0070131

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

COMPLETE COPY OF DATA PACKAGE TO:

Jill Thomson	H0-23	KW 6/14/06 INITIAL/DATE
Jeanette Duncan	H9-02	KW 6/14/06 INITIAL/DATE

COMMENTS:

SDG F1508 SAF-RC-051

Rad only X Chem only Rad & Chem

X Complete Partial

Waste Site: 100-D Riparian #2

RECEIVED
JUL 11 2006
EDMC

CH2M HILL
Applied Sciences Laboratory
2300 NW Walnut Blvd
Corvallis, OR
97330-3538
P.O. Box 428
Corvallis, OR
97339-0428
Tel 541.752.4271
Fax 541.752.0276

CH2MHILL
Applied Sciences Laboratory

May 19, 2006

ELR Consulting
2328 S. Garfield Street
Kennewick, WA 99337

RECEIVED
MAY 2006

RE: Laboratory Report for ELR Consulting
Applied Sciences Laboratory Reference No. F1508

Dear Emmett Richards:

On April 10, 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. F1508

Sample ID	Client Sample ID	Date Collected	Time Collected
F150801	J11JB5	04/09/2006	15:30

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CH2M HILL Laboratory Reference No. F1508

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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.: F1508

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

Project Name: ELR Consulting Prime Contractor.:

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

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

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

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

F. Analytical Exceptions:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

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

Reported by: Elizabeth A Topp Date: 5-1-06

Reviewed by: Ginger Collins Date: 5/2/06

SAMPLE DATA
SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JB5

SDG No.: F1508

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F150801

Date Received: 04/10/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7664-41-7	Ammonia-N	0.840	3.15	7.93		mg/kg	1	0.6418 G	E350.3	04/13/06

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0413

SDG No.: F1508

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0413

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7664-41-7	Ammonia-N	0.534	2.00	1.28	B	mg/kg	1	1 G	E350.3	04/13/06

QC DATA SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 04/05/06 1500

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506NH3

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Ammonia-N	0.10	160	1.0	103	10.0	51.0	100	-8.2						

Comments:

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Initial Calibration Date: 04/05/06 1500

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506NH3

Analyte	Curve Type	r	Q
Ammonia-N	LNR	0.9994	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Second Source ID: ICV-0405

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506NH3

Analyte	Expected	Found	%D	Q
Ammonia-N	10	9.93	-0.7	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Analytical Lot ID: 041306NH3

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 040506NH3

CCV #1 ID: CV1-0413 CCV #2 ID: CV2-0413 CCV #3 ID: CV3-0413

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Ammonia-N	1	1.12	11.7		10	10.1	1.0		1	0.942	-5.8	

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0413

SDG No.: F1508

Analysis Method: E350.3

Initial Cal ID: 040506NH3

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0413

Date Analyzed: 04/13/06

Time Analyzed: 1244

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

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
10	BS1S0413	BS1S0413	04/13/06	1240
19	J11JB5	F150801	04/13/06	1319

COMMENTS: _____

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1508

Analysis Method: E350.3

Initial Cal ID: 040506NH3

Matrix: (Soil/Water) SOIL

Instrument: NONE

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS1S0413

Date Analyzed: 04/13/06

Time Analyzed: 1240

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Ammonia-N	200	196	98.1	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 040506NH3

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	LEVEL 1	LEVEL 1	04/05/06	1544
01	LEVEL 2	LEVEL 2	04/05/06	1546
02	LEVEL 3	LEVEL 3	04/05/06	1548
03	LEVEL 4	LEVEL 4	04/05/06	1550
07	ICV-0405	ICV-0405	04/05/06	1559

COMMENTS: _____

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E350.3

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 041306NH3

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
08	CV1-0413	CV1-0413	04/13/06	1235
09	CV2-0413	CV2-0413	04/13/06	1235
11	BS1S0413	BS1S0413	04/13/06	1240
13	SB1-0413	SB1-0413	04/13/06	1244
20	J11JB5	F150801	04/13/06	1319
24	CV3-0413	CV3-0413	04/13/06	1409

COMMENTS: _____

CH2MHILL
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P.O. Box 428
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Telephone: 541-752-4271
Fax: 541-752-0276

05/01/06

MDL Study Report

Analytical Method: E350.3

Matrix: Soil

Instrument ID: NONE

Concentration Units: mg/kg

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

ET060501-16:15-F1508-W

ANIONS BY METHOD EPA300.0A

CASE NARRATIVE
ANIONS

Analytical Method: EPA300.0 Batch No.: F1508

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

Base/Command: ELR Consulting Prime Contractor.:

I. Holding Times:
All acceptance criteria were met.

II. Analysis:

A. Calibration:
All acceptance criteria were met.

B. Blanks:
All acceptance criteria were met.

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

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

E. Analytical Exception:
None.

F. Other:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

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

Reported by: Date: 5/18/06

Reviewed by: Date: 5/19/06

SAMPLE DATA
SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JB5

SDG No.: F1508

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F150801

Date Received: 04/10/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.109	0.897	3.37		mg/kg	1	2.8157 G	E300.0A	04/28/06
16984-48-8	Fluoride	0.0973	0.897	0.897	U	mg/kg	1	2.8157 G	E300.0A	04/28/06
14797-55-8	Nitrate-N	0.0842	0.897	4.48		mg/kg	1	2.8157 G	E300.0A	04/28/06
14797-65-0	Nitrite-N	0.0805	0.897	0.594	B	mg/kg	1	2.8157 G	E300.0A	04/28/06
14808-79-8	Sulfate	0.145	0.897	24.4		mg/kg	1	2.8157 G	E300.0A	04/28/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0428

SDG No.: F1508

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0428

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
16887-00-6	Chloride	0.121	1.00	0.210	B	mg/kg	1	2.5 G	E300.0A	04/28/06
16984-48-8	Fluoride	0.109	1.00	1.00	U	mg/kg	1	2.5 G	E300.0A	04/28/06
14797-55-8	Nitrate-N	0.0939	1.00	1.00	U	mg/kg	1	2.5 G	E300.0A	04/28/06
14797-65-0	Nitrite-N	0.0898	1.00	1.00	U	mg/kg	1	2.5 G	E300.0A	04/28/06
14808-79-8	Sulfate	0.161	1.00	0.380	B	mg/kg	1	2.5 G	E300.0A	04/28/06

QC DATA SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

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

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

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

Comments:

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

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

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

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

Comments:

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Second Source ID: ICV-0130

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

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

Comments:

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Analytical Lot ID: 042806Q3

Instrument Name: ICQ

Concentration Units: mg/L

Initial Calibration ID: 300A-013006

CCV #1 ID: CV1-0428 CCV #2 ID: CV2-0428 CCV #3 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Chloride	5	5.44	8.7		5	5.48	9.6					
Fluoride	5	5.40	8.0		5	5.33	6.6					
Nitrate-N	5	5.24	4.7		5	5.18	3.6					
Nitrite-N	5	5.29	5.8		5	5.10	2.0					
Sulfate	15	15.6	4.1		15	15.6	3.8					

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0428

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Sample ID: SB1-0428

Initial Cal ID: 300A-013006

Date Analyzed: 04/28/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1136

Instrument: ICQ

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

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
16	BS1S0428	BS1S0428	04/28/06	1057
18	BS2S0428	BS2S0428	04/28/06	1116
19	BS3S0428	BS3S0428	04/28/06	1126
21	J11JB5	F150801	04/28/06	1200

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS1S0428

Initial Cal ID: 300A-013006

Date Analyzed: 04/28/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1057

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Chloride	50	52.0	104	90-110	
Fluoride	50	51.5	103	90-110	
Sulfate	50	51.6	103	90-110	

* Values outside of QC limits

Comments:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

LCS ID: BS2S0428

Initial Cal ID: 300A-013006

Date Analyzed: 04/28/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1116

Instrument: ICQ

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Nitrite-N	11.3	11.8	104	90-110	

* Values outside of QC limits

Comments:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1508

Analysis Method: E300.0A

Initial Cal ID: 300A-013006

Matrix: (Soil/Water) SOIL

Instrument: ICQ

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS3S0428

Date Analyzed: 04/28/06

Time Analyzed: 1126

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Nitrate-N	71.9	72.9	101	90-110	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 300A-013006

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

COMMENTS: _____

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E300.0A

Lab Code: CVO

Instrument: ICQ

Analytical Lot ID: 042806Q3

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
15	CV1-0428	CV1-0428	04/28/06	1038
16	BS1S0428	BS1S0428	04/28/06	1057
18	BS2S0428	BS2S0428	04/28/06	1116
19	BS3S0428	BS3S0428	04/28/06	1126
20	SB1-0428	SB1-0428	04/28/06	1136
21	J11JB5	F150801	04/28/06	1200
30	CV2-0428	CV2-0428	04/28/06	1504

COMMENTS: _____

CH2MHILL
Applied Sciences Laboratory

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

05/18/06

MDL Study Report

Analytical Method: E300.0A

Matrix: Soil

Instrument ID: ICQ

Concentration Units: mg/kg

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

PERCENT MOISTURE
ASTM D2216

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JB5

SDG No.: F1508

Matrix: SOIL

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F150801

Date Received: 04/10/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
MOISTURE	Moisture	0.00	0.00	1.34		%	1	9.4158 G	ASTM D2216	04/17/06

ET060420-16:58-F1508-W

FORM I GEN CHEM

PARTICLE SIZE
METHOD 422

Hanford

Particle Size

500.0 **g sample used**

Weight retained is the weight of material ON each sieve

ANALYST: **KM** **04/19/2006**

Lab I.D.	Client I.D.	Sieve #	Sieve Size (um)	Sieve Size (mm)	Weight Retained (g)	Weight Retained (%)	Cumulative Coarser (%)	Cumulative Finer (%)
F150801	J11JB5	8	2362	2.362	0.00	0.00	0.00	100.00
		16	1180	1.180	41.40	8.30	8.30	91.70
		30	600	0.600	170.20	34.12	42.42	57.58
		50	500	0.500	211.50	42.40	84.82	15.18
		100	147	0.147	55.40	11.11	95.93	4.07
		200	75	0.075	13.20	2.65	98.58	1.42
		pan			7.10	1.42	100.00	0.00
		total			498.8			

CH2M HILL
Applied Sciences Group

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

pH
METHOD SW9045C

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JB5

SDG No.: F1508

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F150801

Date Received: 04/10/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
pH	pH	0.00	0.00	7.28		pH	1	20 G	SW9045C	04/12/06

TKN
METHOD EPA 351.4

CASE NARRATIVE
TKN

Analytical Method: EPA 351.4 Batch No.: F1508

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 aceeptance criteria were met.

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

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

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

F. Analytical Exceptions:
None.

III. Sampling Equipment:
None.

IV. Documentation Exceptions:
None

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

Reported by: Elizabeth M Tepps Date: 5-1-06

Reviewed by: [illegible] Date: 5/3/06

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JB5

SDG No.: F1508

Matrix: SOIL

% Moisture: 1

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: F150801

Date Received: 04/10/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	47.2	173	1020		mg/kg	1	0.5833 G	E351.4	04/18/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0418

SDG No.: F1508

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0418

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
7727-37-9	Total Kjeldahl Nitrogen as N	27.3	100	100	U	mg/kg	1	1 G	E351.4	04/18/06

QC DATA SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 04/18/06 1040

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 041806TKN

Analyte	Std 1	Resp 1	Std 2	Resp 2	Std 3	Resp 3	Std 4	Resp 4	Std 5	Resp 5	Std 6	Resp 6	Std 7	Resp 7
Total Kjeldahl Nitrogen	2.0	155	20.0	106	200	50.2	2000	-10						

Comments:

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Initial Calibration Date: 04/18/06 1040

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 041806TKN

Analyte	Curve Type	r	Q
Total Kjeldahl Nitrogen as N	LNR	0.9979	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Second Source ID: ICV-0418

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 041806TKN

Analyte	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	20	17.7	-11.5	

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Analytical Lot ID: 041806TKN

Instrument Name: NONE

Concentration Units: mg/L

Initial Calibration ID: 041806TKN

CCV #1 ID: CV1-0418 CCV #2 ID: CV2-0418 CCV #3 ID: CV3-0414

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Kjeldahl Nitrogen as N	20	17.5	-12.6		200	181	-9.6		20	18.4	-8.1	

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0418

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Lab Sample ID: SB1-0418

Initial Cal ID: 041806TKN

Date Analyzed: 04/18/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1053

Instrument: NONE

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

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
09	BS1S0418	BS1S0418	04/18/06	1051
16	J11JB5	F150801	04/18/06	1106

COMMENTS:

7-WC

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

LCS ID: BS1S0418

Initial Cal ID: 041806TKN

Date Analyzed: 04/18/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1051

Instrument: NONE

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Kjeldahl Nitrogen as N	680	807	119	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: E351.4

Lab Code: CVO

Instrument: NONE

Analytical Lot ID: 041806TKN

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	LEVEL 1	LEVEL 1	04/18/06	1040
02	LEVEL 2	LEVEL 2	04/18/06	1040
03	LEVEL 3	LEVEL 3	04/18/06	1040
04	LEVEL 4	LEVEL 4	04/18/06	1040
05	CV1-0418	CV1-0418	04/18/06	1042
06	CV2-0418	CV2-0418	04/18/06	1042
07	ICV-0418	ICV-0418	04/18/06	1045
09	BS1S0418	BS1S0418	04/18/06	1051
11	SB1-0418	SB1-0418	04/18/06	1053
16	J11JB5	F150801	04/18/06	1106
22	CV3-0414	CV3-0414	04/18/06	1121

COMMENTS: _____

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Fax: 541-752-0276

05/01/06

MDL Study Report

Analytical Method: E351.4
Matrix: Soil

Instrument ID: NONE
Concentration Units: mg/kg

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

TOTAL ORGANIC CARBON
BY ASTM E777

CASE NARRATIVE
TOC SOILS

Analytical Method: ASTM E-777 Batch No.: F1508

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: 4-25-06

Reviewed by: Ginger Collins Date: 4/26/06

SAMPLE DATA SUMMARY

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

J11JB5

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Matrix: SOIL

Lab Sample ID: F150801

% Moisture: 0

Date Received: 04/10/06

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	96.8	277	11700		mg/kg	1	0.3612 G	ASTM E777	04/25/06

1A-WC

GENERAL CHEMISTRY ANALYSIS DATA SHEET

Field Sample ID:

SB1-0425

SDG No.: F1508

Matrix: SOIL

% Moisture: 0

Lab Name: CH2M HILL/LAB/CVO

Lab Sample ID: SB1-0425

Date Received: / /

CAS No.	Analyte	MDL	PQL	Result	Q	Units	DF	Sample Amount	Analysis Method	Date Analyzed
TOC	Total Organic Carbon	35.0	100	100	U	mg/kg	1	1 G	ASTM E777	04/25/06

QC SUMMARY

2-WC

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

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

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

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

Comments:

GENERAL CHEMISTRY INITIAL CALIBRATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

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

Instrument Name: TOC Skalar

Concentration Units: mg/Kg

Initial Calibration ID: 101405S1

Analyte	Curve Type	r	Q
Total Organic Carbon	LNR	0.9997	

Comments:

2B-WC

GENERAL CHEMISTRY SECOND SOURCE CALIBRATION VERIFICATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Second Source ID: ICV-1014

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

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

Comments:

2A-WC

GENERAL CHEMISTRY CALIBRATION VERIFICATION DATA

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Analytical Lot ID: 042506TOCS

Instrument Name: TOC Skalar

Concentration Units: mg/kg

Initial Calibration ID: 101405S1

CCV #1 ID: CV1-0425 CCV #2 ID: CV2-0425 CCV #3 ID:

Analyte	Expected	Found	%D	Q	Expected	Found	%D	Q	Expected	Found	%D	Q
Total Organic Carbon	4000	3940	-1.5		4000	4090	2.2					

Comments:

3-WC

SOIL GENERAL CHEMISTRY METHOD BLANK SUMMARY

Field Sample ID:

SB1-0425

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Sample ID: SB1-0425

Initial Cal ID: 101405S1

Date Analyzed: 04/25/06

Matrix: (Soil/Water) SOIL

Time Analyzed: 1121

Instrument: TOC Skalar

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

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
02	BS1S0425	BS1S0425	04/25/06	1111
04	J11JB5	F150801	04/25/06	1132

COMMENTS:

GENERAL CHEMISTRY LABORATORY CONTROL SAMPLE

SDG No.: F1508

Analysis Method: ASTM E777

Initial Cal ID: 101405S1

Matrix: (Soil/Water) SOIL

Instrument: TOC Skalar

Lab Name: CH2M HILL/LAB/CVO

LCS ID: BS1S0425

Date Analyzed: 04/25/06

Time Analyzed: 1111

Concentration Units: mg/kg

Analyte	Expected	Found	%R	QC Limits %R	Q
Total Organic Carbon	8840	9120	103	75-125	

* Values outside of QC limits

Comments:

14-WC

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Code: CVO

Instrument: TOC SKALAR

Analytical Lot ID: 101405TOCS

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

COMMENTS: _____

GENERAL CHEMISTRY ANALYTICAL SEQUENCE

SDG No.: F1508

Lab Name: CH2M HILL/LAB/CVO

Analysis Method: ASTM E777

Lab Code: CVO

Instrument: TOC Skalar

Analytical Lot ID: 042506TOCS

	CLIENT SAMPLE ID	LAB SAMPLE ID	DATE ANALYZED	TIME ANALYZED
01	CV1-0425	CV1-0425	04/25/06	1058
02	BS1S0425	BS1S0425	04/25/06	1111
03	SB1-0425	SB1-0425	04/25/06	1121
04	J11JB5	F150801	04/25/06	1132
14	CV2-0425	CV2-0425	04/25/06	1511

COMMENTS: _____

CH2MHILL
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Telephone: 541-752-4271
Fax: 541-752-0276

04/25/06

MDL Study Report

Analytical Method: ASTM E777

Instrument ID: TOC Skalar

Matrix: Soil

Concentration Units: mg/kg

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

CHAIN OF CUSTODY/SHIPPING DOCUMENTS

E 1508

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-66	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-D RIPARIAN #2		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	4000g									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									
Sample No.	Matrix *	Sample Date	Sample Time								
J11JB5	SOIL	4-9-06	15:30	1	1						~1

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From CH2MHILL	Date/Time 10:30	Received By/Stored In	Date/Time
Elizabeth M Tepper 4-10-06		Kathy McKinley	4/10/06 1035
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

^~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

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

This is a composite of all 5 samples from 1 Investigation Area

Matrix *

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

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

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

CH2MHILL
Analytical Services

Sample Receipt Record

Batch Number: F 1508 Date received: 4/10/06

Client/Project ELR Consulting

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

Observation	YES	NO
Radiological Screening for AFCEE		X
Were custody seals intact and on the outside of the cooler?		HD
If yes, Where? Front____ Rear____ Lt Side____ Rt Side____		
Type of packing material: Ice Blue Ice Bubble wrap		X
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. C		X
All VOCs free of air bubbles ?		

VERIFICATION OF SAMPLE PRESERVATION

Sample No	Nutrients pH <2	Metals pH <2	Volatiles pH <2	Cyanides pH >12	TOC pH <2	TOX pH <2	Other (specify)	N/A (circle/one/res)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								

LOGIN AND pH VERIFICATIONS PERFORMED BY

KMcKinley 4/10/06 1035
Date/Time

Date/Time

Rev 11/05/2003-recptrcd.xls

VersionCo	LabName	SDG	FieldID	NativeID	QAQCTyp	LRType	Matrix	LabSampl	AnalysisM	ExtractionI	SampleDa	SampleTin	ReceiveDa	ExtractDat	ExtractTim	AnalysisDa	AnalysisTi	PercentSo	LabLotCtlN	CAS	ParamID	Analyte	Result
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	ASTM E77	NONE	4/9/2006	15:30	4/10/2006			4/25/2006	11:32	98.66		TOC	TOC	Total Orga	11700
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	E351.4	METHOD	4/9/2006	15:30	4/10/2006	4/18/2006	11:06	4/18/2006	11:06	98.66	SB1-0418	7727-37-9	KN	Total Kjeld	1020
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	E350.3	METHOD	4/9/2006	15:30	4/10/2006	4/13/2006	13:19	4/13/2006	13:19	98.66	SB1-0413	7664-41-7	NH3N	Ammonia-I	7.93
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	E300.0A	METHOD	4/9/2006	15:30	4/10/2006	4/28/2006	12:00	4/28/2006	12:00	98.66	SB1-0428	16887-00-I	CL	Chloride	3.37
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	E300.0A	METHOD	4/9/2006	15:30	4/10/2006	4/28/2006	12:00	4/28/2006	12:00	98.66	SB1-0428	16984-48-I	F	Fluoride	0.897
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	E300.0A	METHOD	4/9/2006	15:30	4/10/2006	4/28/2006	12:00	4/28/2006	12:00	98.66	SB1-0428	14797-55-I	NO3N	Nitrate-N	4.48
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	E300.0A	METHOD	4/9/2006	15:30	4/10/2006	4/28/2006	12:00	4/28/2006	12:00	98.66	SB1-0428	14797-65-I	NO2N	Nitrite-N	0.594
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	E300.0A	METHOD	4/9/2006	15:30	4/10/2006	4/28/2006	12:00	4/28/2006	12:00	98.66	SB1-0428	14808-79-I	SO4	Sulfate	24.4
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	ASTM D22	NONE	4/9/2006	15:30	4/10/2006			4/17/2006	16:52	98.66		MOISTURI	MOIST	Moisture	1.34
4.00	EPAC	CHMC	F1508	J11JB5	J11JB5	N	SOIL	F150801	SW9045C	METHOD	4/9/2006	15:30	4/10/2006	4/12/2006	15:27	4/12/2006	15:27	98.66	SB1-0412	pH	PH	pH	7.28
4.00	EPAC	CHMC	F1508	BS1S0412	BS1S0412	BS	SOIL	BS1S0412	SW9045C	METHOD				4/12/2006	15:04	4/12/2006	15:04	100	SB1-0412	pH	PH	pH	7.11
4.00	EPAC	CHMC	F1508	BS1S0413	BS1S0413	BS	SOIL	BS1S0413	E350.3	METHOD				4/13/2006	12:40	4/13/2006	12:40	100	SB1-0413	7664-41-7	NH3N	Ammonia-I	196
4.00	EPAC	CHMC	F1508	BS1S0418	BS1S0418	BS	SOIL	BS1S0418	E351.4	METHOD				4/18/2006	10:51	4/18/2006	10:51	100	SB1-0418	7727-37-9	KN	Total Kjeld	807
4.00	EPAC	CHMC	F1508	BS1S0425	BS1S0425	BS	SOIL	BS1S0425	ASTM E77	NONE						4/25/2006	11:11	100		TOC	TOC	Total Orga	9120
4.00	EPAC	CHMC	F1508	BS1S0428	BS1S0428	BS	SOIL	BS1S0428	E300.0A	METHOD				4/28/2006	10:57	4/28/2006	10:57	100	SB1-0428	16887-00-I	CL	Chloride	52
4.00	EPAC	CHMC	F1508	BS1S0428	BS1S0428	BS	SOIL	BS1S0428	E300.0A	METHOD				4/28/2006	10:57	4/28/2006	10:57	100	SB1-0428	16984-48-I	F	Fluoride	51.5
4.00	EPAC	CHMC	F1508	BS1S0428	BS1S0428	BS	SOIL	BS1S0428	E300.0A	METHOD				4/28/2006	10:57	4/28/2006	10:57	100	SB1-0428	14808-79-I	SO4	Sulfate	51.6
4.00	EPAC	CHMC	F1508	BS2S0428	BS2S0428	BS	SOIL	BS2S0428	E300.0A	METHOD				4/28/2006	11:16	4/28/2006	11:16	100	SB1-0428	14797-65-I	NO2N	Nitrite-N	11.8
4.00	EPAC	CHMC	F1508	BS3S0428	BS3S0428	BS	SOIL	BS3S0428	E300.0A	METHOD				4/28/2006	11:26	4/28/2006	11:26	100	SB1-0428	14797-55-I	NO3N	Nitrate-N	72.9
4.00	EPAC	CHMC	F1508	SB1-0412	SB1-0412	LB	SOIL	SB1-0412	SW9045C	METHOD				4/12/2006	15:02	4/12/2006	15:02	100	SB1-0412	pH	PH	pH	6.04
4.00	EPAC	CHMC	F1508	SB1-0413	SB1-0413	LB	SOIL	SB1-0413	E350.3	METHOD				4/13/2006	12:44	4/13/2006	12:44	100	SB1-0413	7664-41-7	NH3N	Ammonia-I	1.28
4.00	EPAC	CHMC	F1508	SB1-0418	SB1-0418	LB	SOIL	SB1-0418	E351.4	METHOD				4/18/2006	10:53	4/18/2006	10:53	100	SB1-0418	7727-37-9	KN	Total Kjeld	100
4.00	EPAC	CHMC	F1508	SB1-0425	SB1-0425	LB	SOIL	SB1-0425	ASTM E77	NONE						4/25/2006	11:21	100		TOC	TOC	Total Orga	100
4.00	EPAC	CHMC	F1508	SB1-0428	SB1-0428	LB	SOIL	SB1-0428	E300.0A	METHOD				4/28/2006	11:36	4/28/2006	11:36	100	SB1-0428	16887-00-I	CL	Chloride	0.21
4.00	EPAC	CHMC	F1508	SB1-0428	SB1-0428	LB	SOIL	SB1-0428	E300.0A	METHOD				4/28/2006	11:36	4/28/2006	11:36	100	SB1-0428	16984-48-I	F	Fluoride	1
4.00	EPAC	CHMC	F1508	SB1-0428	SB1-0428	LB	SOIL	SB1-0428	E300.0A	METHOD				4/28/2006	11:36	4/28/2006	11:36	100	SB1-0428	14797-55-I	NO3N	Nitrate-N	1
4.00	EPAC	CHMC	F1508	SB1-0428	SB1-0428	LB	SOIL	SB1-0428	E300.0A	METHOD				4/28/2006	11:36	4/28/2006	11:36	100	SB1-0428	14797-65-I	NO2N	Nitrite-N	1
4.00	EPAC	CHMC	F1508	SB1-0428	SB1-0428	LB	SOIL	SB1-0428	E300.0A	METHOD				4/28/2006	11:36	4/28/2006	11:36	100	SB1-0428	14808-79-I	SO4	Sulfate	0.38

ExpectedV	Units	Dilution	MDL	RL	LabQualifi	Surrogate	Comments	ParValUnc	Recovery	LowerCont	UpperCont	Basis	ConcQual	MDLAdjus	RLAdjuste	SampleDe	LeachMeth	LeachDate	LeachTime	LeachLot	AnalysisLo	CalRefID
	MG/KG	1	96.8	277		N						D	=	96.8	277	J11JB5	NONE				SB1-0425	101405S1
	MG/KG	1	46.8	171		N						D	=	47.2	173	J11JB5	NONE				041806KN	041806TKN
	MG/KG	1	0.832	3.12		N						D	=	0.84	3.15	J11JB5	NONE				041306NH	040506NH3
	MG/KG	1	0.108	0.888		N						D	=	0.109	0.897	J11JB5	NONE				042806Q3	300A-013006
	MG/KG	1	0.0964	0.888	U	N						D	U	0.0973	0.897	J11JB5	NONE				042806Q3	300A-013006
	MG/KG	1	0.0834	0.888		N						D	=	0.0842	0.897	J11JB5	NONE				042806Q3	300A-013006
	MG/KG	1	0.0797	0.888	B	N						D	J	0.0805	0.897	J11JB5	NONE				042806Q3	300A-013006
	MG/KG	1	0.143	0.888		N						D	=	0.145	0.897	J11JB5	NONE				042806Q3	300A-013006
	PERCENT	1	0	0		N						D	=	0	0	J11JB5	NONE				041706MC	NONE
	PH UNITS	1	0	0		N						D	=	0	0	J11JB5	NONE				041206PH	NONE
7.15	PH UNITS	1	0	0		N			99.4	80	120	D	=	0	0		NONE				041206PH	NONE
200	MG/KG	1	0.534	2		N			98.1	75	125	D	=	0.534	2		NONE				041306NH	040506NH3
680	MG/KG	1	27.3	100		N			119	75	125	D	=	27.3	100		NONE				041806KN	041806TKN
8840	MG/KG	1	56.5	162		N			103	75	125	D	=	56.5	162		NONE				SB1-0425	101405S1
50	MG/KG	1	0.121	1		N			104	90	110	D	=	0.121	1		NONE				042806Q3	300A-013006
50	MG/KG	1	0.109	1		N			103	90	110	D	=	0.109	1		NONE				042806Q3	300A-013006
50	MG/KG	1	0.161	1		N			103	90	110	D	=	0.161	1		NONE				042806Q3	300A-013006
11.3	MG/KG	1	0.0898	1		N			104	90	110	D	=	0.0898	1		NONE				042806Q3	300A-013006
71.9	MG/KG	1	0.0939	1		N			101	90	110	D	=	0.0939	1		NONE				042806Q3	300A-013006
0	PH UNITS	1	0	0		N						D	=	0	0		NONE				041206PH	NONE
0	MG/KG	1	0.534	2	B	N						D	J	0.534	2		NONE				041306NH	040506NH3
0	MG/KG	1	27.3	100	U	N						D	U	27.3	100		NONE				041806KN	041806TKN
0	MG/KG	1	35	100	U	N						D	U	35	100		NONE				SB1-0425	101405S1
0	MG/KG	1	0.121	1	B	N						D	J	0.121	1		NONE				042806Q3	300A-013006
0	MG/KG	1	0.109	1	U	N						D	U	0.109	1		NONE				042806Q3	300A-013006
0	MG/KG	1	0.0939	1	U	N						D	U	0.0939	1		NONE				042806Q3	300A-013006
0	MG/KG	1	0.0898	1	U	N						D	U	0.0898	1		NONE				042806Q3	300A-013006
0	MG/KG	1	0.161	1	B	N						D	J	0.161	1		NONE				042806Q3	300A-013006

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BIOASSAY REPORT
CHRONIC SCREENING BIOASSAYS
Conducted April 26 through May 31, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD

Prepared by

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June 12, 2006
Lab I.D. Nos. BG1575-01 thru 11
SDG Number BG1575

SAF RC-051
SDG F1508

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APPENDIX A. RAW DATA SHEETS
APPENDIX B. CHAIN OF CUSTODY

INTRODUCTION

CH2M HILL conducted chronic screening bioassay tests using the Sandberg bluegrass (*Poa sandbergii*) on soil samples provided by the ELR Consulting for Washington Closure Hanford, Richland, Washington. The tests were conducted from April 26 through May 31, 2006.

METHODS AND MATERIALS

TEST METHODS

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

TEST ORGANISMS

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

CONTROL SOIL

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

HYDRATION WATER

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

TEST CONCENTRATIONS

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

SAMPLE COLLECTION

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

SAMPLE CROSS-REFERENCE TABLE

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

Table 1
Sample Cross-Reference

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

SAMPLE PREPARATION

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

TEST INITIATION

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

TEST MONITORING

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

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

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

TEST TERMINATION

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

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

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

DATA ANALYSIS

For each test chamber, the following endpoints were calculated:

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

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

RESULTS AND DISCUSSION

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

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

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

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

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

The results for sample J11JH9 indicated no statistically significant reduction when compared to the laboratory control.

The results for sample J11JB6 indicated no statistically significant reduction when compared to the laboratory control.

The results for sample J11JK34 indicated a statistically significant reduction in average above ground shoot mass (wet), average above ground shoot mass (dry), average root mass (wet), average root mass (dry), average total mass (shoots + roots, wet), and average total mass (shoots + roots, dry) when compared to the laboratory control.

The results for sample J11JK28 indicated a statistically significant reduction in 14 day germination, average 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 samples J11K61, J11K40, and J11JX6 indicated no statistically significant reduction when compared to the laboratory control.

Table 2: Bluegrass Chronic Test Results for Washington Closure Hanford

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

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

Lab ID:	Sample Number:	Bluegrass 14 day Germination Endpoint (%)	Significantly different compared to Lab Control?	Bluegrass Average Stem Height (mm)	Significantly different compared to Lab Control?	Bluegrass Average Root Length (mm)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Above Ground Shoot Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Wet) (mg)	Significantly different compared to Lab Control?	Average Root Mass (Dry) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Wet) (mg)	Significantly different compared to Lab Control?	Average Total Mass (Shoots + Roots) (Dry) (mg)	Significantly different compared to Lab Control?
Tests Initiated on April 28, 2008																			
Laboratory Control		88	--	21.7	--	28.2	--	34.2	--	8.05	--	36.2	--	1.54	--	70.4	--	7.59	--
BG1575-01	J11JB4	84	ns	17.8	ns	18.8	E [5]	27.0	ns	4.32	ns	29.2	ns	0.87	ns	56.2	ns	5.00	E [5]
BG1575-02	J11JB5	92	ns	16.8	ns	13.6	E [5]	30.4	ns	4.80	ns	29.2	ns	1.86	ns	59.6	ns	6.66	ns
BG1575-03	J11JH8	92	ns	16.7	ns	17.4	E [5]	27.2	ns	4.53	ns	38.3	ns	1.79	ns	65.5	ns	6.31	ns
BG1575-04	J11JJ0	96	ns	12.9	E [5]	15.0	W [5]	25.8	ns	3.55	E [5]	33.0	ns	1.92	ns	58.8	ns	5.47	ns
BG1575-05	J11JH9	78	ns	19.1	ns	19.1	ns	28.4	ns	4.72	ns	46.5	ns	2.15	ns	74.9	ns	6.86	ns
BG1575-06	J11JB6	80	ns	21.5	ns	18.0	ns	35.5	ns	5.04	ns	45.4	ns	1.81	ns	80.9	ns	6.85	ns
BG1575-07	J11K34	72	ns	27.8	ns	25.9	ns	16.8	E [5]	2.94	E [5]	14.4	E [5]	0.50	E [5]	31.2	E [5]	3.44	E [5]
BG1575-08	J11K28	44	E [5]	43.1	ns	41.8	ns	13.3	E [5]	2.83	E [5]	9.1	E [5]	0.70	E [5]	22.4	E [5]	3.33	E [5]
BG1575-09	J11K61	80	ns	27.9	ns	25.5	ns	34.4	ns	5.76	ns	39.1	ns	1.24	ns	73.5	ns	6.99	ns
BG1575-10	J11K40	80	ns	22.6	ns	21.3	ns	38.7	ns	6.31	ns	34.7	ns	1.67	ns	71.4	ns	8.98	ns
BG1575-11	J11JX8	68	ns	34.0	ns	42.9	ns	27.1	ns	4.84	ns	38.7	ns	1.80	ns	63.8	ns	6.44	ns

CERTIFICATION STATEMENT

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

APPENDIX A
RAW DATA SHEETS

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials:

Day 0 DD/Bm Day 12 _____ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 NJ Day 28 TP Day 35 Bm

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

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		6	6	7	8	8	5	5	6.2	7.5
	B		5	5	5	5	5	5	5		
	C		4	4	4	4	4	4	2L, 2 dead		
	D		5	6	6	6	6	5	5		
	E		7	7	8	8	8	5	5		

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

Replicate A 2lg G, 3 md G Removed 3sm G - w/1 B tip

Replicate B 4lg G, 1md G

Replicate C 1lg G 1sm G 2sm B

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

Replicate E 5lg G Removed 2lg G + 1md G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A 1 Md G 4 Md w/ 1 B shoot.

Replicate B 1 Lg w/ 1 B shoot 2 Med G, 2 Med w/ 1 B shoot.

Replicate C 1 Lg w/ 1 B shoot 1 Med G, 2 Sm dead - removed

Replicate D 2 Md G, 2 Md w/ 1 B shoot.

Replicate E 2 Lg G, 2 Lg G w/ 1 B shoot each.

