265003

WESTON
5 Underwood Court, Delran, New Jersey 08075-1229
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SITE ASSESSMENT TECHNICAL ASSISTANCE

EPA CONTRACT 68-S5-

25 April 2000

Mr. Mike Towle (3HS31)
On-Scene Coordinator
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029

TDD No. 0001-0090A
DCN F0000191

Subject: 12th Street Landfill Site - Evaluation of Toxicity of Soil Samples to the Earthworm (*Eisenia foetida*).

Dear Mr. Towle:

Roy F. Weston, Inc. (WESTON®) conducted a review of the Evaluation of Toxicity of Soil Samples to the Earthworm (*Eisenia foetida*) prepared by Envirosystems, Inc. and corresponding analytical data for the 12th Street Landfill Site (Site). Five soil samples were collected and analyzed for target analyte list metals and used to conduct 14-day chronic exposure toxicity tests for the earthworm (*Eisenia foetida*). Sample locations are illustrated in Attachment 1, Sample Location Map. WESTON has reviewed all toxicity and analytical data and submits the following summary of results.

Controls

Two controls were used in this soil bioassay. Laboratory Control A was an artificial soil consisting of screened sphagnum peat moss, kaolinite clay, and fine silica sand. Laboratory Control B consisted of commercially available compost. The mean survival of Laboratory A (74%) failed the 90% survival requirement under Amertican Society for Testing and Materials (ASTM) 1676-95. This is discussed further in the Uncertainties section of this report. Laboratory Control B (93% survival) passed the ASTM 1676-95 survival requirement, since this is the same soil type (compost) used for growing test worms. However, Laboratory Control B should not be considered an acceptable field control or background station because the soil type is significantly different than the sample soil types. Laboratory Control B suggests that the test earthworms were healthy and mortality in sample soils was not associated with any pre-existing conditions in the worms. Sample BG-04 was selected by SATA as a background station to compare with areas of known contamination. The only control or reference sample for which analytical data exists is BG-04.

Mean Survival Results

The Evaluation of Toxicity of Soil Samples to the Earthworm, *Eisenia foetida*, March 2000 is included as Attachment 2. The mean survival results for samples SS-34 (72%) and SS-35 (72%) differ significantly from Laboratory Control B (93%). These results suggest that contaminants in samples SS-34 and SS-35 may be responsible for approximately 21% mortality. It is important to note that these results do not differ significantly from the background (BG-04) survival results (83%). In addition, samples SS-36 and SS-37 show similar survival results when compared to BG-04.

Analytical Results:

Analytical results for all samples used in this bioassay are included in Attachment 3, Analytical Summary. WESTON reviewed all analytical data to identify compounds that exceeded background concentrations. Compounds that WESTON selected as contaminants of potential concern (COPCs) include arsenic, chromium, copper, and lead. WESTON reviewed these results to compare concentrations of COPCs with mean survival results. Table 1 includes the mean survival results and COPC concentrations.

Table 1
Results Summary Table

Compound	SS-34	SS-35	SS-36	SS-37	BG-04
Mean Survival (%)	72	72	84	85	83
Arsenic	73.9	114	18.9	17.4	13.8
Chromium	298	289	121	45.4	49.6
Copper	2,990	405	1,080	60.4	28.7
Lead	7,350	13,400	22,600	566	29.2

All data are reported in milligrams per kilogram, unless otherwise noted.

Uncertainties

Several uncertainties should be addressed for this bioassay. It is difficult to conclude that contaminants are primarily responsible for significant differences in survival when conducting toxicity tests. Several variables can influence the behavior and survival of test organisms (worms) in soil. Soil types are a significant parameter to address when conducting toxicity tests, because worms grow and behave differently in different soil types and not all soil samples are necessarily the same soil type.

Other factors that can introduce uncertainty are associated with contaminant uptake by the test organism. Organic content can introduce uncertainty because it affects the bioavailability of contaminants. Contaminant uptake is also affected by the species of the chemical of concern. Several metals can exist in numerous forms and may only be bioavailable in some of them. The speciation of metals often requires extremely high concentrations, that are well above the levels detected at this site.

