	-3.6		20	20.7	3.3	

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0605

SDG No.: F1886

Analysis Method: E351.4

Initial Cal ID: 060506TKN

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0605

Date Analyzed: 06/05/06

Time Analyzed: 1833

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
09	BS1S0605	BS1S0605	06/05/06	1824
18	J11JV2	F188601	06/05/06	1855

COMMENTS: _____

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

LCS ID: BS1S0605

Initial Cal ID: 060506TKN

Date Analyzed: 06/05/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1824

Instrument: NONE

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Kjeldahl Nitrogen as N	1420	1610	113	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 060506TKN

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	LEVEL 1	LEVEL 1	06/05/06	1600
02	LEVEL 2	LEVEL 2	06/05/06	1605
03	LEVEL 3	LEVEL 3	06/05/06	1610
03	LEVEL 4	LEVEL 4	06/05/06	1615
05	CV1-0605	CV1-0605	06/05/06	1819
06	CV2-0605	CV2-0605	06/05/06	1819
07	ICV-0605	ICV-0605	06/05/06	1824
09	BS1S0605	BS1S0605	06/05/06	1824
10	SB1-0605	SB1-0605	06/05/06	1833
18	J11JV2	F188601	06/05/06	1855
20	CV3-0605	CV3-0605	06/05/06	1903

COMMENTS: _____

CH2MHILL
Applied Sciences Laboratory

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06/10/06

MDL Study Report

Analytical Method: E351.4

Matrix: Soil

Instrument ID: NONE

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Total Kjeldahl Nitrogen	03/13/06	100	168	154	161	147	152	161	171		8.67	27.3

ET060610-13:20-F1886-W

TOTAL ORGANIC CARBON
BY ASTM E777

CASE NARRATIVE
TOC SOILS

Analytical Method: ASTM E-777 Batch No.: F1886

Lab Name: CH2M HILL Applied Sciences Lab Contract #: 920842.OTC

Project Name: ELR Consulting Prime Contractor: _____

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)
All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)
All acceptance criteria were met.

E. Duplicate Sample(s):
All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:
All acceptance criteria were met.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

V. I certify that this data package is in compliance with the terms and conditions agreed to by the client and CH2M HILL, both technically and for completeness, except for the conditions detailed above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designee, as verified by the following signature.

Reported by: Douglas A. Hardy Date: 6/9/06

Reviewed by: [signature] Date: 12 June 2006

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JV2

SDG No.: F1886

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F188601

Date Received: 05/23/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	79.2	227	3120		mg/kg	1	0.4414 G	ASTM E777	06/08/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0608

SDG No.: F1886

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0608

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	35.0	100	100	U	mg/kg	1	1 G	ASTM E777	06/08/06

QC SUMMARY

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Initial Calibration Date: 10/14/05 11:48

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Total Organic Carbon	100	737000	200	1600000	1000	6840000	4000	2.48E+7	8000	4.79E+7				

Comments:

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Initial Calibration Date: 10/14/05 11:48

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

Analyte	Curve Type	r	Q
Total Organic Carbon	LNR	0.9997	

Comments:

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Second Source ID: ICV-1014

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

Analyte	Expected	Found	%D	Q
Total Organic Carbon	6430	6680	3.9	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Analytical Lot ID: 060806TOCS1

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

CCV #1 ID: CV1-0608 CCV #2 ID: CV2-0608 CCV #3 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Organic Carbon	4000	4080	1.9		4000	4460	11.5					

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID: SB1-0608

SDG No.: F1886

Analysis Method: ASTM E777

Initial Cal ID: 101405S1

Matrix: (Soil/Water) SOIL

Instrument: TOC Skalar

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0608

Date Analyzed: 06/08/06

Time Analyzed: 1656

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	BS1S0608	BS1S0608	06/08/06	0944
11	J11JV2	F188601	06/08/06	1701

COMMENTS: _____

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

LCS ID: BS1S0608

Initial Cal ID: 101405S1

Date Analyzed: 06/08/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 0944

Instrument: TOC Skalar

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Organic Carbon	8840	9570	108	75-125	

* Values outside of QC limits

Comments:

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Code: CVO

Instrument: TOC SKALAR

Analytical Lot ID: 101405TOCS

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	LEVEL1	LEVEL1	10/14/05	1148
03	LEVEL2	LEVEL2	10/14/05	1158
04	LEVEL3	LEVEL3	10/14/05	1208
05	LEVEL4	LEVEL4	10/14/05	1218
06	LEVEL5	LEVEL5	10/14/05	1228
07	ICV-1014	ICV-1014	10/14/05	1252

COMMENTS: _____

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1886

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Code: CVO

Instrument: TOC Skalar

Analytical Lot ID: 060806TOCS1

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	CV1-0608	CV1-0608	06/08/06	0930
02	BS1S0608	BS1S0608	06/08/06	0944
03	SB1-0608	SB1-0608	06/08/06	1656
11	J11JV2	F188601	06/08/06	1701
15	CV2-0608	CV2-0608	06/08/06	1733

COMMENTS: _____

CH2MHILL
Applied Sciences Laboratory

CH2M HILL
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Telephone: 541-752-4271
Fax: 541-752-0276

06/09/06

MDL Study Report

Analytical Method: ASTM E777

Instrument ID: TOC Skalar

Matrix: Soil

Concentration Units: mg/kg

Analyte	Analysis Date	Amt. Spiked	Replicates 1	2	3	4	5	6	7	8	Std. Dev.	MDL
Total Organic Carbon	08/17/05	140	31.0	14.4	8.89	29.4	32.4	27.1	6.37		11.1	35.0

CHAIN OF CUSTODY/SHIPPING DOCUMENTS

F1886

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-150	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality ☐	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 116-N-3		SAF No. RC-051		
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JV2	SOIL	5-22-06	1706	1	1								-1

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
[signature] M Tyler	1710 5-22-06	[signature]	5/23/06 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

Matrix *

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

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

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

CH2MHILL
Analytical Services

Sample Receipt Record

Batch Number: F1886 Date received: 5/23/06

Client/Project: EIR Consulting

VERIFICATION OF SAMPLE CONDITIONS (verify all items) * HD = Client Hand delivered Samples

Observation		YES	NO
Radiological Screening for AFCEE			X
Were custody seals intact and on the outside of the cooler?			X
If yes, Where? Front____ Rear____ Lt Side____ Rt Side____	HD		
Type of packing material: Ice Blue Ice Bubble wrap	HD		
Was the Chain of Custody inside the cooler?		X	
Was the Chain of Custody properly filled out?		X	
Were the sample containers in good condition?		X	
Containers supplied by ASL?		X	
Any sample with < 1/2 holding time remaining? If so contact LPM			X
Was there ice in the cooler? Enter temp. C	NA		
All VOCs free of air bubbles ?	NA		

VERIFICATION OF SAMPLE PRESERVATION

Sample No	Nutrients pH <2	Metals pH <2	Volatiles pH <2	Cyanides pH >12	TOC pH <2	TOX pH <2	Other (specify)	N/A (solls/unpres)
1								X
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
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24								
25								
26								
27								

LOGIN AND pH VERIFICATIONS PERFORMED BY

Dayna Kumpmann 5/23/06 11:30

Date/Time Date/Time

VersionCo	LabName	SDG	FieldID	NativeID	QAQCTyp	LRType	Matrix	LabSampl	AnalysisM	ExtractionI	SampleDa	SampleTin	ReceiveDa	ExtractDat	ExtractTim	AnalysisDa	AnalysisTi	PercentSo	LabLotCtlN	CAS	ParamID	Analyte	Result
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	ASTM E77	NONE	5/22/2006	17:06	5/23/2006			6/8/2006	17:01	99.05		TOC	TOC	Total Orga	3120
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	E350.3	METHOD	5/22/2006	17:06	5/23/2006	6/6/2006	14:46	6/6/2006	14:46	99.05	SB1-0606	7664-41-7	NH3N	Ammonia-I	1.35
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	E351.4	METHOD	5/22/2006	17:06	5/23/2006	6/5/2006	18:55	6/5/2006	18:55	99.05	SB1-0605	7727-37-9	KN	Total Kjeld	348
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	E300.0A	METHOD	5/22/2006	17:06	5/23/2006	5/31/2006	5:08	5/31/2006	5:08	99.05	SB1-0530	16887-00-I	CL	Chloride	0.986
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	E300.0A	METHOD	5/22/2006	17:06	5/23/2006	5/31/2006	5:08	5/31/2006	5:08	99.05	SB1-0530	16984-48-I	F	Fluoride	0.312
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	E300.0A	METHOD	5/22/2006	17:06	5/23/2006	5/31/2006	5:08	5/31/2006	5:08	99.05	SB1-0530	14797-55-I	NO3N	Nitrate-N	0.241
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	E300.0A	METHOD	5/22/2006	17:06	5/23/2006	5/31/2006	5:08	5/31/2006	5:08	99.05	SB1-0530	14797-65-I	NO2N	Nitrite-N	0.183
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	E300.0A	METHOD	5/22/2006	17:06	5/23/2006	5/31/2006	5:08	5/31/2006	5:08	99.05	SB1-0530	14808-79-I	SO4	Sulfate	1.65
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	ASTM D22	NONE	5/22/2006	17:06	5/23/2006			6/2/2006	14:17	99.05		MOISTURI	MOIST	Moisture	0.953
4.00	EPAC	CHMC	F1886	J11JV2	J11JV2	N		SOIL	F188601	SW9045C	METHOD	5/22/2006	17:06	5/23/2006	6/2/2006	15:09	6/2/2006	15:09	99.05	SB1-0602	pH	PH	pH	8.27
4.00	EPAC	CHMC	F1886	BS1S0530	BS1S0530	BS		SOIL	BS1S0530	E300.0A	METHOD				5/30/2006	17:47	5/30/2006	17:47	100	SB1-0530	16887-00-I	CL	Chloride	25
4.00	EPAC	CHMC	F1886	BS1S0530	BS1S0530	BS		SOIL	BS1S0530	E300.0A	METHOD				5/30/2006	17:47	5/30/2006	17:47	100	SB1-0530	16984-48-I	F	Fluoride	24.4
4.00	EPAC	CHMC	F1886	BS1S0530	BS1S0530	BS		SOIL	BS1S0530	E300.0A	METHOD				5/30/2006	17:47	5/30/2006	17:47	100	SB1-0530	14808-79-I	SO4	Sulfate	26.6
4.00	EPAC	CHMC	F1886	BS1S0605	BS1S0605	BS		SOIL	BS1S0605	E351.4	METHOD				6/5/2006	18:24	6/5/2006	18:24	100	SB1-0605	7727-37-9	KN	Total Kjeld	1610
4.00	EPAC	CHMC	F1886	BS1S0606	BS1S0606	BS		SOIL	BS1S0606	E350.3	METHOD				6/6/2006	14:13	6/6/2006	14:13	100	SB1-0606	7664-41-7	NH3N	Ammonia-I	184
4.00	EPAC	CHMC	F1886	BS1S0608	BS1S0608	BS		SOIL	BS1S0608	ASTM E77	NONE						6/8/2006	9:44	100		TOC	TOC	Total Orga	9570
4.00	EPAC	CHMC	F1886	BS2S0530	BS2S0530	BS		SOIL	BS2S0530	E300.0A	METHOD				5/30/2006	18:57	5/30/2006	18:57	100	SB1-0530	14797-65-I	NO2N	Nitrite-N	5.63
4.00	EPAC	CHMC	F1886	BS3S0530	BS3S0530	BS		SOIL	BS3S0530	E300.0A	METHOD				5/30/2006	20:08	5/30/2006	20:08	100	SB1-0530	14797-55-I	NO3N	Nitrate-N	38
4.00	EPAC	CHMC	F1886	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	16887-00-I	CL	Chloride	0.5
4.00	EPAC	CHMC	F1886	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	16984-48-I	F	Fluoride	0.5
4.00	EPAC	CHMC	F1886	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	14797-55-I	NO3N	Nitrate-N	0.5
4.00	EPAC	CHMC	F1886	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	14797-65-I	NO2N	Nitrite-N	0.5
4.00	EPAC	CHMC	F1886	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	14808-79-I	SO4	Sulfate	0.5
4.00	EPAC	CHMC	F1886	SB1-0605	SB1-0605	LB		SOIL	SB1-0605	E351.4	METHOD				6/5/2006	18:33	6/5/2006	18:33	100	SB1-0605	7727-37-9	KN	Total Kjeld	92.1
4.00	EPAC	CHMC	F1886	SB1-0606	SB1-0606	LB		SOIL	SB1-0606	E350.3	METHOD				6/6/2006	14:18	6/6/2006	14:18	100	SB1-0606	7664-41-7	NH3N	Ammonia-I	0.604
4.00	EPAC	CHMC	F1886	SB1-0608	SB1-0608	LB		SOIL	SB1-0608	ASTM E77	NONE						6/8/2006	16:56	100		TOC	TOC	Total Orga	100

ExpectedV	Units	Dilution	MDL	RL	LabQualifi	Surrogate	Comments	ParValUnc	Recovery	LowerCont	UpperCont	Basis	ConcQual	MDLAdjust	RLAdjuste	SampleDe	LeachMeth	LeachDate	LeachTime	LeachLot	AnalysisLo	CalRefID
	MG/KG	1	79.2	227		N						D	=	79.2	227	J11JV2	NONE				SB1-0608	101405S1
	MG/KG	1	0.814	3.05	B	N						D	J	0.822	3.08	J11JV2	NONE				060606NH	060606NH32
	MG/KG	1	49.5	181		N						D	=	50	183	J11JV2	NONE				060506KN	060506TKN
	MG/KG	1	0.0537	0.442		N						D	=	0.0542	0.446	J11JV2	NONE				053006Q3	300A-013006
	MG/KG	1	0.048	0.442	B	N						D	J	0.0484	0.446	J11JV2	NONE				053006Q3	300A-013006
	MG/KG	1	0.0415	0.442	B	N						D	J	0.0419	0.446	J11JV2	NONE				053006Q3	300A-013006
	MG/KG	1	0.0397	0.442	B	N						D	J	0.0401	0.446	J11JV2	NONE				053006Q3	300A-013006
	MG/KG	1	0.0713	0.442		N						D	=	0.072	0.446	J11JV2	NONE				053006Q3	300A-013006
	PERCENT	1	0	0		N						D	=	0	0	J11JV2	NONE				060206MC	NONE
	PH UNITS	1	0	0		N						D	=	0	0	J11JV2	NONE				060206PH	NONE
25	MG/KG	1	0.0607	0.5		N			99.9	90	110	D	=	0.0607	0.5		NONE				053006Q3	300A-013006
25	MG/KG	1	0.0543	0.5		N			97.6	90	110	D	=	0.0543	0.5		NONE				053006Q3	300A-013006
25	MG/KG	1	0.0806	0.5		N			106	90	110	D	=	0.0806	0.5		NONE				053006Q3	300A-013006
1420	MG/KG	1	27.3	100		N			113	75	125	D	=	27.3	100		NONE				060506KN	060506TKN
200	MG/KG	1	0.534	2		N			92.1	75	125	D	=	0.534	2		NONE				060606NH	060606NH32
8840	MG/KG	1	72.1	206		N			108	75	125	D	=	72.1	206		NONE				SB1-0608	101405S1
5.65	MG/KG	1	0.0449	0.5		N			99.6	90	110	D	=	0.0449	0.5		NONE				053006Q3	300A-013006
36	MG/KG	1	0.0469	0.5		N			106	90	110	D	=	0.0469	0.5		NONE				053006Q3	300A-013006
0	MG/KG	1	0.0607	0.5	U	N						D	U	0.0607	0.5		NONE				053006Q3	300A-013006
0	MG/KG	1	0.0543	0.5	U	N						D	U	0.0543	0.5		NONE				053006Q3	300A-013006
0	MG/KG	1	0.0469	0.5	U	N						D	U	0.0469	0.5		NONE				053006Q3	300A-013006
0	MG/KG	1	0.0449	0.5	U	N						D	U	0.0449	0.5		NONE				053006Q3	300A-013006
0	MG/KG	1	0.0806	0.5	U	N						D	U	0.0806	0.5		NONE				053006Q3	300A-013006
0	MG/KG	1	27.3	100	B	N						D	J	27.3	100		NONE				060506KN	060506TKN
0	MG/KG	1	0.534	2	B	N						D	J	0.534	2		NONE				060606NH	060606NH32
0	MG/KG	1	35	100	U	N						D	U	35	100		NONE				SB1-0608	101405S1

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JUL 2006

BIOASSAY REPORT
CHRONIC SCREENING BIOASSAYS
Conducted June 7 through July 5, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

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July 20, 2006
Lab I.D. Nos. BG1607-01 thru 11
SDG Number BG1607

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APPENDIX B. CHAIN OF CUSTODY

INTRODUCTION

CH2M HILL conducted chronic screening bioassay tests using the Sandberg bluegrass (*Poa sandbergii*) on soil samples provided by the ELR Consulting for Washington Closure Hanford, Richland, Washington. The tests were conducted from June 7 through July 5, 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 subirrigation.

TEST CONCENTRATIONS

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

SAMPLE COLLECTION

The soil samples were collected from May 16 through June 5, 2006. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

SAMPLE CROSS-REFERENCE TABLE

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

Table 1
Sample Cross-Reference

Client ID	Sample Date	Sample Location	Bluegrass test SDG	Analytical Lab SDG
J11K10	05/16/2006	BORROW PIT 18	BG1607-01	F1779
J11K04	05/17/2006	BORROW PIT 14	BG1607-02	F1788
J11K97	05/17/2006	McGEE RANCH	BG1607-03	F1793
J11JT6	05/22/2006	1607-42	BG1607-04	F1816
J11JV2	05/22/2006	116-N-3	BG1607-05	F1886
J11K22	05/23/2006	600-23	BG1607-06	F1827
J11JH7	05/29/2006	UPPER RIPARIAN #11	BG1607-07	F1852
J11K16	05/29/2006	BORROW PIT 24	BG1607-08	F1853
J11K79	05/30/2006	VERNITA UPRIVER ON SOUTH SIDE	BG1607-09	F1859
J11JY8	05/30/2006	BORROW PIT 9	BG1607-10	F1863
J11JX0	06/05/2006	300-44/618-4	BG1607-11	F1901

SAMPLE PREPARATION

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

TEST INITIATION

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

TEST MONITORING

According to information provided by the seed supplier, germination should take place between 14 and 28 days. The number of seeds in each test chamber that germinated was recorded on days 14, 16, 20, and 22. Germination was determined to have occurred on day 21.

Observations of the shoot appearance were recorded 7 days after post germination (day 21 after planting). The number of germinated seeds in each test chamber was also recorded. Chambers that had more than five germinated seeds had the smallest seedlings removed until the number of seedlings was reduced to five.

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

TEST TERMINATION

Tests were terminated 14 days post germination (day 28 after planting). The number of seedlings, shoot appearance and height (tallest shoot of each plant), and root appearance and length (longest recovered root of each plant) was recorded.

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

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

DATA ANALYSIS

For each test chamber, the following endpoints were calculated:

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

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

RESULTS AND DISCUSSION

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

The results for sample J11K10 indicated a statistically significant reduction in average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11K04 indicated a statistically significant reduction in average root length, average above ground shoot mass (dry), average root mass (dry), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11K97 indicated a statistically significant reduction in germination, average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11JT6 indicated a statistically significant reduction in germination, average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11JV2 indicated a statistically significant reduction in germination, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (dry), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11K22 indicated a statistically significant reduction in average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

Note: One seedling was lost during the test termination of the J11K22 sample. Five seeds had germinated in replicate B, but only 4 were available for the 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) endpoints. The number of germinated plants was reduced to 4 for these endpoints during the statistical analysis.

The results for sample J11JH7 indicated a statistically significant reduction in average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11K16 indicated a statistically significant reduction in germination, average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11K79 indicated a statistically significant reduction in average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11JY8 indicated a statistically significant reduction in average stem height, average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11JX0 indicated a statistically significant reduction in average root length, average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford

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

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

Lab ID:	Sample Number:	Bluegrass 14 day Germination Endpoint (%)	Significantly different compared to Lab Control?	Bluegrass Average 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 June 7, 2006																			
Laboratory Control		96	--	77.8	--	103.0	--	24.4	--	4.41	--	18.7	--	1.09	--	43.1	--	5.50	--
BG1607-01	J11K10	96	ns	65.8	E [5]	66.6	E [5]	16.5	E [5]	2.70	E [5]	16.1	ns	0.94	ns	32.6	ns	3.63	E [5]
BG1607-02	J11K04	92	ns	68.6	ns	72.4	E [5]	19.3	ns	3.01	E [5]	22.0	ns	0.83	E [5]	41.4	ns	3.84	E [5]
BG1607-03	J11K97	60	E [5]	42.0	E [5]	41.2	E [5]	9.4	E [5]	1.49	E [5]	5.4	E [5]	0.38	E [5]	14.8	E [5]	1.87	E [5]
BG1607-04	J11JT6	78	E [5]	54.5	E [5]	41.4	E [5]	10.8	E [5]	1.50	E [5]	10.7	E [5]	0.53	E [5]	21.5	E [5]	2.03	E [5]
BG1607-05	J11JV2	44	E [5]	71.2	ns	47.7	E [5]	16.9	E [5]	2.24	E [5]	17.7	ns	0.47	E [5]	34.6	ns	2.71	E [5]
BG1607-06	J11K22	100	ns	59.1	E [5]	48.6	E [5]	11.7	E [5]	1.53	E [5]	10.9	E [5]	0.84	ns	22.5	E [5]	2.37	E [5]
BG1607-07	J11JH7	96	ns	55.8	E [5]	51.2	E [5]	14.4	E [5]	1.75	E [5]	12.4	E [5]	0.45	E [5]	26.8	E [5]	2.21	E [5]
BG1607-08	J11K16	80	E [5]	61.8	E [5]	51.5	E [5]	15.6	E [5]	2.29	E [5]	9.5	E [5]	0.50	E [5]	25.0	E [5]	2.78	E [5]
BG1607-09	J11K79	88	ns	61.3	E [5]	54.7	E [5]	14.0	E [5]	1.92	E [5]	11.7	E [5]	0.73	E [5]	25.8	E [5]	2.65	E [5]
BG1607-10	J11JY8	80	ns	63.1	E [5]	73.0	E [5]	13.8	E [5]	2.34	E [5]	10.0	E [5]	0.57	E [5]	23.8	E [5]	2.91	E [5]
BG1607-11	J11JX0	92	ns	70.0	ns	70.7	E [5]	16.4	E [5]	2.58	E [5]	15.0	E [5]	0.84	E [5]	31.4	E [5]	3.42	E [5]

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: June 7, 2006 — 7-5-06

Initials: Day 0 TP — Day 12 NJ — Day 14 NJ — Day 16 NJ — Day 19 TP — Day 21 NJ — Day 23 TP — Day 21 NJ — Day NJ/Bm

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

CONC.	REPLICATE	# seeds germinated: Emergence 6-14-06 12 days after planting	14 days after planting (2-21)	16 days after planting (6-23)	19 days after planting (6-26)	21 days after planting (6-28)	23 days after planting (6-30)	7-DAYS POST-EMERGENCE (~~14~~ 21 days after planting)	14-DAYS POST-EMERGENCE (~~21~~ 28 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	8	8	8	8		~~8~~ 5	8→5	5	6.7	7.7
	B	7	7	7	7		5	7→5	5		
	C	4	4	4	4		4	4	4		
	D	8	8	8	8		5	8→5	5		
	E	7	7	7	7		5	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, 2 med G, 2 sm G Remove: 3 sm G
Replicate B: 5 lg G Remove: 1 med G, 1 sm G
Replicate C: 2 lg G, 2 sm G
Replicate D: 4 ~~3~~ lg G, 1 med G Remove: 2 med G, 1 sm B
Replicate E: 2 lg G 3 med G Remove: 2 sm B

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 lg G, 1 med G, 1 sm G
Replicate B: 3 lg G, 1 lg G w/1 B shoot 1 med G w/1 B shoot
Replicate C: 1 lg G, 1 lg G w/1 B shoot, 1 med G, 1 med G w/1 B shoot
Replicate D: 4 lg G, 1 lg G w/1 B shoot
Replicate E: 4 lg G, 1 med G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	95 mm	76 mm	84 mm	35 mm	58 mm
Replicate B	75 mm	97 mm	90 mm	85 mm	85 mm
Replicate C	92 mm	87 mm	44 mm	53 mm	mm
Replicate D	91 mm	87 mm	90 mm	77 mm	86 mm
Replicate E	62 mm	77 mm	84 mm	88 mm	79 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1289.75	1379.6	1305.32
Replicate B	1266.02	1429.9	1294.51
Replicate C	1265.09	1334.2	1278.48
Replicate D	1293.32	1448.5	1323.72
Replicate E	1294.74	1409.0	~~1296.09~~ 1313.72

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	68 mm	72 mm	56 mm	114 mm	118 mm
Replicate B	113 mm	99 mm	114 mm	113 mm	120 mm
Replicate C	121 mm	122 mm	62 mm	50 mm	mm
Replicate D	112 mm	138 mm	131 mm	115 mm	137 mm
Replicate E	90 mm	81 mm	92 mm	132 mm	115 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1288.31	1361.6	1292.68
Replicate B	1283.00	1404.8	1289.69
Replicate C	~~1283.48~~	1332.4	1286.56
Replicate D	1283.31	1390.6	1289.40
Replicate E	1290.41	1393.2	1296.09

1282.98

Comments:

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006 7-5-06

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

Bioassay Lab ID: BG 1607-01 Sample No: J11K10

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 (24 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)	pH INITIAL (@ planting)	pH FINAL (@ 14 days Post-Emergence)
Control	A	4	4	4	4		4	4	4	8.8	7.7
	B	6	6	6	6		5	6→5	5		
	C	7	7	7	7		6	7→5	5		
	D	3	5	5	5		5	5	5		
	E	4	5	6	6		5	6→5	5		

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

Replicate A 2lg G 2med G

Replicate B 1lg G, 4med G Remove: 1sm G

Replicate C 1lg G, 4med G Remove 1sm G

Replicate D 2med G, 3sm G

Replicate E 2med G, 3sm G Remove 1sm 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 1lg G, 1lg G w/1 B Shoot, 2 med G

Replicate B 3lg G, 1med G 1med G w/1 B shoot

Replicate C 2lg G, 3med G

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

Replicate E 2med G w/1 B shoot, 3med G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	85 mm	48 mm	77 mm	57 mm	mm
Replicate B	83 mm	78 mm	71 mm	86 mm	65 mm
Replicate C	97 mm	65 mm	69 mm	76 mm	61 mm
Replicate D	79 mm	83 mm	65 mm	50 mm	11 mm
Replicate E	54 mm	70 mm	40 mm	55 mm	54 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1285.28	1348.0	1298.14
Replicate B	1296.42	1425.2	1313.39
Replicate C	1293.68	1386.6	1310.52
Replicate D	~~1296.61~~ 1296.61	1351.7	1304.96
Replicate E	1289.83	1346.9	1299.02

tin tare 1296.61 → Replicate D

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	86 mm	31 mm	140 mm	142 mm	mm
Replicate B	31 mm	33 mm	46 mm	60 mm	82 mm
Replicate C	58 mm	112 mm	70 mm	89 mm	46 mm
Replicate D	31 mm	38 mm	119 mm	6 mm	101 mm
Replicate E	85 mm	40 mm	51 mm	28 mm	41 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1291.06	1358.8	1295.86
Replicate B	1292.43	1405.7	1297.78
Replicate C	1286.80	1381.0	1292.43
Replicate D	1296.10	1367.7	1299.76
Replicate E	1297.63	1335.9	1300.38

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 2:09 PM
Test Link: 14-0075-2468/B160701psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	15-2916-1027	**Test Type:**	Plant Chronic	**Duration:**	28d 0h
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:	05 Jul-06	**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06 12:00 AM	**Brine:**			

Sample No:	05-2474-4754	**Code:**	B1607-01	**Client:**	
Sample Date:	16 May-06 04:00 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	21d 8h	**Station:**			

Comments: J11K10

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
09-7274-7276	% Germination	100	> 100	N/A	11.51%	Wilcoxon Rank Sum Two-Sample
17-8375-3931	Average Height (mm)	< 100	100	N/A	13.73%	Equal Variance t Two-Sample
09-4434-8220	Average Length (mm)	< 100	100	N/A	21.91%	Equal Variance t Two-Sample
12-2358-3328	Average AG Wt (Wet, mg)	< 100	100	N/A	32.14%	Equal Variance t Two-Sample
05-1082-0854	Average AG Wt (Dry, mg)	< 100	100	N/A	30.76%	Equal Variance t Two-Sample
17-8788-1143	Average Root Wt. (Wet, mg	100	> 100	N/A	33.42%	Equal Variance t Two-Sample
12-4126-4935	Average Root Wt. (Dry, mg)	100	> 100	N/A	26.35%	Equal Variance t Two-Sample
04-8138-0981	Average Total Wt (Wet, mg	100	> 100	N/A	31.81%	Equal Variance t Two-Sample
16-0918-3359	Average Total Wt (Dry, mg)	< 100	100	N/A	29.18%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 2:09 PM
Test Link: 14-0075-2468/B160701psc

% Germination Summary

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

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	65.84	54.6	76.6	4.3079	9.6327	14.63%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	66.640	49	99.800	9.4941	21.229	31.86%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	16.490	11.018	25.756	2.7075	6.0541	36.71%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	2.69700	1.67000	3.39399	0.38710	0.86559	32.09%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	16.081	7.6540	22.654	2.5066	5.6049	34.86%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.93560	0.55000	1.19998	0.12537	0.28033	29.96%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	32.571	19.068	48.41	5.0452	11.281	34.64%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	3.63260	2.38801	4.49399	0.50541	1.13012	31.11%

CETIS Test Summary

Report Date: 19 Jul-06 2:09 PM
Test Link: 14-0075-2468/B160701psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		66.8000	76.6	73.6	57.6	54.6

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		99.8000	50.4000	75	59	49

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		15.68	25.756	18.584	11.018	11.4140

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		3.21500	3.39399	3.36799	1.67000	1.83801

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		16.935	22.654	18.84	14.32	7.65400

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		1.19998	1.07000	1.12600	0.73201	0.55000

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		32.615	48.41	37.424	25.338	19.0680

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		4.41498	4.46399	4.49399	2.40200	2.38801

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	11.51%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	27.5		0.5000	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0	0	1	0.00	1.00000	Non-Significant Effect
Error	0.0907326	0.011342	8			
Total	0.09073264	0.0113416	9			

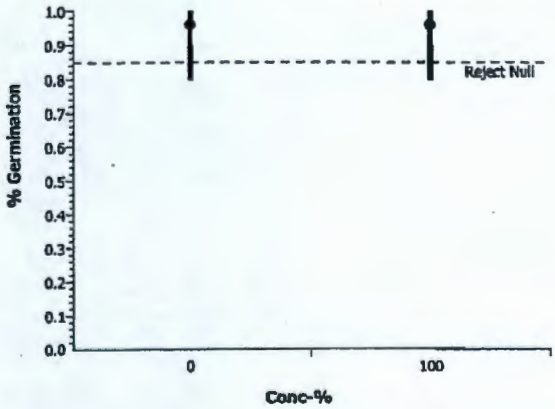
ANOVA Assumptions

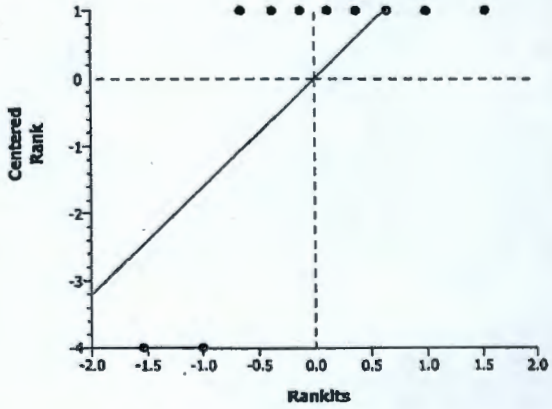
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00000	23.15450	1.00000	Equal Variances
Distribution	Shapiro-Wilk W	0.50927		0.00000	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	5.50000	1.50000	6.50000	2.23607
100		5	0.96000	0.80000	1.00000	0.08944	5.50000	1.50000	6.50000	2.23607

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	13.73%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.08833	1.85955	0.0351	10.6854	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	360	360	1	4.36	0.07020	Non-Significant Effect
Error	660.384	82.548	8			
Total	1020.38403	442.54800	9			

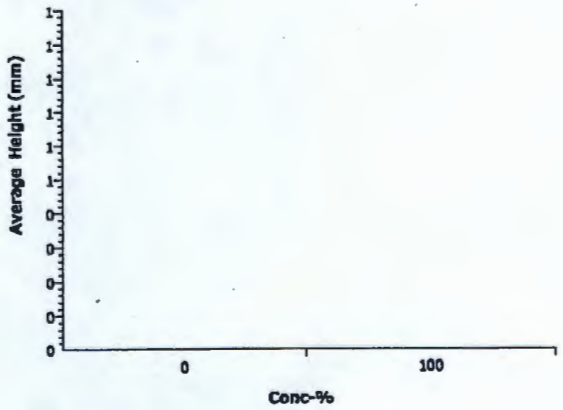
ANOVA Assumptions

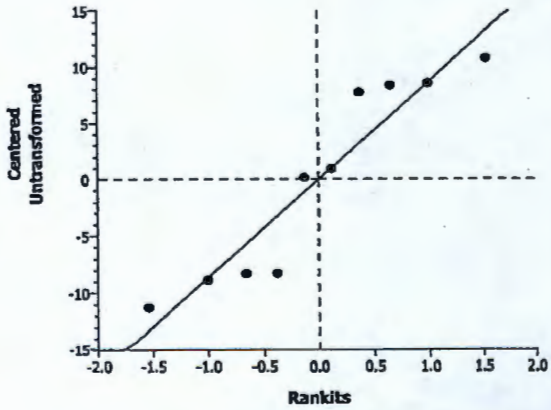
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.28323	23.15450	0.81488	Equal Variances
Distribution	Shapiro-Wilk W	0.86502		0.08742	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	65.84	54.6	76.6	9.6327				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	21.91%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.99433	1.85955	0.0086	22.5556	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3297.856	3297.856	1	8.97	0.01722	Significant Effect
Error	2942.544	367.818	8			
Total	6240.40015	3665.674	9			