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	31 mm	70 mm	70 mm	100 mm	72 mm
Replicate B	120 mm	95 mm	75 mm	85 mm	90 mm
Replicate C	45 mm	89 mm	mm	mm	mm
Replicate D	102 mm	93 mm	80 mm	81 mm	98 mm
Replicate E	110 mm	128 mm	146 mm	95 mm	98 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	995.35	1147.4	1018.02
Replicate B	1245.74	1411.6	1278.86
Replicate C	1257.58	1297.5	1265.85
Replicate D	1252.12	1423.3	1283.56
Replicate E	1237.76	1503.8	~~1283.58~~ 1281.17

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

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

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

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

Comments:

BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 11-26-96

Initials: Day 0 (A) Day 12 _____ Day 14 NJ Day 16 NJ Day 19 (TP) Day 21 NJ Day 23 NJ Day 33 NJ Day 35 DW

Bioassay Lab ID: BG 1575-01 Sample No: J11JB4

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		3	3	4	4	4	4	4	6.2	7.3
	B		2	2	3	3	3	3	3		
	C		2	3	4	6	6	5	5		
	D		1	2	3	4	4	4	4		
	E		2	3	4	4	5	5	5		

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

Replicate A: 3lg G, 1md G

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

Replicate C: ~~3~~ 2lg G, 1md G, 2sm G Removed 1sm G

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

Replicate E: 2lg G, 3sm G

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest, 5+ shoots), # Med = # of plants (smaller than large, fewer shoots), # Sm = # small plants (1-3 shoots)

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 md G, 3 md w/ B tips

Replicate B: 2 Lg G, 1 Sm G

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

Replicate D: 2 Md G 2 Sm G

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

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

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

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	992.17 ~~1001.15~~	1142.10	1022.45
Replicate B	1257.92	1357.10	1272.72
Replicate C	1255.06	1374.49	1273.56
Replicate D	1265.17	1318.15	1273.04
Replicate E	1248.72	1386.52	1265.96

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	45 mm	81 mm	78 mm	112 mm	mm
Replicate B	76 mm	133 mm	41 mm	mm	mm
Replicate C	26 mm	39 mm	98 mm	93 mm	92 mm
Replicate D	67 mm	22 mm	36 mm	70 mm	mm
Replicate E	78 mm	47 mm	36 mm	13 mm	86 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1001.15 ~~992.17~~	1149.40	997.78
Replicate B	1246.57	1360.91	1251.37
Replicate C	1262.94	1424.60	1267.81
Replicate D	1245.56	1302.11	1248.15
Replicate E	1246.83	1368.20	1251.77

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 11:54 AM
Test Link: 01-5490-7432/B157501psc

Plant Chronic test — **CH2M Hill**

Test No:	15-9699-0343	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

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

Comments: J11JB4

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
00-4445-8819	% Germination	100	> 100	N/A	28.11%	Wilcoxon Rank Sum Two-Sample
05-4687-7944	AG Average Dry Wt.	100	> 100	N/A	38.17%	Equal Variance t Two-Sample
09-9360-9499	AG Average Height	100	> 100	N/A	41.18%	Equal Variance t Two-Sample
03-4688-6730	AG Average Wet Wt.	100	> 100	N/A	36.98%	Equal Variance t Two-Sample
03-4734-7130	Root Average Dry Wt.	100	> 100	N/A	62.26%	Equal Variance t Two-Sample
19-4429-6604	Root Average Length	< 100	100	N/A	34.73%	Equal Variance t Two-Sample
20-1135-4620	Root Average Wet Wt.	100	> 100	N/A	49.20%	Equal Variance t Two-Sample
10-7667-2564	Total Average Biomass Dry	< 100	100	N/A	32.75%	Equal Variance t Two-Sample
11-2543-1866	Total Average Biomass Wet	100	> 100	N/A	42.46%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 11:54 AM
Test Link: 01-5490-7432/B157501psc

% Germination Summary

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

AG Average Dry Wt. Summary

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

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	17.767	9.8	30.333	3.6288	8.1143	45.67%

AG Average Wet Wt. Summary

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

Root Average Dry Wt. Summary

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

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	16.813	10.4	27.667	3.1328	7.0052	41.66%

Root Average Wet Wt. Summary

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

Total Average Biomass Dry Wt. Summary

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

Total Average Biomass Wet Wt. Summary

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

CETIS Test Summary

Report Date: 05 Jun-06 11:54 AM
Test Link: 01-5490-7432/B157501psc

% Germination Detail

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

AG Average Dry Wt. Detail

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

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		21	30.3333	13.2	14.5	9.8

AG Average Wet Wt. Detail

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

Root Average Dry Wt. Detail

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

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		19.75	27.6667	14	12.25	10.4

Root Average Wet Wt. Detail

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

Total Average Biomass Dry Wt. Detail

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

Total Average Biomass Wet Wt. Detail

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

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	01-5490-7432	01-5490-7432	05 Jun-06 11:54 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	28.11%

Group Comparisons

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

ANOVA Table

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

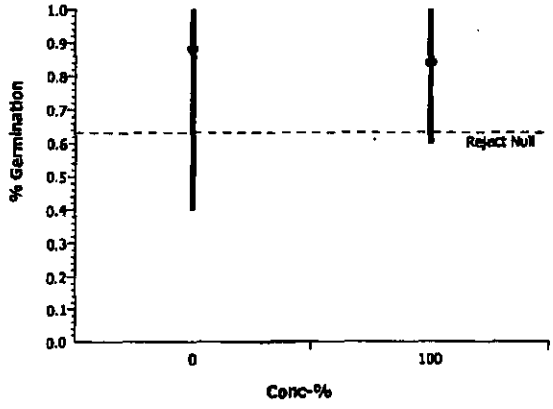
ANOVA Assumptions

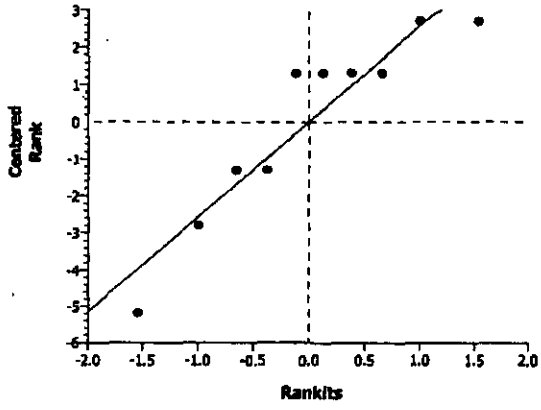
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.33866	23.15450	0.43080	Equal Variances
Distribution	Shapiro-Wilk W	0.77968		0.00820	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	01-5490-7432	01-5490-7432	05 Jun-06 11:54 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	38.17%

Group Comparisons

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

ANOVA Table

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

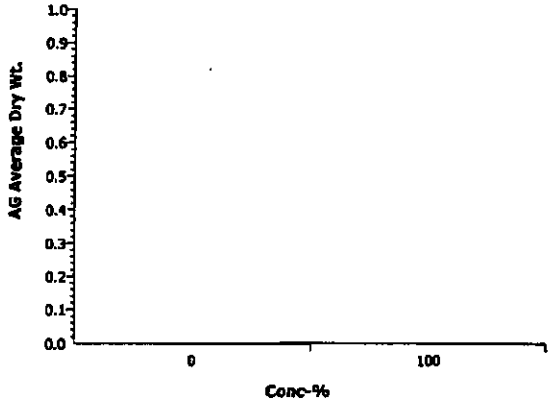
ANOVA Assumptions

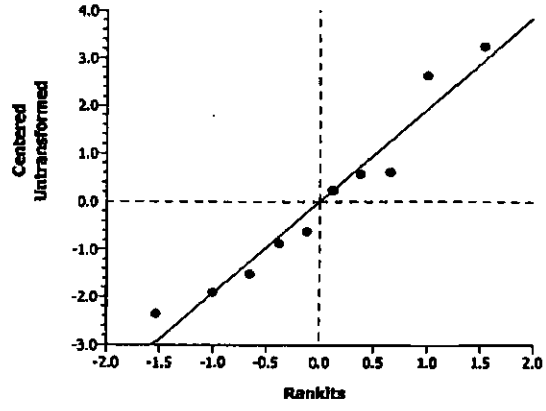
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.32865	23.15450	0.78970	Equal Variances
Distribution	Shapiro-Wilk W	0.93627		0.51234	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	01-5490-7432	01-5490-7432	05 Jun-06 11:54 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	41.18%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.82527	1.85955	0.2166	8.95292	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	39.46844	39.46844	1	0.68	0.43313	Non-Significant Effect
Error	463.6009	57.95011	8			
Total	503.069336	97.418556	9			

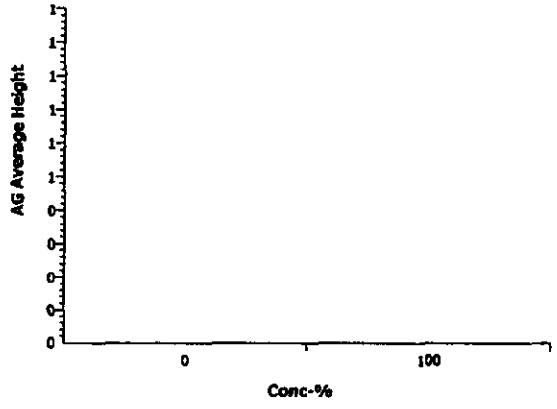
ANOVA Assumptions

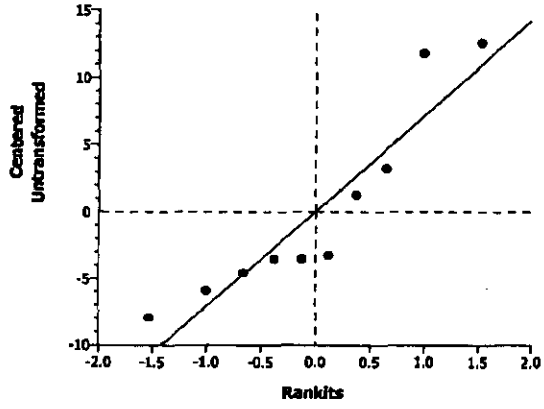
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.31532	23.15450	0.79698	Equal Variances
Distribution	Shapiro-Wilk W	0.85209		0.06150	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752				
100		5	17.767	9.8	30.333	8.1143				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**		**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Wet Wt.	Comparison		01-5490-7432	01-5490-7432	05 Jun-06 11:54 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	36.98%

Group Comparisons

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

ANOVA Table

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

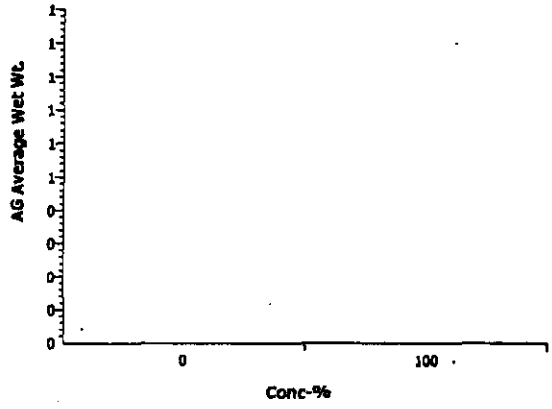
ANOVA Assumptions

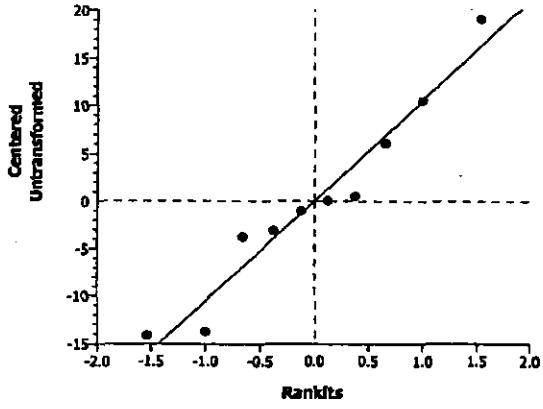
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.67756	23.15450	0.62853	Equal Variances
Distribution	Shapiro-Wilk W	0.94965		0.66441	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	01-5490-7432	01-5490-7432	05 Jun-06 11:54 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	62.26%

Group Comparisons

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

ANOVA Table

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

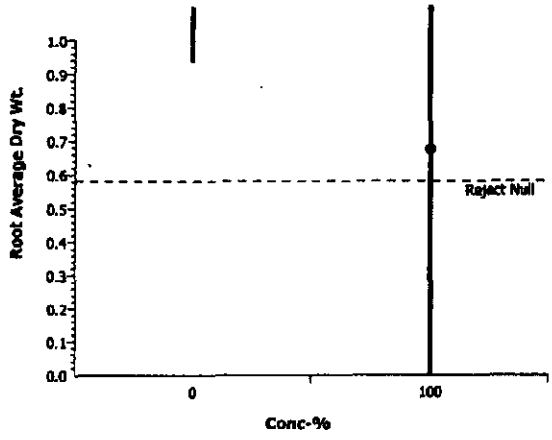
ANOVA Assumptions

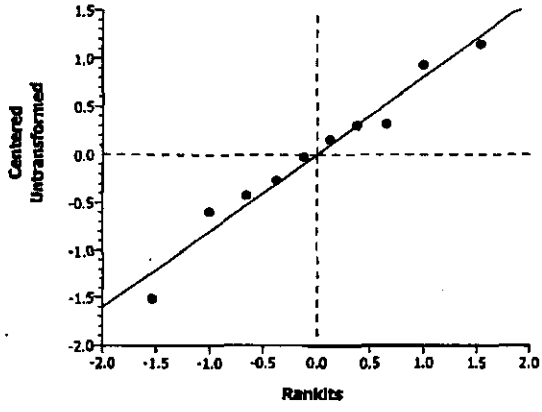
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.72351	23.15450	0.61089	Equal Variances
Distribution	Shapiro-Wilk W	0.96848		0.87637	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	01-5490-7432	01-5490-7432	05 Jun-06 11:54 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	34.73%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.91283	1.85955	0.0461	9.08633	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	218.4005	218.4005	1	3.66	0.09213	Non-Significant Effect
Error	477.5206	59.69007	8			
Total	695.921021	278.09052	9			

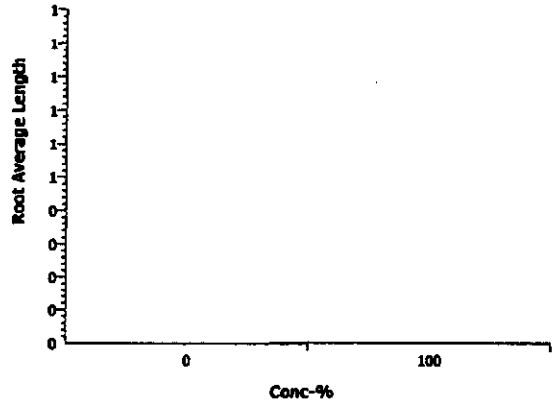
ANOVA Assumptions

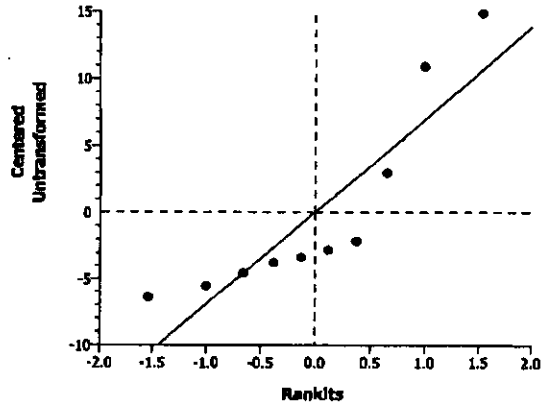
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.43275	23.15450	0.73599	Equal Variances
Distribution	Shapiro-Wilk W	0.78969		0.01086	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	26.16	20.6	41	8.385				
100		5	16.813	10.4	27.667	7.0052				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	01-5490-7432	01-5490-7432	05 Jun-06 11:54 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	49.20%

Group Comparisons

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

ANOVA Table

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

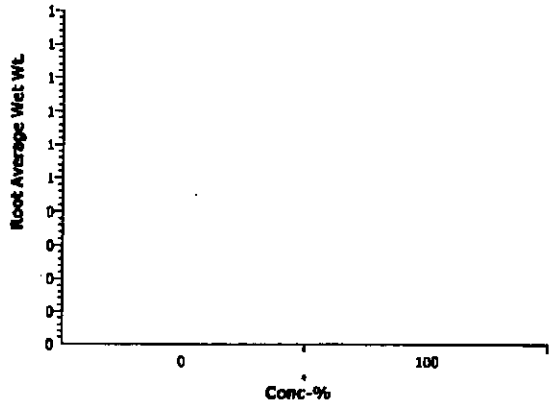
ANOVA Assumptions

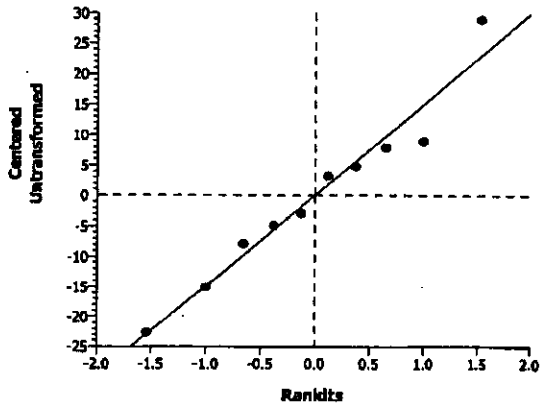
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.57181	23.15450	0.24520	Equal Variances
Distribution	Shapiro-Wilk W	0.96953		0.88643	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	01-5490-7432	01-5490-7432	05 Jun-06 11:54 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.75%

Group Comparisons

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

ANOVA Table

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

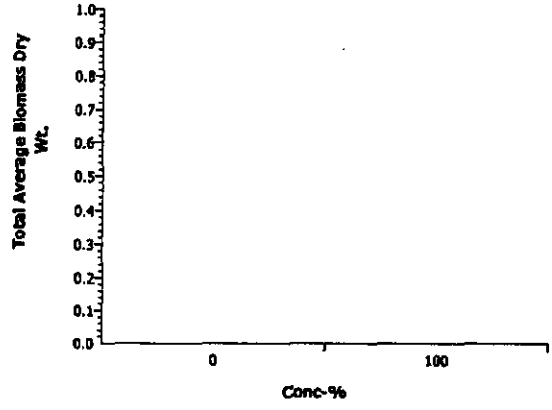
ANOVA Assumptions

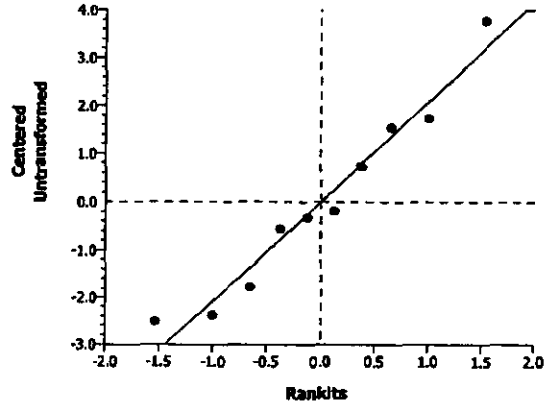
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.12204	23.15450	0.48412	Equal Variances
Distribution	Shapiro-Wilk W	0.95228		0.69553	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Total Average Biomass Wet Wt.	Comparison	01-5490-7432	01-5490-7432	05 Jun-06 11:54 AM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	42.48%

Group Comparisons

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

ANOVA Table

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

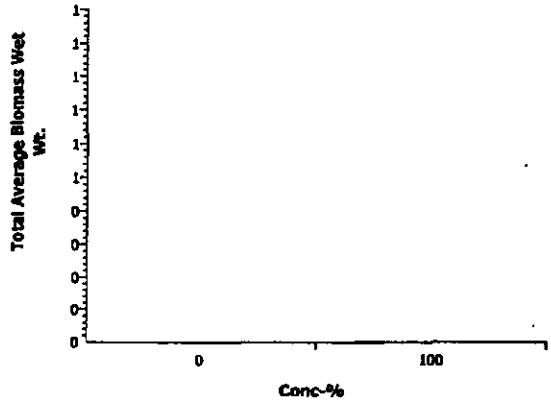
ANOVA Assumptions

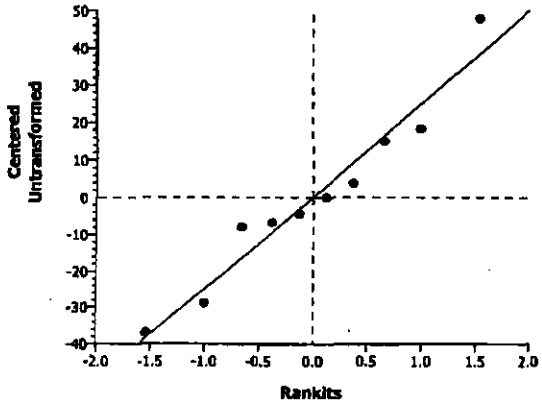
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.67346	23.15450	0.36394	Equal Variances
Distribution	Shapiro-Wilk W	0.95865		0.77041	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 (TP) Day 12 _____ Day 14 NJ Day 16 NJ Day 19 (TP) Day 21 NJ Day 23 NJ Day 28 (TP) Day 35 [illegible]

Bioassay Lab ID: BG 1575-02 Sample No: J1JB5

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		6	7	7	7	7	7 → 5	5	6.4	7.2
	B		2	3	5	5	5	5 → 5	5		
	C		1	1	2	2	4	4 → 4	4		
	D		3	4	4	5	6	6 → 5	5		
	E		NT 3	3	4	4	4	4	4		

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

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

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

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

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

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

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 5 Lg G

Replicate B: 2 Lg G, 3 med G

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

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

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

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

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

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1002.78	1242.2	1042.12
Replicate B	1243.18	1405.9	1269.41
Replicate C	1250.91	1333.8	1260.26
Replicate D	1254.41	1336.8	1258.58
Replicate E	1247.05	1449.9	1277.97

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	93 mm	84 mm	63 mm	70 mm	73 mm
Replicate B	114 mm	44 mm	96 mm	55 mm	67 mm
Replicate C	39 mm	47 mm	36 mm	71 mm	mm
Replicate D	30 mm	38 mm	31 mm	46 mm	34 mm
Replicate E	95 mm	56 mm	66 mm	94 mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	999.21	1244.1	1016.41
Replicate B	1244.66	1385.4	1255.35
Replicate C	1260.50	1337.0	1264.27
Replicate D	NT 1255.49	1287.0	1257.40
Replicate E	1254.57	1448.3	1264.16

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 1:08 PM
Test Link: 08-9288-3730/B157502psc

Plant Chronic test — **CH2M Hill**

Test No:	12-3841-4549	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

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

Comments: J11JB5

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
10-6433-8072	% Germination	100	> 100	N/A	25.39%	Wilcoxon Rank Sum Two-Sample
09-0109-2012	AG Average Dry Wt.	100	> 100	N/A	50.12%	Equal Variance t Two-Sample
02-4303-2633	AG Average Height	100	> 100	N/A	38.08%	Equal Variance t Two-Sample
04-5906-2559	AG Average Wet Wt.	100	> 100	N/A	56.09%	Equal Variance t Two-Sample
03-3028-7706	Root Average Dry Wt.	100	> 100	N/A	75.69%	Equal Variance t Two-Sample
13-1608-2134	Root Average Length	< 100	100	N/A	30.35%	Equal Variance t Two-Sample
10-3116-6838	Root Average Wet Wt.	100	> 100	N/A	62.32%	Equal Variance t Two-Sample
08-8542-3021	Total Average Biomass Dry	100	> 100	N/A	54.62%	Equal Variance t Two-Sample
11-4607-5895	Total Average Biomass Wet	100	> 100	N/A	58.66%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:08 PM
Test Link: 08-9288-3730/B157502psc

% Germination Summary

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

AG Average Dry Wt. Summary

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

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	16.83	8	26.75	3.1311	7.0014	41.60%

AG Average Wet Wt. Summary

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

Root Average Dry Wt. Summary

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

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	13.82	7.2	19.5	2.0407	4.5631	33.02%

Root Average Wet Wt. Summary

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

Total Average Biomass Dry Wt. Summary

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

Total Average Biomass Wet Wt. Summary

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

CETIS Test Summary

Report Date: 05 Jun-06 1:08 PM
Test Link: 08-9288-3730/B157502psc

% Germination Detail

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

AG Average Dry Wt. Detail

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

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		19	17.4	13	8	26.75

AG Average Wet Wt. Detail

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

Root Average Dry Wt. Detail

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

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		15.4	15	12	7.2	19.5

Root Average Wet Wt. Detail

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

Total Average Biomass Dry Wt. Detail

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

Total Average Biomass Wet Wt. Detail

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

CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
% Germination	Comparison	08-9288-3730	08-9288-3730	05 Jun-06 1:07 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	25.39%

Group Comparisons

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

ANOVA Table

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

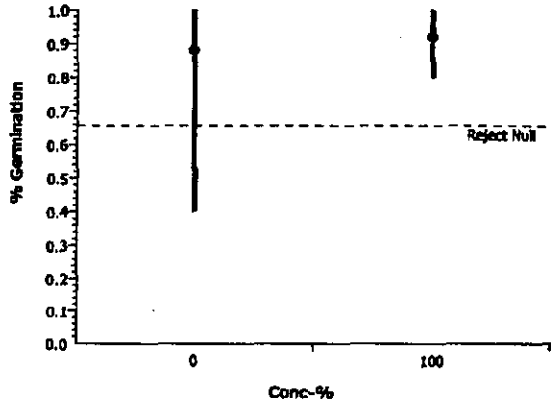
ANOVA Assumptions

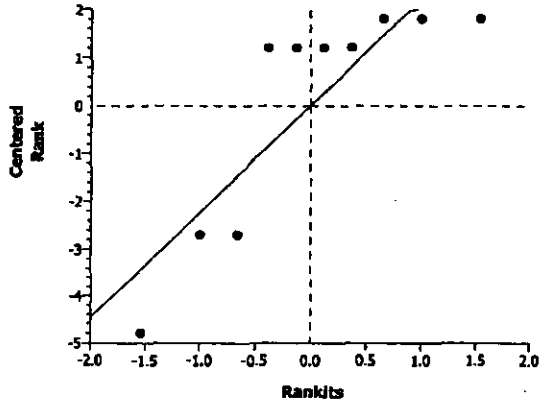
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.12973	23.15450	0.14232	Equal Variances
Distribution	Shapiro-Wilk W	0.68083		0.00052	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Dry Wt.	Comparison	08-9288-3730	08-9288-3730	05 Jun-06 1:07 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	50.12%

Group Comparisons

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

ANOVA Table

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

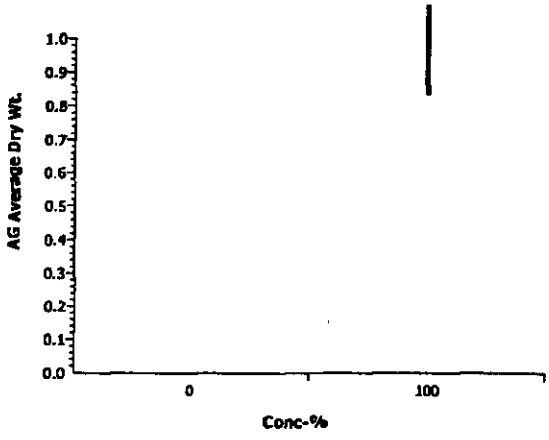
ANOVA Assumptions

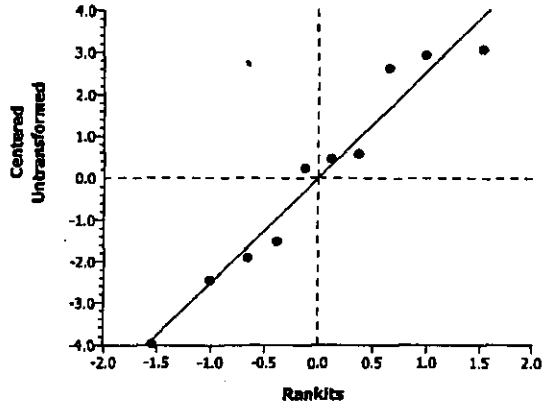
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.01584	23.15450	0.31028	Equal Variances
Distribution	Shapiro-Wilk W	0.93288		0.47676	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	08-9288-3730	08-9288-3730	05 Jun-06 1:07 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	38.08%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.10301	1.85955	0.1510	8.27770	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	60.27025	60.27025	1	1.22	0.30210	Non-Significant Effect
Error	396.31	49.53875	8			
Total	456.580246	109.809	9			

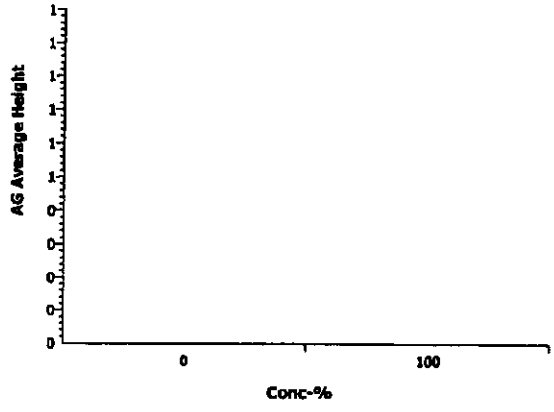
ANOVA Assumptions

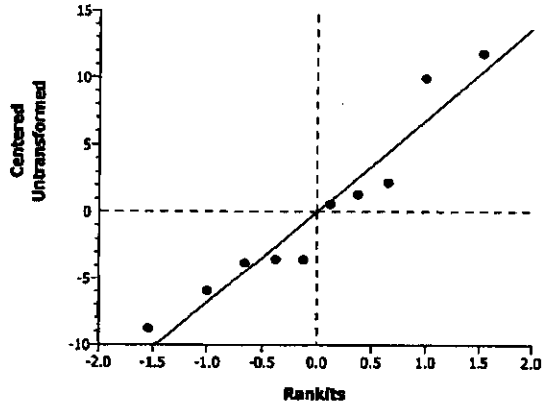
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.02119	23.15450	0.98428	Equal Variances
Distribution	Shapiro-Wilk W	0.91768		0.33798	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752				
100		5	16.83	8	26.75	7.0014				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	08-9288-3730	08-9288-3730	05 Jun-06 1:08 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	56.09%

Group Comparisons

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

ANOVA Table

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

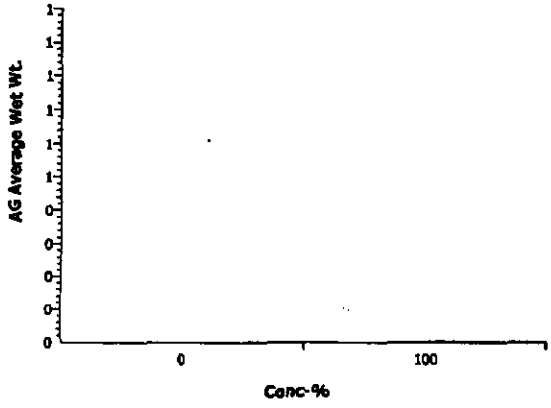
ANOVA Assumptions

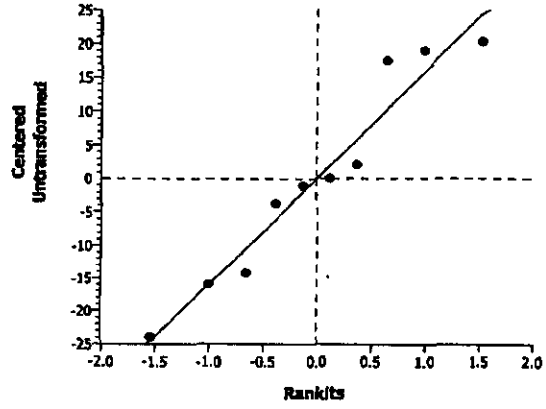
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.67268	23.15450	0.36408	Equal Variances
Distribution	Shapiro-Wilk W	0.92799		0.42844	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	08-9288-3730	08-9288-3730	05 Jun-06 1:08 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	75.69%

Group Comparisons

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

ANOVA Table

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

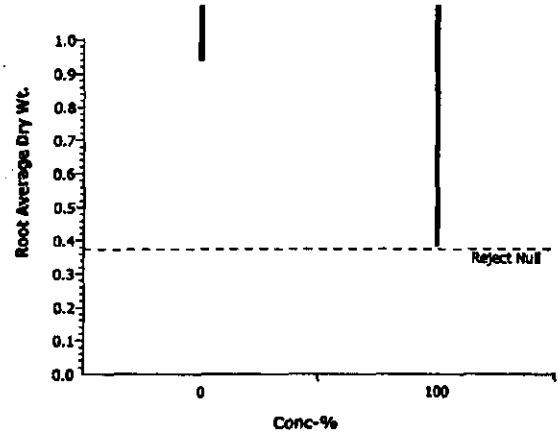
ANOVA Assumptions

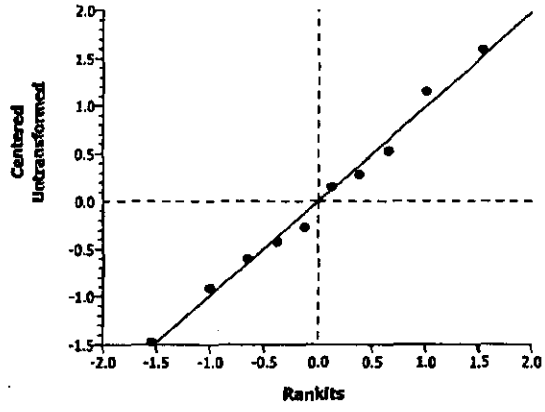
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.02456	23.15450	0.30907	Equal Variances
Distribution	Shapiro-Wilk W	0.98618		0.98959	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	08-9288-3730	08-9288-3730	05 Jun-06 1:08 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	30.35%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.89048	1.85955	0.0101	7.93877	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	380.689	380.689	1	8.35	0.02018	Significant Effect
Error	364.52	45.565	8			
Total	745.208984	426.25399	9			

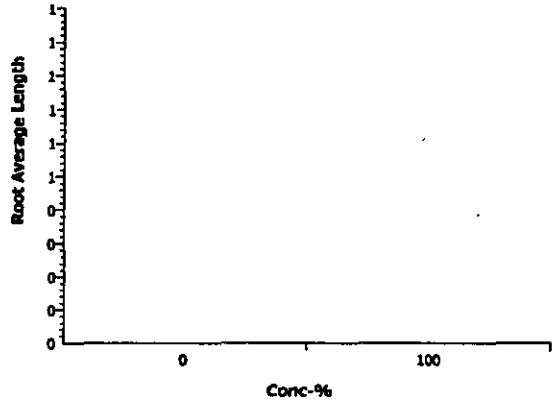
ANOVA Assumptions

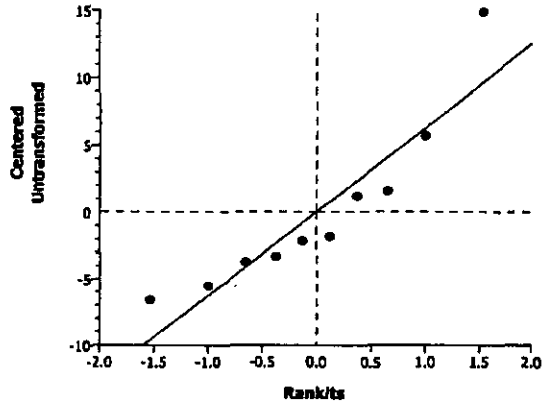
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.37662	23.15450	0.26552	Equal Variances
Distribution	Shapiro-Wilk W	0.86191		0.08038	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	26.16	20.6	41	8.385				
100		5	13.82	7.2	19.5	4.5631				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	08-9288-3730	08-9288-3730	05 Jun-06 1:08 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	62.32%

Group Comparisons

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

ANOVA Table

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

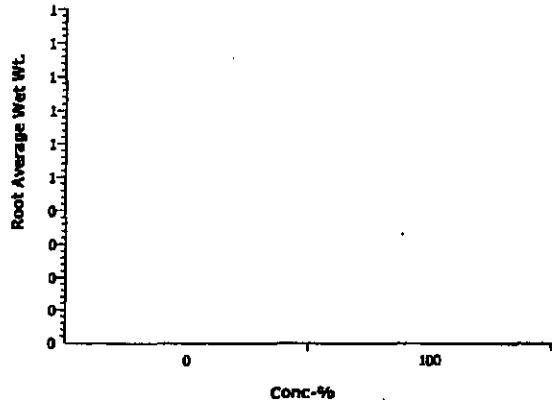
ANOVA Assumptions

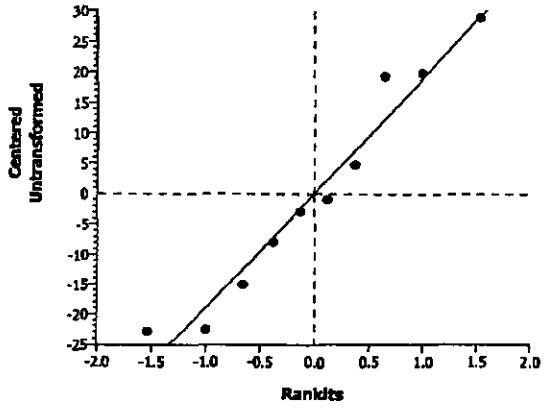
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.05362	23.15450	0.96085	Equal Variances
Distribution	Shapiro-Wilk W	0.93785		0.52939	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	08-9288-3730	08-9288-3730	05 Jun-06 1:08 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	54.62%

Group Comparisons

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

ANOVA Table

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

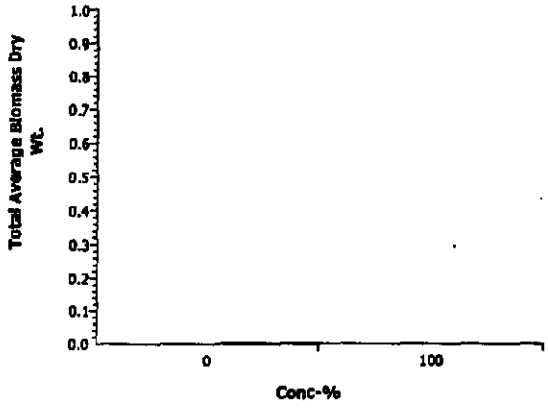
ANOVA Assumptions

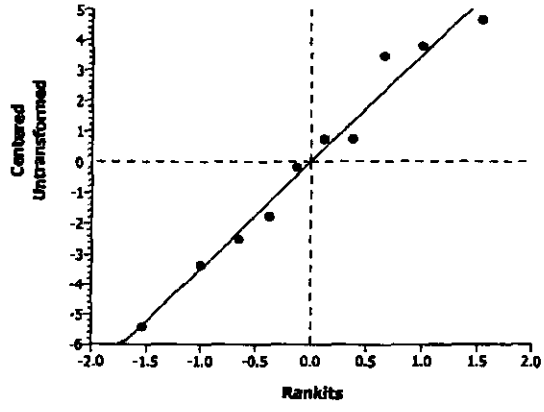
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.09181	23.15450	0.29997	Equal Variances
Distribution	Shapiro-Wilk W	0.95953		0.78055	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Total Average Biomass Wet Wt.	Comparison	08-9288-3730	08-9288-3730	05 Jun-06 1:08 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	58.66%

Group Comparisons

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

ANOVA Table

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

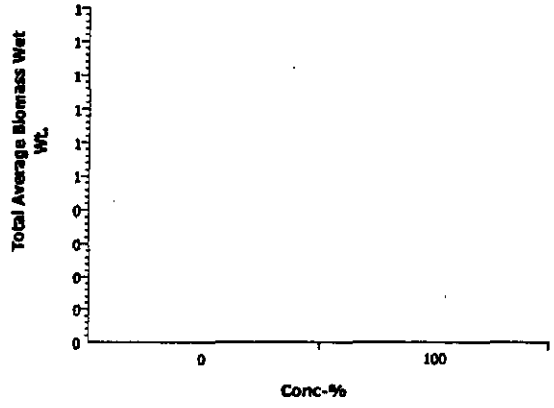
ANOVA Assumptions

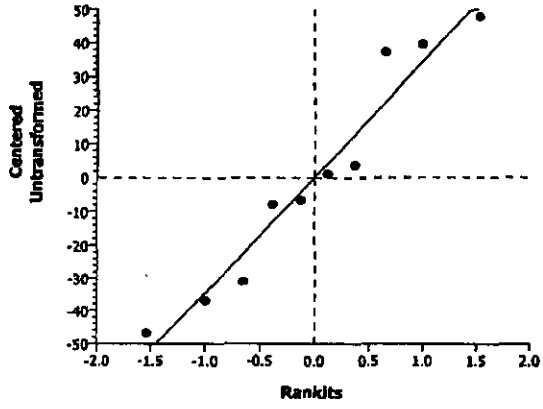
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.62045	23.15450	0.65148	Equal Variances
Distribution	Shapiro-Wilk W	0.92956		0.44353	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 (NJ) Day 12 ____ Day 14 NJ Day 18 NJ Day 19 (TP) Day 21 NJ Day 23 NJ Day 28 (TP) Day 35 Bm

Bioassay Lab ID: BG 1575-03 Sample No: J11JH6

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		2	3	4	4	4	5 -> 5	4 Live, 1 dead	6.4	7.2
	B		4	6	7	7	7	7 -> 5	5		
	C		4	4	5	6	6	6 -> 5	5		
	D		5	6	6	7	10	10 -> 5	4*		
	E		4	5	4	4	4	7 -> 5	5		

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

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

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

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

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

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

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted. # Lg = # of large plants (tallest, 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, 2 med w/ 1 B shoot each, dead plant removed - 1 broadleaf removed

Replicate B: 3 Lg G, 1 Md G, 1 Md w/ 1 B shoot - 1 broadleaf removed

Replicate C: 3 Md G, 2 Sm G - 1 broadleaf removed

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

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	80 mm	83 mm	97 mm	52 mm	mm
Replicate B	102 mm	75 mm	55 mm	89 mm	100 mm
Replicate C	63 mm	70 mm	64 mm	37 mm	34 mm
Replicate D	81 mm	100 mm	121 mm	34 mm	mm
Replicate E	94 mm	42 mm	76 mm	134 mm	34 mm