Identifying a single concentration of a single contaminant to attribute all differences in survival data is a difficult task and often involves the collection of numerous samples. The cumulative effects of contaminants are often potentially responsible for differences in survival data.

The significant difference between the results of the laboratory controls (A and B) introduces uncertainty to the use of a reference sample when evaluating the results of this test. The difference may have been caused by the inability of test worms to live in or adapt to the artificial soil in Laboratory Control A. Because test worm survival was higher in three site samples (SS-36, SS-37, BG-04) than Laboratory Control A it is likely that the soil type rather than pre-existing conditions in test organisms was responsible for the difference. Laboratory Control B had significantly higher survival results, due to the fact that the soil type (compost) was the same soil used to grow the test worms. Because of these results and the uncertainty associated with them, WESTON recommends the use of the background sample (BG-04) when determining remedial objectives for the site.

Conclusions

WESTON reviewed all toxicity and analytical data to determine if compounds in site soil could be responsible for mortality to test worms. The percent survival was compared with concentrations of COPCs for all samples to determine if any trends existed. WESTON observed that increasing concentrations of arsenic and chromium coincided with decreasing survival percentages. Lead and copper were included as COPCs due to their high concentrations in samples SS-34, SS-35, and SS-36. A comparison of samples SS-35 and SS-36 suggests that lead and copper are not primarily responsible for decreasing survival percentages. Sample SS-35 has lower concentrations of lead and copper, and a lower survival percentage than SS-34.

Table 1 shows the concentration ranges of arsenic and chromium as well as survival differences for all samples. A comparison of samples SS-34 and SS-35 with samples SS-36 and SS-37 reveals that survival differences occurred between concentration ranges of arsenic (18.9 – 73.9 mg/kg) and chromium (121 – 289 mg/kg). These ranges represent no observed adverse effect levels (NOAELs) and lowest observed adverse effect levels (LOAELs). NOAELs are typically the highest concentrations for which contaminants have no effect on test organisms and LOAELs are the lowest concentrations for which contaminants have an observed effect on test organisms. Table 2 summarizes the NOAELs and LOAELs based on analytical and toxicity data for this site.

AR100497

Mr. Mike Towle, OSC
U.S. Environmental Protection Agency
25 April 2000

Table 2
Observed Effect Levels

Compound	NOAEL	LOAEL
Arsenic	18.9	73.9
Chromium	121	289

All data are reported in milligrams per kilogram.

These values should only be used within the context of this test and the uncertainties addressed in the previous section. Identifying a single concentration of a single contaminant to attribute all significant survival differences would be difficult for this test, given the results. However, the values in Table 2 can be used as a guide for determining remedial objectives for the site.

References:

American Society for Testing and Materials (ASTM). 1996. Annual Book of ASTM Standards. Volume 11.05 Standard Guide for Conducting a Laboratory Soil Toxicity Test with the Lumbricid Earthworm Eisenia foetida. Standard: E1676-95. Philadelphia, PA.

If you have any questions regarding the results of the toxicity test or this report I can be reached at (732) 417-5883.

Sincerely,

(b) (4)

[redacted]

Biologist

Attachments: (3)