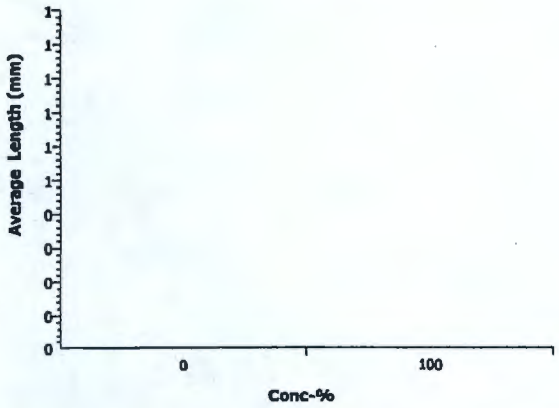
ANOVA Assumptions

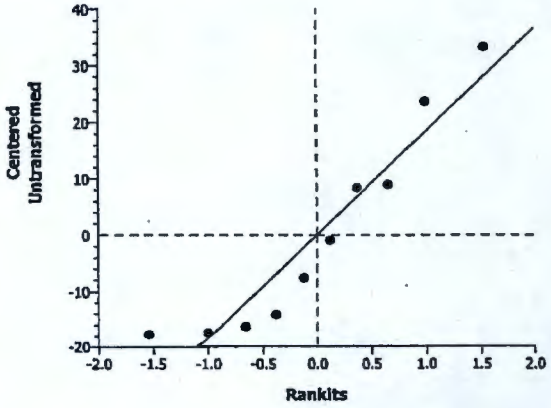
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.58165	23.15450	0.66777	Equal Variances
Distribution	Shapiro-Wilk W	0.88536		0.15028	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	66.640	49	99.8	21.229				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.14%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.87248	1.85955	0.0490	7.83741	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	155.7055	155.7055	1	3.51	0.09803	Non-Significant Effect
Error	355.2716	44.40895	8			
Total	510.977097	200.11447	9			

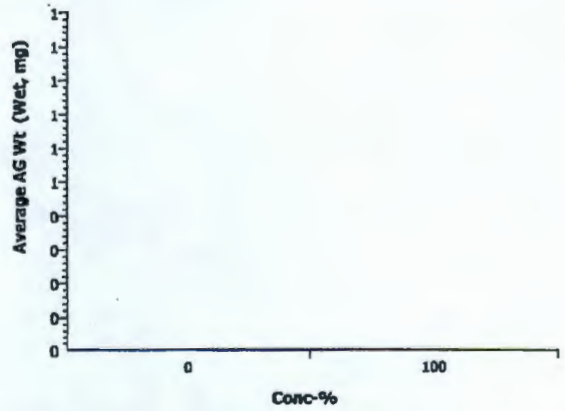
ANOVA Assumptions

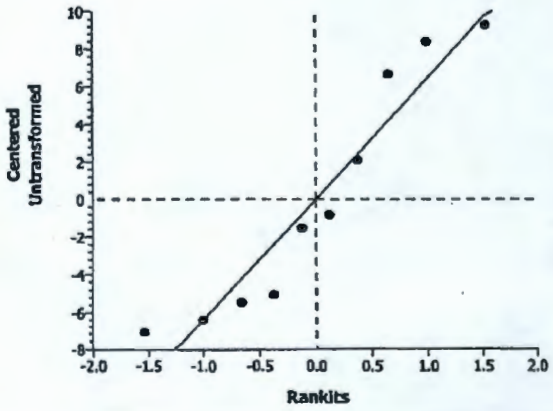
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.42328	23.15450	0.74066	Equal Variances
Distribution	Shapiro-Wilk W	0.88894		0.16496	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	16.490	11.018	25.756	6.0541				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	30.76%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.34565	1.85955	0.0235	1.35571	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7.311106	7.311106	1	5.50	0.04700	Significant Effect
Error	10.63031	1.328788	8			
Total	17.9414124	8.6398945	9			

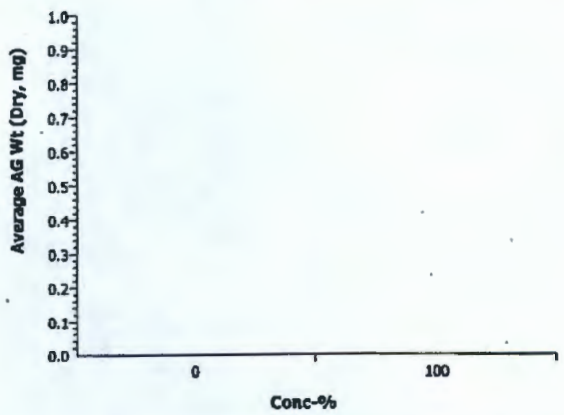
ANOVA Assumptions

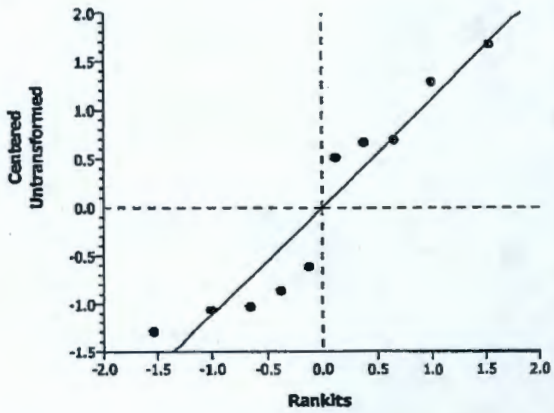
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.54704	23.15450	0.38726	Equal Variances
Distribution	Shapiro-Wilk W	0.89098		0.17392	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	2.69700	1.67000	3.39399	0.86559				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	33.42%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.77374	1.85955	0.2307	6.24196	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	16.86363	16.86363	1	0.60	0.46134	Non-Significant Effect
Error	225.3494	28.16868	8			
Total	242.213041	45.032307	9			

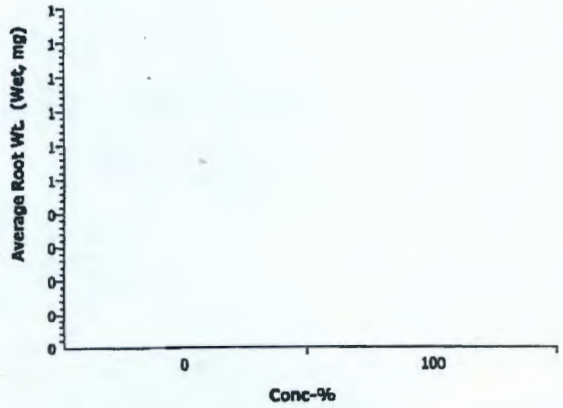
ANOVA Assumptions

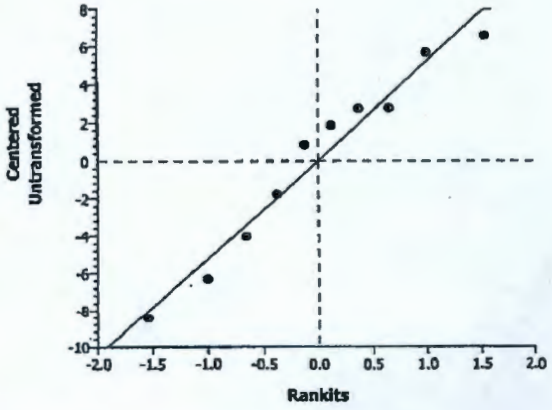
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.26053	23.15450	0.82789	Equal Variances
Distribution	Shapiro-Wilk W	0.94704		0.63359	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	16.081	7.6540	22.654	5.6049				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	26.35%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.01191	1.85955	0.1706	0.28778	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0613091	0.061309	1	1.02	0.34120	Non-Significant Effect
Error	0.4789946	0.059874	8			
Total	0.54030378	0.1211835	9			

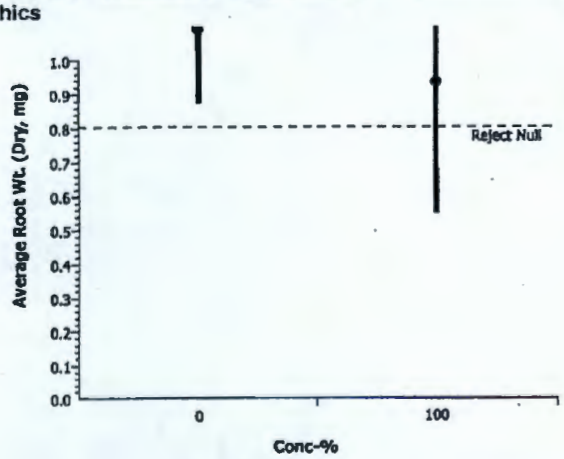
ANOVA Assumptions

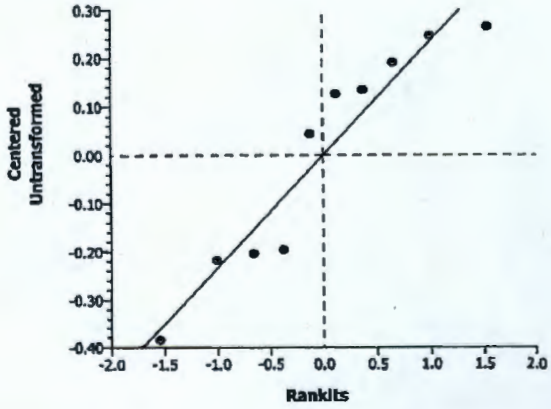
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.90926	23.15450	0.54645	Equal Variances
Distribution	Shapiro-Wilk W	0.89294		0.18295	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.93560	0.55000	1.19998	0.28033				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:49 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	31.81%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.4238	1.85955	0.0962	13.6993	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	275.0535	275.0535	1	2.03	0.19232	Non-Significant Effect
Error	1085.454	135.6818	8			
Total	1360.50787	410.73532	9			

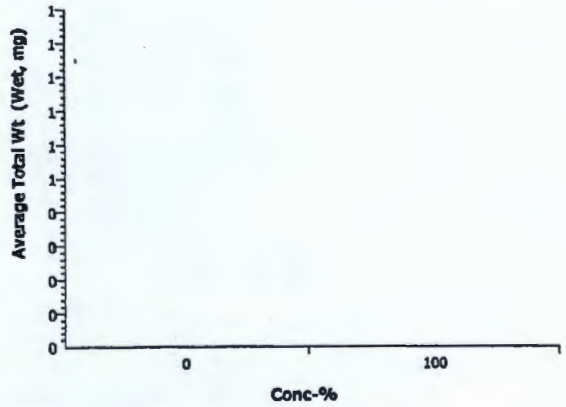
ANOVA Assumptions

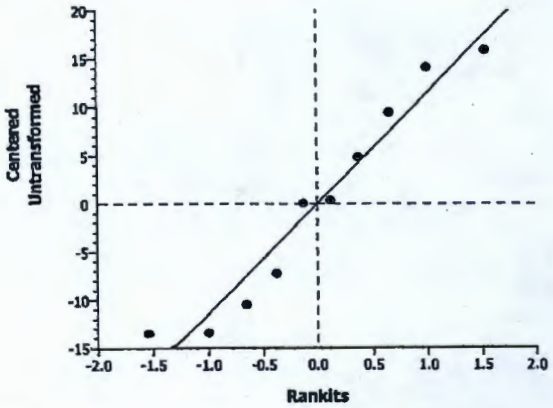
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.13222	23.15450	0.90711	Equal Variances
Distribution	Shapiro-Wilk W	0.92206		0.37447	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	32.571	19.068	48.41	11.281				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:49 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.18%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.16337	1.85955	0.0312	1.60454	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	8.711427	8.711427	1	4.68	0.06246	Non-Significant Effect
Error	14.89081	1.861352	8			
Total	23.6022396	10.572778	9			

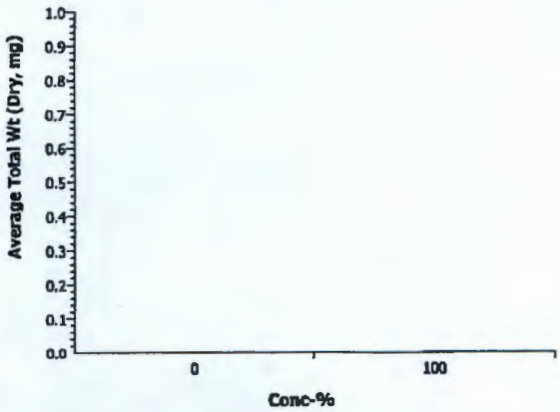
ANOVA Assumptions

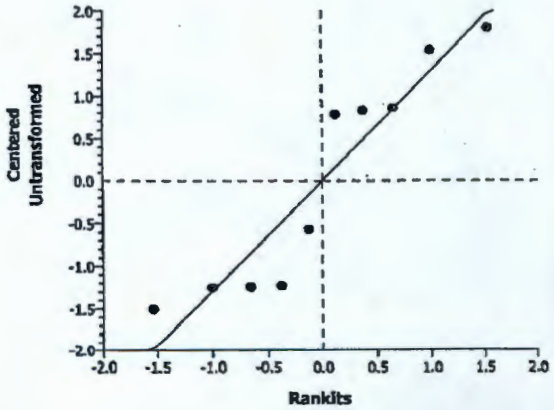
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.91480	23.15450	0.54469	Equal Variances
Distribution	Shapiro-Wilk W	0.85910		0.07446	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	3.63260	2.38801	4.49399	1.13012				

Graphics





Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

7-5-06

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day NJ Day NJ

Bioassay Lab ID: BG 1607-02 Sample No: JUK04

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 (14 days after 2(planting)	14-DAYS POST-EMERGENCE (26 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	5	5	5	5		5	5	5	8.9	7.9
	B	2	4	6	6		5	6 → 5	5		
	C	6	6	6	6		5	6 → 5	5		
	D	4	5	5	5		5	5	5		
	E	3	3	3	3		3	3	3		

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

Replicate A 2lg G, 1med G, 2sm G

Replicate B 1lg G, 4med G, Remove: 1sm B

Replicate C 2lg G, 3 med G Remove 1med G

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

Replicate E 3lg 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 2lg G, 1med G, 2sm G

Replicate B 1lg G, 2med G, 2sm G

Replicate C 1lg G, 1lg G w/2 B shoots, 3 med G

Replicate D 1lg G, 3med G, 1sm G

Replicate E 3lg G

Measure Shoot Height:

Individual height of each seedling (above ground)

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	72 mm	45 mm	5 mm	89 mm	110 mm
Replicate B	83 mm	62 mm	48 mm	42 mm	58 mm
Replicate C	79 mm	50 mm	58 mm	89 mm	60 mm
Replicate D	83 mm	48 mm	70 mm	65 mm	72 mm
Replicate E	81 mm	88 mm	87 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	1287.61	1394.4	1303.09
Replicate B	1285.24	1344.4	1294.10
Replicate C	1283.86	1378.0	1297.69
Replicate D	1279.95	1379.2	1295.65
Replicate E	1282.70	1357.1	1295.54

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	100 mm	4 mm	56 mm	34 mm	141 mm
Replicate B	36 mm	50 mm	55 mm	31 mm	44 mm
Replicate C	128 mm	53 mm	36 mm	107 mm	34 mm
Replicate D	104 mm	86 mm	42 mm	64 mm	151 mm
Replicate E	118 mm	83 mm	72 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	1286.03	~~1442.7~~ 1421	1290.41
Replicate B	1267.31	1330.9	1270.02
Replicate C	1283.92	1365.1	1287.17
Replicate D	1282.43	1394.3	1287.23
Replicate E	1282.13	1376.8	1285.48

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 2:08 PM
Test Link: 03-0780-2116/B160702psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	08-5786-2300	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	06-9112-3540	**Code:**	B1607-02	**Client:**	
Sample Date:	17 May-06 12:57 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	20d 11h	**Station:**			

Comments: J11K04

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
06-7336-5700	% Germination	100	> 100	N/A	16.82%	Wilcoxon Rank Sum Two-Sample
19-0704-1634	Average Height (mm)	100	> 100	N/A	14.04%	Equal Variance t Two-Sample
14-9155-9465	Average Length (mm)	< 100	100	N/A	20.82%	Equal Variance t Two-Sample
19-0385-9231	Average AG Wt (Wet, mg)	100	> 100	N/A	29.51%	Equal Variance t Two-Sample
07-4092-0913	Average AG Wt (Dry, mg)	< 100	100	N/A	31.10%	Equal Variance t Two-Sample
07-0730-1229	Average Root Wt. (Wet, mg	100	> 100	N/A	40.91%	Equal Variance t Two-Sample
02-2704-3987	Average Root Wt. (Dry, mg)	< 100	100	N/A	23.50%	Equal Variance t Two-Sample
03-4725-4822	Average Total Wt (Wet, mg	100	> 100	N/A	33.12%	Equal Variance t Two-Sample
14-3265-9601	Average Total Wt (Dry, mg)	< 100	100	N/A	29.09%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 2:08 PM
Test Link: 03-0780-2116/B160702psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.92000	0.60000	1.00000	0.08000	0.17889	19.44%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	68.58	58.6	85.300	4.4789	10.015	14.60%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	72.440	43.200	91	8.7103	19.477	26.89%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	19.334	11.832	24.800	2.1304	4.7638	24.64%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	3.01081	1.77200	4.28003	0.40184	0.89854	29.84%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	22.02	12.718	31.557	3.4499	7.7142	35.03%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.82893	0.54199	1.11666	0.10405	0.23266	28.07%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	41.353	24.55	56.357	5.4767	12.246	29.61%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	3.83973	2.31399	5.39669	0.50084	1.11991	29.17%

CETIS Test Summary

Report Date: 19 Jul-06 2:08 PM
Test Link: 03-0780-2116/B160702psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		64.2	58.6	67.2	67.6	85.3000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		67	43.2000	71.6	89.4000	91

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		21.3580	11.8320	18.8280	19.8500	24.8000

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		3.09600	1.77200	2.76599	3.14001	4.28003

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		27.214	12.718	16.236	22.374	31.5567

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.87600	0.54199	0.65000	0.95999	1.11666

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		48.572	24.55	35.064	42.224	56.3567

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		3.97200	2.31399	3.41599	4.10000	5.39669

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	03-0780-2116	03-0780-2116	19 Jul-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	16.82%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	27		0.5000	4	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	0.18	0.68038	Non-Significant Effect
Error	0.2140623	0.026758	8			
Total	0.21894955	0.0316451	9			

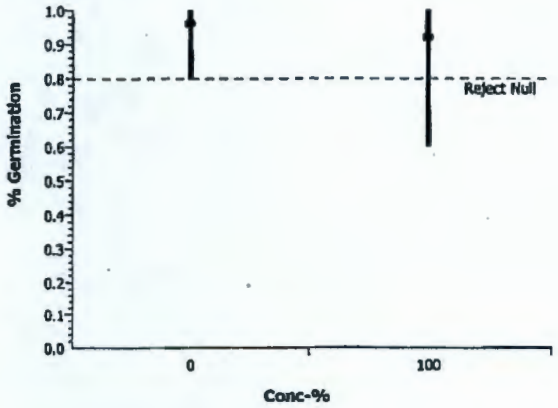
ANOVA Assumptions

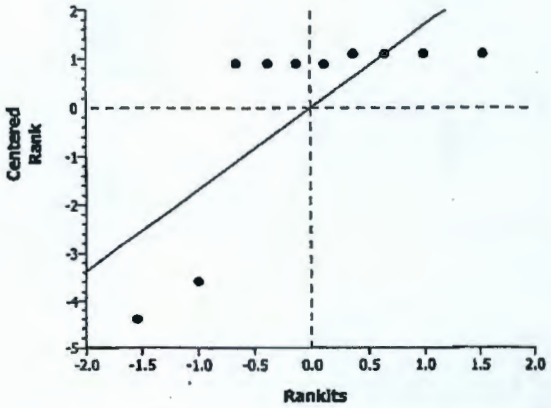
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.71853	23.15450	0.23141	Equal Variances
Distribution	Shapiro-Wilk W	0.64384		0.00019	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	5.60000	2.00000	6.50000	2.01246
100		5	0.92000	0.60000	1.00000	0.17889	5.40000	1.00000	6.50000	2.45967

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	03-0780-2116	03-0780-2116	19 Jul-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	14.04%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.57603	1.85955	0.0768	10.9259	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	214.369	214.369	1	2.48	0.15367	Non-Significant Effect
Error	690.4402	86.30502	8			
Total	904.809219	300.67406	9			

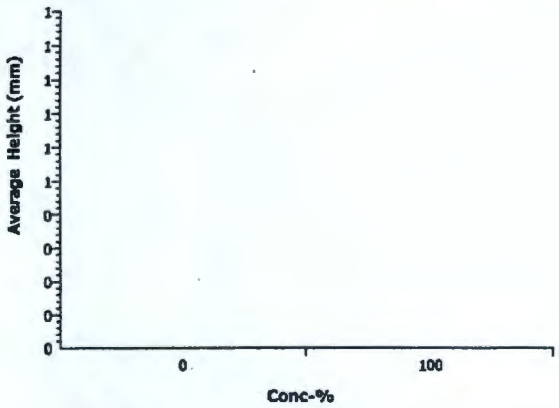
ANOVA Assumptions

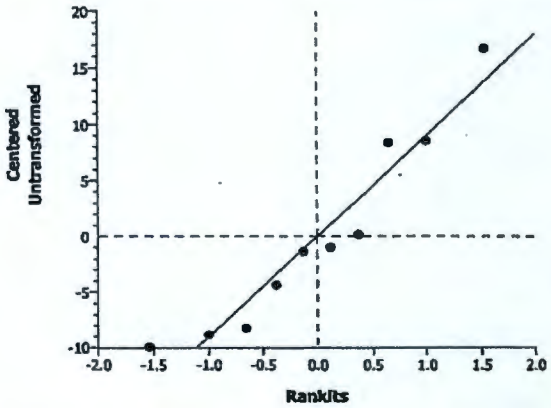
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.38715	23.15450	0.75886	Equal Variances
Distribution	Shapiro-Wilk W	0.91786		0.33946	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	68.58	58.6	85.3	10.015				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	03-0780-2116	03-0780-2116	19 Jul-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	20.82%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.64782	1.85955	0.0147	21.434	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2328.676	2328.676	1	7.01	0.02935	Significant Effect
Error	2657.184	332.148	8			
Total	4985.85986	2660.8240	9			

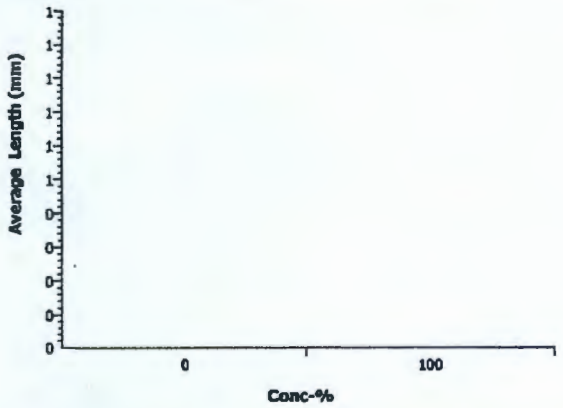
ANOVA Assumptions

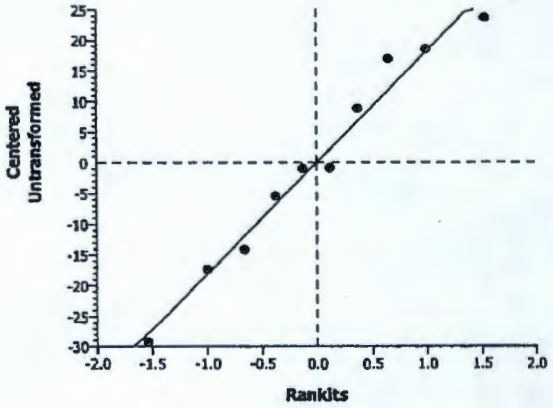
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.33129	23.15450	0.78828	Equal Variances
Distribution	Shapiro-Wilk W	0.96293		0.81870	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	72.440	43.2	91	19.477				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	03-0780-2116	03-0780-2116	19 Jul-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	29.51%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.30479	1.85955	0.1141	7.19527	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	63.72332	63.72332	1	1.70	0.22825	Non-Significant Effect
Error	299.4398	37.42998	8			
Total	363.163174	101.15331	9			

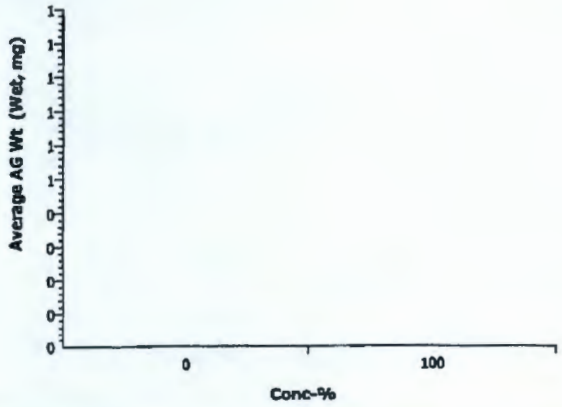
ANOVA Assumptions

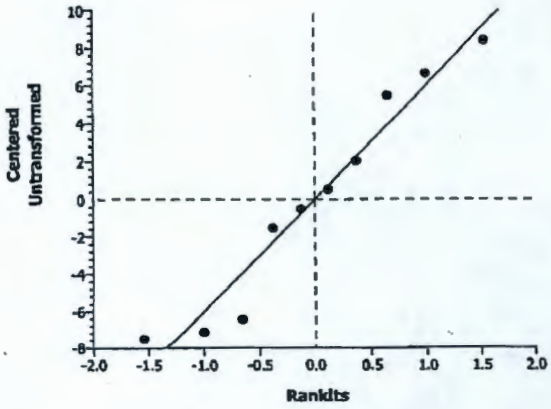
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.29867	23.15450	0.43997	Equal Variances
Distribution	Shapiro-Wilk W	0.92793		0.42789	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	19.334	11.832	24.800	4.7638				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	03-0780-2116	03-0780-2116	19 Jul-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	31.10%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.89461	1.85955	0.0474	1.37045	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	4.874084	4.874084	1	3.59	0.09475	Non-Significant Effect
Error	10.86282	1.357852	8			
Total	15.7369003	6.2319356	9			

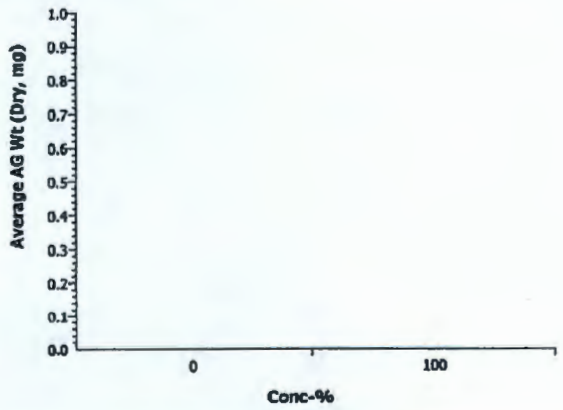
ANOVA Assumptions

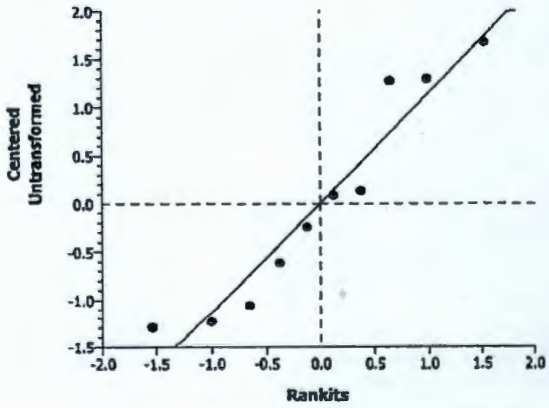
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.36366	23.15450	0.42520	Equal Variances
Distribution	Shapiro-Wilk W	0.90600		0.25466	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	3.01081	1.77200	4.28003	0.89854				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	03-0780-2116	03-0780-2116	19 Jul-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	40.91%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.8133	1.85955	0.7802	7.64138	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	27.92133	27.92133	1	0.66	0.43960	Non-Significant Effect
Error	337.7219	42.21523	8			
Total	365.643192	70.136562	9			

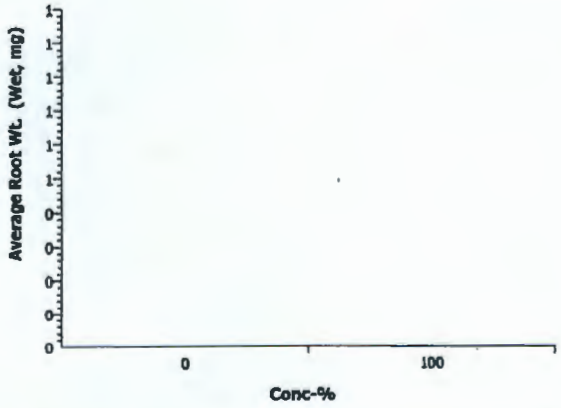
ANOVA Assumptions

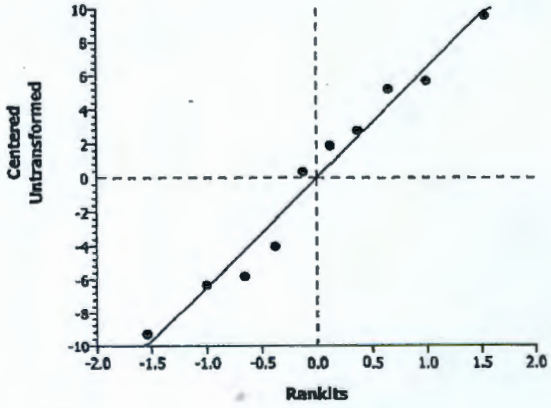
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.38777	23.15450	0.41991	Equal Variances
Distribution	Shapiro-Wilk W	0.96007		0.78669	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	22.02	12.718	31.557	7.7142				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	03-0780-2116	03-0780-2116	19 Jul-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	23.50%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.90702	1.85955	0.0465	0.25672	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1732775	0.173278	1	3.64	0.09296	Non-Significant Effect
Error	0.381173	0.047647	8			
Total	0.55445053	0.2209241	9			

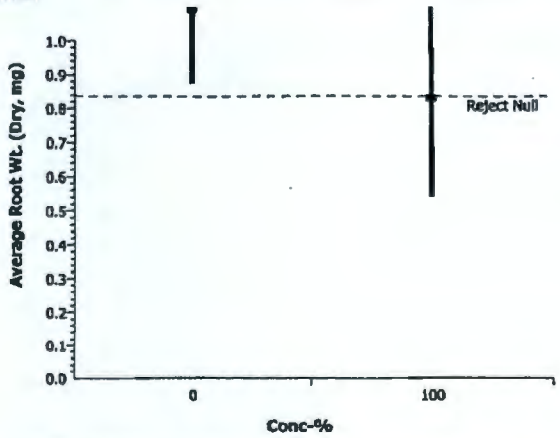
ANOVA Assumptions

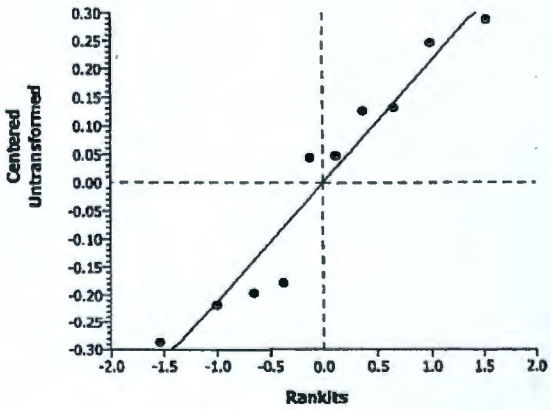
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.31512	23.15450	0.79709	Equal Variances
Distribution	Shapiro-Wilk W	0.91397		0.30941	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.82893	0.54199	1.11666	0.23266				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	03-0780-2116	03-0780-2116	19 Jul-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	33.12%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.22255	1.85955	0.4147	14.2608	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7.282578	7.282578	1	0.05	0.82946	Non-Significant Effect
Error	1176.257	147.0322	8			
Total	1183.53978	154.31473	9			

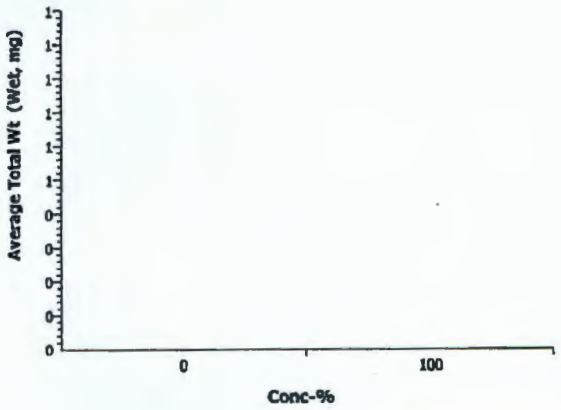
ANOVA Assumptions

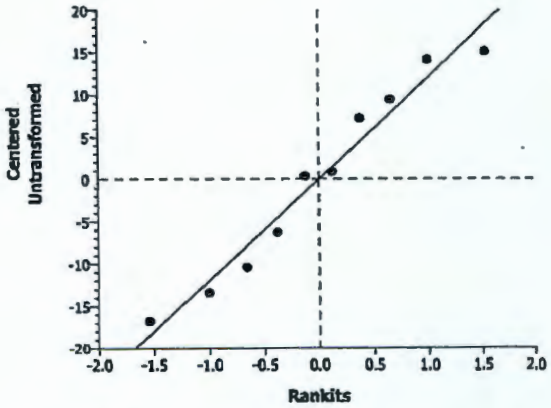
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.04076	23.15450	0.97004	Equal Variances
Distribution	Shapiro-Wilk W	0.93897		0.54162	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	41.353	24.55	56.357	12.246				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	03-0780-2116	03-0780-2116	19 Jul-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	29.09%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.92927	1.85955	0.0449	1.59959	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	6.88537	6.88537	1	3.72	0.08982	Non-Significant Effect
Error	14.79891	1.849864	8			
Total	21.6842828	8.7352339	9			

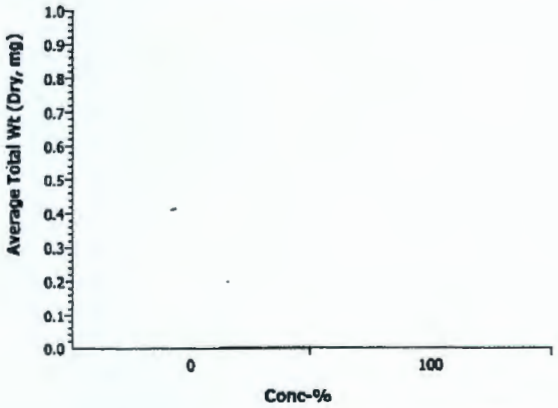
ANOVA Assumptions

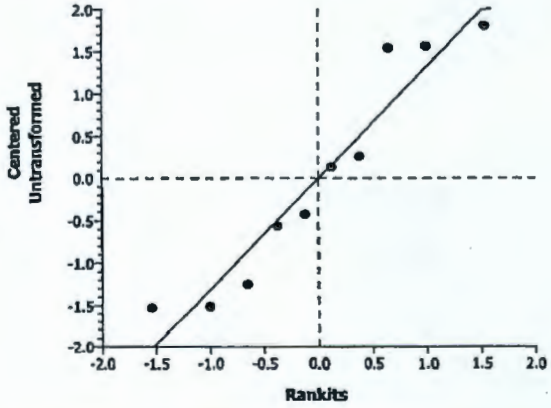
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.94988	23.15450	0.53369	Equal Variances
Distribution	Shapiro-Wilk W	0.89498		0.19282	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	3.83973	2.31399	5.39669	1.11991				

Graphics





BLUEGRASS GR

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day 21 NJ Day 25 NJ 7-5-06

Bioassay Lab ID: BG 1607-03 Sample No: J11K97

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 (19 days after 21 planting)	14-DAYS POST-EMERGENCE (23 days after planting)	pH INITIAL (@ planting)	pH FINAL (@ 14 days Post-Emergence)
Control	A	0	1	2	2		2	2	3	8.6	8.3
	B	1	1	4	4		4	4	4		
	C	1	1	1	2		3	2	3		
	D	3	3	3	3		4	4	4		
	E	0	0	1	1		1	1	1		