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

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

Describe root appearance:

Replicate A:

Replicate B:

Replicate C:

Replicate D:

Replicate E:

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	98 mm	47 mm	89 mm	105 mm	mm
Replicate B	77 mm	82 mm	122 mm	113 mm	89 mm
Replicate C	88 mm	60 mm	88 mm	75 mm	35 mm
Replicate D	108 mm	49 mm	114 mm	74 mm	mm
Replicate E	84 mm	130 mm	81 mm	53 mm	40 mm

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

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

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

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

CETIS Test Summary

Report Date: 05 Jun-06 1:11 PM
Test Link: 17-8681-9524/B157503psc

Plant Chronic test — **CH2M Hill**

Test No:	05-8591-7312	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

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

Comments: J11JH6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
06-5828-5538	% Germination	100	> 100	N/A	25.39%	Wilcoxon Rank Sum Two-Sample
07-7490-4773	AG Average Dry Wt.	100	> 100	N/A	32.40%	Equal Variance t Two-Sample
01-4877-6460	AG Average Height	100	> 100	N/A	31.05%	Equal Variance t Two-Sample
12-0817-2449	AG Average Wet Wt.	100	> 100	N/A	38.84%	Equal Variance t Two-Sample
16-8309-1826	Root Average Dry Wt.	100	> 100	N/A	46.09%	Equal Variance t Two-Sample
01-7072-4958	Root Average Length	< 100	100	N/A	28.84%	Equal Variance t Two-Sample
06-4871-2664	Root Average Wet Wt.	100	> 100	N/A	55.30%	Equal Variance t Two-Sample
07-1631-4873	Total Average Biomass Dry	100	> 100	N/A	34.60%	Equal Variance t Two-Sample
04-8179-8176	Total Average Biomass Wet	100	> 100	N/A	46.90%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:11 PM
Test Link: 17-8681-9524/B157503psc

% Germination Summary

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

AG Average Dry Wt. Summary

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

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	16.66	10.8	21	1.7803	3.981	23.90%

AG Average Wet Wt. Summary

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

Root Average Dry Wt. Summary

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

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	17.39	12.6	21.5	1.5478	3.4609	19.90%

Root Average Wet Wt. Summary

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

Total Average Biomass Dry Wt. Summary

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

Total Average Biomass Wet Wt. Summary

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

CETIS Test Summary

Report Date: 05 Jun-06 1:11 PM
Test Link: 17-8681-9524/B157503psc

% Germination Detail

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

AG Average Dry Wt. Detail

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

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		19.5	16.8	10.8	21	15.2

AG Average Wet Wt. Detail

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

Root Average Dry Wt. Detail

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

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		19.25	18.2	12.6	21.5	15.4

Root Average Wet Wt. Detail

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

Total Average Biomass Dry Wt. Detail

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

Total Average Biomass Wet Wt. Detail

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

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	17-8681-9524	17-8681-9524	05 Jun-06 1:11 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	25.39%

Group Comparisons

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

ANOVA Table

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

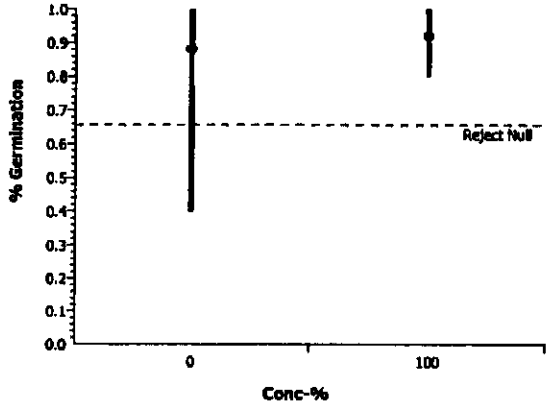
ANOVA Assumptions

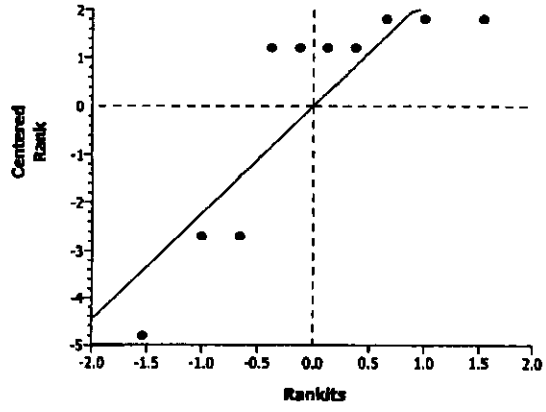
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.12973	23.15450	0.14232	Equal Variances
Distribution	Shapiro-Wilk W	0.68083		0.00052	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Dry Wt.	Comparison	17-8681-9524	17-8681-9524	05 Jun-06 1:11 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	32.40%

Group Comparisons

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

ANOVA Table

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

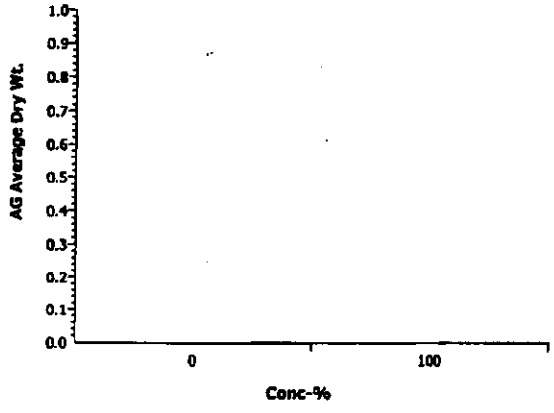
ANOVA Assumptions

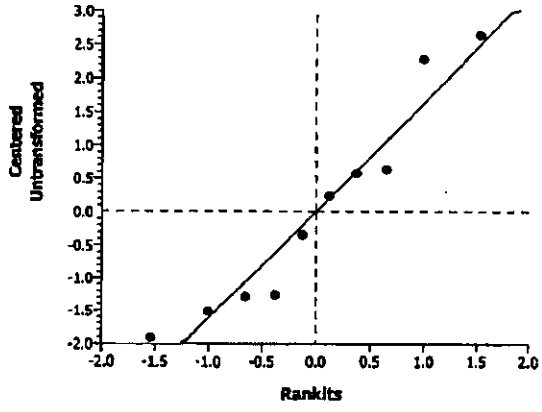
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.47550	23.15450	0.71542	Equal Variances
Distribution	Shapiro-Wilk W	0.91713		0.33365	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	17-8681-9524	17-8681-9524	05 Jun-06 1:11 PM	CETISv1.1.2

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	31.05%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.39922	1.85955	0.0997	6.75126	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	64.516	64.516	1	1.96	0.19930	Non-Significant Effect
Error	263.624	32.953	8			
Total	328.139992	97.468998	9			

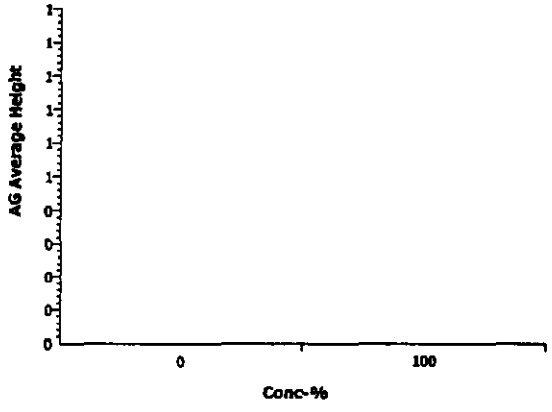
ANOVA Assumptions

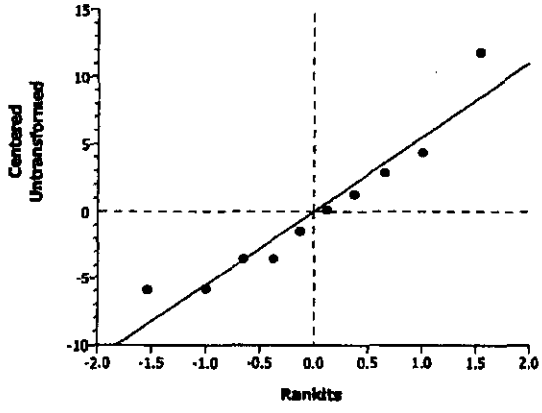
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.15863	23.15450	0.29132	Equal Variances
Distribution	Shapiro-Wilk W	0.91502		0.31731	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752				
100		5	16.66	10.8	21	3.981				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M HILL**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	17-8681-9524	17-8681-9524	05 Jun-06 1:11 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	38.84%

Group Comparisons

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

ANOVA Table

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

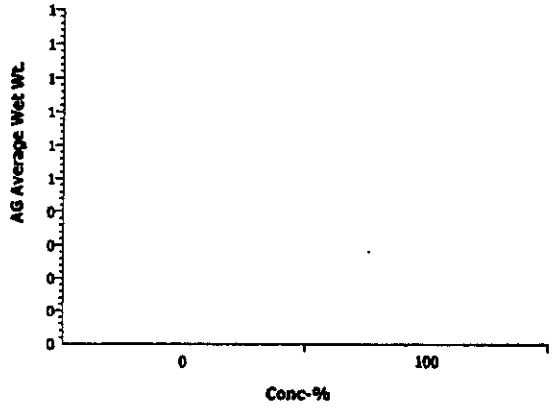
ANOVA Assumptions

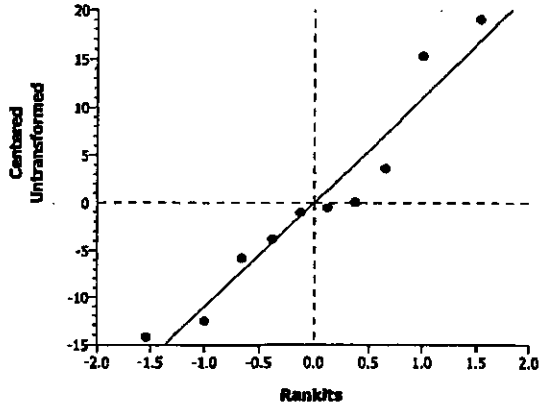
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.31442	23.15450	0.79747	Equal Variances
Distribution	Shapiro-Wilk W	0.92795		0.42805	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	17-8681-9524	17-8681-9524	05 Jun-06 1:11 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	46.09%

Group Comparisons

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

ANOVA Table

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

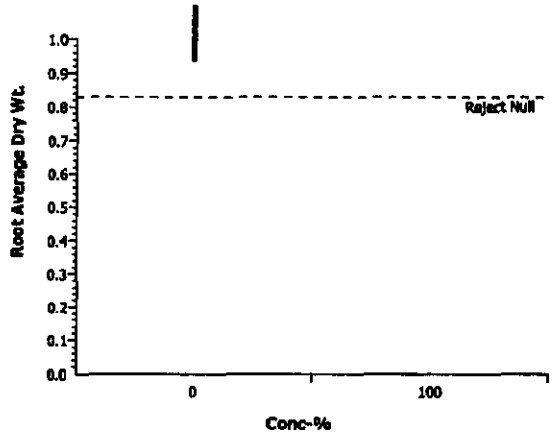
ANOVA Assumptions

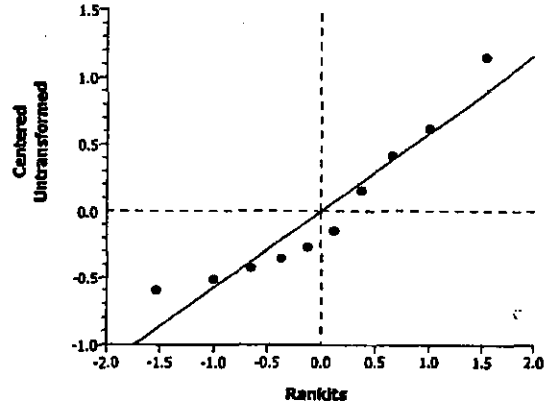
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.02940	23.15450	0.50991	Equal Variances
Distribution	Shapiro-Wilk W	0.90272		0.23460	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	17-8681-9524	17-8681-9524	05 Jun-06 1:11 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	28.84%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.16183	1.85955	0.0313	7.54372	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	192.2823	192.2823	1	4.67	0.06261	Non-Significant Effect
Error	329.144	41.143	8			
Total	521.42627	233.42526	9			

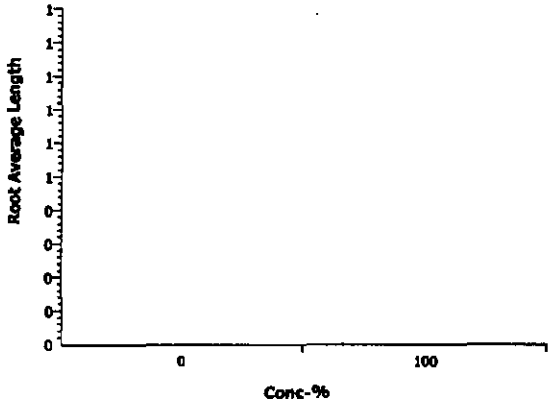
ANOVA Assumptions

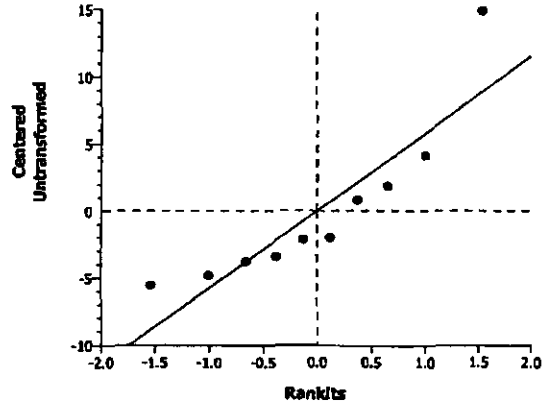
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	5.86976	23.15450	0.11480	Equal Variances
Distribution	Shapiro-Wilk W	0.81268		0.02067	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	26.16	20.6	41	8.385				
100		5	17.390	12.6	21.5	3.4609				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	17-8681-9524	17-8681-9524	05 Jun-06 1:11 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	55.30%

Group Comparisons

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

ANOVA Table

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

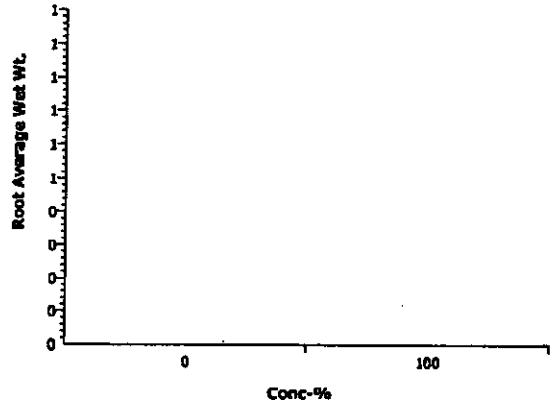
ANOVA Assumptions

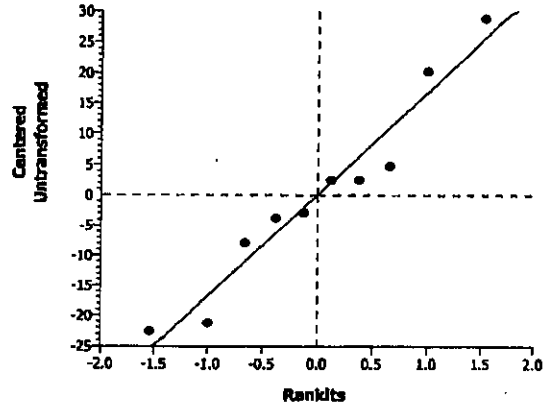
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.62064	23.15450	0.65140	Equal Variances
Distribution	Shapiro-Wilk W	0.94540		0.61452	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	17-8681-9524	17-8681-9524	05 Jun-06 1:11 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.60%

Group Comparisons

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

ANOVA Table

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

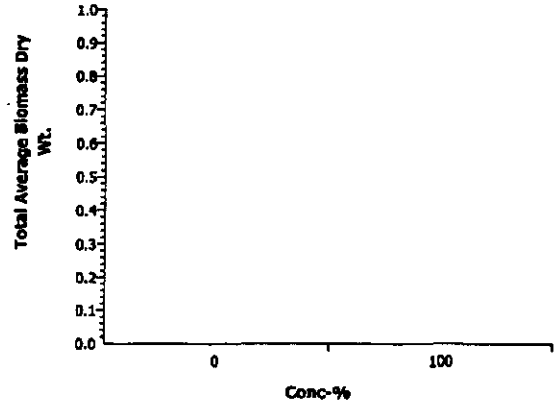
ANOVA Assumptions

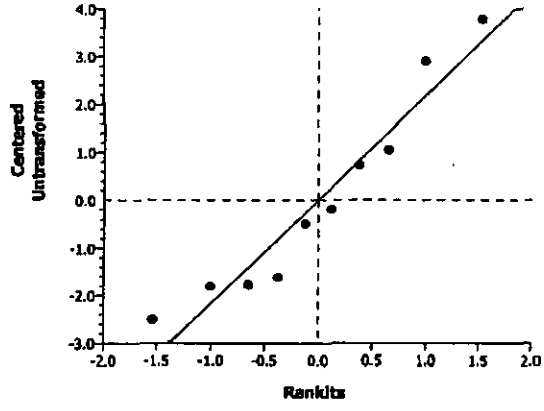
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.55825	23.15450	0.67787	Equal Variances
Distribution	Shapiro-Wilk W	0.92039		0.36024	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	17-8681-9524	17-8681-9524	05 Jun-06 1:11 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	46.90%

Group Comparisons

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

ANOVA Table

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

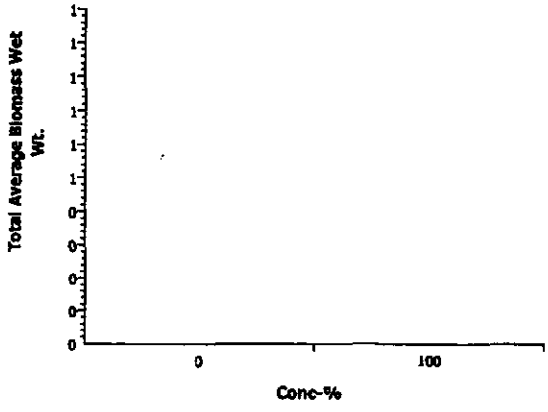
ANOVA Assumptions

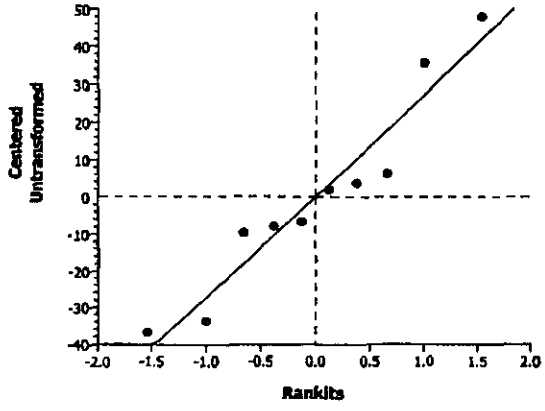
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.48202	23.15450	0.71236	Equal Variances
Distribution	Shapiro-Wilk W	0.92915		0.43960	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

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

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

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		5	5	5	6	6	6 -> 5	5	6.4	7.4
	B		6	6	8	8	8	9 -> 5	5		
	C		3	3	3	4	4	4 -> 4	4		
	D		4	4	5	5	5	5 -> 5	5		
	E		5	6	6	6	7	8 -> 5	5		

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

Replicate A: 2 Lg (G), 3 Med (G) — removed: 1 med (G)

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

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

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

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

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

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

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

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	110 mm	93 mm	0 mm	90 mm	56 mm
Replicate B	75 mm	60 mm	95 mm	56 mm	67 mm
Replicate C	80 mm	25 mm	20 mm	20 mm	mm
Replicate D	64 mm	73 mm	44 mm	14 mm	12 mm
Replicate E	93 mm	51 mm	96 mm	86 mm	85 mm

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

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

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	106 mm	47 mm	132 mm	78 mm	52 mm
Replicate B	104 mm	87 mm	73 mm	74 mm	55 mm
Replicate C	115 mm	38 mm	55 mm	51 mm	mm
Replicate D	10 mm	75 mm	71 mm	76 mm	33 mm
Replicate E	94 mm	40 mm	39 mm	95 mm	108 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	991.97	1189.5	1004.04
Replicate B	1248.55	1423.0	1259.01
Replicate C	1247.77	1355.4	1254.43
Replicate D	1242.68	1341.8	1247.85
Replicate E	1248.07	1467.4	1260.92

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 1:14 PM
Test Link: 04-5125-2759/B157504psc

Plant Chronic test — CH2M Hill

Test No:	12-2793-2721	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

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

Comments: J11JJ0

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
10-5756-3320	% Germination	100	> 100	N/A	24.60%	Wilcoxon Rank Sum Two-Sample
09-1303-6568	AG Average Dry Wt.	< 100	100	N/A	31.32%	Equal Variance t Two-Sample
09-1597-6154	AG Average Height	< 100	100	N/A	30.81%	Equal Variance t Two-Sample
08-5645-7970	AG Average Wet Wt.	100	> 100	N/A	35.96%	Equal Variance t Two-Sample
02-8216-7256	Root Average Dry Wt.	100	> 100	N/A	49.22%	Equal Variance t Two-Sample
16-4287-8059	Root Average Length	< 100	100	N/A	27.48%	Wilcoxon Rank Sum Two-Sample
11-1905-9625	Root Average Wet Wt.	100	> 100	N/A	48.78%	Equal Variance t Two-Sample
08-3287-6257	Total Average Biomass Dry	100	> 100	N/A	34.45%	Equal Variance t Two-Sample
14-0645-1947	Total Average Biomass Wet	100	> 100	N/A	41.74%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:14 PM
Test Link: 04-5125-2759/B157504psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.96000	0.80000	1.00000	0.04000	0.08944	9.32%

AG Average Dry Wt. Summary

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

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	12.8	8.4	16.6	1.7205	3.8471	30.06%

AG Average Wet Wt. Summary

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

Root Average Dry Wt. Summary

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

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	15.01	11.4	16.6	0.9413	2.1049	14.02%

Root Average Wet Wt. Summary

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

Total Average Biomass Dry Wt. Summary

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

Total Average Biomass Wet Wt. Summary

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

CETIS Test Summary

Report Date: 05 Jun-06 1:14 PM
Test Link: 04-5125-2759/B157504psc

% Germination Detail

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

AG Average Dry Wt. Detail

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

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	16.2	33.5	18.2	23
100		15.8	14.2	9	8.4	16.6

AG Average Wet Wt. Detail

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

Root Average Dry Wt. Detail

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

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		16.6	15.8	16.25	11.4	15

Root Average Wet Wt. Detail

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

Total Average Biomass Dry Wt. Detail

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

Total Average Biomass Wet Wt. Detail

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

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	04-5125-2759	04-5125-2759	05 Jun-06 1:14 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	24.60%

Group Comparisons

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

ANOVA Table

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

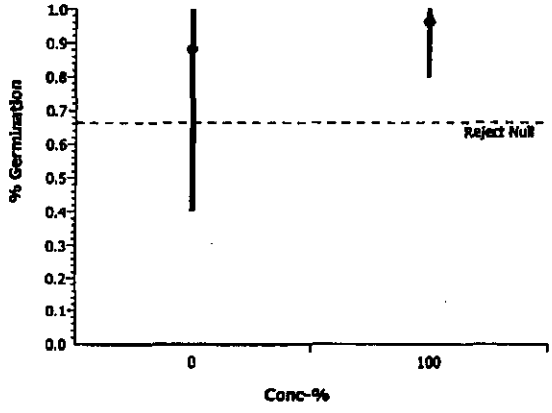
ANOVA Assumptions

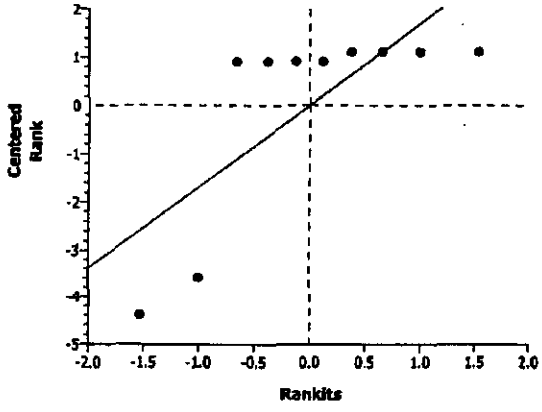
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.69460	23.15450	0.07328	Equal Variances
Distribution	Shapiro-Wilk W	0.66873		0.00037	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	04-5125-2759	04-5125-2759	05 Jun-06 1:14 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	31.32%

Group Comparisons

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

ANOVA Table

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

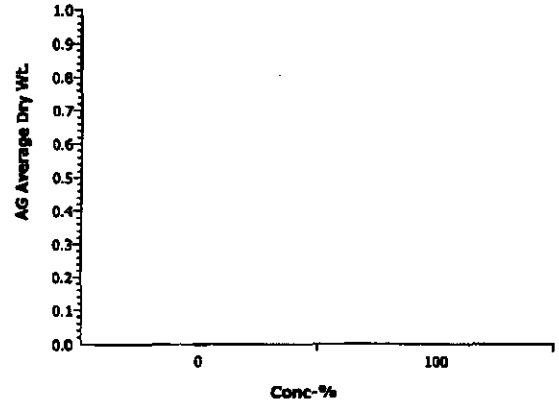
ANOVA Assumptions

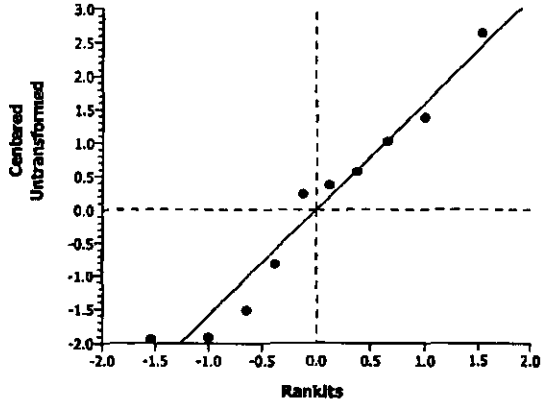
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.76116	23.15450	0.59697	Equal Variances
Distribution	Shapiro-Wilk W	0.94233		0.57918	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	3.54850	1.60601	4.92400	1.37195				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	04-5125-2759	04-5125-2759	05 Jun-06 1:14 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	30.81%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	2.48222	1.85955	0.0190	6.69737	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	199.609	199.609	1	6.16	0.03798	Significant Effect
Error	259.432	32.429	8			
Total	459.241013	232.23801	9			

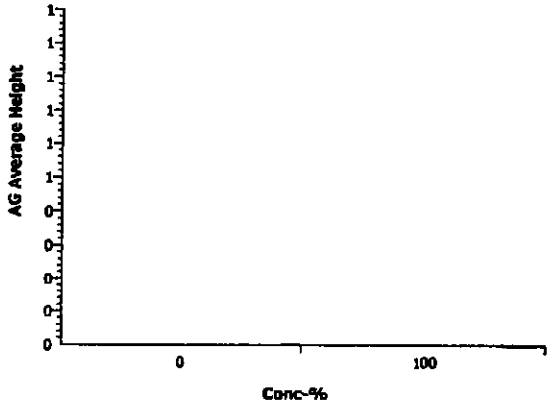
ANOVA Assumptions

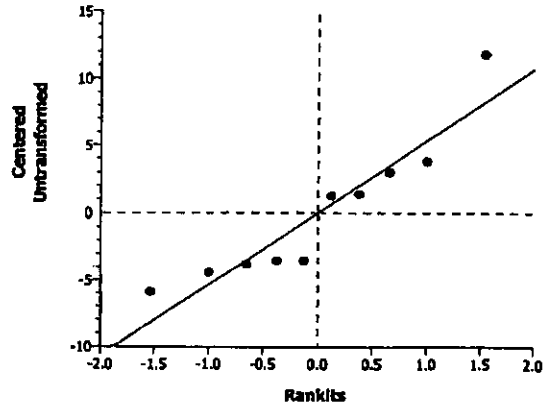
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.38230	23.15450	0.26490	Equal Variances
Distribution	Shapiro-Wilk W	0.87992		0.13021	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752				
100		5	12.8	8.4	16.6	3.8471				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	04-5125-2759	04-5125-2759	05 Jun-06 1:14 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	35.96%

Group Comparisons

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

ANOVA Table

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

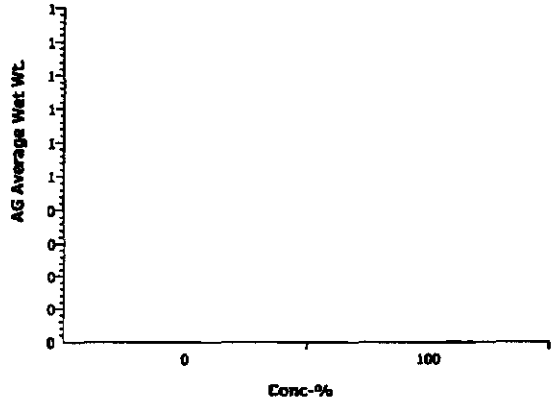
ANOVA Assumptions

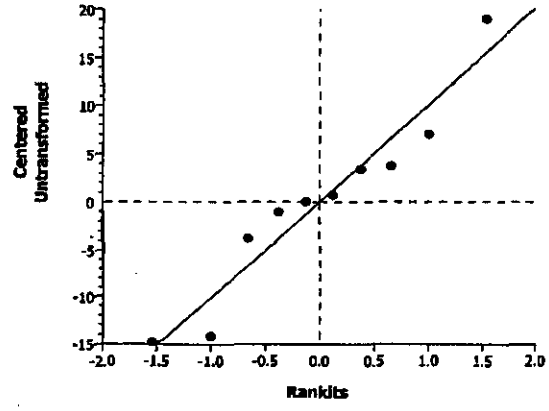
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.96304	23.15450	0.52964	Equal Variances
Distribution	Shapiro-Wilk W	0.93424		0.49090	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	04-5125-2759	04-5125-2759	05 Jun-06 1:14 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	49.22%

Group Comparisons

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

ANOVA Table

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

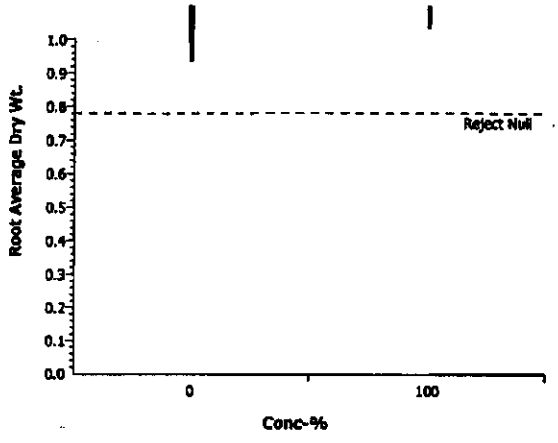
ANOVA Assumptions

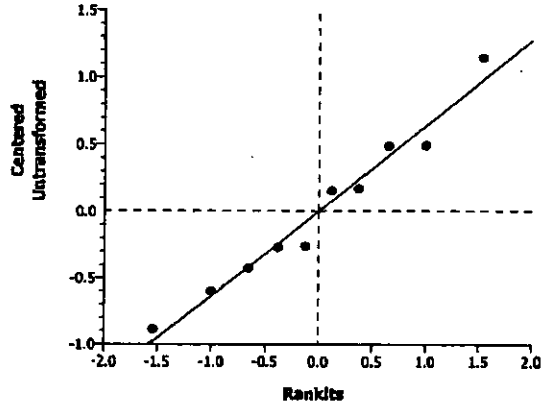
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.42384	23.15450	0.74038	Equal Variances
Distribution	Shapiro-Wilk W	0.96959		0.88704	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	1.92300	1.03398	2.41400	0.58389				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	04-5125-2759	04-5125-2759	05 Jun-06 1:14 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		<100	100		N/A	27.48%

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	310.8062	310.8062	1	8.32	0.02039	Significant Effect
Error	298.954	37.36925	8			
Total	609.760254	348.1755	9			

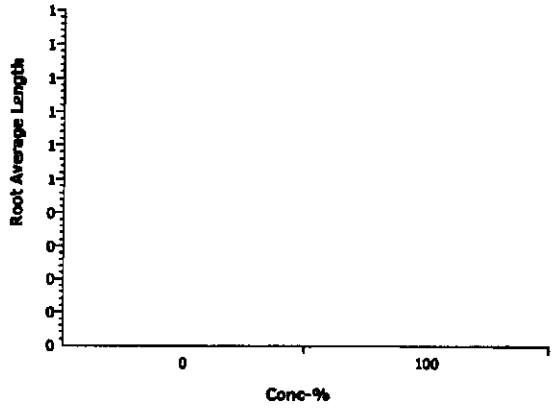
ANOVA Assumptions

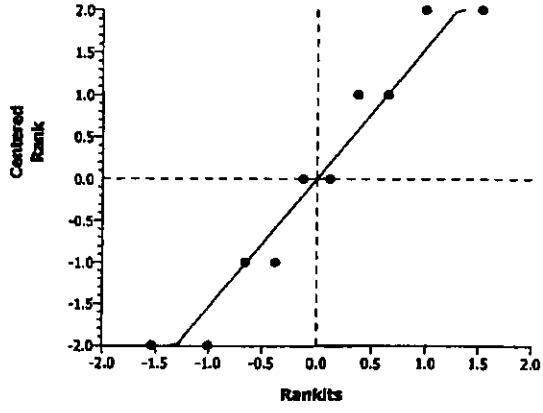
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	15.86909	23.15450	0.02025	Equal Variances
Distribution	Shapiro-Wilk W	0.76261		0.00508	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	26.16	20.6	41	8.385	8.00000	6.00000	10.0000	1.58114
100		5	15.010	11.4	16.6	2.1049	3.00000	1.00000	5.00000	1.58114

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	04-5125-2759	04-5125-2759	05 Jun-06 1:14 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	48.78%

Group Comparisons

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

ANOVA Table

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

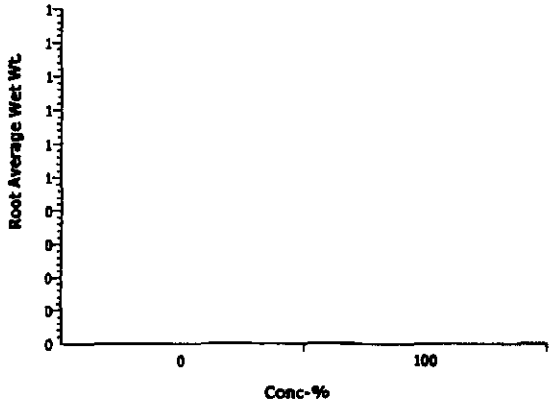
ANOVA Assumptions

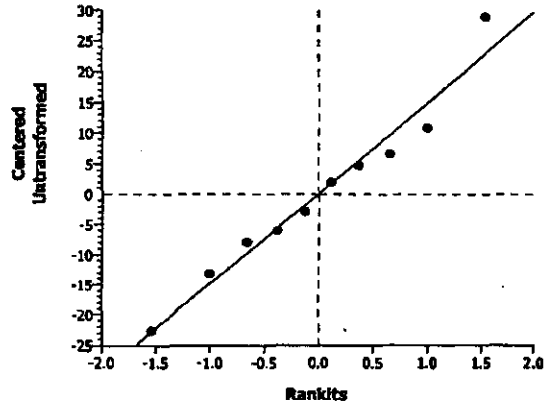
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.87004	23.15450	0.21835	Equal Variances
Distribution	Shapiro-Wilk W	0.97563		0.93759	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	32.967	19.824	43.706	9.6338				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	04-5125-2759	04-5125-2759	05 Jun-06 1:14 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.45%

Group Comparisons

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

ANOVA Table

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

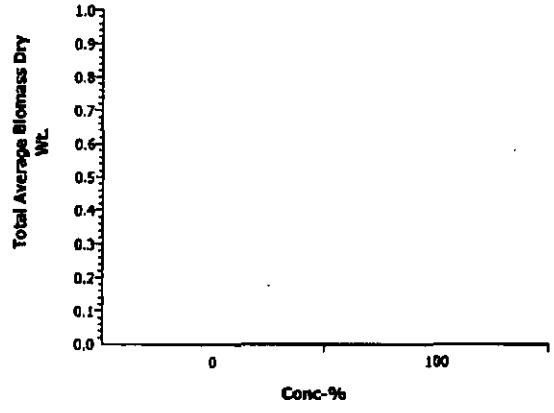
ANOVA Assumptions

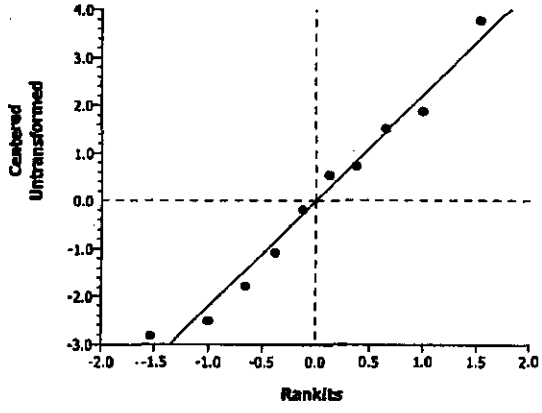
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.59361	23.15450	0.66268	Equal Variances
Distribution	Shapiro-Wilk W	0.96804		0.87208	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	04-5125-2759	04-5125-2759	05 Jun-06 1:14 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	41.74%

Group Comparisons

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

ANOVA Table

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

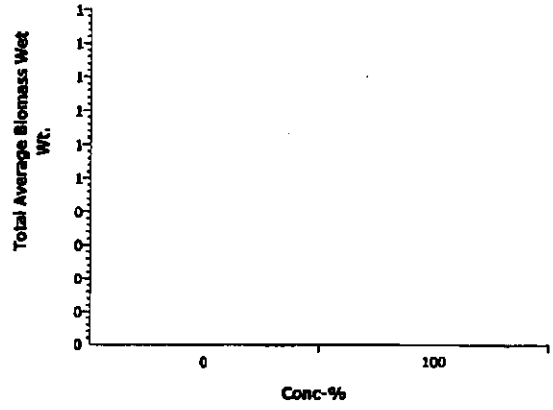
ANOVA Assumptions

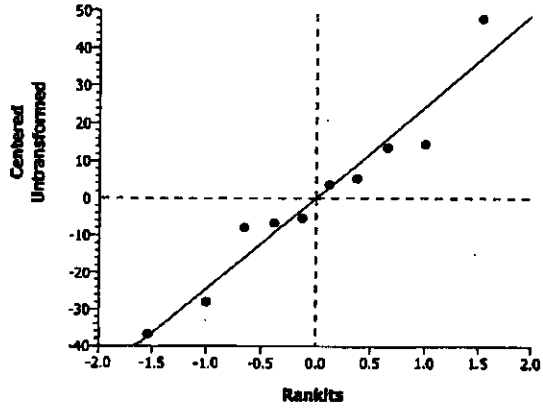
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	3.05894	23.15450	0.30437	Equal Variances
Distribution	Shapiro-Wilk W	0.95186		0.69052	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	58.759	30.774	73.196	17.55				