cc: TDD File

SATA0312thstreetworms.doc

ATTACHMENT 1
SAMPLE LOCATION MAP

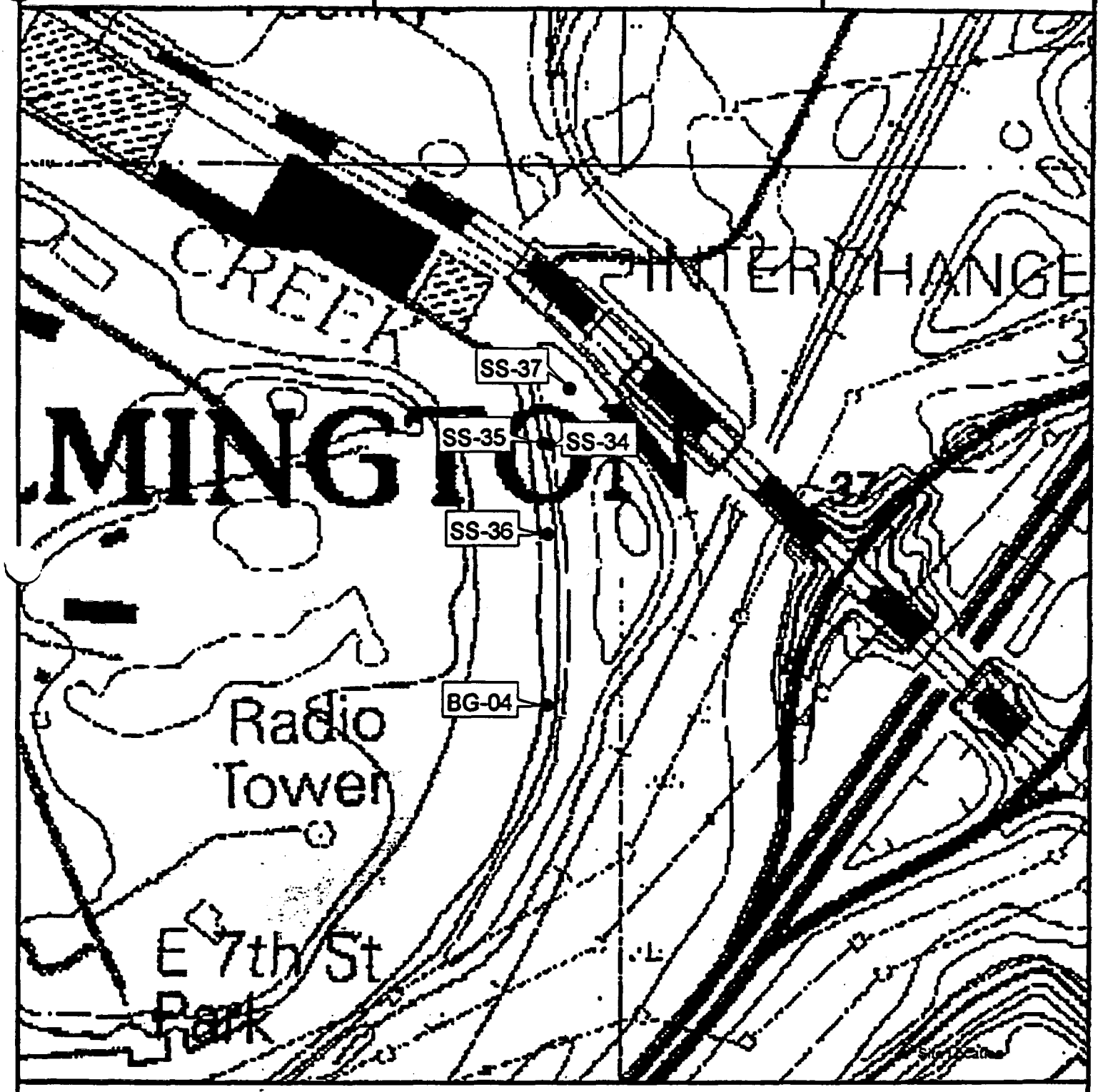
WESTON FEDERAL PROGRAMS DIVISION

MANAGERS DESIGNERS/CONSULTANTS

12th Street Landfill Site

Wilmington, DE

TDD No. 0001-0090A
Contract No. 68-S5-3002



Site Location

Attachment 1
Sample Location Map

AR100506

Source: USGS 7.5 Minute Topographic Quadrangles Wilmington South, DE- NJ, 1993

0 250 500 Feet

ATTACHMENT 2
TOXICITY REPORT

ESI

EnviroSystems, Inc.
P.O. Box 778, One Lafayette Road
Hampton, N.H. 03843-0778
(603) 926-3345 • (603) 926-3521 Fax
Email ESI @ www.envirosystems.com

March 29, 2000

VIA FAX - 856-461-4916

(b) (4) [redacted]
Roy F. Weston, Incorporated
Federal Programs Division
5 Underwood Court
Delran, NJ 08075-1229

Subject: U.S. EPA Project 0002-L01

Dear Ms. Murphy:

The toxicity evaluation using the earthworm, *Eisenia foetida* ended yesterday. Please find attached a summary of the survival data. The artificial soil control replicates failed to meet the minimum test acceptability criteria of 90% survival. However, this time we also included an organic compost control which exceeded the minimum survival requirements. Unless otherwise stated, all statistical comparisons will be done against the organic compost control. We feel this control more closely matches the test soil characteristics.