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

Replicate A: 2 Med G
Replicate B: 1 lg G, 2 med G, 1 sm G
Replicate C: 1 Med G, 1 sm G
Replicate D: 1 lg G, 2 med G, 1 sm G
Replicate E: 1 med G w/1 B shoot

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 med G, 1 sm G
Replicate B: 1 lg G, 2 med G, 1 sm G
Replicate C: 1 med G, 2 sm G
Replicate D: 2 lg G, 1 med G, 1 sm G
Replicate E: 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	51 mm	22 mm	41 mm	mm	mm
Replicate B	38 mm	93 mm	52 mm	47 mm	mm
Replicate C	14 mm	69 mm	37 mm	mm	mm
Replicate D	70 mm	141 mm	82 mm	29 mm	mm
Replicate E	44 mm	mm	mm	mm	mm

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

	Tin Tare WL (mg)	Wet Wt (mg)	Dry WL (mg)
Replicate A	1285.46	1302.6	1287.53
Replicate B	1289.89	1334.6	~~1282.75~~ @ 1297.01
Replicate C	1294.89	1311.7	1297.07
Replicate D	1287.05	1359.9	1300.40
Replicate E	1293.42	1299.8	1294.33

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	57 mm	8 mm	52 mm	mm	mm
Replicate B	17 mm	33 mm	41 mm	36 mm	mm
Replicate C	7 mm	16 mm	46 mm	mm	mm
Replicate D	22 mm	115 mm	122 mm	68 mm	mm
Replicate E	37 mm	mm	mm	mm	mm

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

	Tin Tare WL (mg)	Wet Wt (mg)	Dry WL (mg)
Replicate A	~~1296.79~~ 1289.56	1297.3	1290.36
Replicate B	~~1292.65~~ 1280.92	1307.3	1282.75
Replicate C	1294.47	1304.0	1294.92
Replicate D	~~1292.65~~ 1292.64	1345.2	1296.39
Replicate E	~~1296.79~~ 1296.77	1298.4	1296.84

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 2:12 PM
Test Link: 19-0444-8574/B160703psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	08-7221-5092	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	07-1215-2851	**Code:**	B1607-03	**Client:**	
Sample Date:	17 May-06 05:57 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	20d 6h	**Station:**			

Comments: J11K97

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
09-2283-2326	% Germination	< 100	100	N/A	20.56%	Equal Variance t Two-Sample
16-5582-9022	Average Height (mm)	< 100	100	N/A	20.93%	Equal Variance t Two-Sample
02-8980-8646	Average Length (mm)	< 100	100	N/A	23.22%	Equal Variance t Two-Sample
05-4288-6540	Average AG Wt (Wet, mg)	< 100	100	N/A	30.82%	Equal Variance t Two-Sample
04-3496-9037	Average AG Wt (Dry, mg)	< 100	100	N/A	33.61%	Equal Variance t Two-Sample
08-8644-1811	Average Root Wt. (Wet, mg	< 100	100	N/A	30.53%	Equal Variance t Two-Sample
10-6504-7665	Average Root Wt. (Dry, mg)	< 100	100	N/A	30.53%	Equal Variance t Two-Sample
08-2836-5557	Average Total Wt (Wet, mg	< 100	100	N/A	30.29%	Equal Variance t Two-Sample
06-9987-2823	Average Total Wt (Dry, mg)	< 100	100	N/A	32.36%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 2:12 PM
Test Link: 19-0444-8574/B160703psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.60000	0.20000	0.80000	0.10954	0.24495	40.82%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	52	38	80.5	7.8946	17.653	33.95%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	41.180	23	81.800	10.404	23.264	56.49%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	9.4173	5.6033	18.212	2.4284	5.4301	57.66%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	1.48881	0.69002	3.33749	0.50282	1.12433	75.52%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	5.4243	1.6300	13.14	2.1029	4.7022	86.69%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.37632	0.06995	0.93750	0.15470	0.34591	91.92%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	14.842	8.0100	31.352	4.5138	10.093	68.01%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	1.86513	0.87667	4.27499	0.65315	1.46049	78.30%

CETIS Test Summary

Report Date: 19 Jul-06 2:12 PM
Test Link: 19-0444-8574/B160703psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.80000	1.00000	1.00000
100		0.60000	0.80000	0.60000	0.80000	0.20000

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		38	57.5	40	80.5	44

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		32.3	31.8	23	81.8000	37

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		5.71334	11.1775	5.60331	18.2125	6.38000

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		0.69002	1.78000	0.72664	3.33749	0.90991

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		2.58	6.59500	3.17668	13.14	1.63000

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.26664	0.45749	0.15002	0.93750	0.06995

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		8.29333	17.7725	8.77999	31.3525	8.01001

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		0.95667	2.23749	0.87667	4.27499	0.97986

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	19-0444-8574	19-0444-8574	19 Jul-06 2:12 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	20.56%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.21522	1.85955	0.0062	0.23576	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.4154182	0.415418	1	10.34	0.01233	Significant Effect
Error	0.3214806	0.040185	8			
Total	0.73689884	0.4556033	9			

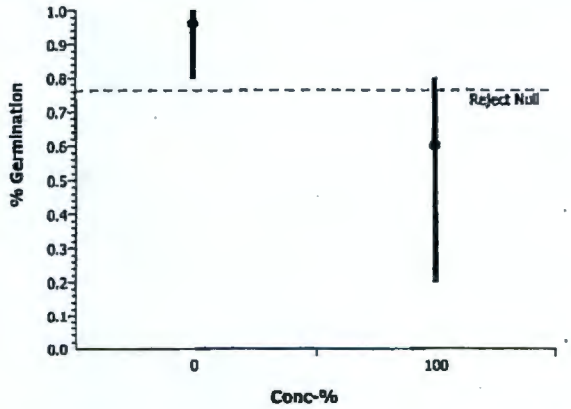
ANOVA Assumptions

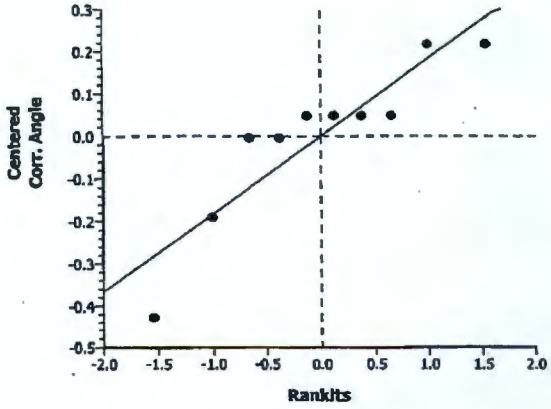
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.08633	23.15450	0.10824	Equal Variances
Distribution	Shapiro-Wilk W	0.84328		0.04830	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
100		5	0.60000	0.20000	0.80000	0.24495	0.89002	0.46365	1.10715	0.26273

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	19-0444-8574	19-0444-8574	19 Jul-06 2:12 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	20.93%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.94883	1.85955	0.0092	16.2948	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1669.264	1669.264	1	8.70	0.01846	Significant Effect
Error	1535.732	191.9665	8			
Total	3204.99597	1861.2304	9			

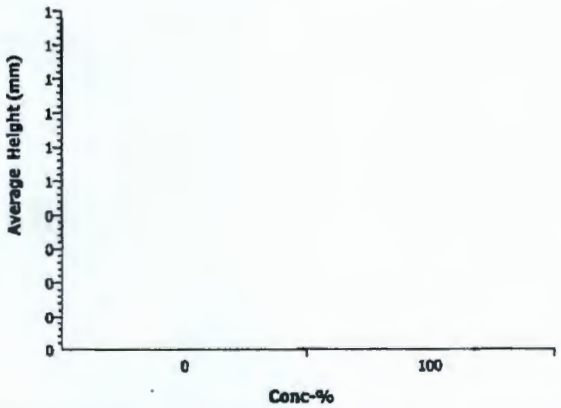
ANOVA Assumptions

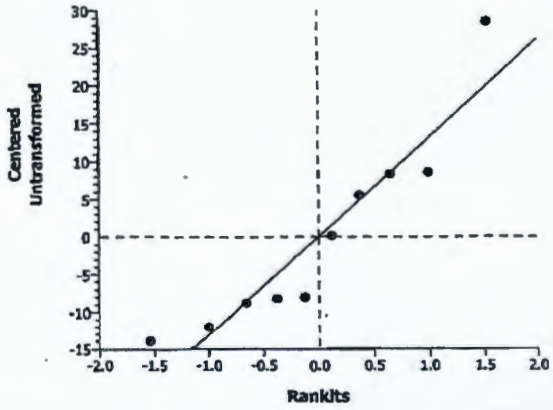
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.30969	23.15450	0.18610	Equal Variances
Distribution	Shapiro-Wilk W	0.88410		0.14539	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	52	38	80.5	17.653				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M HIII**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	19-0444-8574	19-0444-8574	19 Jul-06 2:12 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	23.22%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.80622	1.85955	0.0007	23.903	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	9541.921	9541.921	1	23.10	0.00134	Significant Effect
Error	3304.6	413.075	8			
Total	12846.5212	9954.9959	9			

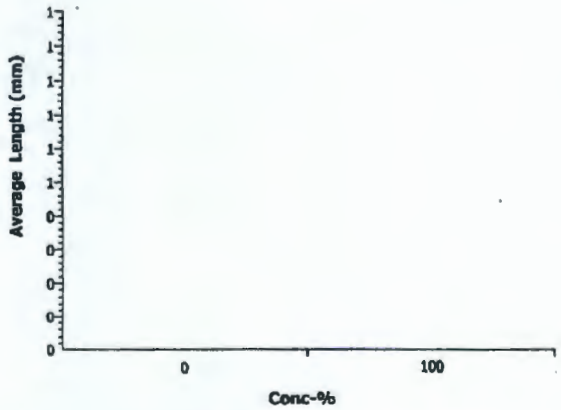
ANOVA Assumptions

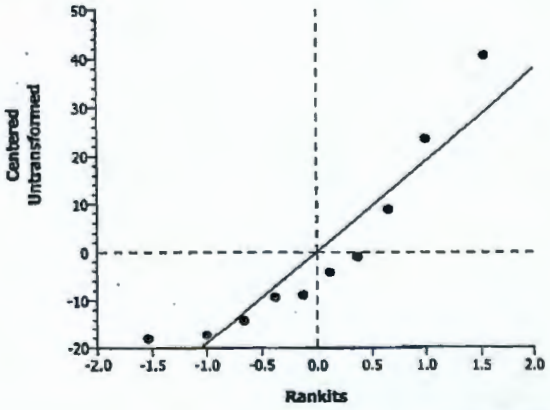
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.89930	23.15450	0.54965	Equal Variances
Distribution	Shapiro-Wilk W	0.86208		0.08075	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	41.180	23	81.8	23.264				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	19-0444-8574	19-0444-8574	19 Jul-06 2:12 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	30.82%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.7032	1.85955	0.0030	7.51461	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	559.876	559.876	1	13.71	0.00601	Significant Effect
Error	326.6085	40.82606	8			
Total	886.484528	600.7021	9			

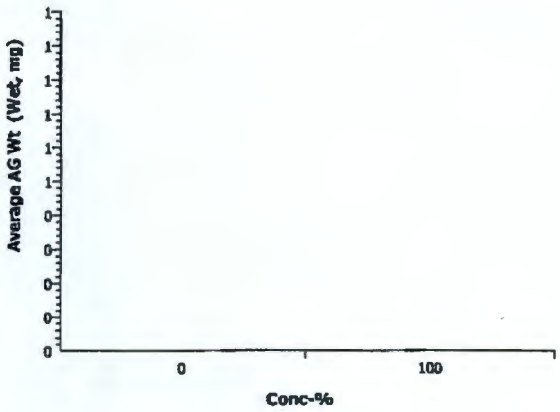
ANOVA Assumptions

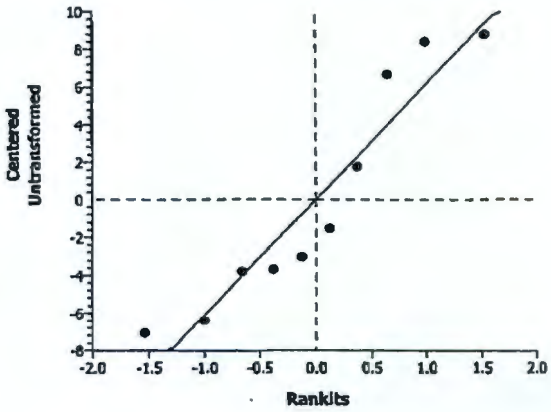
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.76917	23.15450	0.59407	Equal Variances
Distribution	Shapiro-Wilk W	0.88151		0.13581	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	9.4173	5.6033	18.212	5.4301				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	19-0444-8574	19-0444-8574	19 Jul-06 2:12 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	33.61%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.66365	1.85955	0.0032	1.48122	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	21.29095	21.29095	1	13.42	0.00637	Significant Effect
Error	12.68986	1.586232	8			
Total	33.980814	22.877187	9			

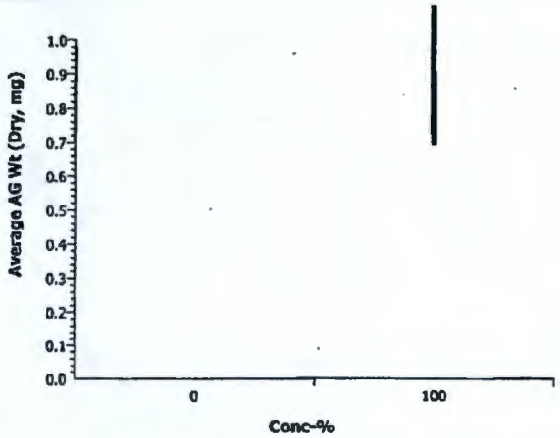
ANOVA Assumptions

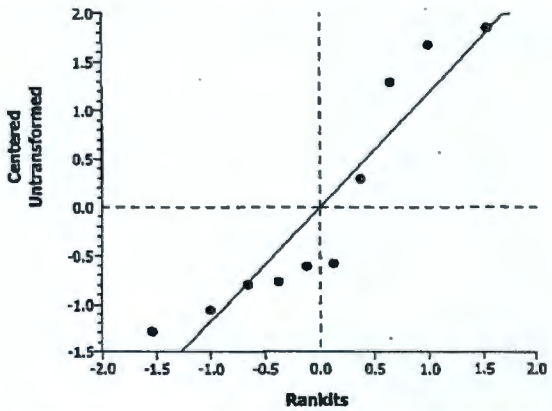
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.50961	23.15450	0.69959	Equal Variances
Distribution	Shapiro-Wilk W	0.84777		0.05465	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	1.48881	0.69002	3.33749	1.12433				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	19-0444-8574	19-0444-8574	19 Jul-06 2:12 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	30.53%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	4.32132	1.85955	0.0013	5.70323	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	439.1356	439.1356	1	18.67	0.00254	Significant Effect
Error	188.1295	23.51618	8			
Total	627.265091	462.65180	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.12718	23.15450	0.91043	Equal Variances
Distribution	Shapiro-Wilk W	0.95048		0.67423	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	5.4243	1.6300	13.14	4.7022				

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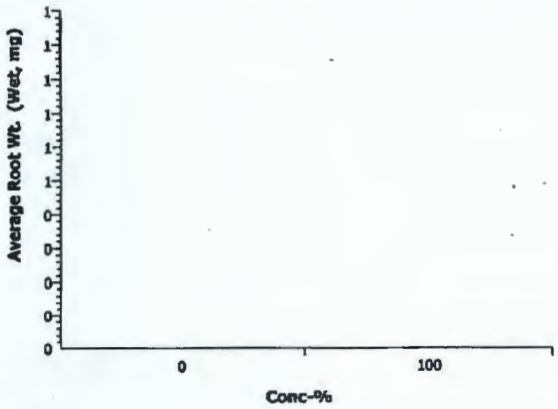
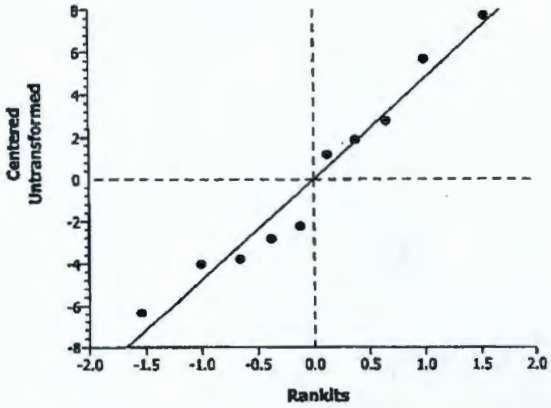




CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	19-0444-8574	19-0444-8574	19 Jul-06 2:12 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	30.53%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.99172	1.85955	0.0020	0.33349	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.281199	1.281199	1	15.93	0.00400	Significant Effect
Error	0.64326	0.080408	8			
Total	1.92445922	1.3616067	9			

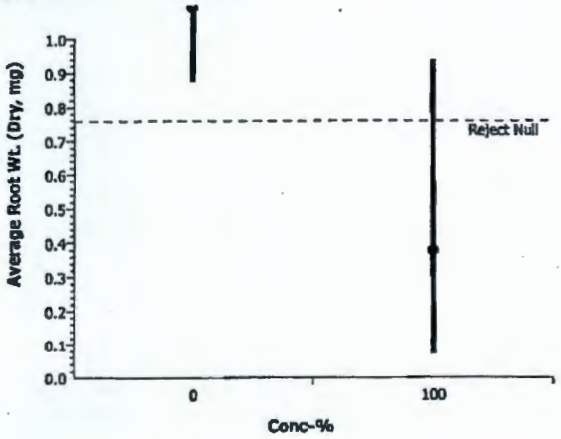
ANOVA Assumptions

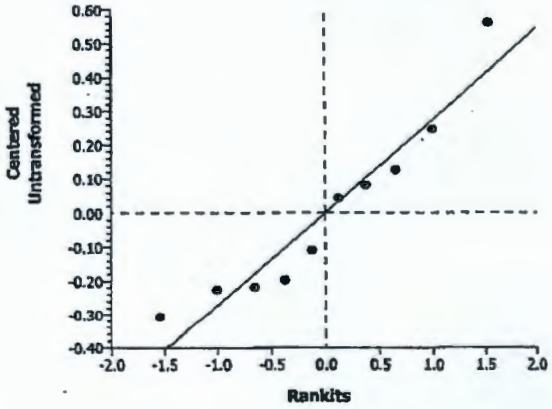
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.90696	23.15450	0.32600	Equal Variances
Distribution	Shapiro-Wilk W	0.91477		0.31541	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.37632	0.06995	0.93750	0.34591				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	19-0444-8574	19-0444-8574	19 Jul-06 2:12 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	30.29%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.02326	1.85955	0.0019	13.0425	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1990.7	1990.7	1	16.19	0.00382	Significant Effect
Error	983.8741	122.9843	8			
Total	2974.57434	2113.6845	9			

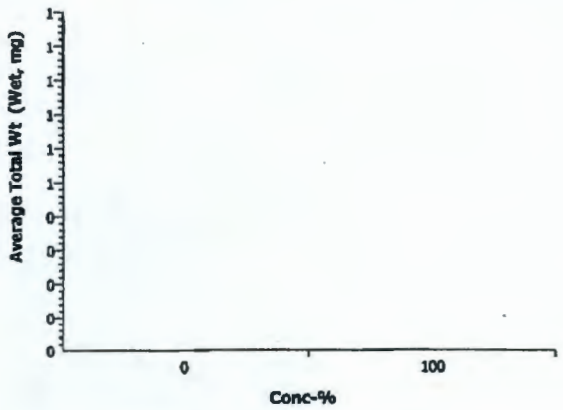
ANOVA Assumptions

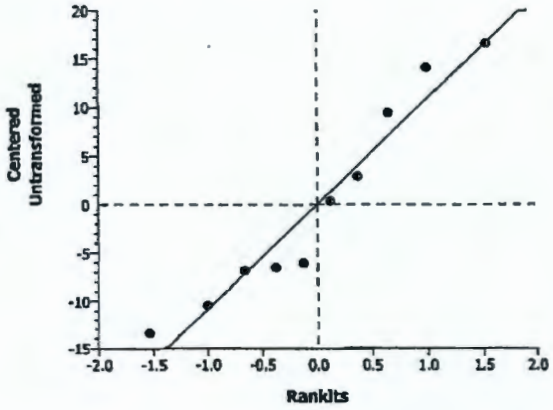
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.41446	23.15450	0.74504	Equal Variances
Distribution	Shapiro-Wilk W	0.92368		0.38864	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	14.842	8.0100	31.352	10.093				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	19-0444-8574	19-0444-8574	19 Jul-06 2:12 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	32.36%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.79773	1.85955	0.0026	1.77946	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	33.01781	33.01781	1	14.42	0.00525	Significant Effect
Error	18.31429	2.289286	8			
Total	51.3320999	35.307100	9			

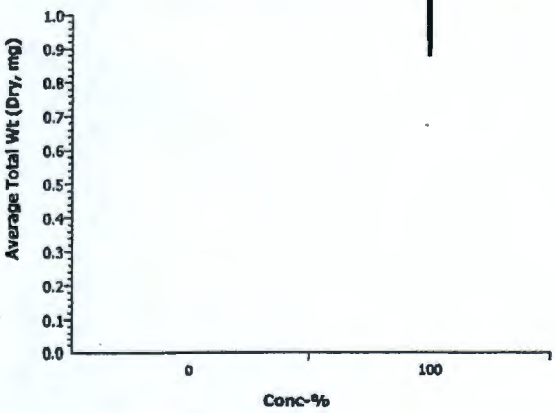
ANOVA Assumptions

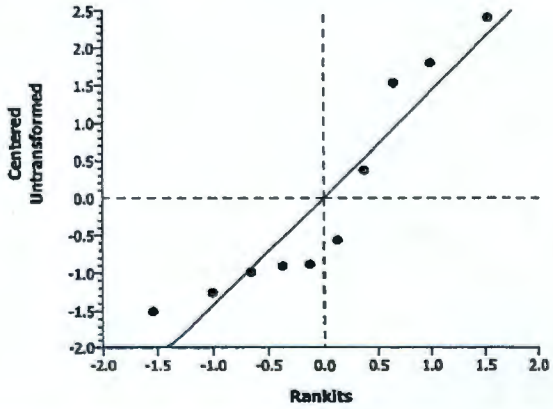
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.14650	23.15450	0.89778	Equal Variances
Distribution	Shapiro-Wilk W	0.85888		0.07402	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	1.86513	0.87667	4.27499	1.46049				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

7-5-06

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 18 NJ Day 19 TP Day 21 NJ Day 23 TP Day ___ Day 25 BW

Bioassay Lab ID: BG 1607-04 Sample No: J115T6

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 (~~14~~ 21 days after planting)	14-DAYS POST-EMERGENCE (25 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	3	5	5	6		6	6→5	5	8.4	7.3
	B	1	1	2	2		4	2	3		
	C	2	4	5	5		5	5	5		
	D	0	1	2	2		2	2	3		
	E	1	3	3	3		3	3	3		

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

Replicate A: 4 ~~3~~ med, 1sm G Remove: 1sm G

Replicate B: 1 med G, 1sm G

Replicate C: 3 med G, 2sm G

Replicate D: 1 med G, 1sm G

Replicate E: 1lg G, 2 med G

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

14-Days Post-Emergence: Describe shoot appearance:

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

Replicate B: 1 med G, 2sm G

Replicate C: 1lg G, 4 med G

Replicate D: 2 med G, 1sm G

Replicate E: 1lg G, 2 med G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	76 mm	78 mm	58 mm	59 mm	32 mm
Replicate B	69 mm	16 mm	15 mm	mm	mm
Replicate C	80 mm	52 mm	45 mm	50 mm	55 mm
Replicate D	78 mm	27 mm	65 mm	mm	mm
Replicate E	56 mm	51 mm	96 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	1284.45	1331.7	1290.10
Replicate B	1289.54	1309.4	1292.89
Replicate C	1290.88	1354.4	1299.51
Replicate D	1283.40	1304.0	1285.43
Replicate E	1275.21	1330.6	~~1296.37~~ 1283.49

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	26 mm	60 mm	77 mm	10 mm	58 mm
Replicate B	65 mm	6 mm	5 mm	mm	mm
Replicate C	112 mm	47 mm	41 mm	48 mm	35 mm
Replicate D	50 mm	14 mm	19 mm	mm	mm
Replicate E	84 mm	34 mm	36 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	1291.34	1331.2	1293.69
Replicate B	1282.06	1312.3	1283.46
Replicate C	1293.91	1342.0	1296.22
Replicate D	1283.16	1295.8	1283.72
Replicate E	1293.14	1357.4	1296.37

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 2:16 PM
Test Link: 07-2400-6075/B160704psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	15-1658-8215	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	07-0187-4948	**Code:**	B1607-04	**Client:**	
Sample Date:	22 May-06 02:00 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	15d 10h	**Station:**			

Comments: J11JT6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-1882-9179	% Germination	< 100	100	N/A	19.80%	Equal Variance t Two-Sample
03-1352-2526	Average Height (mm)	< 100	100	N/A	16.11%	Equal Variance t Two-Sample
04-7980-8676	Average Length (mm)	< 100	100	N/A	17.78%	Equal Variance t Two-Sample
11-5181-0069	Average AG Wt (Wet, mg)	< 100	100	N/A	29.82%	Equal Variance t Two-Sample
16-3930-2186	Average AG Wt (Dry, mg)	< 100	100	N/A	30.03%	Equal Variance t Two-Sample
11-4408-2700	Average Root Wt. (Wet, mg	< 100	100	N/A	36.29%	Equal Variance t Two-Sample
06-6680-4244	Average Root Wt. (Dry, mg)	< 100	100	N/A	29.33%	Equal Variance t Two-Sample
05-9169-3420	Average Total Wt (Wet, mg	< 100	100	N/A	31.49%	Equal Variance t Two-Sample
07-7950-4353	Average Total Wt (Dry, mg)	< 100	100	N/A	28.96%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 2:16 PM
Test Link: 07-2400-6075/B160704psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.76000	0.60000	1.00000	0.09798	0.21909	28.83%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	54.54	33.3	65.7	5.5702	12.455	22.84%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	41.42	25.3	56.6	6.3206	14.133	34.12%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	10.821	6.62	18.463	2.2036	4.9274	45.54%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	1.49520	0.74333	2.76001	0.35320	0.78978	52.82%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	10.661	4.2133	21.420	2.8808	6.4418	60.43%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.53238	0.18665	1.07666	0.14645	0.32747	61.51%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	21.481	11.08	39.883	4.9339	11.033	51.36%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	2.02758	0.92997	3.83667	0.49414	1.10493	54.49%

CETIS Test Summary

Report Date: 19 Jul-06 2:16 PM
Test Link: 07-2400-6075/B160704psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		60.6	33.3	56.4000	56.7000	65.7

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		46.2000	25.3	56.6	27.7000	51.3

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		9.45	6.62	12.7040	6.86666	18.4633

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		1.13000	1.11666	1.72600	0.74333	2.76001

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		7.972	10.08	9.61799	4.21334	21.4200

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.47000	0.46663	0.46199	0.18665	1.07666

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		17.422	16.7	22.322	11.08	39.8833

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		1.60000	1.58329	2.18799	0.92997	3.83667

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	07-2400-6075	07-2400-6075	19 Jul-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	Angular (Corrected)		<100	100		N/A	19.80%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.86572	1.85955	0.0495	0.22714	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1298422	0.129842	1	3.48	0.09906	Non-Significant Effect
Error	0.2984103	0.037301	8			
Total	0.42825246	0.1671435	9			

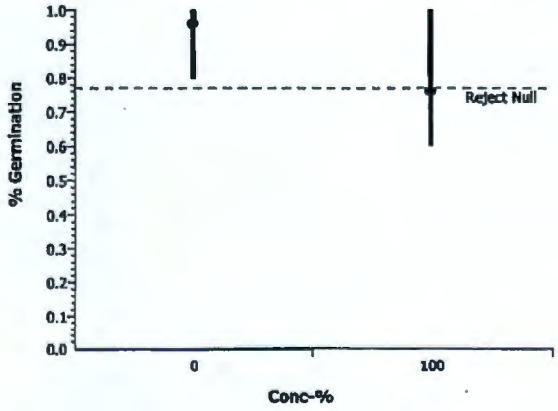
ANOVA Assumptions

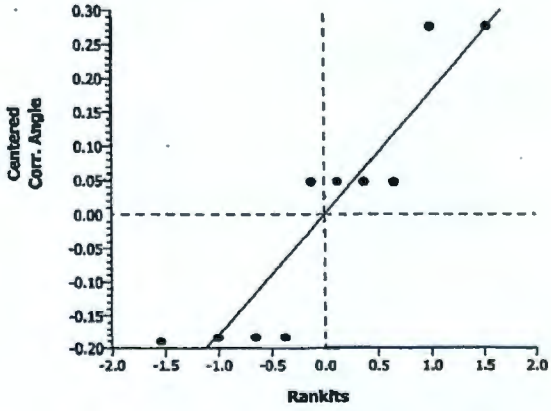
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.57779	23.15450	0.12462	Equal Variances
Distribution	Shapiro-Wilk W	0.82581		0.02979	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
100		5	0.76000	0.60000	1.00000	0.21909	1.06976	0.88608	1.34528	0.25152

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	07-2400-6075	07-2400-6075	19 Jul-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		N/A	16.11%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.45467	1.85955	0.0043	12.5417	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1357.225	1357.225	1	11.93	0.00864	Significant Effect
Error	909.764	113.7205	8			
Total	2266.98895	1470.9455	9			

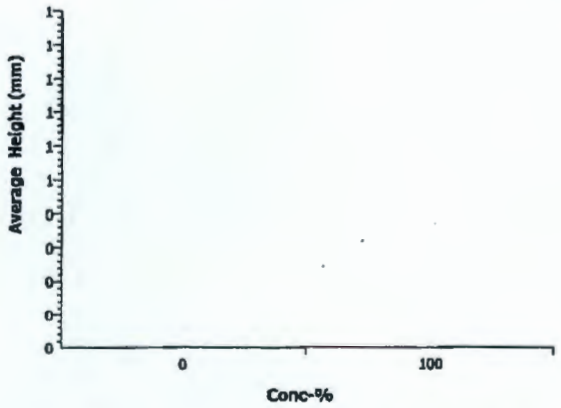
ANOVA Assumptions

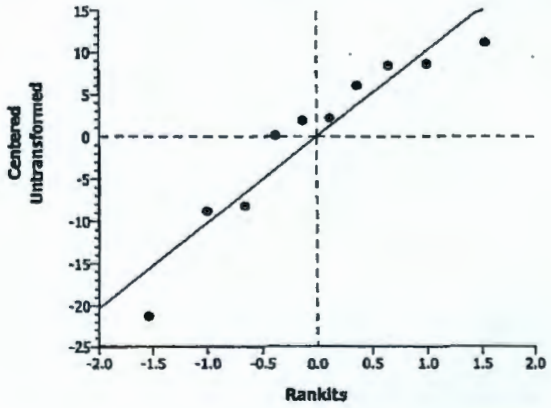
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.14545	23.15450	0.47791	Equal Variances
Distribution	Shapiro-Wilk W	0.89954		0.21655	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	54.54	33.3	65.7	12.455				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	07-2400-6075	07-2400-6075	19 Jul-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		N/A	17.78%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	6.25041	1.85955	0.0001	18.3087	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	9467.93	9467.93	1	39.07	0.00025	Significant Effect
Error	1938.78	242.3475	8			
Total	11406.7096	9710.2772	9			

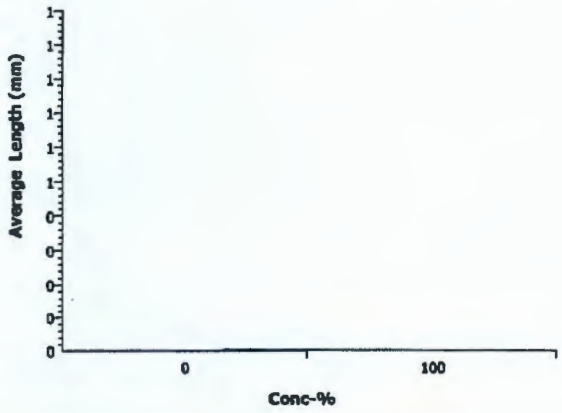
ANOVA Assumptions

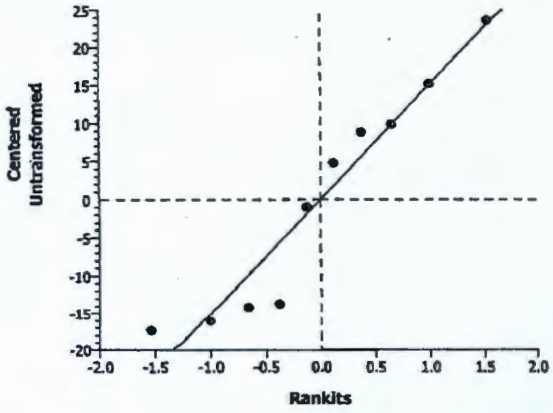
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.42654	23.15450	0.73904	Equal Variances
Distribution	Shapiro-Wilk W	0.90865		0.27185	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	41.42	25.3	56.6	14.133				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	07-2400-6075	07-2400-6075	19 Jul-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		N/A	29.82%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.46831	1.85955	0.0042	7.27104	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	459.7858	459.7858	1	12.03	0.00846	Significant Effect
Error	305.7797	38.22247	8			
Total	765.565552	498.00829	9			

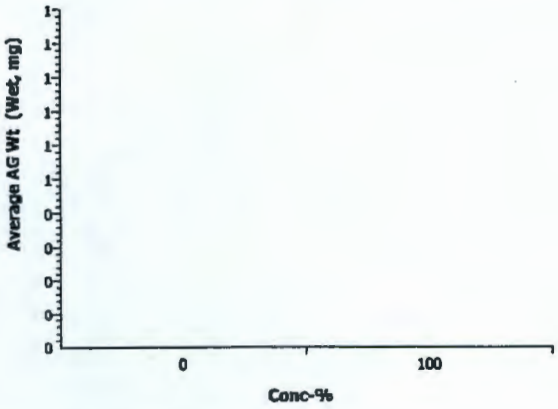
ANOVA Assumptions

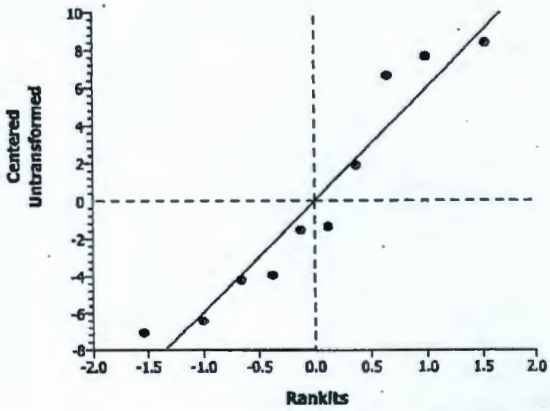
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.14860	23.15450	0.47708	Equal Variances
Distribution	Shapiro-Wilk W	0.89739		0.20507	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	10.821	6.62	18.463	4.9274				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	07-2400-6075	07-2400-6075	19 Jul-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		N/A	30.03%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.09187	1.85955	0.0017	1.32331	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	21.19788	21.19788	1	16.74	0.00348	Significant Effect
Error	10.12834	1.266043	8			
Total	31.3262205	22.463921	9			