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

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

Bioassay Lab ID: BG 1575- 05 Sample No: J11J49

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		5	5	5	5	4	4	4	6.4	7.1
	B		4	5	6	7	7	5	5		
	C		2	3	3	3	4	4	4		
	D		2	2	2	2	2	3	3		
	E		4	4	4	4	4	4	3 live, 1 dead		

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

Replicate A: 2 lg G, 2 med G
Replicate B: 4 med G, 1 sm G Removed 2 sm G w/1 B-tip
Replicate C: 1 lg G w/1 B tip, 2 med G, 1 sm G
Replicate D: 1 lg G, 1 med G, 1 sm G
Replicate E: 1 lg G, 2 med G, 1 sm 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, 3 med G
Replicate B: 3 Lg G, 2 med G
Replicate C: 3 Lg G, 1 Sm G
Replicate D: 1 Lg G, 1 med G w/1 B shoot, 1 Sm G
Replicate E: 3 Lg G, * removed: 1 Sm dead

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	84 mm	112 mm	95 mm	74 mm	mm
Replicate B	87 mm	83 mm	52 mm	46 mm	32 mm
Replicate C	74 mm	36 mm	51 mm	33 mm	mm
Replicate D	74 mm	51 mm	15 mm	mm	mm
Replicate E	102 mm	92 mm	78 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1029.66	1177.0	1054.19
Replicate B	1253.67	1363.3	1272.95
Replicate C	1250.91	1338.8	1264.48
Replicate D	1248.54	1309.5	1253.21
Replicate E	1243.07	1367.0	1264.01

Describe root appearance:

Replicate A
Replicate B
Replicate C
Replicate D
Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	97 mm	79 mm	57 mm	93 mm	mm
Replicate B	41 mm	31 mm	67 mm	89 mm	72 mm
Replicate C	93 mm	53 mm	36 mm	89 mm	mm
Replicate D	83 mm	57 mm	71 mm	mm	mm
Replicate E	92 mm	85 mm	98 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	981.54	1272.9	991.00
Replicate B	1253.38	1422.8	1265.08
Replicate C	~~1556.44~~ NG	1434.9	1263.26
Replicate D	1247.10	1320.6	1251.39
Replicate E	1252.35	1422.1	1260.99

tare wt. C 1256.41 → Replicate C

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 1:18 PM
Test Link: 06-6514-0864/B157505psc

Plant Chronic test — **CH2M Hill**

Test No:	02-4058-2635	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

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

Comments: J11JH9

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
06-8216-4886	% Germination	100	> 100	N/A	28.01%	Equal Variance t Two-Sample
15-5199-1116	AG Average Dry Wt.	100	> 100	N/A	34.42%	Equal Variance t Two-Sample
02-0355-8196	AG Average Height	100	> 100	N/A	38.89%	Equal Variance t Two-Sample
01-0958-4685	AG Average Wet Wt.	100	> 100	N/A	37.90%	Equal Variance t Two-Sample
02-1587-6349	Root Average Dry Wt.	100	> 100	N/A	48.94%	Equal Variance t Two-Sample
01-6861-2988	Root Average Length	100	> 100	N/A	35.10%	Equal Variance t Two-Sample
10-6003-1182	Root Average Wet Wt.	100	> 100	N/A	61.56%	Equal Variance t Two-Sample
15-0450-1637	Total Average Biomass Dry	100	> 100	N/A	36.49%	Equal Variance t Two-Sample
03-0746-0004	Total Average Biomass Wet	100	> 100	N/A	48.91%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:18 PM
Test Link: 06-6514-0864/B157505psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.60000	0.12000	0.26833	30.49%
100		5	0.76000	0.60000	1.00000	0.07483	0.16733	22.02%

AG Average Dry Wt. Summary

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

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	19.1	12	30.333	3.2644	7.2995	38.22%

AG Average Wet Wt. Summary

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

Root Average Dry Wt. Summary

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

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	19.083	12	30.667	3.2124	7.1831	37.64%

Root Average Wet Wt. Summary

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

Total Average Biomass Dry Wt. Summary

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

Total Average Biomass Wet Wt. Summary

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

CETIS Test Summary

Report Date: 05 Jun-06 1:18 PM
Test Link: 06-6514-0864/B157505psc

% Germination Detail

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

AG Average Dry Wt. Detail

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

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		22.25	12	15.25	15.6667	30.3333

AG Average Wet Wt. Detail

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

Root Average Dry Wt. Detail

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

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		20.5	12	17.25	15	30.6667

Root Average Wet Wt. Detail

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

Total Average Biomass Dry Wt. Detail

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

Total Average Biomass Wet Wt. Detail

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

CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
% Germination	Comparison	06-6514-0864	06-6514-0864	05 Jun-06 1:17 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		100	>100	1	N/A	28.01%

Group Comparisons

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

ANOVA Table

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

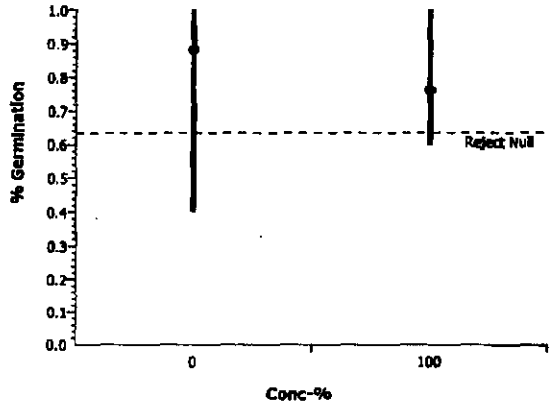
ANOVA Assumptions

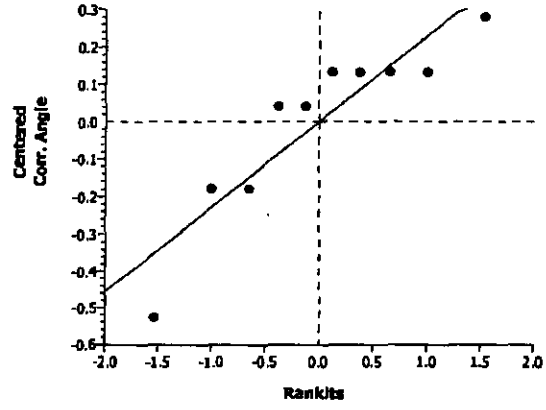
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.38881	23.15450	0.41968	Equal Variances
Distribution	Shapiro-Wilk W	0.84743		0.05414	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	06-6514-0864	06-6514-0864	05 Jun-06 1:17 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.42%

Group Comparisons

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

ANOVA Table

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

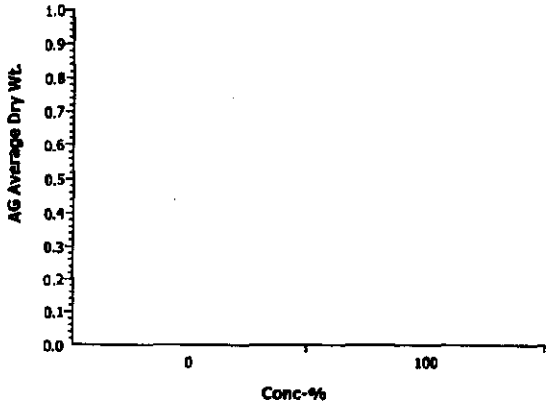
ANOVA Assumptions

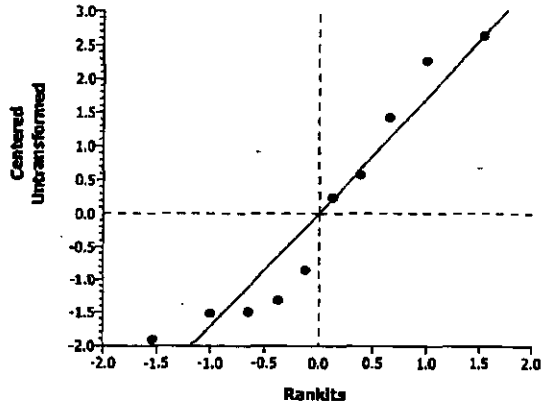
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.11881	23.15450	0.91597	Equal Variances
Distribution	Shapiro-Wilk W	0.89863		0.21165	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Height	Comparison	06-6514-0864	06-6514-0864	05 Jun-06 1:17 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	38.89%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.58070	1.85955	0.2887	8.45392	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	17.424	17.424	1	0.34	0.57743	Non-Significant Effect
Error	413.3625	51.67032	8			
Total	430.786549	69.094318	9			

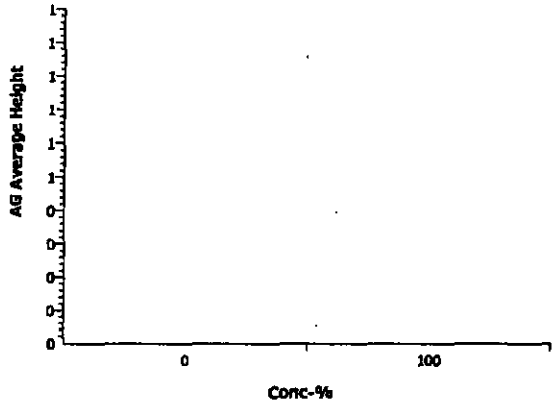
ANOVA Assumptions

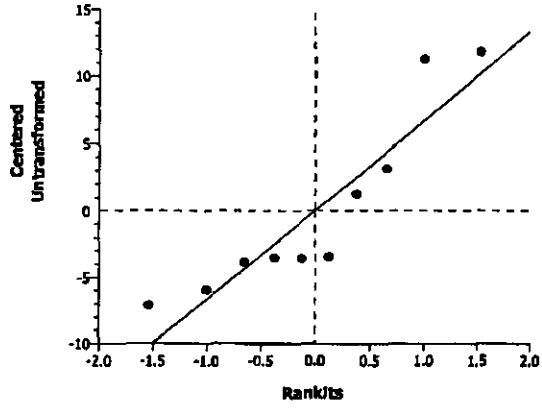
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.06442	23.15450	0.95321	Equal Variances
Distribution	Shapiro-Wilk W	0.83369		0.03707	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752				
100		5	19.100	12	30.333	7.2995				

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
AG Average Wet Wt.	Comparison	06-6514-0864	06-6514-0864	05 Jun-06 1:17 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	37.90%

Group Comparisons

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

ANOVA Table

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

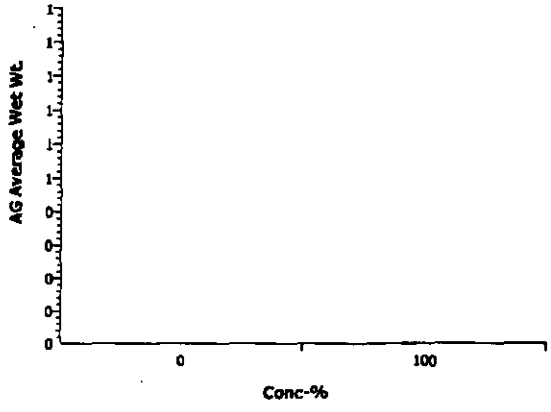
ANOVA Assumptions

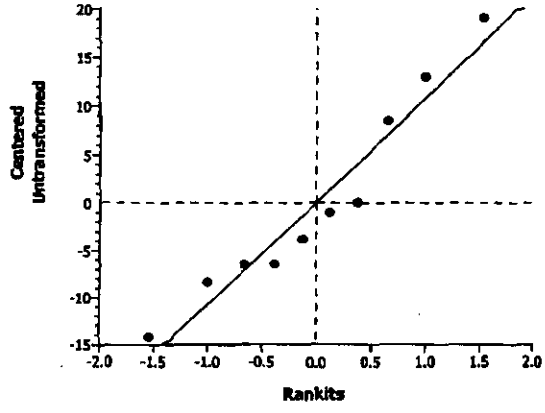
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.47898	23.15450	0.71378	Equal Variances
Distribution	Shapiro-Wilk W	0.93839		0.53521	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	06-6514-0864	06-6514-0864	05 Jun-06 1:18 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	48.94%

Group Comparisons

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

ANOVA Table

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

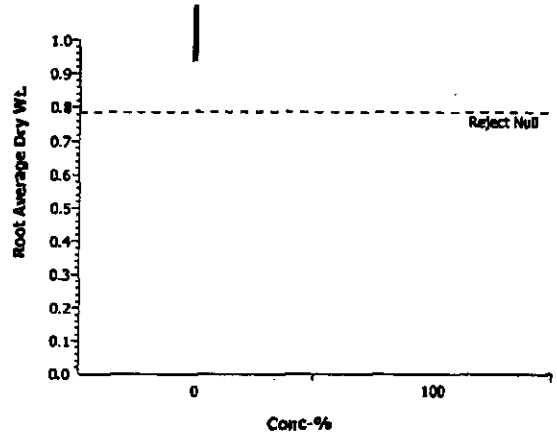
ANOVA Assumptions

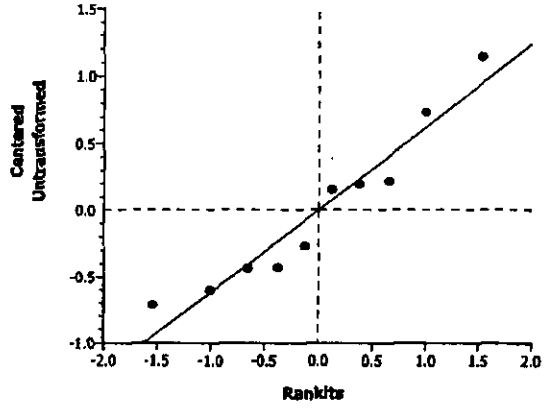
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.46468	23.15450	0.72055	Equal Variances
Distribution	Shapiro-Wilk W	0.92470		0.39778	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	06-6514-0864	06-6514-0864	05 Jun-06 1:18 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	35.10%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.43319	1.85955	0.0949	9.18192	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	125.198	125.198	1	2.05	0.18970	Non-Significant Effect
Error	487.6209	60.95261	8			
Total	612.818909	186.15064	9			

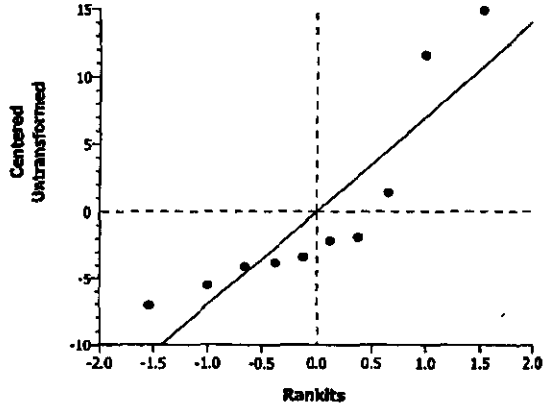
ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.36263	23.15450	0.77158	Equal Variances
Distribution	Shapiro-Wilk W	0.79435		0.01238	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	26.16	20.6	41	8.385				
100		5	19.083	12	30.667	7.1831				

Graphics



CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	06-6514-0864	06-6514-0864	05 Jun-06 1:18 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	61.56%

Group Comparisons

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

ANOVA Table

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

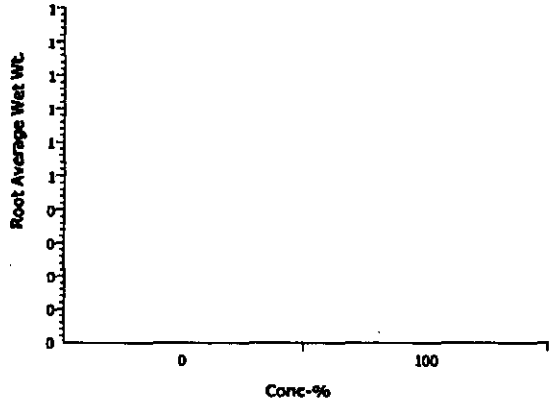
ANOVA Assumptions

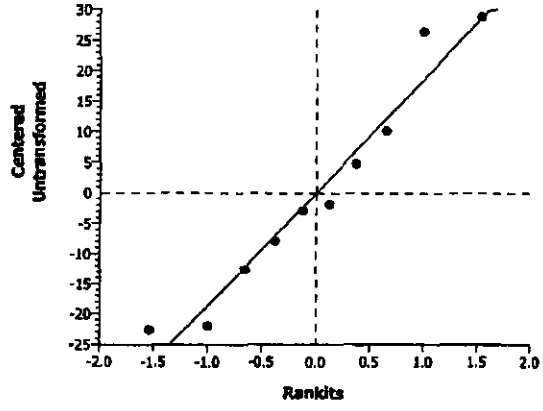
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00379	23.15450	0.99716	Equal Variances
Distribution	Shapiro-Wilk W	0.93515		0.50039	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Total Average Biomass Dry Wt.	Comparison	06-6514-0864	06-6514-0864	05 Jun-06 1:18 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	36.49%

Group Comparisons

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

ANOVA Table

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

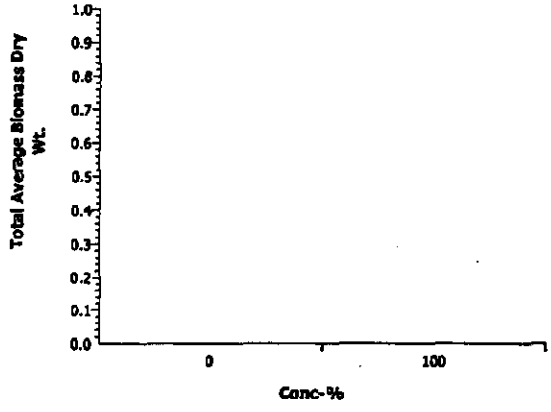
ANOVA Assumptions

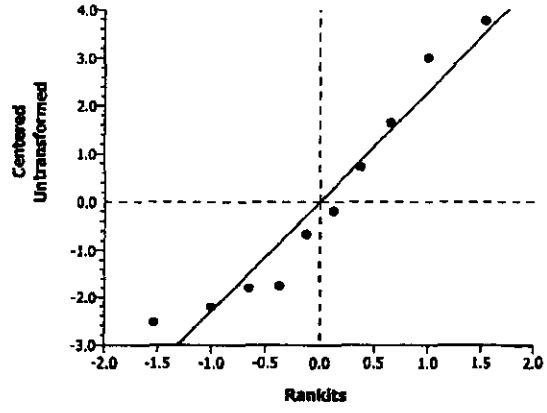
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.21046	23.15450	0.85762	Equal Variances
Distribution	Shapiro-Wilk W	0.91631		0.32720	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	06-6514-0864	06-6514-0864	05 Jun-06 1:18 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	48.91%

Group Comparisons

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

ANOVA Table

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

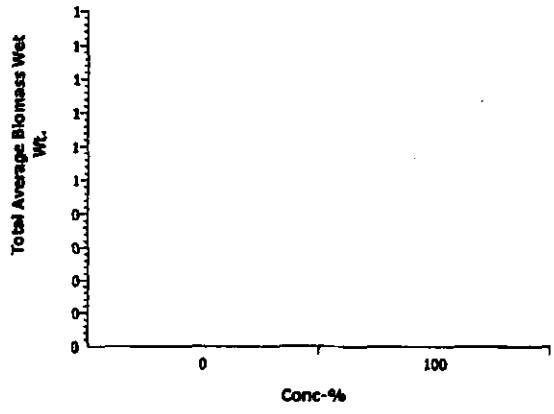
ANOVA Assumptions

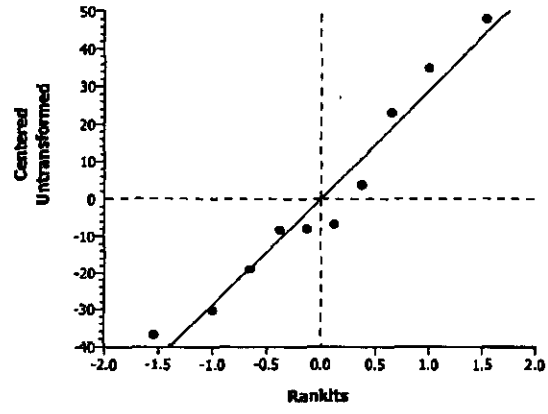
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.21708	23.15450	0.85360	Equal Variances
Distribution	Shapiro-Wilk W	0.94591		0.62044	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

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

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

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		3	3	3	4	4	5 -> 5	5	6.6	4.2
	B		1	1	1	2	2	2 -> 2	2		
	C		5	5	5	5	6	6 -> 5	5		
	D		5	5	6	6	6	7 -> 5	5		
	E		1	1	3	3	3	3 -> 3	3		

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

Replicate A: 1 Lg (G) w/ B tip, 2 Med (G), 2 Sm (G)

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

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

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

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

Appearance Code: Good (G) = deep green color with no brown, Brown (B) = brown color noted, # Lg = # of large plants (tallest, 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 Sm G, 1 Sm w/ B tip

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

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

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

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	104 mm	52 mm	59 mm	9 mm	11 mm
Replicate B	117 mm	58 mm	mm	mm	mm
Replicate C	76 mm	97 mm	90 mm	71 mm	26 mm
Replicate D	32 mm	62 mm	73 mm	83 mm	14 mm
Replicate E	67 mm	121 mm	74 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1014.63	1097.98	1028.58
Replicate B	1249.53	1340.03	1262.79
Replicate C	1248.55	~~1476.07~~*	1273.85
Replicate D	1246.92	1456.10	1268.79
Replicate E	1242.53	1366.09	1261.62

* 1410.88 D.W.

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	42 mm	23 mm	15 mm	42 mm	71 mm
Replicate B	101 mm	40 mm	mm	mm	mm
Replicate C	118 mm	61 mm	79 mm	45 mm	26 mm
Replicate D	34 mm	21 mm	82 mm	69 mm	90 mm
Replicate E	88 mm	50 mm	62 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1031.27	1118.90	1036.29
Replicate B	1249.32	1390.79	1254.73
Replicate C	1247.27	1476.07	1258.19
Replicate D	1246.96	1475.40	1254.32
Replicate E	1245.62	1388.22	1250.64

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 1:22 PM
Test Link: 11-9487-2971/B157506psc

Plant Chronic test — **CH2M Hill**

Test No:	14-2250-1820	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

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

Comments: J11JB6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
13-4204-6882	% Germination	100	> 100	N/A	35.39%	Wilcoxon Rank Sum Two-Sample
12-6190-9985	AG Average Dry Wt.	100	> 100	N/A	32.97%	Equal Variance t Two-Sample
08-4113-2537	AG Average Height	100	> 100	N/A	62.81%	Equal Variance t Two-Sample
00-3825-1023	AG Average Wet Wt.	100	> 100	N/A	40.52%	Equal Variance t Two-Sample
06-9369-2244	Root Average Dry Wt.	100	> 100	N/A	51.83%	Equal Variance t Two-Sample
10-4581-7262	Root Average Length	100	> 100	N/A	43.66%	Equal Variance t Two-Sample
11-1246-0300	Root Average Wet Wt.	100	> 100	N/A	61.36%	Equal Variance t Two-Sample
10-5356-5497	Total Average Biomass Dry	100	> 100	N/A	35.67%	Equal Variance t Two-Sample
03-4810-9124	Total Average Biomass Wet	100	> 100	N/A	50.41%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:22 PM
Test Link: 11-9487-2971/B157506psc

% Germination Summary

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

AG Average Dry Wt. Summary

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

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	21.48	9.4	44	6.6262	14.817	68.98%

AG Average Wet Wt. Summary

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

Root Average Dry Wt. Summary

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

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	18.027	7.8	35	4.8646	10.878	60.34%

Root Average Wet Wt. Summary

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

Total Average Biomass Dry Wt. Summary

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

Total Average Biomass Wet Wt. Summary

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

CETIS Test Summary

Report Date: 05 Jun-06 1:22 PM
Test Link: 11-9487-2971/B157506psc

% Germination Detail

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

AG Average Dry Wt. Detail

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

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		9.4	44	14.4	10.6	29

AG Average Wet Wt. Detail

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

Root Average Dry Wt. Detail

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

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		7.8	35	13.2	11.8	22.3333

Root Average Wet Wt. Detail

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

Total Average Biomass Dry Wt. Detail

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

Total Average Biomass Wet Wt. Detail

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

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	11-9487-2971	11-9487-2971	05 Jun-06 1:21 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	35.39%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	25.5		0.3452	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.021087	0.021087	1	0.23	0.64701	Non-Significant Effect
Error	0.7455132	0.093189	8			
Total	0.7666002	0.1142761	9			

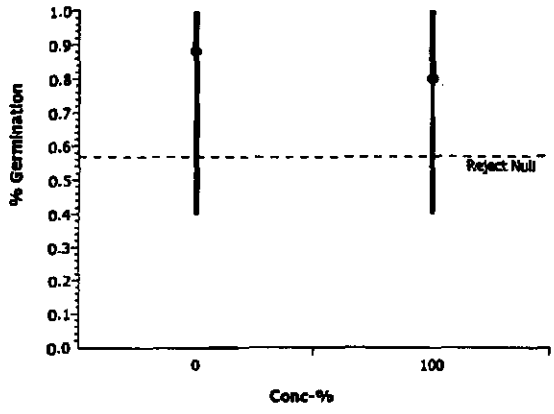
ANOVA Assumptions

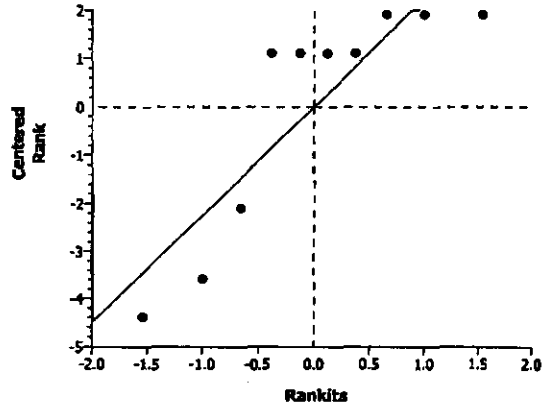
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.13568	23.15450	0.90483	Equal Variances
Distribution	Shapiro-Wilk W	0.74930		0.00350	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	11-9487-2971	11-9487-2971	05 Jun-06 1:21 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	1	N/A	32.97%

Group Comparisons

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

ANOVA Table

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

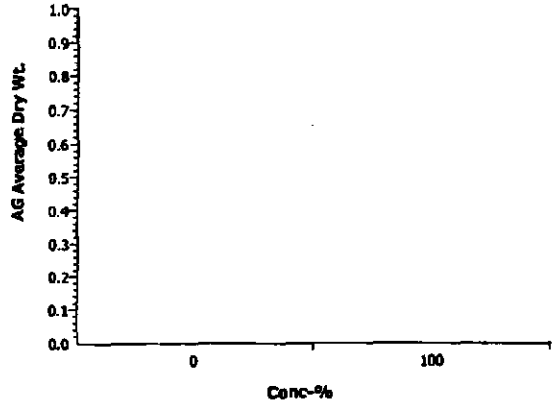
ANOVA Assumptions

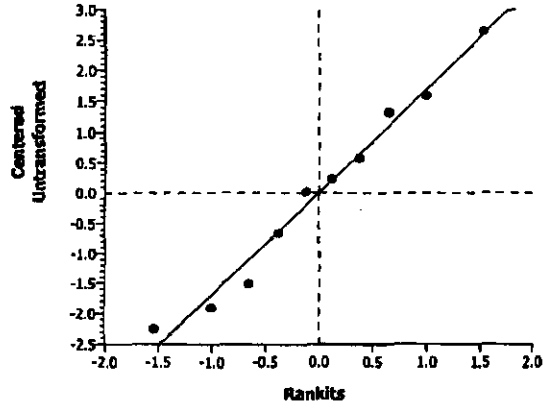
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.35501	23.15450	0.77559	Equal Variances
Distribution	Shapiro-Wilk W	0.96747		0.86646	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	11-9487-2971	11-9487-2971	05 Jun-06 1:21 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	1	N/A	62.81%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.03541	1.85955	0.4863	13.6545	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.169	0.169	1	0.00	0.97262	Non-Significant Effect
Error	1078.36	134.795	8			
Total	1078.52899	134.964	9			

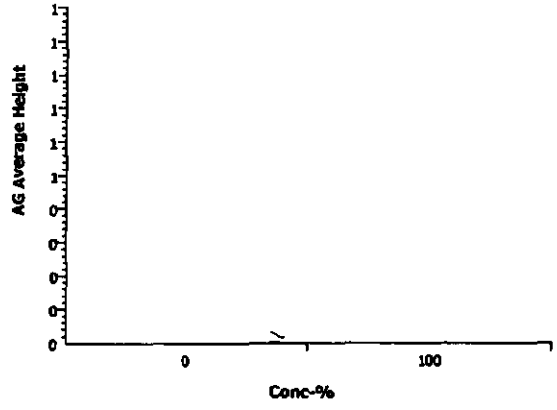
ANOVA Assumptions

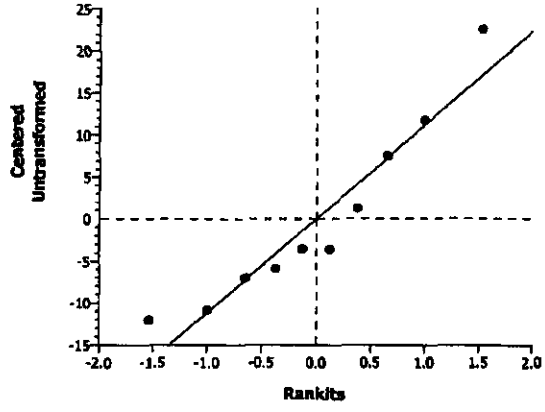
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.38555	23.15450	0.18126	Equal Variances
Distribution	Shapiro-Wilk W	0.90920		0.27552	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752				
100		5	21.48	9.4	44	14.817				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	11-9487-2971	11-9487-2971	05 Jun-06 1:21 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	1	N/A	40.52%

Group Comparisons

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

ANOVA Table

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

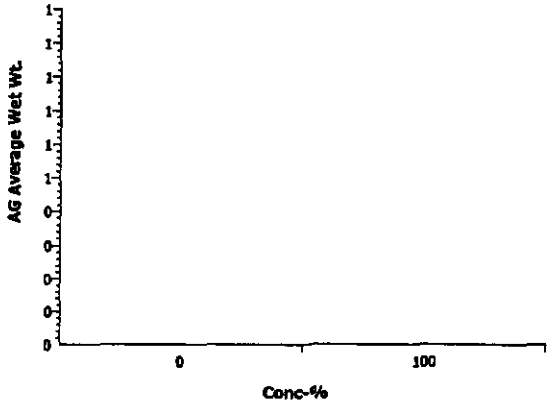
ANOVA Assumptions

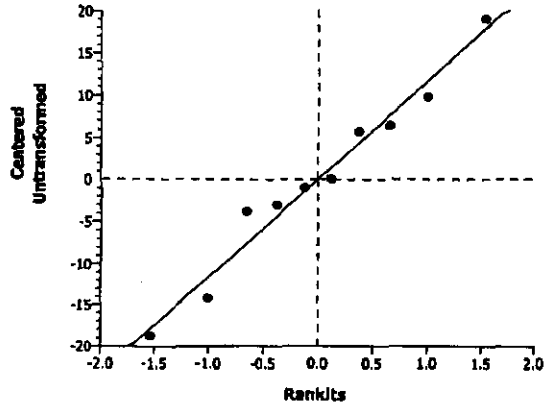
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.09157	23.15450	0.93437	Equal Variances
Distribution	Shapiro-Wilk W	0.97340		0.92046	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Root Average Dry Wt.	Comparison	11-9487-2971	11-9487-2971	05 Jun-06 1:21 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	1	N/A	51.83%

Group Comparisons

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

ANOVA Table

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

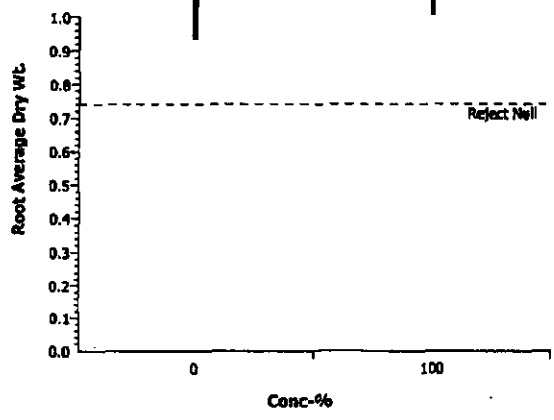
ANOVA Assumptions

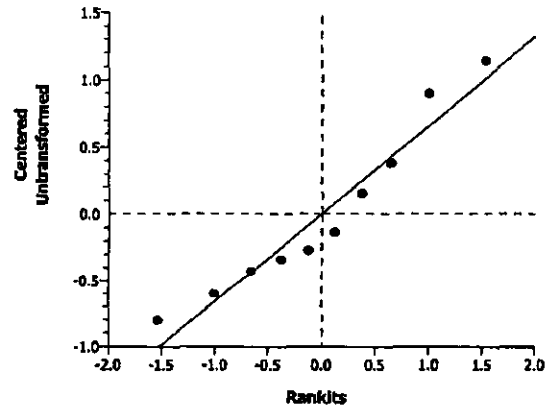
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.12666	23.15450	0.91077	Equal Variances
Distribution	Shapiro-Wilk W	0.93016		0.44943	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	11-9487-2971	11-9487-2971	05 Jun-06 1:21 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	1	N/A	43.66%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.32418	1.85955	0.1110	11.4217	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	165.3778	165.3778	1	1.75	0.22202	Non-Significant Effect
Error	754.5262	94.31578	8			
Total	919.904022	259.69356	9			

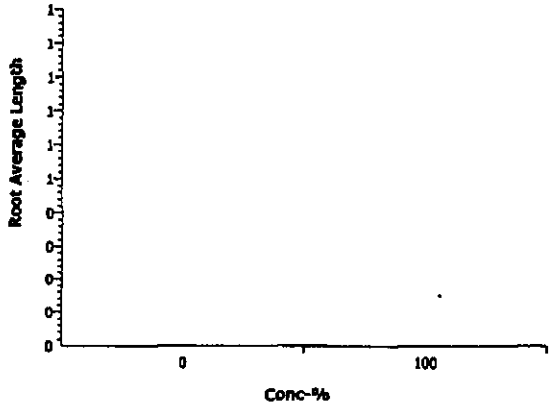
ANOVA Assumptions

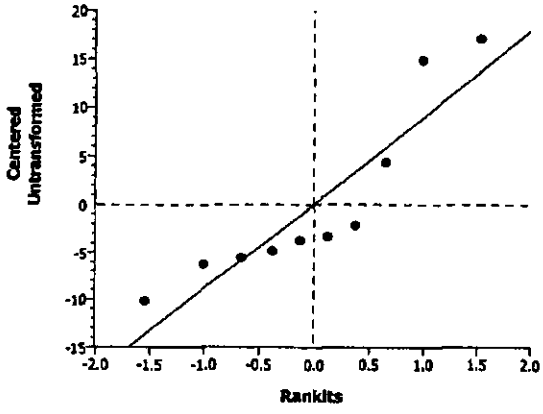
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.68293	23.15450	0.62643	Equal Variances
Distribution	Shapiro-Wilk W	0.82792		0.03158	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	26.16	20.6	41	8.385				
100		5	18.027	7.8	35	10.878				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	11-9487-2971	11-9487-2971	05 Jun-06 1:22 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	61.36%

Group Comparisons

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

ANOVA Table

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

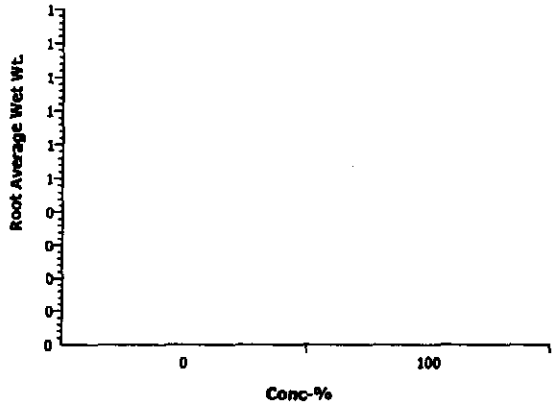
ANOVA Assumptions

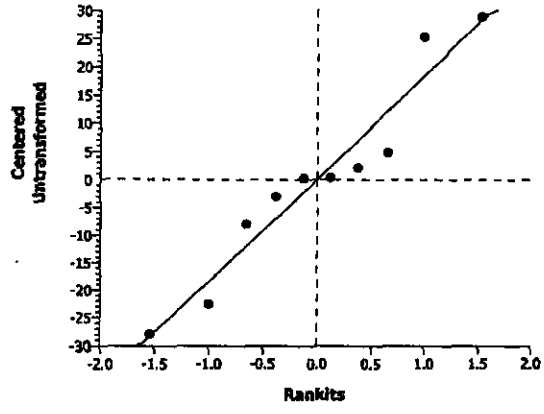
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.00906	23.15450	0.99323	Equal Variances
Distribution	Shapiro-Wilk W	0.93238		0.47175	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Total Average Biomass Dry Wt.	Comparison	11-9487-2971	11-9487-2971	05 Jun-06 1:22 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	35.67%

Group Comparisons

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

ANOVA Table

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

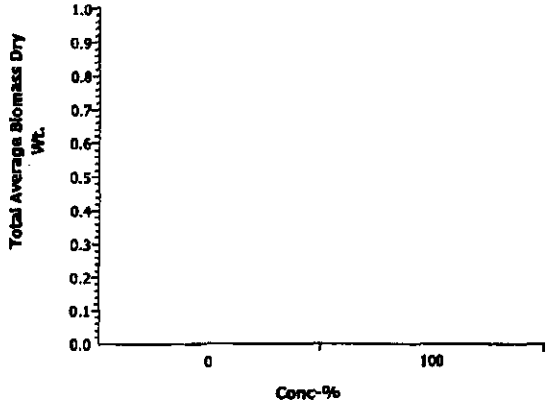
ANOVA Assumptions

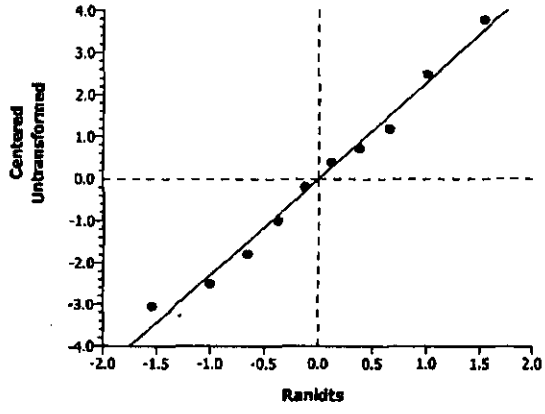
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.34320	23.15450	0.78187	Equal Variances
Distribution	Shapiro-Wilk W	0.97689		0.94641	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	11-9487-2971	11-9487-2971	05 Jun-06 1:22 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	50.41%

