

0070486

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

**COMPLETE COPY OF DATA PACKAGE TO:**

**RECEIVED**  
AUG 14 2006

**EDMC**

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

**COMMENTS:**

**SDG F1788      SAF-RC-051**

Rad only    X Chem only    Rad & Chem

X Complete    Partial

**Waste Site: Borrow Pit 14**



**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**  
**F1788**

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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.

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.

<b>Client ID</b>	<b>Percent Survival</b>	<b>Percent Recovered</b>
Control	93.3	100
J11K97	90.0	90.0
J11JT6	76.7 <sup>a</sup>	83.3
J11JV2	63.3 <sup>a</sup>	80.0
J11K10	76.7 <sup>a</sup>	86.7
J11K04	96.7	96.7

<sup>a</sup> 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.

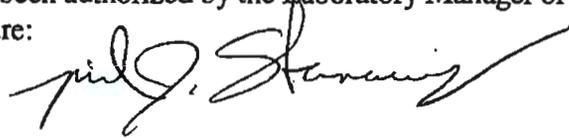
## REFERENCE TOXICANT TEST

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<sub>50</sub> value and control chart limits are listed in the table below.

Table 4 Chronic Reference Toxicant Tests (ug/L)		
Species (test)	LC <sub>50</sub>	Control Chart Limits
<i>Caenorhabditis elegans</i> (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**



**CHM HILL CODE TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA**

Client ELR - Washington Closure Hanford  
 Sample Description see below  
 Test Spec: Caenorhabditis elegans

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

ID#: Nem 015

Lab ID	Soil pH		Soil % Moisture 0 hr	Soil Temperature (°C)		Comments:
	0 hr	24 hr		0 hr	24 hr	
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								

101

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: NJ Time: 0845

Test Termination: Tech: NJ Time: 1130

Chamber Number	Start Count	# alive found	total # found
	0	24 hr	24 hr
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

Comments: \_\_\_\_\_  
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Chamber Number	Start Count	# alive found	total # found
	0	24 hr	24 hr
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		

Comments: \_\_\_\_\_  
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Report Date: 02 Jun-06 10:30 AM  
 Test Link: 16-7857-1224/B159901cea

# CETIS Test Summary

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

Report Date: 02 Jun-06 10:32 AM

Test Link: 00-6816-4943/B159902cea

## CETIS Test Summary

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

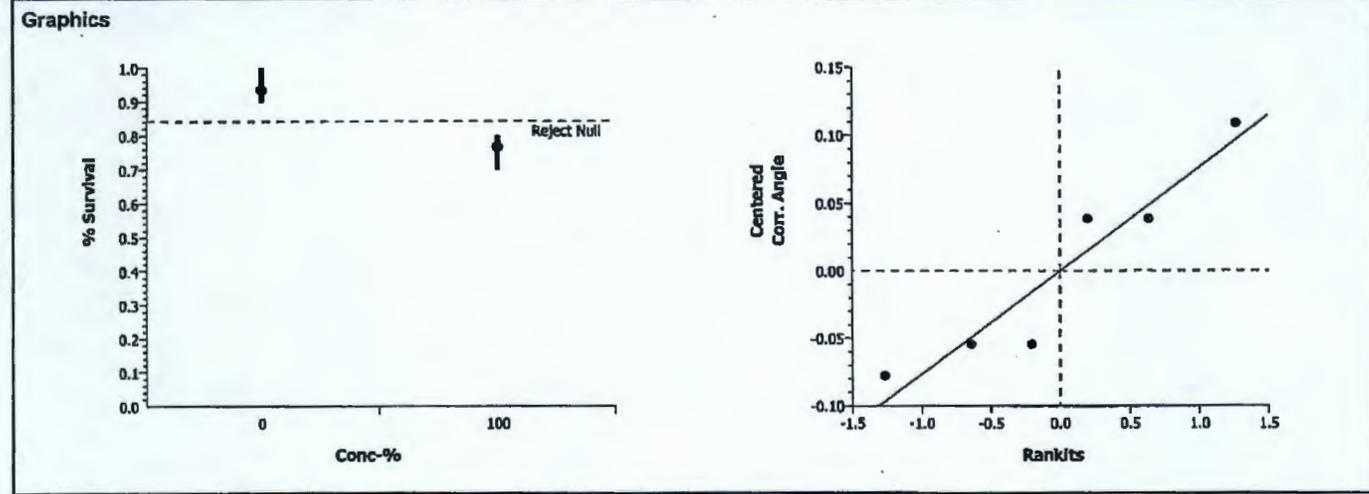
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	9.85%

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



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

# CETIS Test Summary

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

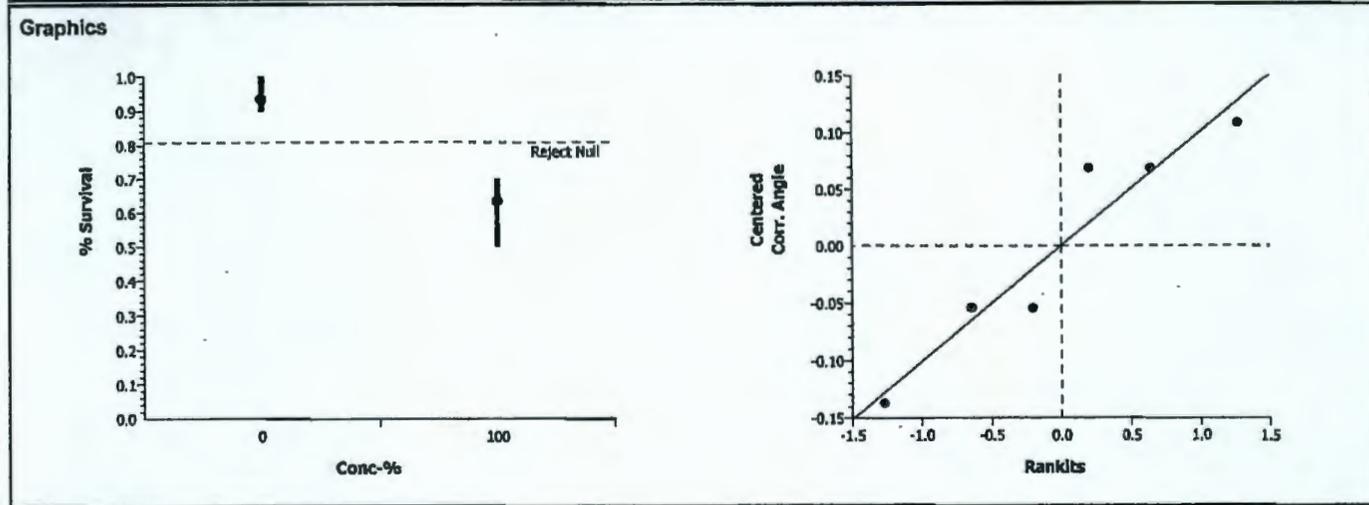
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	13.46%

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



## 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					



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

# CETIS Test Summary

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

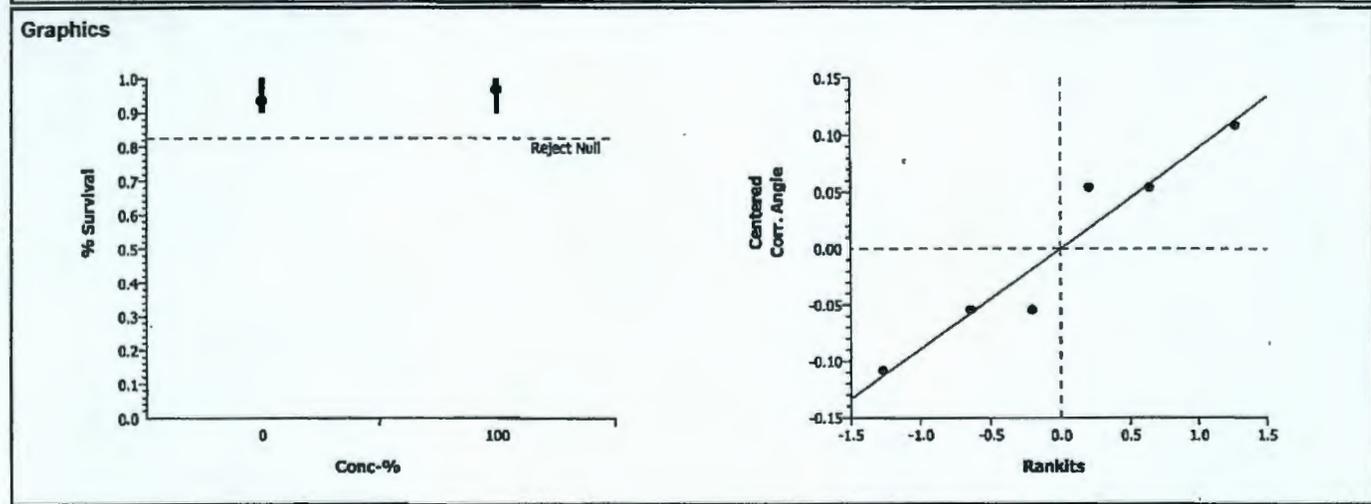
Nematode 24 hour Acute test							CH2M Hill	
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
% Survival	Comparison	17-0467-7544	17-0467-7544	02 Jun-06 10:39 AM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (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



**APPENDIX B**  
**REFERENCE TOXICANT DATA SHEETS**



**CHM HILL** TOXICITY TEST SOIL QUALITY AND TEST CHAMBER ASSIGNMENT DATA

Client QA/QC

Tech. 0 Hrs NJ 24 Hrs NJ/BN

Beginning, Date 5-18-06 Time 0900

Sample Description see below

Time 0 Hrs 0900 24 Hrs 0920

Ending, Date 5-19-06 Time 0920

Test Spec: Caenorhabditis elegans ID#: Nem 014

Lab ID	K-Medium pH		% Moisture	Temperature (°C)		Comments:
	0 hr	24 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								

24-

## CETIS Test Summary

Report Date:

19 May-06 11:18 AM

Test Link:

17-1623-5361/rcea014

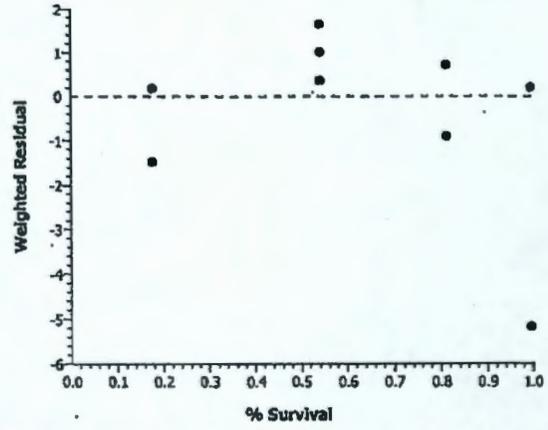
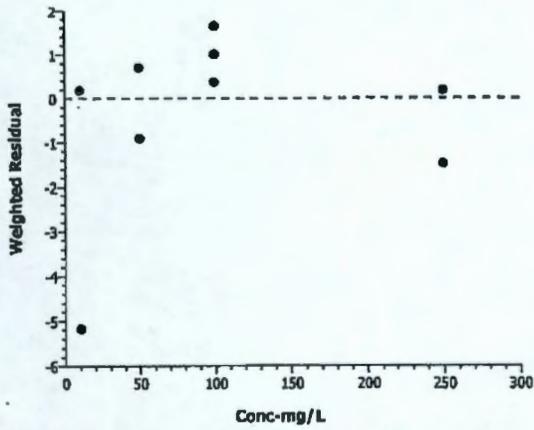
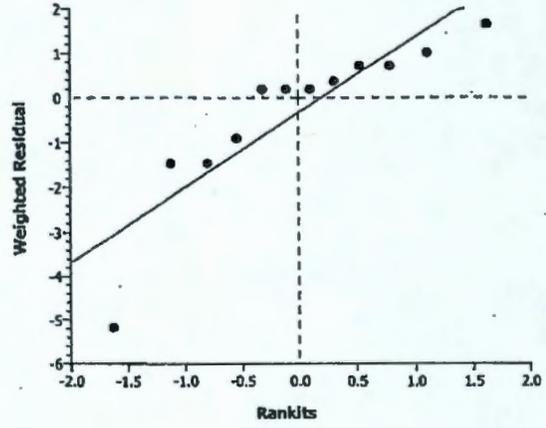
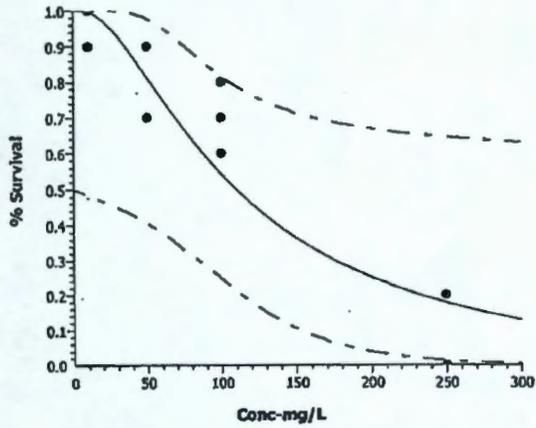
Nematode 24 hour Acute test							CH2M Hill	
Test No:	10-9243-8639	Test Type:	Nematode Survival	Duration:	24h			
Start Date:	18 May-06 09:00 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans			
Ending Date:	19 May-06 09:20 AM	Dil Water:		Source:	In-House Culture			
Setup Date:	18 May-06 09:00 AM	Brine:						
Sample No:	15-1457-1183	Code:	1B048-05	Client:				
Sample Date:	16 May-06	Material:	Copper	Project:				
Receive Date:		Source:	Reference Toxicant					
Sample Age:	57h	Station:						
Comments:	in K medium							
Point Estimate Summary								
Analysis	Endpoint	% Effect	Conc-mg/L	95% LCL	95% UCL	Method		
04-9941-0734	% Survival	50	110.0226	51.11752	306.4394	Linear Regression		
% Survival Summary								
Conc-mg/L	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Water	3	1.00000	1.00000	1.00000	0.00000	0.00000	0.00%
10		3	0.96667	0.90000	1.00000	0.03333	0.05774	5.97%
50		3	0.83333	0.70000	0.90000	0.06667	0.11547	13.86%
100		3	0.70000	0.60000	0.80000	0.05774	0.10000	14.29%
250		3	0.06667	0.00000	0.20000	0.06667	0.11547	173.21
% Survival Detail								
Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3				
0	Dilution Water	1.00000	1.00000	1.00000				
10		1.00000	1.00000	0.90000				
50		0.70000	0.90000	0.90000				
100		0.60000	0.70000	0.80000				
250		0.00000	0.00000	0.20000				

# CETIS Analysis Detail

Nematode 24 hour Acute test							CH2M Hill				
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version						
% Survival	Linear Regression	17-1623-5361	17-1623-5361	19 May-06 11:18 AM	CETISv1.1.2						
Linear Regression Options											
Model Function	Threshold Option	Threshold	Threshold Opt	Reweighted	Pooled Groups	Het Corr					
Log-Normal [NED=A+B*log(X)]	Control Threshold	0	Yes	Yes	No	Yes					
Regression Summary											
Iters	Log Likelihood	Mu	Sigma	G	Chi-Sq	Critical	P-Value	Decision(0.05)			
5	-48.13368	-0.11105	0.38609	0.61289	36.80609	18.30704	0.00006	Significant Heterogeneity			
Point Estimates											
% Effect	Conc-mg/L	95% LCL	95% UCL								
50	110.0226	51.11752	306.4394								
Regression Parameters											
Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P-Value	Decision(0.05)				
Slope	2.590097	0.9100504	0.5623779	4.617815	2.846	0.01737	Significant				
Intercept	-0.2876353	1.846492	-4.401875	3.826605	-0.156	0.87931	Not Significant				
Residual Analysis											
Attribute	Method	Statistic	Critical	P-Value	Decision(0.05)						
Variances	Modified Levene	1.514036	4.06618	0.28357	Equal Variances						
Distribution	Shapiro-Wilk W	0.8021035		0.00990	Non-normal Distribution						
Data Summary											
Conc-mg/	Control Type	Count	Calculated Variate(A/B)								
			Mean	Minimum	Maximum	SE	SD	A	B		
0	Dilution Water	3	1.00000	1.00000	1.00000	0.00000	0.00000	30	30		
10		3	0.96667	0.90000	1.00000	0.01179	0.05773	29	30		
50		3	0.83333	0.70000	0.90000	0.02357	0.11547	25	30		
100		3	0.70000	0.60000	0.80000	0.02041	0.10000	21	30		
250		3	0.06667	0.00000	0.20000	0.02357	0.11547	2	30		
Data Detail											
Conc-mg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1.00000	1.00000	1.00000							
10		1.00000	1.00000	0.90000							
50		0.70000	0.90000	0.90000							
100		0.60000	0.70000	0.80000							
250		0.00000	0.00000	0.20000							

# CETIS Analysis Detail

## Graphics



**APPENDIX C  
CHAIN OF CUSTODY**

F1793

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-051-270	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 McGEE RANCH		SAF No. RC-051	Air Quality <input type="checkbox"/>		
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			

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> 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.	<b>Preservation</b>	None	None								
	<b>Type of Container</b>	G/P	P/G								
	<b>No. of Container(s)</b>	1	1								
	<b>Volume</b>	1000g	4000g								

<b>SAMPLE ANALYSIS</b>				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						

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	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 - D3216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids				S=Soil SE=Sediment SO=Soil ST=Sludge W=Water O=Oil A=Air DS=Dust Solids DL=Drum Liquids T=Tissue W/W=Wipe L=Liquid V=Vegetation X=Other
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					

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

F1816

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			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	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location <del>100-H-24</del> 1607-42	RC-051		SAF No. RC-051	Air Quality <input type="checkbox"/>	
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 OSCP				

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b>  NONE  <b>Special Handling and/or Storage</b> 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									

<b>SAMPLE ANALYSIS</b>		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							

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>
Relinquished By/Removed From <i>Elizabeth M. Tupper</i>	Date/Time 5-22-06	Received By/Stored In <i>Joan Kessner</i>	Date/Time 5-22-06	* 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				S=Soil SS=Settlement SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Time Ws=Wipe L=Liquid V=Vegetation X=Other
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					

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

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 Data Turnaround 45 Days	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 116-N-3		SAT No. RC-051		Air Quality <input type="checkbox"/>			
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			Preservation	None	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.			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 Neurotoxicity ASTM E2172				
Sample No.	Matrix *	Sample Date	Sample Time						
J11JV2	SOIL	5 22-06	1700	1	1				-1
CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS				Matrix *	
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		* 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 - D2316; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  BN 1579-03	
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		S=Soil SS=Sediment SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Trace WJ=Wipe L=Liquid V=Vegetation X=Other	
LABORATORY SECTION		Received By		Title				Date/Time	
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By				Date/Time	

F1779

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-198	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 18	SAF No. RC-051		Air Quality <input type="checkbox"/>	
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				

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> 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								

<b>SAMPLE ANALYSIS</b>				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						

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	* 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 B1599-04				S=Soil SE=Sediment SD=Solid SL=Sludge W = Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Trash Wf=Wipe L=Liquid V=Vegetation X=Other
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					

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

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 <input type="checkbox"/>						
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				Preservation	None	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.				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				SPECIAL INSTRUCTIONS				Matrix *
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		* 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 Amions - 300.0; Percent Solids  BN 1599-05				S=Soil SE=Sediment SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue W=Wgs L=Liquid V=Vegetation X=Other
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						
LABORATORY SECTION	Received By			Title			Date/Time					
FINAL SAMPLE DISPOSITION	Disposal Method			Disposed By			Date/Time					



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

June 12, 2006

ELR Consulting  
2328 S. Garfield Street  
Kennewick, WA 99337

RE: Laboratory Report for ELR Consulting  
Applied Sciences Laboratory Reference No. F1788

Dear Emmett Richards:

On May 17, 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. F1788**

<b>Sample ID</b>	<b>Client Sample ID</b>	<b>Date Collected</b>	<b>Time Collected</b>
F178801	J11K04	05/17/2006	12:57

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## Applied Sciences Laboratory

### Organic CLP and CLP Like Data Qualifiers

- U The analyte was analyzed for, but not detected above the reported sample quantitation limit.
- J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".
- NJ The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
- P The primary and confirmation analyte result recoveries do not match.
- E The analyte was positively identified; the associated numerical value exceeded the instrument calibration range.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

### Inorganic CLP and CLP Like Data Qualifiers

- U The analyte was analyzed for, but not detected above the reported sample quantitation limit.
- B The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
- UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- E The analyte was positively identified; the associated numerical value exceeded the instrument calibration range.
- N The matrix spike/matrix spike duplicate recovery for the analyte is outside of acceptance criteria—qualifier is applied to the native sample only.
- R The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

**AMMONIA  
METHOD EPA 350.3**

**CASE NARRATIVE  
AMMONIA**

Analytical Method: EPA 350.3

Batch No.: F1788

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 Wiggins

Date: 5-30-06

Reviewed by: Joseph A. Hardy

Date: 6/1/06

**SAMPLE DATA  
SUMMARY**





**QC DATA  
SUMMARY**



















**ANIONS BY METHOD EPA300.0A**

**CASE NARRATIVE  
ANIONS**

Analytical Method: EPA300.0

Batch No.: F1788

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.

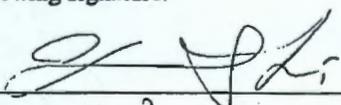
E. Analytical Exception:  
None.

F. Other:  
None.

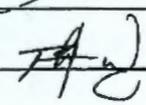
III. Sampling Equipment:  
None.

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: 6/6/06

Reviewed by: 

Date: 6-7-06

**SAMPLE DATA  
SUMMARY**





**QC DATA SUMMARY**























**PERCENT MOISTURE**  
**ASTM D2216**



**PARTICLE SIZE  
METHOD 422**

Hanford

Particle Size

500.0 g sample used

Weight retained is the weight of material ON each sieve

ANALYST: KRM 05/19/2006

Lab	I.D.	Client I.D.	Sieve #	Sieve Size (um)	Sieve Size (mm)	Weight Retained (g)	Weight Retained (%)	Cumulative Coarser (%)	Cumulative Finer (%)
F178801		J11K04	8	2362	2.362	0.00	0.00	0.00	100.00
			16	1180	1.180	44.80	8.98	8.98	91.02
			30	600	0.600	102.60	20.57	29.54	70.46
			50	500	0.500	144.80	29.02	58.57	41.43
			100	147	0.147	84.30	16.90	75.47	24.53
			200	75	0.075	105.90	21.23	96.69	3.31
			pan			16.50	3.31	100.00	0.00
			total			498.9			

**pH**  
**METHOD SW9045C**



**TKN  
METHOD EPA 351.4**

**CASE NARRATIVE**  
**TKN**

Analytical Method: EPA 351.4 Batch No.: F1788  
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 W. Torres

Date: 6-9-06

Reviewed by: Joseph A. Handy

Date: 6/12/06

**SAMPLE DATA  
SUMMARY**





**QC DATA  
SUMMARY**

















**TOTAL ORGANIC CARBON  
BY ASTM E777**

**CASE NARRATIVE  
TOC SOILS**

Analytical Method: ASTM E-777

Batch No.: F1788

Lab Name: CH2M HILL Applied Sciences Lab

Contract #: 920842.OTC

Project Name: ELR Consulting

Prime Contractor: \_\_\_\_\_

I. Holding Times:

All acceptance criteria were met.

II. Analysis:

A. Calibration:

All acceptance criteria were met.

B. Blanks:

All acceptance criteria were met.

C. Matrix Spike/Matrix Spike Duplicate(MS/MSD)

All analyses were performed in accordance with standard operating procedures.

D. Laboratory Control Spike(LCS)

All acceptance criteria were met.

E. Duplicate Sample(s):

All analyses were performed in accordance with standard operating procedures.

F. Analytical Exceptions:

All acceptance criteria were met.

III. Sampling Equipment:

None.

IV. Documentation Exceptions:

None

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

Reported by: 

Date: 2/9/06

Reviewed by: 

Date: 12 June 2006

**SAMPLE DATA SUMMARY**





**QC SUMMARY**



















**CHAIN OF CUSTODY/SHIPPING DOCUMENTS**

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 <b>8L</b> Data Turnaround <b>45 Days</b>		
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location BORROW PIT 14		SAF No. RC-051		Air Quality <input type="checkbox"/>				
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 <i>NONE</i>				Preservation	None	None				
Special Handling and/or Storage <i>Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, &amp; page 2 for chemical analytical fractions to Lionville.</i>				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		SPECIAL INSTRUCTIONS				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	* 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
<i>Therese M. Taylor</i>	<i>1257</i> 5-17-06	<i>Joan Kessner</i>	<i>5-17-06</i>							
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							
LABORATORY SECTION	Received By	Title		Date/Time						
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By		Date/Time						



# Sample Receipt Record

Batch Number: F1788

Date received: 5-17-04

Client/Project ELR Consulting + bags

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

Observation	YES	NO
Radiological Screening for AFCEE		X
Were custody seals intact and on the outside of the cooler?		HD
If yes, Where? Front <u>    </u> Rear <u>    </u> Lt Side <u>    </u> Rt Side <u>    </u>		
Type of packing material: Ice Blue Ice Bubble wrap		HD
Was the Chain of Custody inside the cooler?		HD
Was the Chain of Custody properly filled out?	X	
Were the sample containers in good condition?	X	
Containers supplied by ASL?	X	
Any sample with < 1/2 holding time remaining? If so contact LPM		X
Was there ice in the cooler? Enter temp. <u>20.6 C</u>		X
All VOCs free of air bubbles?		N/A

**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)
1							N/A (soils/unpres)
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							

**LOGIN AND pH VERIFICATIONS PERFORMED BY**

Daisy Hubbard 5-17-04 15:00  
Date/Time

\_\_\_\_\_  
Date/Time

Version	Co	LabName	SDG	FieldID	NativeID	QAQCTyp	LRTType	Matrix	LabSample	AnalysisM	ExtractionM	SampleDate	SampleTime	ReceiveDate	ExtractDate	ExtractTime	AnalysisDate	AnalysisTime	PercentSo	LabLotCt	CAS	ParamID	Analyte	Result	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	ASTM E77	NONE	5/17/2006	12:57	5/17/2006			6/7/2006	15:04	99.55		TOC	TOC	Total Orga	898	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	E350.3	METHOD	5/17/2006	12:57	5/17/2006	5/22/2006	11:16	5/24/2006	11:16	99.55	SB1-0524	7664-41-7	NH3N	Ammonia-l	1.4	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	E351.4	METHOD	5/17/2006	12:57	5/17/2006	5/22/2006	20:15	5/22/2006	20:15	99.55	SB1-0522	7727-37-9	KN	Total Kjeld	180	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	E300.0A	METHOD	5/17/2006	12:57	5/17/2006	5/31/2006	3:10	5/31/2006	3:10	99.55	SB1-0530	16887-00-1	CL	Chloride	0.164	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	E300.0A	METHOD	5/17/2006	12:57	5/17/2006	5/31/2006	3:10	5/31/2006	3:10	99.55	SB1-0530	16984-48-1	F	Fluoride	0.443	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	E300.0A	METHOD	5/17/2006	12:57	5/17/2006	5/31/2006	3:10	5/31/2006	3:10	99.55	SB1-0530	14797-55-1	NO3N	Nitrate-N	0.183	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	E300.0A	METHOD	5/17/2006	12:57	5/17/2006	5/31/2006	3:10	5/31/2006	3:10	99.55	SB1-0530	14797-65-1	NO2N	Nitrite-N	0.48	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	E300.0A	METHOD	5/17/2006	12:57	5/17/2006	5/31/2006	3:10	5/31/2006	3:10	99.55	SB1-0530	14808-79-1	SO4	Sulfate	1.07	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	ASTM D22	NONE	5/17/2006	12:57	5/17/2006			5/19/2006	16:30	99.55		MOISTURI	MOIST	Moisture	0.446	
4.00	EPAC	CHMC	F1788	J11K04	J11K04	N		SOIL	F178801	SW9045C	METHOD	5/17/2006	12:57	5/17/2006	6/2/2006	14:51	6/2/2006	14:51	99.55	SB1-0602		pH	PH	pH	8.71
4.00	EPAC	CHMC	F1788	BS1S0522	BS1S0522	BS		SOIL	BS1S0522	E351.4	METHOD				5/22/2006	19:47	5/22/2006	19:47	100	SB1-0522	7727-37-9	KN	Total Kjeld	1440	
4.00	EPAC	CHMC	F1788	BS1S0524	BS1S0524	BS		SOIL	BS1S0524	E350.3	METHOD				5/24/2006	9:55	5/24/2006	9:55	100	SB1-0524	7664-41-7	NH3N	Ammonia-l	20.7	
4.00	EPAC	CHMC	F1788	BS1S0530	BS1S0530	BS		SOIL	BS1S0530	E300.0A	METHOD				5/30/2006	17:47	5/30/2006	17:47	100	SB1-0530	16887-00-1	CL	Chloride	25	
4.00	EPAC	CHMC	F1788	BS1S0530	BS1S0530	BS		SOIL	BS1S0530	E300.0A	METHOD				5/30/2006	17:47	5/30/2006	17:47	100	SB1-0530	16984-48-1	F	Fluoride	24.4	
4.00	EPAC	CHMC	F1788	BS1S0530	BS1S0530	BS		SOIL	BS1S0530	E300.0A	METHOD				5/30/2006	17:47	5/30/2006	17:47	100	SB1-0530	14808-79-1	SO4	Sulfate	26.6	
4.00	EPAC	CHMC	F1788	BS1S0607	BS1S0607	BS		SOIL	BS1S0607	ASTM E77	NONE						6/7/2006	14:27	100		TOC	TOC	Total Orga	10200	
4.00	EPAC	CHMC	F1788	BS2S0530	BS2S0530	BS		SOIL	BS2S0530	E300.0A	METHOD				5/30/2006	18:57	5/30/2006	18:57	100	SB1-0530	14797-65-1	NO2N	Nitrite-N	5.63	
4.00	EPAC	CHMC	F1788	BS3S0530	BS3S0530	BS		SOIL	BS3S0530	E300.0A	METHOD				5/30/2006	20:08	5/30/2006	20:08	100	SB1-0530	14797-55-1	NO3N	Nitrate-N	38	
4.00	EPAC	CHMC	F1788	SB1-0522	SB1-0522	LB		SOIL	SB1-0522	E351.4	METHOD				5/22/2006	19:50	5/22/2006	19:50	100	SB1-0522	7727-37-9	KN	Total Kjeld	77.3	
4.00	EPAC	CHMC	F1788	SB1-0524	SB1-0524	LB		SOIL	SB1-0524	E350.3	METHOD				5/24/2006	10:21	5/24/2006	10:21	100	SB1-0524	7664-41-7	NH3N	Ammonia-l	2	
4.00	EPAC	CHMC	F1788	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	16887-00-1	CL	Chloride	0.5	
4.00	EPAC	CHMC	F1788	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	16984-48-1	F	Fluoride	0.5	
4.00	EPAC	CHMC	F1788	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	14797-55-1	NO3N	Nitrate-N	0.5	
4.00	EPAC	CHMC	F1788	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	14797-65-1	NO2N	Nitrite-N	0.5	
4.00	EPAC	CHMC	F1788	SB1-0530	SB1-0530	LB		SOIL	SB1-0530	E300.0A	METHOD				5/31/2006	0:26	5/31/2006	0:26	100	SB1-0530	14808-79-1	SO4	Sulfate	0.5	
4.00	EPAC	CHMC	F1788	SB1-0607	SB1-0607	LB		SOIL	SB1-0607	ASTM E77	NONE						6/7/2006	14:38	100		TOC	TOC	Total Orga	100	

ExpectedV	Units	Dilution	MDL	RL	LabQualif	Surrogate	Comments	ParVal	Unc	Recovery	LowerCont	UpperCont	Basis	ConcQual	MDLAdjus	RLAdjus	SampleDe	LeachMetr	LeachDate	LeachTime	LeachLot	AnalysisLo	CalRefID
	MG/KG	1	81.8	234		N							D	=	81.8	234	J11K04	NONE				SB1-0607	101405S1
	MG/KG	1	0.8	3	B	N							D	J	0.8	3	J11K04	NONE				052406NH	052406NH3
	MG/KG	1	55	202	B	N							D	J	55	202	J11K04	NONE				052206KN	052206TKN
	MG/KG	1	0.0583	0.48	B	N							D	J	0.0583	0.48	J11K04	NONE				053006Q3	300A-013006
	MG/KG	1	0.0521	0.48	B	N							D	J	0.0521	0.48	J11K04	NONE				053006Q3	300A-013006
	MG/KG	1	0.0451	0.48	B	N							D	J	0.0451	0.48	J11K04	NONE				053006Q3	300A-013006
	MG/KG	1	0.0431	0.48	U	N							D	U	0.0431	0.48	J11K04	NONE				053006Q3	300A-013006
	MG/KG	1	0.0774	0.48		N							D	=	0.0774	0.48	J11K04	NONE				053006Q3	300A-013006
	PERCENT	1	0	0		N							D	=	0	0	J11K04	NONE				051906MC	NONE
	PH UNITS	1	0	0		N							D	=	0	0	J11K04	NONE				060206PH	NONE
1420	MG/KG	1	27.3	100		N				102	75	125	D	=	27.3	100		NONE				052206KN	052206TKN
20	MG/KG	1	0.534	2		N				103	75	125	D	=	0.534	2		NONE				052406NH	052406NH3
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
8840	MG/KG	1	50.2	144		N				115	75	125	D	=	50.2	144		NONE				SB1-0607	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	27.3	100	B	N							D	J	27.3	100		NONE				052206KN	052206TKN
0	MG/KG	1	0.534	2	U	N							D	U	0.534	2		NONE				052406NH	052406NH3
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	35	100	U	N							D	U	35	100		NONE				SB1-0607	101405S1



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

Prepared for

**ELR CONSULTING, INC.**  
**WASHINGTON CLOSURE HANFORD**

Prepared by

**CH2M HILL**  
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Lab I.D. Nos. BG1607-01 thru 11  
SDG Number BG1607

RC-051  
F1788

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## INTRODUCTION

CH2M HILL conducted chronic screening bioassay tests using the Sandberg bluegrass (*Poa sandbergii*) on soil samples provided by the ELR Consulting for Washington Closure Hanford, Richland, Washington. The tests were conducted from 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  $7.0 \pm 0.5$ .

### 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.

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 (Two-Sample) Test

ns indicates a non statistically significant result; <sup>s</sup> indicates statistically significant at alpha (p) = 0.05; --, indicates no statistical test performed.

Lab ID:	Sample Number:	Bluegrass 34 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 <sup>s</sup>	66.6	E <sup>s</sup>	16.5	E <sup>s</sup>	2.70	E <sup>s</sup>	16.1	ns	0.94	ns	32.6	ns	3.63	E <sup>s</sup>
BG1607-02	J11K04	92	ns	68.6	ns	72.4	E <sup>s</sup>	19.3	ns	3.01	E <sup>s</sup>	22.0	ns	0.83	E <sup>s</sup>	41.4	ns	3.84	E <sup>s</sup>
BG1607-03	J11K97	60	E <sup>s</sup>	42.0	E <sup>s</sup>	41.2	E <sup>s</sup>	9.4	E <sup>s</sup>	1.49	E <sup>s</sup>	5.4	E <sup>s</sup>	0.38	E <sup>s</sup>	14.8	E <sup>s</sup>	1.87	E <sup>s</sup>
BG1607-04	J11JT6	78	E <sup>s</sup>	54.5	E <sup>s</sup>	41.4	E <sup>s</sup>	10.8	E <sup>s</sup>	1.50	E <sup>s</sup>	10.7	E <sup>s</sup>	0.53	E <sup>s</sup>	21.5	E <sup>s</sup>	2.03	E <sup>s</sup>
BG1607-05	J11JV2	44	E <sup>s</sup>	71.2	ns	47.7	E <sup>s</sup>	16.9	E <sup>s</sup>	2.24	E <sup>s</sup>	17.7	ns	0.47	E <sup>s</sup>	34.6	ns	2.71	E <sup>s</sup>
BG1607-06	J11K22	100	ns	59.1	E <sup>s</sup>	48.6	E <sup>s</sup>	11.7	E <sup>s</sup>	1.53	E <sup>s</sup>	10.9	E <sup>s</sup>	0.84	ns	22.5	E <sup>s</sup>	2.37	E <sup>s</sup>
BG1607-07	J11JH7	96	ns	55.8	E <sup>s</sup>	51.2	E <sup>s</sup>	14.4	E <sup>s</sup>	1.75	E <sup>s</sup>	12.4	E <sup>s</sup>	0.45	E <sup>s</sup>	26.8	E <sup>s</sup>	2.21	E <sup>s</sup>
BG1607-08	J11K16	80	E <sup>s</sup>	61.8	E <sup>s</sup>	51.5	E <sup>s</sup>	15.6	E <sup>s</sup>	2.29	E <sup>s</sup>	9.5	E <sup>s</sup>	0.50	E <sup>s</sup>	25.0	E <sup>s</sup>	2.28	E <sup>s</sup>
BG1607-09	J11K79	88	ns	61.3	E <sup>s</sup>	54.7	E <sup>s</sup>	14.0	E <sup>s</sup>	1.92	E <sup>s</sup>	11.7	E <sup>s</sup>	0.73	E <sup>s</sup>	25.8	E <sup>s</sup>	2.65	E <sup>s</sup>
BG1607-10	J11JY8	80	ns	63.1	E <sup>s</sup>	73.0	E <sup>s</sup>	13.8	E <sup>s</sup>	2.34	E <sup>s</sup>	10.0	E <sup>s</sup>	0.57	E <sup>s</sup>	23.8	E <sup>s</sup>	2.91	E <sup>s</sup>
BG1607-11	J11JX0	92	ns	70.0	ns	70.7	E <sup>s</sup>	16.4	E <sup>s</sup>	2.58	E <sup>s</sup>	15.0	E <sup>s</sup>	0.84	E <sup>s</sup>	31.4	E <sup>s</sup>	3.42	E <sup>s</sup>

**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:

A handwritten signature in black ink, appearing to read "Paul J. Stoney", written over a horizontal line.