The final report will be delivered to your attention by no later than Friday, April 7, 2000.

Please do not hesitate to call should you have any questions or concerns.

Sincerely,

(b) (4) [redacted]

Laboratory Manager

Attachment

ESI STUDY NUMBER : 8505
CLIENT: ROY F. WESTON
PROJECT NAME: 0002-L01
TEST DATE: MARCH 14, 2000 - MARCH 28, 2000
***Eisenia foetida* SURVIVAL**

REPLICATE				SAMPLE			
	Artificial Soil	Organic Compost	SS-34	SS-35	SS-36	BG-04	SS-37
A	100%	90%	90%	80%	70%	80%	100%
B	40%	80%	70%	70%	90%	90%	100%
C	60%	100%	60%	80%	100%	90%	70%
D	80%	90%	60%	100%	70%	90%	100%
E	80%	90%	70%	80%	80%	100%	70%
F	90%	100%	70%	60%	80%	90%	90%
G	60%	100%	70%	70%	80%	70%	80%
H	70%	80%	80%	50%	100%	100%	80%
I	80%	100%	80%	60%	90%	70%	60%
J	80%	100%	70%	70%	80%	70%	80%
MEAN	74.0%	93.0%	72.0%	72.0%	84.0%	85.0%	83.0%
SURVIVAL							

EVALUATION OF TOXICITY OF SOIL SAMPLES TO THE EARTHWORM, *Eisenia foetida*
MARCH 2000

U.S. EPA Project 0002-L01

Prepared For

Roy F. Weston, Incorporated
Federal Programs Division
5 Underwood Court
Delran, NJ 08075-1229

By

EnviroSystems, Incorporated
1 Lafayette Road
Hampton, New Hampshire 03842

March 2000
Reference Number RFW 8505-00-03

STUDY NUMBER 8505

EXECUTIVE SUMMARY

The following summarizes the results of chronic exposure bioassays during March 2000 on soil samples provided by Roy F. Weston, Incorporated of Delran, New Jersey. Soils were evaluated using the earthworm, *Eisenia foetida*.

Station Number	ESI Suffix	Exposure (Days)	Mean Survival (%)	Significantly Different from Laboratory Control - B?
Laboratory Control - A (Artificial Soil)	-	14	74.0	-
Laboratory Control - B (Organic Compost)	-	14	93.0	-
"SS-34"	-1	14	72.0	Yes
"SS-35"	-2	14	72.0	Yes
"SS-36"	-3	14	84.0	No
"SS-37"	-4	14	85.0	No
"BG-04"	-5	14	83.0	No

Authorized Signature: (b) (4) [redacted] 3/31/2000

EnviroSystems, Incorporated Date

EVALUATION OF TOXICITY OF SOIL SAMPLES TO THE EARTHWORM, *Eisenia foetida* MARCH 2000

U.S. EPA Project 0002-L01

1.0 INTRODUCTION

Toxicity tests expose groups of organisms to environmental samples and a laboratory control for a specified period to assess potential impact on survival and growth. The data are used to determine the relative toxicity of samples as compared to field reference sample sites.

This report presents the results of toxicity tests on five (5) soil samples provided by Roy F. Weston, Incorporated, Delran, New Jersey. Biological testing was based on programs and protocols developed by the US EPA (1989) and ASTM (1996). The toxicity of the samples was determined by conducting 14 day exposure assays with the earthworm, *Eisenia foetida*. All assays were performed at EnviroSystems, Incorporated (ESI), Hampton, New Hampshire.

2.0 MATERIALS AND METHODS

2.1 General Methods, Biological Evaluations

Toxicological and analytical protocols used in this program follow procedures outlined in *Protocol for Short Term Toxicity Screening of Hazardous Waste Sites* (EPA 1989), *Aquatic Toxicology and Risk Assessment: Volume 11.05* (ASTM 1996) and *Standard Methods for the Examination of Water and Wastewater* (APHA 1991). These protocols provide standard approaches for physical and chemical analysis and for the evaluation of toxicological effects of soils to terrestrial organisms.