Group Comparisons

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

ANOVA Table

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

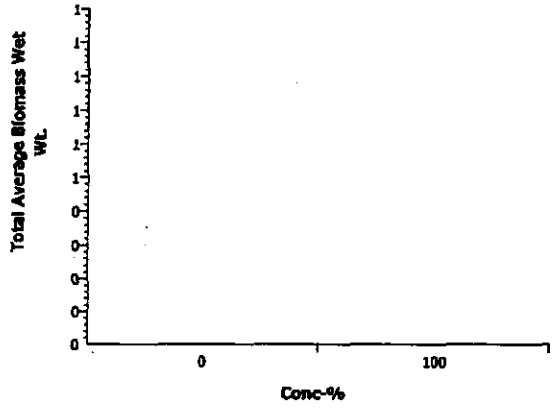
ANOVA Assumptions

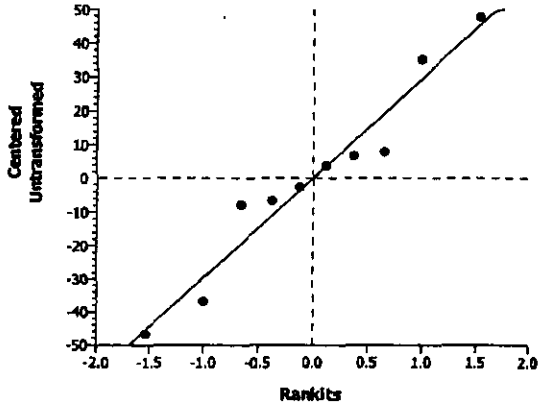
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.06963	23.15450	0.94956	Equal Variances
Distribution	Shapiro-Wilk W	0.94841		0.64969	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Initials: Day 0 (DW) Day 12 _____ Day 14 NJ Day 16 NJ Day 19 (JP) Day 21 NJ Day 23 NJ Day 28 NJ Day 30 DW

Bioassay Lab ID: BG 1575-07 Sample No: J11K34

CONC.	REPLICATE	# seeds germinated: Emergence 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		5	5	5	5	5	5	~~5~~ 4L, 1dead	7.9	7.2
	B		2	2	2	2	2	2	1L, 1dead		
	C		5	6	6	6	7	5	4L, 1dead		
	D		4	4	4	5	5	5	4L, 1dead		
	E		6	6	6	6	6	5	5		

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

Replicate A: 1 Lg G, 3 md G, 1 sm B

Replicate B: 2 md G, one Brown tip

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

Replicate D: 3 lg G, 1 sm G

Replicate E: 3 md G, 2 sm

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

14-Days Post-Emergence: Describe shoot appearance:

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

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

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

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

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	89 mm	87 mm	59 mm	73 mm	mm
Replicate B	79 mm	mm	mm	mm	mm
Replicate C	57 mm	49 mm	75 mm	51 mm	mm
Replicate D	73 mm	65 mm	67 mm	15 mm	mm
Replicate E	74 mm	53 mm	31 mm	107 mm	40 mm

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

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

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	83 mm	54 mm	61 mm	71 mm	mm
Replicate B	68 mm	mm	mm	mm	mm
Replicate C	49 mm	89 mm	106 mm	75 mm	mm
Replicate D	18 mm	64 mm	82 mm	71 mm	mm
Replicate E	24 mm	22 mm	48 mm	98 mm	56 mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1008.93	1068.90	1011.51
Replicate B	1239.51	1252.35	1239.98
Replicate C	1243.09	1304.50	1245.08
Replicate D	1246.25	1327.57	1248.43
Replicate E	1247.92	1289.25	1249.56

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 1:25 PM
Test Link: 09-5159-5769/B157507psc

Plant Chronic test — **CH2M Hill**

Test No:	07-3847-0882	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

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

Comments: J11K34

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
03-9507-6141	% Germination	100	> 100	N/A	36.50%	Wilcoxon Rank Sum Two-Sample
14-0796-9768	AG Average Dry Wt.	< 100	100	N/A	27.85%	Equal Variance t Two-Sample
05-2666-0517	AG Average Height	100	> 100	N/A	113.14%	Wilcoxon Rank Sum Two-Sample
14-3835-9054	AG Average Wet Wt.	< 100	100	N/A	32.17%	Equal Variance t Two-Sample
16-9157-3921	Root Average Dry Wt.	< 100	100	N/A	38.24%	Equal Variance t Two-Sample
02-5876-5296	Root Average Length	100	> 100	N/A	80.25%	Wilcoxon Rank Sum Two-Sample
13-5844-4558	Root Average Wet Wt.	< 100	100	N/A	44.63%	Equal Variance t Two-Sample
11-9926-3875	Total Average Biomass Dry	< 100	100	N/A	29.16%	Equal Variance t Two-Sample
01-1473-8406	Total Average Biomass Wet	< 100	100	N/A	37.55%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:25 PM
Test Link: 09-5159-5769/B157507psc

% Germination Summary

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

AG Average Dry Wt. Summary

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

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	27.83	12.4	79	12.843	28.719	103.19

AG Average Wet Wt. Summary

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

Root Average Dry Wt. Summary

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

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	25.9	10	68	10.649	23.812	91.94%

Root Average Wet Wt. Summary

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

Total Average Biomass Dry Wt. Summary

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

Total Average Biomass Wet Wt. Summary

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

CETIS Test Summary

Report Date: 05 Jun-06 1:25 PM
Test Link: 09-5159-5769/B157507psc

% Germination Detail

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

AG Average Dry Wt. Detail

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

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		19.25	79	14.5	14	12.4

AG Average Wet Wt. Detail

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

Root Average Dry Wt. Detail

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

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		16.75	68	20	14.75	10

Root Average Wet Wt. Detail

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

Total Average Biomass Dry Wt. Detail

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

Total Average Biomass Wet Wt. Detail

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

CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
% Germination	Comparison	09-5159-5769	09-5159-5769	05 Jun-06 1:24 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	36.50%

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0875112	0.087511	1	0.89	0.37321	Non-Significant Effect
Error	0.7870126	0.098377	8			
Total	0.87452383	0.1858878	9			

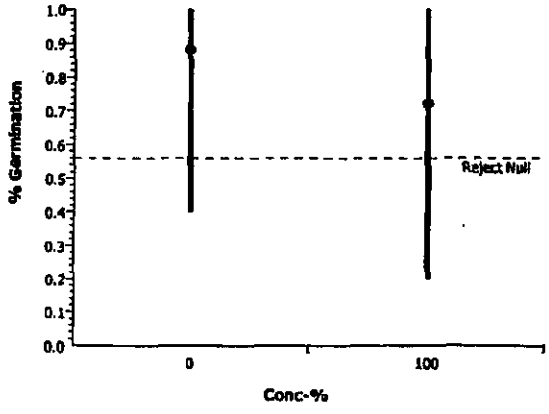
ANOVA Assumptions

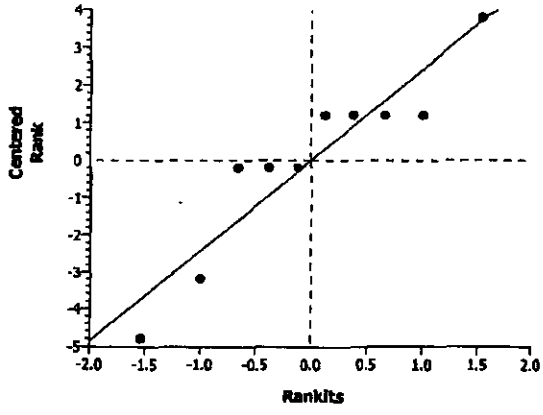
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.25456	23.15450	0.83135	Equal Variances
Distribution	Shapiro-Wilk W	0.70025		0.00089	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Dry Wt.	Comparison	09-5159-5769	09-5159-5769	05 Jun-06 1:24 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	27.85%

Group Comparisons

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

ANOVA Table

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

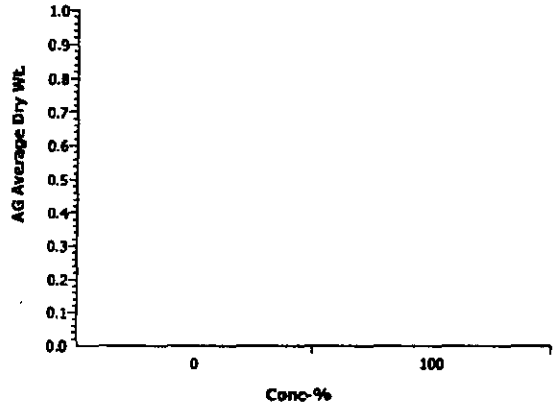
ANOVA Assumptions

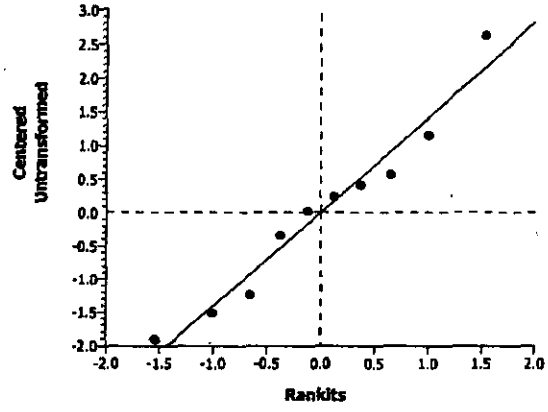
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.17312	23.15450	0.19531	Equal Variances
Distribution	Shapiro-Wilk W	0.96206		0.80903	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	09-5159-5769	09-5159-5769	05 Jun-06 1:24 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	113.14%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	23		0.2103	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	92.72025	92.72025	1	0.21	0.65748	Non-Significant Effect
Error	3499.26	437.4075	8			
Total	3591.98026	530.12775	9			

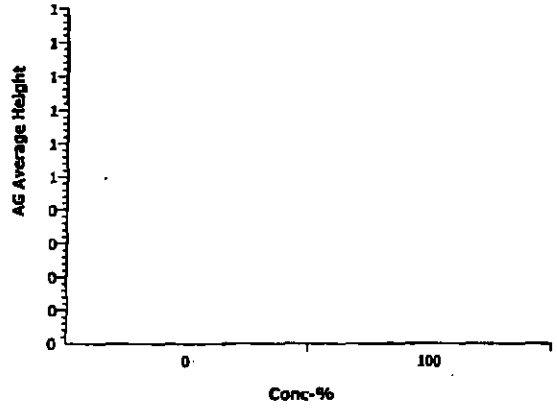
ANOVA Assumptions

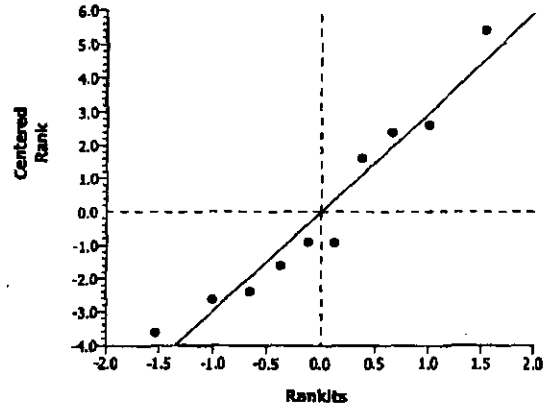
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	16.47603	23.15450	0.01890	Equal Variances
Distribution	Shapiro-Wilk W	0.72794		0.00192	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752	6.40000	4.00000	9.00000	2.04328
100		5	27.83	12.4	79	28.719	4.60000	1.00000	10.0000	3.78153

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	09-5159-5769	09-5159-5769	05 Jun-06 1:24 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	32.17%

Group Comparisons

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

ANOVA Table

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

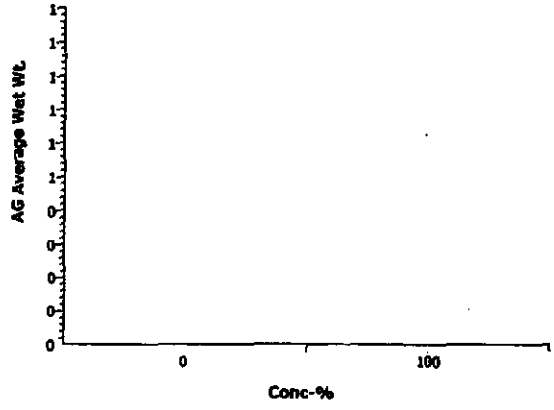
ANOVA Assumptions

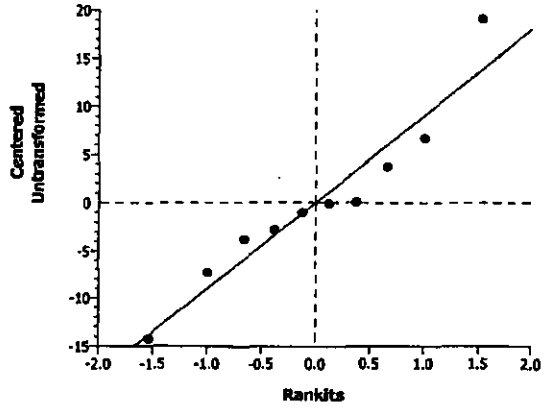
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.81756	23.15450	0.15697	Equal Variances
Distribution	Shapiro-Wilk W	0.94246		0.58070	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	09-5159-5769	09-5159-5769	05 Jun-06 1:24 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	38.24%

Group Comparisons

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

ANOVA Table

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

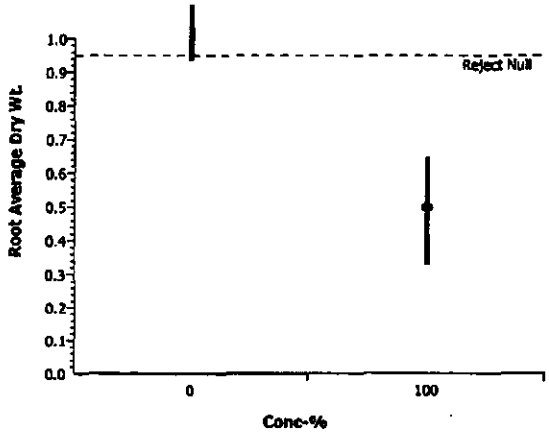
ANOVA Assumptions

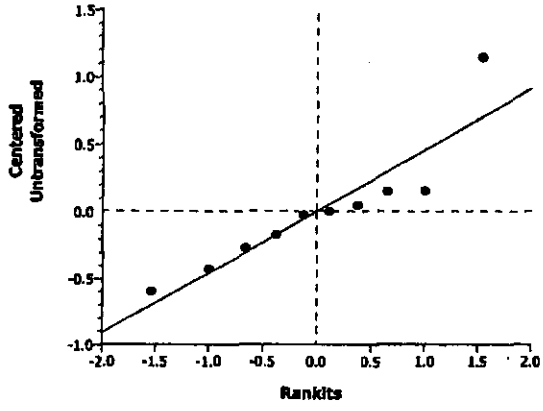
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	36.29308	23.15450	0.00424	Unequal Variances
Distribution	Shapiro-Wilk W	0.85613		0.06869	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	09-5159-5769	09-5159-5769	05 Jun-06 1:24 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	80.25%

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.169	0.169	1	0.00	0.98219	Non-Significant Effect
Error	2549.307	318.6634	8			
Total	2549.47588	318.83236	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.06478	23.15450	0.06765	Equal Variances
Distribution	Shapiro-Wilk W	0.74937		0.00351	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	26.16	20.6	41	8.385	7.00000	5.00000	9.00000	1.58114
100		5	25.9	10	68	23.812	4.00000	1.00000	10.0000	3.53553

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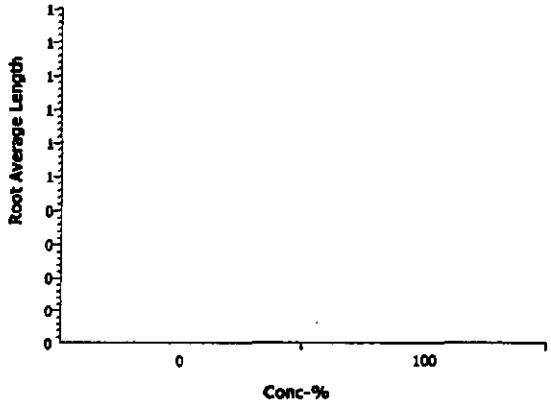
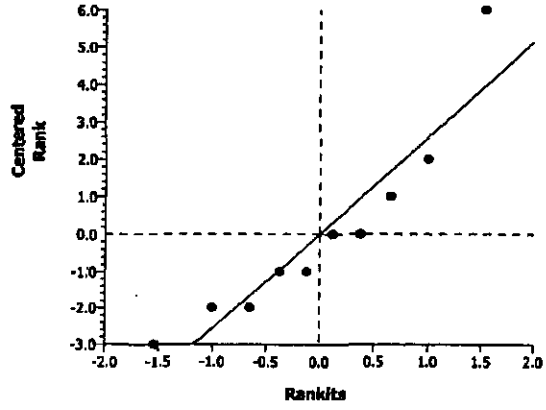




CETIS Analysis Detail

Plant Chronic test — **CH2M HILL**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	09-5159-5769	09-5159-5769	05 Jun-06 1:24 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed	-	<100	100		N/A	44.63%

Group Comparisons

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

ANOVA Table

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

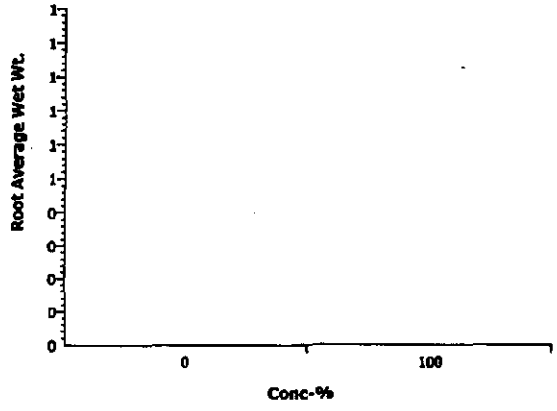
ANOVA Assumptions

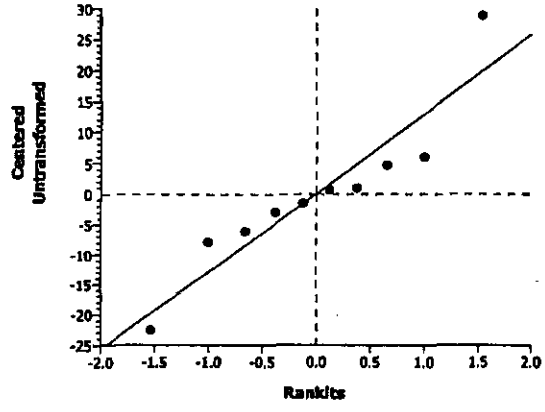
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	18.83196	23.15450	0.01474	Equal Variances
Distribution	Shapiro-Wilk W	0.90354		0.23952	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	14.37	8.2760	20.337	4.3672				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	09-5159-5769	09-5159-5769	05 Jun-06 1:25 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	29.16%

Group Comparisons

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

ANOVA Table

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

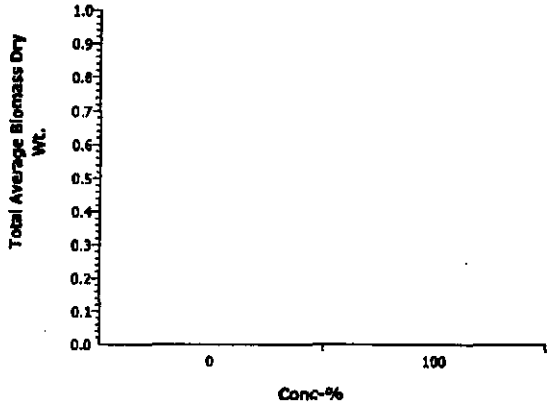
ANOVA Assumptions

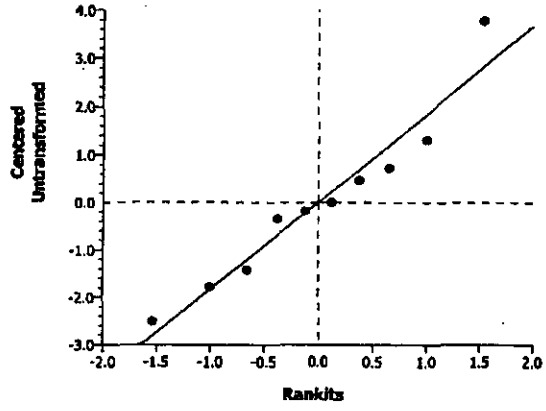
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	6.02455	23.15450	0.11005	Equal Variances
Distribution	Shapiro-Wilk W	0.94983		0.66648	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	09-5159-5769	09-5159-5769	05 Jun-06 1:25 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	37.55%

Group Comparisons

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

ANOVA Table

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

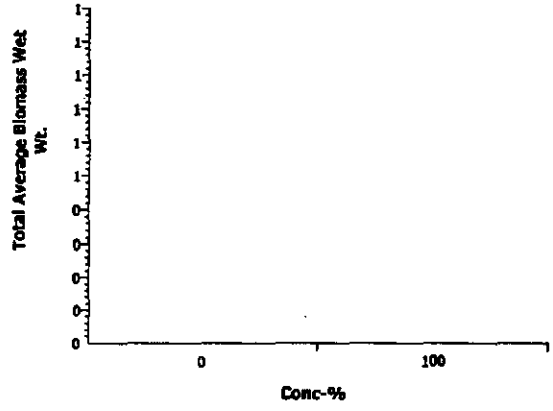
ANOVA Assumptions

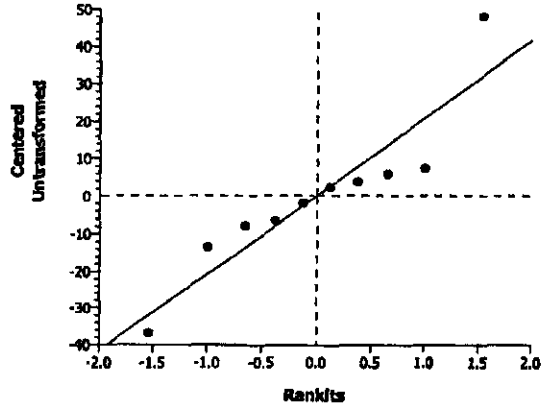
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	13.61081	23.15450	0.02682	Equal Variances
Distribution	Shapiro-Wilk W	0.88411		0.14541	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

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

Bioassay Lab ID: BG 1575-08 Sample No: JHK28

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		0	0	1	1	1	1	1	7.6	7.4
	B		2	3	3	3	3	3	3		
	C		0	0	1	1	1	1	1		
	D		5	5	6	6	6	5	5		
	E		0	1	1	1	1	1	1		

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

Replicate A: 1 md G
Replicate B: 2 md G, 1 sm G
Replicate C: 1 sm G
Replicate D: 2 lg G, 3 md G Removed 1 sm G
Replicate E: 1 md G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 1 md G
Replicate B: 2 med G, 1 md w/ 3 B shoots
Replicate C: 1 med G
Replicate D: 1 Lg w 2 B shoots, 4 med w/ B shoots
Replicate E: 1 Md G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	65 mm	mm	mm	mm	mm
Replicate B	72 mm	53 mm	62 mm	mm	mm
Replicate C	54 mm	mm	mm	mm	mm
Replicate D	91 mm	91 mm	63 mm	66 mm	78 mm
Replicate E	60 mm	mm	mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt. (mg)	Dry Wt. (mg)
Replicate A	1046.42	1054.2	1048.53
Replicate B	1248.24	1289.3	1256.82
Replicate C	1251.57	1260.0	1252.72
Replicate D	1245.92	1356.7	1270.28
Replicate E	1256.67	1265.9	1253.83

Describe root appearance:

Replicate A
Replicate B
Replicate C
Replicate D
Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	53 mm	mm	mm	mm	mm
Replicate B	44 mm	45 mm	48 mm	mm	mm
Replicate C	45 mm	mm	mm	mm	mm
Replicate D	73 mm	72 mm	70 mm	49 mm	54 mm
Replicate E	80 mm	mm	mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt. (mg)	Dry Wt. (mg)
Replicate A	1025.38	1033.4	1025.87
Replicate B	1249.64	1290.4	1253.32
Replicate C	1248.09	1253.7	1248.21
Replicate D	NJ 1250.63	1324.2	1255.78
Replicate E	1247.86	1254.8	1248.49

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 1:30 PM
Test Link: 05-5309-6055/B157508psc

Plant Chronic test — **CH2M Hill**

Test No:	06-9020-4589	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

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

Comments: J11K28

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
12-7638-8337	% Germination	< 100	100	N/A	40.98%	Equal Variance t Two-Sample
04-9562-1591	AG Average Dry Wt.	< 100	100	N/A	31.49%	Equal Variance t Two-Sample
03-0128-0469	AG Average Height	100	> 100	N/A	92.60%	Equal Variance t Two-Sample
08-1251-3733	AG Average Wet Wt.	< 100	100	N/A	32.14%	Equal Variance t Two-Sample
11-2920-5317	Root Average Dry Wt.	< 100	100	N/A	44.60%	Equal Variance t Two-Sample
02-1274-6226	Root Average Length	100	> 100	N/A	91.52%	Equal Variance t Two-Sample
11-2893-3543	Root Average Wet Wt.	< 100	100	N/A	44.25%	Equal Variance t Two-Sample
08-7132-3386	Total Average Biomass Dry	< 100	100	N/A	33.12%	Equal Variance t Two-Sample
09-9247-1083	Total Average Biomass Wet	< 100	100	N/A	37.76%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:30 PM
Test Link: 05-5309-6055/B157508psc

% Germination Summary

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

AG Average Dry Wt. Summary

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

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	43.053	15.6	65	10.353	23.149	53.77%

AG Average Wet Wt. Summary

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

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	0.69933	0.12000	1.22664	0.19643	0.43922	62.81%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	41.827	12.8	80	12.317	27.543	66.17%

Root Average Wet Wt. Summary

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

Total Average Biomass Dry Wt. Summary

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

Total Average Biomass Wet Wt. Summary

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

CETIS Test Summary

Report Date: 05 Jun-06 1:30 PM
Test Link: 05-5309-6055/B157508psc

% Germination Detail

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

AG Average Dry Wt. Detail

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

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		65	20.6667	54	15.6	60

AG Average Wet Wt. Detail

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

Root Average Dry Wt. Detail

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

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		53	17.3333	45	12.8	80

Root Average Wet Wt. Detail

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

Total Average Biomass Dry Wt. Detail

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

Total Average Biomass Wet Wt. Detail

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

CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
% Germination	Comparison	05-5309-6055	05-5309-6055	05 Jun-06 1:29 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Angular (Corrected)		<100	100		N/A	40.98%

Group Comparisons

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

ANOVA Table

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

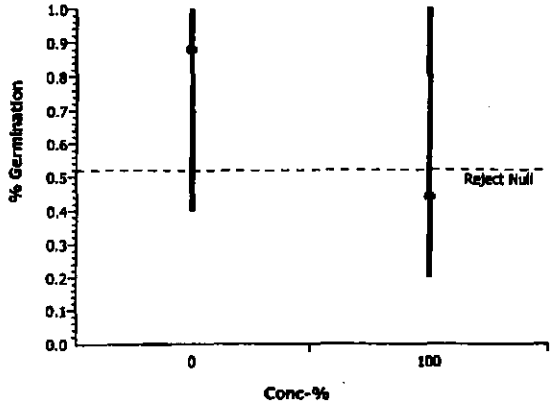
ANOVA Assumptions

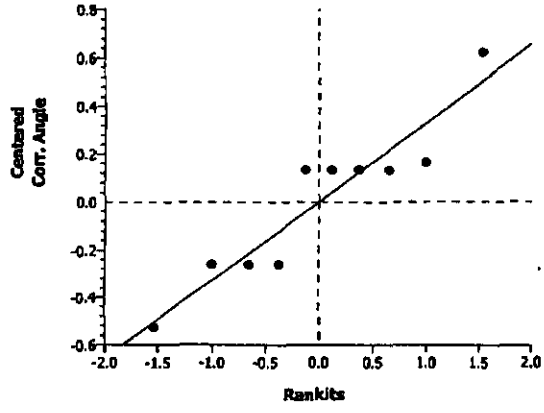
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.76355	23.15450	0.59611	Equal Variances
Distribution	Shapiro-Wilk W	0.89809		0.20874	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	05-5309-6055	05-5309-6055	05 Jun-06 1:29 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

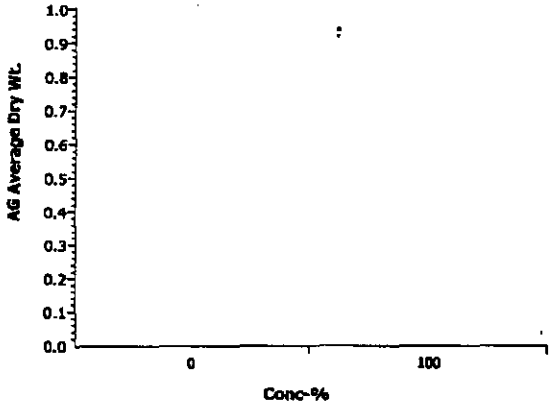
ANOVA Assumptions

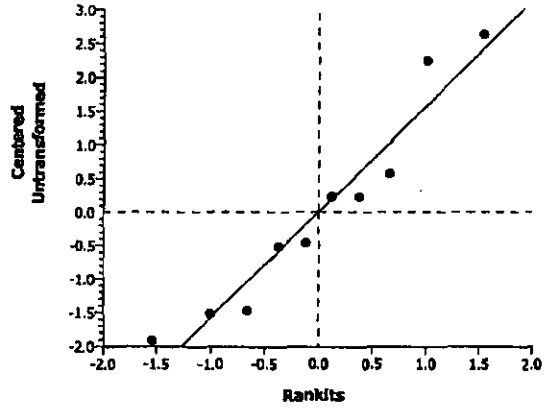
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.70848	23.15450	0.61658	Equal Variances
Distribution	Shapiro-Wilk W	0.92243		0.37770	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	05-5309-6055	05-5309-6055	05 Jun-06 1:29 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	92.60%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-1.9688	1.85955	0.9578	20.1302	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1135.645	1135.645	1	3.88	0.08450	Non-Significant Effect
Error	2343.756	292.9695	8			
Total	3479.40100	1428.6148	9			

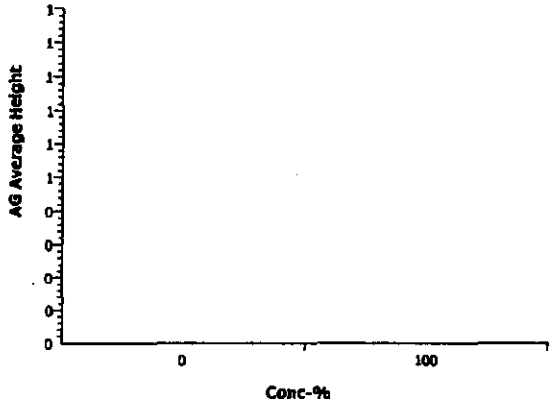
ANOVA Assumptions

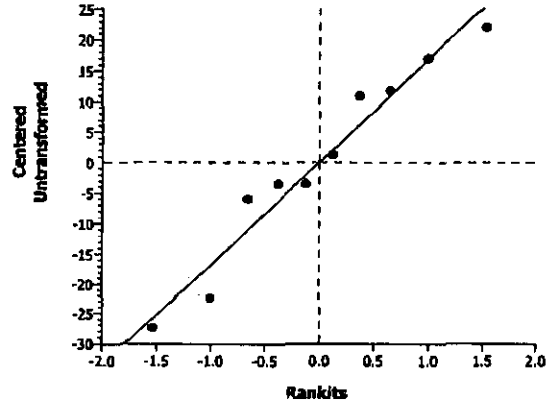
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.70520	23.15450	0.04130	Equal Variances
Distribution	Shapiro-Wilk W	0.94436		0.60246	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752				
100		5	43.053	15.6	65	23.149				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	05-5309-6055	05-5309-6055	05 Jun-06 1:30 PM	CETISv1.1.2

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

Group Comparisons

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

ANOVA Table

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

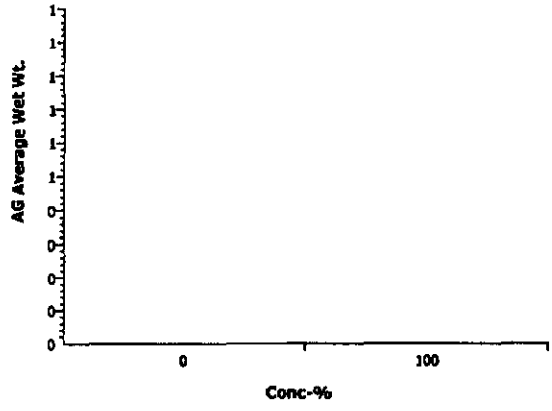
ANOVA Assumptions

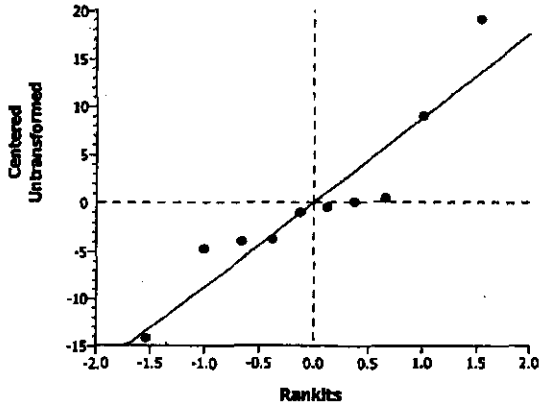
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.86485	23.15450	0.15461	Equal Variances
Distribution	Shapiro-Wilk W	0.89729		0.20454	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	05-5309-6055	05-5309-6055	05 Jun-06 1:30 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	44.60%

Group Comparisons

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

ANOVA Table

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

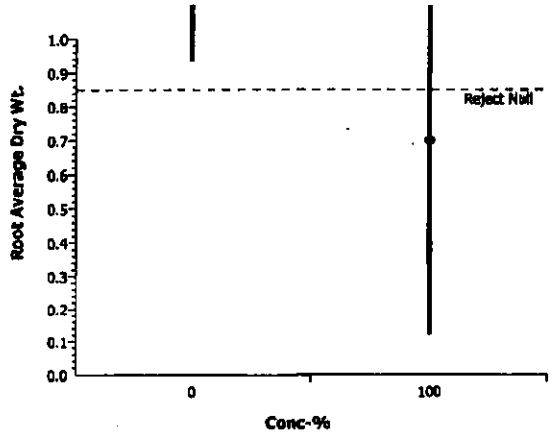
ANOVA Assumptions

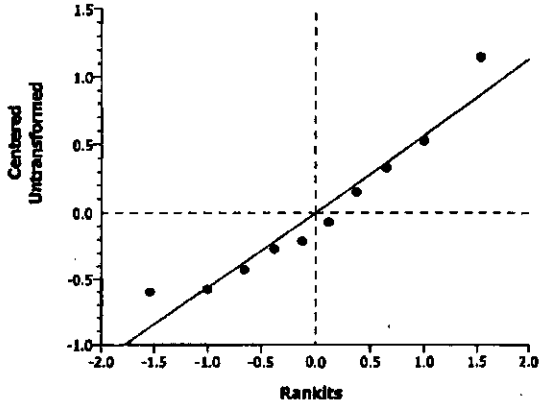
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.51629	23.15450	0.39326	Equal Variances
Distribution	Shapiro-Wilk W	0.92395		0.39107	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	05-5309-6055	05-5309-6055	05 Jun-06 1:30 PM	CETISv1.1.2

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	91.52%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-1.2012	1.85955	0.8680	23.9428	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	598.0444	598.0444	1	1.44	0.26401	Non-Significant Effect
Error	3315.62	414.4525	8			
Total	3913.66406	1012.4969	9			

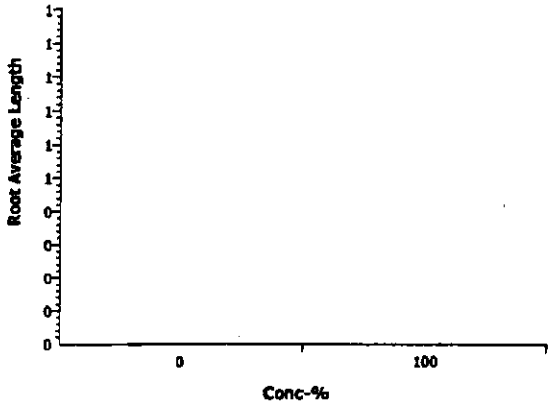
ANOVA Assumptions

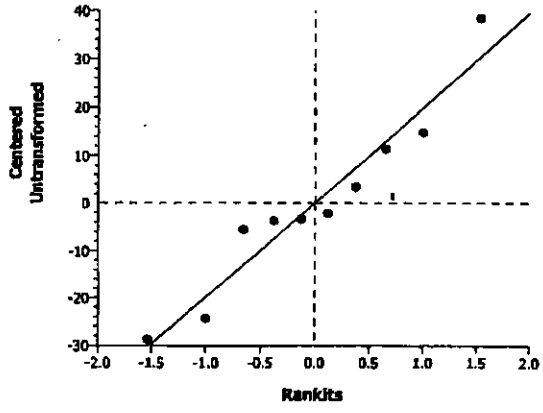
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	10.78962	23.15450	0.04073	Equal Variances
Distribution	Shapiro-Wilk W	0.94518		0.61199	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	26.16	20.6	41	8.385				
100		5	41.627	12.8	80	27.543				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	05-5309-6055	05-5309-6055	05 Jun-06 1:30 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	44.25%

Group Comparisons

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

ANOVA Table

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

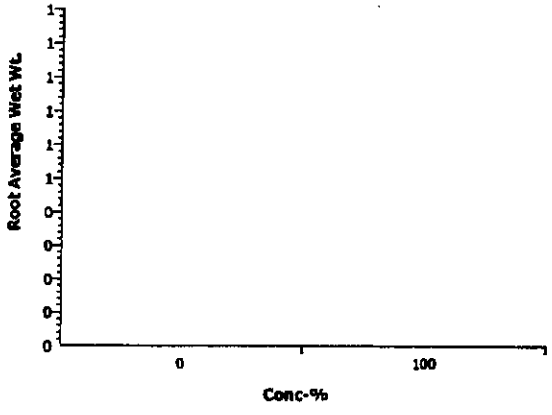
ANOVA Assumptions

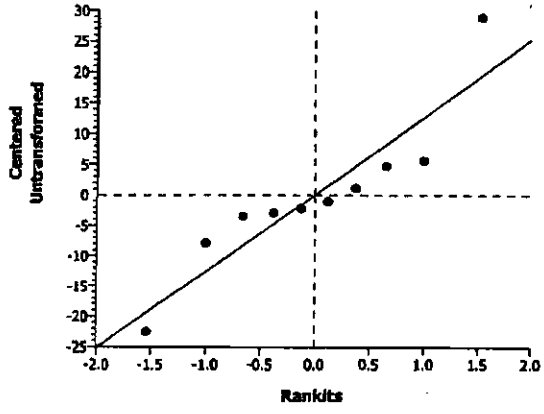
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	28.24906	23.15450	0.00685	Unequal Variances
Distribution	Shapiro-Wilk W	0.88470		0.14770	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Total Average Biomass Dry Wt.	Comparison	05-5309-6055	05-5309-6055	05 Jun-06 1:30 PM	CETISv1.1.2	