**APPENDIX A  
RAW DATA SHEETS**

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

7-5-06

Day 0 (P) Day 12 NT Day 14 NT Day 16 NT Day 18 (TP) Day 21 NT Day 23 (TP) Day 25 NT Day 27 NT/B

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

CONC.	REPLICATE	# seeds germinated								pH	
		6-19-06 12 days after planting	6-21 14 days after planting	Emergence 6-23 16 days after planting	6-26 19 days after planting	6-28 21 days after planting	6-30 23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)	INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A	8	8	8	8		8	5		6.7	7.7
	B	7	7	7	7		5	5			
	C	4	4	4	4		4	4			
	D	8	8	8	8		5	5			
	E	7	7	7	7		5	5			

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

Replicate A: 1lg 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 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, 5+ shoots). # Med = # of plants (smaller than large, fewer shoots). # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 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	
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 WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1289.75	1379.6	1305.32
Replicate B	1268.02	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	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	112 mm
Replicate B	113 mm	99 mm	114 mm	113 mm	120 mm
Replicate C	121 mm	122 mm	62 mm	50 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

1282.98

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1208.31	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

Comments:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2008

7-5-08

Initial: Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day      Day 25 B

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

CONC.	REPLICATE	# seeds germinated							pH	
		Emergence							INITIAL (@ planting)	FINAL (@ 14 days Post-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)		
Control	A	4	4	4	4		4	4	8.8	7.7
	B	6	6	6	6		5	5		
	C	7	7	7	7		6	5		
	D	3	5	5	5		5	5		
	E	4	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: 2 lg G, 2 med G  
 Replicate B: 1 lg G, 4 med G, Remove: 1 sm G  
 Replicate C: 1 lg G, 4 med G, Remove: 1 sm G  
 Replicate D: 2 med G, 3 sm G  
 Replicate E: 2 med G, 3 sm G, Remove: 1 sm G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 lg G, 1 lg G w/ 1 B shoot, 2 med G  
 Replicate B: 3 lg G, 1 med G, 1 med G w/ 1 B shoot  
 Replicate C: 2 lg G, 3 med G  
 Replicate D: 2 lg G, 2 med G, 1 sm B  
 Replicate E: 2 med 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	85 mm	48 mm	77 mm	57 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 1296.6

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (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	1296.6	1351.7	1304.96
Replicate E	1289.83	1346.9	1299.02

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	
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 WL (mg)	Wet WL (mg)	Dry WL (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:

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 \_\_\_\_\_  
 \_\_\_\_\_

## 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:

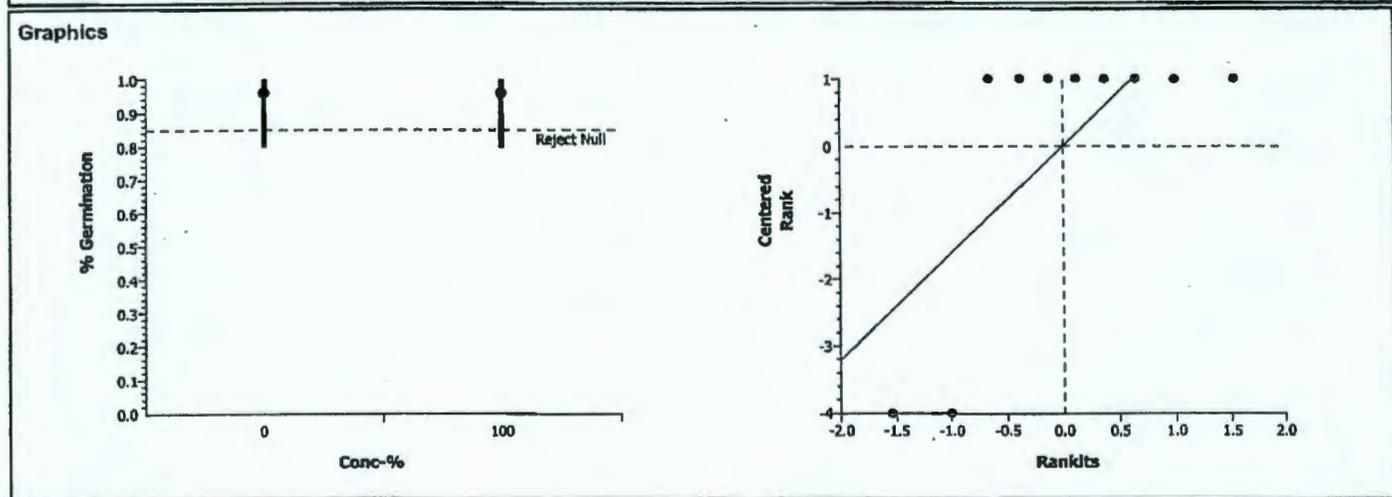
14-0075-2468/B160701psc

% 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

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 2:09 PM  
 Analysis: 09-7274-7276/B160701psc

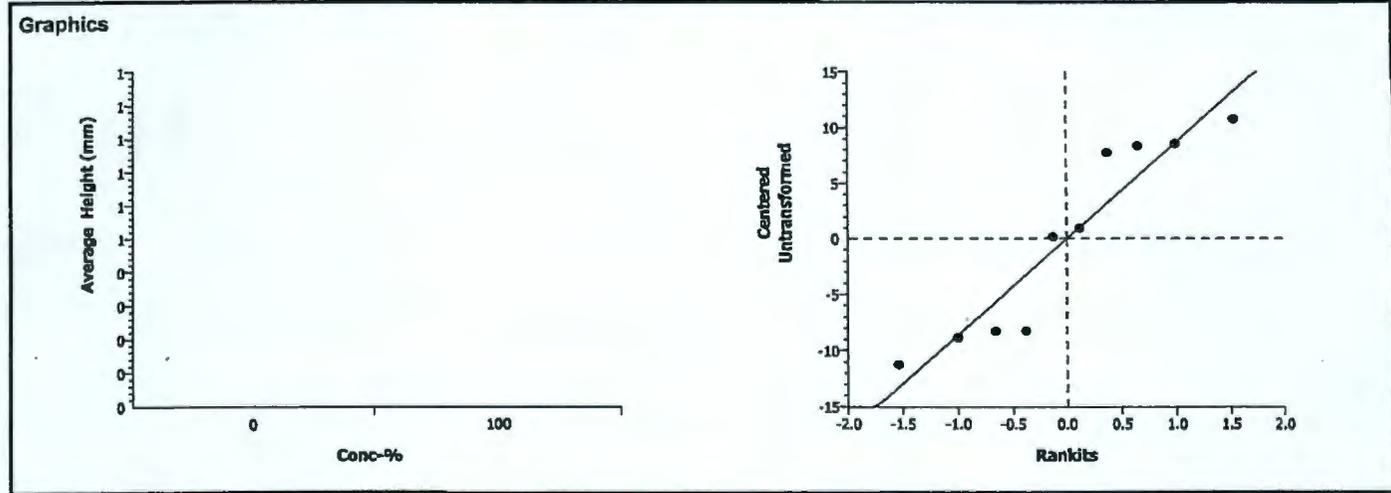
Plant Bioassay - Chronic							CH2M HILL			
Endpoint	Analysis Type		Sample Link	Control Link	Date Analyzed	Version				
% Germination	Comparison		14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2				
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Wilcoxon Rank Sum Two-Sample	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										
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



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 2:09 PM  
 Analysis: 17-8375-3931/B160701psc

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										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 2:09 PM  
 Analysis: 09-4434-8220/B160701psc

Plant Bioassay - Chronic						CH2M Hill
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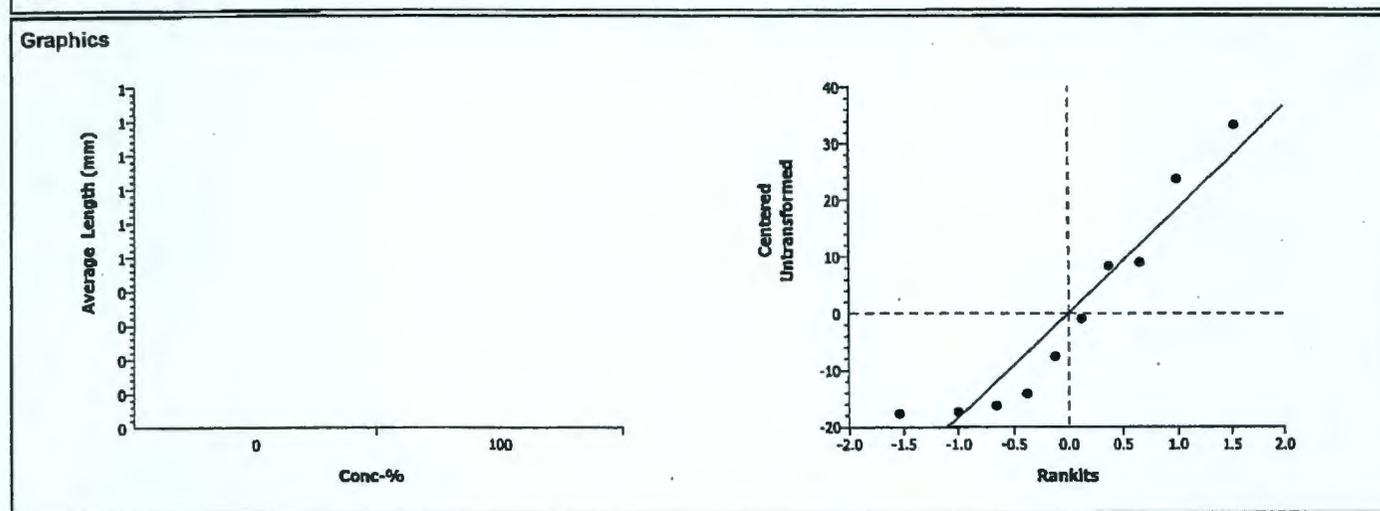
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
Average Length (mm)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	21.91%

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				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 2:09 PM  
 Analysis: 12-2358-3328/B160701psc

Plant Bioassay - Chronic	CH2M Hill
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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

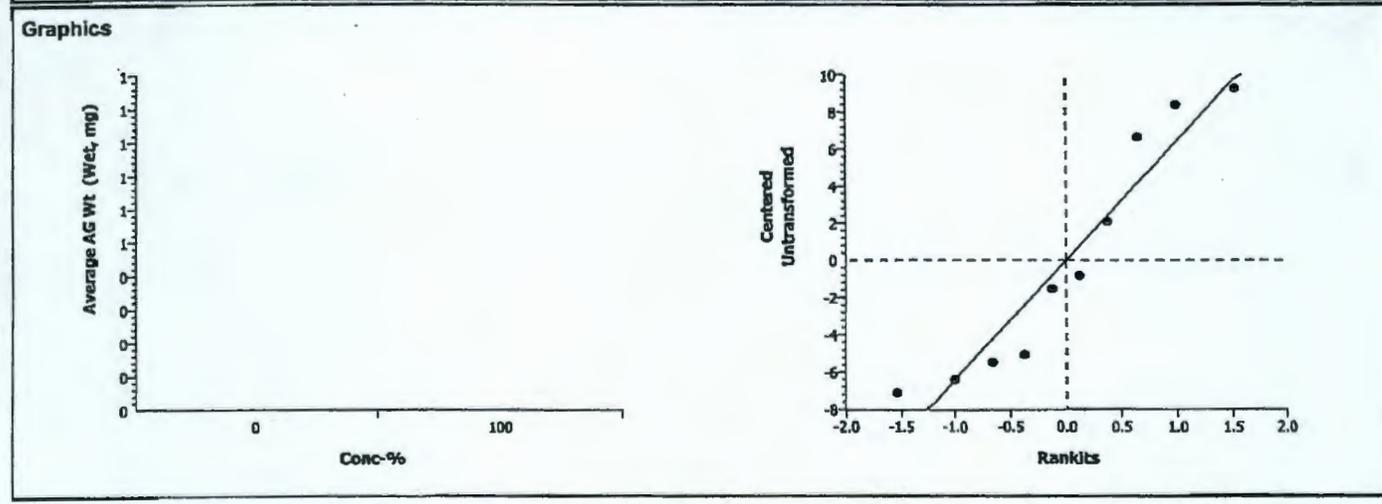
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.14%

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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 2:09 PM  
 Analysis: 05-1082-0854/B160701psc

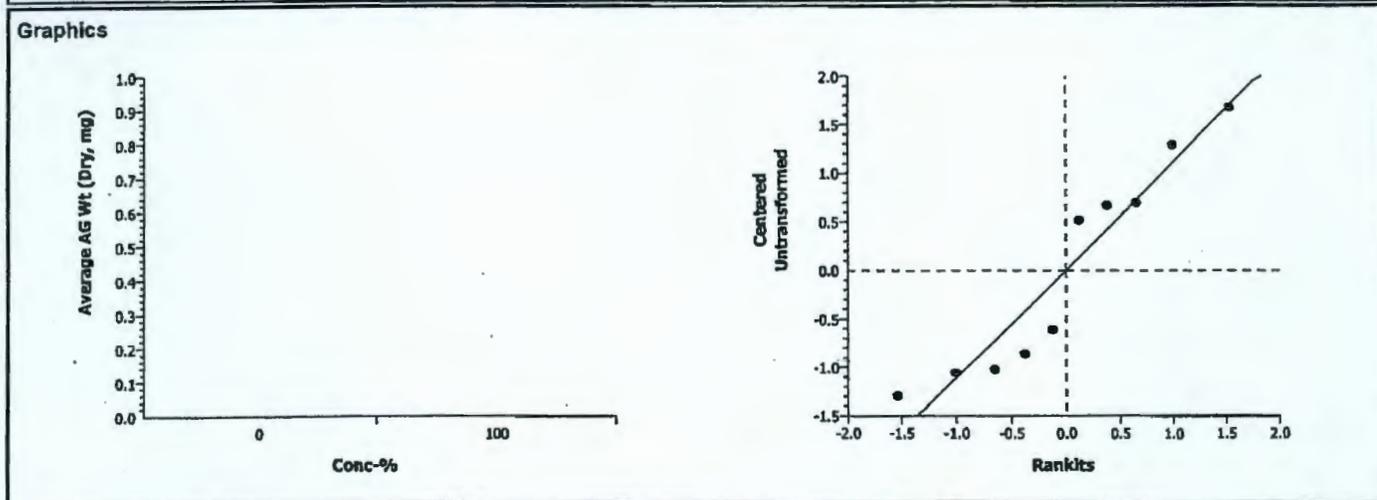
Plant Bioassay - Chronic						CH2M Hill		
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
Average AG Wt (Dry, mg)	Comparison	14-0075-2468	14-0075-2468	18 Jul-06 10:48 AM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	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				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 2:09 PM  
 Analysis: 17-8788-1143/B160701psc

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

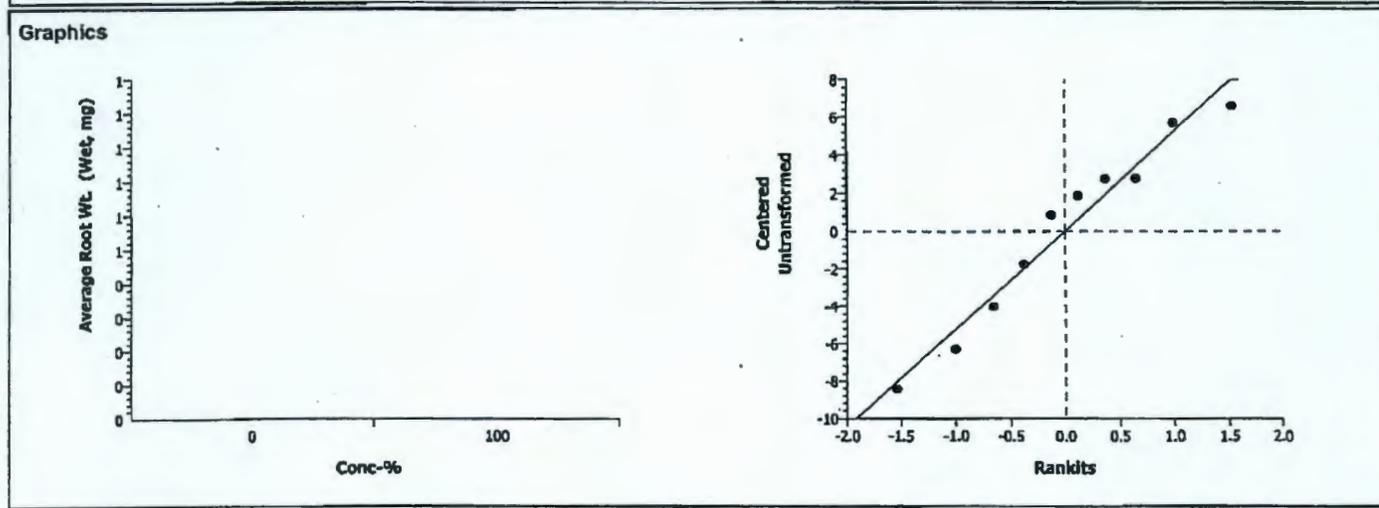
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	33.42%

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				



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 2:09 PM  
 Analysis: 12-4126-4935/B160701psc

**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**

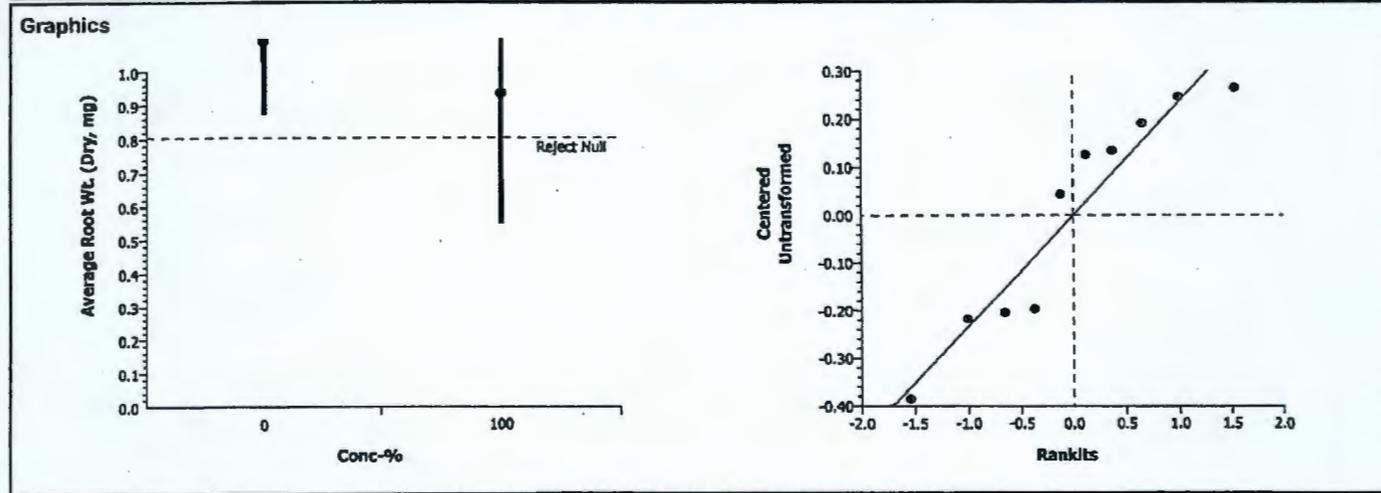
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0613091	0.061309	1	1.02	0.34120	Non-Significant Effect
Error	0.4789946	0.059874	8			
Total	0.54030378	0.1211835	9			

**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**

Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 2:09 PM  
 Analysis: 04-8138-0981/B160701psc

**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/Sedl		100	1.4238	1.85955	0.0962	13.6993	Non-Significant Effect

**ANOVA Table**

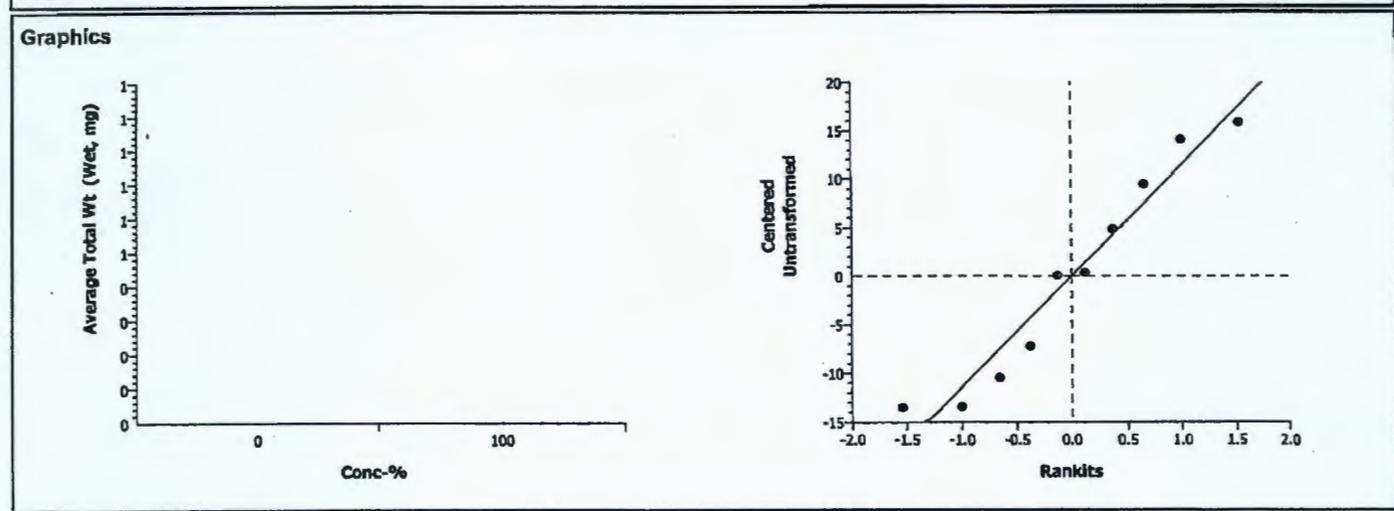
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	275.0535	275.0535	1	2.03	0.19232	Non-Significant Effect
Error	1085.454	135.6818	8			
Total	1360.50787	410.73532	9			

**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**

Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 2:09 PM  
 Analysis: 16-0918-3359/B160701psc

Plant Bioassay - Chronic					CH2M Hill
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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

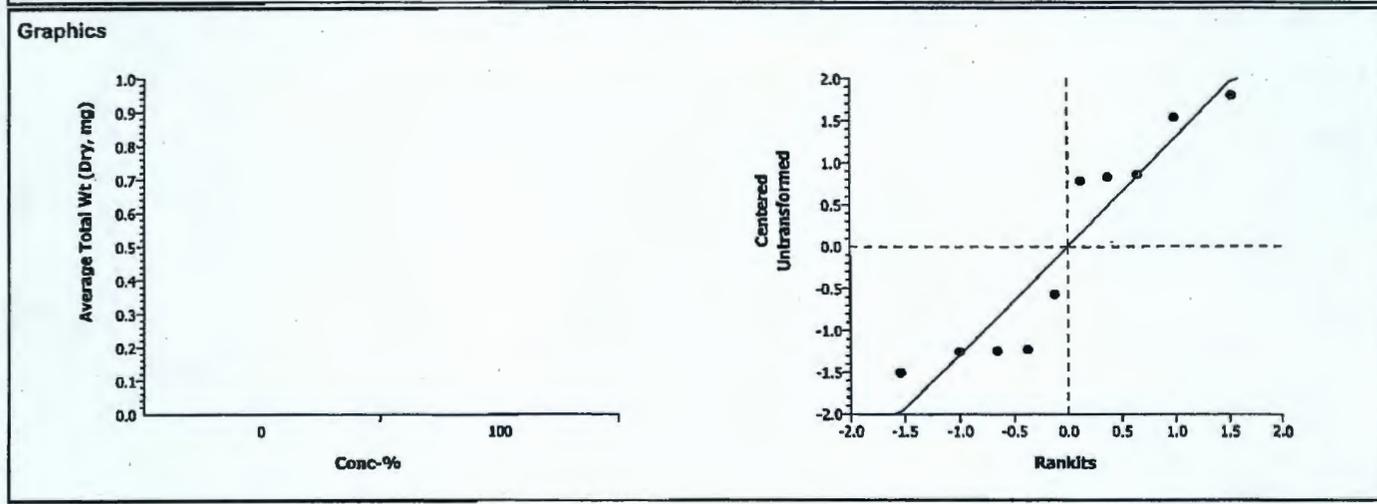
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.18%

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				



Initial: 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: J11004

CONC.	REPLICATE	# seeds germinated								pH			
		Emergence				7-DAYS POST-EMERGENCE (21 days after planting)				14-DAYS POST-EMERGENCE (35 days after planting)		INITIAL (at planting)	FINAL (at 14 days Post-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	25 days after planting	27 days after planting	29 days after planting	31 days after planting		
Control	A	5	5	5	5		5	5	5	5	5	8.9	7.9
	B	2	4	6	6		5	6	5	5	5		
	C	6	6	6	6		5	6	5	5	5		
	D	4	5	5	5		5	5	5	5	5		
	E	3	3	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: 2 lg G, 1 med G, 2 sm G  
 Replicate B: 1 lg G, 4 med G, Remove: 1 sm B  
 Replicate C: 2 lg G, 3 med G, Remove 1 med G  
 Replicate D: 2 lg G, 2 med G, 1 sm G  
 Replicate E: 3 lg G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 2 lg G, 1 med G, 2 sm G  
 Replicate B: 1 lg G, 2 med G, 2 sm G  
 Replicate C: 1 lg G, 1 lg G w/ 2 B shoots, 2 med G  
 Replicate D: 1 lg G, 3 med G, 1 sm G  
 Replicate E: 3 lg 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		

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1287.61	1354.4	1303.09
Replicate B	1285.24	1344.4	1294.10
Replicate C	1283.86	1378.0	1297.69
Replicate D	1279.95	1375.2	1295.65
Replicate E	1282.70	1357.1	1298.54

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	191 mm
Replicate B	32 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		

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1286.03	1442.7	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:

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## 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

Report Date:

19 Jul-06 2:08 PM

## CETIS Test Summary

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%

Report Date:

19 Jul-06 2:08 PM

## CETIS Test Summary

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

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 2:08 PM  
 Analysis: 06-7336-5700/B160702psc

Plant Bioassay - Chronic					CH2M Hill
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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

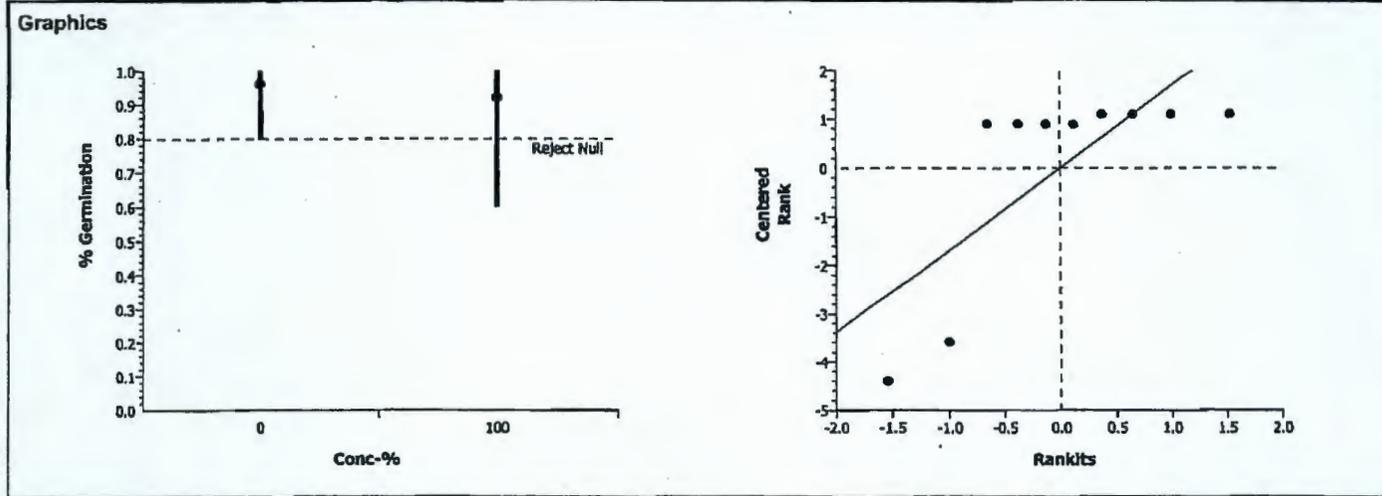
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	16.82%

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



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 2:08 PM  
 Analysis: 19-0704-1634/B160702psc

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

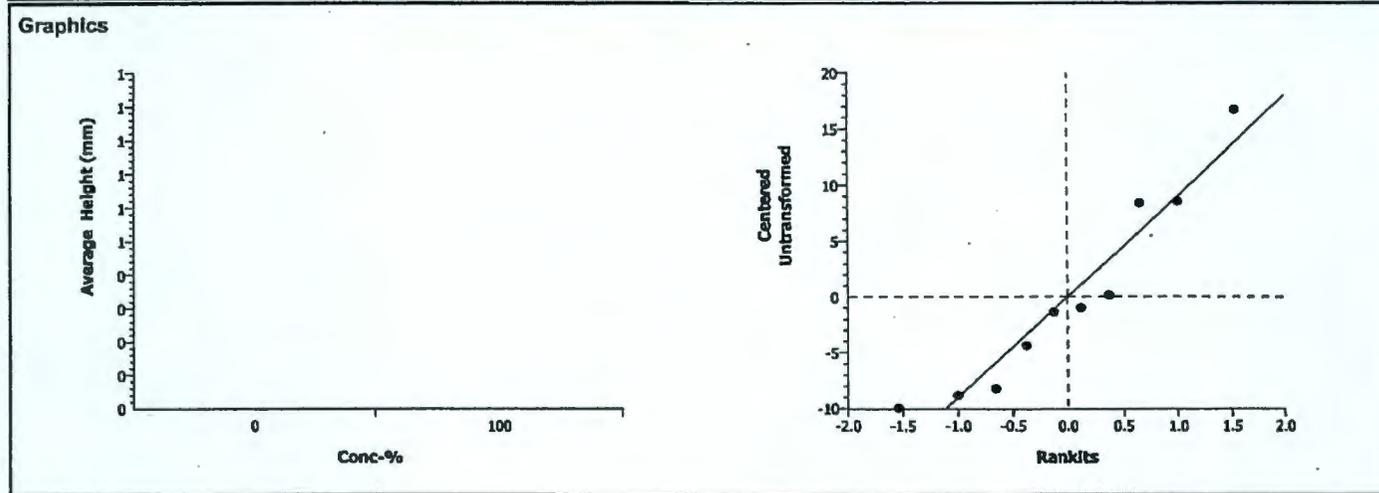
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	14.04%

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				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 2:08 PM  
 Analysis: 14-9155-9465/B160702psc

Plant Bioassay - Chronic						CH2M HILL
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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

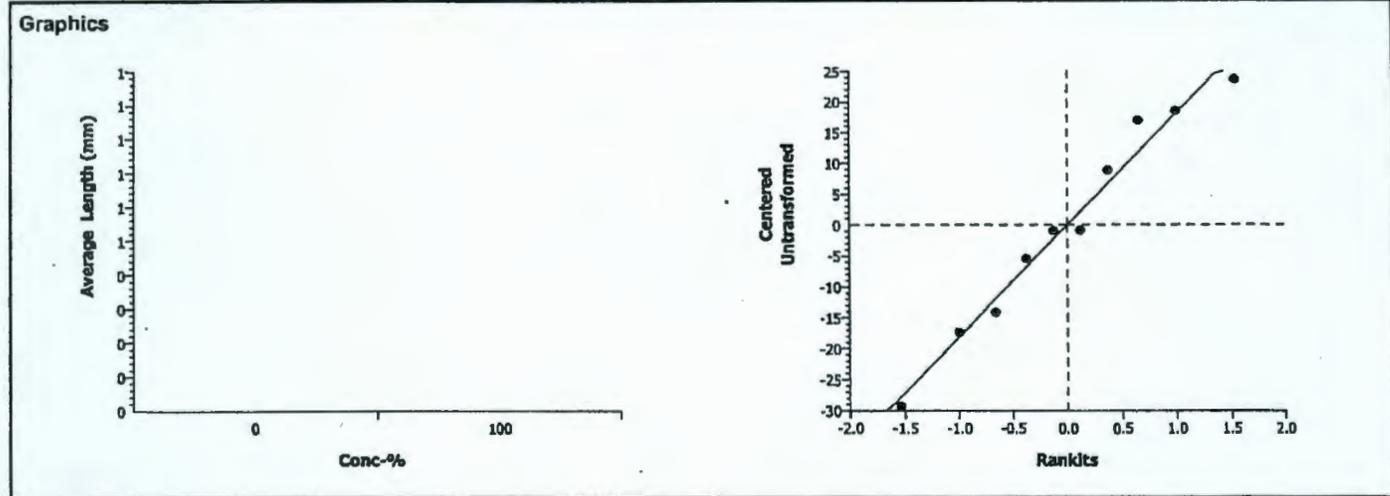
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	20.82%

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				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 2:08 PM  
 Analysis: 19-0385-9231/B160702psc

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

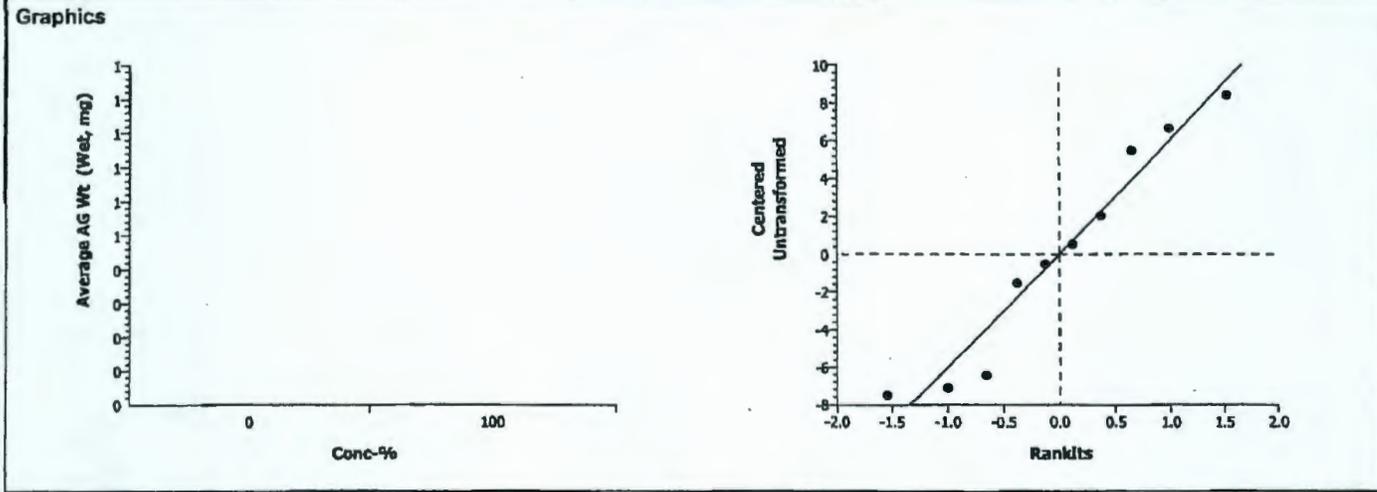
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	29.51%

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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 2:08 PM  
 Analysis: 07-4092-0913/B160702psc