2.2 Test Species

Earthworms *(E. foetida)* were obtained from a single commercial supply source, Happy D Ranch Worm Farm, Visalia, California. Worms were maintained in composted soil. During culture and acclimation, worms were fed a commercially prepared ration identified as "Magic Worm Food." Temperature during culture was maintained at approximately 20°C. Worms used in the assay were adults with a well-developed clitellum.

2.3 Test Samples

A total of five (5) soil samples were received for testing on February 15, 2000. Samples were identified as "SS-34," "SS-35," "SS-36," "SS-37" and "BG-04." Samples were collected on February 14, 2000 and placed in 5 gallon plastic buckets. After the samples were received they were stored at 4°C in a secure sample storage area. Samples were warmed to the appropriate test temperature prior to testing.

2.4 *Eisenia foetida* Toxicological Evaluation Protocol

2.4.1 Sample Preparation

At the time of receipt all samples were visually inspected and the presence of "Free Water or standing water in the sample notes. Samples containing free water were air dried, at room temperature for 24 hours to reduce excess water, prior to further analysis. Prior to testing, moisture content, water holding capacity and pH were measured on each sample. Samples were then identified as to those that needed adjustments (drying or addition of water) to achieve a moisture content equal to approximately 70% of the soil's water holding capacity.

All samples were sieved through a 6-mm stainless steel screen to remove large stones, sticks, roots, and man-made material. Prior to placement in the test chambers, the moisture content of the sieved samples was adjusted, if necessary. At this time, the pH of the soil was adjusted if the pH of the sample was outside the range of 4 to 10 SU.

Two soils were used as laboratory controls in the earthworm assays. The first was an artificial soil prepared according to protocol developed by the EPA (1989). The soil consisted of (by dry weight) 10% screened sphagnum peat moss, 20% kaolinite clay and 70% fine silica sand. The silica sand was classified as 200 mesh. The peat moss was blended prior to use to break-up clods. After blending, the peat moss was screened to remove any large sticks and twigs. The moisture content of the soil was adjusted to approximately 30% using moderately hard reconstituted water. The pH of the soil was checked to insure values were within the range of 4 to 10 SU.

The second laboratory control soil was a commercially available organic compost. The compost, identified as "Coobscook Organic Compost and Planting Soil," is prepared by Coast of Maine, Incorporated of Portland, Maine. The product is described as being prepared from sphagnum peat moss, stone dust and seaweed. The compost has an organic content of 70.57%. The compost was used as a culture media for the *Eisenia* cultures.

2.4.2 Assay Protocol - 14 Day

The earthworm 14 day assay was conducted in a static exposure mode. Survival was the endpoint. The assay utilized 10 replicates with 10 worms per replicate. Approximately 200 g of soil were added to 600 mL glass jars. The jars were covered with lids in which a small hole, 1.6 mm diameter, had been placed to allow ventilation. Containers were placed in an incubator at 20 ±2°C. Lighting was set at 24 hours illumination. Light intensity was approximately 50 foot candles. During the exposure period incubator temperature was checked daily and monitored hourly using a data logger, for the duration of the assay. The worms were not fed during the assay. Daily observations were made concerning sublethal effects. After the counting on day 14 all worms were discarded.

2.5 Statistical Analysis

Survival and growth data were analyzed using TOXSTAT® software to determine potential significant differences between the treatment and background control. Data sets were evaluated to determine homogeneity of sample variances and normality. Data sets were normally distributed with homogeneous variances and were evaluated using parametric statistical models. Statistical differences were evaluated at α=0.05. Results were noted as statistically different only when the results indicated a potential negative impact as compared to the Organic Compost control.

2.6 Reference Toxicant Evaluation

As part of the laboratory quality control program, reference toxicant evaluations was conducted with the test species used in the assay. These results provide relative health and response data while allowing for comparison with historic data sets. A cadmium chloride reference toxicant assay conducted on February 25, 2000 resulted in a 96 hour EC-50 of 8.24 mg/L (Binomial Method), as cadmium. This value was within two standard deviations of the historic mean for the species.