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

Group Comparisons

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

ANOVA Table

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

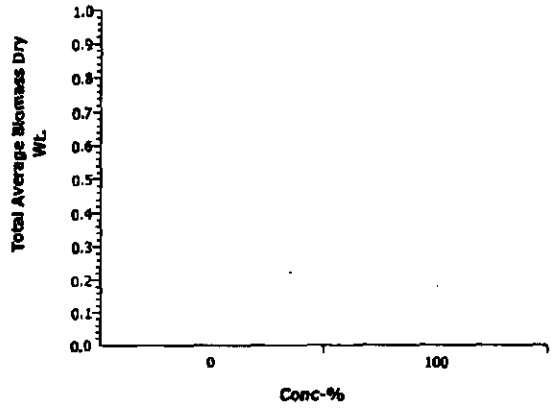
ANOVA Assumptions

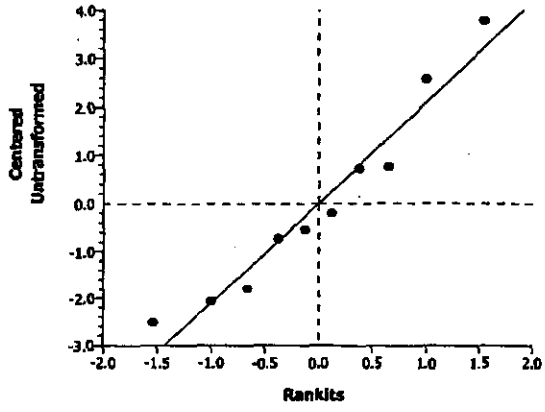
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.98216	23.15450	0.52384	Equal Variances
Distribution	Shapiro-Wilk W	0.94188		0.57406	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	05-5309-6055	05-5309-6055	05 Jun-06 1:30 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		<100	100		N/A	37.76%

Group Comparisons

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

ANOVA Table

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

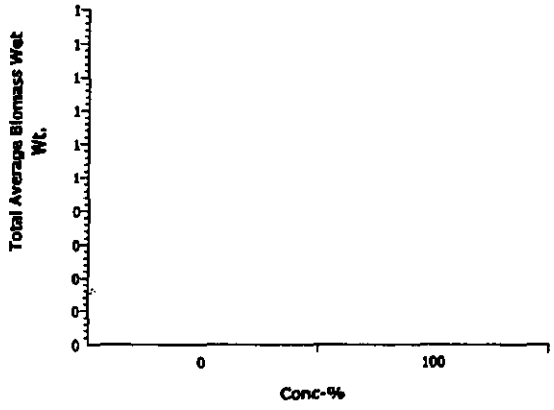
ANOVA Assumptions

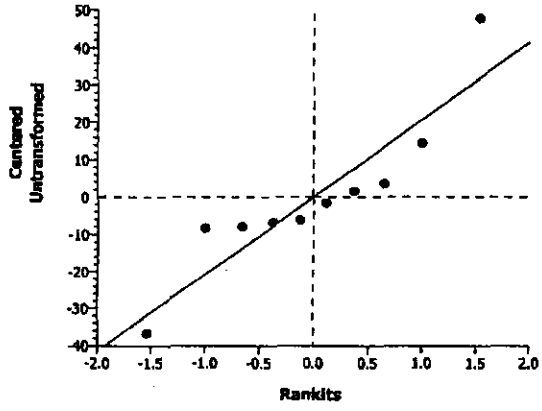
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	11.66703	23.15450	0.03543	Equal Variances
Distribution	Shapiro-Wilk W	0.87375		0.11052	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

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

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

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (26 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		3	3	5	5	6	6 → 5	5	7.6	7.5
	B		5	5	5	5	5	5 → 5	5		
	C		2	3	3	3	3	3 → 3	3		
	D		4	5	5	5	5	5 → 5	5		
	E		1	1	2	2	2	2 → 2	2		

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

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

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

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

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

Replicate E: 2 med w/B Tips

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 Lg each w 1 B shoot, 1 Md w/D shoot, 1 Md G

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

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

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

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

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	80 mm	95 mm	102 mm	96 mm	72 mm
Replicate B	91 mm	101 mm	84 mm	111 mm	132 mm
Replicate C	84 mm	54 mm	75 mm	mm	mm
Replicate D	81 mm	69 mm	82 mm	107 mm	66 mm
Replicate E	141 mm	102 mm	mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1029.31	1210.46	1059.05
Replicate B	1249.78	1443.66	1284.26
Replicate C	1254.19	1325.90	1266.45
Replicate D	1250.36	1433.61	1281.67
Replicate E	1255.70	1328.16	1266.78

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	126 mm	77 mm	64 mm	96 mm	122 mm
Replicate B	81 mm	69 mm	94 mm	116 mm	86 mm
Replicate C	76 mm	96 mm	62 mm	DW mm	mm
Replicate D	80 mm	80 mm	111 mm	76 mm	87 mm
Replicate E	97 mm	92 mm	mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	988.24	1170.22	994.99
Replicate B	1242.04	1497.40	1251.83
Replicate C	1260.94	1344.10	1262.86
Replicate D	1245.99	1434.96	1251.49
Replicate E	1247.50	1332.49	1249.84

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 1:33 PM
Test Link: 12-6213-8664/B157509psc

Plant Chronic test — **CH2M Hill**

Test No:	05-1092-0741	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

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

Comments: J11K61

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
14-8041-1875	% Germination	100	> 100	N/A	35.39%	Wilcoxon Rank Sum Two-Sample
11-1678-1076	AG Average Dry Wt.	100	> 100	N/A	28.89%	Equal Variance t Two-Sample
11-6113-4855	AG Average Height	100	> 100	N/A	76.58%	Wilcoxon Rank Sum Two-Sample
07-7608-3768	AG Average Wet Wt.	100	> 100	N/A	32.64%	Equal Variance t Two-Sample
09-0861-8211	Root Average Dry Wt.	100	> 100	N/A	45.74%	Equal Variance t Two-Sample
06-3523-9609	Root Average Length	100	> 100	N/A	47.84%	Wilcoxon Rank Sum Two-Sample
17-2541-9082	Root Average Wet Wt.	100	> 100	N/A	47.72%	Equal Variance t Two-Sample
15-6049-7422	Total Average Biomass Dry	100	> 100	N/A	31.57%	Equal Variance t Two-Sample
04-7528-9509	Total Average Biomass Wet	100	> 100	N/A	39.79%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:33 PM
Test Link: 12-6213-8664/B157509psc

% Germination Summary

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

AG Average Dry Wt. Summary

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

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	27.893	16.2	61	8.3751	18.727	67.14%

AG Average Wet Wt. Summary

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

Root Average Dry Wt. Summary

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

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	25.52	17.4	47	5.5884	12.496	48.97%

Root Average Wet Wt. Summary

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

Total Average Biomass Dry Wt. Summary

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

Total Average Biomass Wet Wt. Summary

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

CETIS Test Summary

Report Date: 05 Jun-06 1:33 PM
Test Link: 12-6213-8664/B157509psc

% Germination Detail

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

AG Average Dry Wt. Detail

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

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		17.8	20.8	23.6667	16.2	61

AG Average Wet Wt. Detail

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

Root Average Dry Wt. Detail

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

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		19.4	17.8	26	17.4	47

Root Average Wet Wt. Detail

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

Total Average Biomass Dry Wt. Detail

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

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	116.262
100		72.63	89.856	51.6234	74.45	78.75

CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
% Germination	Comparison	12-6213-8664	12-6213-8664	05 Jun-06 1:33 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	35.39%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	25.5		0.3452	4	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.021087	0.021087	1	0.23	0.64701	Non-Significant Effect
Error	0.7455132	0.093189	8			
Total	0.7666002	0.1142761	9			

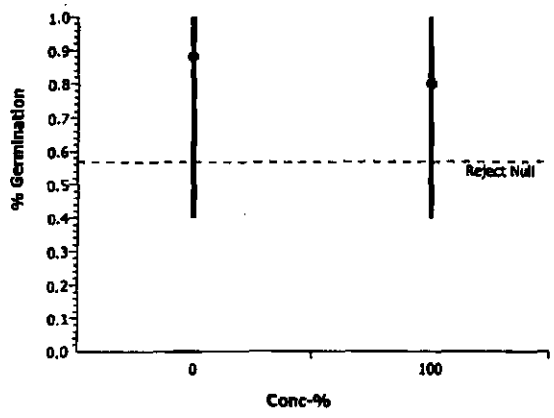
ANOVA Assumptions

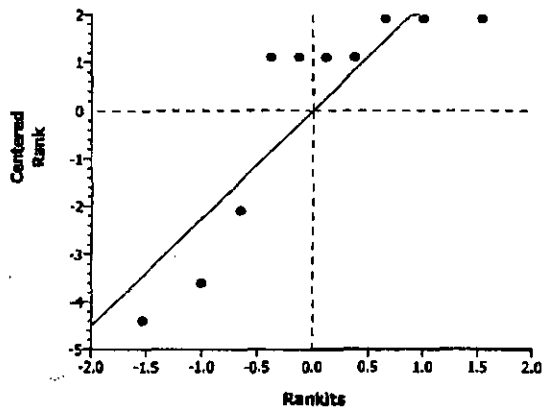
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.13568	23.15450	0.90483	Equal Variances
Distribution	Shapiro-Wilk W	0.74930		0.00350	Non-normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	12-6213-8664	12-6213-8664	05 Jun-06 1:33 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	28.89%

Group Comparisons

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

ANOVA Table

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

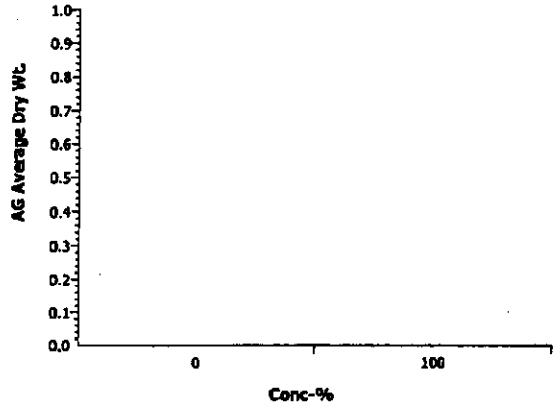
ANOVA Assumptions

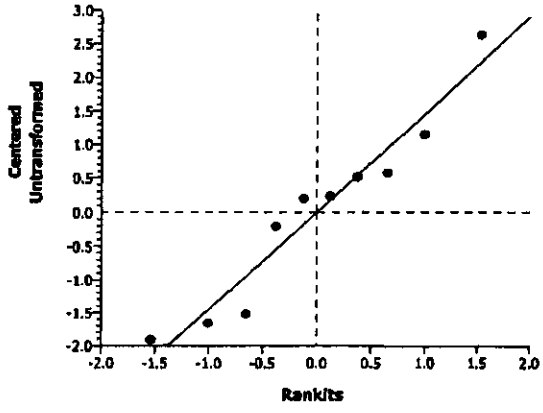
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.99632	23.15450	0.31302	Equal Variances
Distribution	Shapiro-Wilk W	0.93571		0.50637	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	12-6213-8664	12-6213-8664	05 Jun-06 1:33 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	76.58%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	29		0.5794	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	94.65878	94.65878	1	0.47	0.51132	Non-Significant Effect
Error	1603.073	200.3841	8			
Total	1697.73165	295.04288	9			

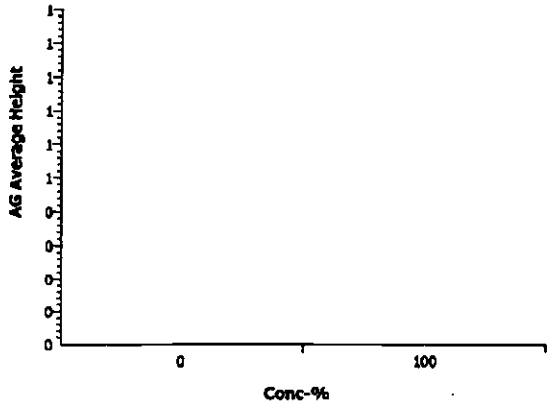
ANOVA Assumptions

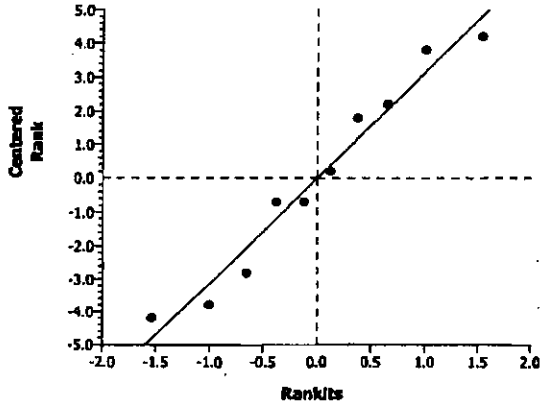
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	7.00608	23.15450	0.08581	Equal Variances
Distribution	Shapiro-Wilk W	0.76434		0.00534	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752	5.20000	1.00000	9.00000	3.01247
100		5	27.893	16.2	61	18.727	5.80000	2.00000	10.0000	3.34664

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	12-6213-8664	12-6213-8664	05 Jun-06 1:33 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	32.64%

Group Comparisons

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

ANOVA Table

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

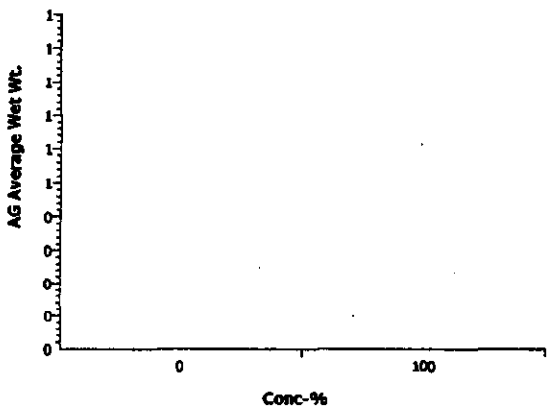
ANOVA Assumptions

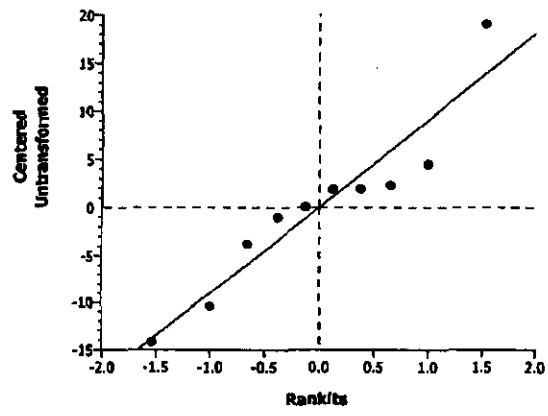
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.10277	23.15450	0.20032	Equal Variances
Distribution	Shapiro-Wilk W	0.91656		0.32912	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	12-6213-8664	12-6213-8664	05 Jun-06 1:33 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	45.74%

Group Comparisons

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

ANOVA Table

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

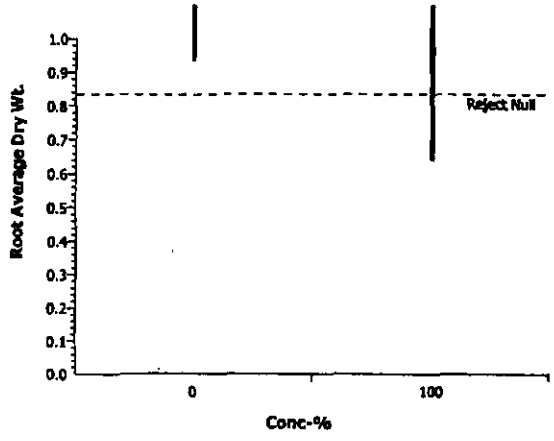
ANOVA Assumptions

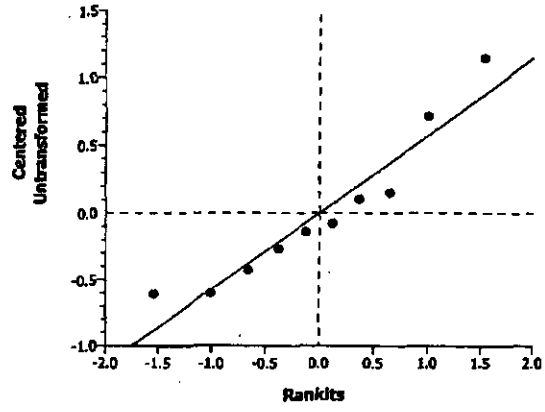
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.12904	23.15450	0.48225	Equal Variances
Distribution	Shapiro-Wilk W	0.90479		0.24709	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	12-6213-8664	12-6213-8664	05 Jun-06 1:33 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	47.84%

Group Comparisons

Control vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi	100	24		0.2738	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.024	1.024	1	0.01	0.92658	Non-Significant Effect
Error	905.84	113.23	8			
Total	906.864027	114.25400	9			

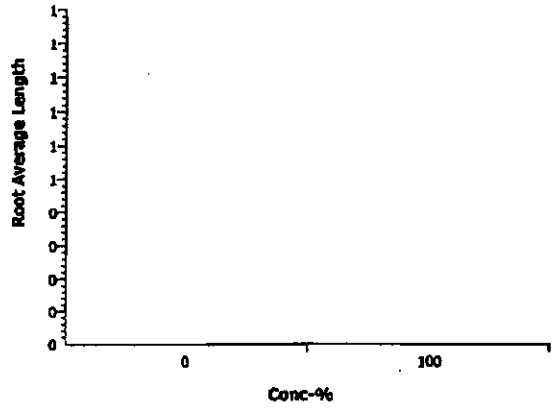
ANOVA Assumptions

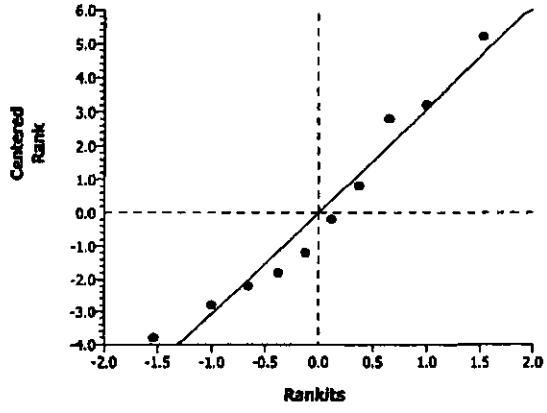
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.22097	23.15450	0.45863	Equal Variances
Distribution	Shapiro-Wilk W	0.76079		0.00483	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	26.16	20.6	41	8.385	6.20000	4.00000	9.00000	1.92354
100		5	25.52	17.4	47	12.496	4.80000	1.00000	10.0000	3.96232

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	12-6213-8664	12-6213-8664	05 Jun-06 1:33 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	47.72%

Group Comparisons

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

ANOVA Table

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

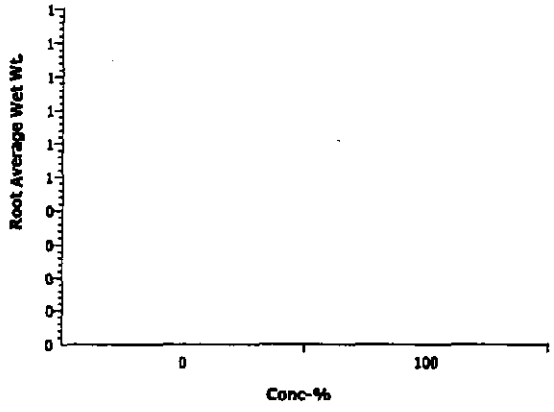
ANOVA Assumptions

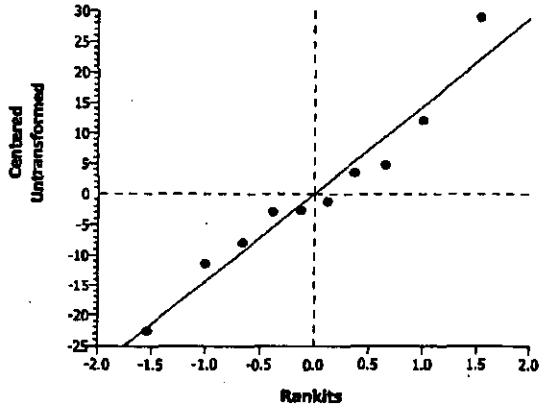
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.89658	23.15450	0.15305	Equal Variances
Distribution	Shapiro-Wilk W	0.95962		0.78153	Normal Distribution

Data Summary

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

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	12-6213-8664	12-6213-8664	05 Jun-06 1:33 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	31.57%

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.8977821	0.897782	1	0.22	0.65425	Non-Significant Effect
Error	33.20163	4.150204	8			
Total	34.0994155	5.0479863	9			

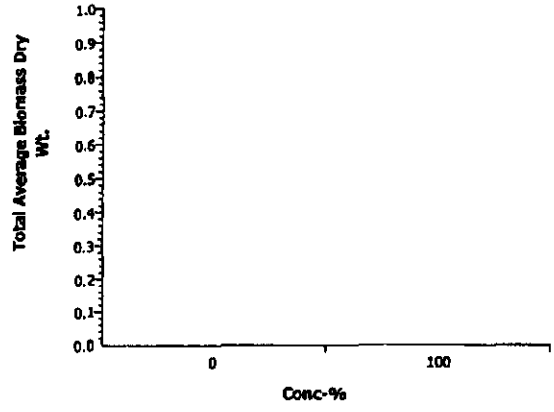
ANOVA Assumptions

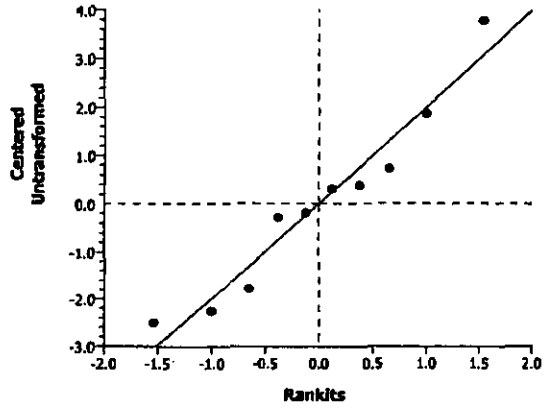
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.72689	23.15450	0.35470	Equal Variances
Distribution	Shapiro-Wilk W	0.94508		0.61078	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.9901	4.7267	8.854	1.4924				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	12-6213-8664	12-6213-8664	05 Jun-06 1:33 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	39.79%

Group Comparisons

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

ANOVA Table

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

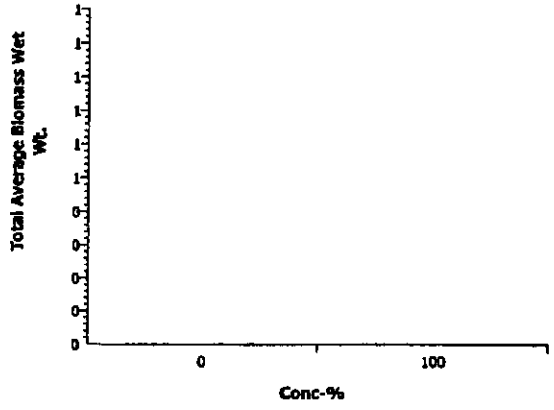
ANOVA Assumptions

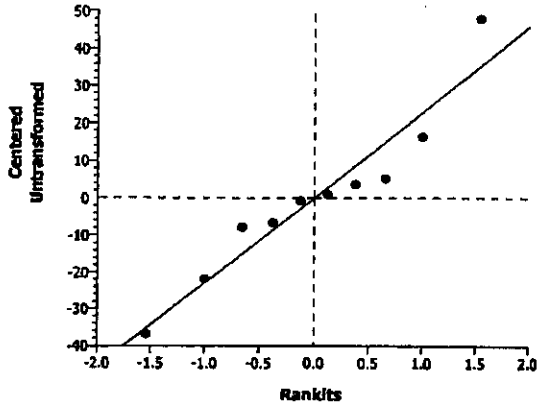
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	4.86062	23.15450	0.15482	Equal Variances
Distribution	Shapiro-Wilk W	0.93987		0.55153	Normal Distribution

Data Summary

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

Graphics





BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

Day 6 (initials) NB Day 12 _____ Day 14 NJ Day 16 NJ Day 19 TP Day 21 NJ Day 23 NJ Day 28 NJ Day 35 [illegible]

Bioassay Lab ID: BG 1575- 10 Sample No: J1K40

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		3	3	3	3	3	4	4	6.4	6.9
	B		1	2	3	3	3	3	3		
	C		5	5	6	6	6	5	5		
	D		3	5	8	8	8	5	5		
	E		2	2	3	3	3	3	3		

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

Replicate A 1lg G, 2 md G w/1 brown shoot, 1sm G

Replicate B 2 lg G, 1 md G

Replicate C 4 lg G, 2 1 md G Removed-1 md G

Replicate D 1 lg G, 4 md G - Removed- 2 md G + 1 sm G w/1 B tip

Replicate E 2 lg G w/1 B tip, 1 md G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A 1 Lg w/ 3 B shoots, 2 Md G, 1 Sm G

Replicate B 2 Lg G, 1 Md G

Replicate C 2 Lg G w/ 1 B shoot 3 Lg G

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

Replicate E 1 Lg w/ 2 B shoots, 2 Med G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	52 mm	84 mm	52 mm	106 mm	mm
Replicate B	111 mm	64 mm	95 mm	mm	mm
Replicate C	83 mm	84 mm	95 mm	100 mm	110 mm
Replicate D	85 mm	69 mm	75 mm	83 mm	133 mm
Replicate E	71 mm	89 mm	86 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1018.85	1109.9	1034.61
Replicate B	989.91	1069.9	1002.57
Replicate C	1009.75	1193.7	1039.62
Replicate D	995.16	1169.8	1024.80
Replicate E	995.56	1182.8	1015.03

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	47 mm	116 mm	31 mm	30 mm	mm
Replicate B	70 mm	82 mm	51 mm	mm	mm
Replicate C	66 mm	87 mm	116 mm	132 mm	66 mm
Replicate D	80 mm	110 mm	64 mm	48 mm	75 mm
Replicate E	152 mm	116 mm	59 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	995.71	1082.0	999.71
Replicate B	989.80	1060.3	993.16
Replicate C	1003.94	1199.5	1012.74
Replicate D	991.11	1201.5	998.96
Replicate E	1242.74	1383.7	1251.42

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 1:36 PM
Test Link: 07-3016-0892/B157510psc

Plant Chronic test — **CH2M Hill**

Test No:	19-3203-7355	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Sample No:	02-2878-1148	**Code:**	B1580-04	**Client:**	
Sample Date:	25 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	24h	**Station:**			

Comments: J11K40

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
12-6799-4363	% Germination	100	> 100	N/A	30.05%	Equal Variance t Two-Sample
11-6924-1763	AG Average Dry Wt.	100	> 100	N/A	29.58%	Equal Variance t Two-Sample
16-6964-4127	AG Average Height	100	> 100	N/A	34.56%	Equal Variance t Two-Sample
03-5348-7765	AG Average Wet Wt.	100	> 100	N/A	47.70%	Equal Variance t Two-Sample
15-9152-6103	Root Average Dry Wt.	100	> 100	N/A	55.54%	Equal Variance t Two-Sample
02-8622-2247	Root Average Length	100	> 100	N/A	39.24%	Wilcoxon Rank Sum Two-Sample
15-3968-7811	Root Average Wet Wt.	100	> 100	N/A	50.78%	Equal Variance t Two-Sample
12-0608-9443	Total Average Biomass Dry	100	> 100	N/A	33.67%	Equal Variance t Two-Sample
14-0409-3093	Total Average Biomass Wet	100	> 100	N/A	47.40%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:36 PM
Test Link: 07-3016-0892/B157510psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.80000	0.60000	1.00000	0.08944	0.20000	25.00%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	5.31041	3.94000	6.49001	0.51382	1.14894	21.64%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	22.607	18.2	30	2.5129	5.6190	24.86%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	36.711	22.763	62.413	6.9257	15.486	42.18%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	1.66867	1.00000	2.89335	0.33661	0.75268	45.11%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	21.32	14	36.333	4.0505	9.0573	42.48%

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	34.65	21.572	46.987	5.1119	11.430	32.99%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	6.9791	4.9400	9.3834	0.8205	1.8347	26.29%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	71.361	44.335	109.4	11.574	25.880	36.27%

CETIS Test Summary

Report Date: 05 Jun-06 1:36 PM
Test Link: 07-3016-0892/B157510psc

% Germination Detail

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

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		3.94000	4.22001	5.97400	5.92802	6.49001

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		18.5	30	19	18.2	27.3333

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		22.7625	26.6634	36.79	34.9280	62.4133

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		1.00000	1.12000	1.76000	1.57001	2.89335

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		14	22.6667	18.6	15	36.3333

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		21.5725	23.5000	39.112	42.0780	46.9867

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		4.94000	5.34001	7.734	7.49802	9.38338

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		44.3350	50.1633	75.902	77.0060	109.4

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	07-3016-0892	07-3016-0892	05 Jun-06 1:36 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	30.05%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.59281	1.85955	0.2848	0.31116	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0245998	0.0246	1	0.35	0.56968	Non-Significant Effect
Error	0.5600038	0.070000	8			
Total	0.58460358	0.0946003	9			

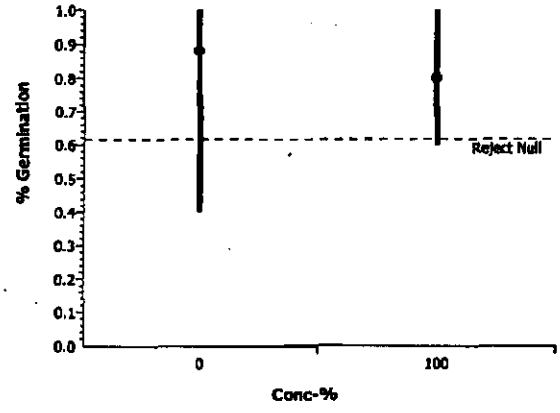
ANOVA Assumptions

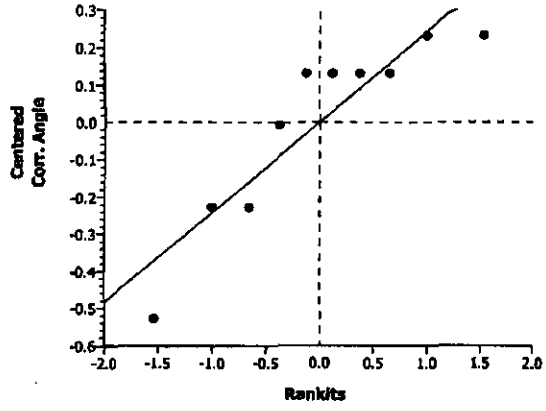
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.65495	23.15450	0.63747	Equal Variances
Distribution	Shapiro-Wilk W	0.82857		0.03216	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	1.21317	0.68472	1.34528	0.29541
100		5	0.80000	0.60000	1.00000	0.20000	1.11397	0.88608	1.34528	0.22963

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	07-3016-0892	07-3016-0892	05 Jun-06 1:36 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	29.58%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.77191	1.85955	0.2312	1.79039	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.380868	1.380868	1	0.60	0.46236	Non-Significant Effect
Error	18.54002	2.317503	8			
Total	19.9208920	3.6983712	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.51121	23.15450	0.39427	Equal Variances
Distribution	Shapiro-Wilk W	0.93026		0.45041	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	5.31041	3.94000	6.49001	1.14894				

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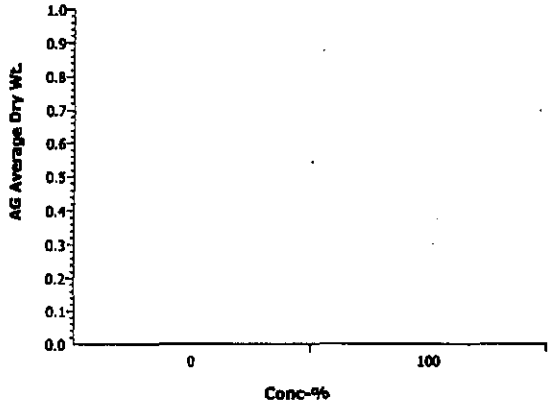
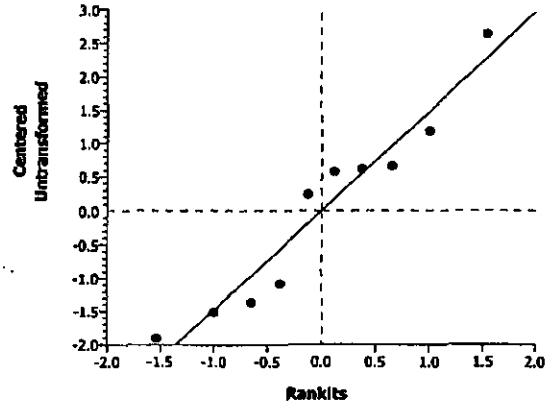




CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
AG Average Height	Comparison	07-3016-0892	07-3016-0892	05 Jun-06 1:36 PM	CETISv1.1.2	

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	34.56%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.2145	1.85955	0.5822	7.51366	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	1.877778	1.877778	1	0.05	0.83553	Non-Significant Effect
Error	326.5262	40.81578	8			
Total	328.403992	42.693555	9			

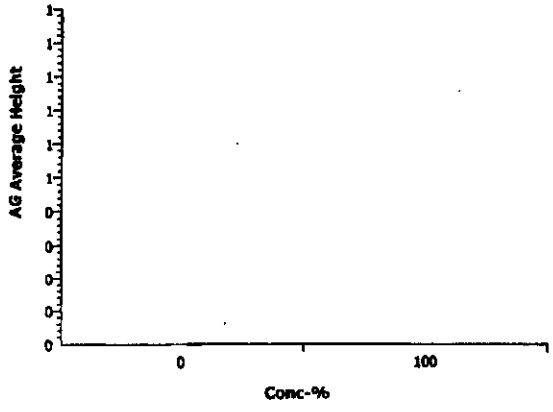
ANOVA Assumptions

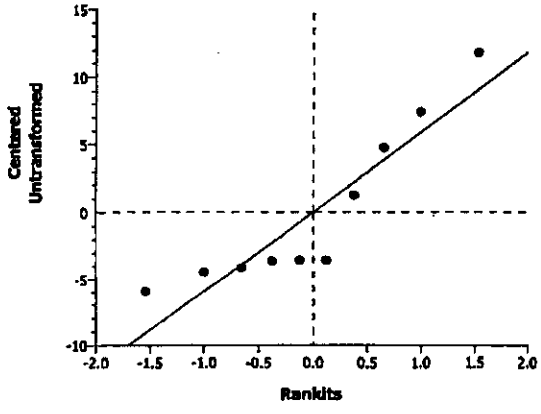
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.58544	23.15450	0.66615	Equal Variances
Distribution	Shapiro-Wilk W	0.83657		0.04013	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752				
100		5	22.607	18.2	30	5.6190				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	07-3016-0892	07-3016-0892	05 Jun-06 1:36 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	47.70%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.2866	1.85955	0.6092	16.3112	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	15.80343	15.80343	1	0.08	0.78168	Non-Significant Effect
Error	1538.815	192.3519	8			
Total	1554.61837	208.15530	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.65540	23.15450	0.63729	Equal Variances
Distribution	Shapiro-Wilk W	0.86232		0.08125	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	36.711	22.763	62.413	15.486				

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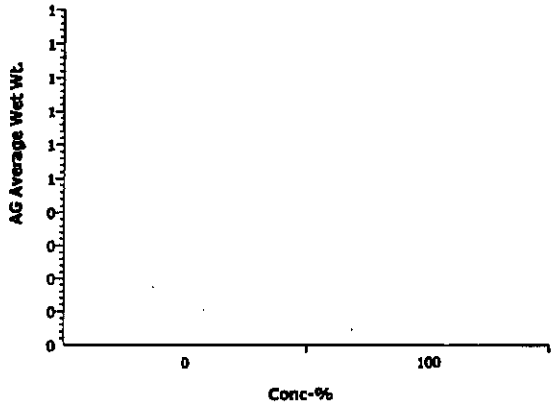

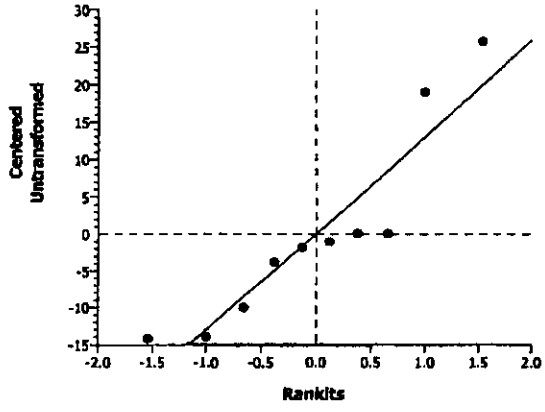

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	07-3016-0892	07-3016-0892	05 Jun-06 1:36 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	55.54%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.2897	1.85955	0.6103	0.85294	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0441422	0.044142	1	0.08	0.77941	Non-Significant Effect
Error	4.207812	0.525977	8			
Total	4.25195407	0.5701187	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.16704	23.15450	0.88460	Equal Variances
Distribution	Shapiro-Wilk W	0.84009		0.04423	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	1.66867	1.00000	2.89335	0.75268				