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

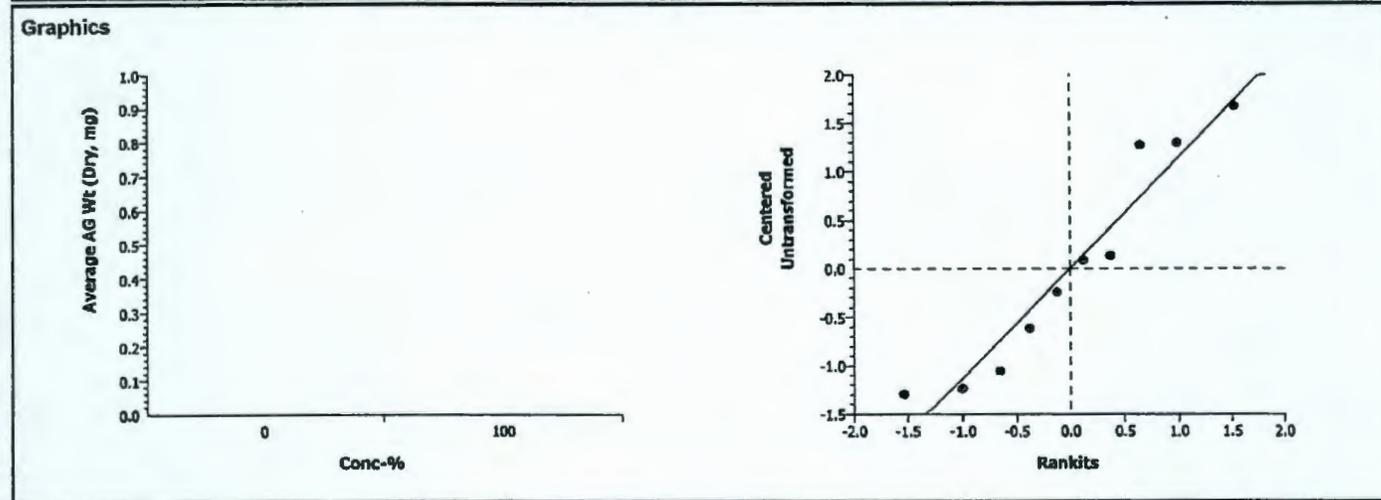
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	31.10%

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				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 2:08 PM  
 Analysis: 07-0730-1229/B160702psc

Plant Bioassay - Chronic	CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root WL (Wet, mg)	Comparison	03-0780-2116	03-0780-2116	19 Jul-06 2:08 PM	CETISv1.1.2

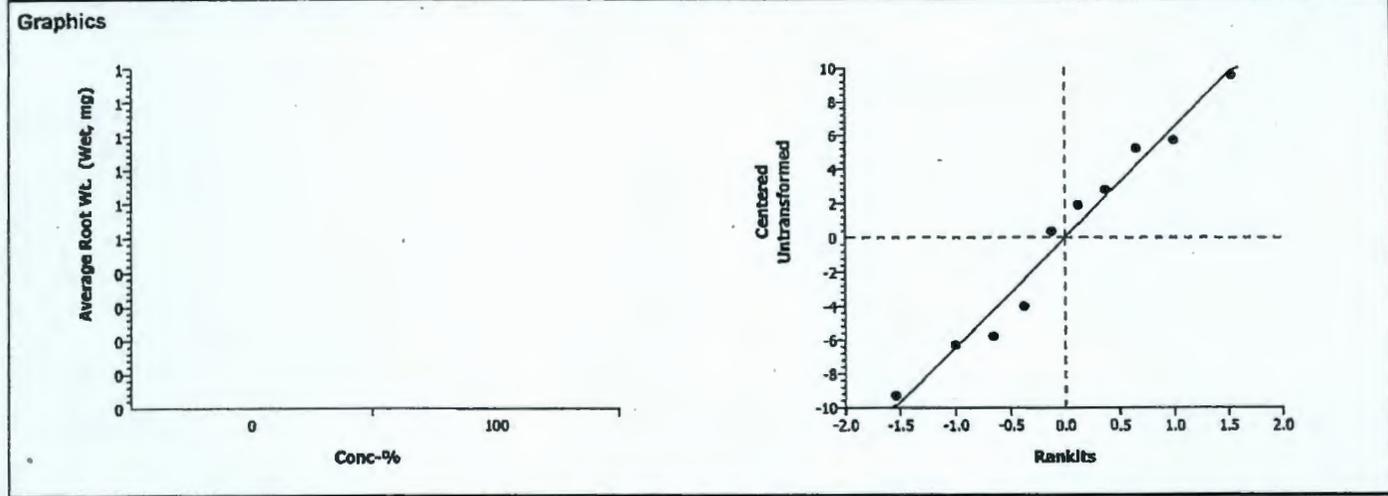
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	40.91%

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				



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 2:08 PM  
 Analysis: 02-2704-3987/B160702psc

**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**

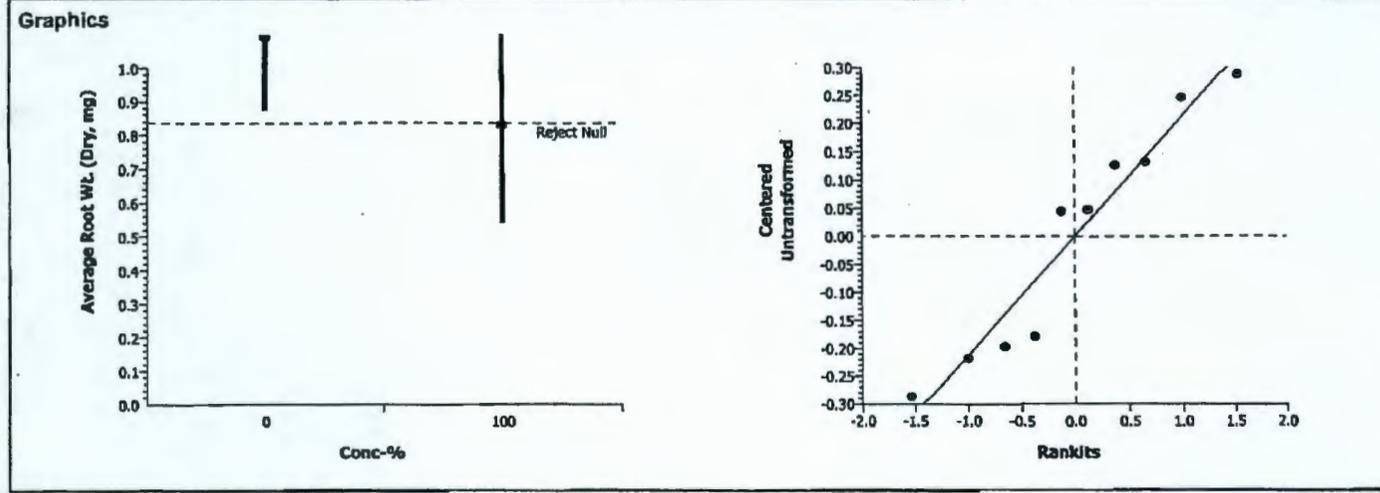
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1732775	0.173278	1	3.64	0.09296	Non-Significant Effect
Error	0.381173	0.047647	8			
Total	0.55445053	0.2209241	9			

**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**

Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 2:08 PM  
 Analysis: 03-4725-4822/B160702psc

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

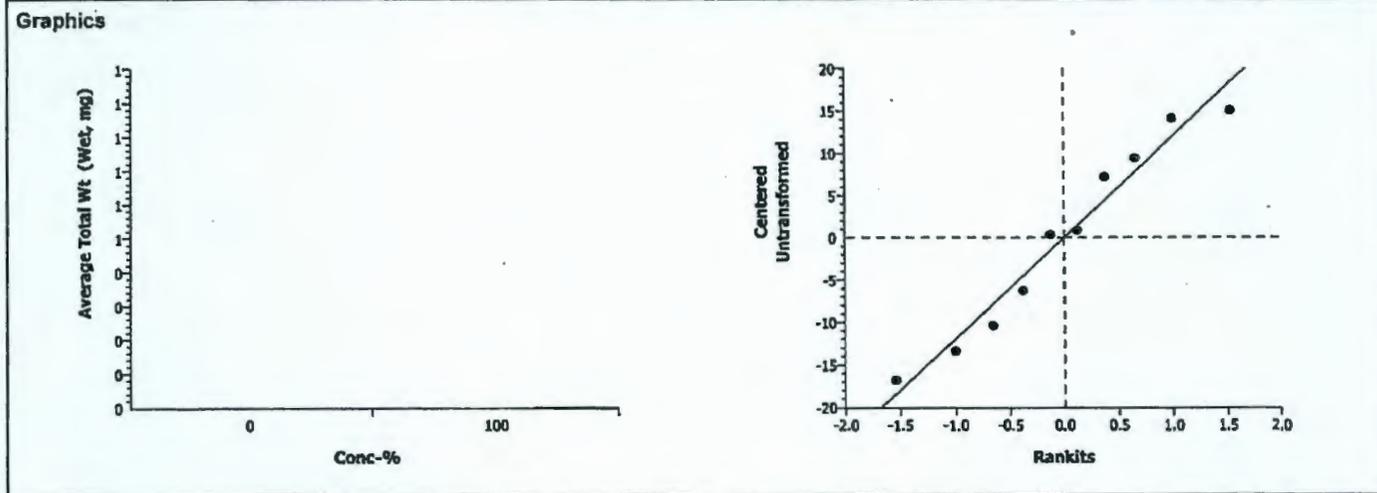
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	33.12%

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				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 2:08 PM  
 Analysis: 14-3265-9601/B160702psc

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

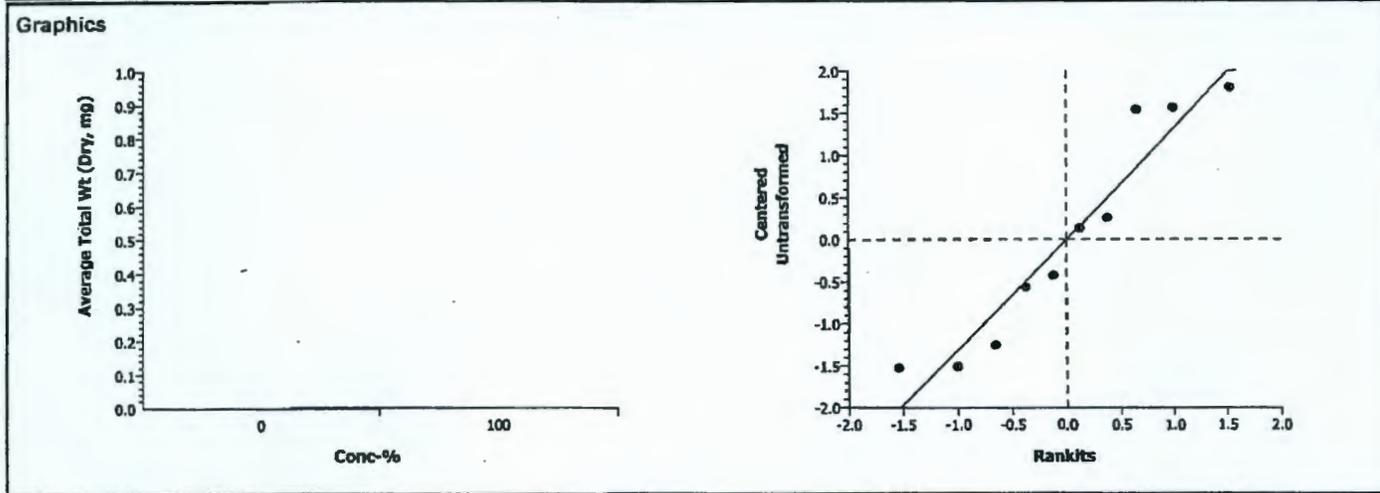
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.09%

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				



BLUEGRASS GR

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

7506

Initials: Day 0 (TP) Day 12 NJ Day 14 NJ Day 16 NJ Day 18 (FI) Day 21 NJ Day 23 (TP) Day 25 NJ Day 27 NJ

CONC.		# seeds germinated								pH		
REPLICATE		Emergence					7-DAYS POST-EMERGENCE (21 days after planting)		14-DAYS POST-EMERGENCE (28 days after planting)		INITIAL (at planting)	FINAL (at 14 days Post-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					
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/ 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		
Replicate B	38 mm	93 mm	52 mm	47 mm	
Replicate C	14 mm	69 mm	37 mm		
Replicate D	70 mm	141 mm	82 mm	29 mm	
Replicate E	44 mm				

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1285.46	1302.6	1287.53
Replicate B	1289.89	1334.6	<del>1282.75</del> @ 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		
Replicate B	17 mm	33 mm	41 mm	36 mm	
Replicate C	7 mm	16 mm	46 mm		
Replicate D	22 mm	115 mm	122 mm	68 mm	
Replicate E	37 mm				

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	<del>1296.79</del>	1297.3	1290.36
Replicate B	<del>1292.65</del>	1307.3	1282.75
Replicate C	1294.47	1304.0	1294.92
Replicate D	<del>1292.65</del>	1345.2	1296.39
Replicate E	<del>1296.79</del>	1298.4	1296.84
	1292.64	1296.77	

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

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 2:12 PM  
 Analysis: 09-2283-2326/B160703psc

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

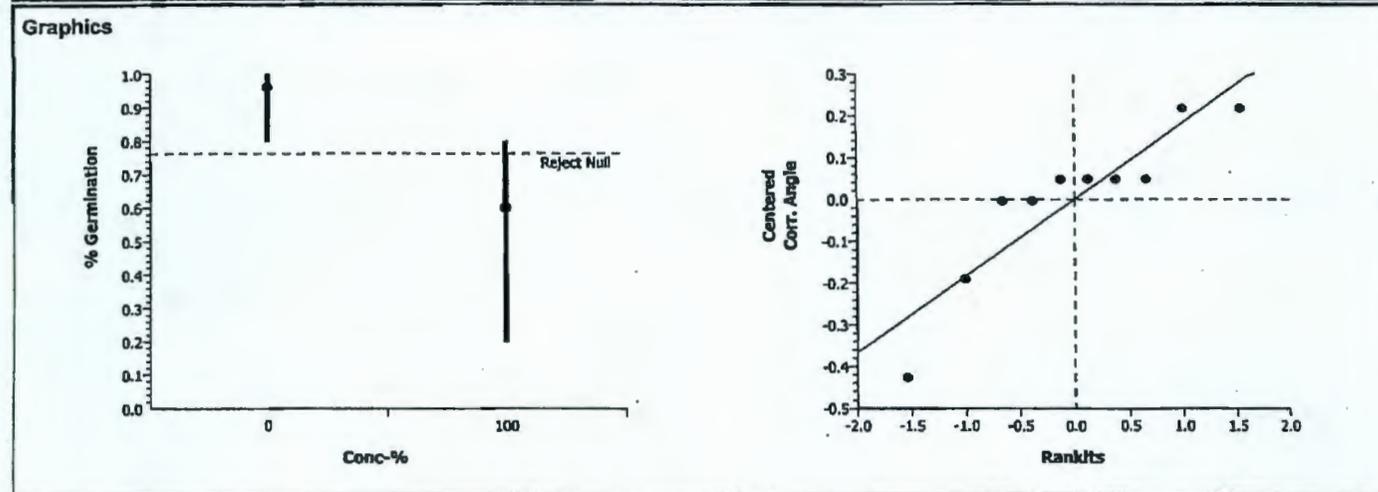
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	20.56%

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



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 2:12 PM  
 Analysis: 16-5582-9022/B160703psc

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

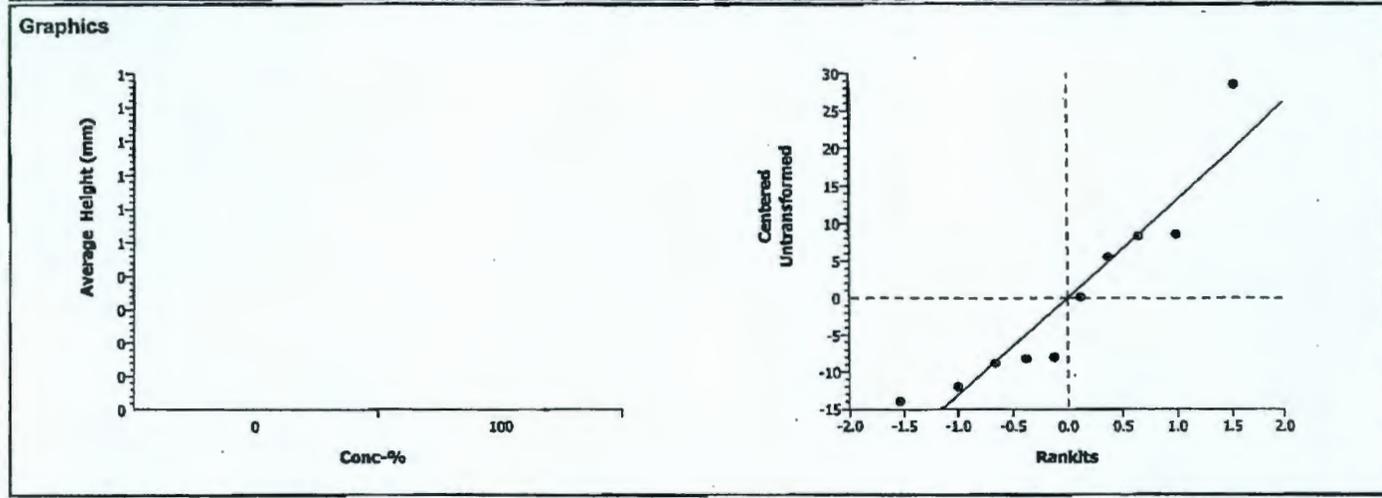
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	20.93%

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				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 2:12 PM  
 Analysis: 02-8980-8646/B160703psc

**Plant Bioassay - Chronic** CH2M HILL

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**

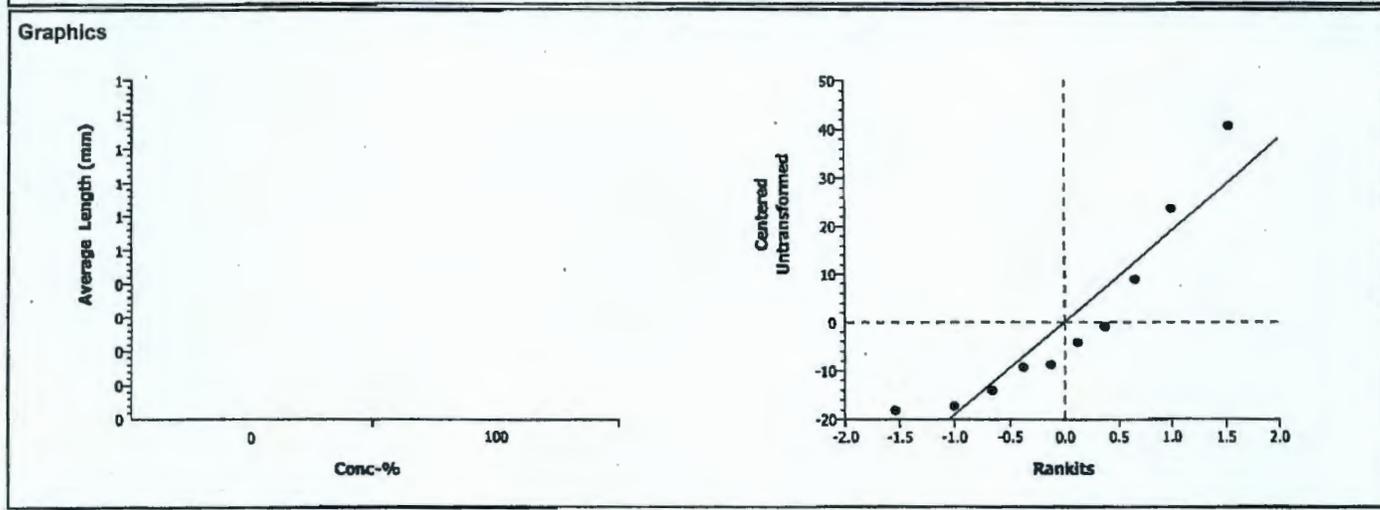
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	9541.921	9541.921	1	23.10	0.00134	Significant Effect
Error	3304.6	413.075	8			
Total	12846.5212	9954.9959	9			

**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**

Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 2:12 PM  
 Analysis: 05-4288-6540/B160703psc

Plant Bioassay - Chronic					CH2M Hill
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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

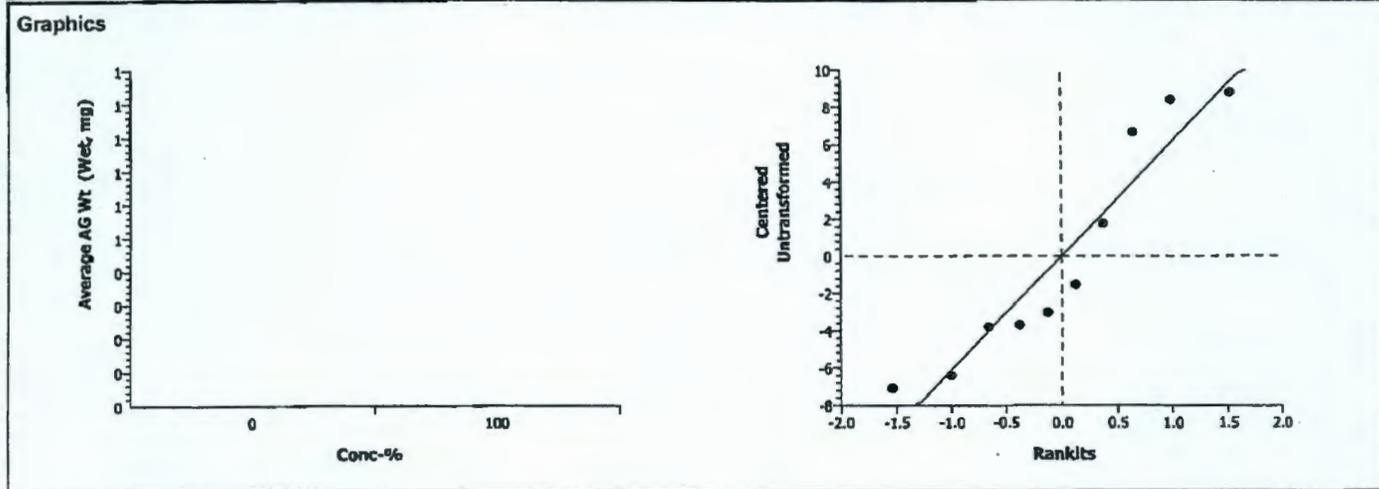
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	30.82%

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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 2:12 PM  
 Analysis: 04-3496-9037/B160703psc

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

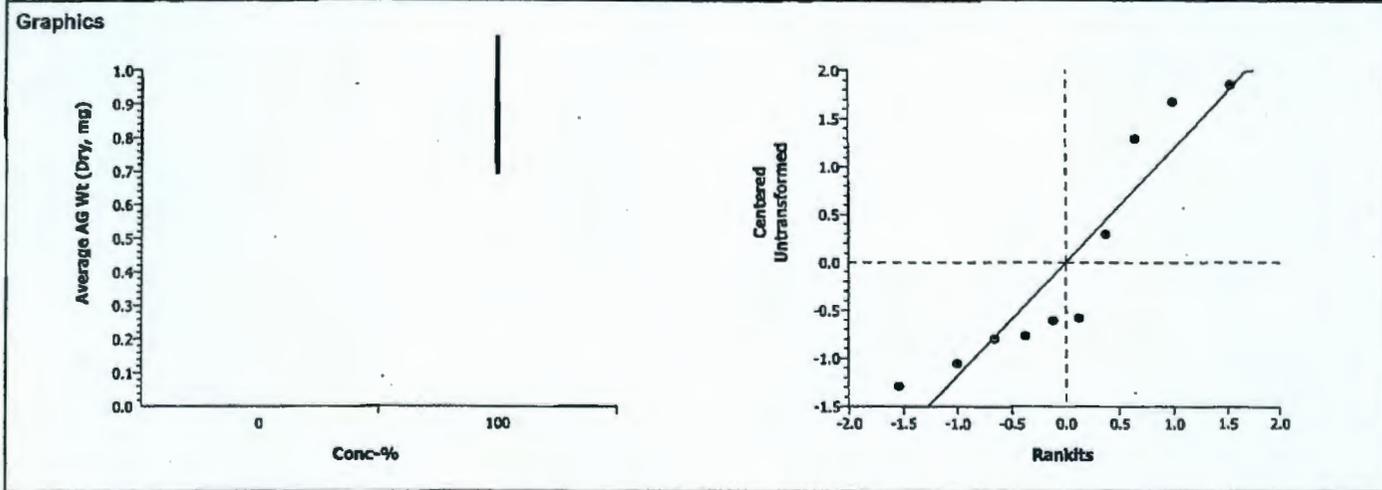
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	33.61%

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				

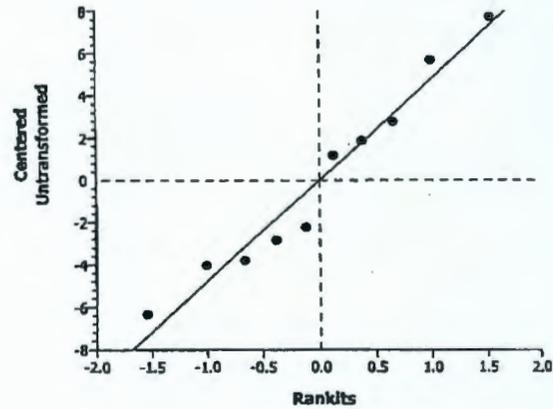
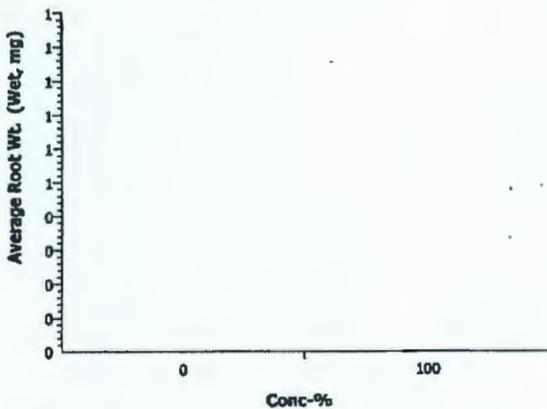


# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 2:12 PM  
 Analysis: 08-8644-1811/B160703psc

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										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				

## Graphics



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 2:12 PM  
 Analysis: 10-6504-7665/B160703psc

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

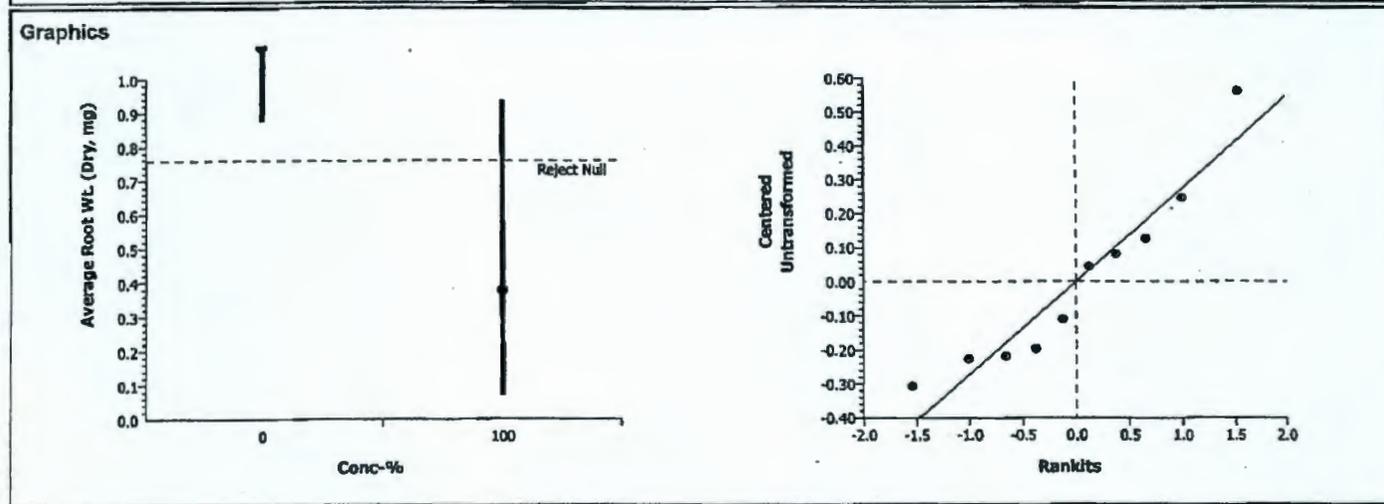
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	30.53%

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				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 2:12 PM  
 Analysis: 08-2836-5557/B160703psc

Plant Bioassay - Chronic					CH2M Hill
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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

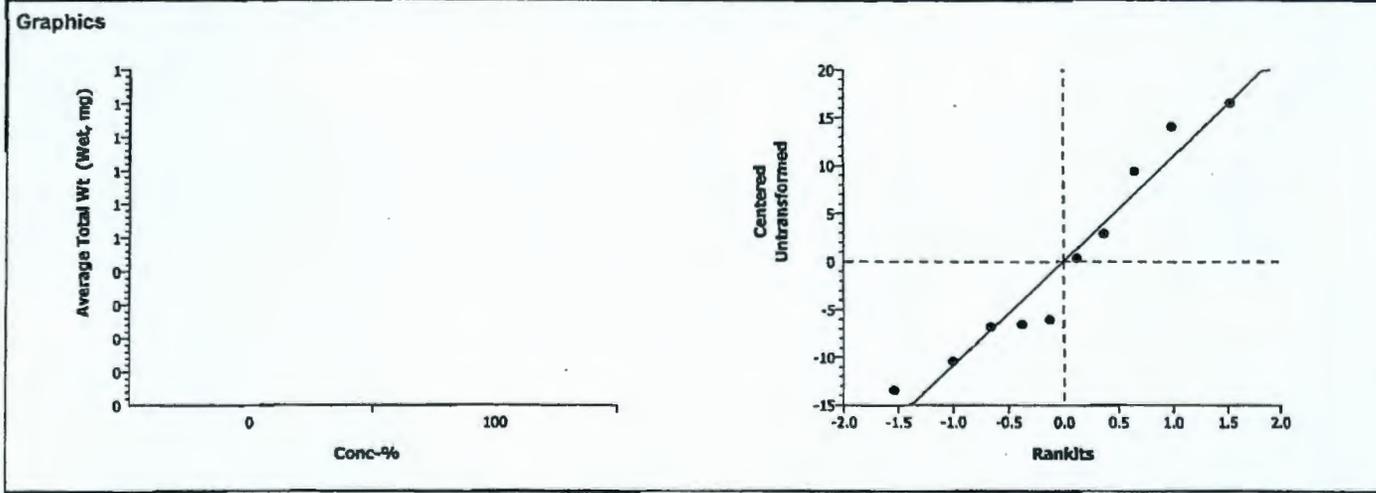
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	30.29%

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				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 2:12 PM  
 Analysis: 06-9987-2823/B160703psc

Plant Bioassay - Chronic							CH2M Hill
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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

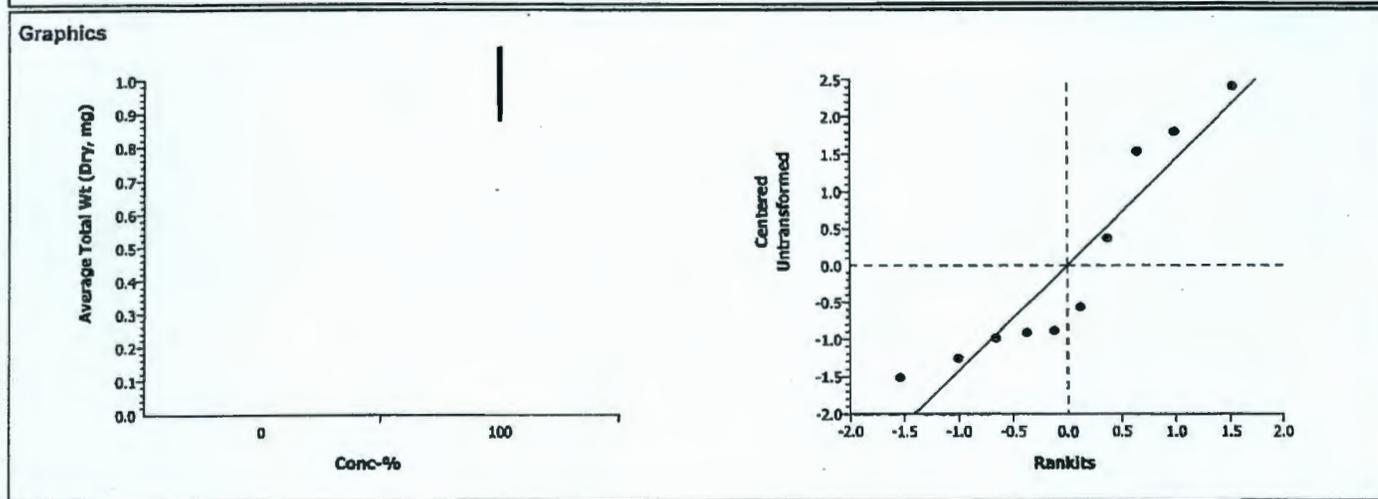
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.36%

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				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2005

75-26

Initials: Day 0 (TP) Day 12 (NT) Day 14 (NT) Day 16 (NJ) Day 18 (TP) Day 21 (NJ) Day 23 (TP) Day 25 (B)

Bioassay Lab ID: BG 1607-04		Sample No: J115T6								pH	
CONC.	REPLICATE	# seeds germinated								INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
		Emergence				7-DAYS POST-EMERGENCE (21 days after planting)		14-DAYS POST-EMERGENCE (35 days after planting)			
		12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting				
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 med, 1 sm G, Remove: 1 sm G  
 Replicate B: 1 med G, 1 sm G  
 Replicate C: 3 med G, 2 sm G  
 Replicate D: 1 med G, 1 sm G  
 Replicate E: 1 lg G, 2 med G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 2 lg G, 2 med G, 1 sm G  
 Replicate B: 1 med G, 2 sm G  
 Replicate C: 1 lg G, 4 med G  
 Replicate D: 2 med G, 1 sm G  
 Replicate E: 1 lg 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		
Replicate C	80 mm	52 mm	45 mm	50 mm	55 mm
Replicate D	78 mm	27 mm	65 mm		
Replicate E	50 mm	51 mm	96 mm		

Measure Shoot Weight

Total mass of all seedlings (above ground)

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (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	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		
Replicate C	112 mm	47 mm	41 mm	48 mm	35 mm
Replicate D	50 mm	14 mm	19 mm		
Replicate E	84 mm	34 mm	30 mm		

Measure Root Weight

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (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
Start Date:	07 Jun-06	Protocol:	ASTM E1963-02 (2002)
Ending Date:		Dil Water:	
Setup Date:	07 Jun-06	Brine:	
Duration:	N/A	Species:	Poa sandbergii
Source:		Client:	
Sample No:	07-0187-4948	Code:	B1607-04
Sample Date:	22 May-06 02:00 PM	Material:	Soil
Receive Date:		Source:	Hanford
Sample Age:	15d 10h	Station:	
Project:		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

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 2:16 PM  
 Analysis: 08-1882-9179/B160704psc

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

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 2:16 PM  
 Analysis: 03-1352-2526/B160704psc

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

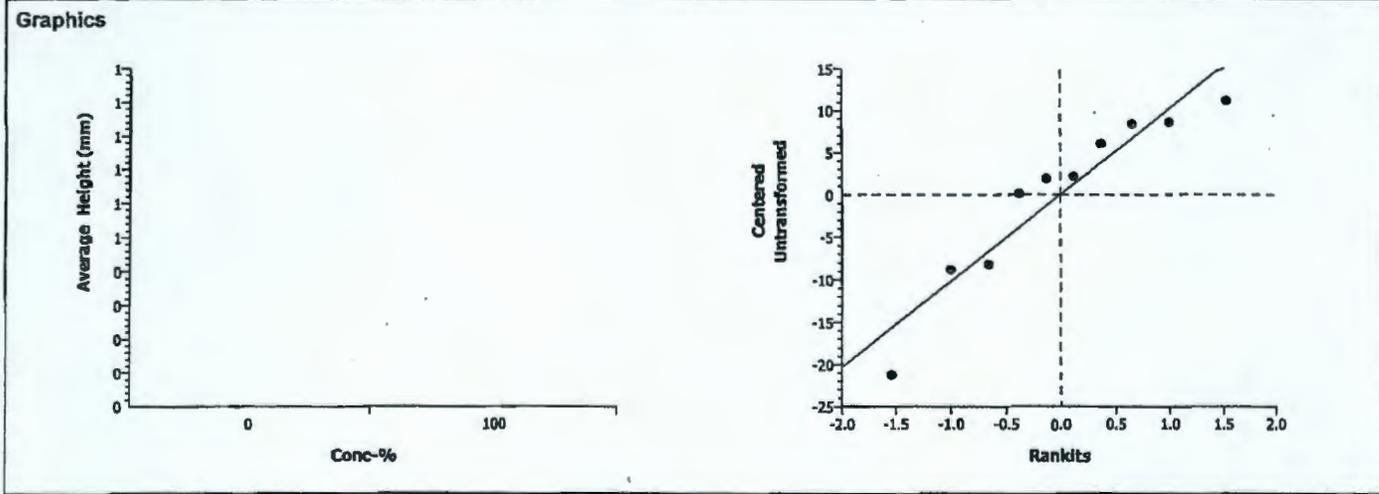
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	16.11%

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				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 2:16 PM  
 Analysis: 04-7980-8676/B160704psc