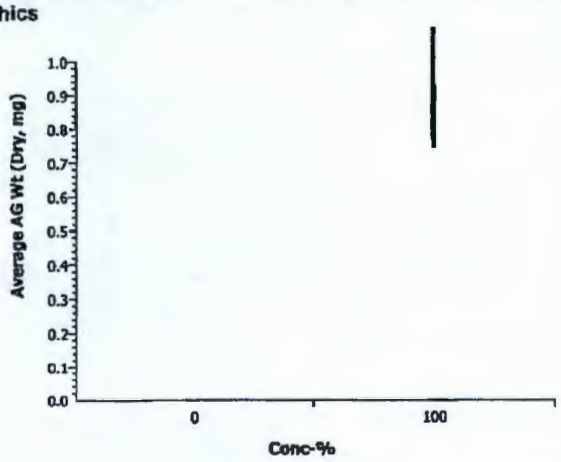
ANOVA Assumptions

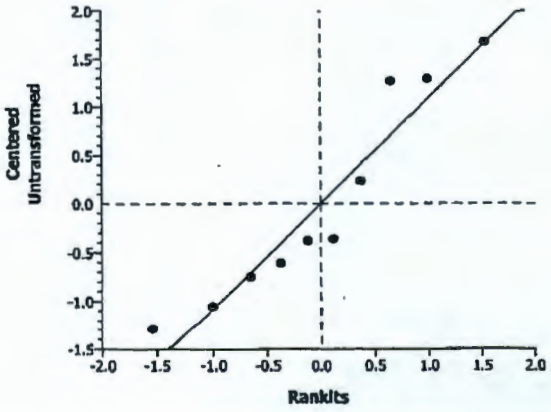
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.05948	23.15450	0.30430	Equal Variances
Distribution	Shapiro-Wilk W	0.89517		0.19375	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	1.49520	0.74333	2.76001	0.78978				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	07-2400-6075	07-2400-6075	19 Jul-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		N/A	36.29%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.19968	1.85955	0.0295	6.77745	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	160.6859	160.6859	1	4.84	0.05902	Non-Significant Effect
Error	265.6733	33.20916	8			
Total	426.359146	193.89503	9			

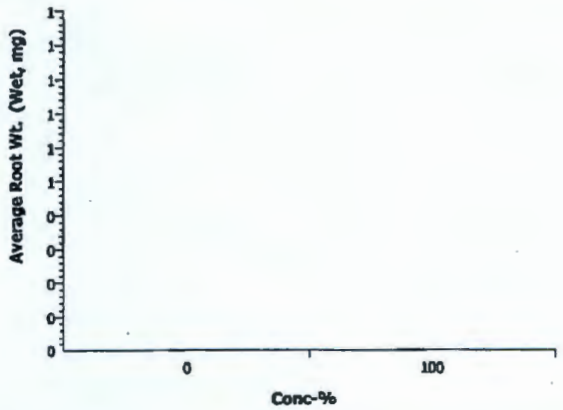
ANOVA Assumptions

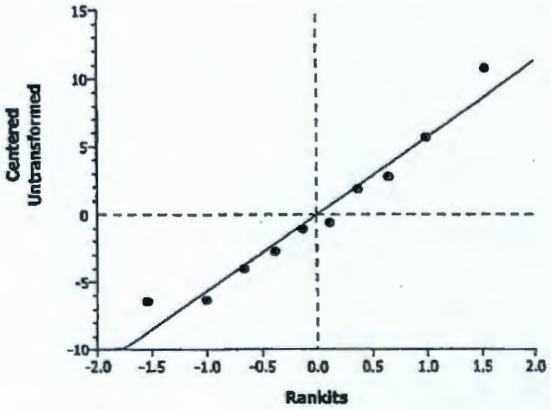
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.66503	23.15450	0.63346	Equal Variances
Distribution	Shapiro-Wilk W	0.94657		0.62819	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	10.661	4.2133	21.42	6.4418				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	07-2400-6075	07-2400-6075	19 Jul-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		N/A	29.33%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.24949	1.85955	0.0059	0.32036	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.7834759	0.783476	1	10.56	0.01171	Significant Effect
Error	0.5935876	0.074198	8			
Total	1.37706351	0.8576744	9			

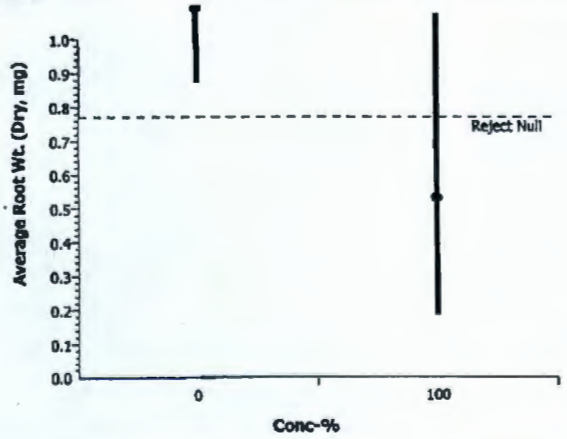
ANOVA Assumptions

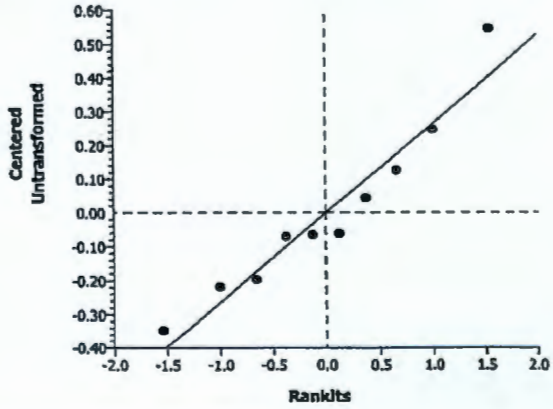
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.60526	23.15450	0.37625	Equal Variances
Distribution	Shapiro-Wilk W	0.93915		0.54360	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.53238	0.18665	1.07666	0.32747				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	07-2400-6075	07-2400-6075	19 Jul-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		N/A	31.49%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.95952	1.85955	0.0091	13.5585	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1164.093	1164.093	1	8.76	0.01816	Significant Effect
Error	1063.249	132.9062	8			
Total	2227.34253	1296.9994	9			

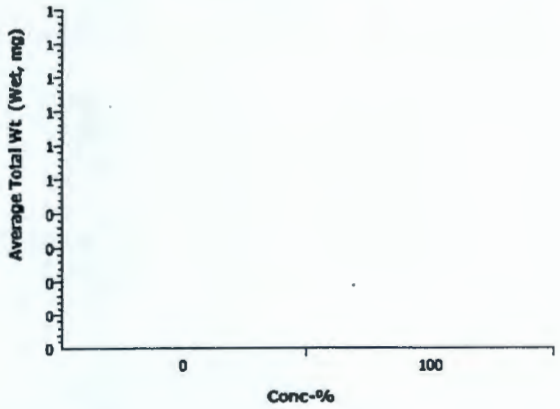
ANOVA Assumptions

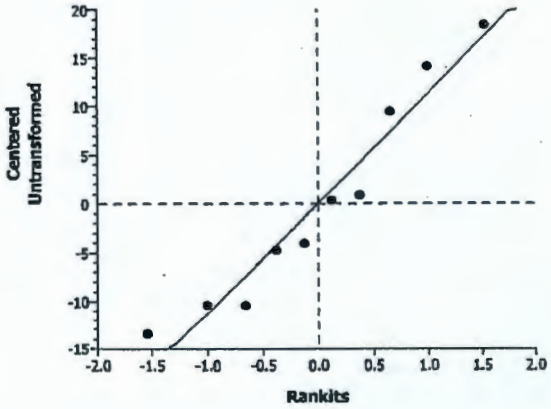
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.18386	23.15450	0.87402	Equal Variances
Distribution	Shapiro-Wilk W	0.92980		0.44597	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	21.481	11.08	39.883	11.033				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	07-2400-6075	07-2400-6075	19 Jul-06 2:16 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.96%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.05423	1.85955	0.0018	1.59237	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	30.13194	30.13194	1	16.44	0.00366	Significant Effect
Error	14.66562	1.833202	8			
Total	44.7975578	31.965145	9			

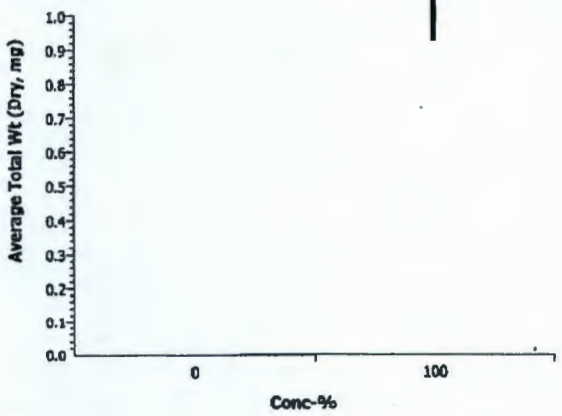
ANOVA Assumptions

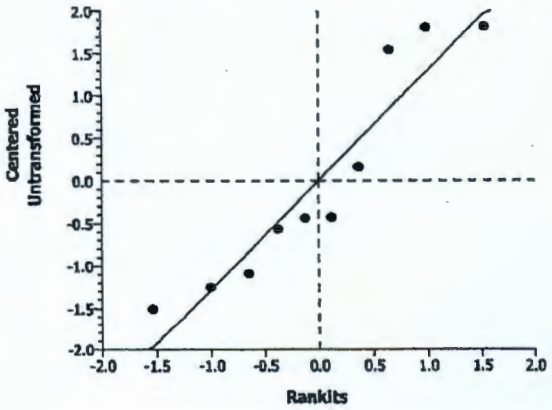
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.00310	23.15450	0.51760	Equal Variances
Distribution	Shapiro-Wilk W	0.86651		0.09100	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	2.02758	0.92997	3.83667	1.10493				

Graphics





BLUEGRASS GR

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006 7-5-06

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day ___ Day 25 NJ

Bioassay Lab ID: BG 1607-05 Sample No: 0115V2

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 (~~11~~ 8 days after 21 planting)	14-DAYS POST-EMERGENCE (32 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	2	2	2	2		2	2	2	8.8	7.7
	B	3	3	3	4		4	4	4		
	C	2	2	2	2		2	2	2		
	D	1	2	2	2		2	2	2		
	E	0	1	1	1		1	1	1		

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

Replicate A 2 med G
Replicate B 1 lg G, 3 med G
Replicate C 1 med G 1 sm G
Replicate D 1 med G 1 sm G
Replicate E 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 2 med G
Replicate B 1 lg G, 3 med G
Replicate C 1 lg G, 1 med G
Replicate D 1 lg G, 1 sm G
Replicate E 1 lg G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	63 mm	63 mm	mm	mm	mm
Replicate B	65 mm	64 mm	72 mm	90 mm	mm
Replicate C	92 mm	64 mm	mm	mm	mm
Replicate D	83 mm	29 mm	mm	mm	mm
Replicate E	86 mm	mm	mm	mm	mm

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

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1291.08	1323.7	1295.54
Replicate B	1296.43	1380.9	1307.33
Replicate C	1275.38	1308.4	1279.99
Replicate D	1294.65	1320.2	1298.09
Replicate E	1288.03	1305.8	1290.24

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	37 mm	60 mm	mm	mm	mm
Replicate B	68 mm	36 mm	38 mm	31 mm	mm
Replicate C	82 mm	37 mm	mm	mm	mm
Replicate D	14 mm	90 mm	mm	mm	mm
Replicate E	35 mm	mm	mm	mm	mm

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

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1287.81	1313.8	1288.89
Replicate B	1285.32	1363.8	1288.14
Replicate C	1285.39	1319.0	1286.43
Replicate D	1288.37	1319.5	1289.03
Replicate E	1296.54	1320.1	1296.81

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 2:18 PM
Test Link: 00-0827-7896/B160705psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	07-0151-5697	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	13-8089-9943	**Code:**	B1607-05	**Client:**	
Sample Date:	22 May-06 05:06 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	15d 6h	**Station:**			

Comments: J11JV2

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
01-3647-0365	% Germination	< 100	100	N/A	18.65%	Equal Variance t Two-Sample
04-8414-2381	Average Height (mm)	100	> 100	N/A	15.62%	Equal Variance t Two-Sample
13-0035-6298	Average Length (mm)	< 100	100	N/A	15.53%	Equal Variance t Two-Sample
18-4520-2711	Average AG Wt (Wet, mg)	< 100	100	N/A	26.68%	Equal Variance t Two-Sample
08-7649-2296	Average AG Wt (Dry, mg)	< 100	100	N/A	26.93%	Equal Variance t Two-Sample
11-1773-8217	Average Root Wt. (Wet, mg	100	> 100	N/A	28.61%	Equal Variance t Two-Sample
04-7129-2113	Average Root Wt. (Dry, mg)	< 100	100	N/A	20.39%	Equal Variance t Two-Sample
17-7022-9127	Average Total Wt (Wet, mg	100	> 100	N/A	26.06%	Equal Variance t Two-Sample
20-2483-4170	Average Total Wt (Dry, mg)	< 100	100	N/A	24.86%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 2:18 PM
Test Link: 00-0827-7896/B160705psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.44000	0.20000	0.80000	0.09798	0.21909	49.79%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	71.160	56	86	5.3203	11.897	16.72%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	47.66	35	59.5	4.1171	9.2061	19.32%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	16.896	12.775	21.117	1.3428	3.0025	17.77%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	2.23799	1.71997	2.72498	0.15982	0.35736	15.97%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	17.709	12.995	23.56	1.81	4.0473	22.85%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.47301	0.27002	0.70502	0.07816	0.17477	36.95%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	34.605	28.34	41.33	2.7553	6.1611	17.80%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	2.71100	2.04999	3.42999	0.22625	0.50590	18.66%

CETIS Test Summary

Report Date: 19 Jul-06 2:18 PM
Test Link: 00-0827-7896/B160705psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		63	72.8000	78	56	86

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		48.5	43.3	59.5	52	35

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		16.31	21.1175	16.5100	12.775	17.7700

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		2.23004	2.72498	2.30499	1.71997	2.20996

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		12.995	19.6200	16.805	15.5650	23.5599

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.53998	0.70502	0.52002	0.33002	0.27002

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		29.305	40.7375	33.3150	28.34	41.33

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		2.77002	3.42999	2.82501	2.04999	2.47998

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 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	18.65%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.97898	1.85955	0.0005	0.21388	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.8198639	0.819864	1	24.79	0.00108	Significant Effect
Error	0.2645767	0.033072	8			
Total	1.08444053	0.8529359	9			

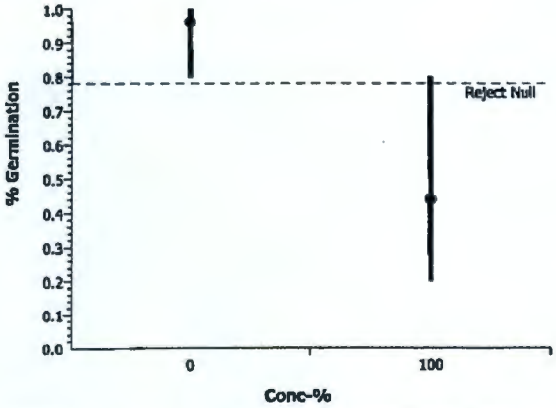
ANOVA Assumptions

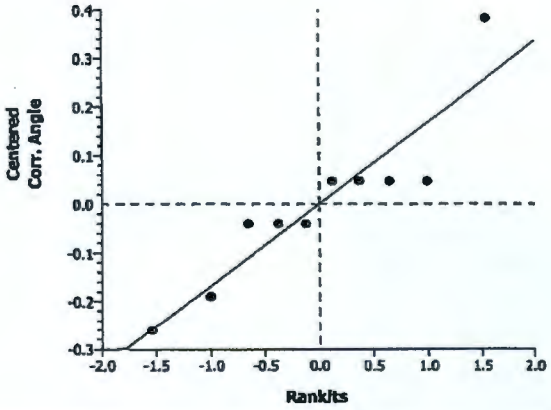
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.83201	23.15450	0.15624	Equal Variances
Distribution	Shapiro-Wilk W	0.87330		0.10922	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
100		5	0.44000	0.20000	0.80000	0.21909	0.72499	0.46365	1.10715	0.23410

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 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	1	N/A	15.62%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.02146	1.85955	0.1685	12.1608	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	111.556	111.556	1	1.04	0.33693	Non-Significant Effect
Error	855.344	106.918	8			
Total	966.899956	218.47396	9			

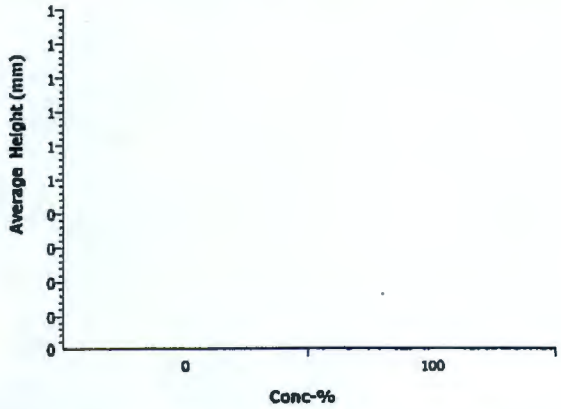
ANOVA Assumptions

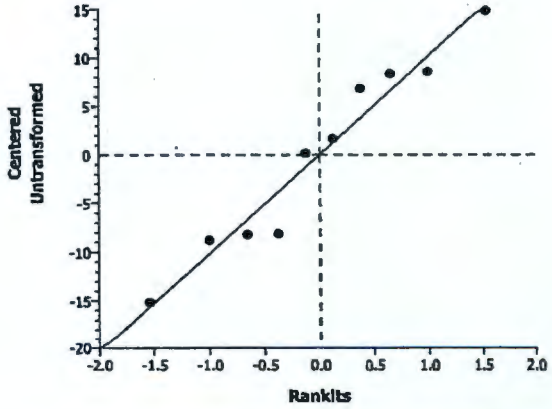
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.95729	23.15450	0.53140	Equal Variances
Distribution	Shapiro-Wilk W	0.94263		0.58260	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	71.160	56	86	11.897				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 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	15.53%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	6.43109	1.85955	0.0001	15.99	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7645.225	7645.225	1	41.36	0.00020	Significant Effect
Error	1478.804	184.8505	8			
Total	9124.02905	7830.0756	9			

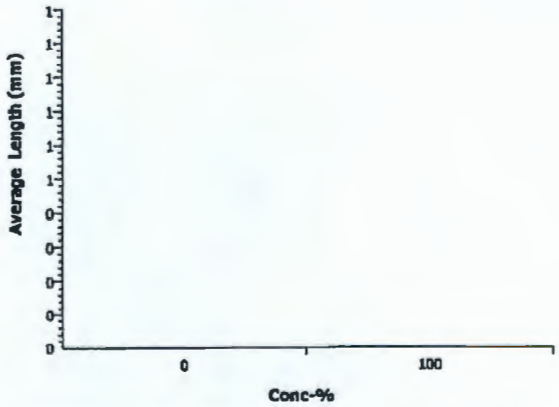
ANOVA Assumptions

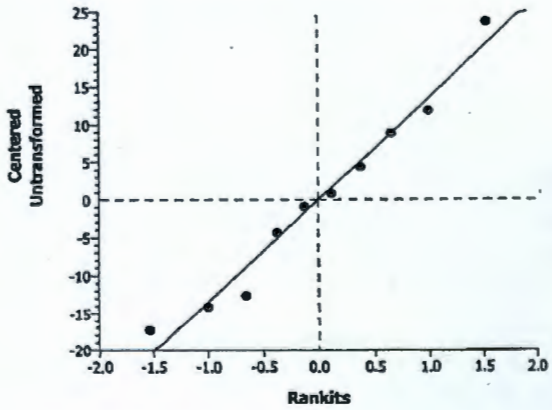
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.36210	23.15450	0.26713	Equal Variances
Distribution	Shapiro-Wilk W	0.96746		0.86639	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	47.66	35	59.5	9.2061				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 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	26.68%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.14001	1.85955	0.0324	6.50475	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	140.0932	140.0932	1	4.58	0.06478	Non-Significant Effect
Error	244.724	30.5905	8			
Total	384.817184	170.68367	9			

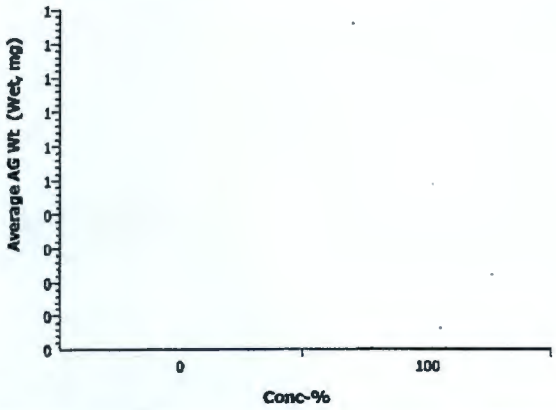
ANOVA Assumptions

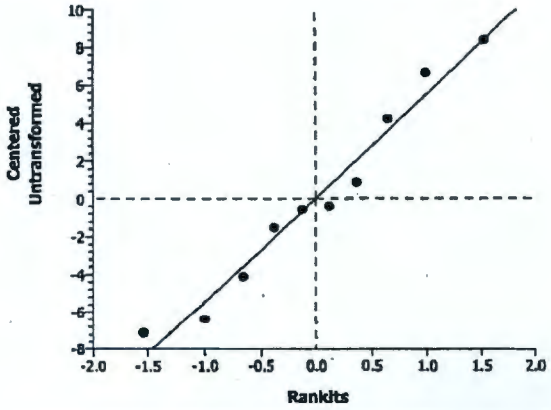
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.78653	23.15450	0.11748	Equal Variances
Distribution	Shapiro-Wilk W	0.95423		0.71859	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	16.896	12.775	21.117	3.0025				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 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	26.93%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.39917	1.85955	0.0047	1.18663	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	11.7626	11.7626	1	11.55	0.00937	Significant Effect
Error	8.144193	1.018024	8			
Total	19.9067898	12.780621	9			

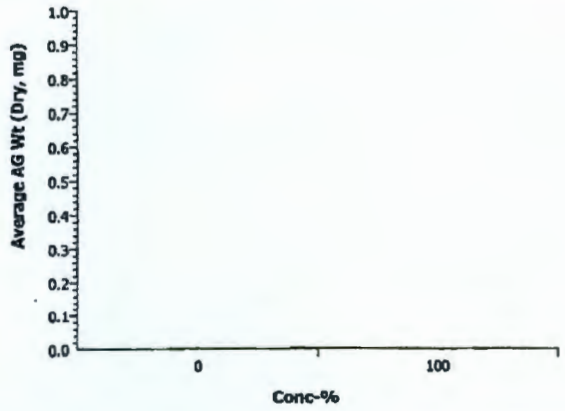
ANOVA Assumptions

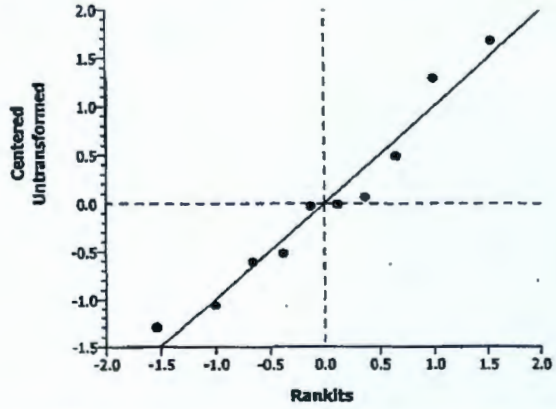
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	14.94284	23.15450	0.02262	Equal Variances
Distribution	Shapiro-Wilk W	0.95093		0.67951	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	2.23799	1.71997	2.72498	0.35736				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 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	1	N/A	28.61%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.33708	1.85955	0.3724	5.34454	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.346452	2.346452	1	0.11	0.74473	Non-Significant Effect
Error	165.2099	20.65123	8			
Total	167.556321	22.997686	9			

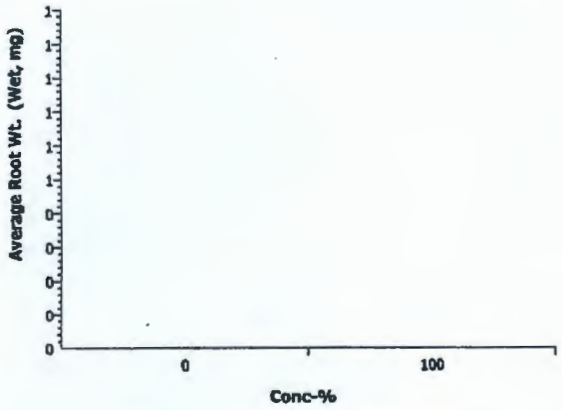
ANOVA Assumptions

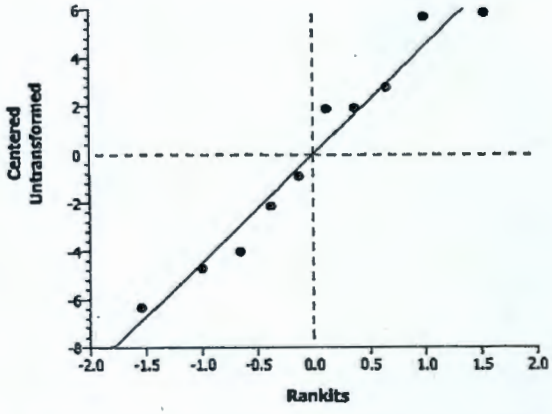
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.52147	23.15450	0.69421	Equal Variances
Distribution	Shapiro-Wilk W	0.94144		0.56918	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	17.709	12.995	23.56	4.0473				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 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	20.39%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	5.17051	1.85955	0.0004	0.22269	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.9584814	0.958481	1	26.73	0.00085	Significant Effect
Error	0.2868188	0.035852	8			
Total	1.24530020	0.9943337	9			

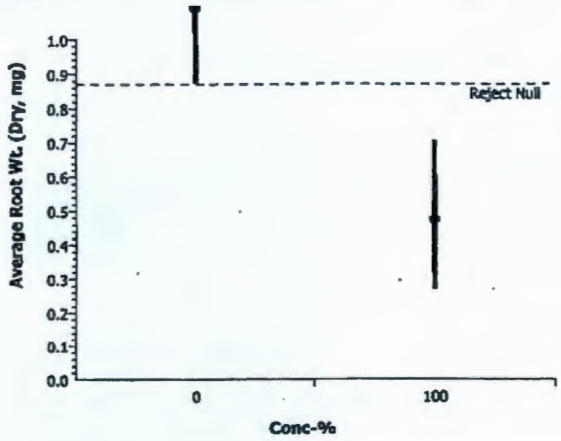
ANOVA Assumptions

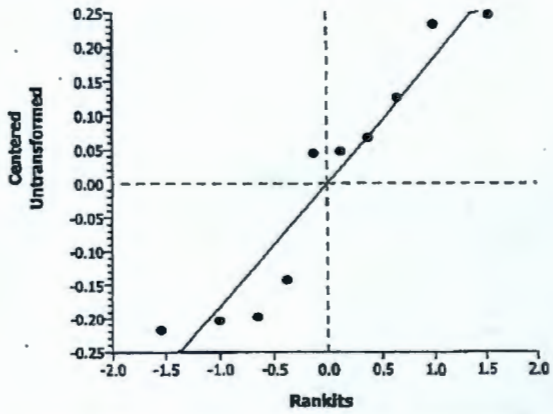
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.34763	23.15450	0.77951	Equal Variances
Distribution	Shapiro-Wilk W	0.88717		0.15755	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.47301	0.27002	0.70502	0.17477				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 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	1	N/A	26.06%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.40113	1.85955	0.0994	11.2208	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	178.701	178.701	1	1.96	0.19875	Non-Significant Effect
Error	728.2191	91.02738	8			
Total	906.920059	269.72839	9			

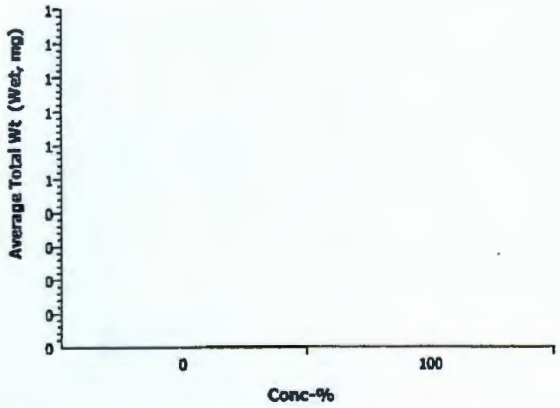
ANOVA Assumptions

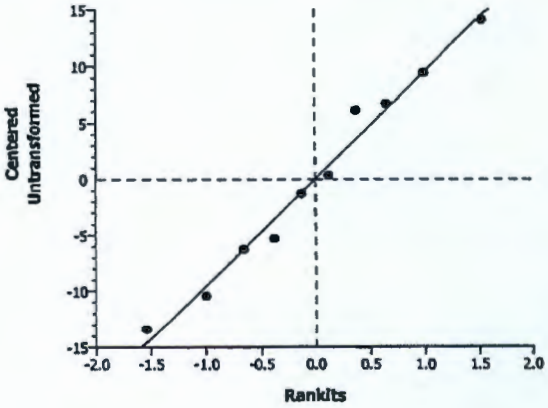
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.79604	23.15450	0.22459	Equal Variances
Distribution	Shapiro-Wilk W	0.96933		0.88454	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	34.605	28.34	41.33	6.1611				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 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	24.86%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.79336	1.85955	0.0026	1.36685	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	19.4365	19.4365	1	14.39	0.00529	Significant Effect
Error	10.80586	1.350732	8			
Total	30.2423620	20.787235	9			

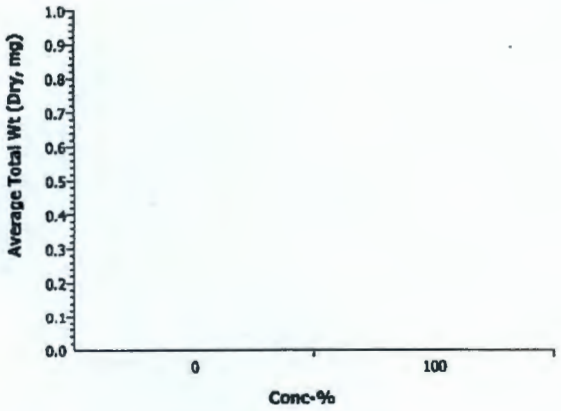
ANOVA Assumptions

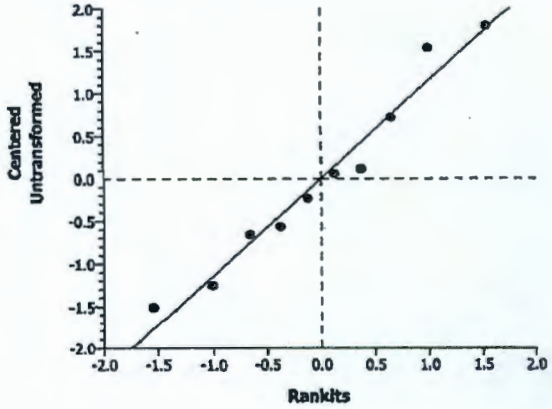
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	9.55528	23.15450	0.05045	Equal Variances
Distribution	Shapiro-Wilk W	0.95301		0.70412	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	2.71100	2.04999	3.42999	0.50590				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

7-8-05 DW

Initials: Day 8 TD Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TD Day 21 NJ Day 23 TD Day __ NJ Day 27 __

Bioassay Lab ID: BG 1607-06 Sample No: J11K22

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 (14 days after planting)	14-DAYS POST-EMERGENCE (27 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	2	5	5	5		5	6→5	5	9.0	8.1
	B	2	3	3	5		5	5	5		
	C	3	3	5	5		5	5	5		
	D	4	5	5	5		5	5	5		
	E	7	7	7	7		5	7→5	5		

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

Replicate A: 2 med G 3 sm G Remove 1 sm G

Replicate B: 1 med G 3 sm G 1 sm B

Replicate C: 5 sm G

Replicate D: 1 lg G 3 med G 1 sm G

Replicate E: 2 lg G 3 sm G Remove: 1 sm G, 1 sm B

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 2 lg G ; 3 med G

Replicate B: 2 med G , 2 sm G , 1 sm B

Replicate C: 3 med G , 1 sm G , 1 sm B

Replicate D: 1 lg G , 3 med G , 1 sm G

Replicate E: 1 lg G , 1 lg G w/ 1 B shoot 3 med G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	84 mm	48 mm	85 mm	52 mm	56 mm
Replicate B	66 mm	50 mm	50 mm	40 mm	2 mm
Replicate C	66 mm	44 mm	49 mm	51 mm	4 mm
Replicate D	72 mm	43 mm	60 mm	46 mm	127 mm
Replicate E	63 mm	60 mm	59 mm	111 mm	89 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1280.54	1336.3	1288.06
Replicate B	1278.38	1304.9	1281.50
Replicate C	1290.43	1334.2	1294.78
Replicate D	1295.62	1365.9	1295.72
Replicate E	1302.97	1381.3	1315.28

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	26 mm	13 mm	47 mm	27 mm	120 mm
Replicate B	11 mm	41 mm	17 mm	19 mm	* mm
Replicate C	46 mm	40 mm	30 mm	63 mm	10 mm
Replicate D	NJ ~~49~~ 49 mm	68 mm	75 mm	25 mm	101 mm
Replicate E	116 mm	105 mm	64 mm	26 mm	55 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1291.22	1350.9	1295.11
Replicate B	1289.53	1310.2	1292.77
Replicate C	1291.62	1325.5	1293.16
Replicate D	1285.03	1354.1	1288.94
Replicate E	1284.88	1368.3	1292.46

Comments: *one seedling lost in Replicate B, seedling was very sm Brown

CETIS Test Summary

Report Date: 19 Jul-06 3:20 PM
Test Link: 02-8314-9013/B160706psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	12-7768-7814	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	05-9570-9641	**Code:**	B1607-06	**Client:**	
Sample Date:	23 May-06 04:00 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	14d 8h	**Station:**			

Comments: J11K22

Count in replicate B reduced for root length and all weight endpoints. 1 seedling lost during test termination.