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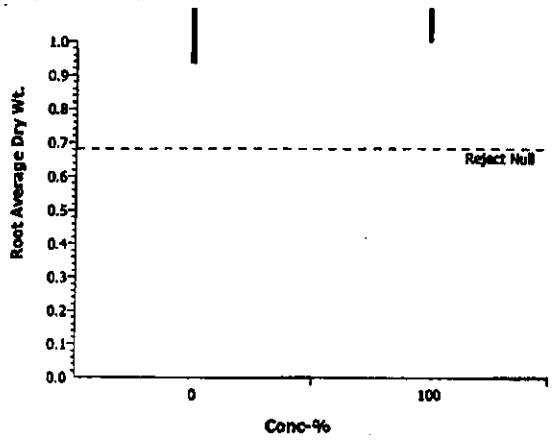
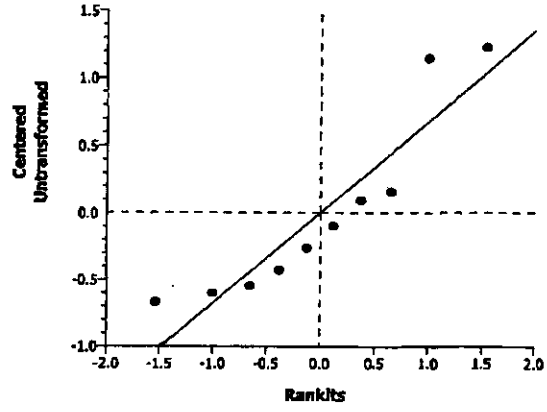




CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Length	Comparison	07-3016-0892	07-3016-0892	05 Jun-06 1:36 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Wilcoxon Rank Sum Two-Sample	C > T	Rank		100	>100	1	N/A	39.24%

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	58.564	58.564	1	0.77	0.40613	Non-Significant Effect
Error	609.3689	76.17111	8			
Total	667.932896	134.73511	9			

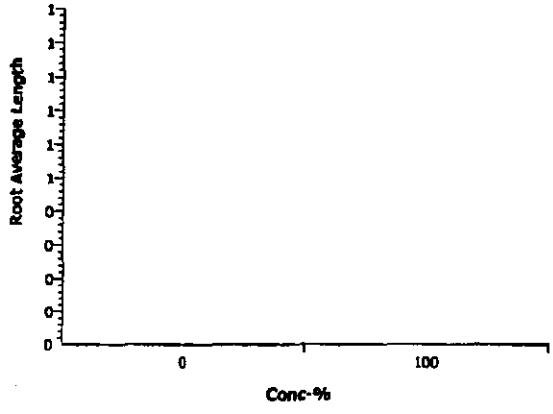
ANOVA Assumptions

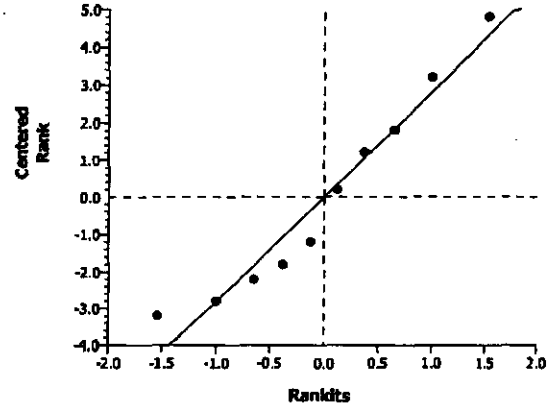
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.16678	23.15450	0.88477	Equal Variances
Distribution	Shapiro-Wilk W	0.75692		0.00433	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	28.16	20.6	41	8.385	6.80000	4.00000	10.0000	2.38747
100		5	21.32	14	36.333	9.0573	4.20000	1.00000	9.00000	3.27109

Graphics





CETIS Analysis Detail

Plant Chronic test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
Root Average Wet Wt.	Comparison	07-3016-0892	07-3016-0892	05 Jun-06 1:36 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	50.78%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.16086	1.85955	0.4381	18.4054	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	6.337531	6.337531	1	0.03	0.87619	Non-Significant Effect
Error	1959.33	244.9163	8			
Total	1965.66785	251.25382	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.74905	23.15450	0.35097	Equal Variances
Distribution	Shapiro-Wilk W	0.97530		0.93521	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	34.65	21.572	46.987	11.430				

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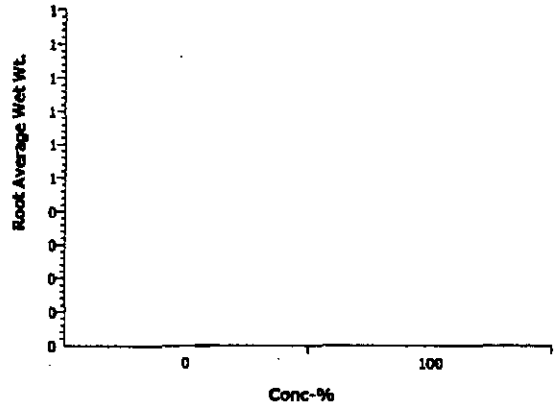

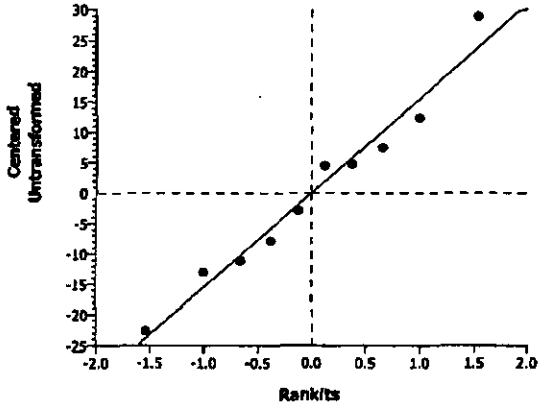

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	07-3016-0892	07-3016-0892	05 Jun-06 1:36 PM	CETISv1.1.2

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

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.44419	1.85955	0.3343	2.55501	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.9312184	0.931218	1	0.20	0.66867	Non-Significant Effect
Error	37.75724	4.719655	8			
Total	38.6884587	5.6508734	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.80426	23.15450	0.58160	Equal Variances
Distribution	Shapiro-Wilk W	0.93163		0.46414	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.9791	4.9400	9.3834	1.8347				

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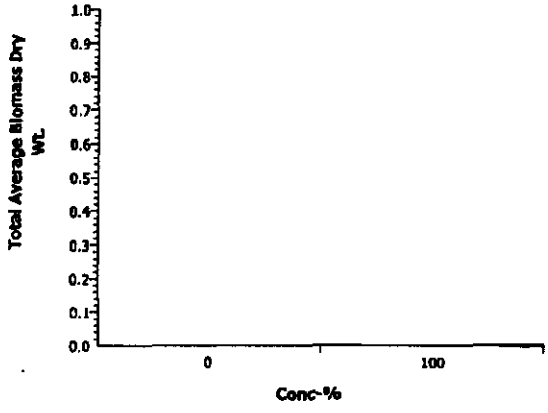

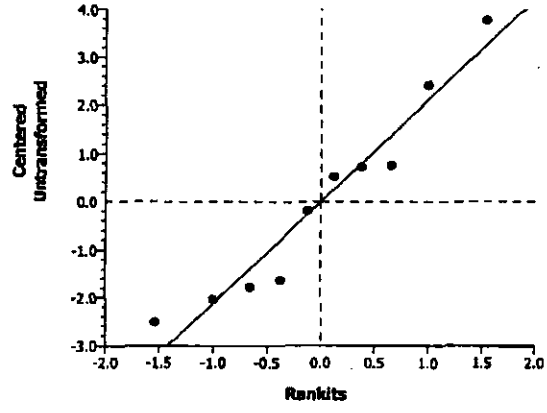

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	07-3016-0892	07-3016-0892	05 Jun-06 1:36 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	47.40%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.0514	1.85955	0.5198	33.3884	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	2.125471	2.125471	1	0.00	0.96030	Non-Significant Effect
Error	6447.727	805.9658	8			
Total	6449.85203	808.09129	9			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.40659	23.15450	0.74899	Equal Variances
Distribution	Shapiro-Wilk W	0.93638		0.51346	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	71.361	44.335	109.4	25.880				

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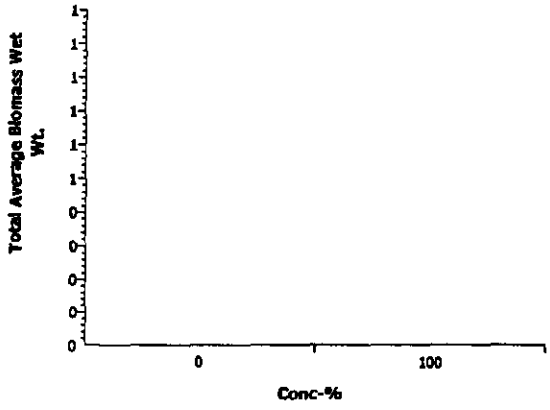
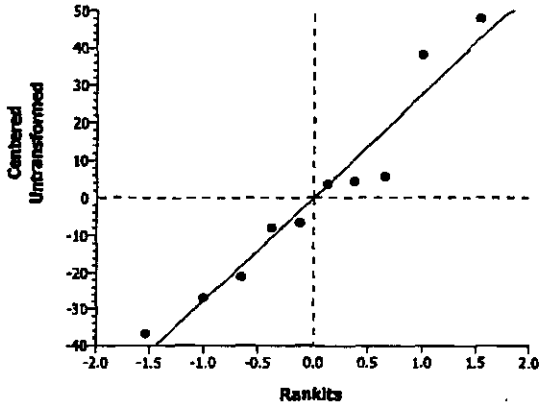




BLUEGRASS GROWTH TEST

Client: Washington Closure Hanford Project

Test Start Date: 4-26-06

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

Bioassay Lab ID: BG 1575- 11 Sample No: J115X6

CONC.	REPLICATE	# seeds germinated: Emergence: 12 days after planting	14 days after planting	16 days after planting	19 days after planting	21 days after planting	23 days after planting	7-DAYS POST-EMERGENCE (28 days after planting)	14-DAYS POST-EMERGENCE (35 days after planting)	pH: INITIAL (@ planting)	FINAL (@ 14 days Post-Emergence)
Control	A		4	5	6	6	6	5	5	8.1	7.6
	B		1	1	1	1	1	1	1		
	C		3	3	4	4	4	4	4		
	D		2	3	4	4	4	4	4		
	E		1	1	3	3	3	3	3		

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

Replicate A: 3 lg G, 2 md G Removed 1 md G

Replicate B: 1 Lg G

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

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

Replicate E: 1 lg G, 2 md G

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

14-Days Post-Emergence: Describe shoot appearance:

Replicate A: 3 Lg G, 1 Med, 1 Med w 1 3 tip

Replicate B: 1 Lg G

Replicate C: 2 Lg G, 2 Med G

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

Replicate E: 1 Lg G, 2 Md G

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	72 mm	84 mm	96 mm	96 mm	111 mm
Replicate B	90 mm	mm	mm	mm	mm
Replicate C	87 mm	108 mm	67 mm	40 mm	mm
Replicate D	75 mm	34 mm	90 mm	73 mm	mm
Replicate E	57 mm	69 mm	105 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1006.97	1188.01	1038.49
Replicate B	1236.50	1272.62	1243.36
Replicate C	1256.52	1361.96	1272.57
Replicate D	1246.56	1310.54	1256.27
Replicate E	1249.55	1311.90	1260.30

Describe root appearance:

Replicate A

Replicate B

Replicate C

Replicate D

Replicate E

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

	1st Seedling	2nd Seedling	3rd Seedling	4th Seedling	5th Seedling
Replicate A	121 ~~134~~ mm	105 mm	93 mm	117 mm	73 mm
Replicate B	135 mm	mm	mm	mm	mm
Replicate C	21 mm	59 mm	122 mm	93 mm	mm
Replicate D	82 mm	51 mm	25 mm	46 mm	mm
Replicate E	131 mm	77 mm	43 mm	mm	mm

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

	Tin Tare Wt. (mg)	Wet Wt (mg)	Dry Wt. (mg)
Replicate A	1004.84	1256.70	1016.55
Replicate B	1241.52	1282.70	1243.55
Replicate C	1247.82	1410.42	1255.03
Replicate D	1249.26	1373.10	1252.52
Replicate E	1247.43	1308.10	1253.53

Comments:

CETIS Test Summary

Report Date: 05 Jun-06 1:39 PM
Test Link: 04-2251-3051/B157511psc

Plant Chronic test — **CH2M Hill**

Test No:	05-1243-9337	**Test Type:**	Plant Chronic test	**Duration:**	N/A
Start Date:	26 Apr-06	**Protocol:**	ASTM E1963-02 (2002)	**Species:**	Poa sandbergii
Ending Date:		**Dil Water:**		**Source:**	
Setup Date:	26 Apr-06	**Brine:**			

Sample No:	12-7590-7138	**Code:**	B1584-01	**Client:**	
Sample Date:	26 Apr-06	**Material:**	Soil	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	N/A	**Station:**			

Comments: J11JX6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
17-9538-4389	% Germination	100	> 100	N/A	36.59%	Wilcoxon Rank Sum Two-Sample
18-5676-6414	AG Average Dry Wt.	100	> 100	N/A	35.93%	Equal Variance t Two-Sample
14-6963-6653	AG Average Height	100	> 100	N/A	123.41%	Wilcoxon Rank Sum Two-Sample
10-6233-5939	AG Average Wet Wt.	100	> 100	N/A	36.63%	Equal Variance t Two-Sample
13-6508-5951	Root Average Dry Wt.	100	> 100	N/A	49.28%	Equal Variance t Two-Sample
11-4850-5174	Root Average Length	100	> 100	N/A	166.68%	Wilcoxon Rank Sum Two-Sample
06-6724-4502	Root Average Wet Wt.	100	> 100	N/A	50.84%	Equal Variance t Two-Sample
04-7794-0433	Total Average Biomass Dry	100	> 100	N/A	37.34%	Equal Variance t Two-Sample
14-7434-0702	Total Average Biomass Wet	100	> 100	N/A	42.91%	Equal Variance t Two-Sample

CETIS Test Summary

Report Date: 05 Jun-06 1:39 PM
Test Link: 04-2251-3051/B157511psc

% Germination Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.12000	0.26833	30.49%
100		5	0.68000	0.20000	1.00000	0.13565	0.30332	44.61%

AG Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	0.81424	1.82070	30.08%
100		5	4.63746	2.42749	6.85999	0.83972	1.87768	40.49%

AG Average Height Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	21.74	15.8	33.5	3.1641	7.0752	32.54%
100		5	34.013	17	90	14.076	31.475	92.54%

AG Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	34.197	19.960	53.208	5.3829	12.036	35.20%
100		5	27.089	15.985	36.206	4.0490	9.0539	33.42%

Root Average Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.31159	0.69673	45.37%
100		5	1.80457	0.81500	2.34199	0.26184	0.58550	32.45%

Root Average Length Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	26.16	20.6	41	3.7499	8.385	32.05%
100		5	42.93	12.75	135	23.146	51.757	120.56

Root Average Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	36.242	13.590	65.054	8.4756	18.952	52.29%
100		5	36.676	20.223	50.372	5.1331	11.478	31.30%

Total Average Biomass Dry Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	7.5894	5.0750	11.36	1.1021	2.4644	32.47%
100		5	6.4420	3.2425	8.8900	1.0527	2.3538	36.54%

Total Average Biomass Wet Wt. Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Artificial Soil/S	5	70.439	33.550	118.26	13.727	30.694	43.58%
100		5	63.765	41.007	86.578	8.7020	19.458	30.52%

CETIS Test Summary

Report Date: 05 Jun-06 1:39 PM
Test Link: 04-2251-3051/B157511psc

% Germination Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.00000	1.00000	0.40000	1.00000	1.00000
100		1.00000	0.20000	0.80000	0.80000	0.60000

AG Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	4.53401	6.62400	4.14001	6.28801	8.68201
100		6.30400	6.85999	4.01248	2.42749	3.58333

AG Average Height Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	15.8	18.2	33.5	18.2	23
100		18.4	90	19	17	25.6667

AG Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	30.4100	33.172	19.9600	34.2360	53.2080
100		36.2060	36.1	26.37	15.985	20.7833

Root Average Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	1.26801	1.68799	0.93500	1.10999	2.67798
100		2.34199	2.03003	1.80252	0.81500	2.03333

Root Average Length Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	20.6	22.8	41	22.4	24
100		20.4	135	18.5	12.75	28

Root Average Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	33.3280	40.9320	13.5900	28.3060	65.054
100		50.372	41.1799	40.6450	30.96	20.2233

Total Average Biomass Dry Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	5.80201	8.31199	5.07501	7.398	11.36
100		8.64601	8.89001	5.81500	3.24249	5.61666

Total Average Biomass Wet Wt. Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	Artificial Soil/S	63.7380	74.1040	33.5500	62.5420	118.262
100		86.578	77.2799	67.0150	46.945	41.0066

CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Germination	Comparison	04-2251-3051	04-2251-3051	05 Jun-06 1:38 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	36.59%

Group Comparisons

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

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1337598	0.13376	1	1.35	0.27810	Non-Significant Effect
Error	0.7902647	0.098783	8			
Total	0.92402454	0.2325429	9			

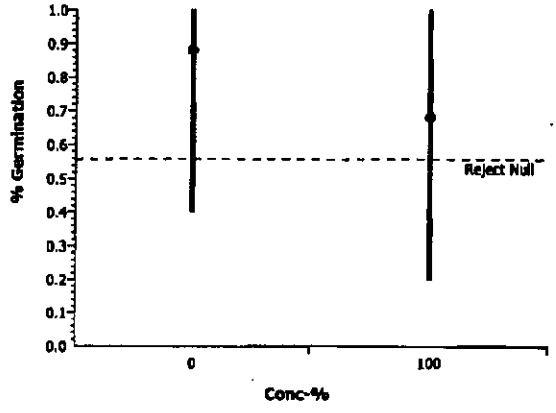
ANOVA Assumptions

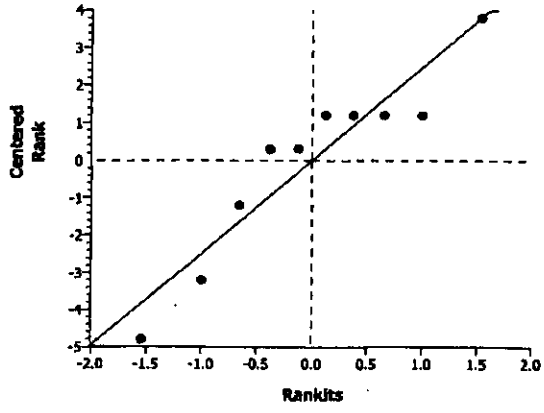
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.26388	23.15450	0.82595	Equal Variances
Distribution	Shapiro-Wilk W	0.76117		0.00488	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	0.88000	0.40000	1.00000	0.26833	6.80000	2.00000	8.00000	2.68328
100		5	0.68000	0.20000	1.00000	0.30332	4.20000	1.00000	8.00000	2.56418

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Dry Wt.	Comparison	04-2251-3051	04-2251-3051	05 Jun-06 1:39 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	35.93%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.21073	1.85955	0.1303	2.17506	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	5.013699	5.013699	1	1.47	0.26055	Non-Significant Effect
Error	27.36253	3.420316	8			
Total	32.3762269	8.4340150	9			

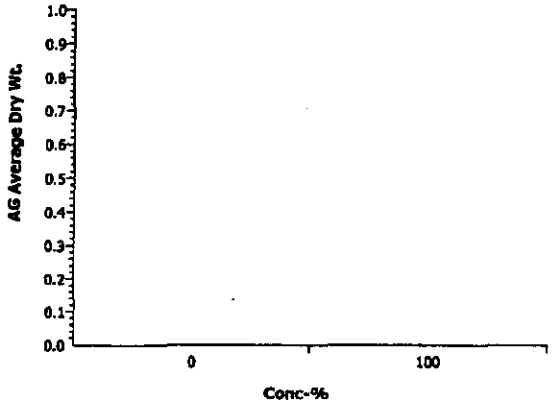
ANOVA Assumptions

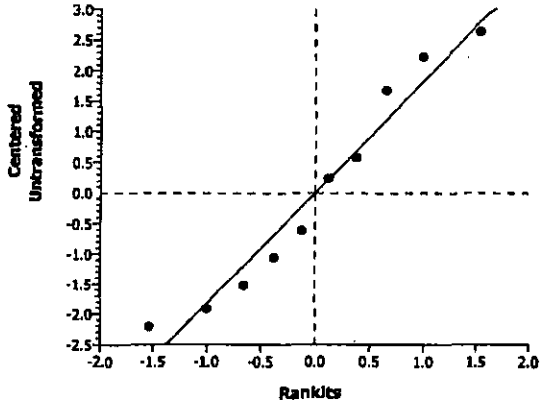
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.06357	23.15450	0.95380	Equal Variances
Distribution	Shapiro-Wilk W	0.93327		0.46081	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	6.05361	4.14001	8.68201	1.82070				
100		5	4.63746	2.42749	6.85999	1.87768				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Height	Comparison	04-2251-3051	04-2251-3051	05 Jun-06 1:39 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	123.41%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	31		0.7262	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	376.5868	376.5868	1	0.72	0.41967	Non-Significant Effect
Error	4163.036	520.3795	8			
Total	4539.62244	896.96625	9			

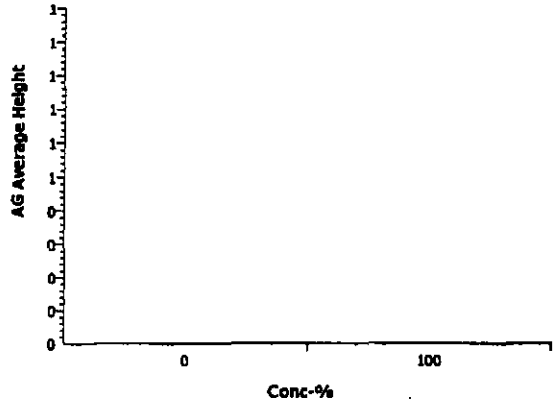
ANOVA Assumptions

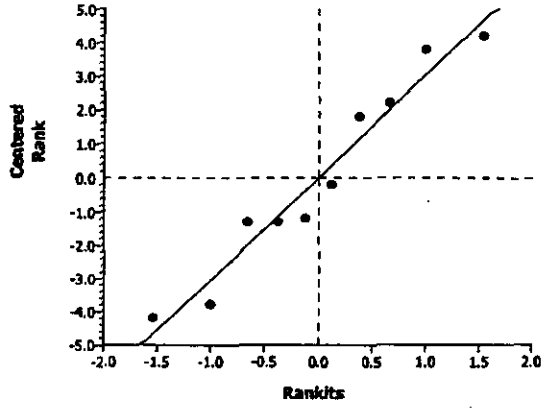
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	19.79106	23.15450	0.01344	Equal Variances
Distribution	Shapiro-Wilk W	0.72824		0.00194	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	21.740	15.8	33.5	7.0752	4.80000	1.00000	9.00000	3.17411
100		5	34.013	17	90	31.475	6.20000	2.00000	10.0000	3.03315

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
AG Average Wet Wt.	Comparison	04-2251-3051	04-2251-3051	05 Jun-06 1:39 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	36.63%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	1.05532	1.85955	0.1611	12.5254	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	126.3217	126.3217	1	1.11	0.32210	Non-Significant Effect
Error	907.3985	113.4248	8			
Total	1033.72018	239.74649	9			

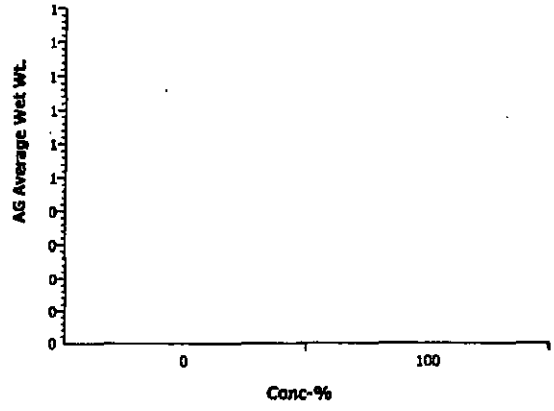
ANOVA Assumptions

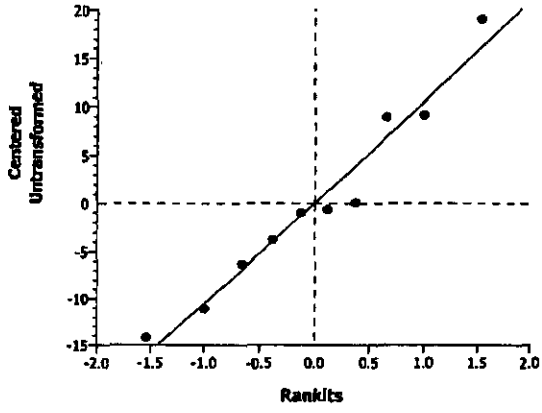
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.76734	23.15450	0.59473	Equal Variances
Distribution	Shapiro-Wilk W	0.95855		0.76923	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	34.197	19.960	53.208	12.036				
100		5	27.089	15.985	36.206	9.0539				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Dry Wt.	Comparison	04-2251-3051	04-2251-3051	05 Jun-06 1:39 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	49.28%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.6604	1.85955	0.7362	0.75683	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.1806107	0.180611	1	0.44	0.52755	Non-Significant Effect
Error	3.31296	0.41412	8			
Total	3.49357083	0.5947307	9			

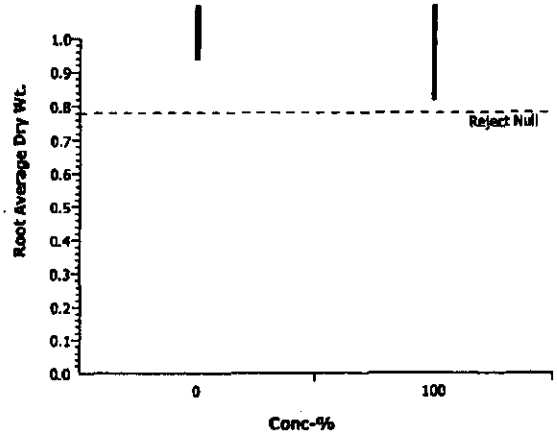
ANOVA Assumptions

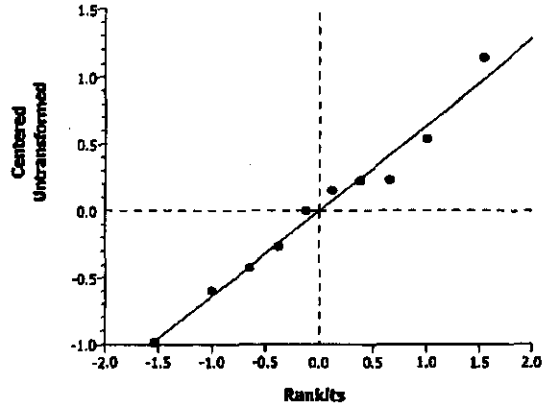
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.41605	23.15450	0.74425	Equal Variances
Distribution	Shapiro-Wilk W	0.98289		0.97873	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	1.53579	0.93500	2.67798	0.69673				
100		5	1.80457	0.81500	2.34199	0.58550				

Graphics





CETIS Analysis Detail

Plant Chronic test						CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**	
Root Average Length	Comparison	04-2251-3051	04-2251-3051	05 Jun-06 1:39 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	166.68%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	Ties	Decision(0.05)
Artificial Soil/Sedi		100	24		0.2738	0	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	703.0823	703.0823	1	0.51	0.49483	Non-Significant Effect
Error	10996.28	1374.535	8			
Total	11699.3625	2077.6173	9			

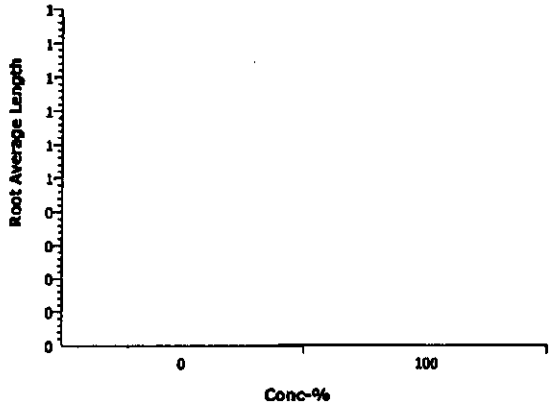
ANOVA Assumptions

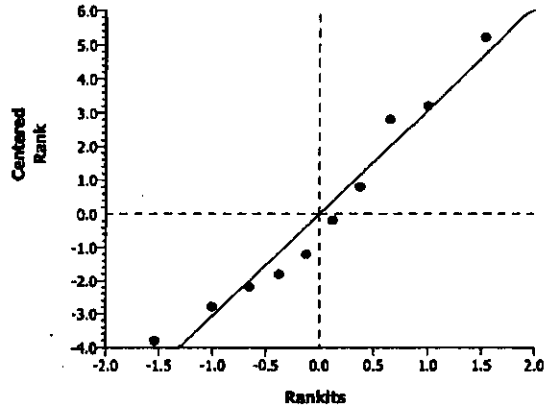
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	38.10039	23.15450	0.00386	Unequal Variances
Distribution	Shapiro-Wilk W	0.71895		0.00150	Non-normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	26.16	20.6	41	8.385	6.20000	4.00000	9.00000	1.92354
100		5	42.93	12.75	135	51.757	4.80000	1.00000	10.0000	3.96232

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Root Average Wet Wt.	Comparison	04-2251-3051	04-2251-3051	05 Jun-06 1:39 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	50.84%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	-0.0438	1.85955	0.5169	18.4259	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.4709786	0.470979	1	0.00	0.96613	Non-Significant Effect
Error	1963.692	245.4615	8			
Total	1964.16287	245.93247	9			

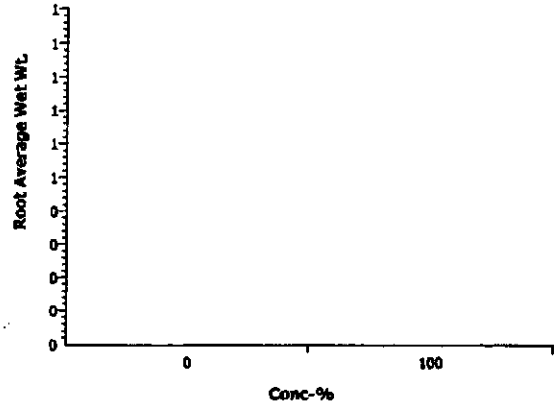
ANOVA Assumptions

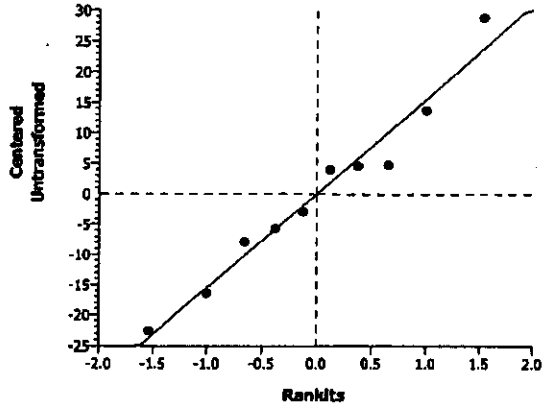
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.72629	23.15450	0.35480	Equal Variances
Distribution	Shapiro-Wilk W	0.97165		0.90569	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	36.242	13.590	65.054	18.952				
100		5	36.676	20.223	50.372	11.478				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Dry Wt.	Comparison	04-2251-3051	04-2251-3051	05 Jun-06 1:39 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	37.34%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.75284	1.85955	0.2366	2.83404	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	3.29111	3.29111	1	0.57	0.47312	Non-Significant Effect
Error	46.45456	5.80682	8			
Total	49.7456732	9.0979304	9			

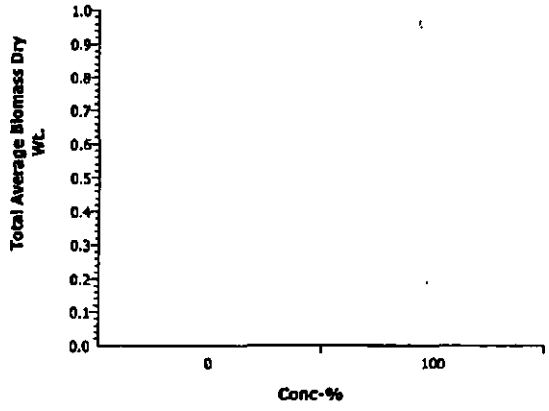
ANOVA Assumptions

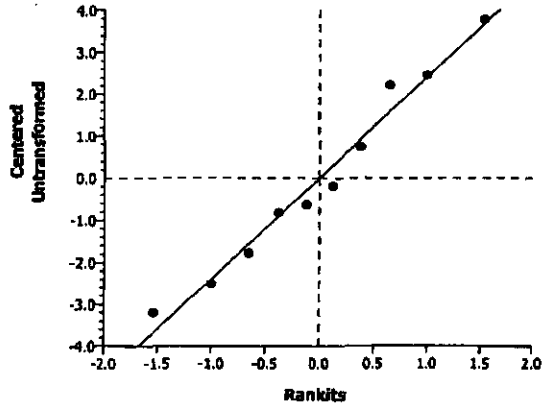
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.09617	23.15450	0.93123	Equal Variances
Distribution	Shapiro-Wilk W	0.96471		0.83795	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	7.5894	5.0750	11.36	2.4644				
100		5	6.4420	3.2425	8.8900	2.3538				

Graphics





CETIS Analysis Detail

Plant Chronic test — **CH2M Hill**

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
Total Average Biomass Wet Wt.	Comparison	04-2251-3051	04-2251-3051	05 Jun-06 1:39 PM	CETISv1.1.2

Method	Alt H	Data Transform	Zeta	NOEL	LOEL	Toxic Units	ChV	PMSD
Equal Variance t Two-Sample	C > T	Untransformed		100	>100	1	N/A	42.91%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Artificial Soil/Sedi		100	0.41066	1.85955	0.3461	30.2228	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	111.3661	111.3661	1	0.17	0.69210	Non-Significant Effect
Error	5283.035	660.3793	8			
Total	5394.40076	771.74543	9			

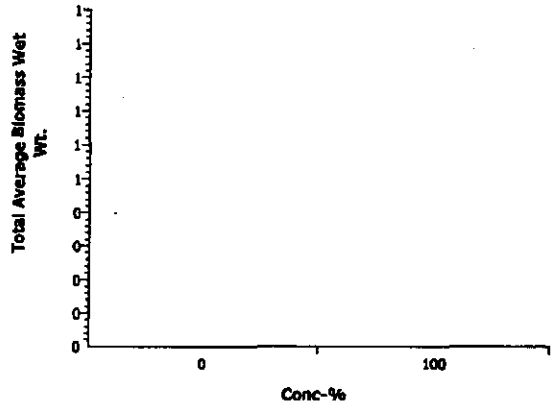
ANOVA Assumptions

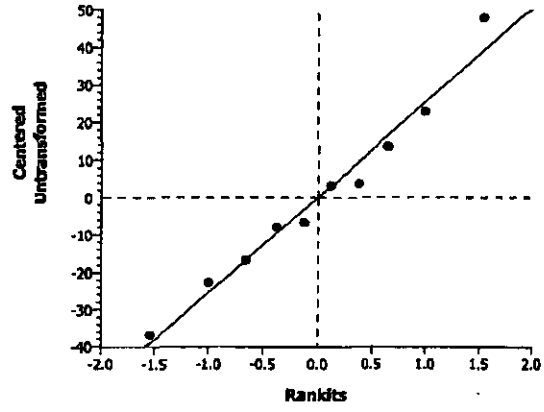
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.48829	23.15450	0.39885	Equal Variances
Distribution	Shapiro-Wilk W	0.97888		0.95892	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Artificial Soil/S	5	70.439	33.550	118.26	30.694				
100		5	63.765	41.007	86.578	19.458				

Graphics





APPENDIX B
CHAIN OF CUSTODY

F1493

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-65	Page 1 of 1

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

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time									
J11J84	SOIL	4-5-06	18:00	1	1							-7

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From (CH2MHILL)	Date/Time 10:30 4-6-06	Received By/Stored In Dagma Kaumann	Date/Time 10:30 4-6-06
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

F149301-5011

DH 1574-01 Nematode

BG 1575-01 Bioassays

Matrix *

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

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

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

E 1508

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-66	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality ☐
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-D RIPARIAN #2		SAF No. RC-051	Data Turnaround 45 Days
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT	
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.	

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	4000g									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									
Sample No. / Matrix * / Sample Date / Sample Time											
J11JB5 / SOIL / 4-9-06 / 15:30	1	1									-1

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: CH2MHILL Elizabeth M Tepper	4-10-06 10:30	Received By/Stored In: Kathy McKinney	4/10/06 1035
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

^~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

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

This is a composite of all 5 samples from 1 Investigation Area F150801-SO2

Matrix *

S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
Li=Liquid
Va=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
	BH1574-02 Nematode	361575-02	3.G.

FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

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

F1514-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-97	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Air Quality ☐	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-H RIPARIAN #9		SAF No. RC-051		
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JH6	SOIL	4-10-06	16:00	1	1								1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth M Tyring	Date/Time 10:30 4-11-06	Received By/Stored In Shawn Hubbard CH2M HILL	Date/Time 4/11/06 10:30
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

^- These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

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

B1574-03 Nematode

B1575-03 BG

Matrix *

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

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

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

F1518-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-101	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location UPPER RIPARIAN #16		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Ladine/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JJ0	SOIL	4-11-06	16:00	1	1								

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth M Tepper		CH2M Hill	
Relinquished By/Removed From: Elizabeth M Tepper	4-12-06 10:30	Received By/Stored In: Nancy D. Halstead CH2M Hill	4-12-06 11:30
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

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

^~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

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

B1574-04 Nematode

B1575-04 B.G.

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W=Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
TS=Tissue
WI=Wipe
LI=Liquid
VS=Vegetation
XE=Other

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

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

F1522-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-100	Page 1 of 1

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

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JH9	SOIL	4-12-06	16:30	1	1								

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From CH2M	Date/Time 10:30 4-13-06	Received By/Stored In	Date/Time 4-13-06 10:30
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

^~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

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

Nematode 3N 1574-05

3G 1575-05 3G.

Matrix *

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

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

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

F1548-1

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-67	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 300-A RIPARIAN #6		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time									
J11JB6	SOIL	4-17-06	1530	1	1							

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth M. Tipton	10:30 4-18-06	Received By/Stored In: Maing D. Hubbard CH2MHILL 857	4-18-06
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

^~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

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

BG 1575-06 Bluegrass

Matrix *

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

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

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

F1556-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-222	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600--139		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11K34	SOIL	4-18-06	16:00	1	1								

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From Elizabeth M Tepper 4-19-06	Date/Time 1030	Received By/Stored In Daisy J. Hatfield CH2M HILL 9:03	Date/Time 4-19-06
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

~ These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

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

BG 1575-07

Matrix *

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

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

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

F1564-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST		RC-051-216	Page 1 of 1
Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600-132/600-190		SAF No. RC-051	Air Quality ☐
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT	
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11K28	SOIL	4-19-06	16:00	1	1								-01

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 0930	Received By/Stored In	Date/Time 4-20-06 10:20
Elizabeth Y Terry	4-20-06	Diana Hubbard CH2M HILL	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

* These marks indicate that unless lined out, analytes to be included with Strontium-89,90 -- Total Sr analysis fraction.
^ These marks indicate that this is a non-analysis used to properly format COC form.
Contact Joan Kessner for any questions.