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

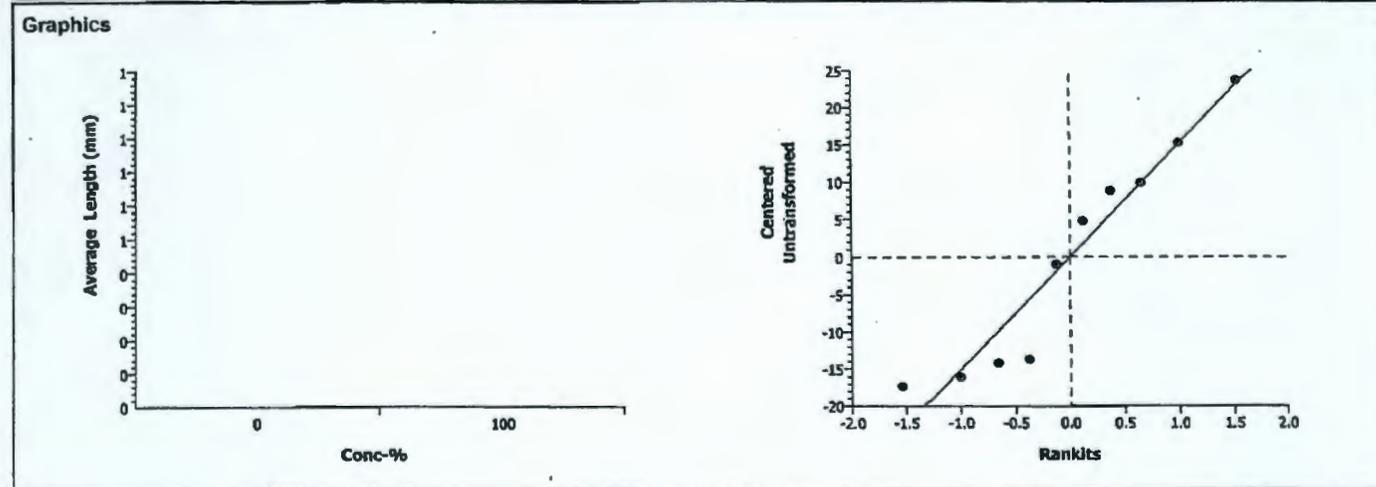
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	17.78%

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

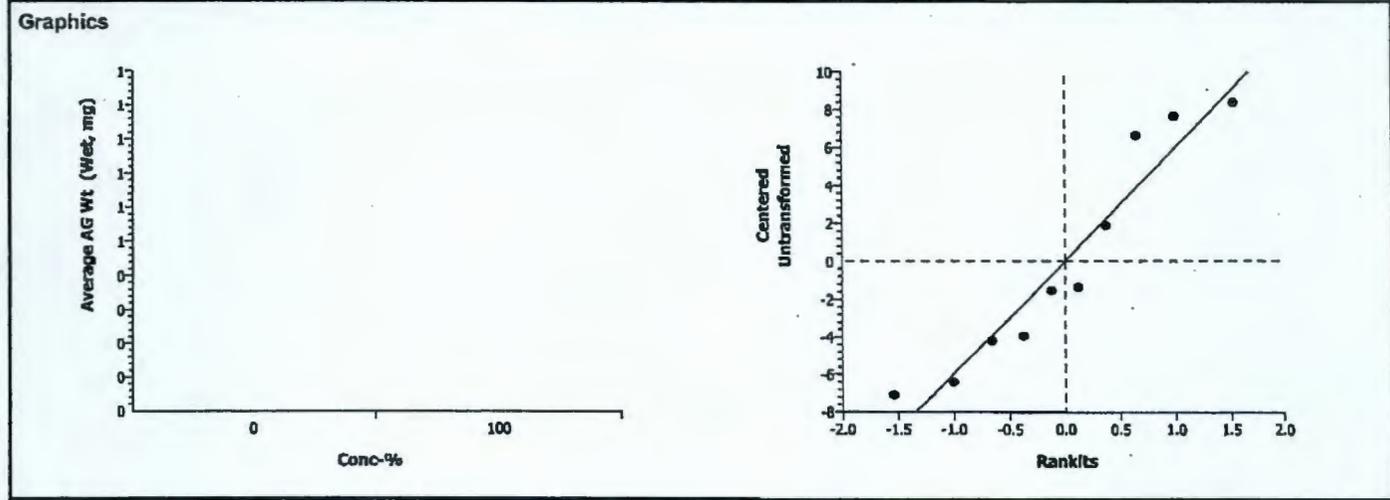
Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	41.42	25.3	56.6	14.133				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 2:16 PM  
 Analysis: 11-5181-0069/B160704psc

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	765.56552	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										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 2:16 PM  
 Analysis: 16-3930-2186/B160704psc

Plant Bioassay - Chronic					CH2M Hill
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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

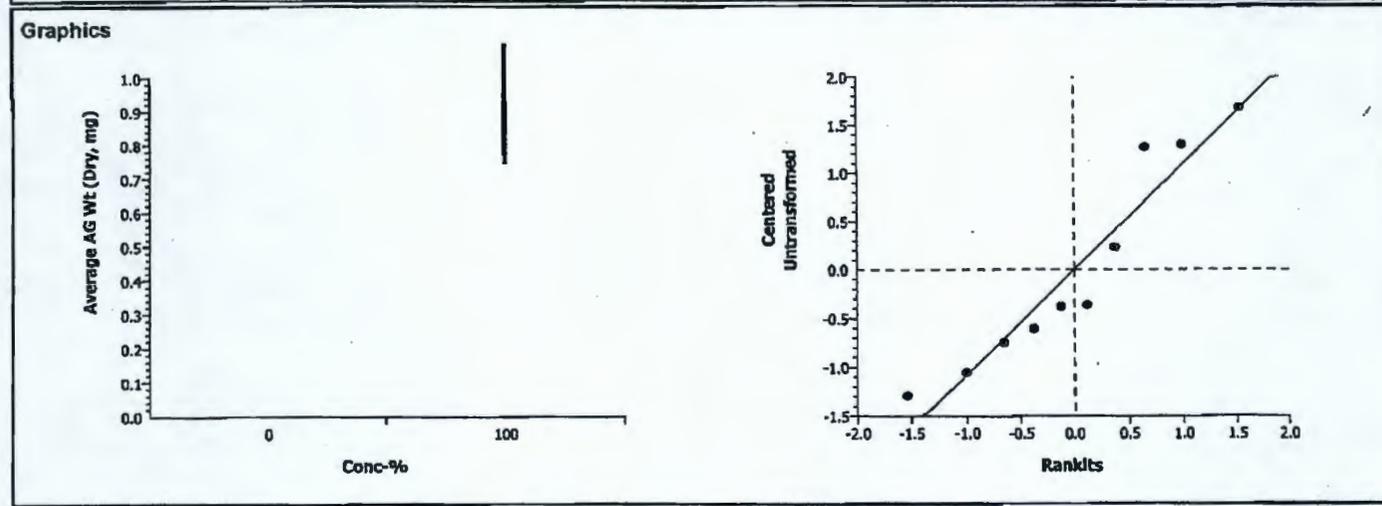
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	30.03%

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

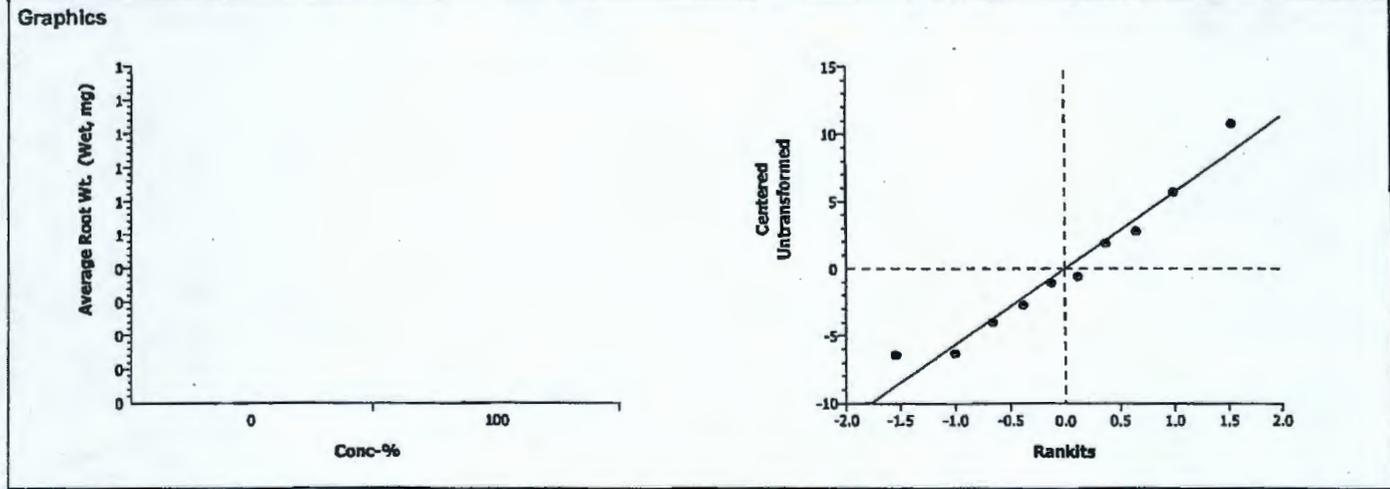
Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	4.40710	3.11399	6.08000	1.38143				
100		5	1.49520	0.74333	2.76001	0.78978				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 2:16 PM  
 Analysis: 11-4408-2700/B160704psc

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										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 2:16 PM  
 Analysis: 06-6680-4244/B160704psc

Plant Bioassay - Chronic							CH2M Hill
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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

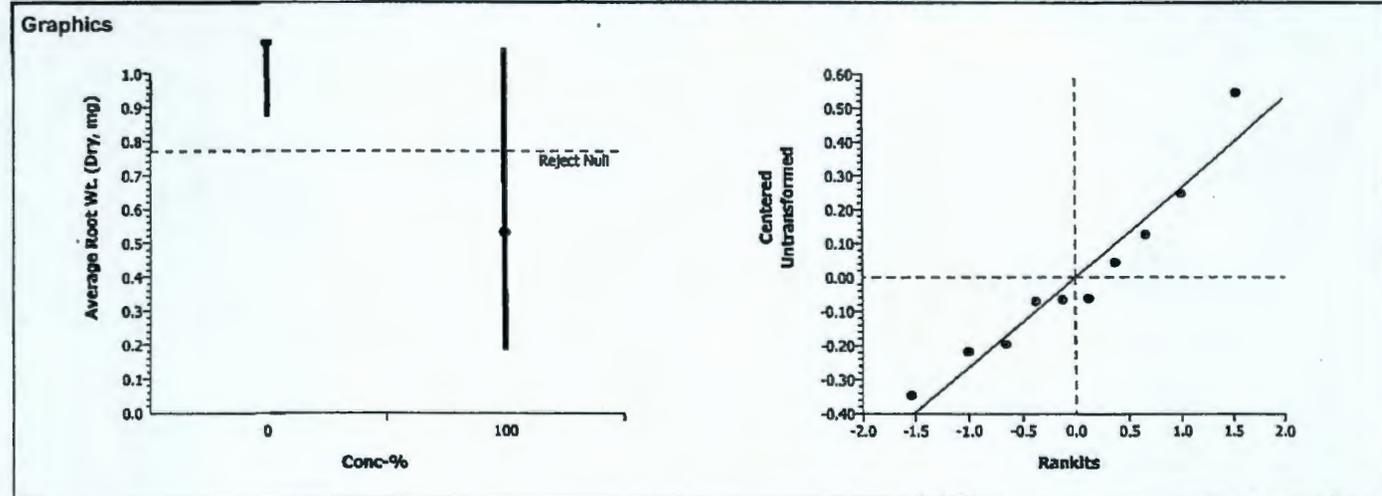
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.33%

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	0.5935676	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				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 2:16 PM  
 Analysis: 05-9169-3420/B160704psc

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

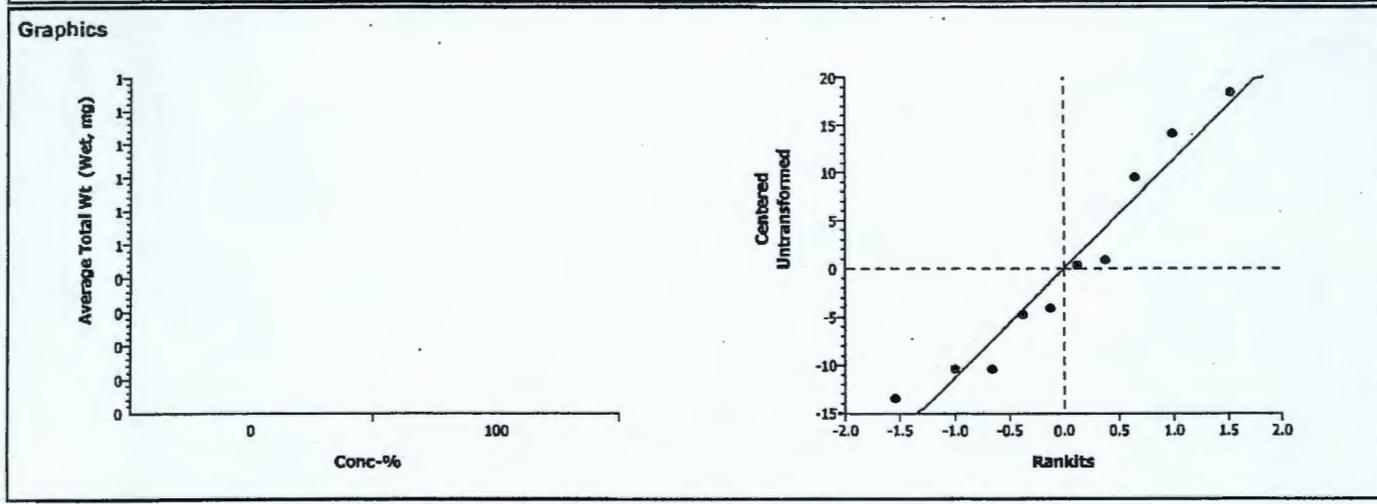
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	31.49%

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				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 2:16 PM  
 Analysis: 07-7950-4353/B160704psc

Plant Bioassay - Chronic						CH2M Hill
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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

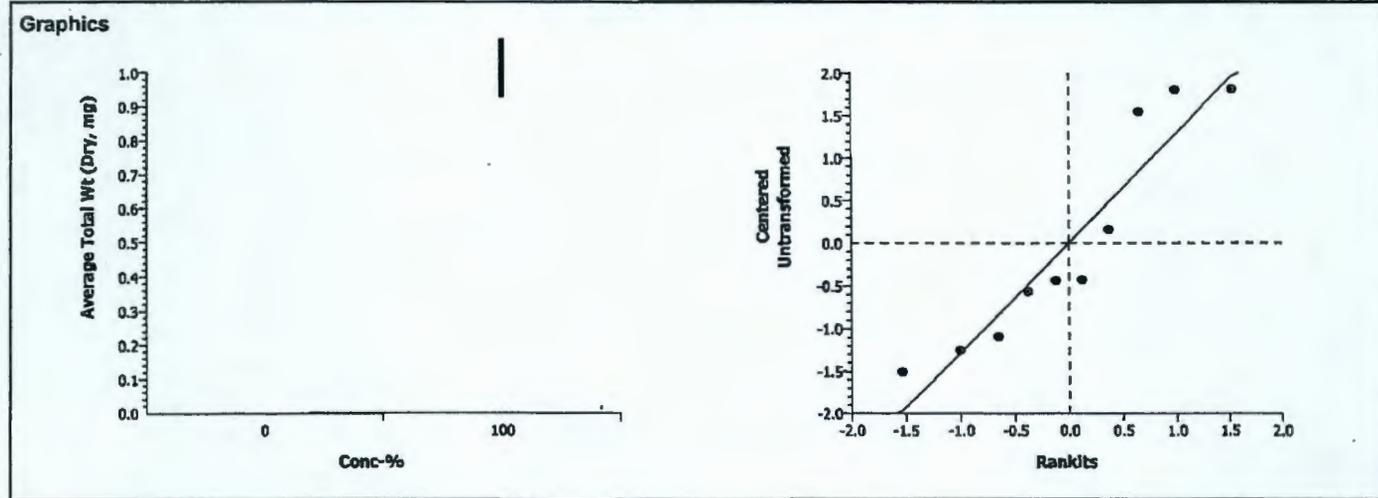
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.96%

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				



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 NT Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day      Day 23 NJ

Bioassay Lab ID: BG 1607-05 Sample No: 01052

CONC.	REPLICATE	# seeds germinated								pH	
		Emergence						7-DAYS POST-EMERGENCE ( <del>17</del> 21 days after planting)	14-DAYS POST-EMERGENCE ( <del>30</del> 35 days after planting)	INITIAL (@ planting)	FINAL (@ 14 days Post-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				
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			
Replicate B	65 mm	64 mm	72 mm	90 mm	
Replicate C	92 mm	64 mm			
Replicate D	83 mm	29 mm			
Replicate E	86 mm				

Measure Shoot Weight:

Total mass of all seedlings (above ground)

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (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	1290.14

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

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (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

<b>Plant Bioassay - Chronic</b>			<b>CH2M HILL</b>
<b>Test No:</b> 07-0151-5697	<b>Test Type:</b> Plant Chronic	<b>Duration:</b> N/A	
<b>Start Date:</b> 07 Jun-06	<b>Protocol:</b> ASTM E1963-02 (2002)	<b>Species:</b> Poa sandbergii	
<b>Ending Date:</b>	<b>Dil Water:</b>	<b>Source:</b>	
<b>Setup Date:</b> 07 Jun-06	<b>Brine:</b>		
<b>Sample No:</b> 13-8089-9943	<b>Code:</b> B1607-05	<b>Client:</b>	
<b>Sample Date:</b> 22 May-06 05:06 PM	<b>Material:</b> Soil	<b>Project:</b>	
<b>Receive Date:</b>	<b>Source:</b> Hanford		
<b>Sample Age:</b> 15d 6h	<b>Station:</b>		
<b>Comments:</b> J11JV2			

<b>Comparison Summary</b>						
<b>Analysis</b>	<b>Endpoint</b>	<b>NOEL</b>	<b>LOEL</b>	<b>ChV</b>	<b>PMSD</b>	<b>Method</b>
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:

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%

Report Date:

19 Jul-06 2:18 PM

Test Link:

00-0827-7896/B160705psc

## CETIS Test Summary

% 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

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 2:18 PM  
 Analysis: 01-3647-0365/B160705psc

Plant Bioassay - Chronic						CH2M Hill
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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

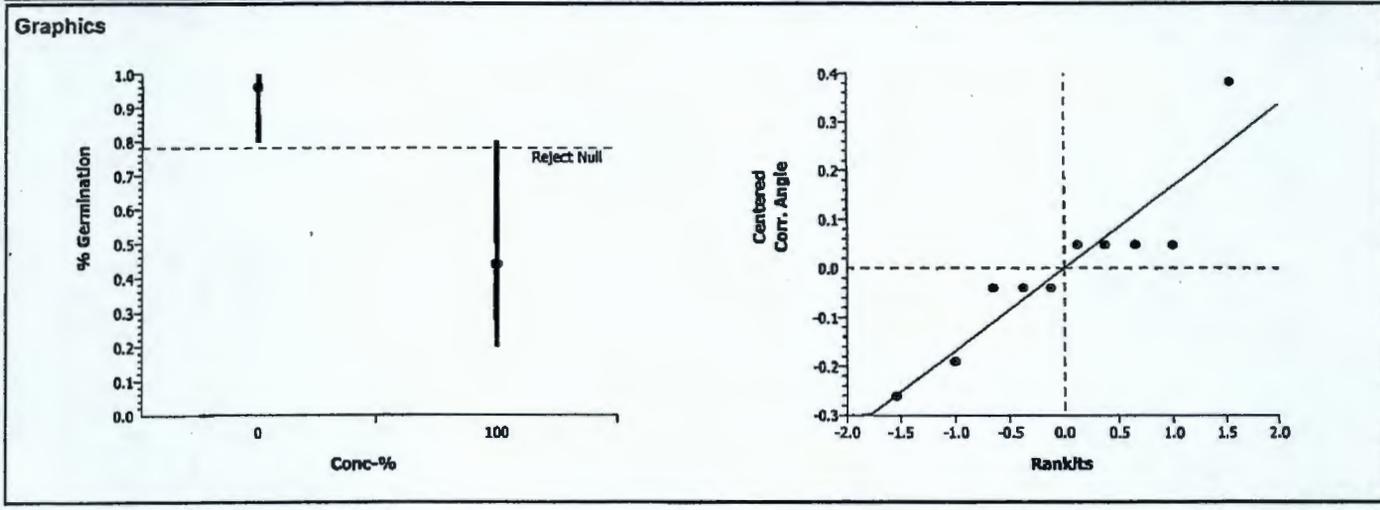
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	18.65%

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



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 2:18 PM  
 Analysis: 04-8414-2381/B160705psc

Plant Bioassay - Chronic							CH2M Hill
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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

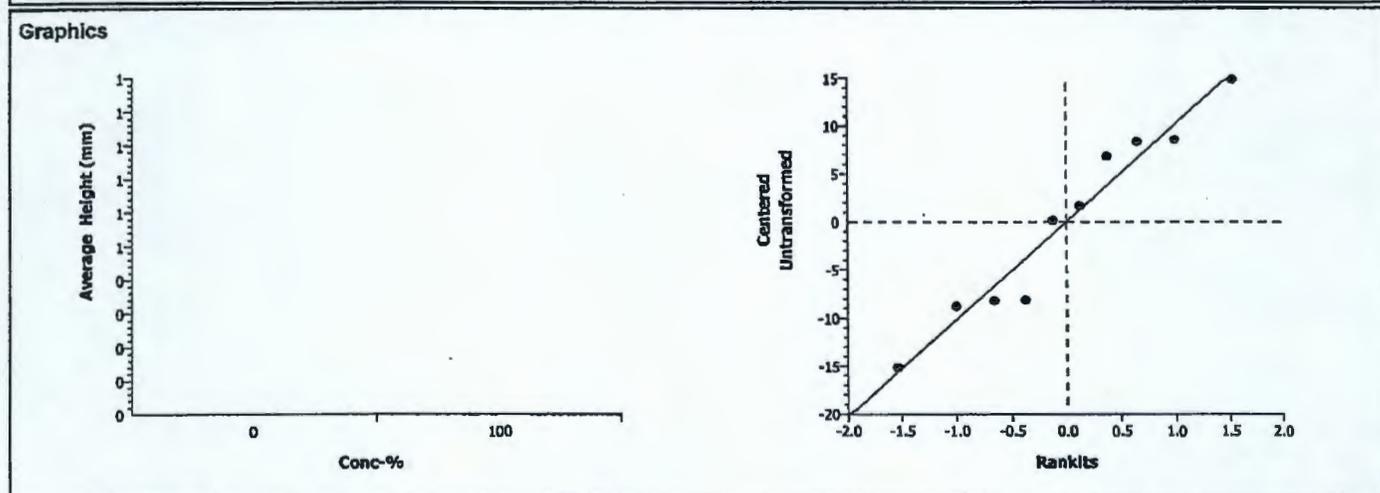
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	15.62%

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				



# CETIS Analysis Detail

Plant Bioassay - Chronic CH2M Hill

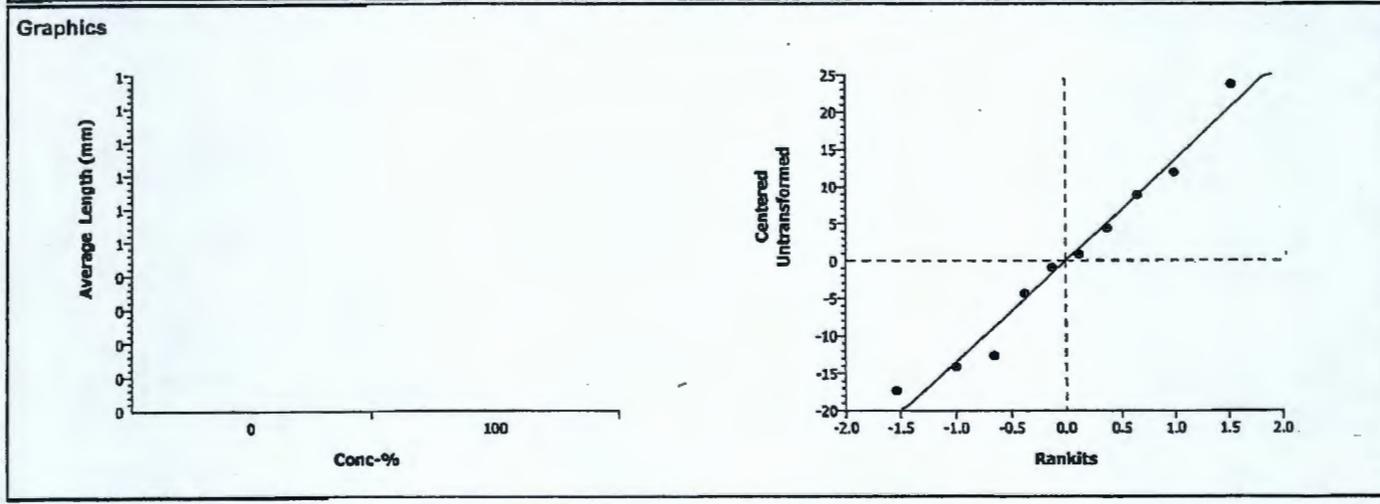
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
Average Length (mm)	Comparison	00-0827-7896	00-0827-7896	19 Jul-06 2:18 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	15.53%

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	0.98746		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				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 2:18 PM  
 Analysis: 18-4520-2711/B160705psc

Plant Bioassay - Chronic					CH2M Hill
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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

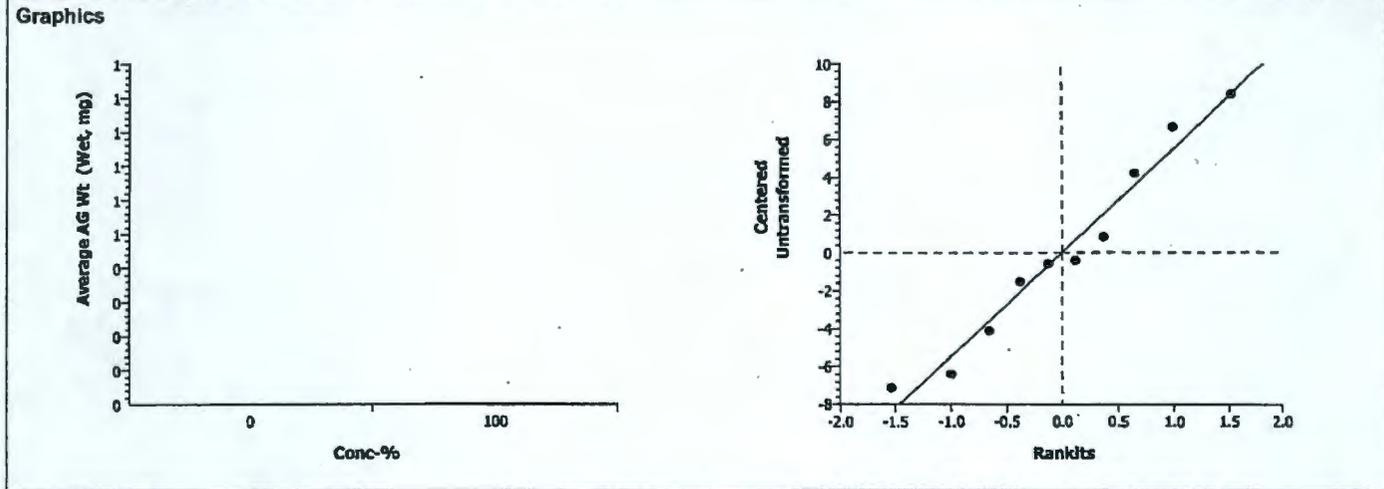
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	26.68%

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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 2:18 PM  
 Analysis: 08-7649-2296/B160705psc

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

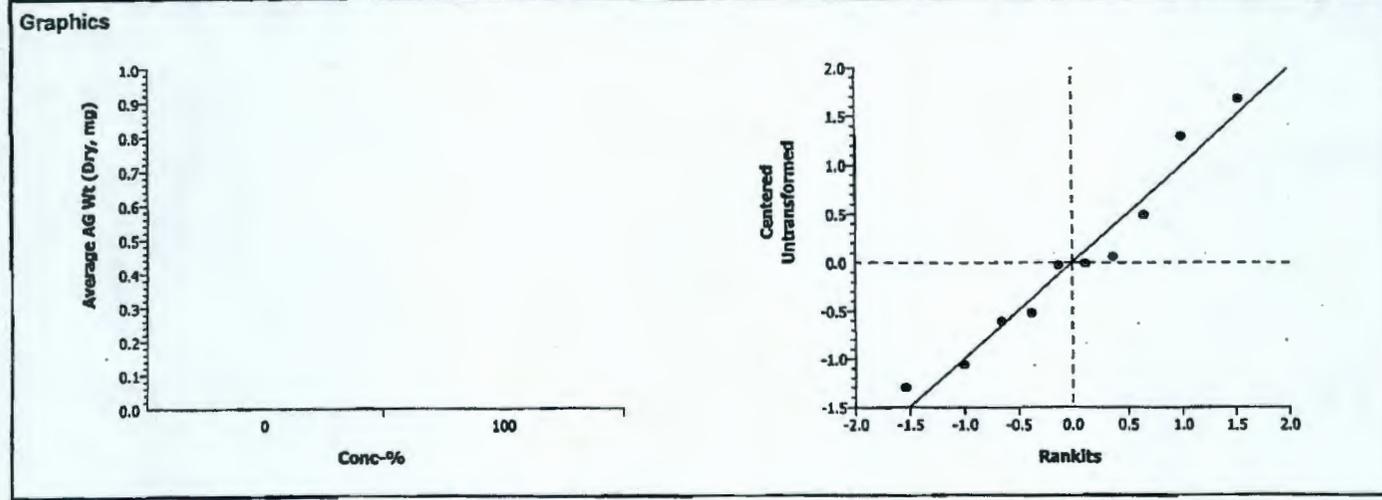
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	26.93%

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				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 2:18 PM  
 Analysis: 11-1773-8217/B160705psc

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

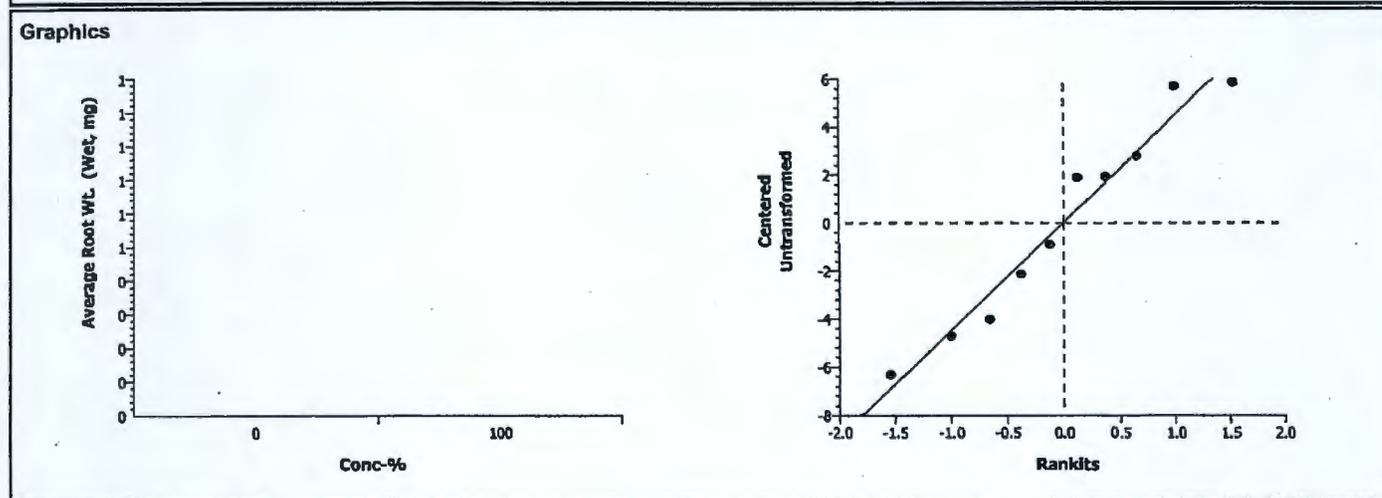
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	28.61%

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				



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 2:18 PM  
 Analysis: 04-7129-2113/B160705psc

Plant Bioassay - Chronic					CH2M Hill	
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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

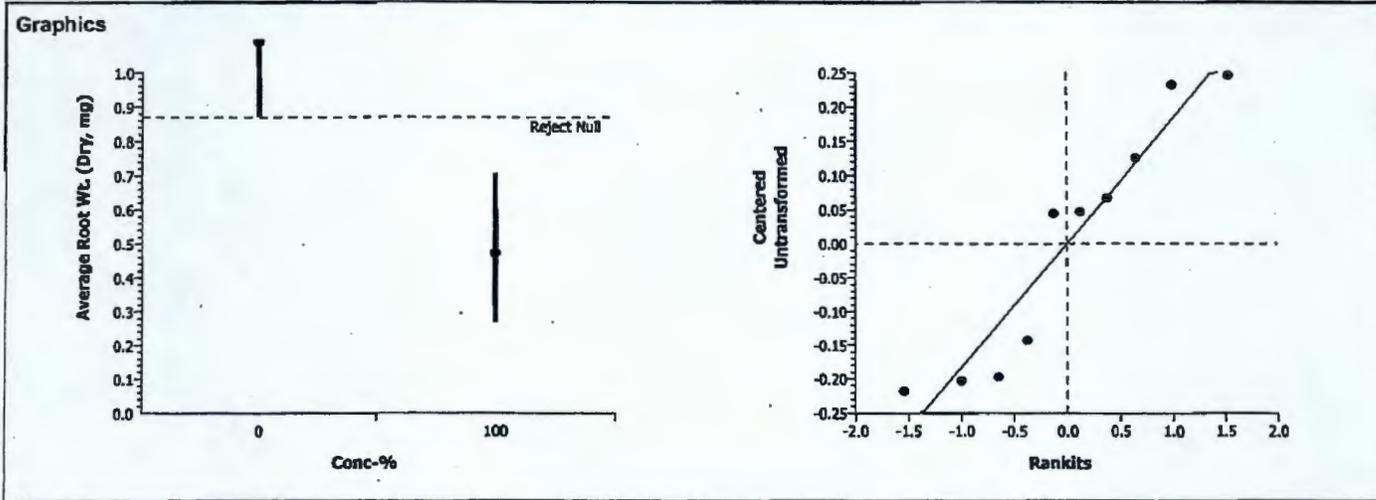
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	20.39%

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				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 2:18 PM  
 Analysis: 17-7022-9127/B160705psc

Plant Bioassay - Chronic	CH2M HILL
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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

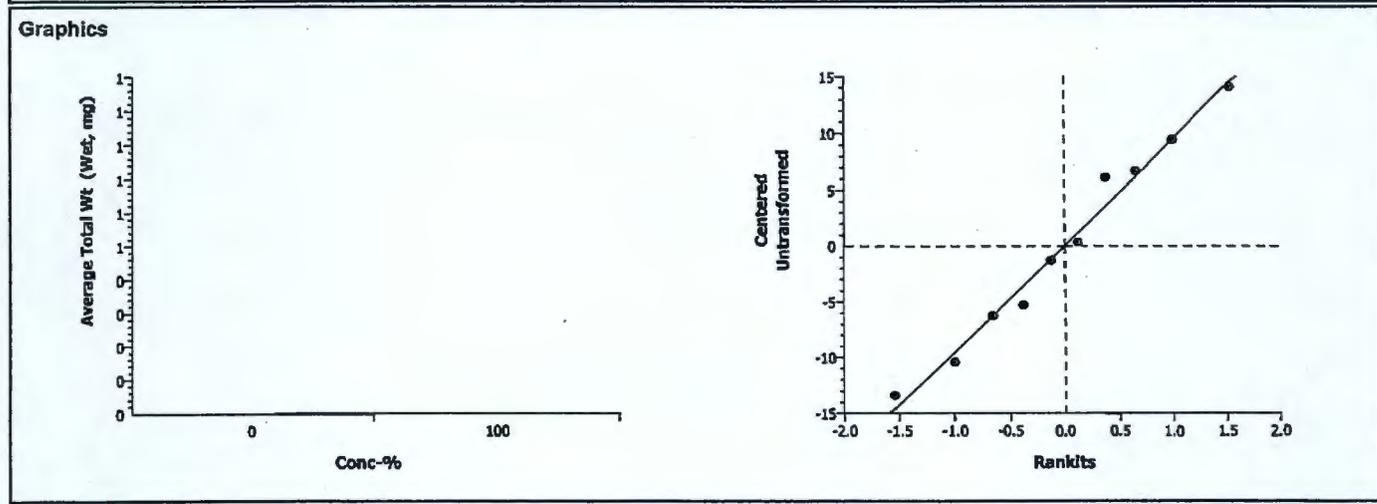
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	26.06%

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				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 2:18 PM  
 Analysis: 20-2483-4170/B160705psc