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
10-6682-1189	% Germination	100	> 100	N/A	8.88%	Wilcoxon Rank Sum Two-Sample
10-9155-7773	Average Height (mm)	< 100	100	N/A	19.30%	Equal Variance t Two-Sample
06-0260-9855	Average Length (mm)	< 100	100	N/A	21.36%	Equal Variance t Two-Sample
01-6572-8209	Average AG Wt (Wet, mg)	< 100	100	N/A	28.44%	Equal Variance t Two-Sample
08-9655-9199	Average AG Wt (Dry, mg)	< 100	100	N/A	29.45%	Equal Variance t Two-Sample
14-1076-1240	Average Root Wt. (Wet, mg	< 100	100	N/A	30.89%	Equal Variance t Two-Sample
02-5142-2850	Average Root Wt. (Dry, mg)	100	> 100	N/A	36.37%	Equal Variance t Two-Sample
11-5006-0384	Average Total Wt (Wet, mg	< 100	100	N/A	28.83%	Equal Variance t Two-Sample
06-4658-3438	Average Total Wt (Dry, mg)	< 100	100	N/A	28.88%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 3:20 PM
Test Link: 02-8314-9013/B160706psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	~~0.06000~~	0.80000	1.00000	0.04000	0.08944	9.32%

100% → see note, Comments, & Analysis Detail page.

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	59.08	41.6	76.400	7.1284	15.94	26.98%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	48.64	22	73.2	9.1059	20.361	41.86%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	11.652	6.6300	16.056	1.8625	4.1646	35.74%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	1.52720	0.78000	2.46201	0.32461	0.72586	47.53%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	10.875	5.1675	16.684	2.1551	4.8189	44.31%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.83880	0.30801	1.51599	0.19340	0.43246	51.56%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	22.527	11.797	32.350	3.9674	8.8714	39.38%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	2.36600	1.17800	3.97800	0.49037	1.09649	46.34%

CETIS Test Summary

Report Date: 19 Jul-06 3:20 PM
Test Link: 02-8314-9013/B160706psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		65	41.6	42.8	69.6	76.4000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		46.6	22	37.8	63.6	73.2

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		11.1520	6.63000	8.75398	16.0560	15.6660

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		1.50400	0.78000	0.87000	2.02000	2.46201

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		11.9360	5.16748	6.77600	13.814	16.6840

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.77800	0.81000	0.30801	0.78198	1.51599

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		23.0880	11.7975	15.53	29.87	32.3500

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		2.28201	1.59000	1.17800	2.80198	3.97800

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 2:21 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	8.88%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	30		0.6548	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0056708	0.005671	1	1.00	0.34659	Non-Significant Effect
Error	0.0453663	0.005671	8			
Total	0.05103711	0.0113416	9			

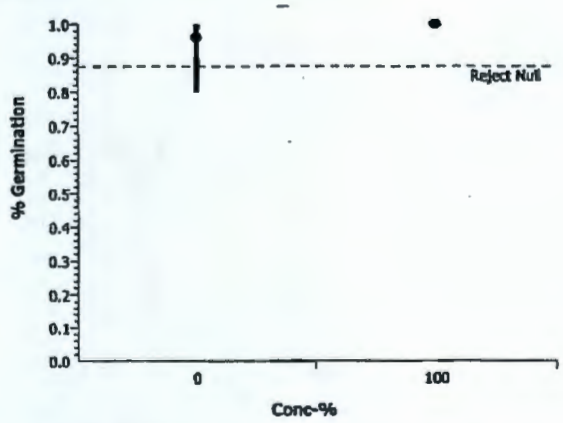
ANOVA Assumptions

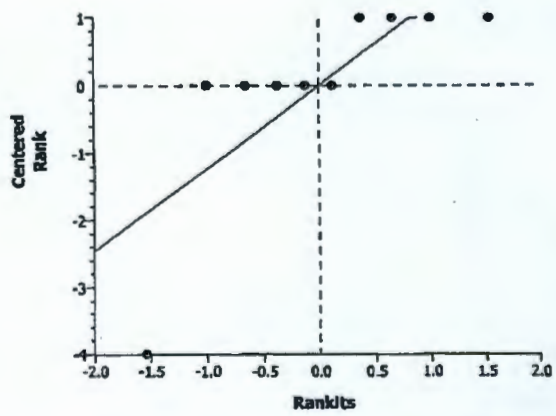
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Modified Levene	1.60000	11.25862	0.24150	Equal Variances
Distribution	Shapiro-Wilk W	0.62470		0.00011	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	5.00000	1.00000	6.00000	2.23607
100		5	1.00000	1.00000	1.00000	0.00000	6.00000	6.00000	6.00000	0.00000

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 2:21 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	19.30%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.32197	1.85955	0.0244	15.024	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	879.844	879.844	1	5.39	0.04877	Significant Effect
Error	1305.52	163.19	8			
Total	2185.36414	1043.0340	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.51375	23.15450	0.25100	Equal Variances
Distribution	Shapiro-Wilk W	0.92660		0.41525	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	59.08	41.6	76.4	15.94				

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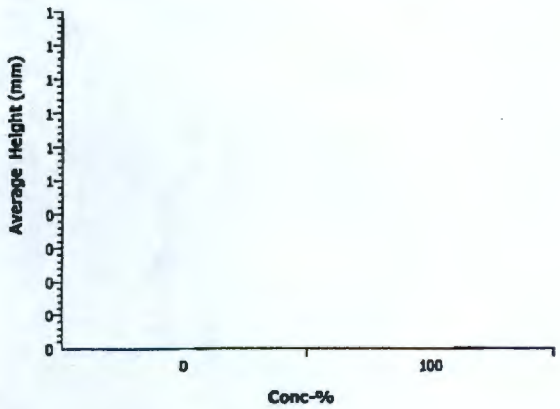
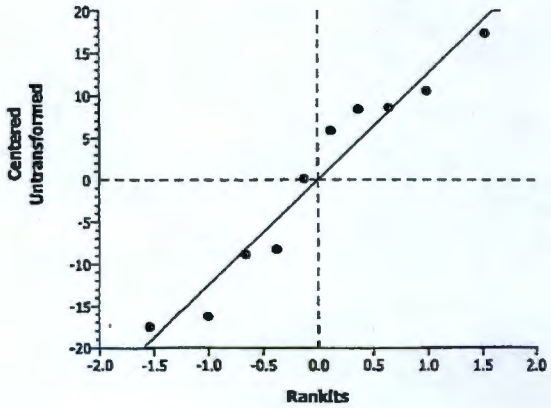




CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 3:19 PM	CETISv1.1.2

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

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	4.59240	1.85955	0.0009	21.9952	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	7376.657	7376.657	1	21.09	0.00177	Significant Effect
Error	2798.144	349.768	8			
Total	10174.8005	7726.4247	9			

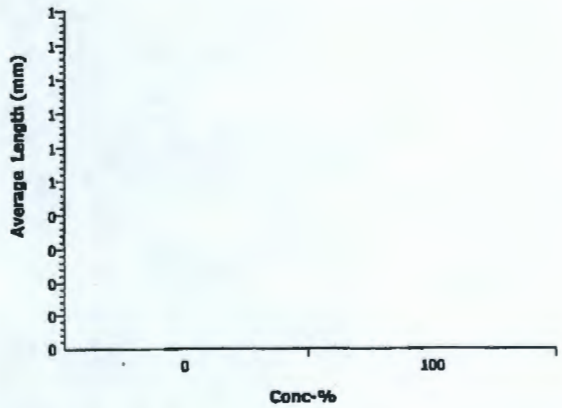
ANOVA Assumptions

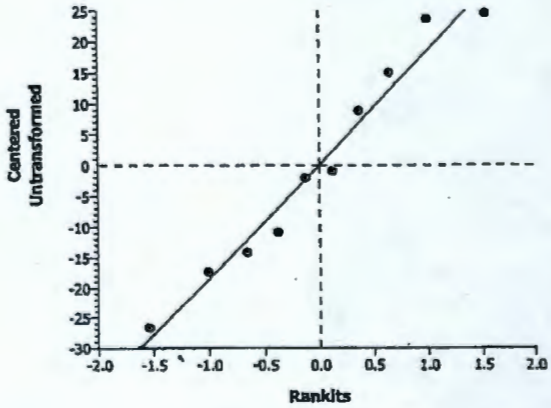
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.45496	23.15450	0.72520	Equal Variances
Distribution	Shapiro-Wilk W	0.95020		0.67091	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	48.64	22	73.2	20.361				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 3:20 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.44%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.41439	1.85955	0.0046	6.93340	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	405.1768	405.1768	1	11.66	0.00916	Significant Effect
Error	278.0403	34.75504	8			
Total	683.217072	439.9318	9			

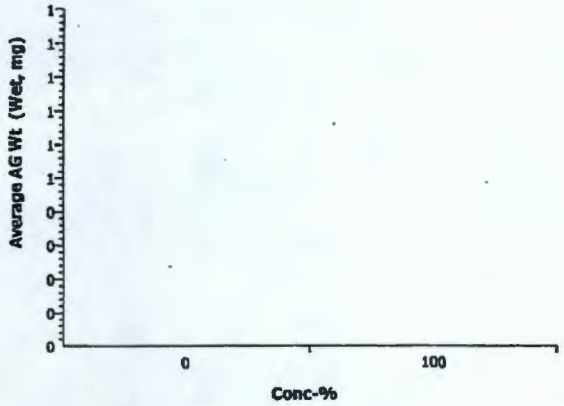
ANOVA Assumptions

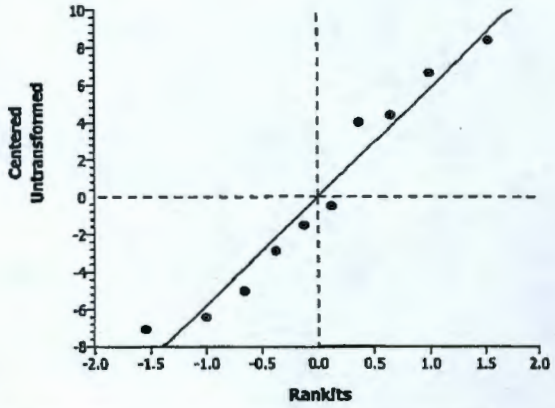
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.00770	23.15450	0.31142	Equal Variances
Distribution	Shapiro-Wilk W	0.93234		0.47129	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	11.652	6.6300	16.056	4.1646				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 3:20 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.45%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.12661	1.85955	0.0017	1.29775	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	20.73452	20.73452	1	17.03	0.00331	Significant Effect
Error	9.740842	1.217605	8			
Total	30.4753656	21.952129	9			

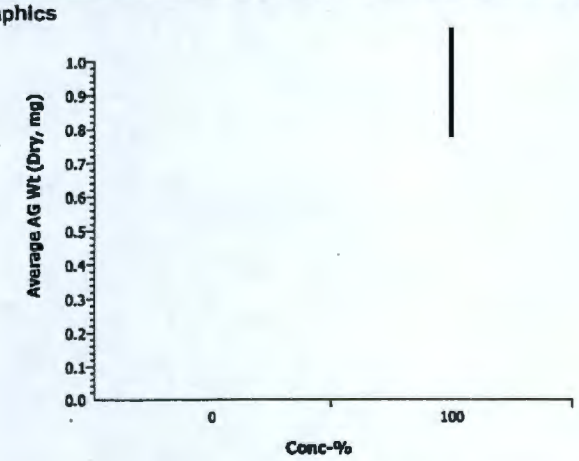
ANOVA Assumptions

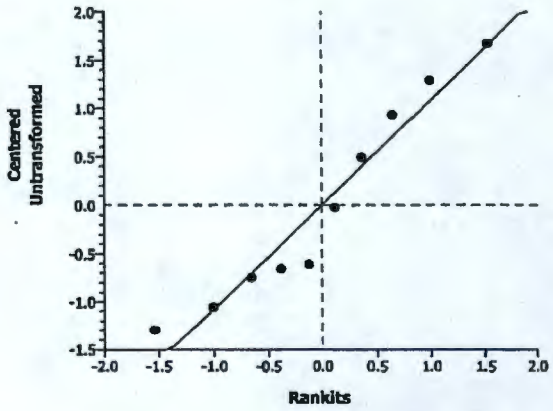
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.62202	23.15450	0.24035	Equal Variances
Distribution	Shapiro-Wilk W	0.92407		0.39216	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	1.52720	0.78000	2.46201	0.72586				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 3:20 PM	CETISv1.1.2

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

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.51442	1.85955	0.0181	5.77021	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	152.1896	152.1896	1	6.32	0.03612	Significant Effect
Error	192.5742	24.07177	8			
Total	344.763733	176.26133	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.07324	23.15450	0.94703	Equal Variances
Distribution	Shapiro-Wilk W	0.88888		0.16470	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	10.875	5.1675	16.684	4.8189				

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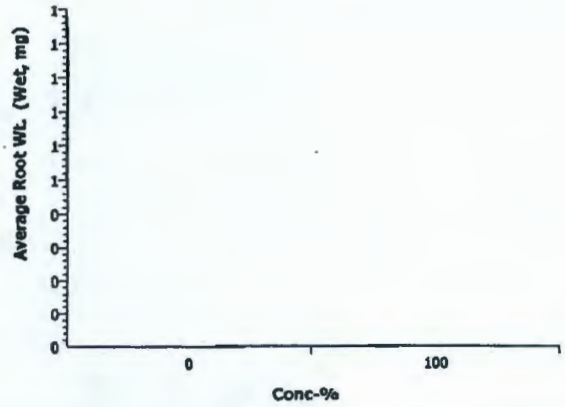
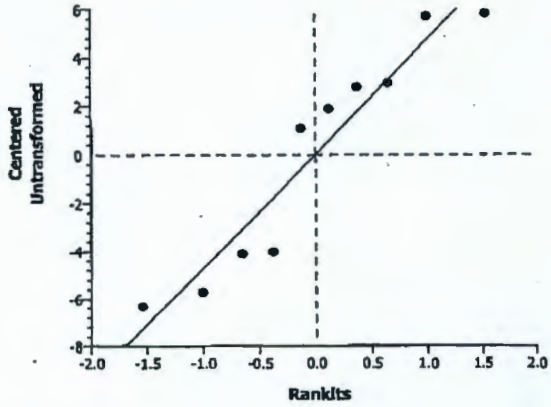




CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 3:20 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	36.37%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.18619	1.85955	0.1348	0.39725	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.16053	0.16053	1	1.41	0.26958	Non-Significant Effect
Error	0.9127272	0.114091	8			
Total	1.07325724	0.2746209	9			

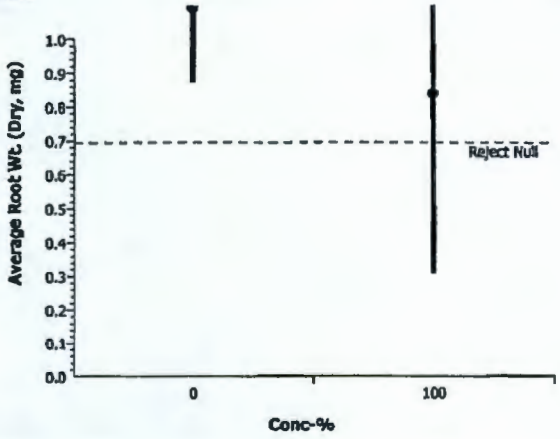
ANOVA Assumptions

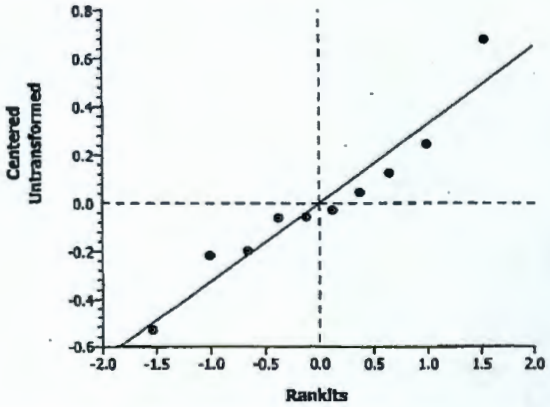
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.54361	23.15450	0.17176	Equal Variances
Distribution	Shapiro-Wilk W	0.94530		0.61333	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.83880	0.30801	1.51599	0.43246				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 3:20 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.83%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	3.07597	1.85955	0.0076	12.4130	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1054.01	1054.01	1	9.46	0.01521	Significant Effect
Error	891.1883	111.3985	8			
Total	1945.19806	1165.4083	9			

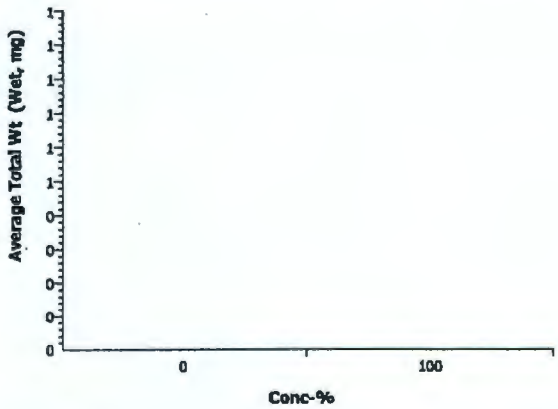
ANOVA Assumptions

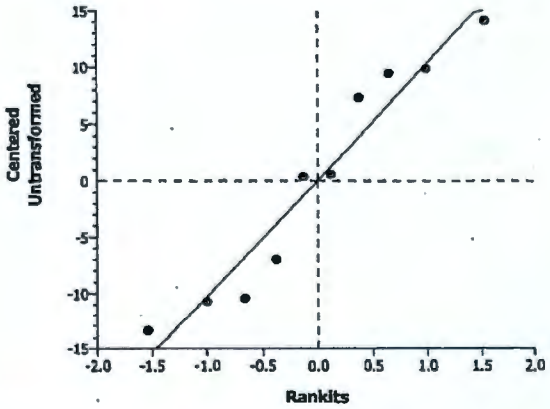
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.83090	23.15450	0.57237	Equal Variances
Distribution	Shapiro-Wilk W	0.91577		0.32302	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	22.527	11.797	32.350	8.8714				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 3:20 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.88%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	3.66834	1.85955	0.0032	1.58833	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	24.5439	24.5439	1	13.46	0.00632	Significant Effect
Error	14.59132	1.823915	8			
Total	39.1352196	26.367811	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.03404	23.15450	0.50857	Equal Variances
Distribution	Shapiro-Wilk W	0.88572		0.15168	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	2.36600	1.17800	3.97800	1.09649				

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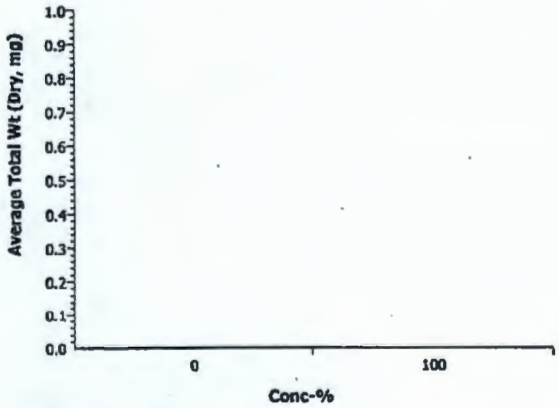
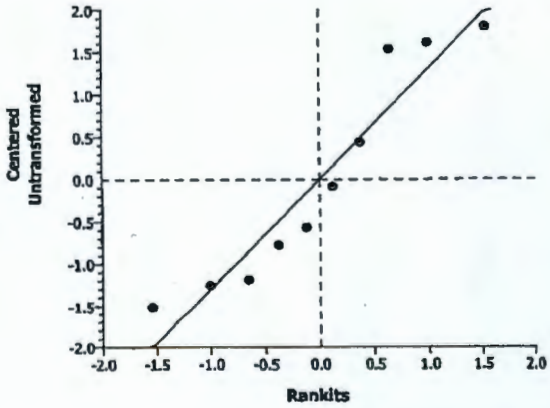




BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day 21 NJ NJ 7-5-06 Day 28 NJ

Bioassay Lab ID: BG 1607-07 Sample No: J15H7

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 (14 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	5	5	5	5		5	5	5	7.6	7.0
	B	3	4	6	7		5	7→5	5		
	C	1	2	5	5		6	5	5		
	D	3	3	4	4		4	4	4		
	E	6	6	6	8		5	8→5	5		

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

Replicate A: 5G Med Shoots

Replicate B: 1Lg G, 3Med G, 1 NJ 8m G Remove: 2 8m G

Replicate C: 3Med G, 2sm G

Replicate D: 3Med G, 1sm G

Replicate E: 1lgG, 2med G, 2sm G Remove: 3 Sm G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 4 lgG, 1smG

Replicate B: 1lgG, 3med G, 1smG

Replicate C: 1lgG, 2medG, 2smG

Replicate D: 1lgG, 2medG, 1smG

Replicate E: 1lgG; 3medG, 1smG

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	85 mm	82 mm	73 mm	86 mm	39 mm
Replicate B	74 mm	17 mm	56 mm	46 mm	58 mm
Replicate C	87 mm	25 mm	64 mm	53 mm	34 mm
Replicate D	79 mm	41 mm	68 mm	13 mm	mm
Replicate E	61 mm	26 mm	41 mm	95 mm	42 mm

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

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1286.41	1377.0	1299.00
Replicate B	1288.58	1357.3	1299.38
Replicate C	1278.32	1313.1	1282.10
Replicate D	1279.71	1328.7	1285.34
Replicate E	1285.51	1389.8	1295.17

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	71 mm	75 mm	95 mm	42 mm	75 mm
Replicate B	64 mm	53 mm	25 mm	80 mm	34 mm
Replicate C	42 mm	25 mm	39 mm	52 mm	51 mm
Replicate D	40 mm	61 mm	22 mm	45 mm	mm
Replicate E	24 mm	80 mm	32 mm	55 mm	56 mm

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

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1299.09	1390.5	1302.78
Replicate B	1277.23	1335.7	1279.41
Replicate C	1296.14	1376.3	1297.26
Replicate D	1300.73	1345.8	1302.13
Replicate E	1295.19	1367.8	1297.74

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 2:24 PM
Test Link: 17-6324-9202/B160707psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	19-7121-0592	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	04-1356-1975	**Code:**	B1607-07	**Client:**	
Sample Date:	29 May-06 11:59 AM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	8d 12h	**Station:**			

Comments: J11JH7

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
17-0180-1532	% Germination	100	> 100	N/A	11.51%	Wilcoxon Rank Sum Two-Sample
17-2546-1336	Average Height (mm)	< 100	100	N/A	13.77%	Equal Variance t Two-Sample
12-6594-2815	Average Length (mm)	< 100	100	N/A	16.81%	Equal Variance t Two-Sample
09-5999-1657	Average AG Wt (Wet, mg)	< 100	100	N/A	30.73%	Equal Variance t Two-Sample
01-3107-1189	Average AG Wt (Dry, mg)	< 100	100	N/A	29.13%	Equal Variance t Two-Sample
05-9453-0547	Average Root Wt. (Wet, mg	< 100	100	N/A	29.92%	Equal Variance t Two-Sample
07-8356-3286	Average Root Wt. (Dry, mg)	< 100	100	N/A	21.28%	Equal Variance t Two-Sample
16-4933-2978	Average Total Wt (Wet, mg	< 100	100	N/A	29.68%	Equal Variance t Two-Sample
05-3103-1245	Average Total Wt (Dry, mg)	< 100	100	N/A	27.05%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 2:24 PM
Test Link: 17-6324-9202/B160707psc

% Germination Summary

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

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	55.82	50.200	73	4.3332	9.6893	17.36%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	51.2	41.8	71.6	5.4424	12.17	23.77%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	14.385	6.9560	20.858	2.4084	5.3853	37.44%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	1.75470	0.75601	2.51799	0.30792	0.68853	39.24%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	12.368	6.072	18.282	2.0115	4.4978	36.37%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.45161	0.22400	0.73801	0.08597	0.19223	42.57%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	26.752	13.028	36.400	4.29	9.5927	35.86%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	2.20631	0.98000	3.25601	0.38824	0.86812	39.35%

CETIS Test Summary

Report Date: 19 Jul-06 2:24 PM
Test Link: 17-6324-9202/B160707psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		73	50.2000	52.6	50.3	53

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		71.6	51.2000	41.8	42	49.4000

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		18.118	13.7440	6.95601	12.2475	20.8580

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		2.51799	2.16001	0.75601	1.40750	1.93201

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		18.2820	11.694	6.072	11.2675	14.5220

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.73801	0.43601	0.22400	0.35001	0.51001

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		36.4000	25.4380	13.0280	23.5150	35.3800

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		3.25601	2.59602	0.98000	1.75751	2.44202

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	17-6324-9202	17-6324-9202	19 Jul-06 2:23 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	11.51%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	27.5		0.5000	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0	0	1	0.00	1.00000	Non-Significant Effect
Error	0.0907326	0.011342	8			
Total	0.09073264	0.0113416	9			

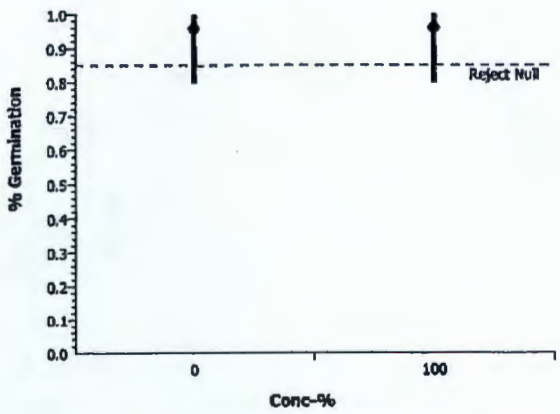
ANOVA Assumptions

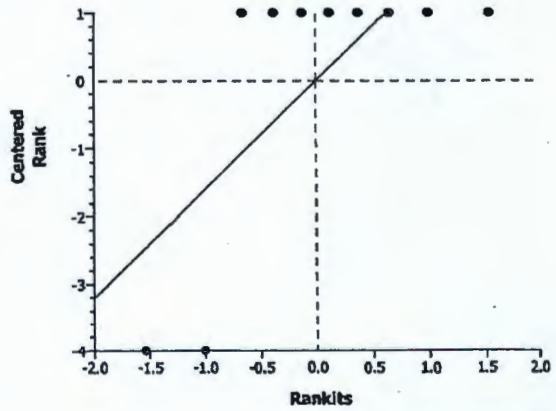
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00000	23.15450	1.00000	Equal Variances
Distribution	Shapiro-Wilk W	0.50927		0.00000	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	5.50000	1.50000	6.50000	2.23607
100		5	0.96000	0.80000	1.00000	0.08944	5.50000	1.50000	6.50000	2.23607

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	17-6324-9202	17-6324-9202	19 Jul-06 2:23 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	13.77%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.81944	1.85955	0.0025	10.7207	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1212.201	1212.201	1	14.59	0.00509	Significant Effect
Error	664.76	83.095	8			
Total	1876.96094	1295.2959	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.29836	23.15450	0.80637	Equal Variances
Distribution	Shapiro-Wilk W	0.87842		0.12515	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	55.82	50.2	73	9.6893				

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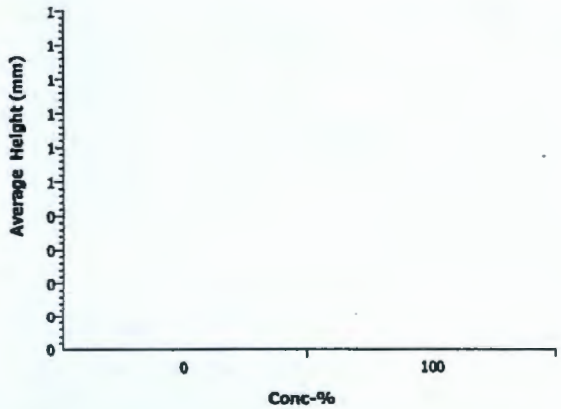
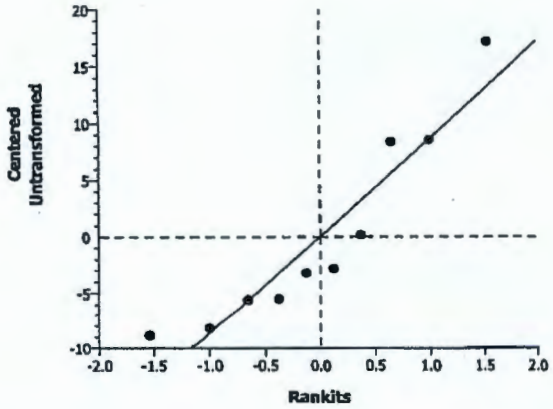




CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	17-6324-9202	17-6324-9202	19 Jul-06 2:23 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	16.81%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	5.56175	1.85955	0.0003	17.3058	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	6697.744	6697.744	1	30.93	0.00053	Significant Effect
Error	1732.192	216.524	8			
Total	8429.93604	6914.2681	9			

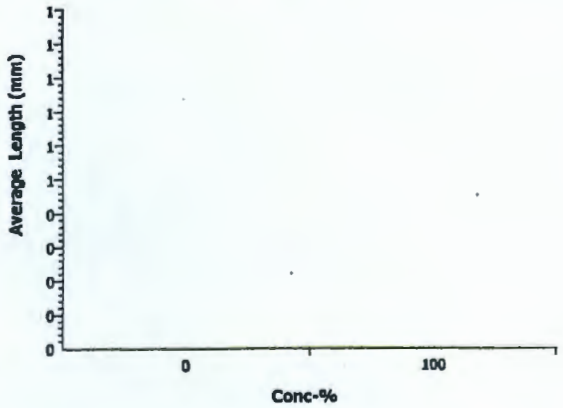
ANOVA Assumptions

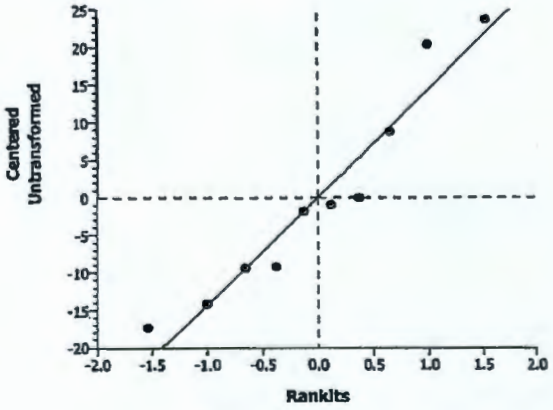
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.92402	23.15450	0.54176	Equal Variances
Distribution	Shapiro-Wilk W	0.92205		0.37437	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	51.2	41.8	71.6	12.17				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	17-6324-9202	17-6324-9202	19 Jul-06 2:23 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	30.73%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.48136	1.85955	0.0190	7.49225	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	249.8798	249.8798	1	6.16	0.03803	Significant Effect
Error	324.6685	40.58357	8			
Total	574.548386	290.46341	9			

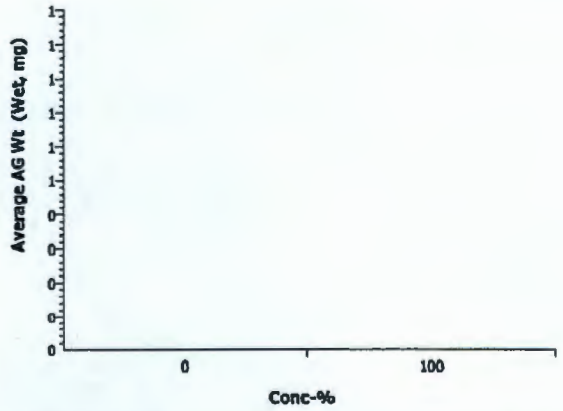
ANOVA Assumptions

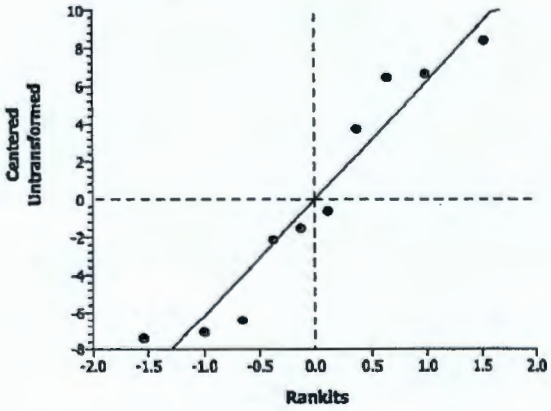
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.79875	23.15450	0.58353	Equal Variances
Distribution	Shapiro-Wilk W	0.90298		0.23617	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	14.385	6.9560	20.858	5.3853				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	17-6324-9202	17-6324-9202	19 Jul-06 2:23 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	29.13%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.84251	1.85955	0.0025	1.28360	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	17.588	17.588	1	14.76	0.00493	Significant Effect
Error	9.529622	1.191203	8			
Total	27.1176195	18.779200	9			

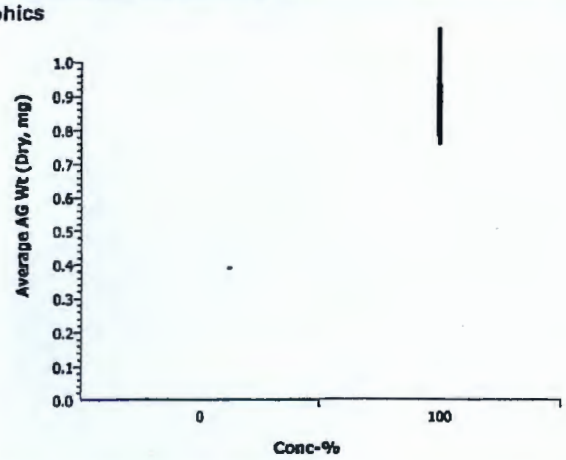
ANOVA Assumptions

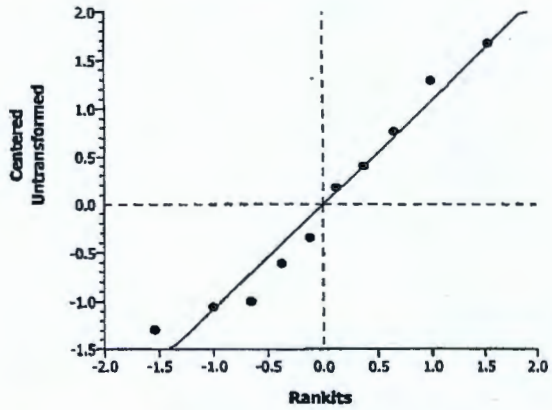
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.02546	23.15450	0.20606	Equal Variances
Distribution	Shapiro-Wilk W	0.94342		0.59163	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	1.75470	0.75601	2.51799	0.68853				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	17-6324-9202	17-6324-9202	19 Jul-06 2:23 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	29.92%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.09988	1.85955	0.0345	5.58807	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	99.5493	99.5493	1	4.41	0.06895	Non-Significant Effect
Error	180.6089	22.57611	8			
Total	280.158188	122.12541	9			