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

DG 1575-08

Matrix *
S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W=Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
Ve=Vegetation
X=Other

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

BHI-~~SP~~-011 (08/29/2005)

E1586-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-246	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 628-1		SAF No. RC-051	Air Quality ☐	
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT		
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC		

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11K61	SOIL	4-24-06	14:00	1	1								-01

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 14:20	Received By/Stored In	Date/Time 4-24-06
Elizabeth Tepper 4-24-06		Darin Hubbard CH2M HILL	14:40
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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Contact Joan Kessner for any questions.

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

36 1575-09

Matrix *

S=Soil
SE=Sediment
SD=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
Ti=Tissue
Wi=Wipe
Li=Liquid
Ve=Vegetation
X=Other

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

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

F15-88-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-228	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 600--204		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

SAMPLE ANALYSIS													
Preservation				None	None								
Type of Container				G/P	P/G								
No. of Container(s)				1	1								
Volume				1000g	4000g								
				See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172								
Sample No.	Matrix *	Sample Date	Sample Time										
J11K40	SOIL	4-24-06	1722	1	1								

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 9:00	Received By/Stored In	Date/Time 4/25/06
Elizabeth M Tepson	4-25-06	Larry Hubbard CH2M HILL	9:00
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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3G 1575-10

Matrix *

Se=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
Ti=Tissue
Wi=Wipe
L=Liquid
Ve=Vegetation
X=Other

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

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

F1600-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-174	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 300-49		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596-1	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No. SEE OSPC

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JX6	SOIL	4-25-06	1430	1	1								-01

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time 1430	Received By/Stored In	Date/Time 4-25-06
Elizabeth M. Tepper 4-25-06		Danny Hubbard CH2M HILL	16:45
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

BG 1575-11

Matrix *

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

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

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

RECEIVED
2006

BIOASSAY REPORT
ACUTE SCREENING BIOASSAYS
Conducted April 20 through 21, 2006

Prepared for

ELR CONSULTING, INC.
WASHINGTON CLOSURE HANFORD
RICHLAND, WASHINGTON

Prepared by

CH2M HILL
2300 NW Walnut Boulevard
Corvallis, Oregon 97330

May 9, 2006
Lab I.D. Nos. BN1574-01 thru -05
SDG Number BN1574

SAF RC-051
SDG F1508

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APPENDIX A. RAW DATA SHEETS
APPENDIX B. REFERENCE TOXICANT RAW DATA SHEETS
APPENDIX C. CHAIN OF CUSTODY

INTRODUCTION

CH2M HILL conducted acute screening bioassay tests using the nematode (*Caenorhabditis elegans*) on soil samples provided by the ELR Consulting for the Washington Closure Hanford project, Richland, Washington. The tests were conducted from April 20 through 21, 2006.

METHODS AND MATERIALS

TEST METHODS

The chronic test methods were performed according to: *Standard Guide for Conducting Laboratory Soil Toxicity Tests with the Nematode Caenorhabditis elegans*, ASTM E 2172-01 (2001).

TEST ORGANISMS

The nematodes used were obtained from CH2M HILL's in-house cultures and were age synchronized as 4 day old organisms at test initiation. All organisms tested were fed and maintained during culturing, acclimation, and testing as prescribed by the ASTM protocol. The test organisms appeared vigorous and in good condition prior to testing.

CONTROL SOIL

The control soil used in the tests was 70 grade silica sand.

HYDRATION WATER

The water used to hydrate the control and test soils was Milli-Q equivalent de-ionized water.

TEST CONCENTRATIONS

The concentrations tested in the nematode test were 100 percent test sample with control soil alone for the control. For the nematode test, 30 organisms per concentration were used with three test chambers per concentration and 10 organisms per chamber.

SAMPLE COLLECTION

The soil samples were collected from April 5, 2006, through April 12, 2006. The samples were stored in the dark at 4°C until test solutions were prepared and tested. Chain of Custody for sample collection is provided in Appendix C.

SAMPLE CROSS-REFERENCE TABLE

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

Table 1
Sample Cross-Reference

Client ID	Sample Date	Sample Location	Nematode test SDG	Analytical Lab SDG
J11JB4	04/05/2006	100-H RIPARIAN #1	BN1574-01	F1493
J11JB5	04/09/2006	100-D RIPARIAN #2	BN1574-02	F1508
J11JH6	04/10/2006	100-H RIPARIAN #9	BN1574-03	F1514
J11JJ0	04/11/2006	UPPER RIPARIAN #16	BN1574-04	F1518
J11JH9	04/12/2006	UPPER RIPARIAN #14	BN1574-05	F1522

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 April 20, 2006.

Table 2
***Caenorhabditis elegans* Results**
Test initiated on April 20, 2006

Client ID	Percent Survival	Percent Recovered
Control	93.3	100
J11JB4	46.7 [a]	90.0
J11JB5	83.3	100
J11JH6	76.7 [a]	96.7
J11JJ0	76.7 [a]	93.3
J11JH9	53.3 [a]	96.7

[a] Indicates a statistically significant reduction when compared to the control at the p equal to 0.05 level using Equal Variance t Two Sample Test.

The nematode results indicated no statistically significant reduction in survival in the J11JB5 sample and a statistically significant reduction in survival in the J11JB4, J11JH6, J11JJ0, and J11JH9 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 April with cupric chloride indicate that the test organisms were within their respective sensitivity range based on EPA guidelines (EPA 1994). The LC_{50} value and control chart limits are listed in the table below.

Table 4
Chronic Reference Toxicant Tests (ug/L)

Species (test)	LC_{50}	Control Chart Limits
Caenorhabditis elegans (survival)	52.6	40.8 to 100.3

CERTIFICATION STATEMENT

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

APPENDIX A
RAW DATA SHEETS

CH2M HILL *TOXICITY TEST ORGANISM AND WATER QUALITY DATA*

Client: ELR Washington Closure Hanford — Test Initiation: Date 4-20-06 — Test Termination: Date 4-21-06

Contact: — Technician: Johnson, Oldham

Test Species/ID: *Caenorhabditis elegans* / Nem 012 /

/ /

Sample Information								Test Species Information	ID# Nem 012	ID#	ID#	ID#
Sample ID Number	Field ID	Collected Date	Collected Time	Total Residual Chlorine (mg/l) As Received / As Dechlor.	Ammonia NH_3-N mg/l	Hardness mg/l as $CaCO_3$	Alkalinity mg/l as $CaCO_3$		Acute			
								Organism Age at Initiation	4 days			
BN1574-01	J115B4	4/15/06	–	– / –	–	–	–		—			
-02	J115B5	4/15/06	–	– / –	–	–	–	Test Container Size	15 mm petri			
-03	J115H6	4/10/06	–	– / –	–	–	–	Test Volume	2.33 g dry wt.			
-04	J11550	4/11/06	–	– / –	–	–	–	Feeding: Type	none			
-05	J115H9	4/12/06	–	– / –	–	–	–	Amount	—			
				/				Aeration: Began	none			
				/				Amount	—			
				/				Dilution Water ID#	Milli-Q Equiv.			
				/				Acclimation Period	4 days			
				/				Test Location	#7			
				/				Organism Source	In house			
				/				Size (mm)	–	–	–	–
				/				Loading Rate	–	–	–	–

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

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

Water Quality Meters Used/ID#

Dissolved Oxygen #2 pH #3 Conductivity #2

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

Client Washington Closure Hanford | Tech. 0 Hrs NJ | 24 Hrs NJ/DO | Beginning, Date 4-20-06 | Time 0910

Sample Description see below | Time 0 Hrs 0910 | 24 Hrs 1130 | Ending, Date 4-21-06 | Time 1130

Test Speci *Caenorhabditis elegans* | ID#: Nem 012

Lab ID	Soil pH 0 hr	Soil pH 24 hr	Soil % Moisture 0 hr	Soil Temperature (°C) 0 hr	Soil Temperature (°C) 24 hr	Comments:
Lab Control	6.0	~~5.3~~ 6.3 NJ		20.6	20.7	Each test chamber has 2.33 g dry wt. soil + 0.93 ml Milli-Q water (40% of dry wt.).
BN1574-01	6.2	6.1		20.6	20.7	Samples hydrated 7 days prior to test initiation.
BN1574-02	6.6	6.5		20.6	20.7	
BN1574-03	6.7	6.5		20.6	20.7	All test soils were dried during sampling process.
BN1574-04	6.6	6.6		20.6	20.7	
BN1574-05	6.8	6.7		20.6	20.7	

Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #	Lab ID	Field ID	Replicate	Chamber #
Lab Control	Artificial Soil	A	13	BN1574-04	J11JJ0	A	7				
Lab Control	Artificial Soil	B	10	BN1574-04	J11JJ0	B	5				
Lab Control	Artificial Soil	C	11	BN1574-04	J11JJ0	C	14				
BN1574-01	J11JB4	A	17	BN1574-05	J11JH9	A	12				
BN1574-01	J11JB4	B	4	BN1574-05	J11JH9	B	15				
BN1574-01	J11JB4	C	8	BN1574-05	J11JH9	C	3				
BN1574-02	J11JB5	A	6								
BN1574-02	J11JB5	B	9								
BN1574-02	J11JB5	C	1								
BN1574-03	J11JH6	A	18								
BN1574-03	J11JH6	B	16								
BN1574-03	J11JH6	C	2								

CH2M HILL **NEMATODE TOXICITY TEST SURVIVAL DATA**

Client: Washington Closure Hanford
Sample Description: Lab ID#: B
Test Species: *Caenorhabditis elegans* ID#: Nem 012

Beginning, Date 4-20-06 Time 0910
Ending, Date 4-21-06 Time 1130

Test Initiation: Tech: Tech: NJ Time: 0916

Test Termination: Tech: Tech: NJ/DO Time: 1130

Chamber Number	Start Count 0	# alive found 24 hr	total # found 24 hr	Comments:
1	10	10	10	control nematodes
2	10	9	10	were very healthy
3	10	6	10	looking - lots of
4	10	6	10	movement and
5	10	9	9	solid in color.
6	10	9	10	#2 had one nematode
7	10	7	10	that was alive
8	10	3	8	but shorter than
9	10	6	10	the rest of the
10	10	9	10	worms.
11	10	10	10	
12	10	4	10	
13	10	9	10	
14	10	7	9	
15	10	6	9	
16	10	7	9	
17	10	5	9	
18	10	7	10	

CETIS Test Summary

Report Date: 27 Apr-06 2:37 PM
Test Link: 03-8088-1488/BN157401ce

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

Test No:	04-3488-9081	**Test Type:**	Nematode Survival	**Duration:**	35h
Start Date:	20 Apr-06	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	21 Apr-06 11:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	20 Apr-06 12:00 AM	**Brine:**			

Sample No:	16-5207-3918	**Code:**	BN1574-01	**Client:**	
Sample Date:	07 Apr-06	**Material:**	Sediment	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	13d 0h	**Station:**			

Comments: J11JB4

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-9580-2332	% Survival	< 100	100	N/A	16.75%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.46667	0.30000	0.60000	0.08819	0.15275	32.73%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	1.00000
100		0.50000	0.60000	0.30000

CETIS Analysis Detail

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

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	03-8088-1488	03-8088-1488	27 Apr-06 2:37 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	16.75%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	5.25283	2.13185	0.0031	0.22443	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.4587094	0.458709	1	27.59	0.00629	Significant Effect
Error	0.0664984	0.016625	4			
Total	0.52520785	0.4753340	5			

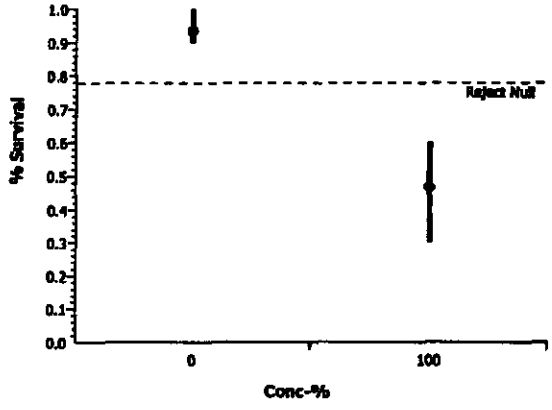
ANOVA Assumptions

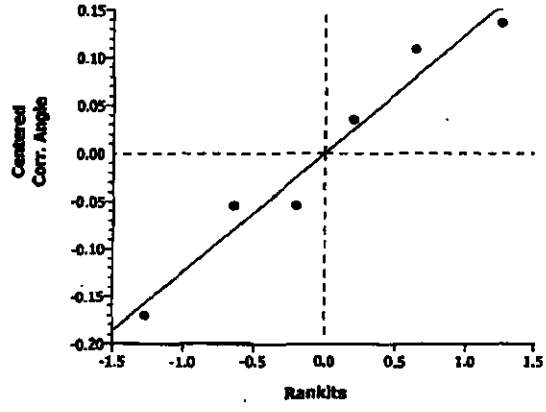
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.75565	199.00000	0.53253	Equal Variances
Distribution	Shapiro-Wilk W	0.94487		0.69861	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.46667	0.30000	0.60000	0.15275	0.75037	0.57964	0.88608	0.15619

Graphics





CETIS Test Summary

Report Date: 27 Apr-06 2:39 PM
Test Link: 01-3023-7423/BN157402ce

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

Test No:	15-2595-4109	**Test Type:**	Nematode Survival	**Duration:**	26h
Start Date:	20 Apr-06 09:10 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	21 Apr-06 11:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	20 Apr-06 09:10 AM	**Brine:**			

Sample No:	04-4665-3490	**Code:**	BN1574-02	**Client:**	
Sample Date:	10 Apr-06	**Material:**	Sediment	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	10d 9h	**Station:**			

Comments: J11JB5

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
19-2191-5951	% Survival	100	> 100	N/A	28.87%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.83333	0.60000	1.00000	0.12019	0.20817	24.98%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	1.00000
100		0.90000	0.60000	1.00000

CETIS Analysis Detail

Nematode 24 hour Acute test					CH2M Hill
Endpoint	**Analysis Type**	**Sample Link**	**Control Link**	**Date Analyzed**	**Version**
% Survival	Comparison	01-3023-7423	01-3023-7423	27 Apr-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	Angular (Corrected)		100	>100	1	N/A	28.87%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	0.73478	2.13185	0.2516	0.35103	Non-Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0219577	0.021958	1	0.54	0.50323	Non-Significant Effect
Error	0.1626787	0.04067	4			
Total	0.1846364	0.0626274	5			

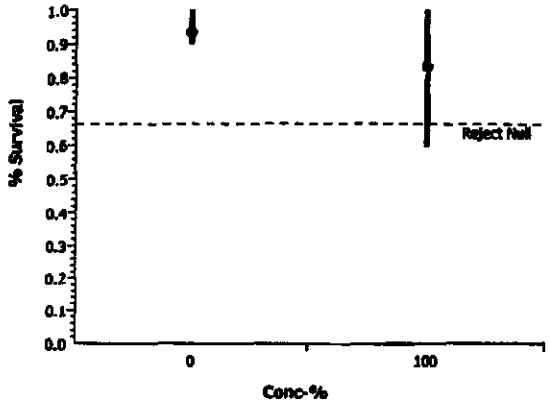
ANOVA Assumptions

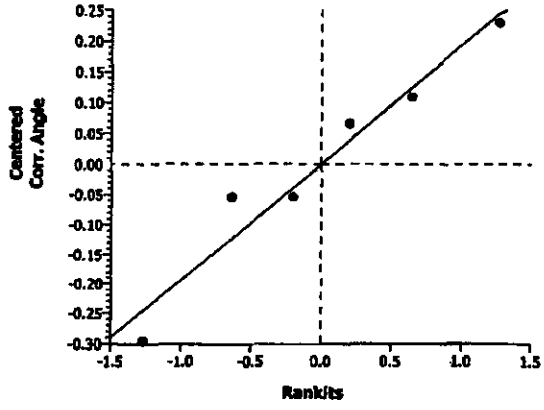
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	8.18766	199.00000	0.21768	Equal Variances
Distribution	Shapiro-Wilk W	0.95710		0.79717	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.83333	0.60000	1.00000	0.20817	1.18238	0.88608	1.41202	0.26923

Graphics





CETIS Test Summary

Report Date: 27 Apr-06 2:42 PM
Test Link: 12-7923-3756/BN157403ce

Nematode 24 hour Acute test — CH2M Hill

Test No:	10-5728-8163	**Test Type:**	Nematode Survival	**Duration:**	26h
Start Date:	20 Apr-06 09:10 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	21 Apr-06 11:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	20 Apr-06 09:10 AM	**Brine:**			

Sample No:	07-1539-2463	**Code:**	BN1574-03	**Client:**	
Sample Date:	11 Apr-06	**Material:**	Sediment	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	9d 9h	**Station:**			

Comments: J11JH6

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
04-8800-1791	% Survival	< 100	100	N/A	16.08%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.76667	0.70000	0.90000	0.06667	0.11547	15.06%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	1.00000
100		0.70000	0.70000	0.90000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	12-7923-3756	12-7923-3756	27 Apr-06 2:42 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	16.08%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	2.22491	2.13185	0.0451	0.21679	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0767833	0.076783	1	4.95	0.09012	Non-Significant Effect
Error	0.0620441	0.015511	4			
Total	0.13882741	0.0922943	5			

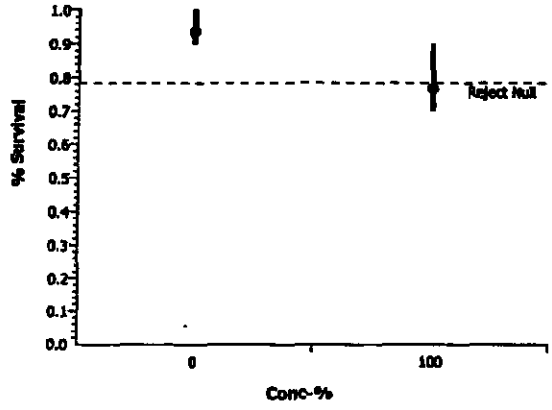
ANOVA Assumptions

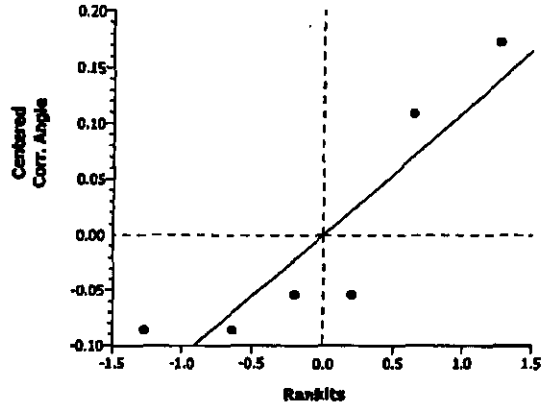
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.50409	199.00000	0.57076	Equal Variances
Distribution	Shapiro-Wilk W	0.78325		0.04132	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.76667	0.70000	0.90000	0.11547	1.07712	0.99116	1.24905	0.14889

Graphics





CETIS Test Summary

Report Date: 27 Apr-06 2:44 PM
Test Link: 04-2557-1266/BN157404ce

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

Test No:	04-6544-2868	**Test Type:**	Nematode Survival	**Duration:**	26h
Start Date:	20 Apr-06 09:10 AM	**Protocol:**	ASTM E2172-01 (2001)	**Species:**	Caenorhabditis elegans
Ending Date:	21 Apr-06 11:30 AM	**Dil Water:**		**Source:**	In-House Culture
Setup Date:	20 Apr-06 09:10 AM	**Brine:**			

Sample No:	07-9940-6935	**Code:**	BN1574-04	**Client:**	
Sample Date:	12 Apr-06	**Material:**	Sediment	**Project:**	
Receive Date:		**Source:**	Hanford		
Sample Age:	8d 9h	**Station:**			

Comments: J11JJ0

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
08-1899-8641	% Survival	< 100	100	N/A	16.08%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.76667	0.70000	0.90000	0.06667	0.11547	15.06%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	1.00000
100		0.70000	0.90000	0.70000

CETIS Analysis Detail

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

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	04-2557-1266	04-2557-1266	27 Apr-06 2:44 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	16.08%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	2.22491	2.13185	0.0451	0.21679	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.0767833	0.076783	1	4.95	0.09012	Non-Significant Effect
Error	0.0620441	0.015511	4			
Total	0.13882741	0.0922943	5			

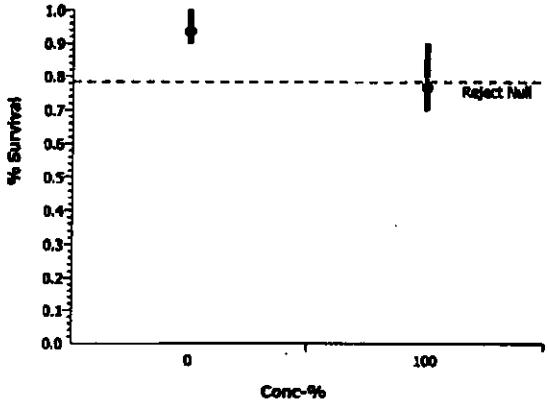
ANOVA Assumptions

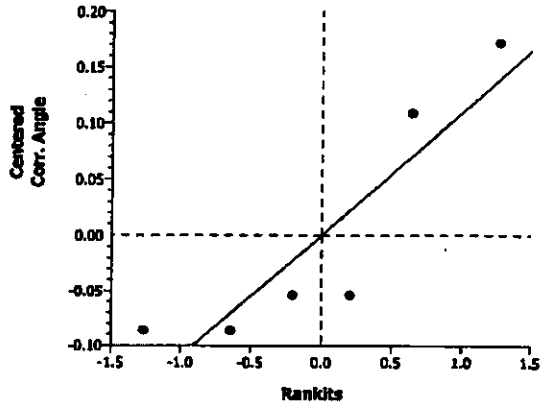
Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	2.50409	199.00000	0.57076	Equal Variances
Distribution	Shapiro-Wilk W	0.78325		0.04132	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.76667	0.70000	0.90000	0.11547	1.07712	0.99116	1.24905	0.14889

Graphics





CETIS Test Summary

Report Date: 27 Apr-06 2:45 PM
Test Link: 06-5520-2340/BN157405ce

Nematode 24 hour Acute test — CH2M Hill

Test No:	02-2116-2399	Test Type:	Nematode Survival	Duration:	26h
Start Date:	20 Apr-06 09:10 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	21 Apr-06 11:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	20 Apr-06 09:10 AM	Brine:			

Sample No:	06-5440-2928	Code:	BN1574-05	Client:	
Sample Date:	13 Apr-06	Material:	Sediment	Project:	
Receive Date:		Source:	Hanford		
Sample Age:	7d 9h	Station:			

Comments: J11JH9

Comparison Summary

Analysis	Endpoint	NOEL	LOEL	ChV	PMSD	Method
04-9959-2325	% Survival	< 100	100	N/A	13.25%	Equal Variance t Two-Sample

% Survival Summary

Conc-%	Control Type	Reps	Mean	Minimum	Maximum	SE	SD	CV
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.03333	0.05774	6.19%
100		3	0.53333	0.40000	0.60000	0.06667	0.11547	21.65%

% Survival Detail

Conc-%	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Sedim	0.90000	0.90000	1.00000
100		0.40000	0.60000	0.60000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Comparison	06-5520-2340	06-5520-2340	27 Apr-06 2:45 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	13.25%

Group Comparisons

Control	vs	Conc-%	Statistic	Critical	P-Value	MSD	Decision(0.05)
Dilution Sediment		100	5.60997	2.13185	0.0025	0.18408	Significant Effect

ANOVA Table

Source	Sum of Squares	Mean Square	DF	F Statistic	P-Value	Decision(0.05)
Between	0.3519816	0.351982	1	31.47	0.00496	Significant Effect
Error	0.0447362	0.011184	4			
Total	0.39671784	0.3631657	5			

ANOVA Assumptions

Attribute	Test	Statistic	Critical	P-Value	Decision(0.01)
Variances	Variance Ratio F	1.52658	199.00000	0.79158	Equal Variances
Distribution	Shapiro-Wilk W	0.90288		0.39125	Normal Distribution

Data Summary

			Original Data				Transformed Data			
Conc-%	Control Type	Count	Mean	Minimum	Maximum	SD	Mean	Minimum	Maximum	SD
0	Dilution Sedim	3	0.93333	0.90000	1.00000	0.05773	1.30337	1.24905	1.41202	0.09409
100		3	0.53333	0.40000	0.60000	0.11547	0.81896	0.68472	0.88608	0.11625

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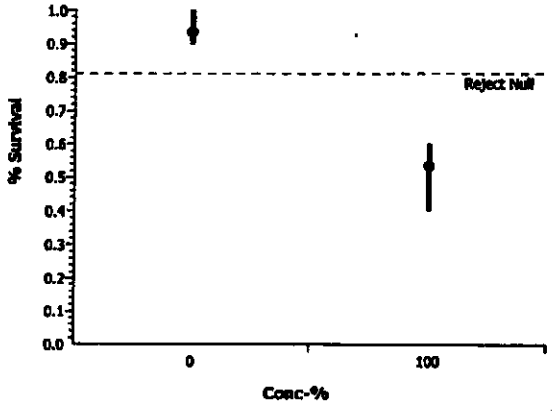
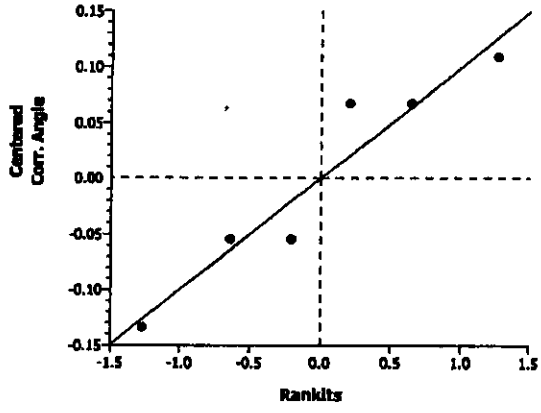




APPENDIX B
REFERENCE TOXICANT DATA SHEETS

CH2M HILL NEMATODE TOXICITY TEST SURVIVAL DATA

Client QA / QC
Sample Description Cu as $CuCl_2xH_2O$ Lab ID#: B053-06
Test Species: *Caenorhabditis elegans* ID#: Nem 009

Beginning, Date 4-3-06 Time 0930
Ending, Date 4-4-06 Time 0830

Test Initiation: Tech: Tech: NJ Time: 0930 Test Termination: Tech: Tech: NJ Time: 0830

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

Comments:
* an extra nematode was added at test initiation but was still alive at test ending.

Endpoint	LC50	Cusum Chart Limits
Survival	52.6	40.9 to 100.3

Task Manager Nalisha Johnson
Project Manager [signature]
QA Officer [signature]

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

Client QA / QC
Sample Description see below
Test Specie *Caenorhabditis elegans* ID#: Nem009

Tech. 0 Hrs NJ 24 Hrs NJ
Time 0 Hrs 0930 24 Hrs 0930

Beginning, Date 4-3-06 Time 0930
Ending, Date 4-4-06 Time 0830

Lab ID	K-Medium pH		% Moisture	Temperature (°C)		Comments:
	0 hr	24 hr	0 hr	0 hr	24 hr	
Lab Control	5.8	~~6.2~~ 6.0 NJ	NA	21.7	21.7	
10 mg/L Cu	5.4	5.5	NA	21.9	21.7	
50 mg/L Cu	5.3	5.3	NA	21.9	21.7	
100 mg/L Cu	5.2	5.2	NA	21.9	21.7	
250 mg/L Cu	NJ ~~8.4~~ 9	9.8	NA	21.8	21.7	

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

CETIS Test Summary

Report Date: 04 Apr-06 11:24 AM
Test Link: 01-8280-8779/rcea009

Nematode 24 hour Acute test — CH2M Hill

Test No:	07-1495-1310	Test Type:	Nematode Survival	Duration:	23h
Start Date:	03 Apr-06 09:30 AM	Protocol:	ASTM E2172-01 (2001)	Species:	Caenorhabditis elegans
Ending Date:	04 Apr-06 08:30 AM	Dil Water:		Source:	In-House Culture
Setup Date:	03 Apr-06 09:30 AM	Brine:			

Sample No:	09-6954-2135	Code:	1B033-06	Client:	
Sample Date:	16 Jan-06	Material:	Copper	Project:	
Receive Date:		Source:	Reference Toxicant		
Sample Age:	77d 9h	Station:			

Comments: 250 mg/L Cu in K medium

Point Estimate Summary

Analysis	Endpoint	% Effect	Conc-µg/L	95% LCL	95% UCL	Method
11-1509-7834	% Survival	50	52.63094	38.6932	68.37195	Linear Regression

% Survival Summary

Conc-µg/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	0.56667	0.30000	0.80000	0.14530	0.25166	44.41%
100		3	0.16667	0.10000	0.20000	0.03333	0.05774	34.64%
250		3	0.06667	0.00000	0.20000	0.06667	0.11547	173.21

% Survival Detail

Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1.00000	1.00000	1.00000
10		0.90000	1.00000	1.00000
50		0.80000	0.60000	0.30000
100		0.20000	0.20000	0.10000
250		0.00000	0.20000	0.00000

CETIS Analysis Detail

Nematode 24 hour Acute test — CH2M Hill

Endpoint	Analysis Type	Sample Link	Control Link	Date Analyzed	Version
% Survival	Linear Regression	01-8280-8779	01-8280-8779	04 Apr-06 11:24 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	No

Regression Summary

Iters	Log Likelihood	Mu	Sigma	G	Chi-Sq	Critical	P-Value	Decision(0.05)
4	-46.54554	0.24538	0.39332	0.09484	15.56585	18.30704	0.11275	Non-Significant Heterogeneity

Point Estimates

% Effect	Conc-µg/L	95% LCL	95% UCL
50	52.63094	38.6932	68.37195

Regression Parameters

Parameter	Estimate	Std Error	95% LCL	95% UCL	t Statistic	P-Value	Decision(0.05)
Slope	2.54243	0.3994823	1.759445	3.325415	6.364	0.00008	Significant
Intercept	0.6238645	0.7404562	-0.8274295	2.075159	0.843	0.41918	Not Significant

Residual Analysis

Attribute	Method	Statistic	Critical	P-Value	Decision(0.05)
Variances	Bartlett	2.977855	7.81473	0.39505	Equal Variances
Distribution	Shapiro-Wilk W	0.9184941		0.27369	Normal Distribution

Data Summary

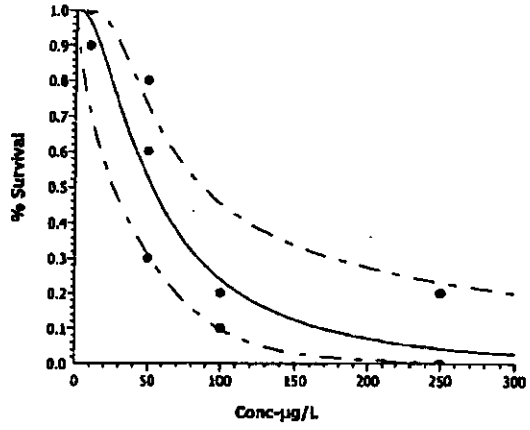
			Calculated Variate(A/B)						
Conc-µg/L	Control Type	Count	Mean	Minimum	Maximum	SE	SD	A	B
0	Dilution Water	3	1.00000	1.00000	1.00000	0.00000	0.00000	31	31
10		3	0.96667	0.90000	1.00000	0.01179	0.05773	29	30
50		3	0.56667	0.30000	0.80000	0.05137	0.25166	17	30
100		3	0.16667	0.10000	0.20000	0.01179	0.05774	5	30
250		3	0.06667	0.00000	0.20000	0.02357	0.11547	2	30

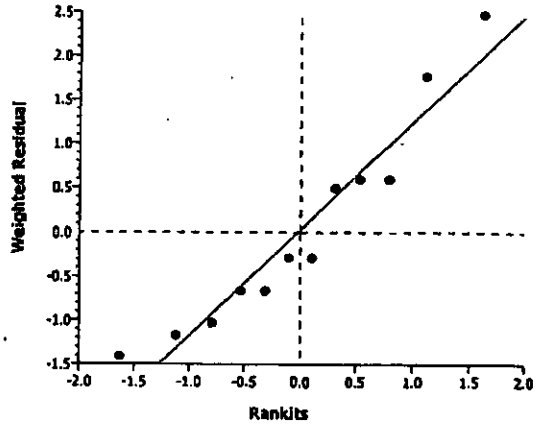
Data Detail

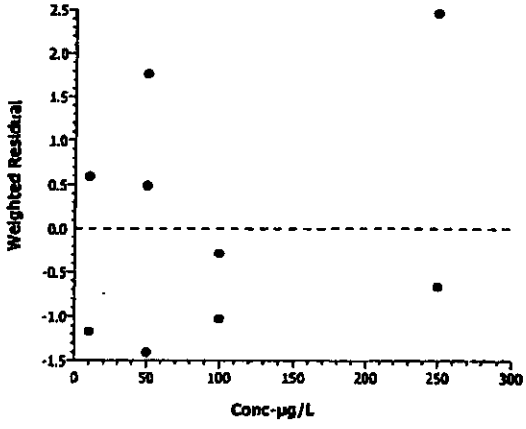
Conc-µg/L	Control Type	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	Dilution Water	1.00000	1.00000	1.00000							
10		0.90000	1.00000	1.00000							
50		0.80000	0.60000	0.30000							
100		0.20000	0.20000	0.10000							
250		0.00000	0.20000	0.00000							

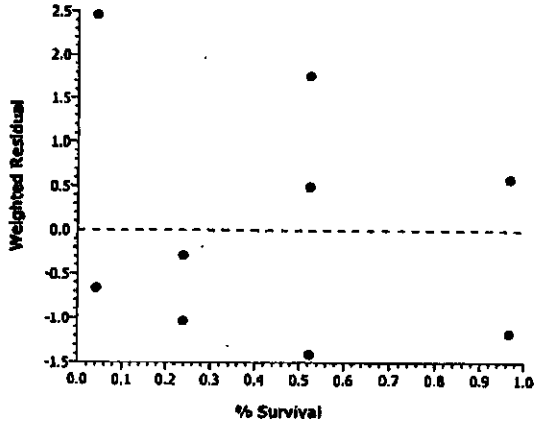
CETIS Analysis Detail

Graphics









APPENDIX C
CHAIN OF CUSTODY

F1493

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-65	Page 1 of 1

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

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JB4	SOIL	4-5-06	18:00	1	1								-1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From CH2MHill	Date/Time 10:30	Received By/Stored In	Date/Time 10:30
Elizabeth M Tapia	4-6-06	Dayna Kaumann	4-6-06
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

F149301-5011

BN 1574-01

Matrix *

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

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

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

3 ~~F1503~~ should be F1503

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-66	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-D RIPARIAN #2		SAF No. RC-051
Ice Chest No.	Field Logbook No. EL-1596	COA BESRAS6520	Method of Shipment GROUND TRANSPORT
Shipped To CH2MHILL	Offsite Property No. A060151		Bill of Lading/Air Bill No.

Price Code 8L

Air Quality ☐

Data Turnaround 45 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JB5	SOIL	4-9-06	15:30	1	1								-1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From CH2MHILL	Date/Time 10:30	Received By/Stored In	Date/Time
Elizabeth M Tepper 4-10-06		Kathy McKinley 4/10/06	1035
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

' These marks indicate that unless lined out, analyses 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

This is a composite of all 5 samples from 1 Investigation Area F150801-5012 BN/574-02

Matrix *

SoSoil
SESediment
SOSolid
SlSludge
WWater
OiOil
AiAir
DSDrum Solids
DLDrum Liquids
TiTissue
WiWipe
LiLiquid
VeVegetation
OtOther

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

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

E1514-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-97	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L	Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location 100-H RIPARIAN #9		SAF No. RC-051	Air Quality ☐	
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

NONE

Special Handling and/or Storage

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

Preservation	None	None										
Type of Container	G/P	P/G										
No. of Container(s)	1	1										
Volume	1000g	4000g										
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172										
Sample No.	Matrix *	Sample Date	Sample Time									
J11JH6	SOIL	4-10-06	16:00	1	1							

CHAIN OF POSSESSION — Sign/Print Names

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
CH2MHILL Elizabeth M Tyson	10:30 4-11-06	Shawn Hubbard CH2M HILL	4/11/06 10:30

SPECIAL INSTRUCTIONS

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

^- These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

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

BN1574-03

Matrix *
S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
Air=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
Li=Liquid
Ve=Vegetation
X=Other

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

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

F1518-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-101	Page 1 of 1
Collector: STANKOVICH, M.	Company Contact: JOAN KESSNER; Telephone No.: 375-4688	Project Coordinator: KESSNER, JH	Price Code: 8L; Data Turnaround: 45 Days
Project Designation: 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location: UPPER RIPARIAN #16	SAF No.: RC-051	Air Quality ☐
Ice Chest No.	Field Logbook No.: EL-1596-1; COA BES/RAS 6520	Method of Shipment: GROUND TRANSPORT	
Shipped To: CH2MHILL	Offsite Property No.: A060151	Bill of Lading/Air Bill No.: SEE OSPC	

POSSIBLE SAMPLE HAZARDS/REMARKS

NONE

Special Handling and/or Storage

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

Preservation	None	None									
Type of Container	G/P	P/G									
No. of Container(s)	1	1									
Volume	1000g	4000g									
SAMPLE ANALYSIS	See item (1) in Special Instructions.	Soil Plant Toxicity ASTM E1963; Soil Nematode Toxicity ASTM E2172									
Sample No.	Matrix *	Sample Date	Sample Time								
J11JJ0	SOIL	4-11-06	16:00	1	1						

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Elizabeth M Tepper		Received By/Stored In: CH2M Hill	
Relinquished By/Removed From: Elizabeth M Tepper	Date/Time 4-12-06 10:30	Received By/Stored In: Nancy D Hatfield CH2M HILL	Date/Time 4-12-06 11:30
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

` 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

BN1574-04

Matrix *

Se=Soil
SR=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
OS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
Ve=Vegetation
X=Other

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

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

F1522-01

Washington Closure Hanford	CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST	RC-051-100	Page 1 of 1

Collector STANKOVICH, M.	Company Contact JOAN KESSNER	Telephone No. 375-4688	Project Coordinator KESSNER, JH	Price Code 8L Data Turnaround 45 Days
Project Designation 100 & 300 Area Component of the RCBRA - Incremental So	Sampling Location UPPER RIPARIAN #14		SAF No. RC-051	Air Quality ☐
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

NONE

Special Handling and/or Storage

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

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

Sample No.	Matrix *	Sample Date	Sample Time										
J11JH9	SOIL	4-12-06	16:30	1	1								— 1

CHAIN OF POSSESSION		Sign/Print Names	
Relinquished By/Removed From CH2M	Date/Time 10:30 4-13-06	Received By/Stored In CH2M HILL	Date/Time 4-13-06 10:30
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

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

^-- These marks indicate that this is a non-analysis used to properly format COC form.

Contact Joan Kessner for any questions.

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

BN 1574-05

Matrix *

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

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

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