**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**

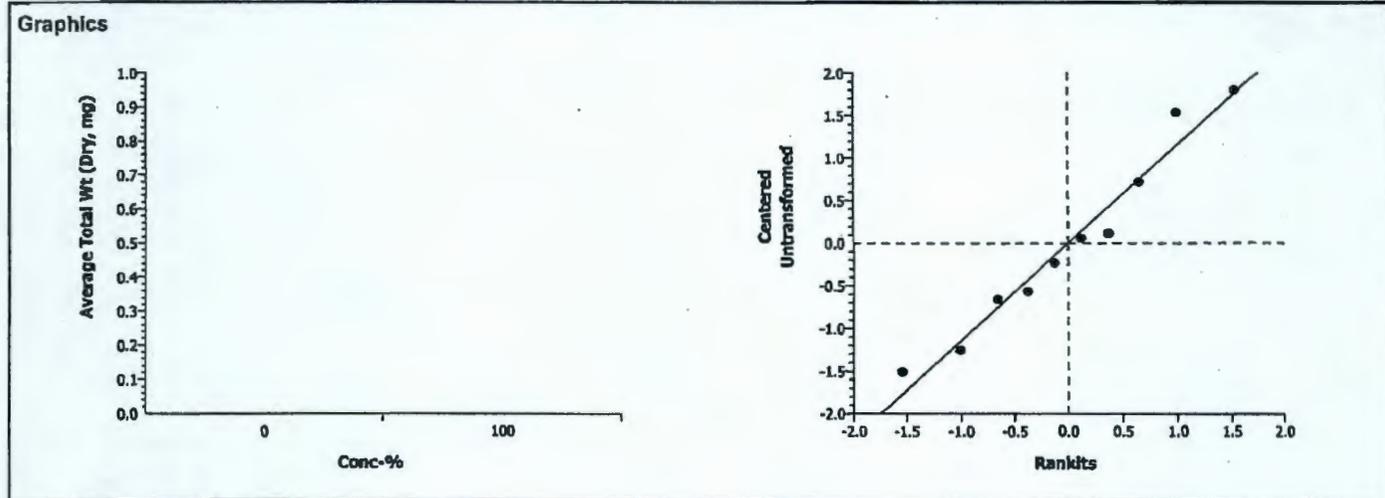
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	19.4365	19.4365	1	14.39	0.00529	Significant Effect
Error	10.80586	1.350732	8			
Total	30.2423620	20.787235	9			

**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**

Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2006

5 DW  
7-5

Initials: Day 10 NP Day 12 NJ Day 14 NJ Day 16 NJ Day 18 TP Day 21 NJ Day 23 TP Day 25 NJ Day 27 TP

CONC.		REPLICATE		# seeds germinated								pH	
				Emergence				7-DAYS POST-EMERGENCE (21 days after planting)		14-DAYS POST-EMERGENCE (28 days after planting)		INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
		12 days after planting	14 days after planting	16 days after planting	18 days after planting	21 days after planting	23 days after planting	25 days after planting	28 days after planting	31 days after planting			
Control	A	2	5	5	5		5	6-7	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 WL (mg)	Wet WL (mg)	Dry WL (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	1285.62	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	*
Replicate C	410 mm	40 mm	30 mm	63 mm	10 mm
Replicate D	NO ROOT 49 mm	68 mm	75 mm	25 mm	101 mm
Replicate E	116 mm	105 mm	69 mm	26 mm	55 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (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	1298.94
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	<del>0.96000</del>	0.80000	1.00000	0.04000	0.08944	9.32%
Average Height (mm) Summary								
			100% → see note, comments, & Analysis Detail page					
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

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 3:20 PM  
 Analysis: 10-6682-1189/B160706psc

Plant Bioassay - Chronic					CH2M Hill
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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

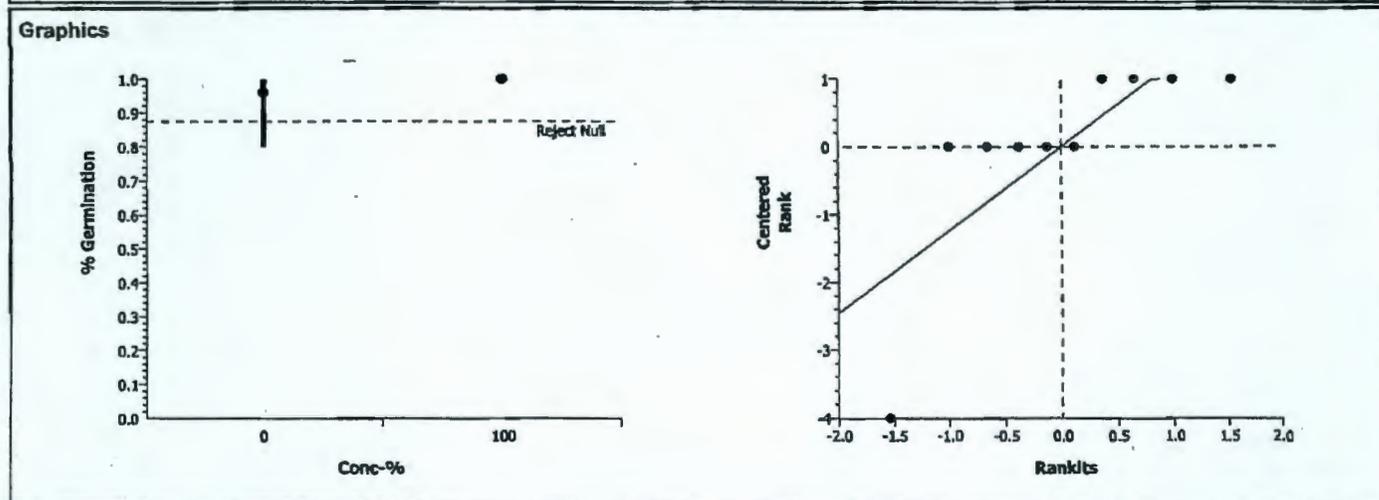
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	CHV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	8.88%

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



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 3:20 PM  
 Analysis: 10-9155-7773/B160706psc

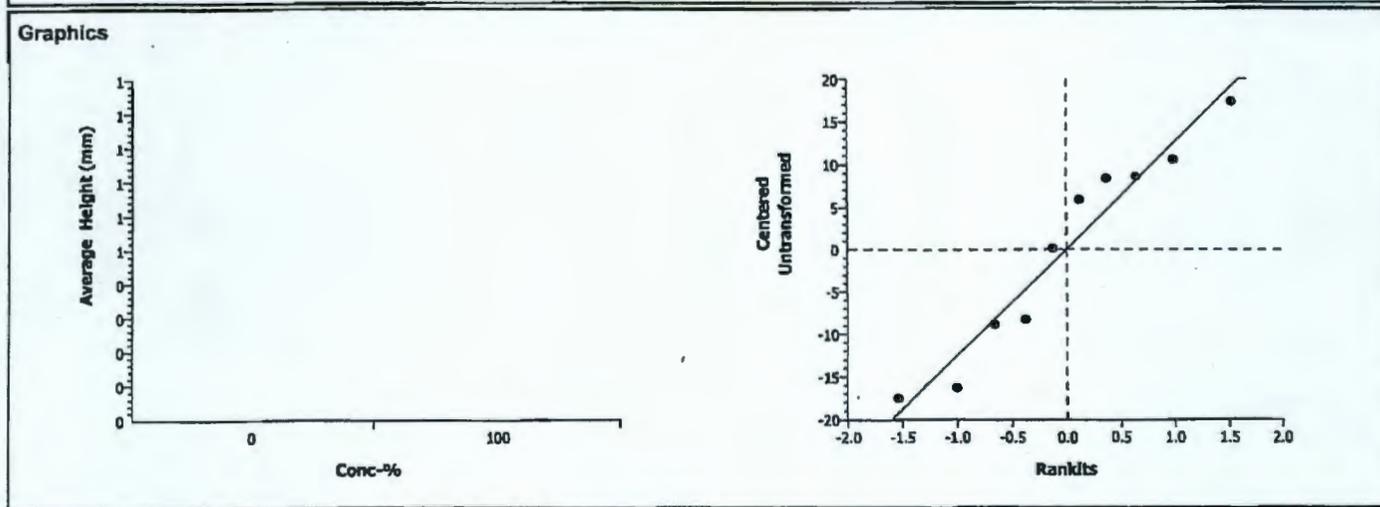
Plant Bioassay - Chronic						CH2M Hill		
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version			
Average Height (mm)	Comparison	02-8314-9013	02-8314-9013	19 Jul-06 2:21 PM	CETISv1.1.2			
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > 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				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 3:20 PM  
 Analysis: 06-0260-9855/B160706psc

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

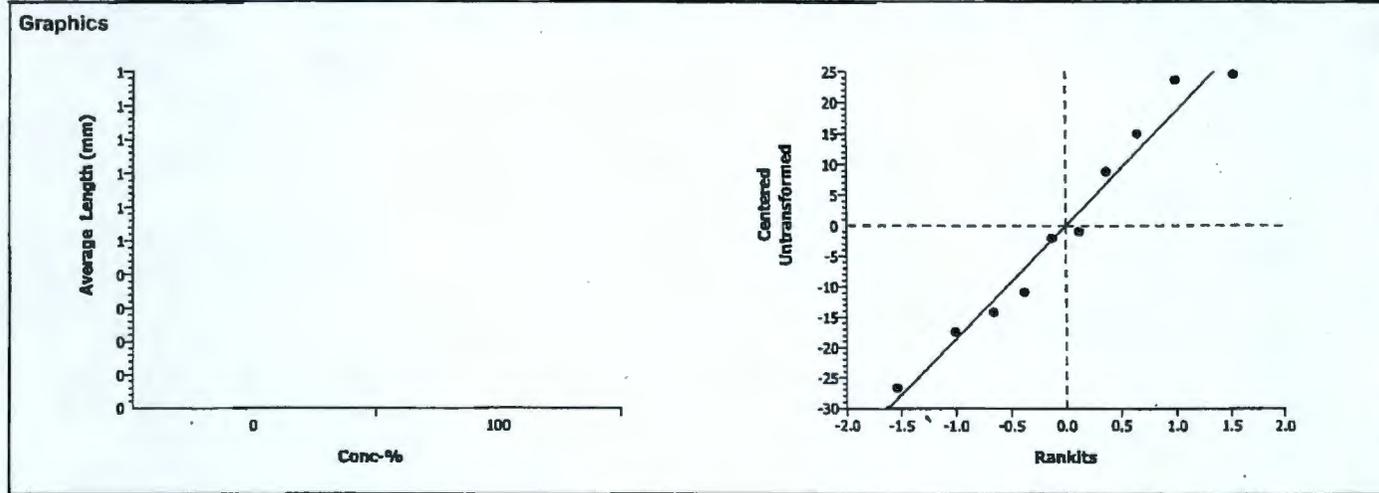
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	21.36%

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				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 3:20 PM  
 Analysis: 01-6572-8209/B160706psc

Plant Bioassay - Chronic							CH2M Hill
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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

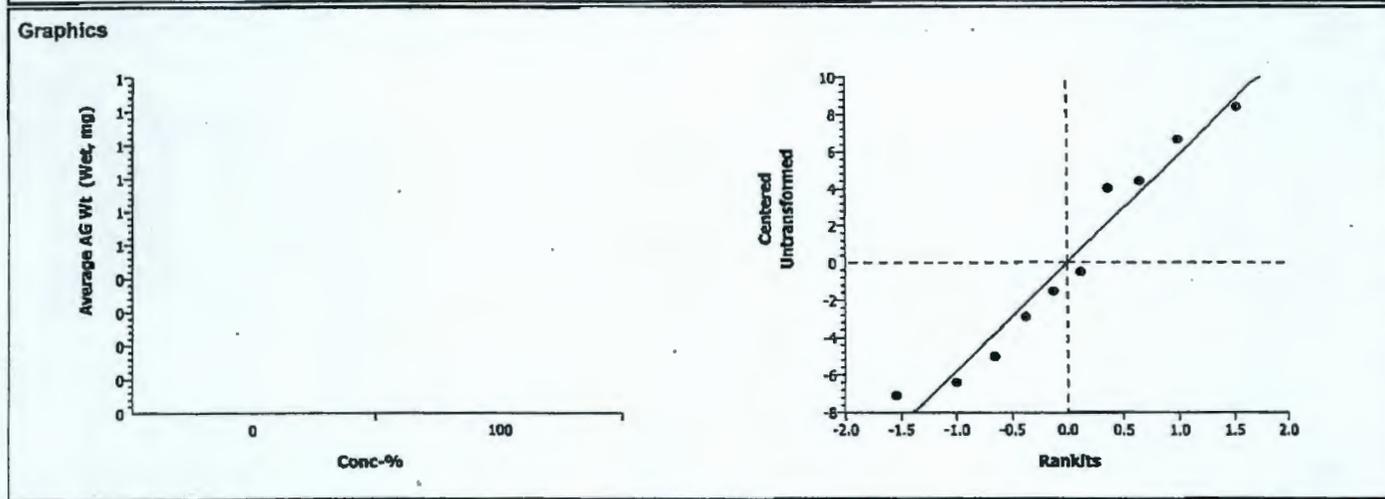
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.44%

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

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			

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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 3:20 PM  
 Analysis: 08-9655-9199/B160706psc

Plant Bioassay - Chronic	CH2M Hill
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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

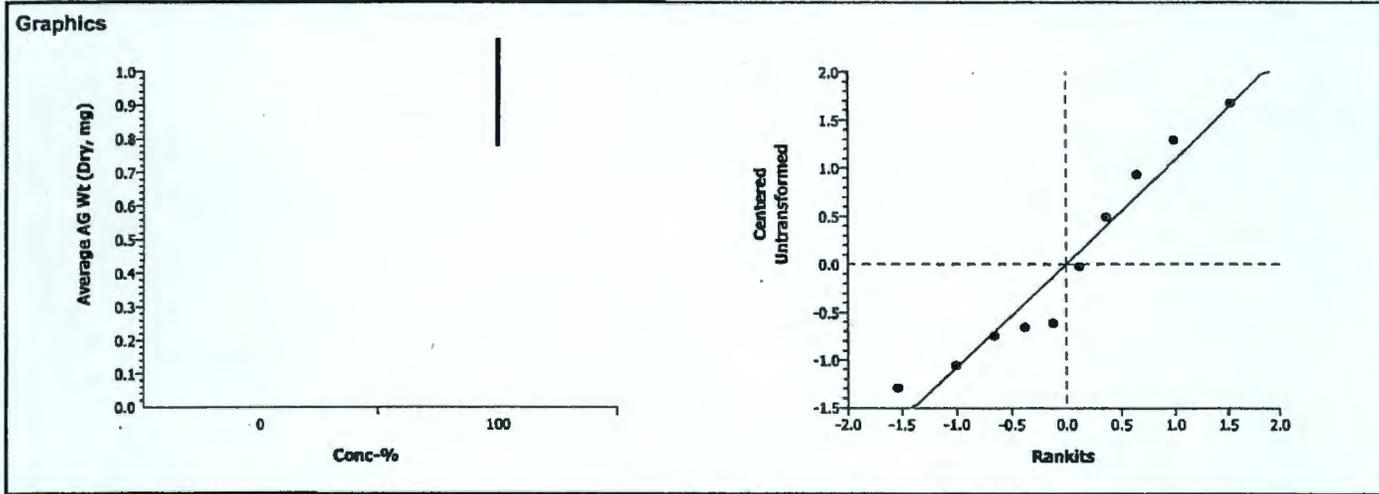
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	CHV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.45%

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				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 3:20 PM  
 Analysis: 14-1076-1240/B160706psc

Plant Bioassay - Chronic	CH2M Hill
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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

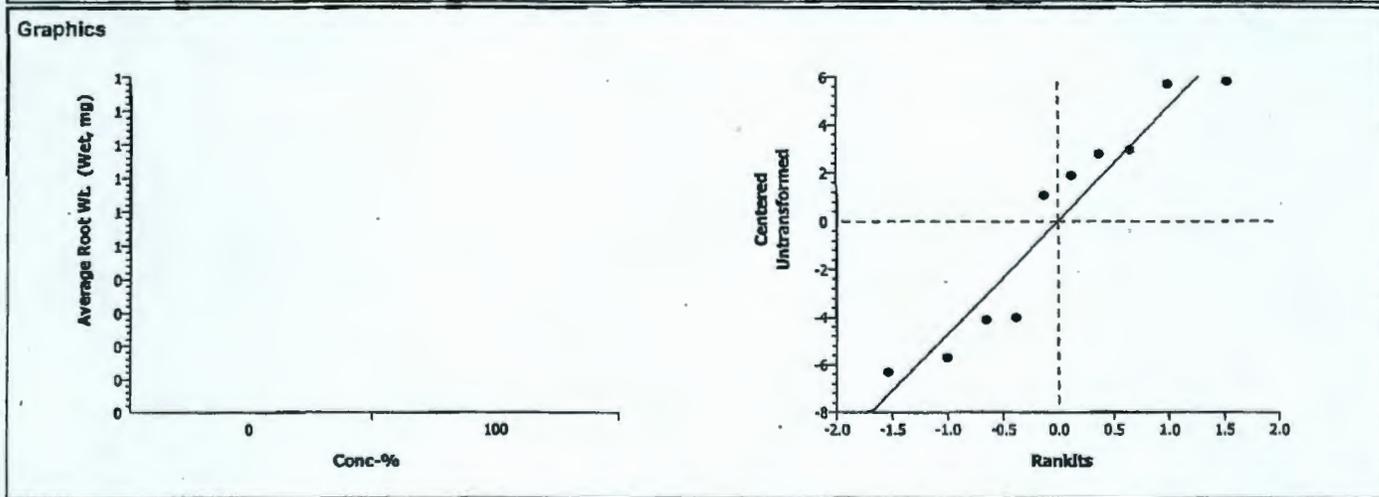
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	30.89%

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				



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 3:20 PM  
 Analysis: 02-5142-2850/B160706psc

**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**

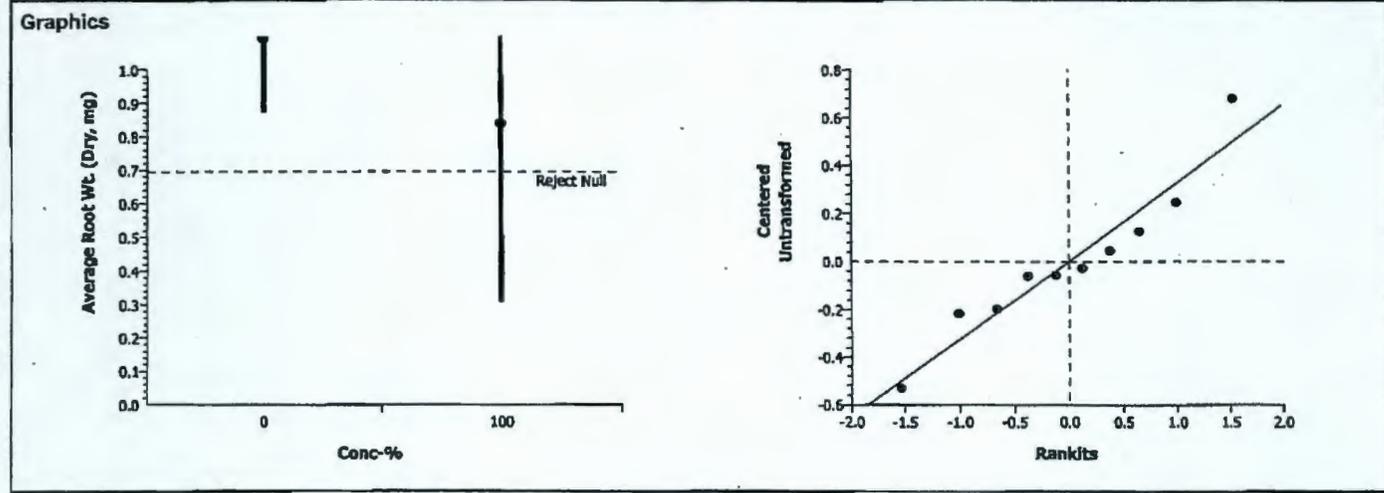
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.16053	0.16053	1	1.41	0.26958	Non-Significant Effect
Error	0.9127272	0.114091	8			
<b>Total</b>	<b>1.07325724</b>	<b>0.2746209</b>	<b>9</b>			

**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**

Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				

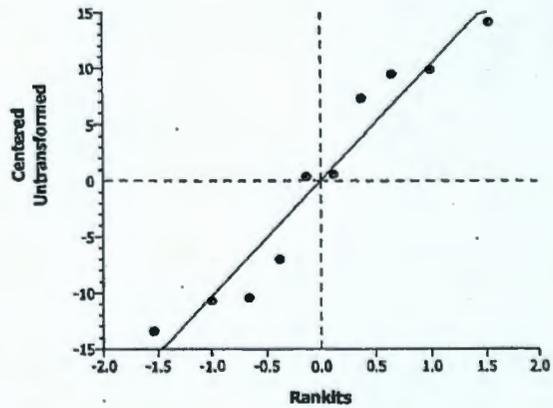
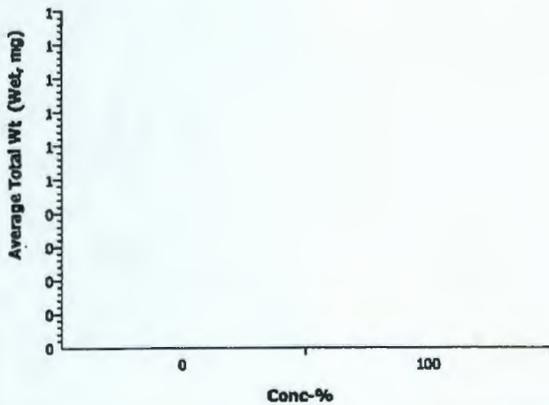


# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 3:20 PM  
 Analysis: 11-5006-0384/B160706psc

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

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 3:20 PM  
 Analysis: 06-4658-3438/B160706psc

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

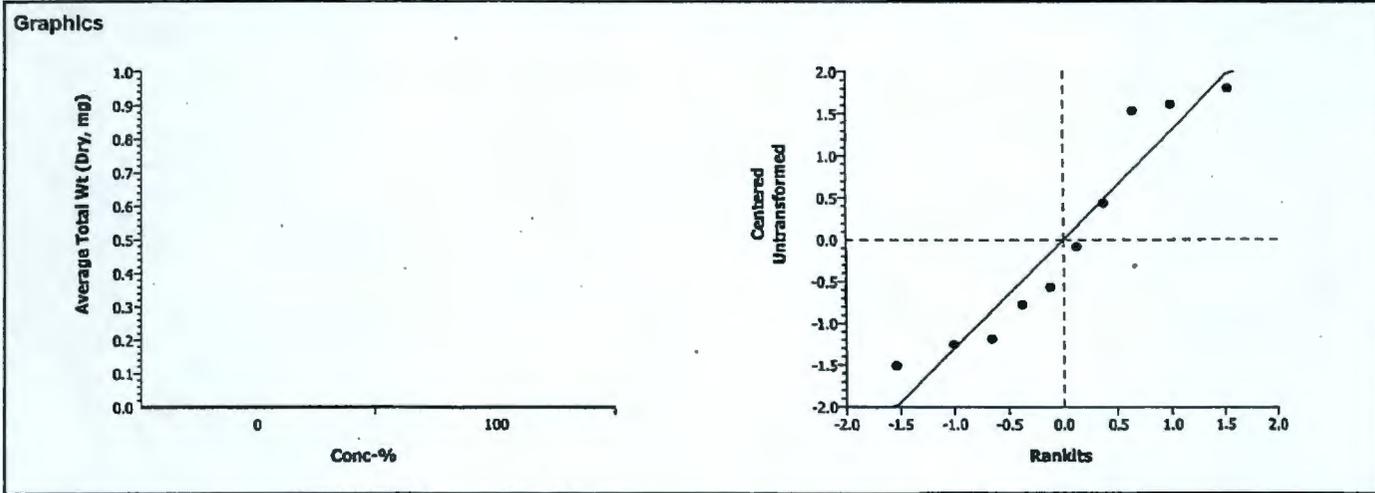
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.88%

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				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2008

Initials: Day 0 PT Day 12 NJ Day 14 NJ Day 16 NJ Day 18 GP Day 21 NJ Day 23 PT Day 25 NJ Day 28 NJ

Bioassay Lab ID: BG 1607-07 Sample No: J11547

CONC.	REPLICATE	# seeds germinated								pH	
		Emergence								INITIAL (@ planting)	FINAL (@ 14 days Post-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 (21 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)		
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: 5 Gn Med shoots  
 Replicate B: 1 Lg Gn, 3 Med Gn, 1 Sm Gn Remove: 2 Sm Gn  
 Replicate C: 3 Med Gn, 2 sm Gn  
 Replicate D: 3 Med Gn, 1 sm Gn  
 Replicate E: 1 Lg Gn, 2 med Gn, 2 sm Gn Remove: 3 Sm Gn

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 4 Lg Gn, 1 sm Gn  
 Replicate B: 1 Lg Gn, 3 med Gn, 1 sm Gn  
 Replicate C: 1 Lg Gn, 2 med Gn, 2 sm Gn  
 Replicate D: 1 Lg Gn, 2 med Gn, 1 sm Gn  
 Replicate E: 1 Lg Gn, 3 med Gn, 1 sm Gn

Measure Shoot Height:

	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	
Replicate E	61 mm	26 mm	41 mm	95 mm	42 mm

Measure Shoot Weight:

	Tin Tare Wt (mg)	Wet Wt (mg)	Dry Wt (mg)
Replicate A	1286.41	1577.0	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:

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	71 mm	75 mm	95 mm	47 mm	75 mm
Replicate B	64 mm	53 mm	25 mm	82 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	
Replicate E	24 mm	80 mm	32 mm	55 mm	56 mm

Measure Root Weight:

	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	1373.7	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

Report Date:

19 Jul-06 2:24 PM

## CETIS Test Summary

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

% 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.

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 2:24 PM  
 Analysis: 17-0180-1532/B160707psc

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

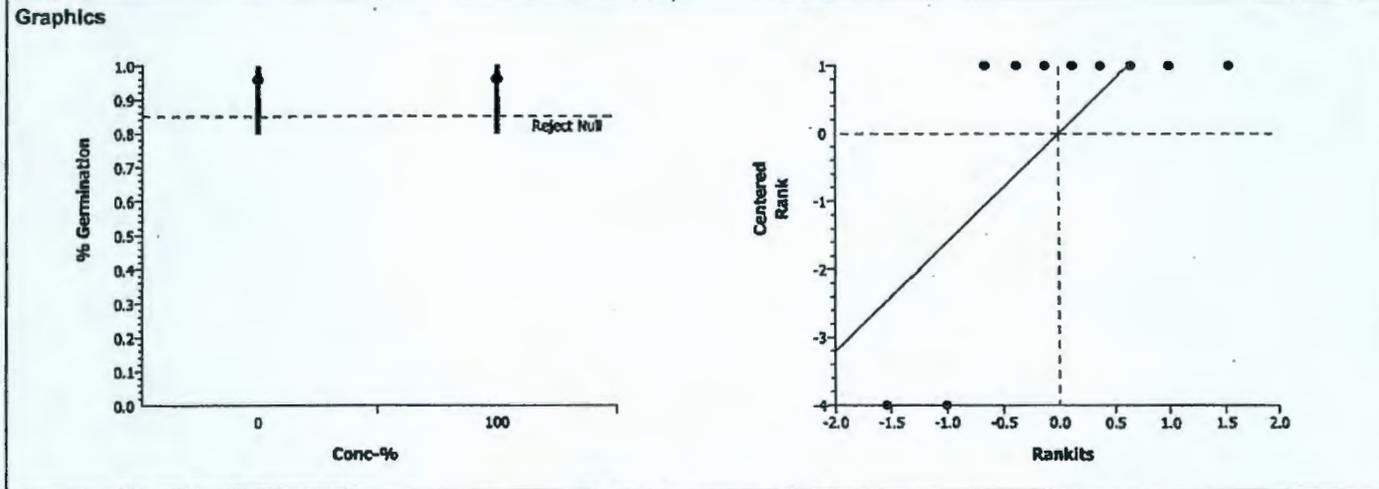
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	11.51%

Group Comparisons							
Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedl		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



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 2:24 PM  
 Analysis: 17-2546-1336/B160707psc

Plant Bioassay - Chronic					CH2M Hill
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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

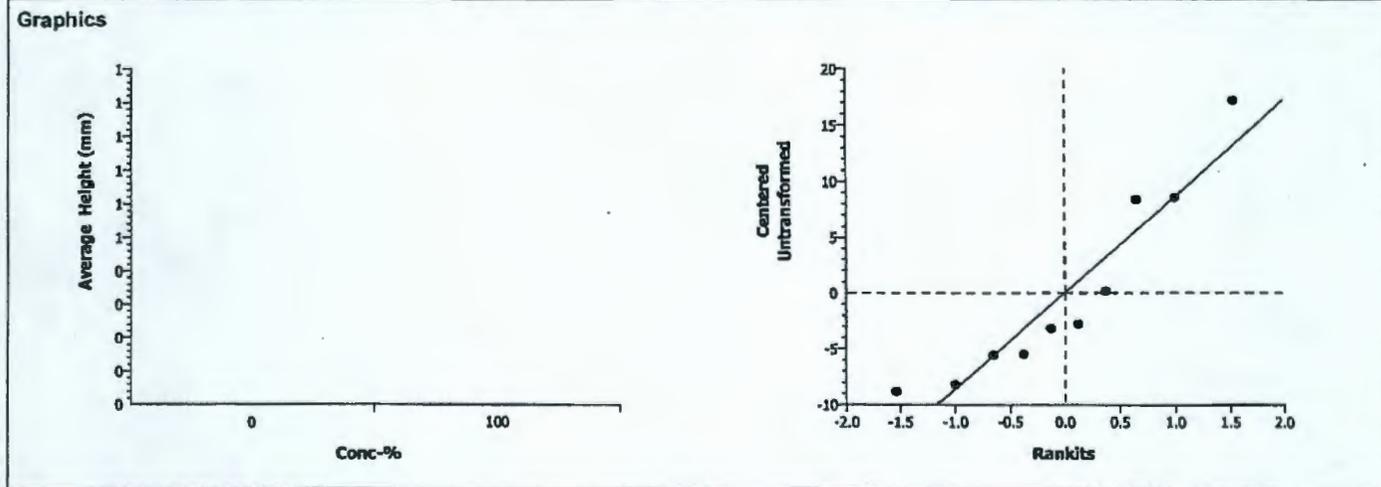
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	13.77%

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				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 2:24 PM  
 Analysis: 12-6594-2815/B160707psc

Plant Bioassay - Chronic					CH2M Hill
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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

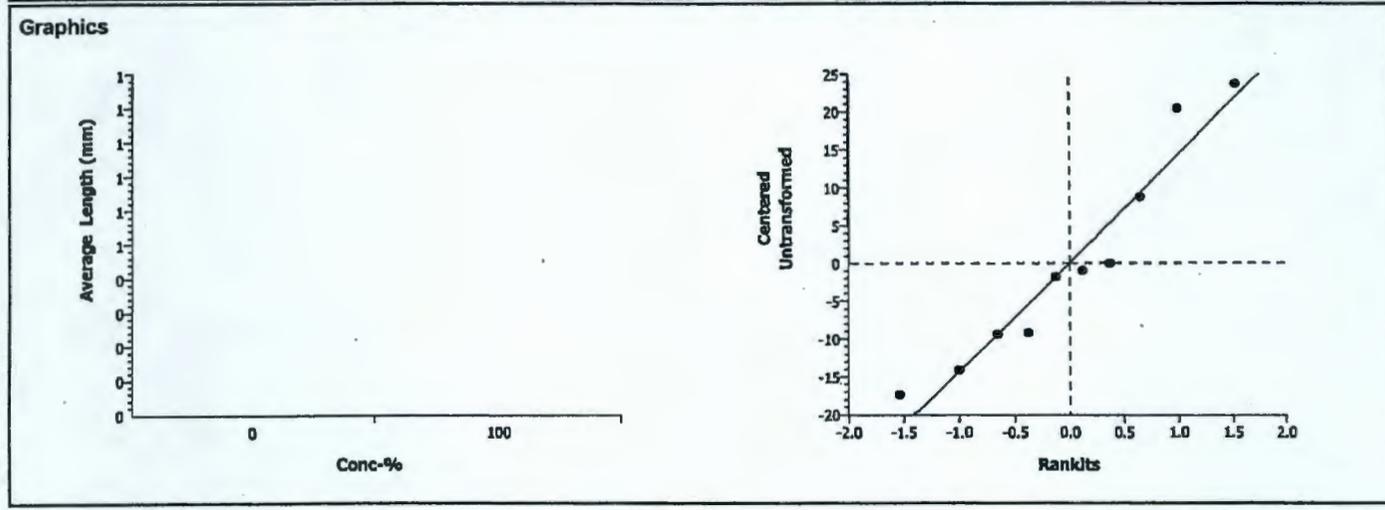
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	16.81%

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

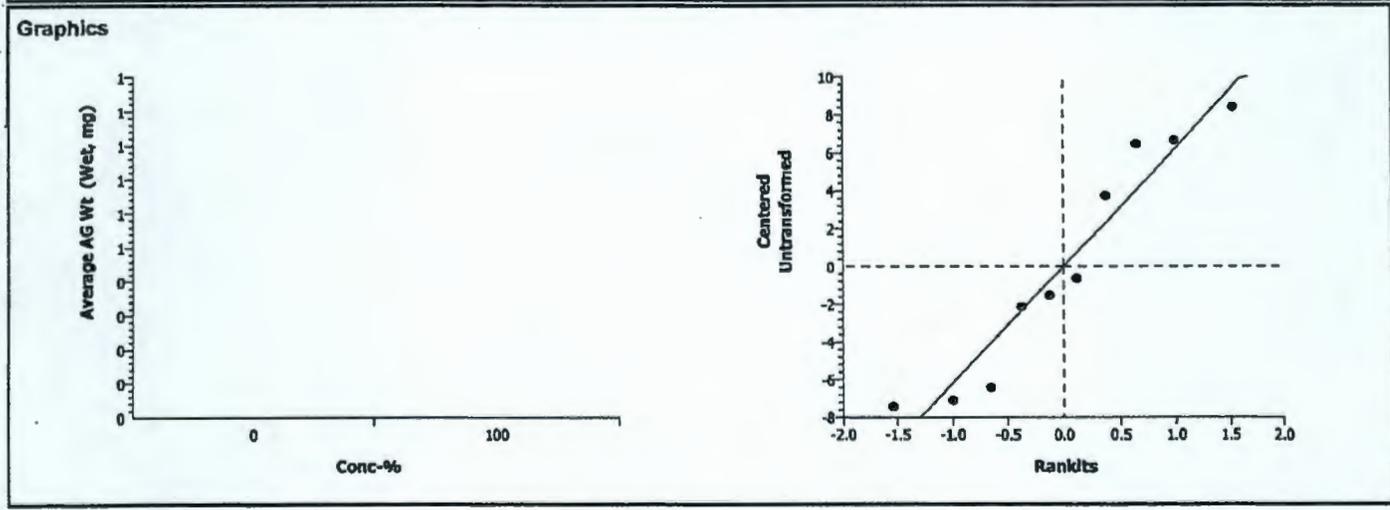
Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	102.96	85.6	126.6	16.880				
100		5	51.2	41.8	71.6	12.17				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 2:24 PM  
 Analysis: 09-5999-1657/B160707psc

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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 2:24 PM  
 Analysis: 01-3107-1189/B160707psc

Plant Bioassay - Chronic					CH2M Hill
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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

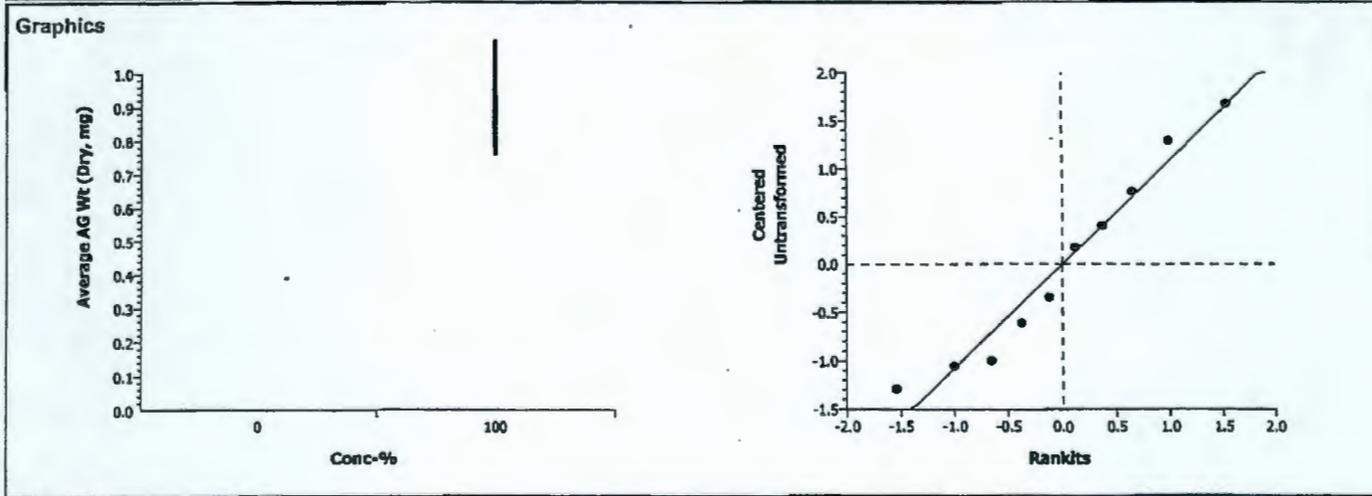
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.13%