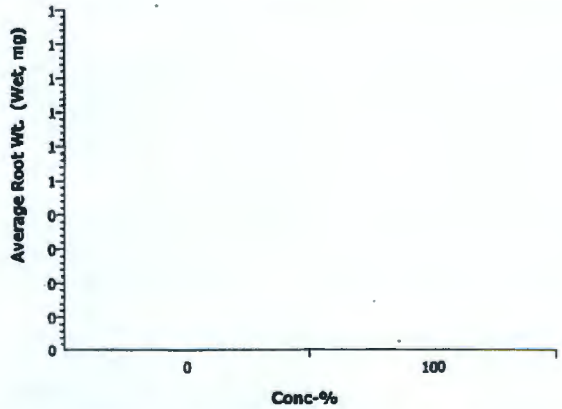
ANOVA Assumptions

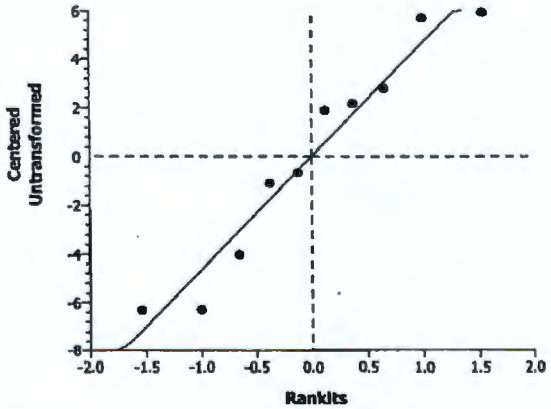
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.23194	23.15450	0.84469	Equal Variances
Distribution	Shapiro-Wilk W	0.92433		0.39446	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	12.368	6.072	18.282	4.4978				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	17-6324-9202	17-6324-9202	19 Jul-06 2:23 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	21.28%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	5.12508	1.85955	0.0005	0.23243	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.025888	1.025888	1	26.27	0.00090	Significant Effect
Error	0.3124553	0.039057	8			
Total	1.33834291	1.0649445	9			

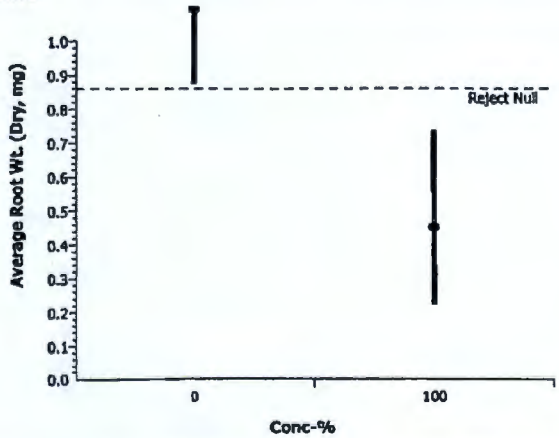
ANOVA Assumptions

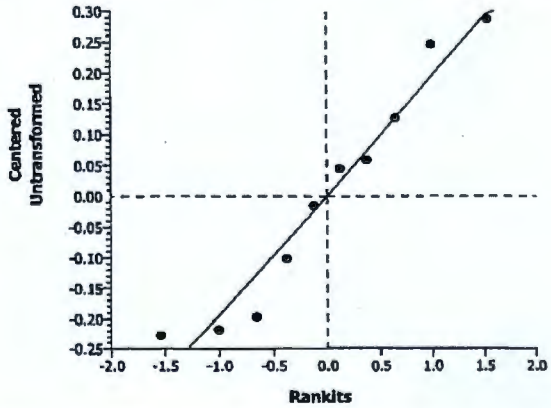
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.11389	23.15450	0.91926	Equal Variances
Distribution	Shapiro-Wilk W	0.92908		0.43895	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.45161	0.22400	0.73801	0.19223				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	17-6324-9202	17-6324-9202	19 Jul-06 2:23 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	29.68%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.37313	1.85955	0.0225	12.7786	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	664.8676	664.8676	1	5.63	0.04503	Significant Effect
Error	944.4609	118.0576	8			
Total	1609.32855	782.92523	9			

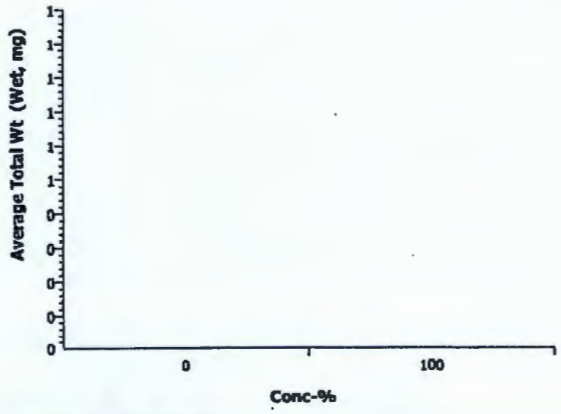
ANOVA Assumptions

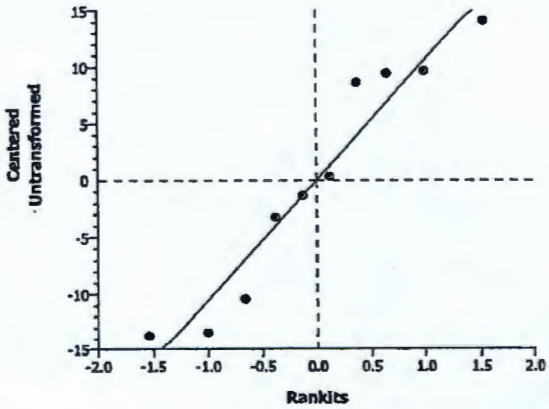
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.56592	23.15450	0.67454	Equal Variances
Distribution	Shapiro-Wilk W	0.91036		0.28347	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	26.752	13.028	36.4	9.5927				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	17-6324-9202	17-6324-9202	19 Jul-06 2:23 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	27.05%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	4.11677	1.85955	0.0017	1.48744	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	27.10937	27.10937	1	16.95	0.00336	Significant Effect
Error	12.79666	1.599583	8			
Total	39.9060297	28.708952	9			

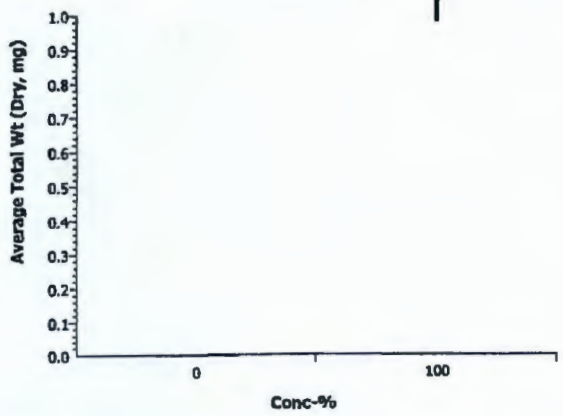
ANOVA Assumptions

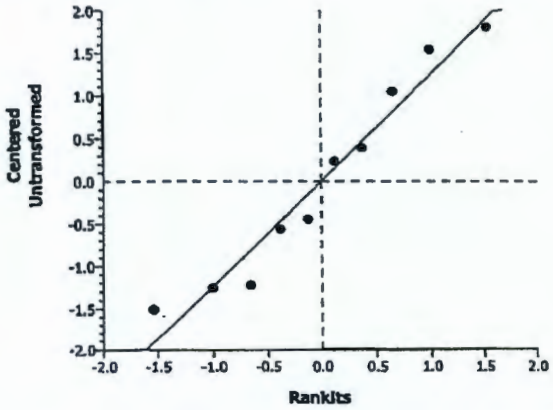
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.24498	23.15450	0.28067	Equal Variances
Distribution	Shapiro-Wilk W	0.93055		0.45329	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	2.20631	0.98000	3.25601	0.86812				

Graphics





Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

7-5-06

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day 21 ____ Day 22 BW

Bioassay Lab ID: BG 1607-08 Sample No: 0116

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 (14 days after 21 planting)	14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	2	5	5	5		4	4	4	7.9	7.6
	B	3	3	4	4		4	4	4		
	C	2	3	4	4		4	4	4		
	D	3	3	3	3		3	3	3		
	E	3	5	5	6		6	5	5		

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

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	82 mm	82 mm	40 mm	6 mm	mm
Replicate B	104 mm	88 mm	23 mm	54 mm	mm
Replicate C	90 mm	54 mm	34 mm	54 mm	mm
Replicate D	84 mm	73 mm	44 mm	mm	mm
Replicate E	64 mm	71 mm	60 mm	66 mm	61 mm

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

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1291.66	1349.5	1300.38
Replicate B	1280.89	1366.4	1293.50
Replicate C	1287.70	1334.4	1294.65
Replicate D	1284.06	1328.7	1290.32
Replicate E	1293.41	1370.3	1304.80

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	8 mm	16 mm	77 mm	72 mm	mm
Replicate B	14 mm	30 mm	131 mm	86 mm	mm
Replicate C	11 mm	134 mm	22 mm	50 mm	mm
Replicate D	59 mm	25 mm	63 mm	mm	mm
Replicate E	58 mm	50 mm	36 mm	35 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	1289.18	1327.5	1290.96
Replicate B	1294.73	1351.3	1297.65
Replicate C	1275.17	1303.3	1276.75
Replicate D	1289.40	1310.9	1290.50
Replicate E	1290.84	1337.5	1293.56

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 2:26 PM
Test Link: 04-0744-1803/B160708psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	16-9666-2893	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	03-1377-9036	**Code:**	B1607-08	**Client:**	
Sample Date:	29 May-06 03:33 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	8d 8h	**Station:**			

Comments: J11K16

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
01-9733-3651	% Germination	< 100	100	N/A	14.30%	Equal Variance t Two-Sample
00-9315-6645	Average Height (mm)	< 100	100	N/A	11.38%	Equal Variance t Two-Sample
06-5083-3477	Average Length (mm)	< 100	100	N/A	15.33%	Equal Variance t Two-Sample
07-8432-6413	Average AG Wt (Wet, mg)	< 100	100	N/A	27.46%	Equal Variance t Two-Sample
11-9793-2178	Average AG Wt (Dry, mg)	< 100	100	N/A	27.89%	Equal Variance t Two-Sample
07-8258-1670	Average Root Wt. (Wet, mg	< 100	100	N/A	25.65%	Equal Variance t Two-Sample
08-8106-9018	Average Root Wt. (Dry, mg)	< 100	100	N/A	19.08%	Equal Variance t Two-Sample
13-6298-8746	Average Total Wt (Wet, mg	< 100	100	N/A	26.20%	Equal Variance t Two-Sample
10-9491-9664	Average Total Wt (Dry, mg)	< 100	100	N/A	25.70%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 2:26 PM
Test Link: 04-0744-1803/B160708psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.80000	0.60000	1.00000	0.06325	0.14142	17.68%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	61.840	52.5	67.300	2.8720	6.4221	10.38%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	51.540	44.5	65.300	3.8803	8.6766	16.83%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	15.554	11.675	21.378	1.5913	3.5582	22.88%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	2.28693	1.73752	3.15250	0.23481	0.52505	22.96%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	9.4507	7.0325	14.143	1.2866	2.877	30.44%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.49613	0.36666	0.73001	0.06580	0.14714	29.66%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	25.005	18.708	35.520	2.8284	6.3244	25.29%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	2.78306	2.13251	3.88251	0.29726	0.66469	23.88%

CETIS Test Summary

Report Date: 19 Jul-06 2:26 PM
Test Link: 04-0744-1803/B160708psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		52.5	67.3000	58	67	64.4000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		44.5	65.3000	54.3	49	44.6

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		14.46	21.3775	11.6750	14.88	15.3780

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		2.17999	3.15250	1.73752	2.08663	2.27800

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		9.57999	14.1425	7.03250	7.16667	9.33201

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.44498	0.73001	0.39499	0.36666	0.54402

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		24.04	35.5200	18.7075	22.0466	24.7100

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		2.62497	3.88251	2.13251	2.45329	2.82202

CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 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	14.30%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.15401	1.85955	0.0317	0.16152	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0875112	0.087511	1	4.64	0.06338	Non-Significant Effect
Error	0.1508886	0.018861	8			
Total	0.23839983	0.1063723	9			

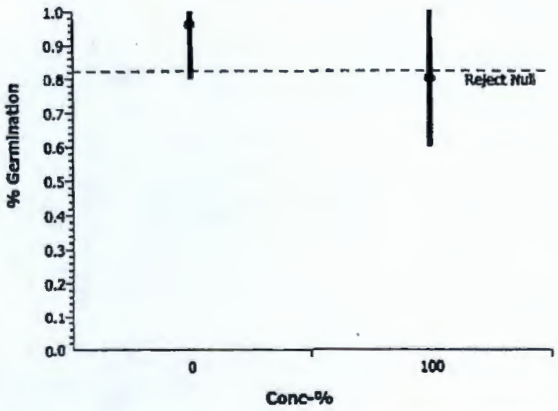
ANOVA Assumptions

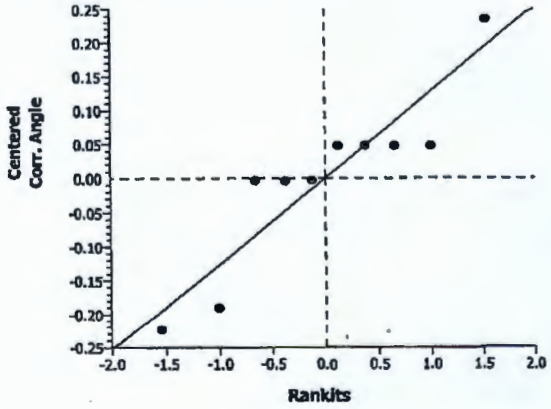
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.32601	23.15450	0.43367	Equal Variances
Distribution	Shapiro-Wilk W	0.86391		0.08483	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
100		5	0.80000	0.60000	1.00000	0.14142	1.11056	0.88608	1.34528	0.16242

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	11.38%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	3.35745	1.85955	0.0050	8.86172	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	639.9999	639.9999	1	11.27	0.00997	Significant Effect
Error	454.204	56.77551	8			
Total	1094.20392	696.77538	9			

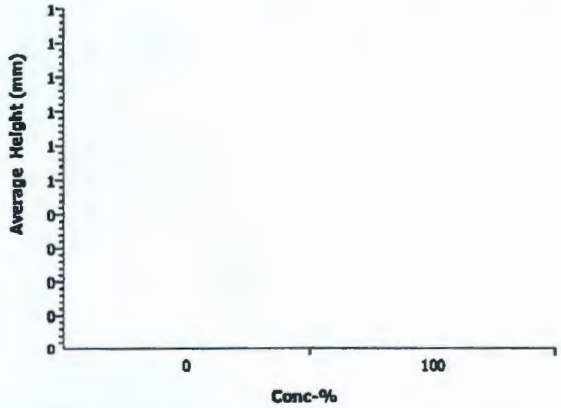
ANOVA Assumptions

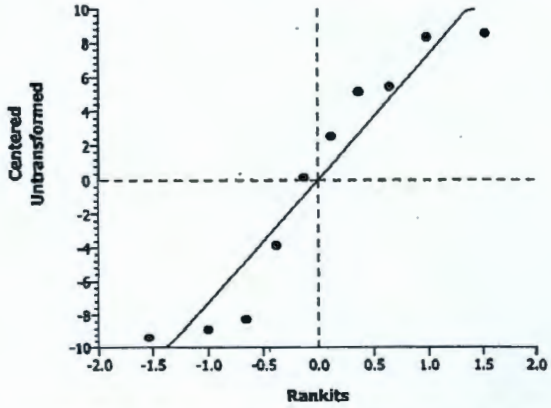
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.75322	23.15450	0.59987	Equal Variances
Distribution	Shapiro-Wilk W	0.88646		0.15463	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	61.840	52.5	67.3	6.4221				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	15.33%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	6.05796	1.85955	0.0002	15.7839	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	6610.041	6610.041	1	36.70	0.00030	Significant Effect
Error	1440.924	180.1155	8			
Total	8050.96509	6790.1565	9			

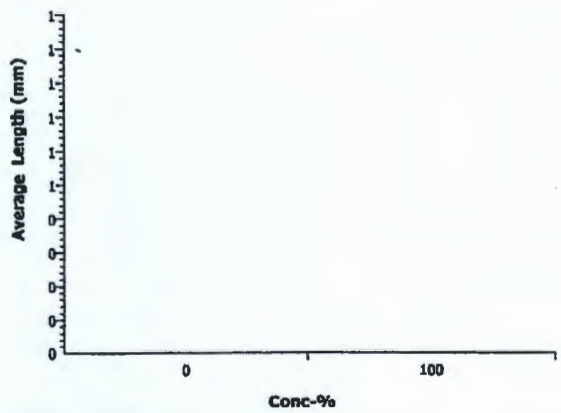
ANOVA Assumptions

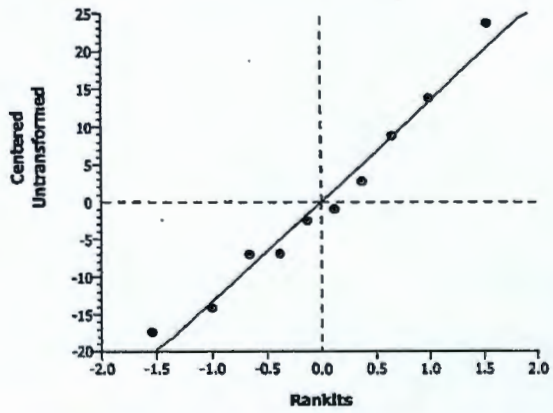
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.78502	23.15450	0.22554	Equal Variances
Distribution	Shapiro-Wilk W	0.96894		0.88088	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	51.540	44.5	65.3	8.6766				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 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	27.46%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.45178	1.85955	0.0199	6.69574	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	194.843	194.843	1	6.01	0.03983	Significant Effect
Error	259.3056	32.4132	8			
Total	454.148621	227.25622	9			

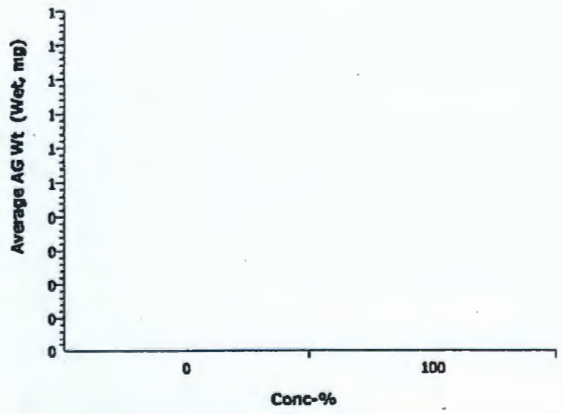
ANOVA Assumptions

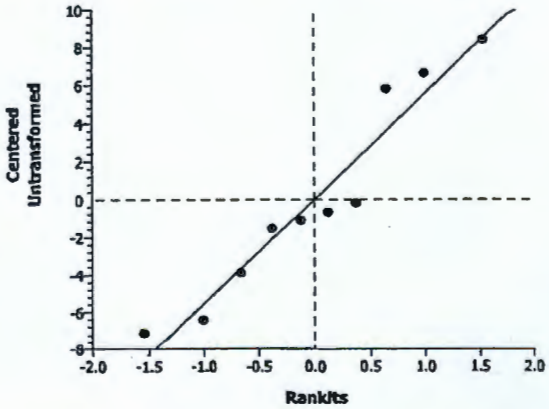
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.12038	23.15450	0.19905	Equal Variances
Distribution	Shapiro-Wilk W	0.92089		0.36443	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	15.554	11.675	21.378	3.5582				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 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	27.89%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.20796	1.85955	0.0062	1.22899	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	11.23781	11.23781	1	10.29	0.01246	Significant Effect
Error	8.73605	1.092006	8			
Total	19.9738569	12.329813	9			

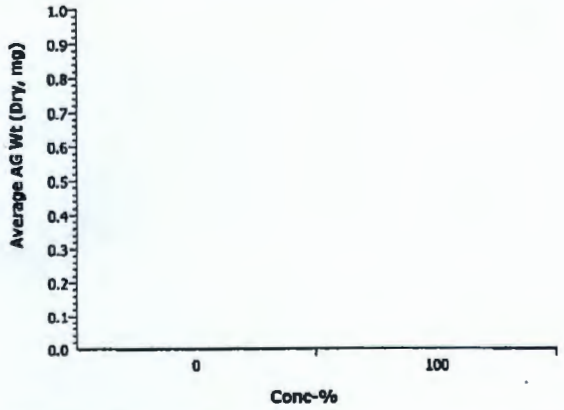
ANOVA Assumptions

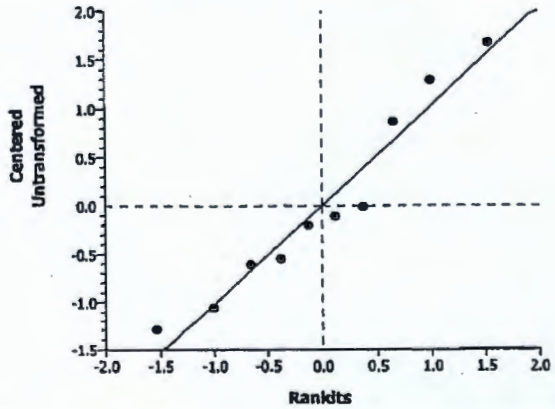
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.92246	23.15450	0.08755	Equal Variances
Distribution	Shapiro-Wilk W	0.93730		0.52338	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	2.28693	1.73752	3.15250	0.52505				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 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	25.65%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.58083	1.85955	0.0036	4.79167	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	212.8465	212.8465	1	12.82	0.00718	Significant Effect
Error	132.797	16.59963	8			
Total	345.64357	229.44616	9			

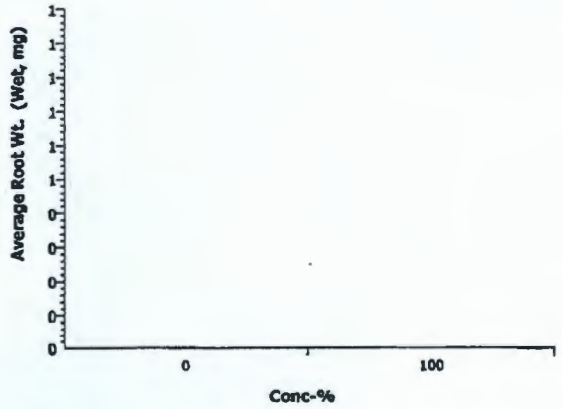
ANOVA Assumptions

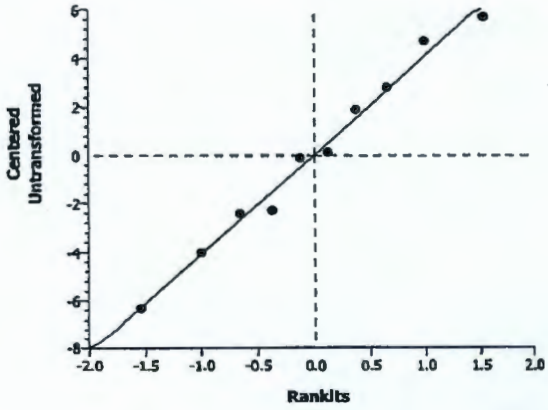
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.01097	23.15450	0.31096	Equal Variances
Distribution	Shapiro-Wilk W	0.97672		0.94525	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	9.4507	7.0325	14.143	2.877				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	19.08%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	5.31813	1.85955	0.0004	0.20842	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.8882381	0.888238	1	28.28	0.00071	Significant Effect
Error	0.2512475	0.031406	8			
Total	1.13948554	0.9196440	9			

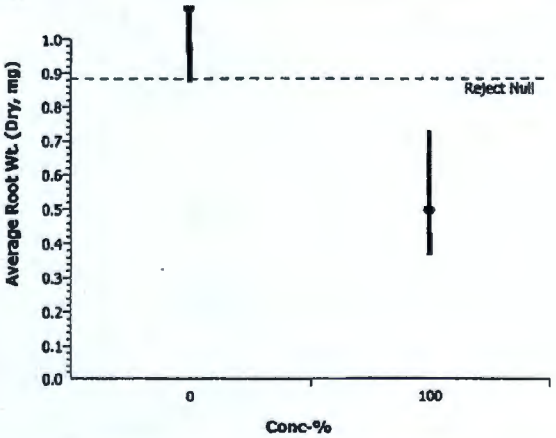
ANOVA Assumptions

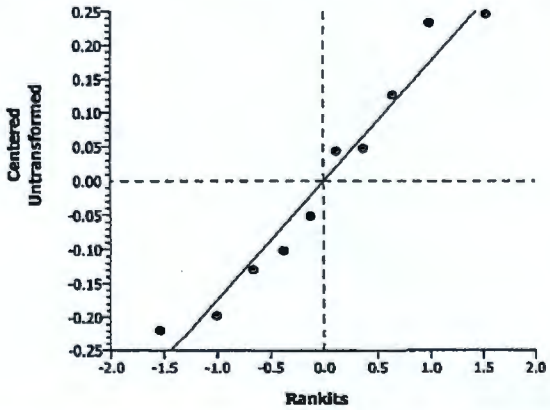
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.90115	23.15450	0.54906	Equal Variances
Distribution	Shapiro-Wilk W	0.93555		0.50465	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.49613	0.36666	0.73001	0.14714				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 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	26.20%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.97556	1.85955	0.0089	11.2835	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	814.9813	814.9813	1	8.85	0.01772	Significant Effect
Error	736.3755	92.04694	8			
Total	1551.35687	907.02827	9			

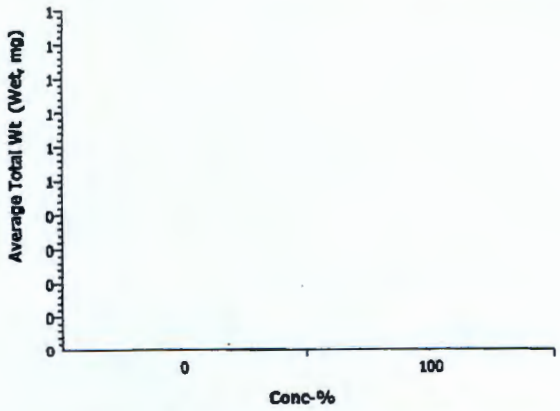
ANOVA Assumptions

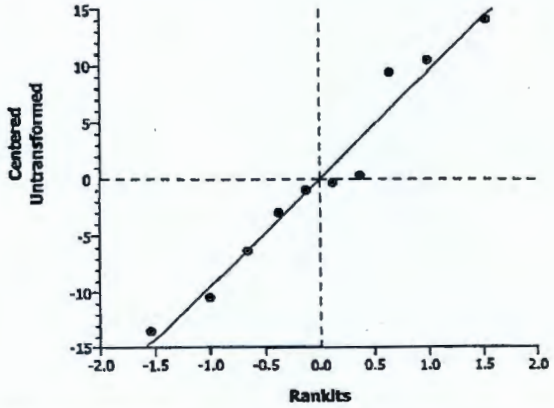
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.60252	23.15450	0.24222	Equal Variances
Distribution	Shapiro-Wilk W	0.95188		0.69072	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	25.005	18.708	35.520	6.3244				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 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	25.70%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.57440	1.85955	0.0036	1.4131	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	18.44486	18.44486	1	12.78	0.00725	Significant Effect
Error	11.54938	1.443673	8			
Total	29.9942417	19.888531	9			

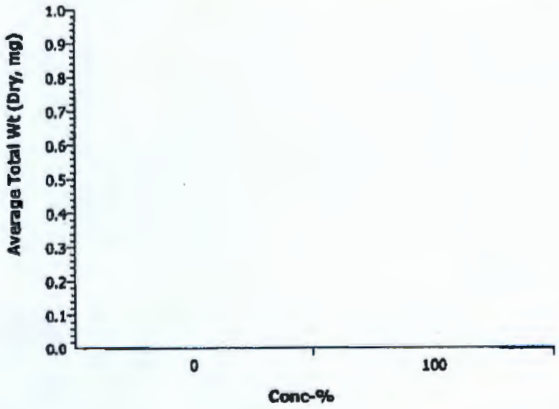
ANOVA Assumptions

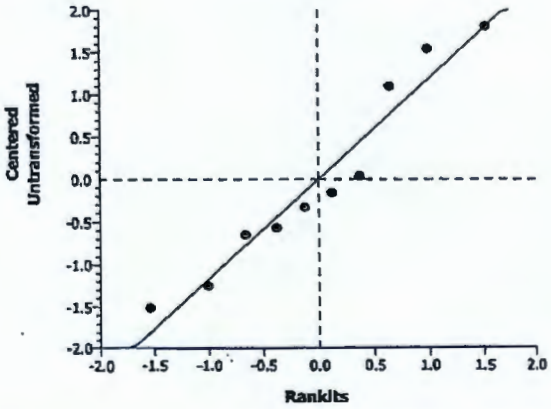
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.53518	23.15450	0.12616	Equal Variances
Distribution	Shapiro-Wilk W	0.92834		0.43174	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	2.78306	2.13251	3.88251	0.66469				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

5 DW 7-8-05

Initials: Day 0 TO Day 12 NJ Day 14 NJ Day 16 NJ Day 19 [illegible] Day 21 NJ Day 23 [illegible] Day __ NJ Day 25 [illegible]

Bioassay Lab ID: BG 1607-09 Sample No: SIIKTR

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 (24 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	2	3	3	4		4	4	4	7.6	6.4
	B	4	4	6	6		5	6→5	5		
	C	2	2	3	3		3	3	3		
	D	3	3	5	5		5	5	5		
	E	2	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: 2 med G, 2 sm G

Replicate B: 2 lg G, 3 med G Remove: 1 sm G

Replicate C: 3 med G

Replicate D: 3 med G, 2 sm G

Replicate E: 2 med G, 3 sm G

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

Replicate C: 1 lg G, 2 med G

Replicate D: 3 med G, 2 sm G

Replicate E: 3 med G, 2 sm G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	70 mm	52 mm	65 mm	83 mm	mm
Replicate B	66 mm	73 mm	52 mm	49 mm	84 mm
Replicate C	86 mm	66 mm	56 mm	mm	mm
Replicate D	75 mm	73 mm	55 mm	40 mm	18 mm
Replicate E	66 mm	64 mm	42 mm	37 mm	55 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1278.35	1358.8	1287.37
Replicate B	1298.71	1375.2	1310.53
Replicate C	1300.56	1351.0	1306.06
Replicate D	1289.01	1335.6	1298.10
Replicate E	1300.24	1343.2	1300.81

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	89 mm	30 mm	56 mm	50 mm	mm
Replicate B	39 mm	110 mm	115 mm	59 mm	81 mm
Replicate C	49 mm	34 mm	49 mm	mm	mm
Replicate D	57 mm	41 mm	60 mm	42 mm	9 mm
Replicate E	91 mm	47 mm	39 mm	47 mm	28 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1283.75	1339.5	1286.75
Replicate B	1302.09	1375.9	1306.48
Replicate C	1296.65	1331.5	1298.19
Replicate D	1290.31	1338.5	1294.62
Replicate E	1281.59	1325.4	1284.91

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 2:32 PM
Test Link: 01-7170-2430/B160709psc

Plant Bioassay - Chronic | **CH2M Hill**

Test No:	15-1145-8001	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	05-2009-5721	**Code:**	B1607-09	**Client:**	
Sample Date:	30 May-06 02:30 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	7d 9h	**Station:**			

Comments: J11K79

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
02-6140-8578	% Germination	100	> 100	N/A	16.88%	Equal Variance t Two-Sample
15-0896-4337	Average Height (mm)	< 100	100	N/A	12.63%	Equal Variance t Two-Sample
06-3461-1993	Average Length (mm)	< 100	100	N/A	18.52%	Equal Variance t Two-Sample
12-8068-1990	Average AG Wt (Wet, mg)	< 100	100	N/A	29.87%	Equal Variance t Two-Sample
08-2542-4686	Average AG Wt (Dry, mg)	< 100	100	N/A	27.23%	Equal Variance t Two-Sample
12-8558-3864	Average Root Wt. (Wet, mg	< 100	100	N/A	25.08%	Equal Variance t Two-Sample
06-3793-1126	Average Root Wt. (Dry, mg)	< 100	100	N/A	19.25%	Equal Variance t Two-Sample
01-6937-8103	Average Total Wt (Wet, mg	< 100	100	N/A	27.10%	Equal Variance t Two-Sample
15-4156-7315	Average Total Wt (Dry, mg)	< 100	100	N/A	24.85%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 2:32 PM
Test Link: 01-7170-2430/B160709psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.88000	0.60000	1.00000	0.08000	0.17889	20.33%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	61.320	52.200	69.300	3.6725	8.2120	13.39%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	54.700	43	80.800	6.9399	15.518	28.37%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	14.027	8.592	20.113	2.2150	4.9529	35.31%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	1.91687	1.31401	2.36401	0.18634	0.41667	21.74%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	11.743	8.7620	14.762	1.1676	2.6107	22.23%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.73346	0.51331	0.87800	0.06744	0.15081	20.56%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	25.77	17.354	34.050	3.2504	7.2680	28.20%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	2.65033	1.97803	3.24202	0.22594	0.50522	19.06%

CETIS Test Summary

Report Date: 19 Jul-06 2:32 PM
Test Link: 01-7170-2430/B160709psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		67.5	64.8000	69.3000	52.2000	52.8

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		56.3	80.8000	44	43	49.4000

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		20.1125	15.298	16.8133	9.31799	8.59199

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		2.25500	2.36401	1.83333	1.81799	1.31401

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		13.9375	14.7620	11.6167	9.63799	8.76201

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.75000	0.87800	0.51331	0.86199	0.66401

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		34.0500	30.0600	28.43	18.956	17.3540

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		3.00500	3.24202	2.34664	2.67998	1.97803

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	01-7170-2430	01-7170-2430	19 Jul-06 2:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	16.88%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.88438	1.85955	0.2011	0.19311	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	0.78	0.40229	Non-Significant Effect
Error	0.2156876	0.026961	8			
Total	0.23677457	0.0480479	9			

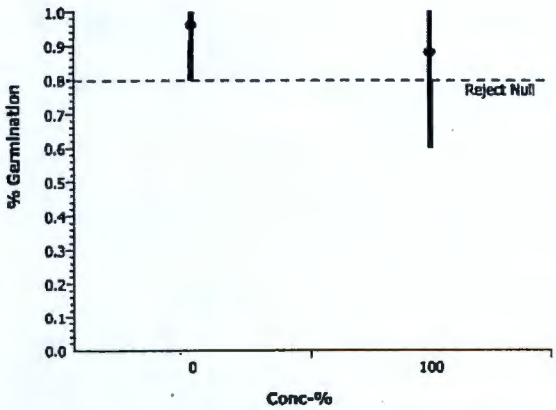
ANOVA Assumptions

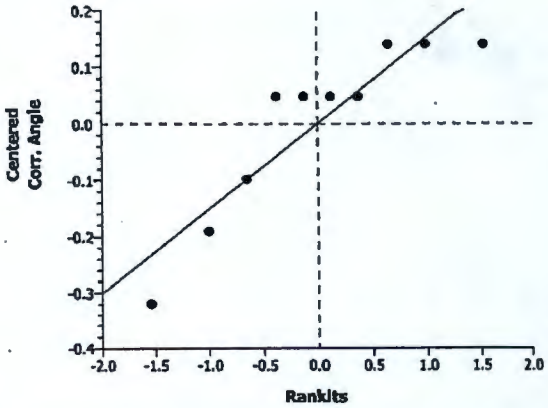
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.75435	23.15450	0.22822	Equal Variances
Distribution	Shapiro-Wilk W	0.82977		0.03325	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	1.29766	1.10715	1.34528	0.10650
100		5	0.88000	0.60000	1.00000	0.17889	1.20581	0.88608	1.34528	0.20635