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				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 2:24 PM  
 Analysis: 05-9453-0547/B160707psc

Plant Bioassay - Chronic					CH2M Hill
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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

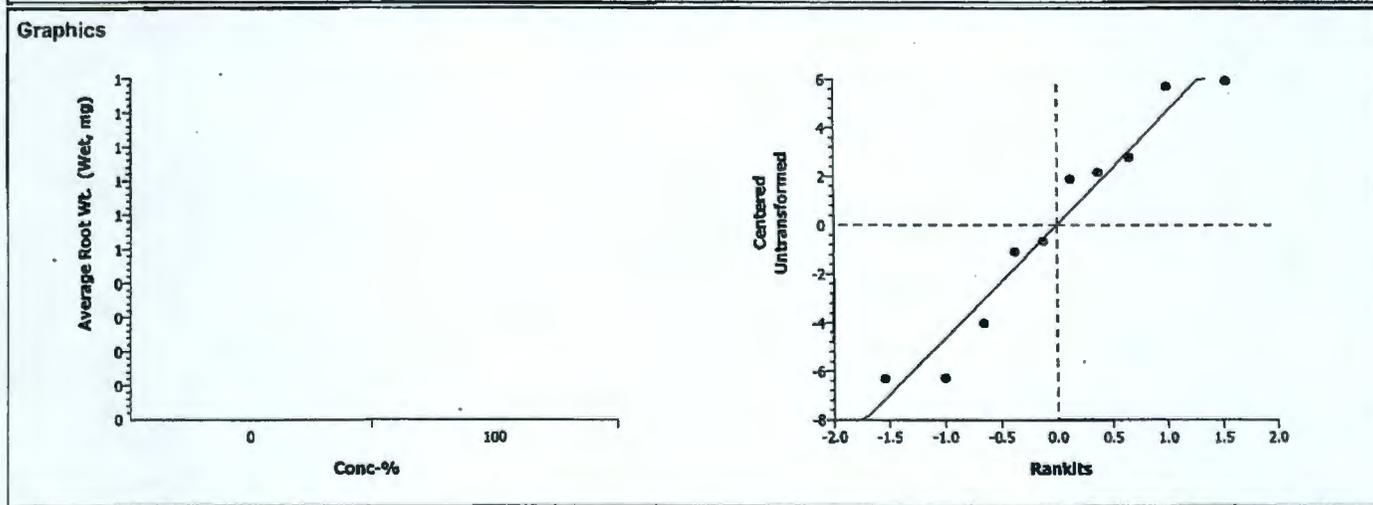
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.92%

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				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
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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

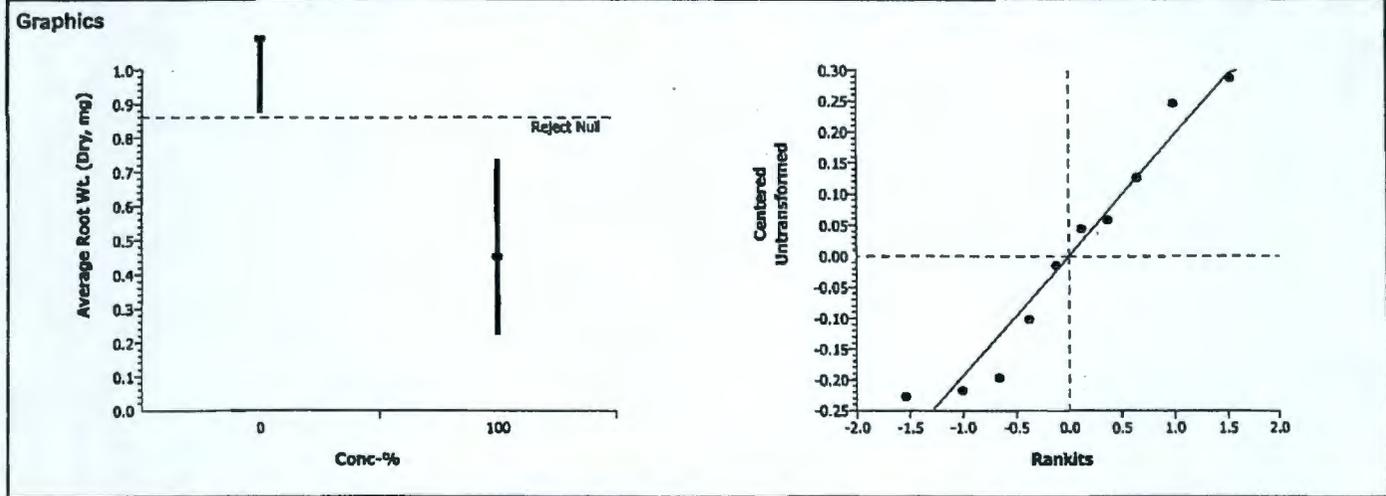
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	21.28%

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				

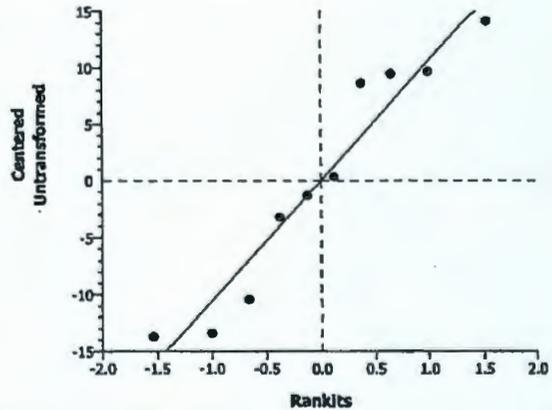
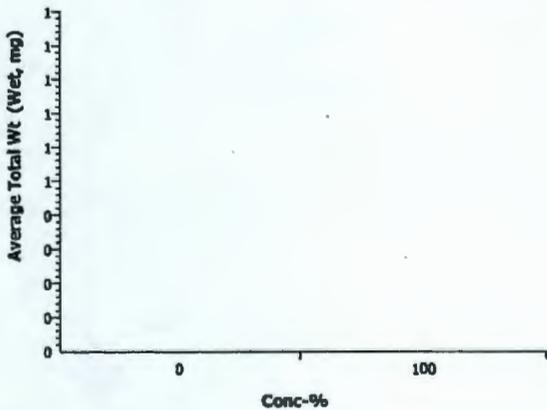


# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 2:24 PM  
 Analysis: 16-4933-2978/B160707psc

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											
Conc-%		Control Type	Count	Original Data				Transformed Data			
				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

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 2:24 PM  
 Analysis: 05-3103-1245/B160707psc

Plant Bioassay - Chronic	CH2M Hill
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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

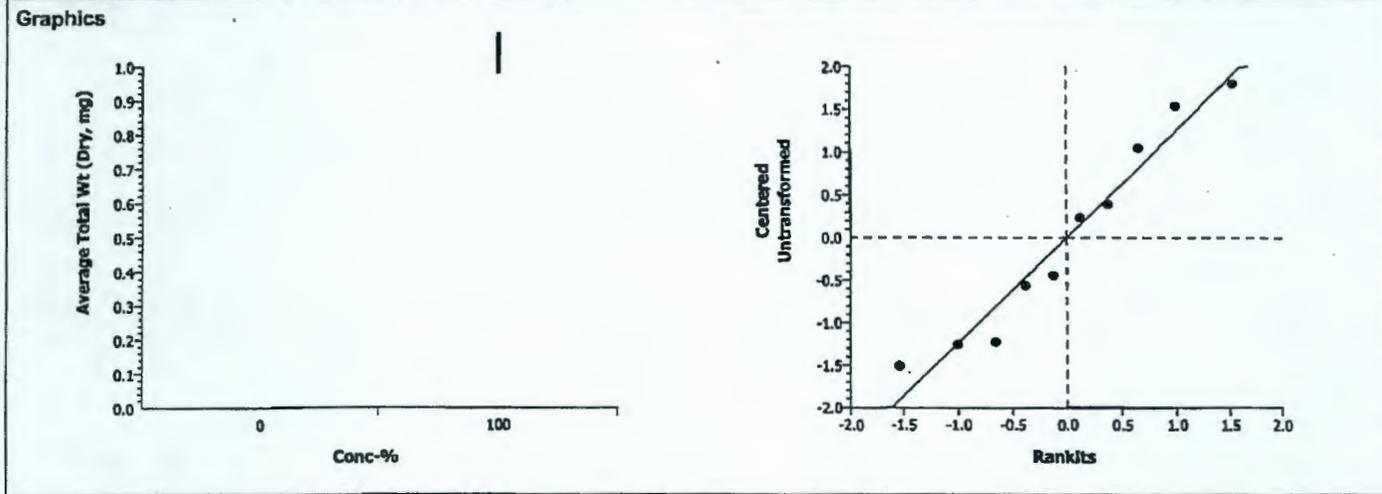
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	27.05%

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				



Day 0 TP Day 12 NJ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 TP Day 25 \_\_\_\_\_ Day 28 TP

Bioassay Lab ID: BG 1607-08 Sample No: JK16

CONC.	REPLICATE	# seeds germinated							pH		
		Emergence							INITIAL (@ planting)	FINAL (@ 14 days Post-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 (21 days after planting)			14-DAYS POST-EMERGENCE (28 days after planting)
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	5		6	5	5		

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

Replicate A: 2 lg G, 2 sm M G  
 Replicate B: 2 lg G, 2 sm G  
 Replicate C: 1 med G, 3 sm G  
 Replicate D: 2 med G, 1 sm G  
 Replicate E: 5 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: 1 lg G, 1 lg G w/ 1 B tipped shoot, 1 sm G, 1 sm B  
 Replicate B: 2 lg G, 1 med G, 1 sm G  
 Replicate C: 1 lg G, 2 med G, 1 sm G  
 Replicate D: 2 lg G, 1 med G  
 Replicate E: 1 lg G, 4 med 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 WL (mg)	Wet WL (mg)	Dry WL (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	77 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 WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1289.18	1322.5	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	1299.56

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

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 2:26 PM  
 Analysis: 01-9733-3651/B160708psc

**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**

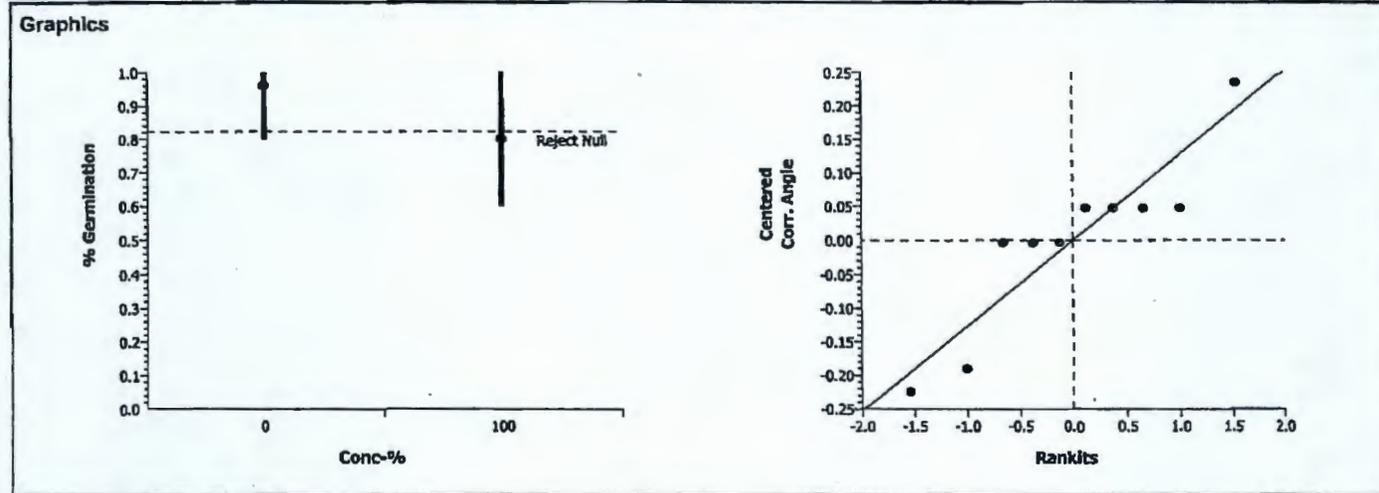
Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0875112	0.087511	1	4.64	0.06338	Non-Significant Effect
Error	0.1508886	0.018861	8			
Total	0.23839983	0.1063723	9			

**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**

Conc-%	Control Type	Count	Original Data				Transformed Data			
			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



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 2:26 PM  
 Analysis: 00-9315-6645/B160708psc

Plant Bioassay - Chronic						CH2M Hill
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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

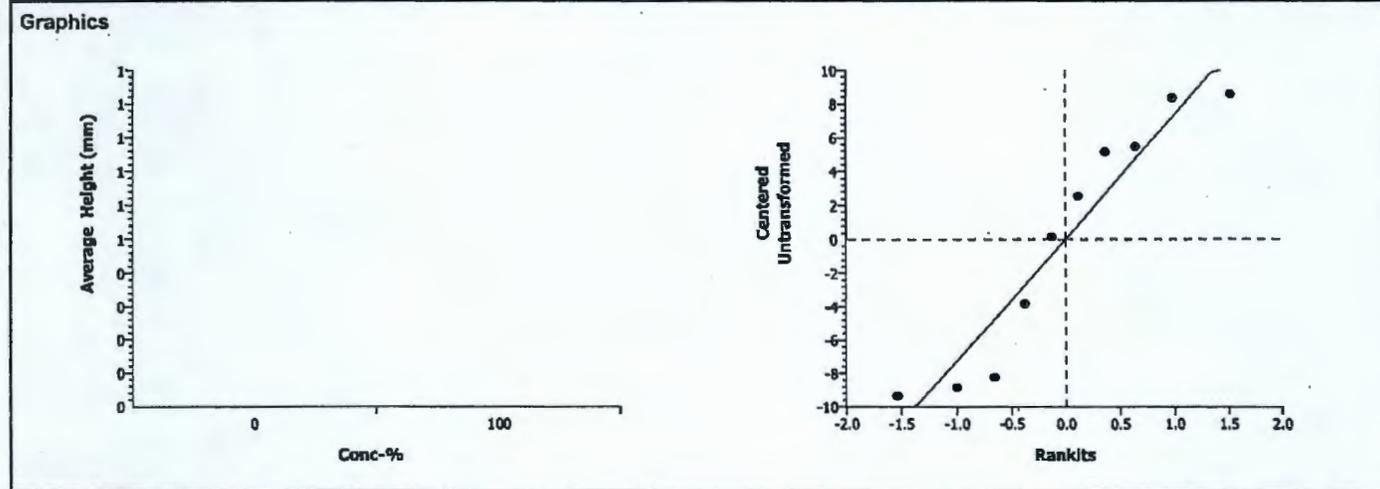
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	11.38%

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				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 2:26 PM  
 Analysis: 06-5083-3477/B160708psc

Plant Bioassay - Chronic						CH2M Hill
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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

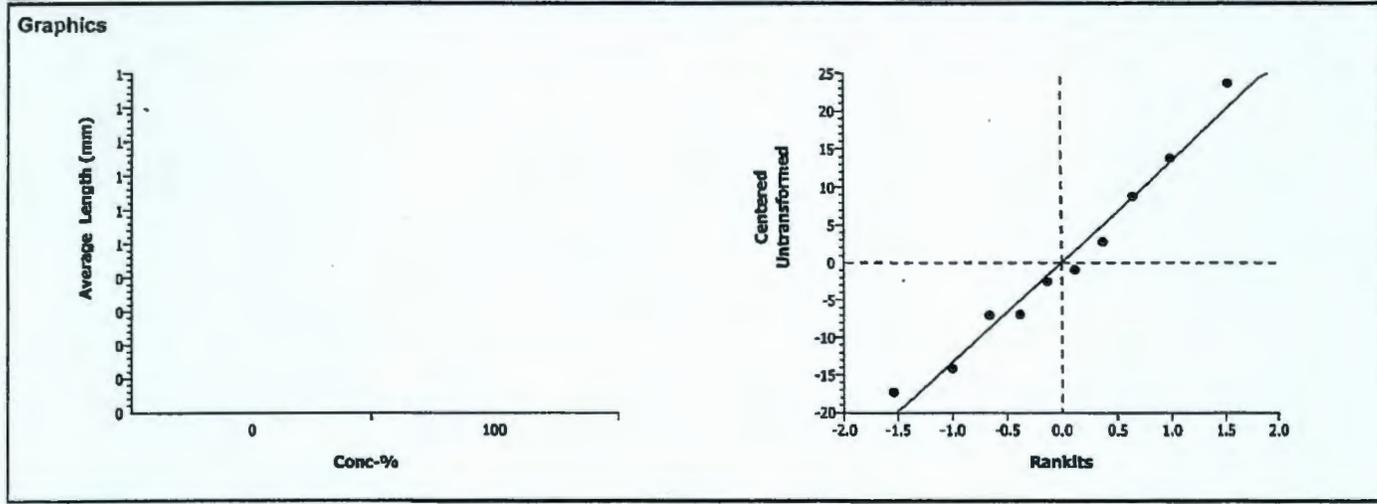
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	15.33%

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				

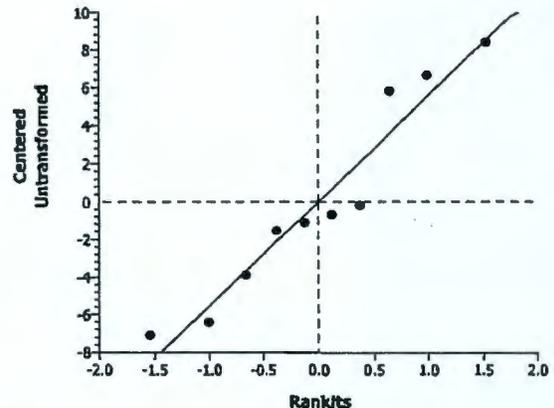
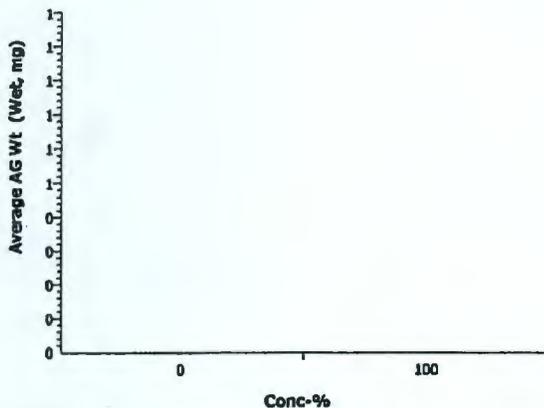


# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 2:26 PM  
 Analysis: 07-8432-6413/B160708psc

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										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			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

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 2:26 PM  
 Analysis: 11-9793-2178/B160708psc

Plant Bioassay - Chronic	CH2M Hill
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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

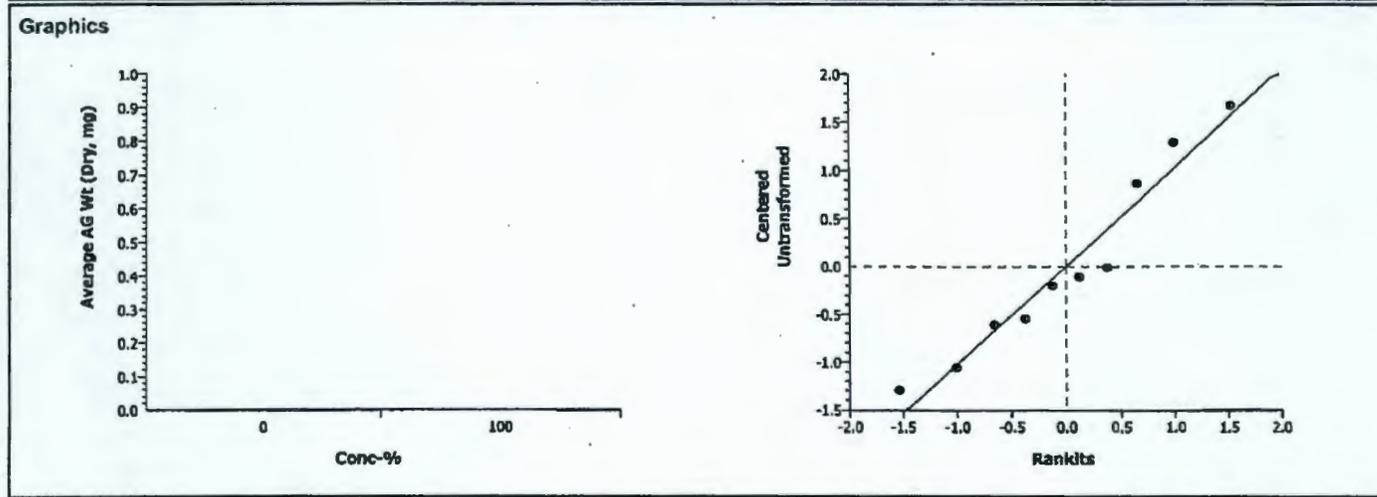
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	27.89%

Group Comparisons						
Control	vs	Conc-%	Statistic	Critical	P-Value	MSD
Artificial Soil/Sedi		100	3.20796	1.85955	0.0062	1.22899
			Decision(0.05) 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				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 2:26 PM  
 Analysis: 07-8258-1670/B160708psc

Plant Bioassay - Chronic	CH2M Hill
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Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Average Root WL (Wet, mg)	Comparison	04-0744-1803	04-0744-1803	19 Jul-06 2:26 PM	CETISv1.1.2

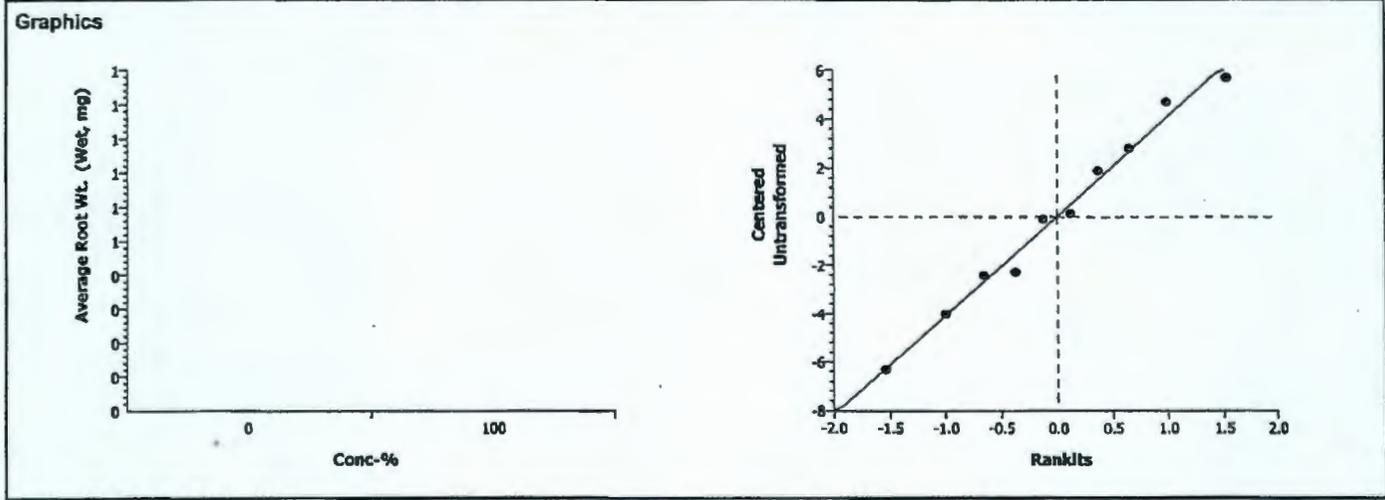
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	25.65%

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

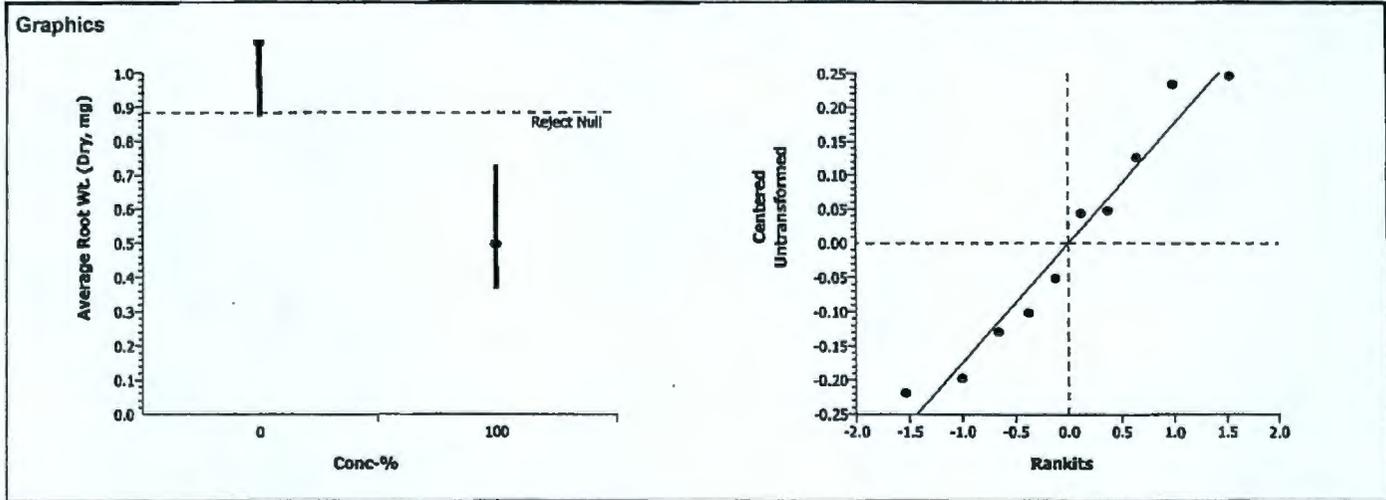
Data Summary		Original Data					Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	18.678	12.355	24.360	4.9922				
100		5	9.4507	7.0325	14.143	2.877				



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 2:26 PM  
 Analysis: 08-8106-9018/B160708psc

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										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 2:26 PM  
 Analysis: 13-6298-8746/B160708psc

Plant Bioassay - Chronic					CH2M Hill
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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

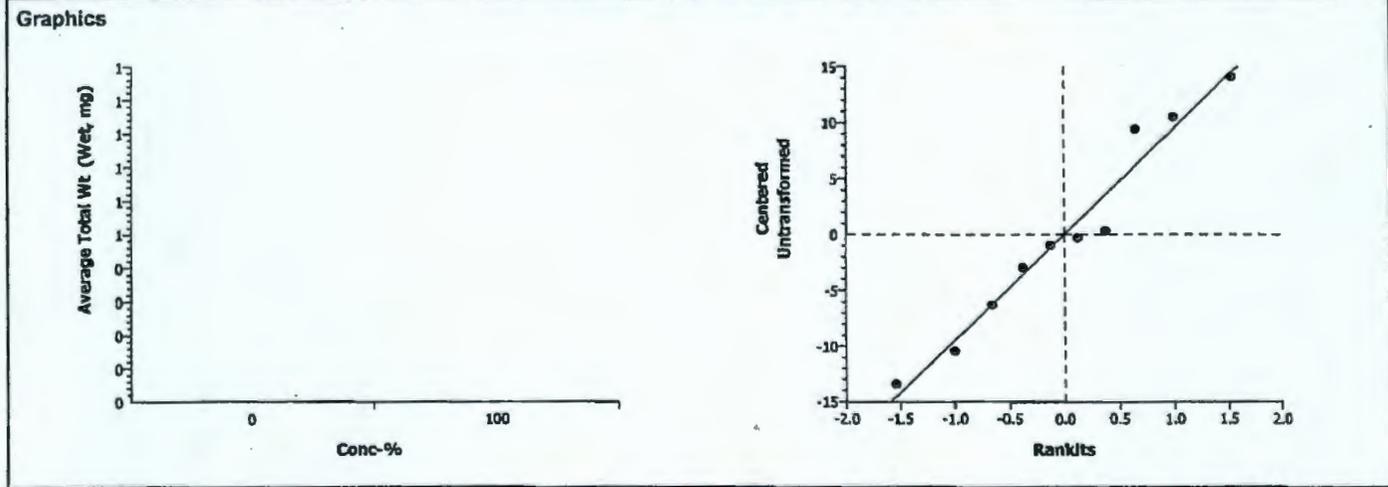
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	26.20%

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				

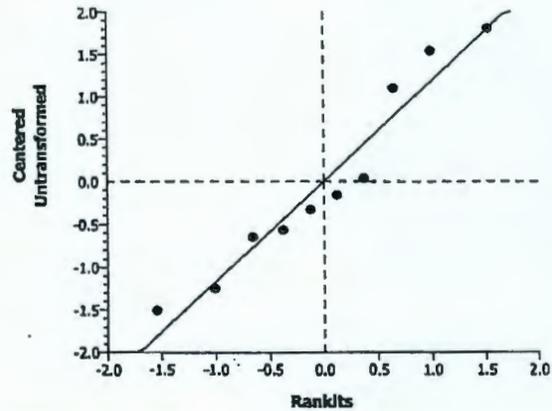
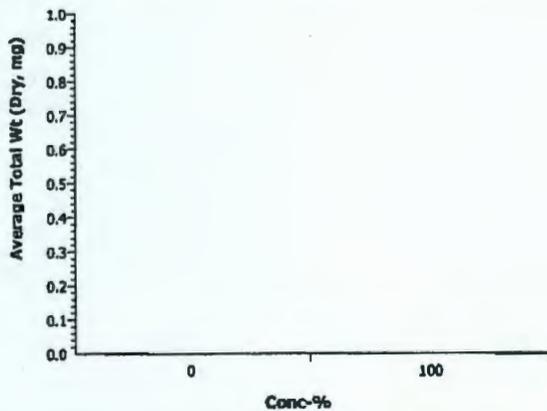


# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 2:26 PM  
 Analysis: 10-9491-9664/B160708psc

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  
7-8-06

Inkplate: Day 0 PT Day 12 NJ Day 14 NJ Day 16 NJ Day 18 PT Day 21 NJ Day 23 PT Day NJ Day 25 B

Bioassay Lab ID: BG 1607-09		Sample No: 511K7R								pH	
CONC.	REPLICATE	# seeds germinated							INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)	
		Emergence					7-DAYS POST-EMERGENCE (21 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)			
		12 days after planting	14 days after planting	18 days after planting	19 days after planting	21 days after planting	23 days after planting				
Control	A	2	3	3	4		4	4	4	7.6	6.4
	B	4	4	6	6		5	6-7.5	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	
Replicate B	66 mm	73 mm	52 mm	49 mm	84 mm
Replicate C	86 mm	66 mm	56 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 WL (mg)	Wet WL (mg)	Dry WL (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	
Replicate B	39 mm	110 mm	115 mm	59 mm	81 mm
Replicate C	49 mm	34 mm	49 mm		
Replicate D	57 mm	41 mm	60 mm	42 mm	9 mm
Replicate E	91 mm	47 mm	39 mm	42 mm	28 mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1283.75	1334.5	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

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 2:32 PM  
 Analysis: 02-6140-8578/B160709psc

Plant Bioassay - Chronic							CH2M Hill
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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

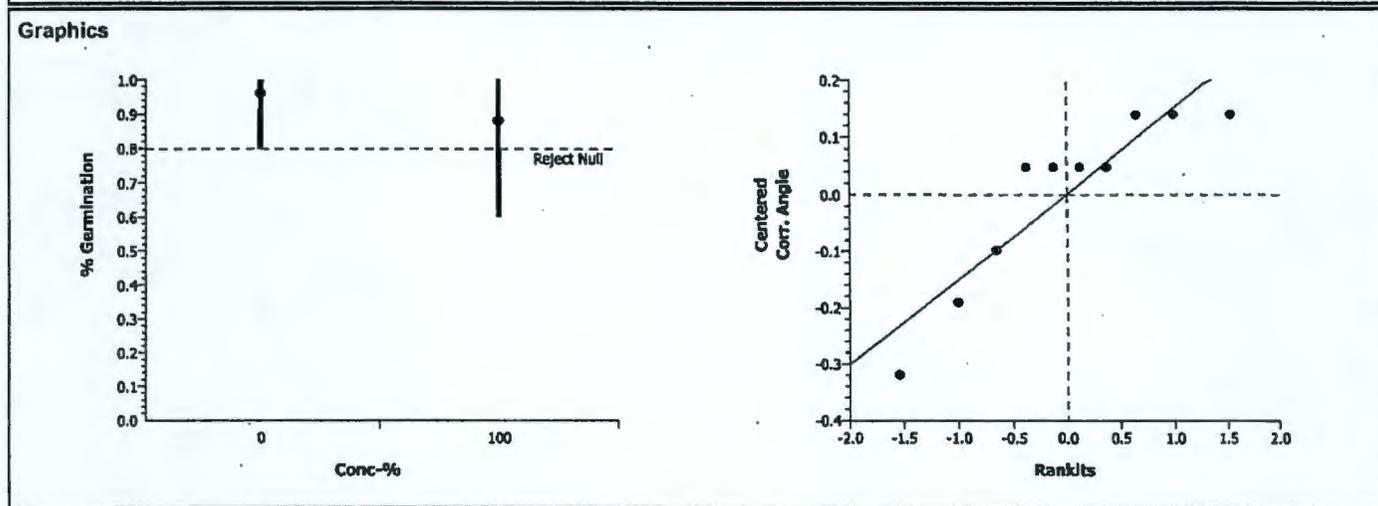
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	CHV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	16.88%

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

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			

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



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 2:32 PM  
 Analysis: 15-0896-4337/B160709psc

Plant Bioassay - Chronic						CH2M Hill
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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

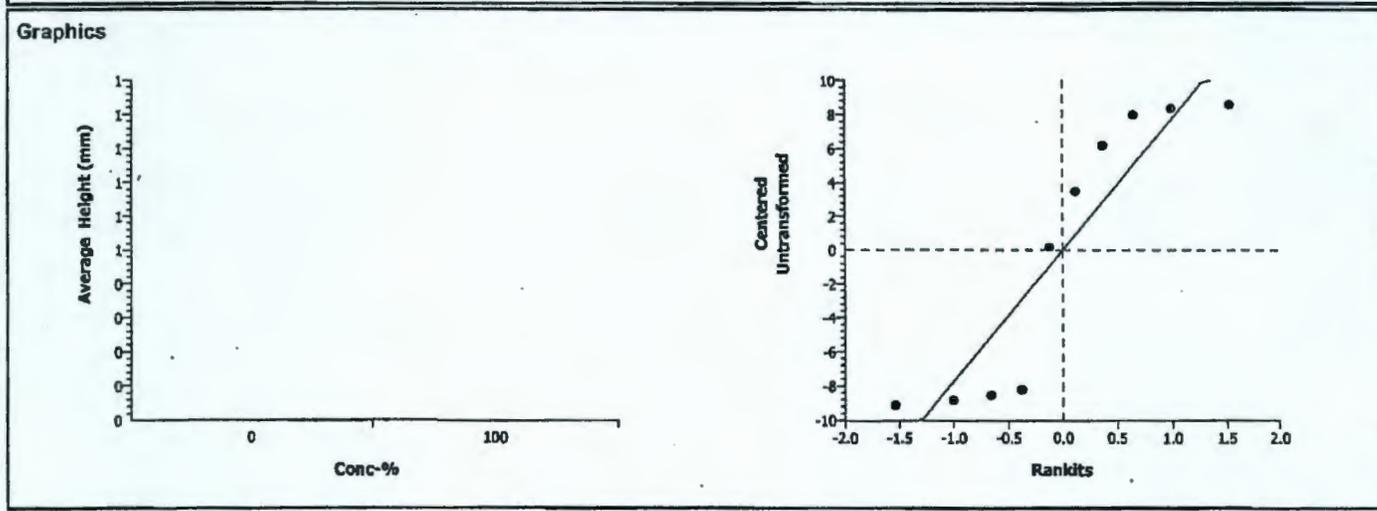
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	12.63%

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	Varlance Ratio F	1.07223	23.15450	0.94774	Equal Variances
Distribution	Shapiro-Wilk W	0.80723		0.01775	Normal Distribution

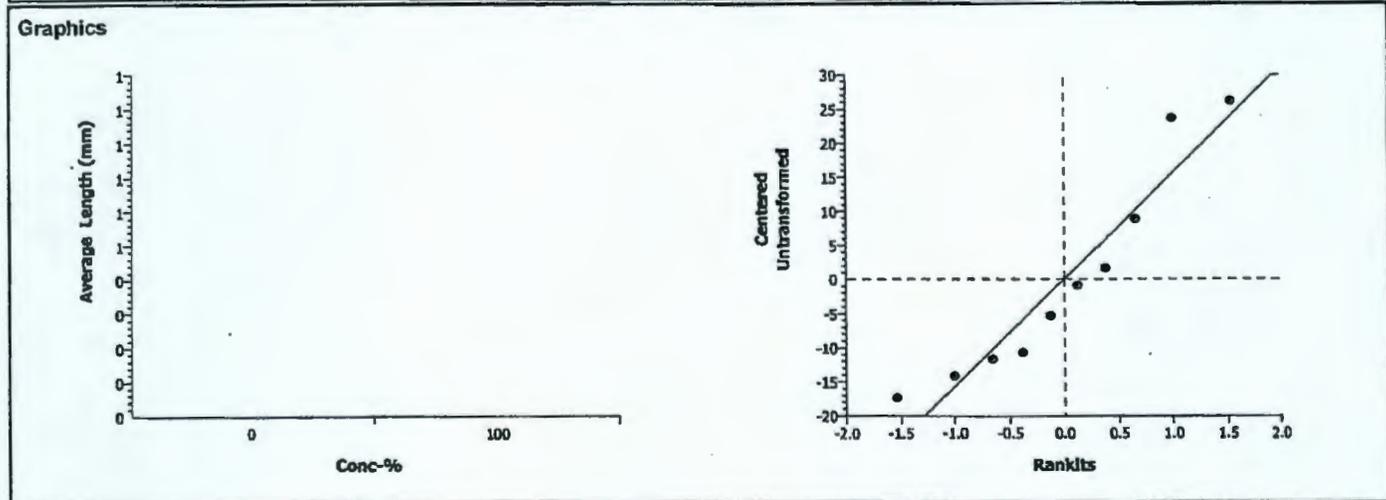
Data Summary			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	77.84	69	86.4	8.5034				
100		5	61.320	52.2	69.3	8.2120				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 2:32 PM  
 Analysis: 06-3461-1993/B160709psc

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										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			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				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 2:32 PM  
 Analysis: 12-8068-1990/B160709psc

Plant Bioassay - Chronic							CH2M Hill
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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

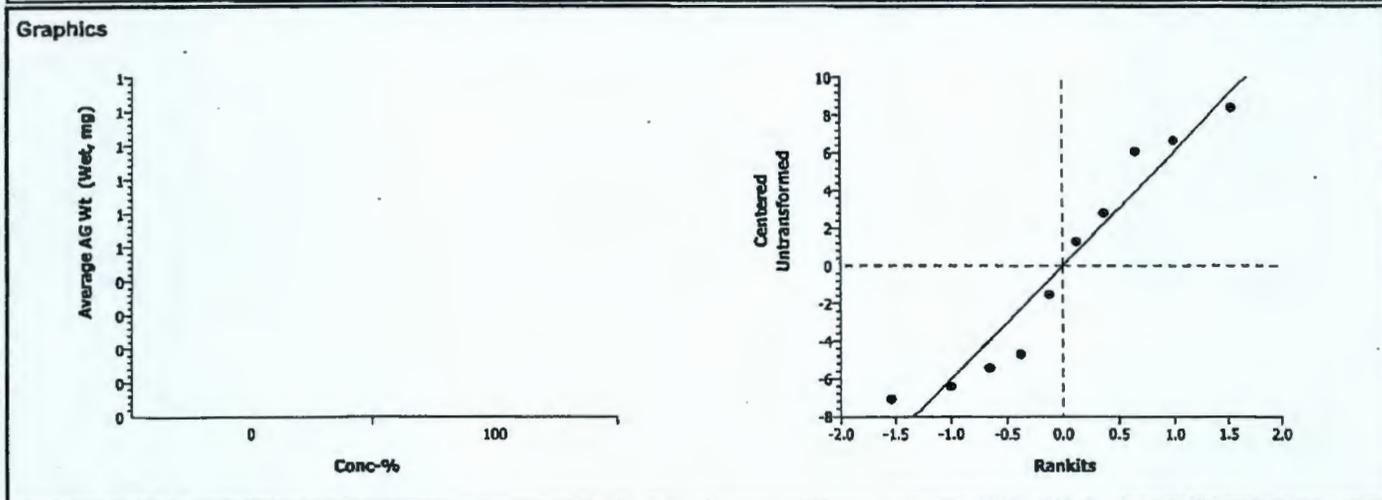
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.87%

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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 2:32 PM  
 Analysis: 08-2542-4686/B160709psc

Plant Bioassay - Chronic						CH2M Hill
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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

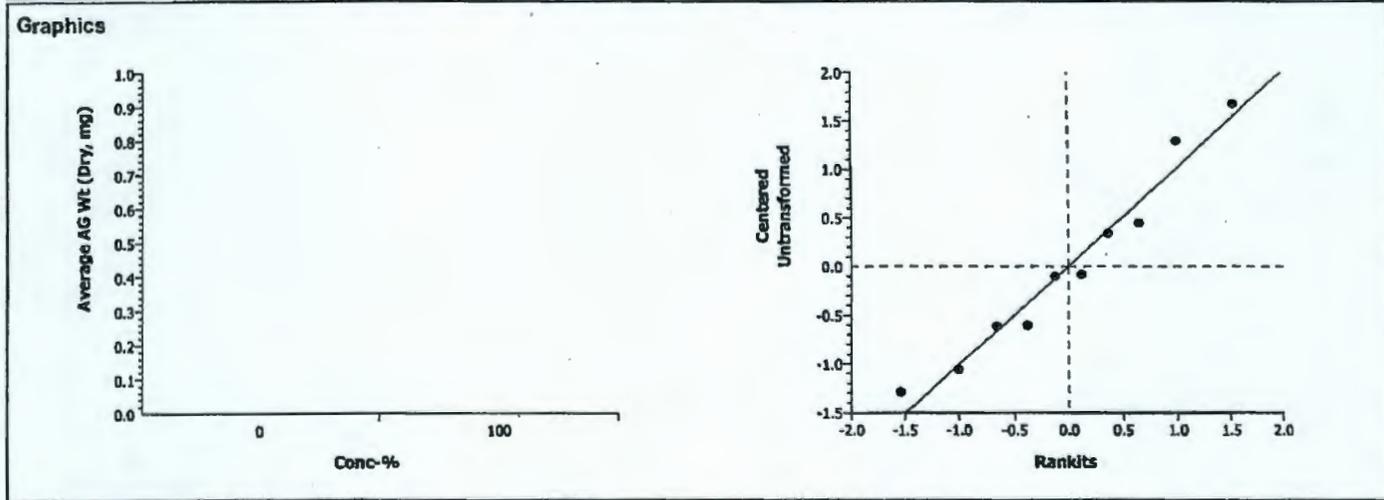
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	27.23%

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				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 2:32 PM  
 Analysis: 12-8558-3864/B160709psc

Plant Bioassay - Chronic						CH2M Hill
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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

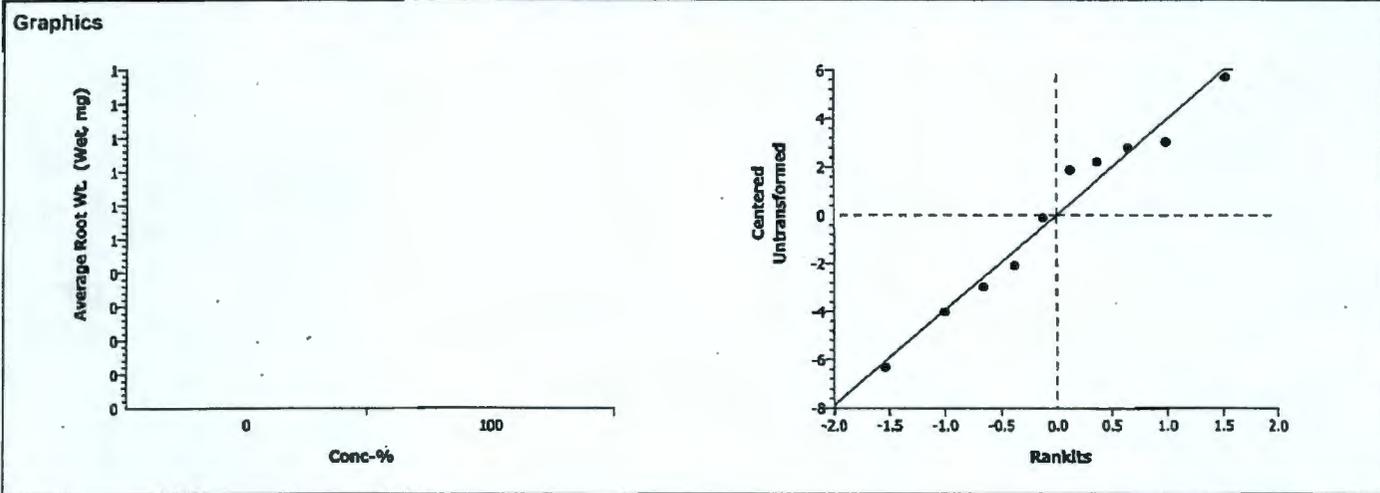
Method	Alt. H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	CHV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	25.08%

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				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M Hill
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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

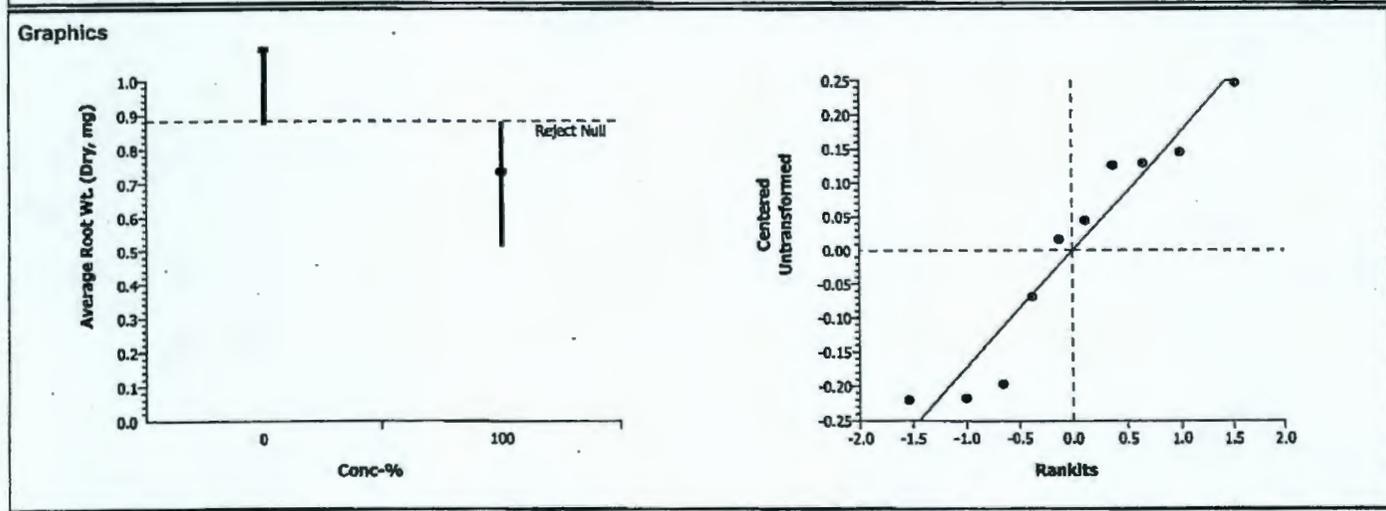
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	19.25%

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	0.20268				
100		5	0.73346	0.51331	0.87800	0.15081				



# 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

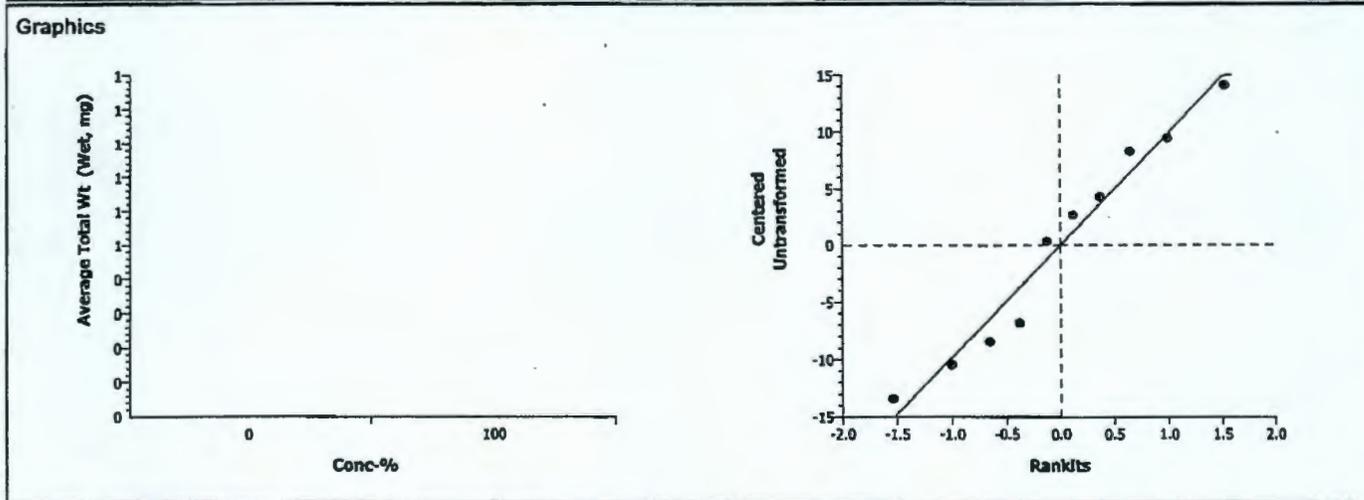
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	27.10%

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	

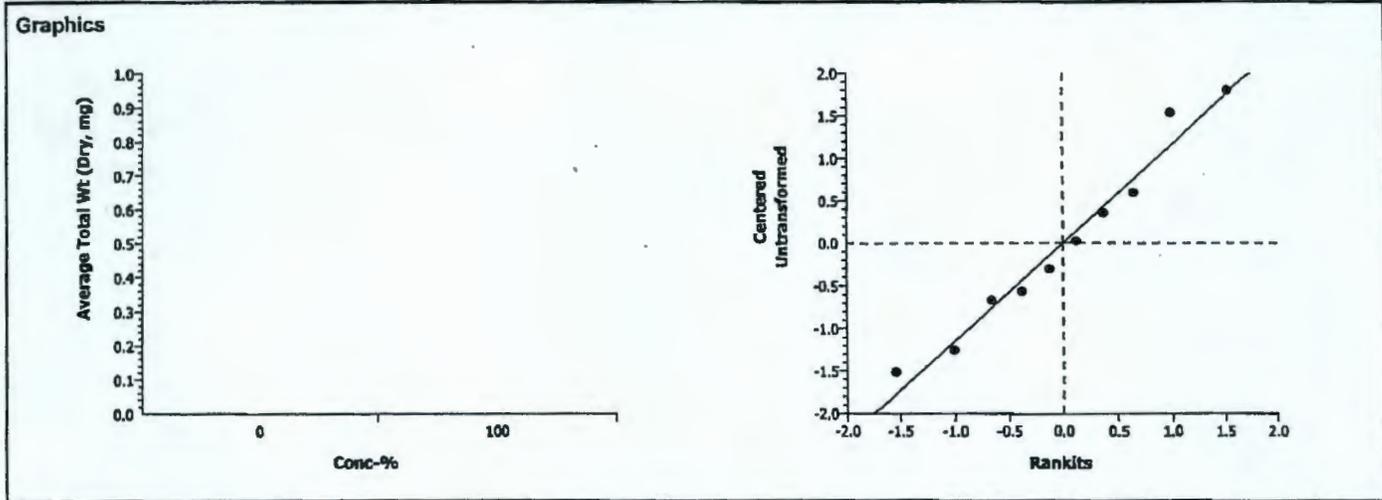
Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	43.060	29.633	57.136	12.004				
100		5	25.77	17.354	34.050	7.2680				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 2:32 PM  
 Analysis: 15-4156-7315/B160709psc

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				



5 DW  
7-8-06

Initials: Day 0 (TP) Day 12 (NJ) Day 14 (NJ) Day 18 (TP) Day 21 (NJ) Day 23 (TP) Day 24 (NJ) Day 25 (NJ)

Bioassay Lab ID: BG 1607-10		Sample No: J11548								pH	
CONC.	REPLICATE	# seeds germinated								INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
		Emergence				7-DAYS POST-EMERGENCE (14 days after planting)					
		12 days after planting	14 days after planting	16 days after planting	18 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (14 days after planting)	14-DAYS POST-EMERGENCE (28 days after planting)		
Control	A	5	6	6	6		5	6→5	5	8.8	9.5
	B	3	4	4	5		5	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: 1 lg G, 3 sm G, 1 sm G Remove: 1 sm G  
 Replicate B: 1 lg G, 2 med G, 1 sm G, 1 sm B  
 Replicate C: 1 lg G, 4 med G Remove: 1 med G, 1 sm G  
 Replicate D: 1 med G  
 Replicate E: 3 lg G, 2 med G Remove: 1 sm G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 lg G, 2 med G, 2 sm G  
 Replicate B: 1 lg G, 3 med G, 1 sm B NT  
 Replicate C: 4 med G, 1 med G w/ 1 B shoot  
 Replicate D: 1 med 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	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 WL (mg)	Wet WL (mg)	Dry WL (mg)
1295.71	1286.89	1359.3	1306.50
	1282.15	1346.2	1292.90
	1286.81	1355.2	1298.55
	1290.47	1298.8	1291.35
	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 WL (mg)	Dry WL (mg)
	1276.04	1327.3	1279.03
	1276.78	1326.2	1279.73
	1286.59	1333.8	1289.35
	1282.60	1287.8	1282.60
	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

Report Date:

19 Jul-06 2:36 PM

## CETIS Test Summary

Test Link:

02-5186-7967/B160710psc

<b>% Germination Summary</b>								
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%
<b>Average Height (mm) Summary</b>								
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%
<b>Average Length (mm) Summary</b>								
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%
<b>Average AG Wt (Wet, mg) Summary</b>								
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%
<b>Average AG Wt (Dry, mg) Summary</b>								
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%
<b>Average Root Wt. (Wet, mg) Summary</b>								
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%
<b>Average Root Wt. (Dry, mg) Summary</b>								
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%
<b>Average Total Wt (Wet, mg) Summary</b>								
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%
<b>Average Total Wt (Dry, mg) Summary</b>								
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%

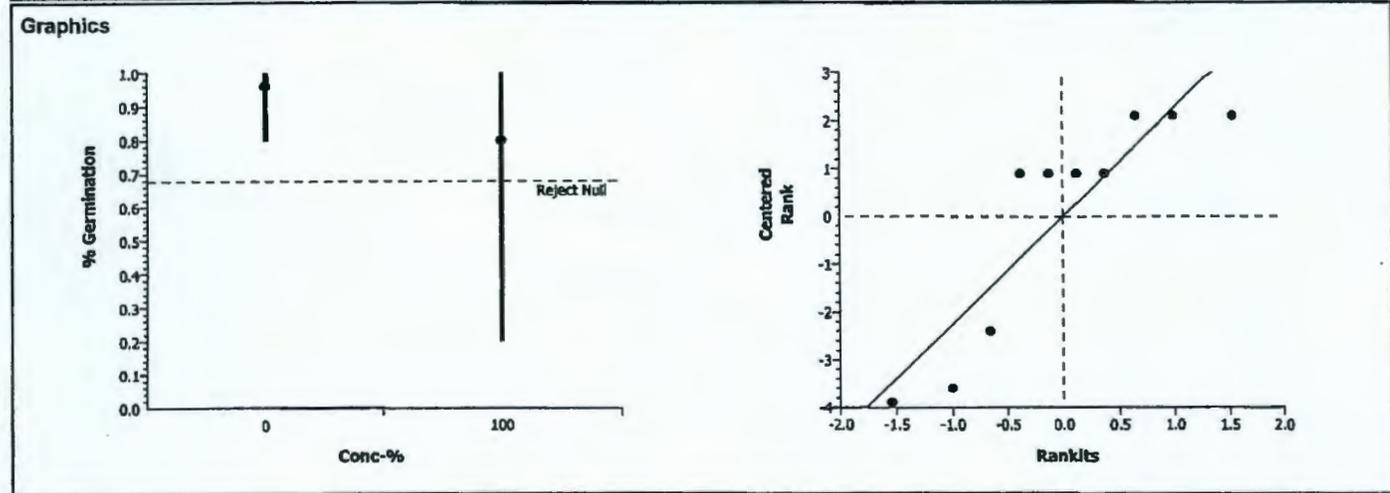
Report Date: 19 Jul-06 2:36 PM  
 Test Link: 02-5186-7967/B160710psc

# CETIS Test Summary

% 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

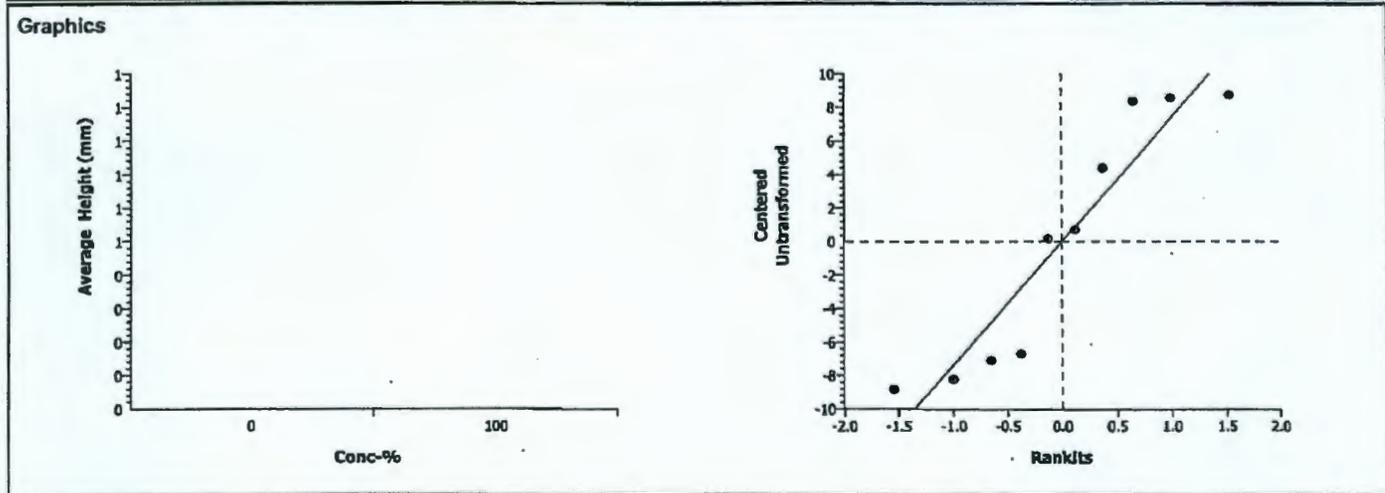
Plant Bioassay - Chronic						CH2M Hill				
Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version					
% Germination	Comparison	02-5186-7967	02-5186-7967	19 Jul-06 2:35 PM	CETISv1.1.2					
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD		
Wilcoxon Rank Sum Two-Sample	C > 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										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			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



# CETIS Analysis Detail

Comparisons: Page 2 of 9  
 Report Date: 19 Jul-06 2:36 PM  
 Analysis: 06-4029-7083/B160710psc

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				



# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-08 2:38 PM  
 Analysis: 06-0907-3552/B160710psc

Plant Bioassay - Chronic						CH2M Hill
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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

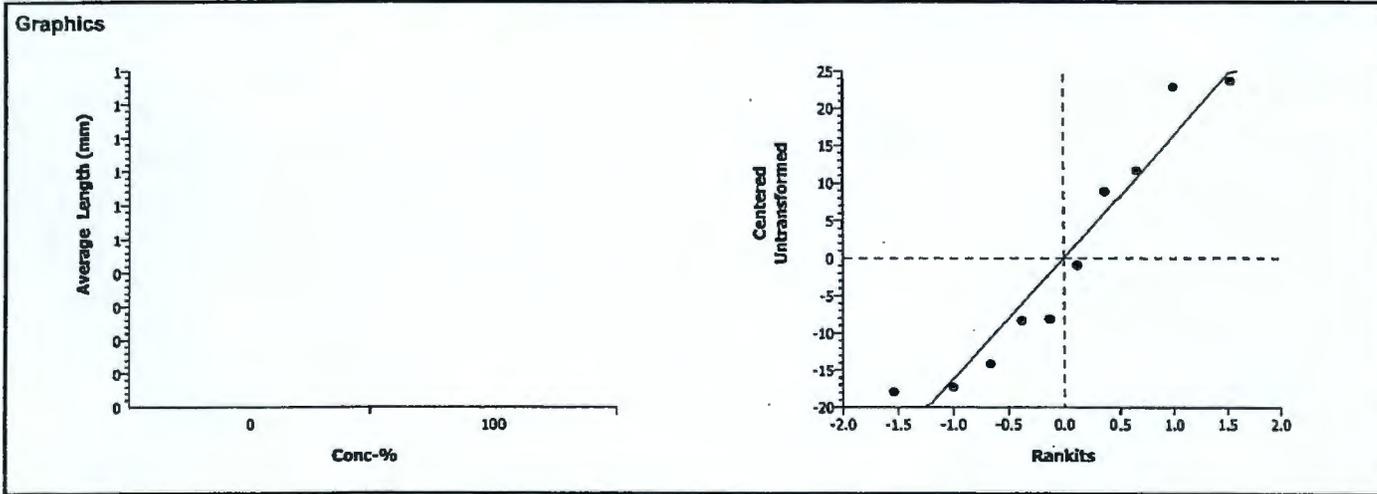
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	19.18%

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				



# CETIS Analysis Detail

Plant Bioassay - Chronic						CH2M HILL
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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

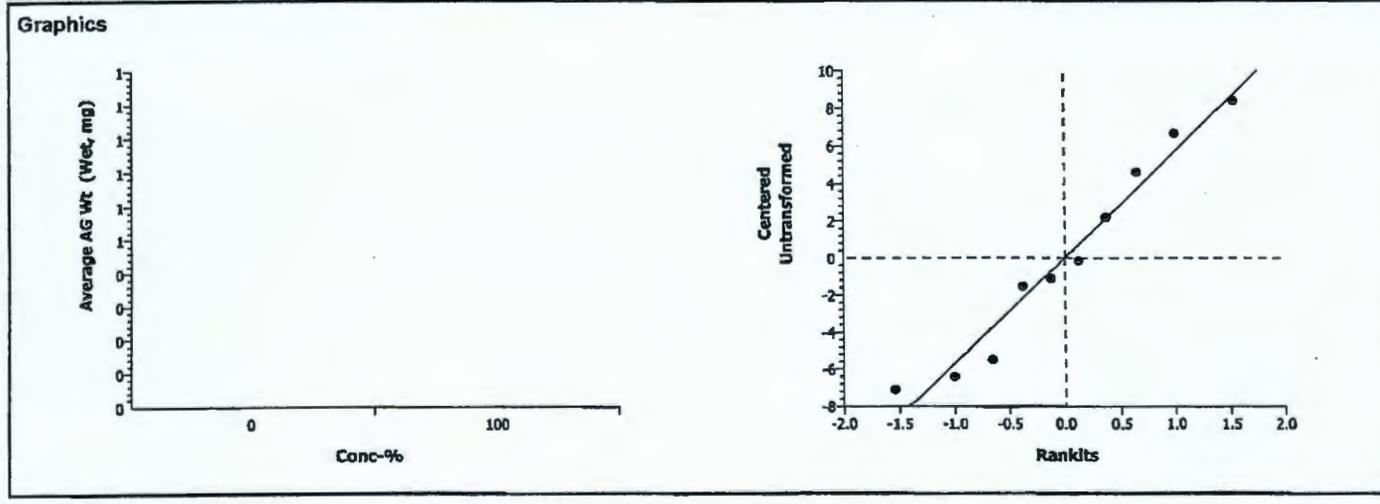
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	27.81%

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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 2:36 PM  
 Analysis: 10-4381-0051/B160710psc

Plant Bioassay - Chronic	CH2M Hill
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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

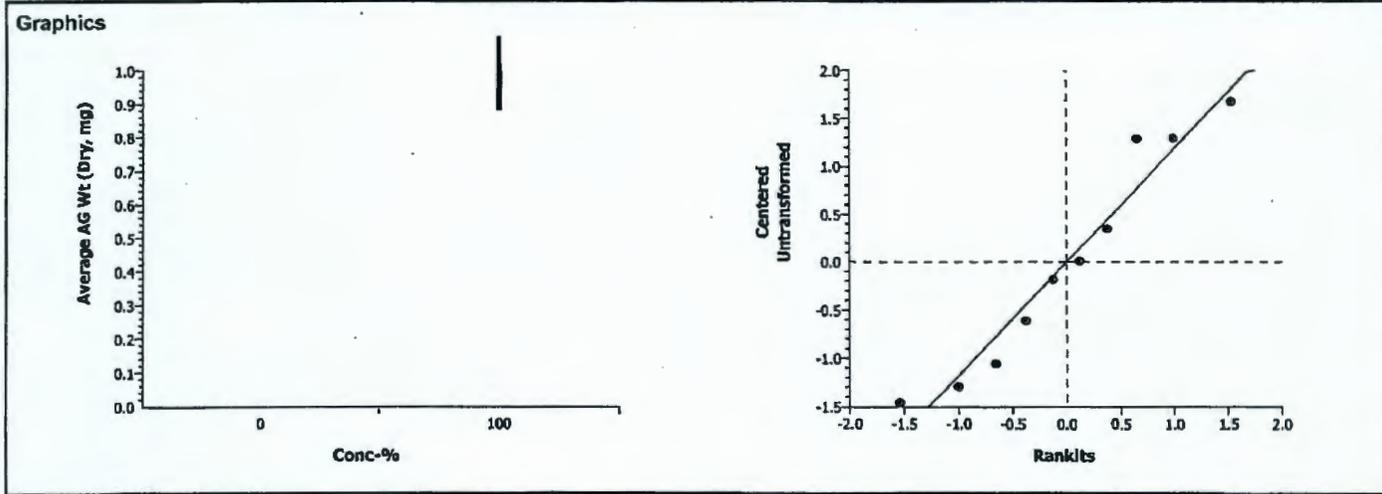
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.10%

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				



# CETIS Analysis Detail

Comparisons: Page 6 of 9  
 Report Date: 19 Jul-06 2:36 PM  
 Analysis: 16-2111-6497/B160710psc

Plant Bioassay - Chronic							CH2M Hill
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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

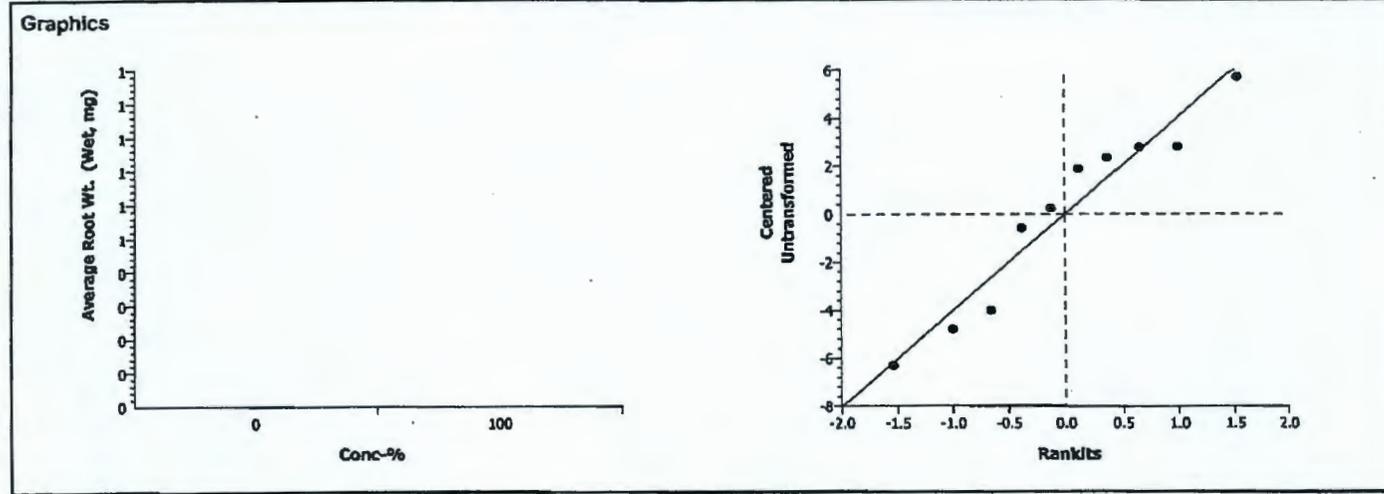
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	26.02%

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				



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 2:36 PM  
 Analysis: 05-8762-7837/B160710psc

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

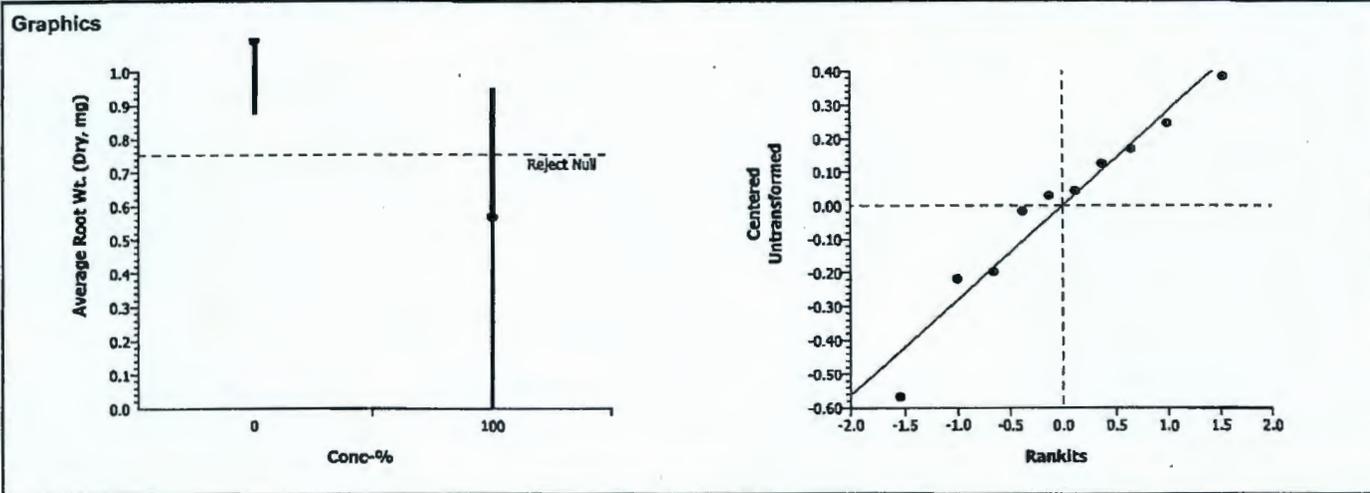
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	31.04%

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				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 2:36 PM  
 Analysis: 00-8470-7796/B160710psc

Plant Bioassay - Chronic						CH2M Hill
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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

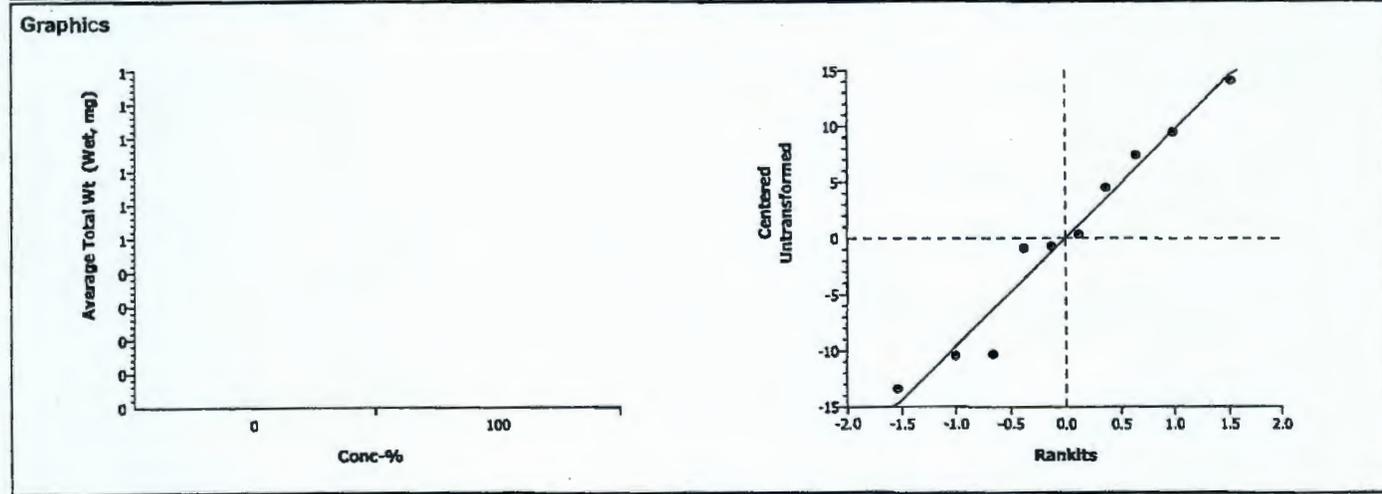
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	26.61%