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	01-7170-2430	01-7170-2430	19 Jul-06 2:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	12.63%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.12483	1.85955	0.0071	9.83084	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	682.2759	682.2759	1	9.76	0.01413	Significant Effect
Error	558.98	69.87251	8			
Total	1241.25592	752.14838	9			

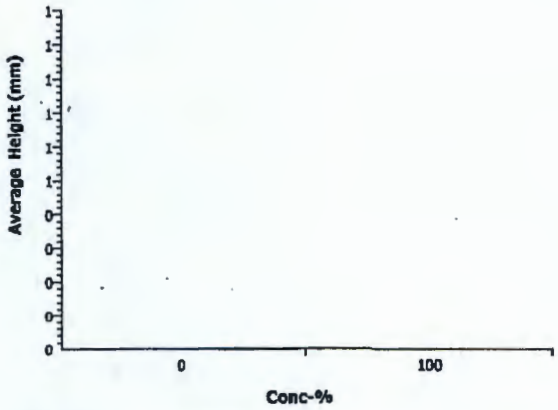
ANOVA Assumptions

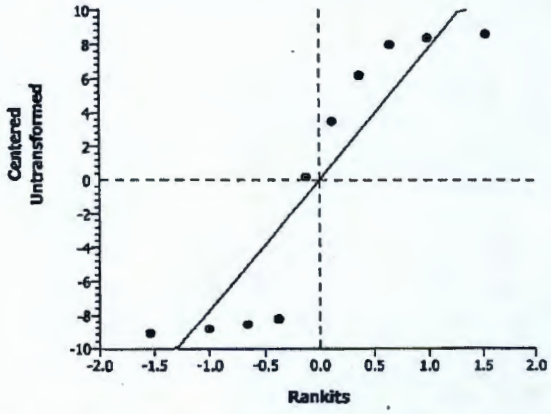
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.07223	23.15450	0.94774	Equal Variances
Distribution	Shapiro-Wilk W	0.80723		0.01775	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	61.320	52.2	69.3	8.2120				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	01-7170-2430	01-7170-2430	19 Jul-06 2:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	18.52%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	4.7063	1.85955	0.0008	19.0685	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5822.569	5822.569	1	22.15	0.00153	Significant Effect
Error	2103.032	262.879	8			
Total	7925.60083	6085.4478	9			

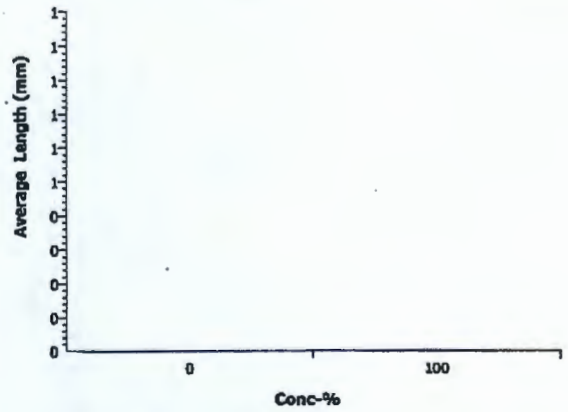
ANOVA Assumptions

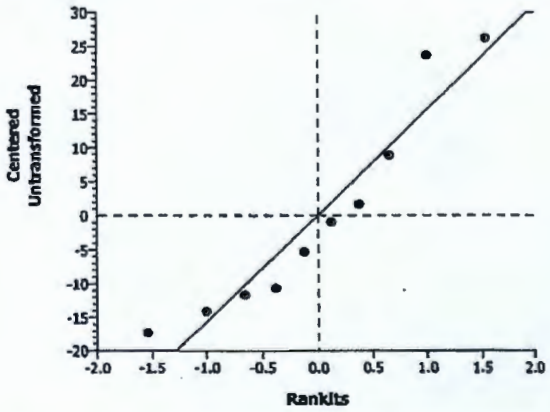
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.18329	23.15450	0.87437	Equal Variances
Distribution	Shapiro-Wilk W	0.89794		0.20796	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	54.700	43	80.8	15.518				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	01-7170-2430	01-7170-2430	19 Jul-06 2:32 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	29.87%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.64403	1.85955	0.0148	7.28305	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	268.0929	268.0929	1	6.99	0.02953	Significant Effect
Error	306.7903	38.34879	8			
Total	574.88324	306.44169	9			

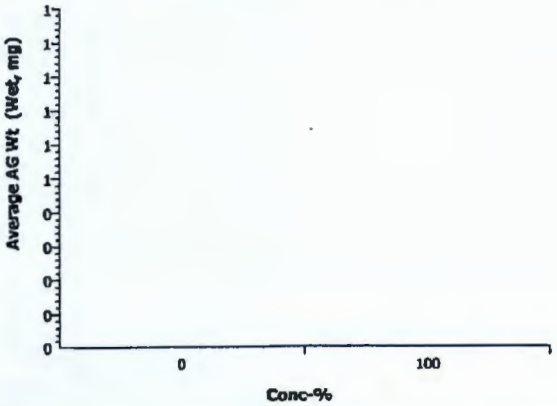
ANOVA Assumptions

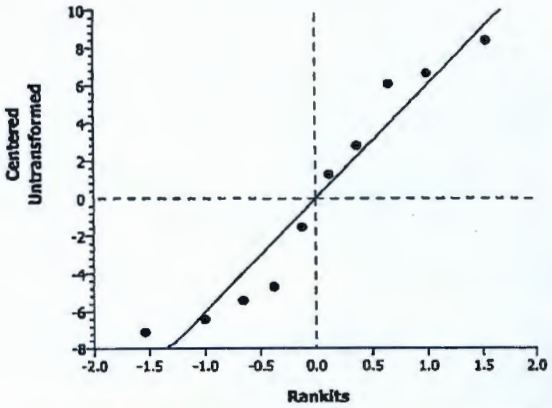
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.12648	23.15450	0.48293	Equal Variances
Distribution	Shapiro-Wilk W	0.90820		0.26886	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	14.027	8.592	20.113	4.9529				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	01-7170-2430	01-7170-2430	19 Jul-06 2:32 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	27.23%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.85912	1.85955	0.0024	1.19994	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	15.50307	15.50307	1	14.89	0.00481	Significant Effect
Error	8.327819	1.040977	8			
Total	23.8308907	16.544049	9			

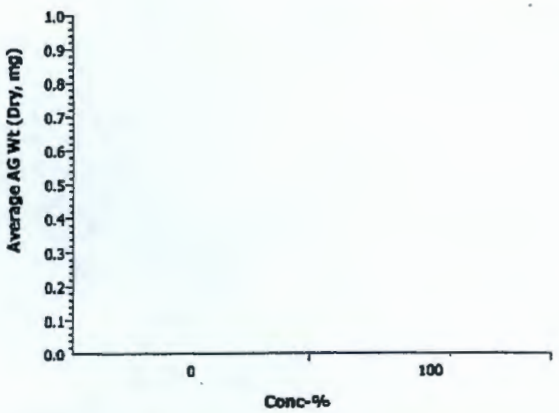
ANOVA Assumptions

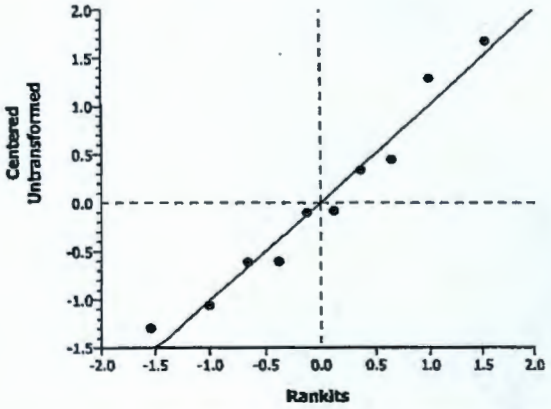
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.99173	23.15450	0.03940	Equal Variances
Distribution	Shapiro-Wilk W	0.95349		0.70981	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	1.91687	1.31401	2.36401	0.41667				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	01-7170-2430	01-7170-2430	19 Jul-06 2:32 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	25.08%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.75241	1.85955	0.0125	4.68503	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	120.2203	120.2203	1	7.58	0.02497	Significant Effect
Error	126.9522	15.86902	8			
Total	247.172516	136.08935	9			

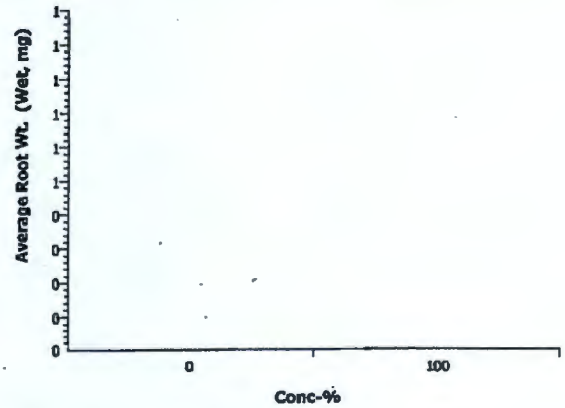
ANOVA Assumptions

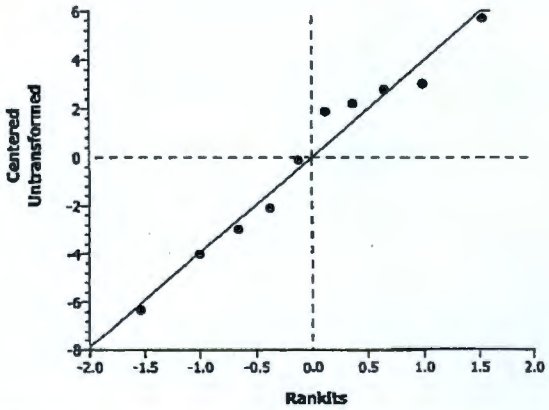
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.65647	23.15450	0.23710	Equal Variances
Distribution	Shapiro-Wilk W	0.96115		0.79890	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	11.743	8.7620	14.762	2.6107				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	01-7170-2430	01-7170-2430	19 Jul-06 2:32 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	19.25%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.17315	1.85955	0.0066	0.21023	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.3217276	0.321728	1	10.07	0.01313	Significant Effect
Error	0.255621	0.031953	8			
Total	0.57734865	0.3536802	9			

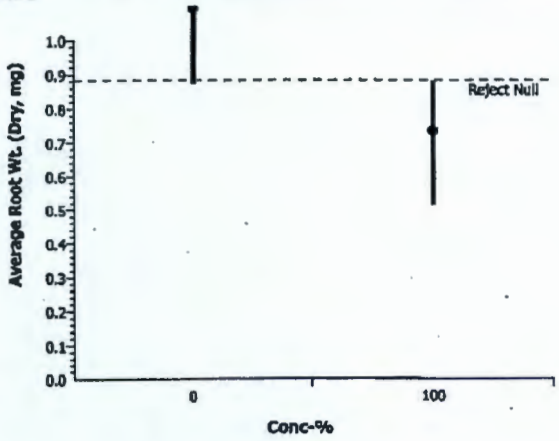
ANOVA Assumptions

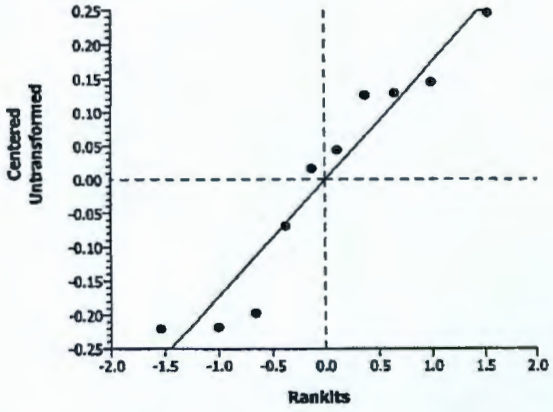
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.80976	23.15450	0.57968	Equal Variances
Distribution	Shapiro-Wilk W	0.90710		0.26164	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.73346	0.51331	0.87800	0.15081				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	01-7170-2430	01-7170-2430	19 Jul-06 2:32 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	27.10%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.75510	1.85955	0.0124	11.6699	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	747.3687	747.3687	1	7.59	0.02486	Significant Effect
Error	787.6796	98.45995	8			
Total	1535.04828	845.82866	9			

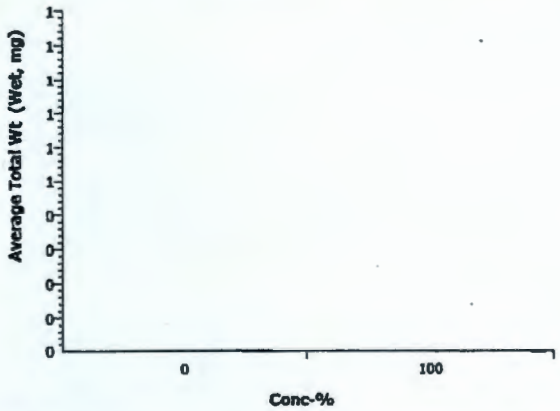
ANOVA Assumptions

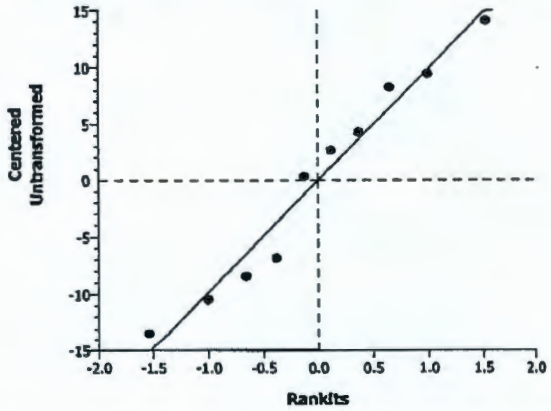
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.72781	23.15450	0.35455	Equal Variances
Distribution	Shapiro-Wilk W	0.94961		0.66386	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	25.77	17.354	34.050	7.2680				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	01-7170-2430	01-7170-2430	19 Jul-06 2:32 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	24.85%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	3.87639	1.85955	0.0023	1.36668	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	20.29146	20.29146	1	15.03	0.00470	Significant Effect
Error	10.80311	1.350388	8			
Total	31.0945673	21.641850	9			

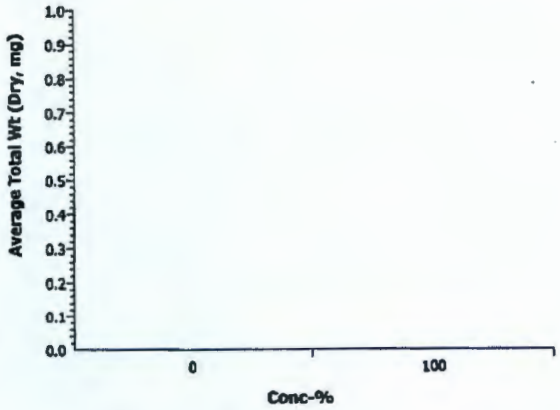
ANOVA Assumptions

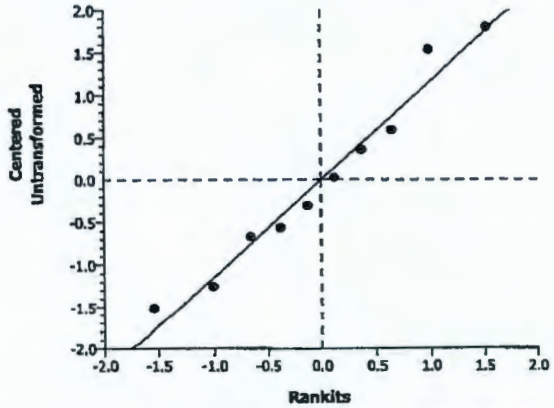
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	9.58106	23.15450	0.05021	Equal Variances
Distribution	Shapiro-Wilk W	0.95707		0.75197	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	2.65033	1.97803	3.24202	0.50522				

Graphics





Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

7-8-06 5 DW

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day 21 NJ Day 28 NJ

Bioassay Lab ID: BG 1607-10 Sample No: J1J5Y8

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 (14 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	5	6	6	6		5	6→5	5	8.8	8.5
	B	3	4	4	5		5	5	NJ ~~5~~ 4		
	C	7	7	8	7		5	7→5	5		
	D	0	1	1	1		1	1	1		
	E	6	7	7	7		5	6→5	5		

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

Replicate A 1lgG, 3~~sm~~ med G NJ 1smG Remove: 1smG

Replicate B 1lgG 2medG, 1smG, 1smB

Replicate C 1lgG, 4medG Remove: 1medG, 1smG

Replicate D 1medG

Replicate E 3lgG 2medG Remove 1smG

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 1lgG, 2medG, 2smG

Replicate B 1lgG, 3medG, ~~1smB~~ NJ

Replicate C 4medG, 1medG w/1 B shoot

Replicate D 1medG

Replicate E 1lgG, 1lgG w/1 B shoot, 3medG

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	74 mm	60 mm	31 mm	37 mm	80 mm
Replicate B	66 mm	45 mm	92 mm	67 mm	mm
Replicate C	70 mm	72 mm	60 mm	59 mm	58 mm
Replicate D	56 mm	mm	mm	mm	mm
Replicate E	79 mm	59 mm	70 mm	66 mm	85 mm

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

Tin tare 1295.71

	Tin Tare WL (mg)	Wet Wt (mg)	Dry WL (mg)
Replicate A	~~1286.89~~	1359.3	1306.50
Replicate B	1282.15	1346.2	1292.90
Replicate C	1286.81	1355.2	1298.55
Replicate D	1290.47	1298.8	1291.35
Replicate E	1286.89	1379.0	1305.07

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	21 mm	119 mm	60 mm	82 mm
Replicate B	101 mm	95 mm	122 mm	65 mm	mm
Replicate C	49 mm	50 mm	65 mm	89 mm	71 mm
Replicate D	55 mm	mm	mm	mm	mm
Replicate E	57 mm	110 mm	70 mm	61 mm	125 mm

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

	Tin Tare WL (mg)	Wet Wt (mg)	Dry WL (mg)
Replicate A	1276.04	1327.3	1279.03
Replicate B	1276.78	1326.2	1279.73
Replicate C	1286.59	1333.8	1289.35
Replicate D	1282.60	1287.8	1282.60
Replicate E	1280.53	1344.6	1285.29

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 2:36 PM
Test Link: 02-5186-7967/B160710psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	15-4133-9306	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	06-0325-5625	**Code:**	B1607-10	**Client:**	
Sample Date:	30 May-06 05:26 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	7d 6h	**Station:**			

Comments: J11JY8

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
03-9678-3540	% Germination	100	> 100	N/A	29.32%	Wilcoxon Rank Sum Two-Sample
08-4029-7083	Average Height (mm)	< 100	100	N/A	11.70%	Equal Variance t Two-Sample
06-0907-3552	Average Length (mm)	< 100	100	N/A	19.18%	Equal Variance t Two-Sample
03-5550-6588	Average AG Wt (Wet, mg)	< 100	100	N/A	27.81%	Equal Variance t Two-Sample
10-4381-0051	Average AG Wt (Dry, mg)	< 100	100	N/A	32.10%	Equal Variance t Two-Sample
16-2111-6497	Average Root Wt. (Wet, mg	< 100	100	N/A	26.02%	Equal Variance t Two-Sample
05-8762-7837	Average Root Wt. (Dry, mg)	< 100	100	N/A	31.04%	Equal Variance t Two-Sample
00-8470-7796	Average Total Wt (Wet, mg	< 100	100	N/A	26.61%	Equal Variance t Two-Sample
12-0327-6502	Average Total Wt (Dry, mg)	< 100	100	N/A	31.16%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 2:36 PM
Test Link: 02-5186-7967/B160710psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.80000	0.20000	1.00000	0.15492	0.34641	43.30%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	63.100	56	71.800	3.0890	6.9072	10.95%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	72.960	55	95.800	7.4706	16.705	22.90%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	13.832	8.3301	18.422	1.6935	3.7868	27.38%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	2.34030	0.88000	3.62800	0.44410	0.99304	42.43%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	10.013	5.2001	12.814	1.3579	3.0364	30.33%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.56790	0.00000	0.95200	0.15811	0.35354	62.25%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	23.845	13.530	31.236	3.023	6.7596	28.35%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	2.90820	0.88000	4.58000	0.59995	1.34153	46.13%

CETIS Test Summary

Report Date: 19 Jul-06 2:36 PM
Test Link: 02-5186-7967/B160710psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		56.4000	67.5	63.8	56	71.8000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		64.6	95.8000	64.8000	55	84.6

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		12.7180	16.0125	13.678	8.33008	18.422

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		2.15801	2.68750	2.34800	0.88000	3.62800

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		10.2520	12.355	9.44202	5.20007	12.814

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.59800	0.73749	0.55200	0.00000	0.95200

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		22.9700	28.3675	23.12	13.5302	31.236

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		2.75601	3.42499	2.90000	0.88000	4.58000

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	29.32%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	24.5		0.2738	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0777281	0.077728	1	0.99	0.34905	Non-Significant Effect
Error	0.6285783	0.078572	8			
Total	0.70630639	0.1563004	9			

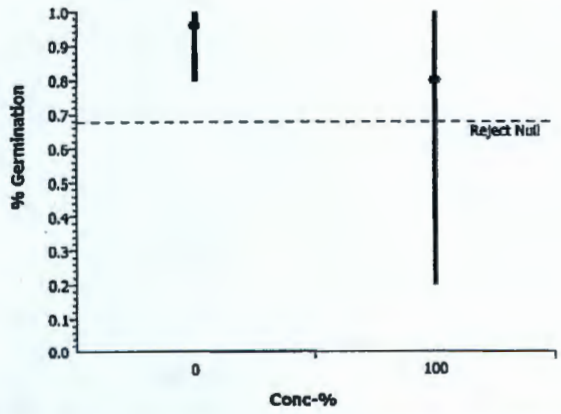
ANOVA Assumptions

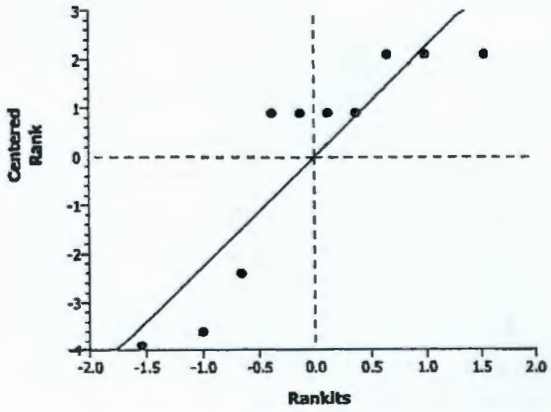
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	12.85562	23.15450	0.02975	Equal Variances
Distribution	Shapiro-Wilk W	0.76446		0.00535	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	6.10000	2.50000	7.00000	2.01246
100		5	0.80000	0.20000	1.00000	0.34641	4.90000	1.00000	7.00000	2.92404

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 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	11.70%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.00856	1.85955	0.0084	9.11057	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	543.1689	543.1689	1	9.05	0.01685	Significant Effect
Error	480.072	60.009	8			
Total	1023.24091	603.17789	9			

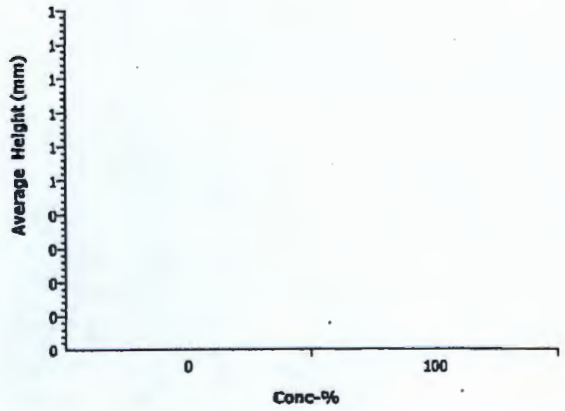
ANOVA Assumptions

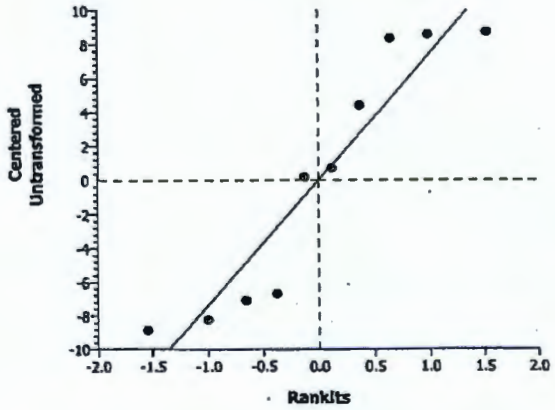
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.51557	23.15450	0.69688	Equal Variances
Distribution	Shapiro-Wilk W	0.85739		0.07108	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	63.100	56	71.8	6.9072				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 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	19.18%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.82467	1.85955	0.0112	19.7497	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2250	2250	1	7.98	0.02233	Significant Effect
Error	2255.984	281.998	8			
Total	4505.98413	2531.9980	9			

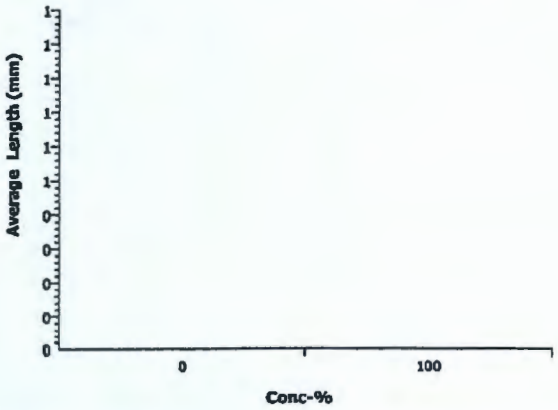
ANOVA Assumptions

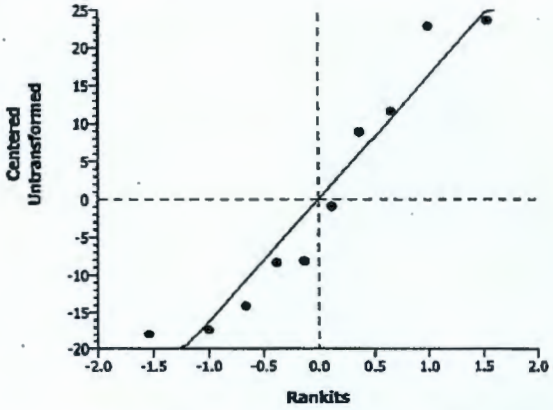
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.02114	23.15450	0.98431	Equal Variances
Distribution	Shapiro-Wilk W	0.89849		0.21087	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	72.960	55	95.8	16.705				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 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	27.81%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.89279	1.85955	0.0101	6.7819	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	278.2663	278.2663	1	8.37	0.02011	Significant Effect
Error	266.0222	33.25277	8			
Total	544.288483	311.51907	9			

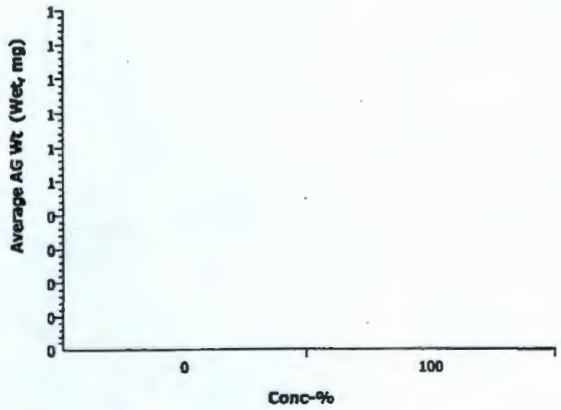
ANOVA Assumptions

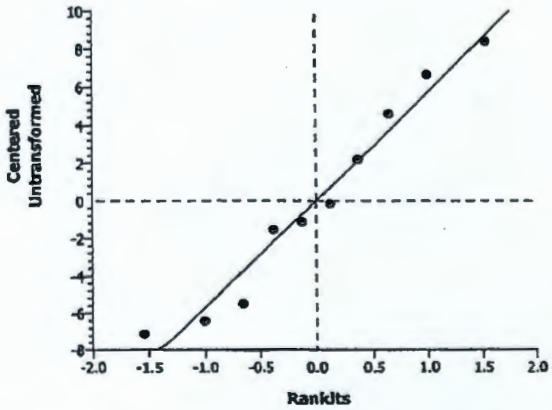
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.63789	23.15450	0.23884	Equal Variances
Distribution	Shapiro-Wilk W	0.94405		0.59892	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	13.832	8.3301	18.422	3.7868				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 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	32.10%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.71643	1.85955	0.0132	1.41484	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	10.67911	10.67911	1	7.38	0.02639	Significant Effect
Error	11.57783	1.447229	8			
Total	22.2569437	12.12634	9			

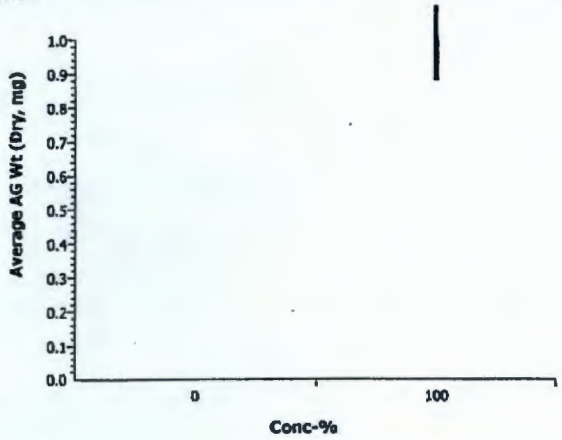
ANOVA Assumptions

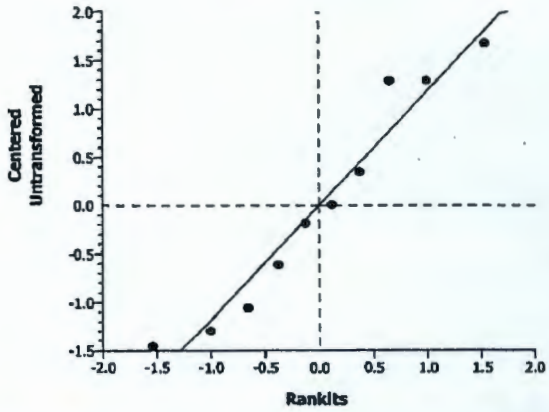
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.93520	23.15450	0.53825	Equal Variances
Distribution	Shapiro-Wilk W	0.92699		0.41894	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	2.34030	0.88000	3.62800	0.99304				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 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	26.02%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.31605	1.85955	0.0053	4.8592	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	187.7134	187.7134	1	11.00	0.01060	Significant Effect
Error	136.5664	17.0708	8			
Total	324.279861	204.78424	9			

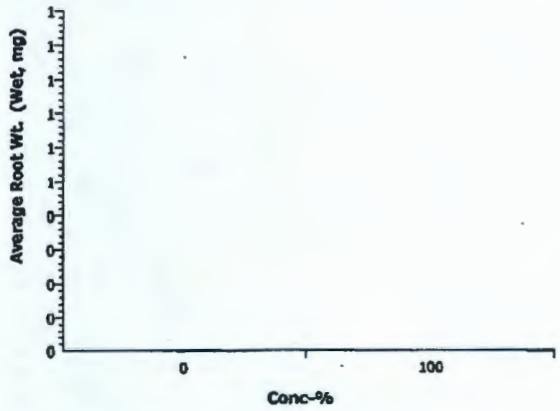
ANOVA Assumptions

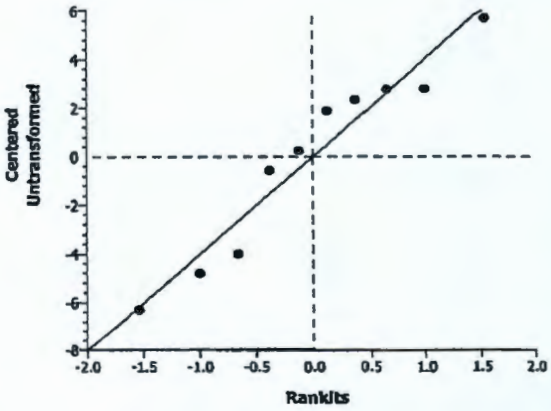
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.70321	23.15450	0.35875	Equal Variances
Distribution	Shapiro-Wilk W	0.93058		0.45360	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	10.013	5.2001	12.814	3.0364				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 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	31.04%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.87615	1.85955	0.0103	0.33898	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.6872244	0.687224	1	8.27	0.02063	Significant Effect
Error	0.6646082	0.083076	8			
Total	1.35183263	0.7703005	9			

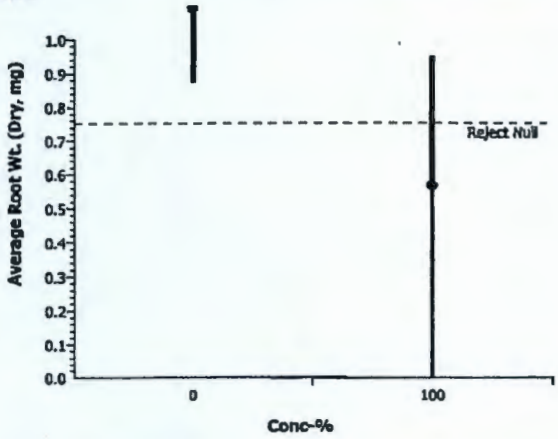
ANOVA Assumptions

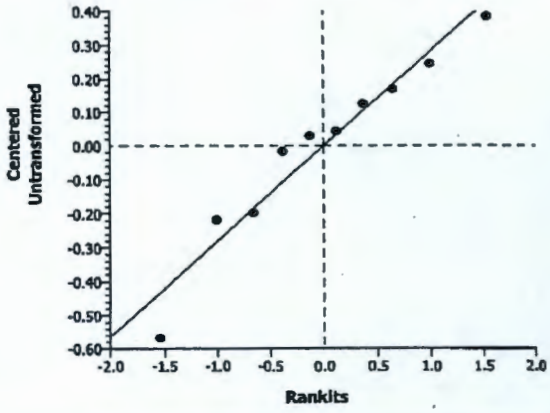
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.03662	23.15450	0.30741	Equal Variances
Distribution	Shapiro-Wilk W	0.95188		0.69080	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.56790	0.00000	0.95200	0.35354				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 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	26.61%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.11889	1.85955	0.0071	11.4566	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	923.0763	923.0763	1	9.73	0.01425	Significant Effect
Error	759.1481	94.89351	8			
Total	1682.22437	1017.9698	9			

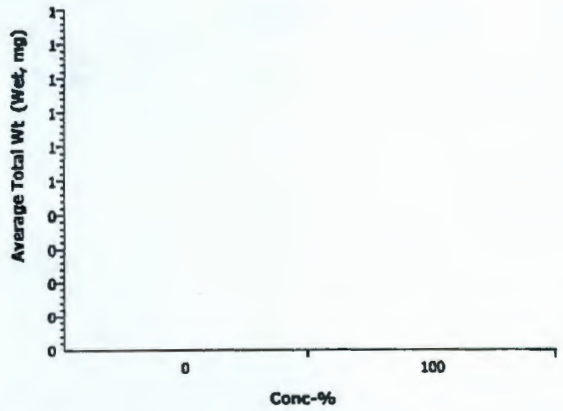
ANOVA Assumptions

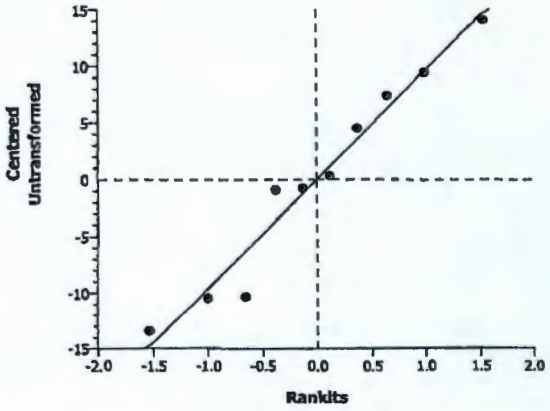
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.15365	23.15450	0.29195	Equal Variances
Distribution	Shapiro-Wilk W	0.94721		0.63564	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	23.845	13.530	31.236	6.7596				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 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	31.16%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.81202	1.85955	0.0114	1.71346	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	16.78443	16.78443	1	7.91	0.02277	Significant Effect
Error	16.98093	2.122616	8			
Total	33.7653599	18.907049	9			

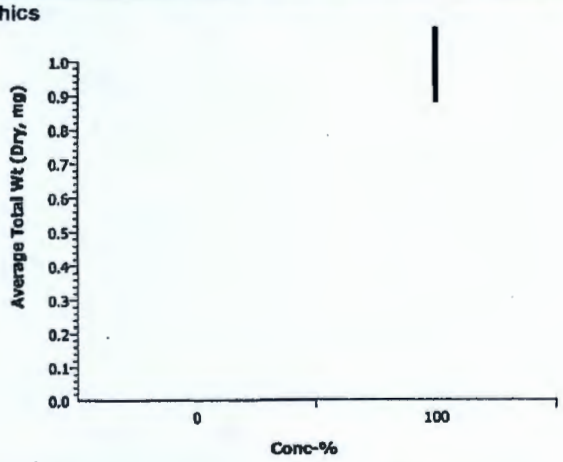
ANOVA Assumptions

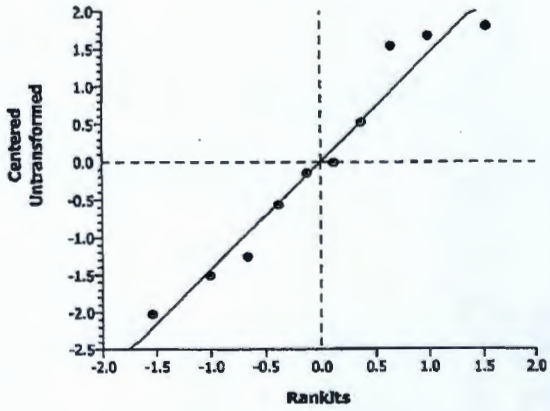
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.36885	23.15450	0.77356	Equal Variances
Distribution	Shapiro-Wilk W	0.93300		0.47809	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	2.90820	0.88000	4.58000	1.34153				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

5 DW 7-8-06

Initials: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day __ NJ Day 28 3m

Bioassay Lab ID: BG 1607-11 Sample No: J115X0

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 (15 days after 21 planting)	14-DAYS POST-EMERGENCE (28 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	6	6	6	7		5	7->5	5	9.0	9.1
	B	3	4	6	6		5	6->5	5		
	C	2	2	2	4		4	4	4		
	D	6	6	7	8		5	8->5	5		
	E	4	5	5	6		4	4	4		

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

Replicate A: 5 med G Remove: 2sm G

Replicate B: 5med G Remove: 1sm G

Replicate C: 2med G 2 sm G

Replicate D: 2lg G, 3med G Remove: 1med G, 2sm G

Replicate E: 4 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: 3lg G, 2med G

Replicate B: 1lg G, 3med G 1sm G

Replicate C: 2lg G, 2sm G

Replicate D: 3lg G, 2med G

Replicate E: 1lg G, 3med G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	76 mm	70 mm	58 mm	77 mm	62 mm
Replicate B	70 mm	70 mm	73 mm	48 mm	54 mm
Replicate C	38 mm	28 mm	79 mm	78 mm	mm
Replicate D	78 mm	71 mm	66 mm	153 mm	89 mm
Replicate E	77 mm	65 mm	71 mm	72 mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1282.54	1371.2	1296.29
Replicate B	1284.41	1348.6	1294.56
Replicate C	1283.96	1334.7	1291.59
Replicate D	1291.37	1397.0	1308.15
Replicate E	1278.83	1350.1	1290.27

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	55 mm	89 mm	64 mm	80 mm	79 mm
Replicate B	101 mm	112 mm	42 mm	23 mm	46 mm
Replicate C	87 mm	10 mm	100 mm	18 mm	mm
Replicate D	58 mm	82 mm	105 mm	130 mm	74 mm
Replicate E	70 mm	71 mm	63 mm	75 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	1283.21	1359.5	1287.91
Replicate B	1288.81	1350.1	1292.73
Replicate C	1291.20	1339.1	1293.77
Replicate D	1281.05	1375.9	1286.32
Replicate E	1279.80	1346.1	1283.00

Comments:

CETIS Test Summary

Report Date: 19 Jul-06 3:01 PM
Test Link: 12-6508-1116/B160711psc

Plant Bioassay - Chronic — **CH2M Hill**

Test No:	11-7178-0093	**Test Type:**	Plant Chronic	**Duration:**	N/A
Start Date:	07 Jun-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	07 Jun-06	**Brine:**			

Sample No:	05-4636-9622	**Code:**	B1607-11	**Client:**	
Sample Date:	05 Jun-06 01:30 PM	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	34h	**Station:**			

Comments: J11JX0

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
20-1410-9684	% Germination	100	> 100	N/A	12.63%	Wilcoxon Rank Sum Two-Sample
15-3565-0971	Average Height (mm)	100	> 100	N/A	16.90%	Equal Variance t Two-Sample
04-5825-2217	Average Length (mm)	< 100	100	N/A	17.29%	Equal Variance t Two-Sample
03-2945-9238	Average AG Wt (Wet, mg)	< 100	100	N/A	27.56%	Equal Variance t Two-Sample
09-9762-8383	Average AG Wt (Dry, mg)	< 100	100	N/A	28.46%	Equal Variance t Two-Sample
10-0279-3037	Average Root Wt. (Wet, mg	100	> 100	N/A	25.83%	Equal Variance t Two-Sample
18-3727-5688	Average Root Wt. (Dry, mg)	< 100	100	N/A	19.56%	Equal Variance t Two-Sample
08-1399-8256	Average Total Wt (Wet, mg	< 100	100	N/A	26.42%	Equal Variance t Two-Sample
16-0128-8841	Average Total Wt (Dry, mg)	< 100	100	N/A	26.21%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 19 Jul-06 3:01 PM
Test Link: 12-6508-1116/B160711psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%
100		5	0.92000	0.80000	1.00000	0.04899	0.10954	11.91%

Average Height (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	77.84	69	86.400	3.8028	8.5034	10.92%
100		5	70.020	55.8	91.400	5.9676	13.344	19.06%

Average Length (mm) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	102.96	85.6	126.6	7.5491	16.880	16.40%
100		5	70.720	53.8	89.800	5.8895	13.169	18.62%

Average AG Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	24.382	17.277	32.776	3.2300	7.2226	29.62%
100		5	16.44	12.685	21.126	1.6217	3.6263	22.06%

Average AG Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	0.61779	1.38143	31.35%
100		5	2.58071	1.90750	3.35601	0.27058	0.60503	23.44%

Average Root Wt. (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	18.678	12.355	24.360	2.2326	4.9922	26.73%
100		5	15.007	11.975	18.97	1.3224	2.9571	19.70%

Average Root Wt. (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.09073	0.20288	18.58%
100		5	0.84410	0.64252	1.05398	0.07051	0.15767	18.68%

Average Total Wt (Wet, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	43.060	29.633	57.136	5.3683	12.004	27.88%
100		5	31.447	24.660	40.096	2.9348	6.5624	20.87%

Average Total Wt (Dry, mg) Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	0.69936	1.56382	28.44%
100		5	3.42480	2.55002	4.40999	0.33426	0.74743	21.82%

CETIS Test Summary

Report Date: 19 Jul-06 3:01 PM
Test Link: 12-6508-1116/B160711psc

% Germination Detail

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

Average Height (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	69.6	86.4000	69	86.2	78
100		68.6	63	55.8	91.4000	71.3000

Average Length (mm) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	85.6	111.800	88.8000	126.6	102
100		73.4000	64.8000	53.8	89.8000	71.8000

Average AG Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	17.97	32.7760	17.2775	31.0360	22.8520
100		17.732	12.838	12.685	21.1260	17.8175

Average AG Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.11399	5.69800	3.34750	6.08000	3.79600
100		2.75000	2.03000	1.90750	3.35601	2.86002

Average Root Wt. (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	14.658	24.3600	12.3550	21.458	20.558
100		15.2580	12.258	11.9750	18.97	16.575

Average Root Wt. (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	0.87400	1.33799	0.89502	1.21799	1.13599
100		0.94001	0.78398	0.64252	1.05398	0.79999

Average Total Wt (Wet, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	32.628	57.1360	29.6325	52.494	43.41
100		32.99	25.096	24.6600	40.096	34.3925

Average Total Wt (Dry, mg) Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	3.98799	7.03599	4.24252	7.29800	4.93198
100		3.69001	2.81399	2.55002	4.40999	3.66000

CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	12-6508-1116	12-6508-1116	19 Jul-06 2:38 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	12.63%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	25		0.3452	5	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0056708	0.005671	1	0.40	0.54474	Non-Significant Effect
Error	0.1134158	0.014177	8			
Total	0.11908659	0.0198478	9			

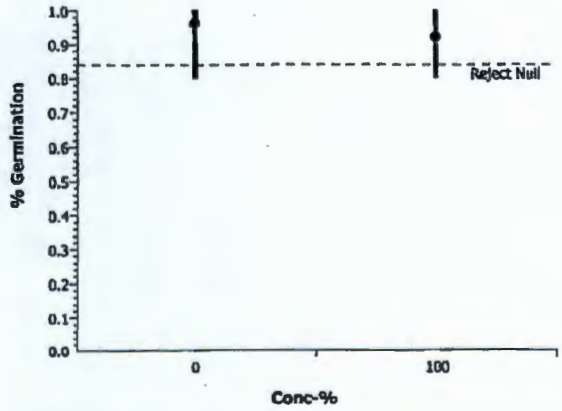
ANOVA Assumptions

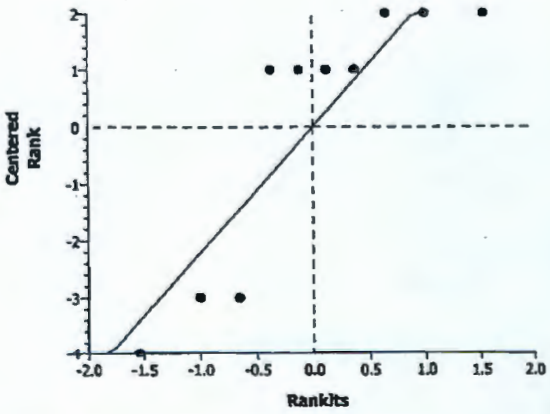
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.50000	23.15450	0.70400	Equal Variances
Distribution	Shapiro-Wilk W	0.75864		0.00455	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.96000	0.80000	1.00000	0.08944	6.00000	2.00000	7.00000	2.23607
100		5	0.92000	0.80000	1.00000	0.10954	5.00000	2.00000	7.00000	2.73861

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Height (mm)	Comparison	12-6508-1116	12-6508-1116	19 Jul-06 2:38 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	16.90%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.1051	1.85955	0.1506	13.1587	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	152.881	152.881	1	1.22	0.30124	Non-Significant Effect
Error	1001.48	125.185	8			
Total	1154.36105	278.06596	9			

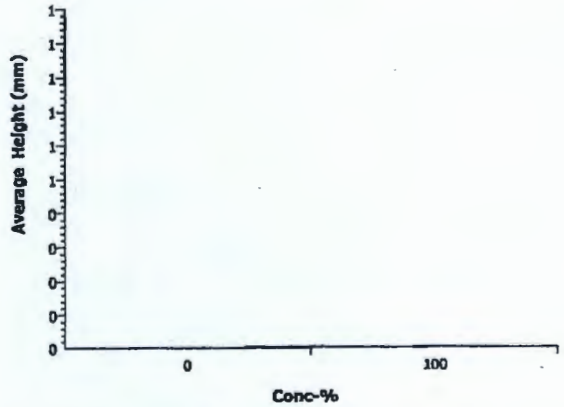
ANOVA Assumptions

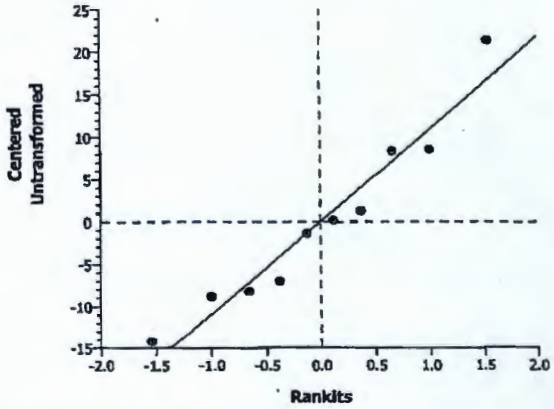
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.46255	23.15450	0.40409	Equal Variances
Distribution	Shapiro-Wilk W	0.94656		0.62805	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	70.020	55.8	91.4	13.344				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Length (mm)	Comparison	12-6508-1116	12-6508-1116	19 Jul-06 2:38 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	17.29%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	3.36719	1.85955	0.0049	17.8047	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2598.544	2598.544	1	11.34	0.00983	Significant Effect
Error	1833.52	229.19	8			
Total	4432.06372	2827.7337	9			

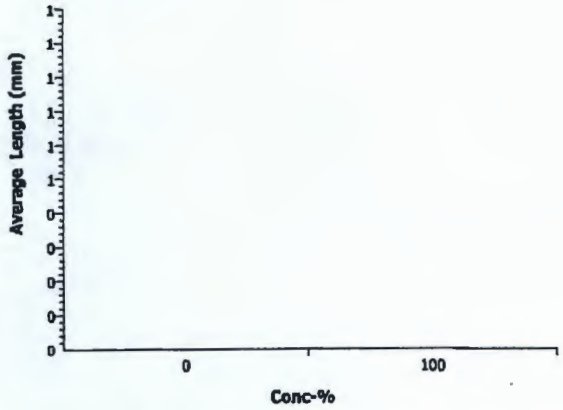
ANOVA Assumptions

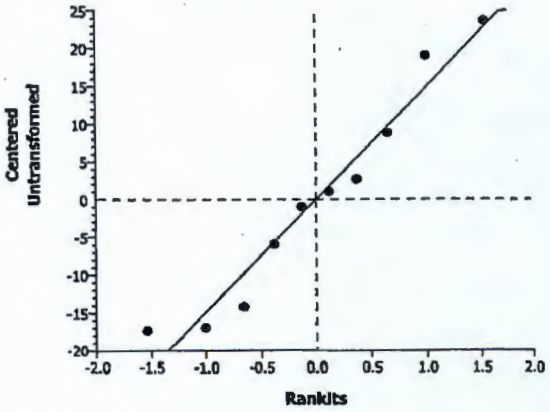
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.64300	23.15450	0.64228	Equal Variances
Distribution	Shapiro-Wilk W	0.93628		0.51246	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	70.720	53.8	89.8	13.169				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Wet, mg)	Comparison	12-6508-1116	12-6508-1116	19 Jul-06 2:38 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	27.56%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi	100	2.19755	1.85955	0.0296	6.72097	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	157.7125	157.7125	1	4.83	0.05922	Non-Significant Effect
Error	261.2637	32.65796	8			
Total	418.976151	190.37044	9			

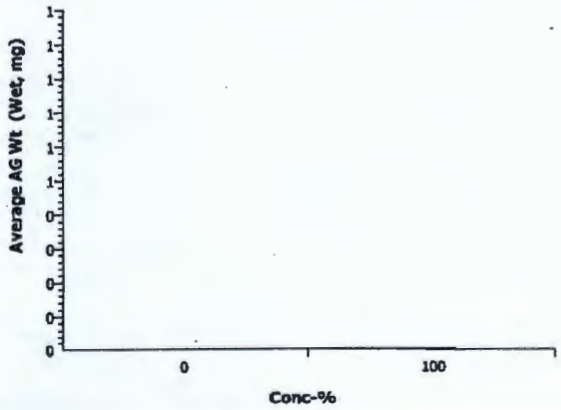
ANOVA Assumptions

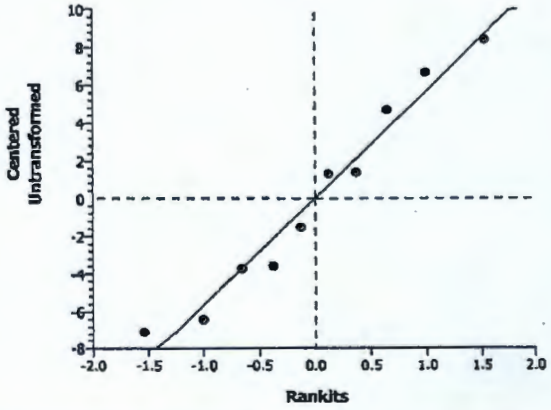
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.96700	23.15450	0.21056	Equal Variances
Distribution	Shapiro-Wilk W	0.94633		0.62539	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	24.382	17.278	32.776	7.2226				
100		5	16.44	12.685	21.126	3.6263				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average AG Wt (Dry, mg)	Comparison	12-6508-1116	12-6508-1116	19 Jul-06 2:38 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.46%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.70798	1.85955	0.0134	1.25417	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	8.339276	8.339276	1	7.33	0.02674	Significant Effect
Error	9.097596	1.1372	8			
Total	17.4368725	9.4764758	9			

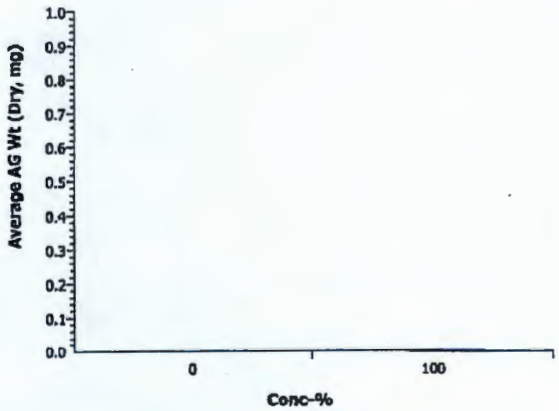
ANOVA Assumptions

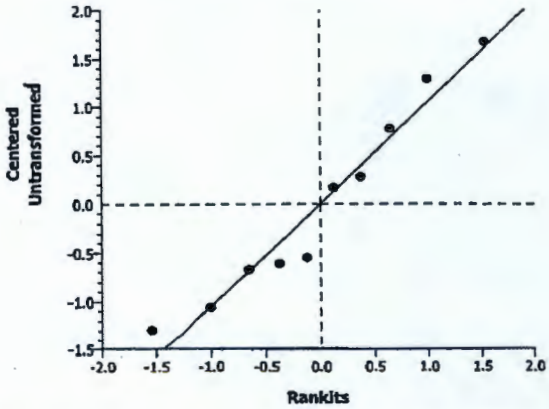
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.21318	23.15450	0.13875	Equal Variances
Distribution	Shapiro-Wilk W	0.93951		0.54757	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	2.58071	1.90750	3.35601	0.60503				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Wet, mg)	Comparison	12-6508-1116	12-6508-1116	19 Jul-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	Untransformed		100	>100	1	N/A	25.83%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.41457	1.85955	0.0975	4.82526	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	33.68325	33.68325	1	2.00	0.19492	Non-Significant Effect
Error	134.6656	16.8332	8			
Total	168.348839	50.516449	9			

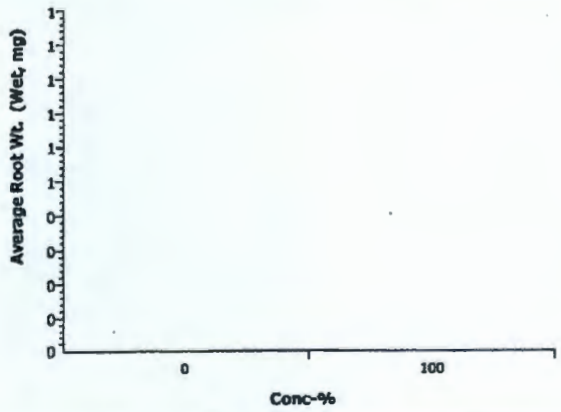
ANOVA Assumptions

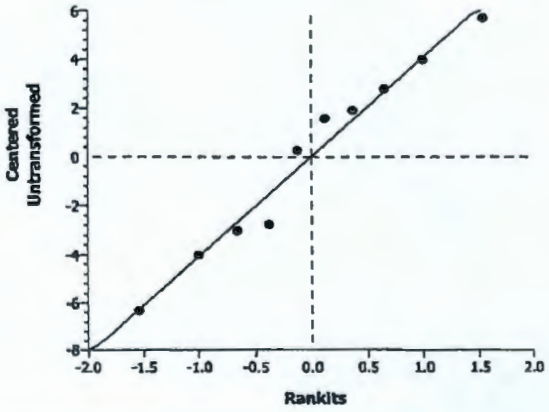
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.85012	23.15450	0.33468	Equal Variances
Distribution	Shapiro-Wilk W	0.96178		0.80592	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	15.007	11.975	18.97	2.9571				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root Wt. (Dry, mg)	Comparison	12-6508-1116	12-6508-1116	19 Jul-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	Untransformed		<100	100		N/A	19.56%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.15907	1.85955	0.0314	0.21368	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1538847	0.153885	1	4.66	0.06288	Non-Significant Effect
Error	0.2640893	0.033011	8			
Total	0.41797404	0.1868959	9			

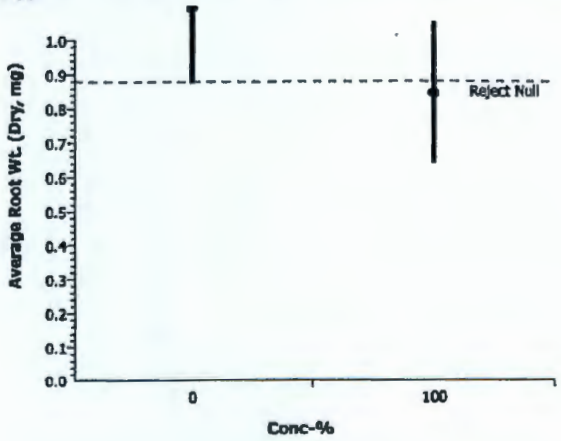
ANOVA Assumptions

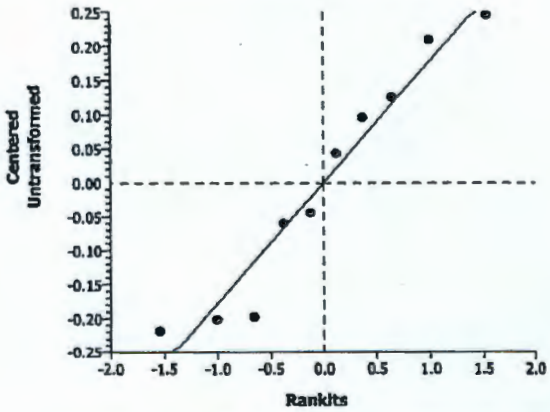
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.65565	23.15450	0.63719	Equal Variances
Distribution	Shapiro-Wilk W	0.92208		0.37461	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.84410	0.64252	1.05398	0.15767				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Wet, mg)	Comparison	12-6508-1116	12-6508-1116	19 Jul-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	Untransformed		<100	100		N/A	26.42%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.89815	1.85955	0.0471	11.3771	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	337.1664	337.1664	1	3.60	0.09424	Non-Significant Effect
Error	748.6422	93.58027	8			
Total	1085.80850	430.74662	9			

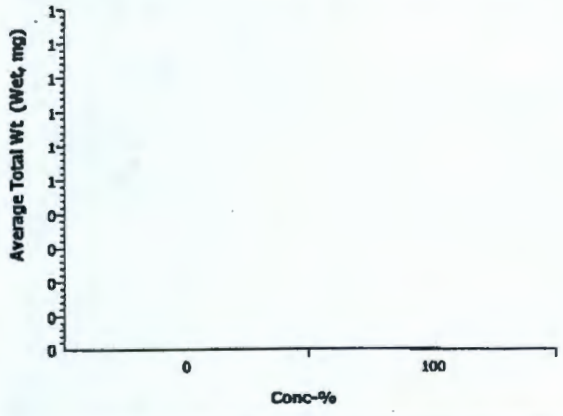
ANOVA Assumptions

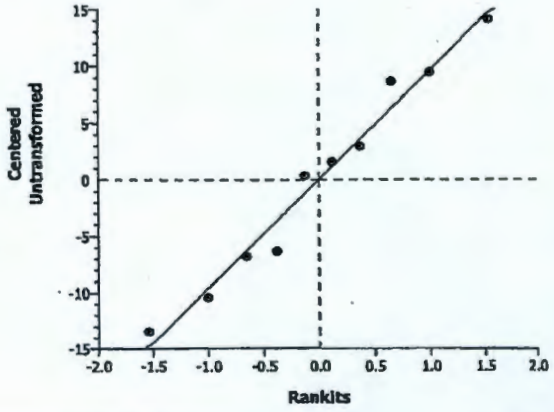
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.34598	23.15450	0.26894	Equal Variances
Distribution	Shapiro-Wilk W	0.96029		0.78915	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	31.447	24.66	40.096	6.5624				

Graphics





CETIS Analysis Detail

Plant Bioassay - Chronic — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Total Wt (Dry, mg)	Comparison	12-6508-1116	12-6508-1116	19 Jul-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	Untransformed		<100	100		N/A	26.21%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.6763	1.85955	0.0140	1.44140	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	10.75881	10.75881	1	7.16	0.02809	Significant Effect
Error	12.0167	1.502088	8			
Total	22.7755098	12.260895	9			

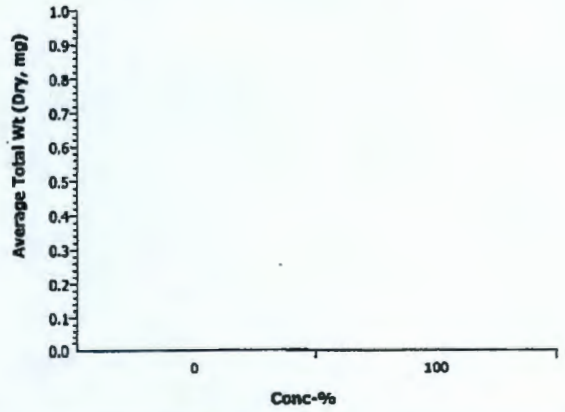
ANOVA Assumptions

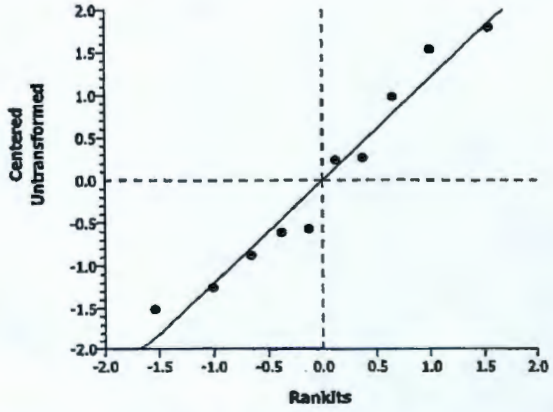
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.37760	23.15450	0.18176	Equal Variances
Distribution	Shapiro-Wilk W	0.93747		0.52526	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	5.49930	3.98799	7.29800	1.56382				
100		5	3.42480	2.55002	4.40999	0.74743				

Graphics





APPENDIX B
CHAIN OF CUSTODY

F1779

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-198	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location BORROW PIT 18		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11K10	SOIL	5-16-06	1600	1	1								-01

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 1600	Received By/Stored In	Date/Time 5-16-06
Elizabeth M. Tiffe	5-16-06	Nancy Hubbard CH2MHILL	17:00
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

* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

36 1607-01

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-EF-011 (08/29/2005)

F1788

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-192	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location BORROW PIT 14		SAF No. RC-051	Air Quality ☐	
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time											
J11K04	SOIL	5-17-06	1257	1	1									1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth A. Tepper	Date/Time 1257 5-17-06	Received By/Stored In Darrin Hubbard CH2MHILL	Date/Time 5-17-06 1500
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

` These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

36 1607-02

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)

F1793

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-270	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location McGEE RANCH		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
J11K97	SOIL	5-17-06	1757	1	1							

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Galen Miller	5-18-06 0900	Received By/Stored In: Dawn Hubbard CH2M HILL	5-18-06 09:45
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

^~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

36 1607-03

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)

F1816

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-144	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location ~~100-H-24~~ 1607-H2		SAF No. RC-051	Air Quality ☐
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment FED EX	
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC	

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										
J11JT6	SOIL	5-22-06	1400	1	1								-0'

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 1500	Received By/Stored In	Date/Time 5-22-06
Elizabeth M Tuppe 5-22-06		Darin Hubbard CH2M HILL	15:40
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

` These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.

^~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

B61607-04

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
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)

F18816

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-150	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality ☐
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 116-N-3		SAF No. RC-051	Data Turnaround 45 Days
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT	
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JV2	SOIL	5-22-06	1706	1	1								-1

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
[signature]	1710 5-22-06	[signature]	5/23/06
			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

361607-05

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-EE-011 (08/29/2005)

F1827

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-210	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600-23		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11K22	SOIL	5-23-06	1600	1	1								1

CHAIN OF POSSESSION 1605

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Michael Terry	5-23-06	Darcy Hubbard CH2M HILL	5-24-06 12:31

Sign/Print Names

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

361607-06

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)

F1852

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-98	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location UPPER RIPARIAN #11		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
J11JH7	SOIL	5-29-06	1159	1	1							

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tappan	5-30-06 0810	Diana Hubbard CH2M HILL	5-30-06 09:50

SPECIAL INSTRUCTIONS

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^~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

B61607-07

Matrix *

S=Soil
SE=Sediment
SO=Solid
SI=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)

F1853

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-204	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location BORROW PIT 24		SAF No. RC-051
ce Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Data Turnaround 45 Days

Air Quality ☐

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
J11K16	SOIL	5-29-06	1533	1	1							

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Elizabeth M Tepe	5-30-06 0815	Nancy Hubbard CH2M HILL	5-30-06 09:58

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

361607-08

Matrix *

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

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

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

F1859

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-264	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location VERNITA UPRIVER ON SOUTH SIDE		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code **8L**

Air Quality ☐

Data Turnaround **45 Days**

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11K79	SOIL	5-30-06	1430	1	1								

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From	Date/Time 1435 5-30-06	Received By/Stored In Daisy Hubbard CH2M HILL	Date/Time 5-30-06 14:49
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

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^~ These marks indicate that this is a non-analysis used to properly format COC form. Contact Joan Kessner for any questions.

(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

BG1607-09

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
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)

F1863

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-186	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremeotal So	Sampling Location BORROW PIT 9		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis far 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									
J11JY8	SOIL	5-30-06	1724	1	1							

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Dakota Wiegar	1730 5-30-06	Diana Hubbard CH2M HILL	5-30-06 1800

SPECIAL INSTRUCTIONS

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(1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids

36H607-10

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
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)

F1901

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-168	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 300-44/618-4		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

Use page 3 for original material to Corvallis for MIS preparation and aliquating, page 1 for radioanalytical fractions to Eberline, & page 2 for chemical analytical fractions to Lionville.

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JX0	SOIL	6-5-06	1330	1	1								1

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From Elizabeth M Tipton	1330 6-5-06	Received By/Stored In Daisy Hubbard CH2MHILL	Date/Time 6-5-06 14:15
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
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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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

3G1607-11

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
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)

Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford

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

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

Lab ID:	Sample Number:	Bluegrass 14 day Germination Endpoint (%)	Significantly different compared to Lab Control?	Bluegrass Average 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 June 7, 2006																			
Laboratory Control		96	--	77.8	--	103.0	--	24.4	--	4.41	--	18.7	--	1.09	--	43.1	--	5.50	--
BG1607-01	J11K10	96	ns	65.8	E ^{5}	66.6	E ^{5}	16.5	E ^{5}	2.70	E ^{5}	16.1	ns	0.94	ns	32.6	ns	3.63	E ^{5}
BG1607-02	J11K04	92	ns	68.6	ns	72.4	E ^{5}	19.3	ns	3.01	E ^{5}	22.0	ns	0.83	E ^{5}	41.4	ns	3.84	E ^{5}
BG1607-03	J11K97	60	E ^{5}	42.0	E ^{5}	41.2	E ^{5}	9.4	E ^{5}	1.49	E ^{5}	5.4	E ^{5}	0.38	E ^{5}	14.8	E ^{5}	1.87	E ^{5}
BG1607-04	J11JT6	76	E ^{5}	54.5	E ^{5}	41.4	E ^{5}	10.8	E ^{5}	1.50	E ^{5}	10.7	E ^{5}	0.53	E ^{5}	21.5	E ^{5}	2.03	E ^{5}
BG1607-05	J11JV2	44	E ^{5}	71.2	ns	47.7	E ^{5}	16.9	E ^{5}	2.24	E ^{5}	17.7	ns	0.47	E ^{5}	34.6	ns	2.71	E ^{5}
BG1607-06	J11K22	100	ns	59.1	E ^{5}	48.6	E ^{5}	11.7	E ^{5}	1.53	E ^{5}	10.9	E ^{5}	0.84	ns	22.5	E ^{5}	2.37	E ^{5}
BG1607-07	J11JH7	96	ns	55.8	E ^{5}	51.2	E ^{5}	14.4	E ^{5}	1.75	E ^{5}	12.4	E ^{5}	0.45	E ^{5}	26.8	E ^{5}	2.21	E ^{5}
BG1607-08	J11K16	80	E ^{5}	61.8	E ^{5}	51.5	E ^{5}	15.6	E ^{5}	2.29	E ^{5}	9.5	E ^{5}	0.50	E ^{5}	25.0	E ^{5}	2.78	E ^{5}
BG1607-09	J11K79	88	ns	61.3	E ^{5}	54.7	E ^{5}	14.0	E ^{5}	1.92	E ^{5}	11.7	E ^{5}	0.73	E ^{5}	25.8	E ^{5}	2.65	E ^{5}
BG1607-10	J11JY8	80	ns	63.1	E ^{5}	73.0	E ^{5}	13.8	E ^{5}	2.34	E ^{5}	10.0	E ^{5}	0.57	E ^{5}	23.8	E ^{5}	2.91	E ^{5}
BG1607-11	J11JX0	92	ns	70.0	ns	70.7	E ^{5}	16.4	E ^{5}	2.58	E ^{5}	15.0	E ^{5}	0.84	E ^{5}	31.4	E ^{5}	3.42	E ^{5}