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				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 2:36 PM  
 Analysis: 12-0327-6502/B160710psc

Plant Bioassay - Chronic						CH2M Hill
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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

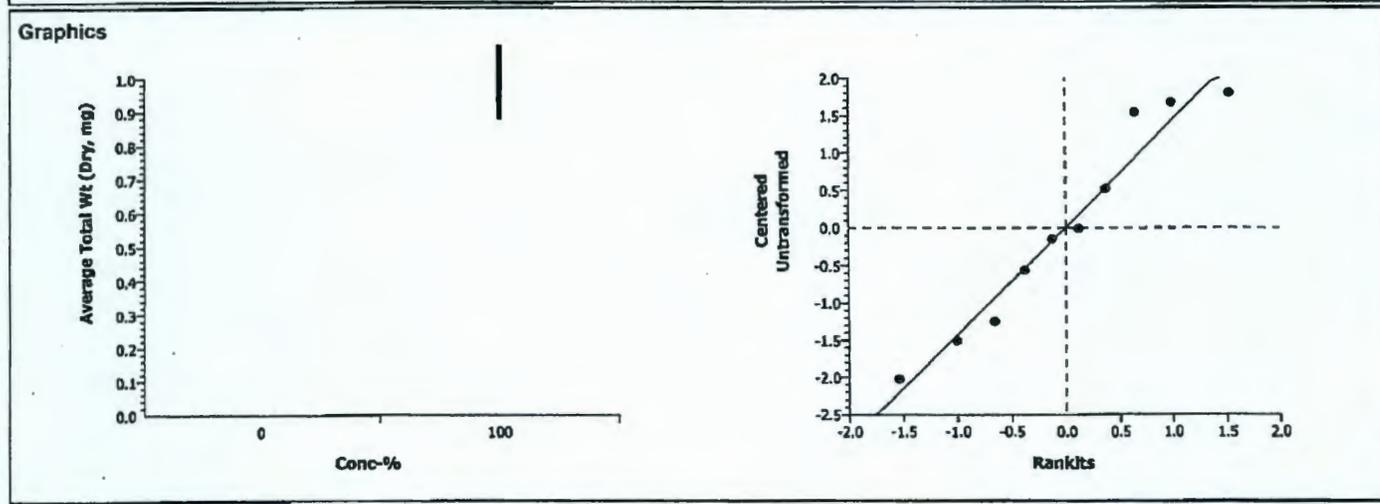
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	31.16%

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	1.35885	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				



BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: June 7, 2008

5 DW.  
7-6-08

Initials:

Day 0 TP Day 12 NT Day 14 NT Day 16 NT Day 19 TP Day 21 NT Day 23 TP Day NT Day 23 30

Bioassay Lab ID: BG 1607-11 Sample No: J115X0

CONC.	REPLICATE	# seeds germinated								pH	
		Emergence								INITIAL (@ planting)	FINAL (@ 14 days Post-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)		
Control	A	6	6	6	7		5	7-75	5	9.0	9.1
	B	3	4	6	6		5	6-75	5		
	C	2	2	2	4		4	4	4		
	D	6	6	7	8		5	8-75	5		
	E	4	5	5	6		4	4	4		

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

Replicate A: 5 med G Remove: 2 sm G  
 Replicate B: 5 med G Remove: 1 sm G  
 Replicate C: 2 med G, 2 sm G  
 Replicate D: 2 lg G, 3 med G Remove: 1 med G, 2 sm 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: 3 lg G, 2 med G  
 Replicate B: 1 lg G, 3 med G, 1 sm G  
 Replicate C: 2 lg G, 2 sm G  
 Replicate D: 3 lg G, 2 med G  
 Replicate E: 1 lg G, 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	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 WL (mg)	Wet WL (mg)	Dry WL (mg)
Replicate A	1282.54	1371.2	1290.29
Replicate B	1284.41	1348.6	1294.50
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	79 mm	63 mm	75 mm	mm

Measure Root Weight:

Total mass of all roots from all seedlings

	Tin Tare WL (mg)	Wet WL (mg)	Dry WL (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	40.098	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

Comparisons: Page 1 of 9  
 Report Date: 19 Jul-06 3:01 PM  
 Analysis: 20-1410-9684/B160711psc

Plant Bioassay - Chronic						CH2M Hill
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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

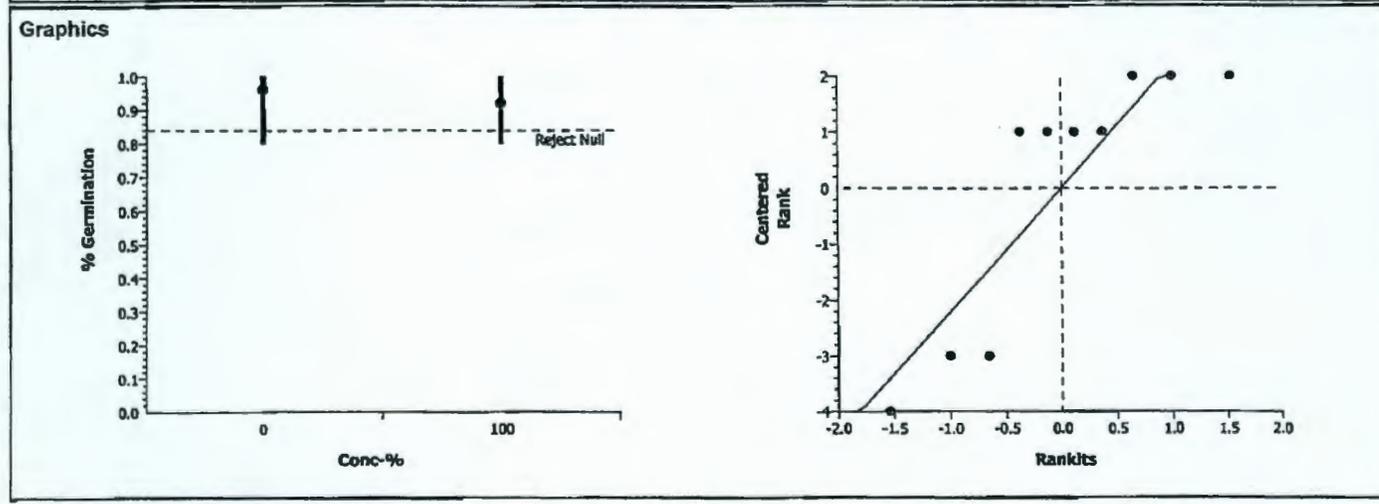
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	12.63%

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





# CETIS Analysis Detail

Comparisons: Page 3 of 9  
 Report Date: 19 Jul-06 3:01 PM  
 Analysis: 04-5825-2217/B160711psc

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

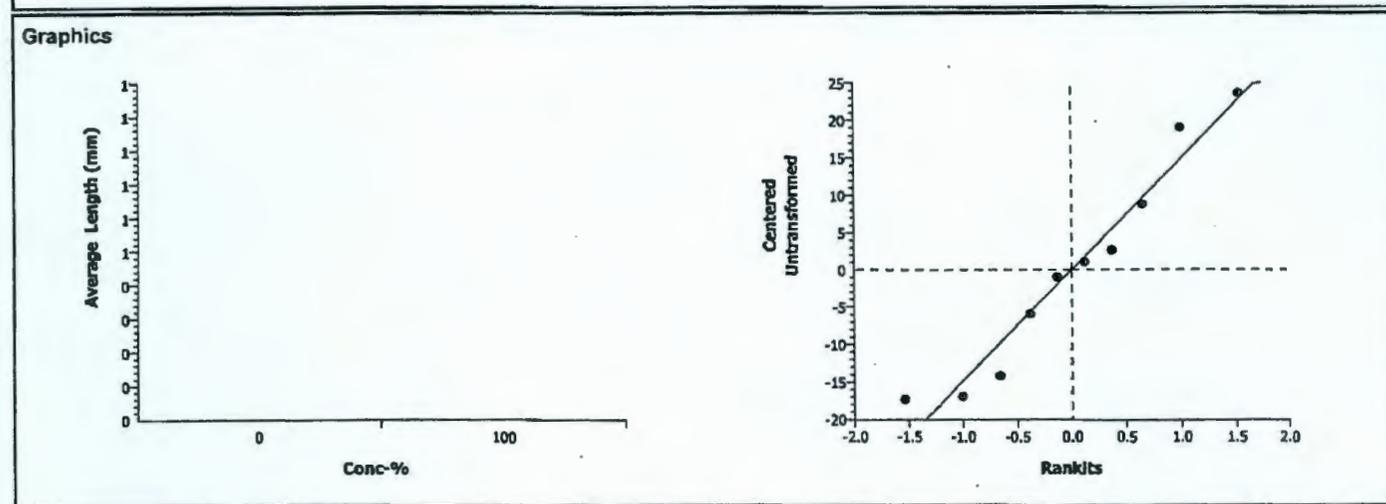
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	17.29%

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				



# CETIS Analysis Detail

Comparisons: Page 4 of 9  
 Report Date: 19 Jul-06 3:01 PM  
 Analysis: 03-2945-9238/B160711psc

Plant Bioassay - Chronic						CH2M Hill
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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

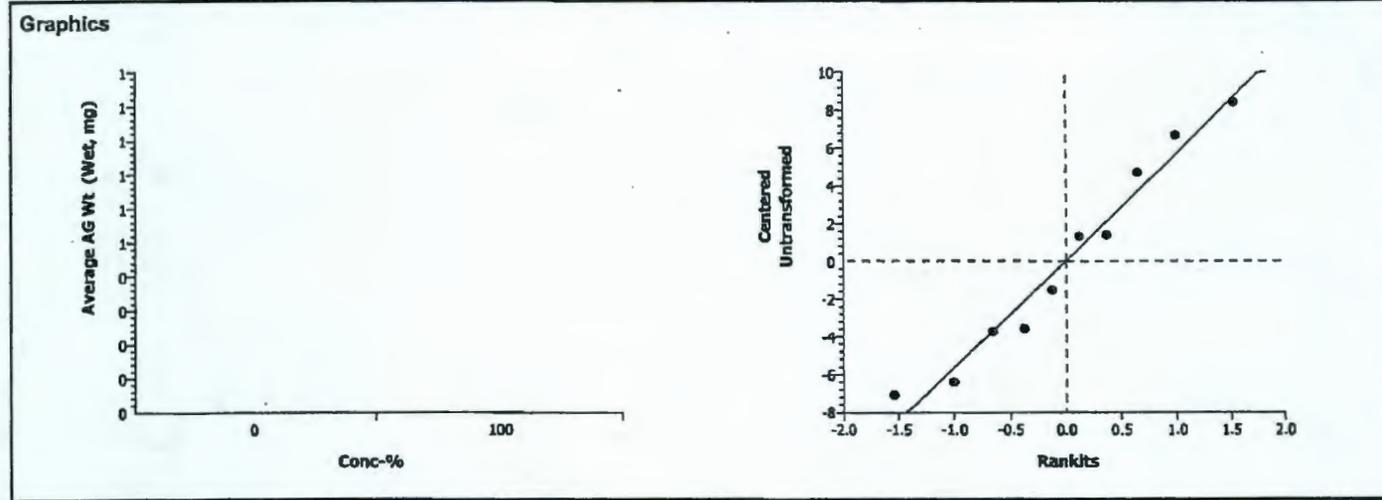
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	27.56%

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				



# CETIS Analysis Detail

Comparisons: Page 5 of 9  
 Report Date: 19 Jul-06 3:01 PM  
 Analysis: 09-9762-8383/B160711psc

Plant Bioassay - Chronic						CH2M HILL
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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

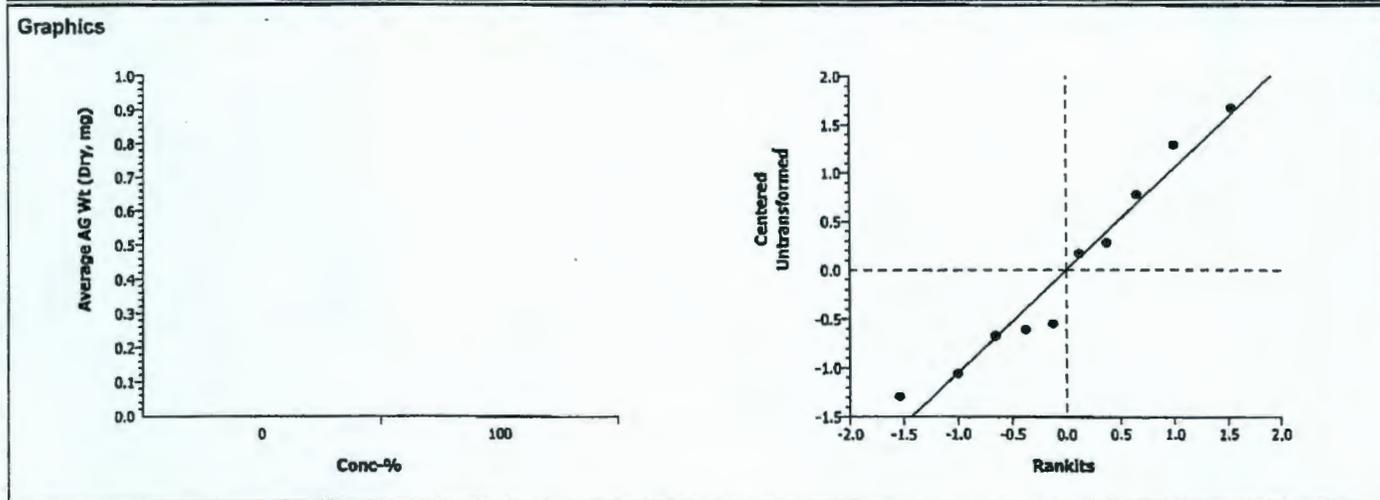
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.46%

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				



# CETIS Analysis Detail

Plant Bioassay - Chronic							CH2M Hill
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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

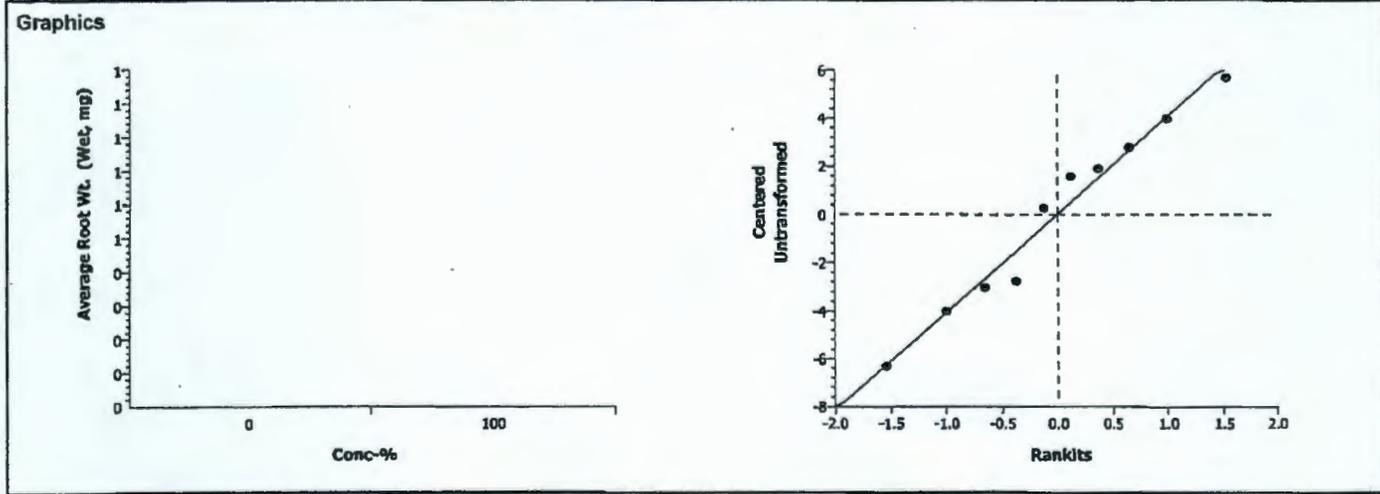
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	25.83%

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				



# CETIS Analysis Detail

Comparisons: Page 7 of 9  
 Report Date: 19 Jul-06 3:01 PM  
 Analysis: 18-3727-5688/B160711psc

Plant Bioassay - Chronic					CH2M HILL
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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

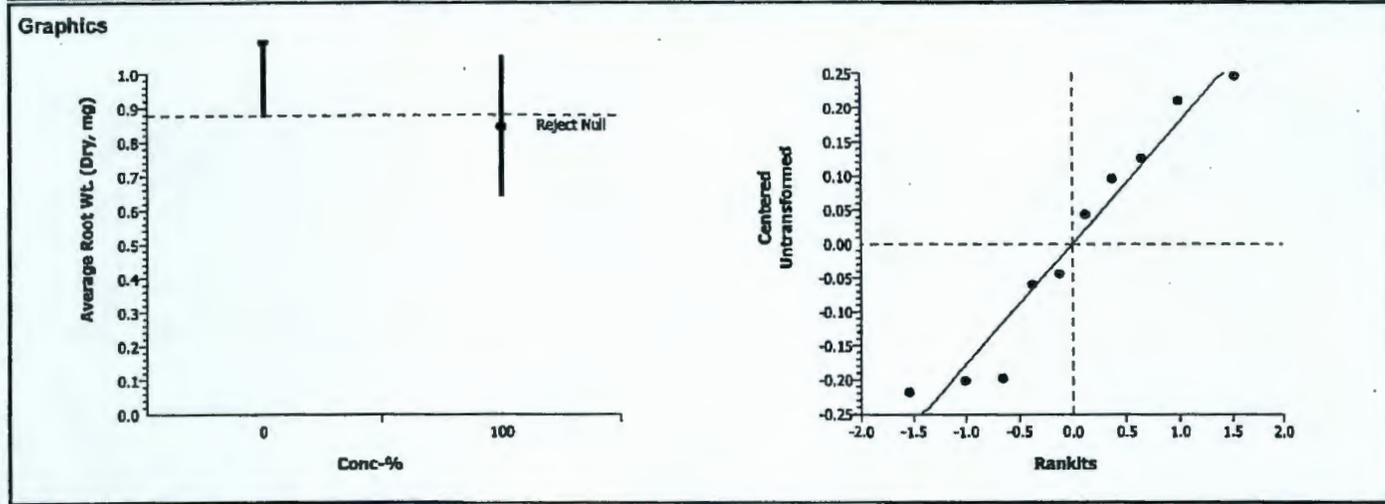
Method	Ajt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	19.56%

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	

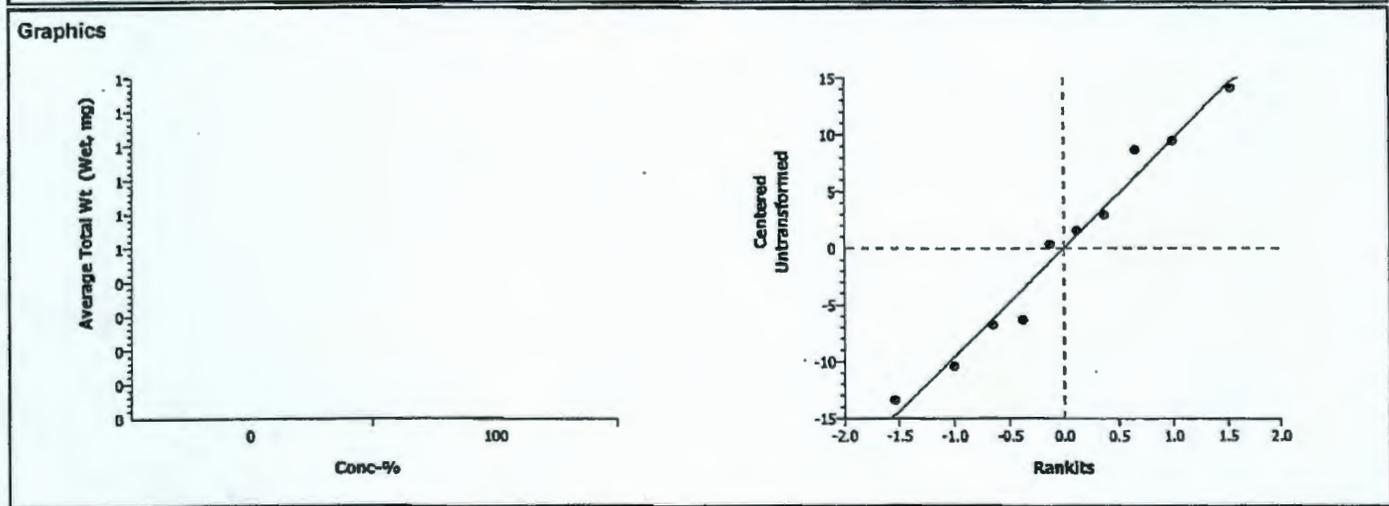
Data Summary										
Conc-%	Control Type	Count	Original Data				Transformed Data			
			Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.09220	0.87400	1.33799	0.20288				
100		5	0.84410	0.64252	1.05398	0.15767				



# CETIS Analysis Detail

Comparisons: Page 8 of 9  
 Report Date: 19 Jul-06 3:01 PM  
 Analysis: 08-1399-8256/B160711psc

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				



# CETIS Analysis Detail

Comparisons: Page 9 of 9  
 Report Date: 19 Jul-06 3:01 PM  
 Analysis: 16-0128-8841/B160711psc

Plant Bioassay - Chronic							CH2M Hill
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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

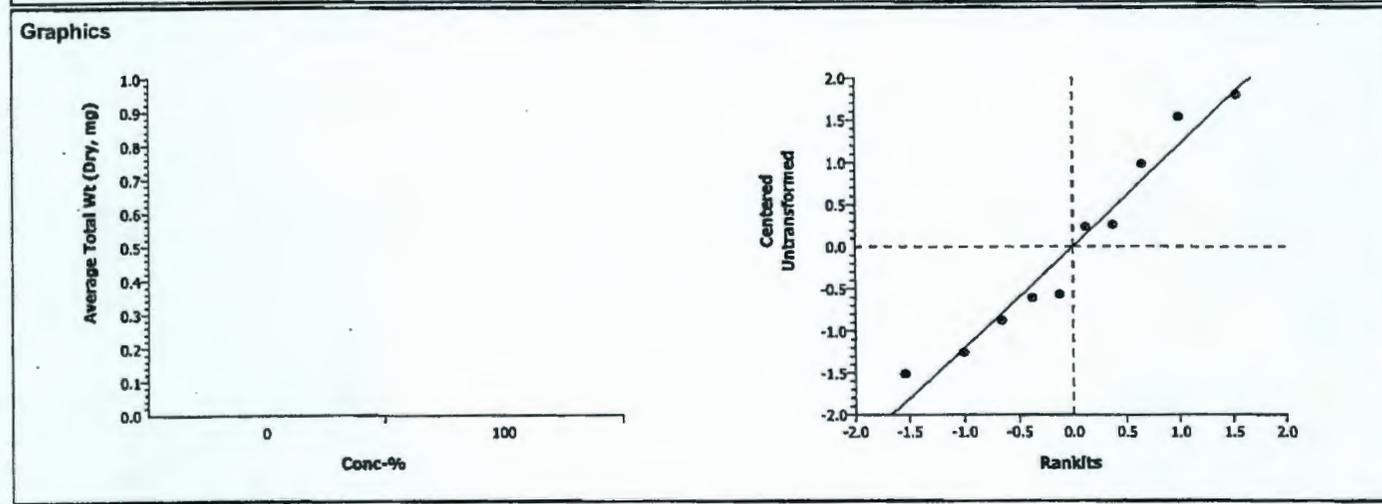
Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	26.21%

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				



**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		Price Code 8L	Data Turnaround
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location BORROW PIT 18	SAF No. RC-051		Air Quality <input type="checkbox"/>		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 OSCP				

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

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix *
Relinquished By/Removed From <i>Elizabeth M. Jeffers</i>	Date/Time 1600 5-16-06	Received By/Stored In <i>Joan Kessner</i>	Date/Time 5-16-06 17:00	* 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  361607-01				S=Soil SE=Soilment SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue Ws=Wipes L=Liquid V=Vegetation X=Other
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					

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

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			
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location BORROW PIT 14		SAF No. RC-051		Air Quality <input type="checkbox"/>		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			Preservation	None	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.			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		SPECIAL INSTRUCTIONS					Matrix *			
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	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  261607-02								S=Soil SE=Sediment SO=Soil SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue Wl=Wipe L=Liquid V=Vegetation X=Other	
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										
LABORATORY SECTION	Received By	Title					Date/Time						
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By					Date/Time						

F1793

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-270	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH		Price Code 8L	Data Turnaround
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location McGEE RANCH	SAF No. RC-051		Air Quality <input type="checkbox"/>		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				

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b>  NONE  <b>Special Handling and/or Storage</b> 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.	<b>Preservation</b>	None	None								
	<b>Type of Container</b>	G/P	P/G								
	<b>No. of Container(s)</b>	1	1								
	<b>Volume</b>	1000g	4000g								

<b>SAMPLE ANALYSIS</b>		See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Neutrode Toxicity ASTM E2172								
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Sample No.	Matrix *	Sample Date	Sample Time								
J11K97	SOIL	5-17-06	1757	1	1						

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>
Relinquished By/Removed From <i>Deborah H. Taylor</i>	Date/Time 9:00 5-18-06	Received By/Stored In <i>Joan Kessner</i>	Date/Time 5-18-06 09:45	* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction. ^~ These marks indicate that this is a non-analysis used to property format COC form. Contact Joan Kessner for any questions.  (1) Particle Size (Dry Sieve) - D422; Moisture Content - D2216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids				S=Soil SE=Settlement SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue W/Wips L=Liquid V=Vegetation X=Other
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					

361607-03

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

F1816

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				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	Data Turnaround	
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location <del>+100-H-24</del> 1607-42 <sup>rs</sup> 5/1/06	SAF No. RC-051		Air Quality <input type="checkbox"/>	45 Days	
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					

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> 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								

<b>SAMPLE ANALYSIS</b>				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172							
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Sample No.	Matrix *	Sample Date	Sample Time									
J11JT6	SOIL	5-22-06	1400	1	1							

<b>CHAIN OF POSSESSION</b>				<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b> S=Soil SE=Soilment SO=Solid SD=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue W=Wipe L=Liquid V=Vegetation X=Other
Relinquished By/Removed From <i>Elizabeth W. Tupper</i>	Date/Time 5-22-06	Received By/Stored In <i>Deann Hubbard</i>	Date/Time 5-22-06	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.				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	(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  <i>361607-04</i>				
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					

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

F18810

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-051-150	Page 1 of 1		
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH			
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 116-N-3		SAF No. RC-051		Price Code <b>8L</b> Data Turnaround <b>45 Days</b>			
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 <i>NONE</i>			Preservation	None	None				
Special Handling and/or Storage <i>Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, &amp; page 2 for chemical analytical fractions to Lionville.</i>			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	1700	1	1		-/		
CHAIN OF POSSESSION				SPECIAL INSTRUCTIONS			Matrix *		
Relinquished By/Removed From		Date/Time		Sign/Print Names		Date/Time			
<i>Joan Kessner</i>		1710		<i>Joan Kessner</i>		5/23/06			
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time			
				<i>Joan Kessner</i>		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			
LABORATORY SECTION				Received By				Title	Date/Time
FINAL SAMPLE DISPOSITION				Disposal Method				Disposed By	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

*361607-05*

- Matrix \***
- S=Soil
  - SE=Soil/element
  - SO=Soil/solid
  - SI=Soil/sieve
  - W = Water
  - O=Oil
  - A=Air
  - DS=Drum Solids
  - DL=Drum Liquids
  - T=Tissue
  - WI=Wipe
  - L=Liquid
  - V=Vegetation
  - X=Other

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	Price Code 8L	Data Turnaround
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 600-23		SAF No. RC-051	Air Quality <input type="checkbox"/>	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									
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Sample No.	Matrix *	Sample Date	Sample Time									
J11K22	SOIL	5-23-04	1600	1	1							

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix *
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	* 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) - D432; Moisture Content - D3216; TOC - 9060; pH (Soil) - 9045; Nitrogen by Kjeldahl - 351.2; Ammonia - 350.3; IC Anions - 300.0; Percent Solids  B61607-06				S=Soil SE=Settlement SO=Solid ST=Sludge W = Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue W=Wipe L=Liquid V=Vegetation X=Other
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					

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

F1852

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-051-98		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 UPPER RIPARIAN #11		SAF No. RC-051		Air Quality <input type="checkbox"/>		Data Turnaround <b>45 Days</b>		
Ice Chest No.		Field Logbook No. EL-1596		COA BESRAS6520		Method of Shipment GROUND TRANSPORT				
Shipped To CH2MHILL		Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC						
POSSIBLE SAMPLE HAZARDS/REMARKS <i>NONE</i>			Preservation		None					
Special Handling and/or Storage <i>Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, &amp; page 2 for chemical analytical fractions to Lionville.</i>			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					SPECIAL INSTRUCTIONS					
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		Matrix + S=Soil SS=Soliment SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue W=Wipe L=Liquid V=Vegetation X=Other		
<i>Joan Kessner</i>		6/8/06		<i>Nancy Hubbard</i>		5-30-06				
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time				
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time				
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time				
Relinquished By/Removed From		Date/Time		Received By/Stored In		Date/Time		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  <b>B61607-07</b>		
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				
LABORATORY SECTION		Received By		Title		Date/Time				
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By		Date/Time				

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		Price Code 8L	Data Turnaround
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location BORROW PIT 24		SAF No. RC-051		Air Quality <input type="checkbox"/>	45 Days
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			

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										
	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										

SAMPLE ANALYSIS

Sample No.	Matrix *	Sample Date	Sample Time									
J11K16	SOIL	5-29-06	1533	1	1							

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
<i>Elizabeth M. Topp</i>	5-30-06	<i>Joan Kessner</i>	5-30-06
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

**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

261607-08

- Matrix \*
- S=Soil
  - SE=Substrate
  - SO=Soil
  - SL=Sludge
  - W=Water
  - O=Oil
  - A=Air
  - OS=Organic Solids
  - DL=Drum Linings
  - T=Trace
  - W=Wipe
  - L=Liquid
  - V=Vegetation
  - X=Other

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

Washington Closure Hanford		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>				RC-051-264		Page 1 of 1			
Collector STANKOVICH, M.		Company Contact JOAN KESSNER		Telephone No. 375-4688		Project Coordinator KESSNER, JH		Price Code <b>8L</b> Data Turnaround			
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location VERNITA UPRIVER ON SOUTH SIDE		SAF No. RC-051		Air Quality <input type="checkbox"/>		<b>45 Days</b>			
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 <i>NONE</i>			Preservation	None	None						
Special Handling and/or Storage <i>Use page 3 for original material to Corvallis for MIS preparation and aliquoting, page 1 for radioanalytical fractions to Eberline, &amp; page 2 for chemical analytical fractions to Lionville.</i>			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				SPECIAL INSTRUCTIONS			
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	* 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  <div style="text-align: center; font-size: 1.2em;">BG1607-09</div>						Matrix * S=Soil SE=Sediment SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue Wt=Wipe L=Liquid V=Vegetation X=Other	
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								
LABORATORY SECTION	Received By	Title		Date/Time							
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By						Date/Time			

F1863

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-186	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH		Price Code <b>8L</b>	Data Turnaround <b>45 Days</b>
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location BORROW PIT 9	SAF No. RC-051		Air Quality <input type="checkbox"/>		
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. SEB OSPC				

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b> NONE  <b>Special Handling and/or Storage</b> 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.	<b>Preservation</b>	None	None								
	<b>Type of Container</b>	G/P	P/G								
	<b>No. of Container(s)</b>	1	1								
	<b>Volume</b>	1000g	4000g								

<b>SAMPLE ANALYSIS</b>		See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172								
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Sample No.	Matrix *	Sample Date	Sample Time								
J11JY8	SOIL	5-30-06	1724	1	1						

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>
Relinquished By/Removed From <i>Maureen Weger</i>	Date/Time 1730 5-30-06	Received By/Stored In <i>Laura Hubbard</i>	Date/Time 5-30-06 1800	* 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  <b>BG-1607-10</b>				S=Soil SE=Sediment SO=Solid SL=Sludge W=Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Tissue W=Wipe L=Liquid V=Vegetation X=Other
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					

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

F1901

<b>Washington Closure Hanford</b>		<b>CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST</b>			RC-051-168	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH		Price Code <b>8L</b>	Data Turnaround <b>45 Days</b>
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So		Sampling Location 300-44/618-4	SAF No. RC-051		Air Quality <input type="checkbox"/>	
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			

<b>POSSIBLE SAMPLE HAZARDS/REMARKS</b>  NONE  <b>Special Handling and/or Storage</b> 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							

<b>SAMPLE ANALYSIS</b>		See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172							
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Sample No.	Matrix *	Sample Date	Sample Time							
J11JX0	SOIL	6-5-06	1330	1	1					

<b>CHAIN OF POSSESSION</b>		<b>Sign/Print Names</b>		<b>SPECIAL INSTRUCTIONS</b>				<b>Matrix *</b>
Relinquished By/Removed From <i>Eugene A. M. [Signature]</i>	Date/Time 1330	Received By/Stored In <i>Joan Kessner</i>	Date/Time 6-5-06	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.				Se=Soil SE=Substrate SO=Solid SL=Sludge W = Water O=Oil A=Air DS=Drum Solids DL=Drum Liquids T=Trace W=Wipe L=Liquid V=Vegetation X=Other
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	(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				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time	361607-11				
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time					

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

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; <sup>s</sup> 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 <sup>s</sup>	66.6	E <sup>s</sup>	16.5	E <sup>s</sup>	2.70	E <sup>s</sup>	16.1	ns	0.94	ns	32.6	ns	3.63	E <sup>s</sup>
BG1607-02	J11K04	92	ns	68.6	ns	72.4	E <sup>s</sup>	19.3	ns	3.01	E <sup>s</sup>	22.0	ns	0.83	E <sup>s</sup>	41.4	ns	3.84	E <sup>s</sup>
BG1607-03	J11K97	60	E <sup>s</sup>	42.0	E <sup>s</sup>	41.2	E <sup>s</sup>	9.4	E <sup>s</sup>	1.49	E <sup>s</sup>	5.4	E <sup>s</sup>	0.38	E <sup>s</sup>	14.8	E <sup>s</sup>	1.87	E <sup>s</sup>
BG1607-04	J11JT6	76	E <sup>s</sup>	54.5	E <sup>s</sup>	41.4	E <sup>s</sup>	10.8	E <sup>s</sup>	1.50	E <sup>s</sup>	10.7	E <sup>s</sup>	0.53	E <sup>s</sup>	21.5	E <sup>s</sup>	2.03	E <sup>s</sup>
BG1607-05	J11JV2	44	E <sup>s</sup>	71.2	ns	47.7	E <sup>s</sup>	16.9	E <sup>s</sup>	2.24	E <sup>s</sup>	17.7	ns	0.47	E <sup>s</sup>	34.6	ns	2.71	E <sup>s</sup>
BG1607-06	J11K22	100	ns	59.1	E <sup>s</sup>	48.6	E <sup>s</sup>	11.7	E <sup>s</sup>	1.53	E <sup>s</sup>	10.9	E <sup>s</sup>	0.84	ns	22.5	E <sup>s</sup>	2.37	E <sup>s</sup>
BG1607-07	J11JH7	96	ns	55.8	E <sup>s</sup>	51.2	E <sup>s</sup>	14.4	E <sup>s</sup>	1.75	E <sup>s</sup>	12.4	E <sup>s</sup>	0.45	E <sup>s</sup>	26.8	E <sup>s</sup>	2.21	E <sup>s</sup>
BG1607-08	J11K16	80	E <sup>s</sup>	61.8	E <sup>s</sup>	51.5	E <sup>s</sup>	15.6	E <sup>s</sup>	2.29	E <sup>s</sup>	9.5	E <sup>s</sup>	0.50	E <sup>s</sup>	25.0	E <sup>s</sup>	2.78	E <sup>s</sup>
BG1607-09	J11K79	88	ns	61.3	E <sup>s</sup>	54.7	E <sup>s</sup>	14.0	E <sup>s</sup>	1.92	E <sup>s</sup>	11.7	E <sup>s</sup>	0.73	E <sup>s</sup>	25.8	E <sup>s</sup>	2.65	E <sup>s</sup>
BG1607-10	J11JY8	80	ns	63.1	E <sup>s</sup>	73.0	E <sup>s</sup>	13.8	E <sup>s</sup>	2.34	E <sup>s</sup>	10.0	E <sup>s</sup>	0.57	E <sup>s</sup>	23.8	E <sup>s</sup>	2.91	E <sup>s</sup>
BG1607-11	J11JX0	92	ns	70.0	ns	70.7	E <sup>s</sup>	16.4	E <sup>s</sup>	2.58	E <sup>s</sup>	15.0	E <sup>s</sup>	0.84	E <sup>s</sup>	31.4	E <sup>s</sup>	3.42	E <sup>s</sup>