2.7 Protocol Deviations

Review of data associated with the conduct of the project identified no deviations from the study protocol. Review of data associated with the artificial soil laboratory control treatment suggest that the low pH, within the range specified by the ASTM and EPA protocols, in conjunction with the relatively organic content may have been responsible for the low survival. As survival in the culture media control exceeded minimum acceptability criteria the test organisms were deemed to be healthy and have had no impact on the outcome of the assay.

3.0 RESULTS AND DISCUSSION

Table 1 provides a summary of survival and growth data for the 14 day exposure period. Table 2 provides a summary of sample collection and receipt information. Percent moisture, water holding capacity and pH measurements are summarized in Table 3. Support data, including copies of laboratory bench sheets and statistical support, are included in Appendix A.

Temperatures monitored hourly in the test incubator during the 14 day exposure period ranged from 18.98 to 21.48°C with a mean value of 19.34°C. The standard deviation and variance for the data set were determined to be 0.178 and 0.032°C, respectively. The coefficient of variation was determined to be 0.9% during the 14 day period. The initial loading rate for the 14-day study was determined to be 13.5 g/Kg. This value was within the limit of 25 g/Kg specified by the method.

3.1 *Eisenia foetida* 14-Day Exposure Data

Review of the data at the end of the 14-day exposure period showed there was 74% survival in the artificial soil control and 93% survival in the organic compost laboratory control soil / culture media. Data from the organic compost control indicates that the test organisms were healthy and not impacted by handling.

Survival in both the "SS-34" soil and "SS-35" soil was 72.0%. Survival was 84% in "SS-36," 85% in "BG-04, " and 83% in "SS-37." Review of the data showed that survival in samples "SS-34" and "SS-35" was significantly different from survival in the organic compost control. None of the samples were significantly different from the artificial soil control. Visual observation made during the counting showed no sublethal effects in any of the treatments.

3.2 Summary

Data collected after 14 days exposure showed that the "SS-34" and "SS-35" soil samples showed significant impact on the survival of the worms when compared to the organic compost control. Samples "SS-36," "SS-37" and "BG-04" showed no significant reduction in survival when compared to the organic compost control.

4.0 LITERATURE CITED

APHA. 1991. *Standard Methods for the Examination of Water and Wastewater*, 18th edition. Washington D.C.

ASTM. 1996. Annual Book of ASTM Standards. Volume 11.05. *Standard Guide for Conducting a Laboratory Soil Toxicity Test with the Lumbricid Earthworm Eisenia foetida*. Standard: E1676-95. ASTM, Philadelphia.

US EPA. 1989. *Protocol for Short Term Toxicity Screening of Hazardous Waste Sites*. EPA/600/3-88/029.

TABLE 1. Summary of Earthworm (*Eisenia foetida*) Survival Data. U.S. EPA Project 0002 - L01. March 2000.

Station Number	ESI Suffix	Exposure (Days)	Mean Survival (%)	Coefficient of Variation (%)	Significantly Different from Laboratory Control - B?
Laboratory Control - A (Artificial Soil)	-	14	74.0	2.20	-
Laboratory Control - B (Culture Media / Compost)	-	14	93.0	0.84	-
"SS-34"	-1	14	72.0	1.21	Yes
"SS-35"	-2	14	72.0	1.84	Yes
"SS-36"	-3	14	84.0	1.21	No
"SS-37"	-4	14	85.0	1.32	No
"BG-04"	-5	14	83.0	1.62	No

TABLE 2. Sample Collection and Receipt Summary.
U.S. EPA Project 0002 - L01. March 2000.

Station Number	ESI Suffix	Collected Date	Collected Time	Received Date	Received Time	Free Water on Receipt?
"SS-34"	-1	02/14/00	1110	02/15/00	0930	No
"SS-35"	-2	02/14/00	1120	02/15/00	0930	Yes*
"SS-36"	-3	02/14/00	1130	02/15/00	0930	Yes*
"SS-37"	-4	02/14/00	1200	02/15/00	0930	No
"BG-04"	-5	02/14/00	1145	02/15/00	0930	No

TABLE 3. Summary of Physical and Chemical Characteristics.
U.S. EPA Project 0002 - L01. March 2000.

Station Number	ESI Suffix	% Moisture	Holding Capacity (mL H_2O/100g)	Soil pH (SU)
Artificial Soil	-	1.95	60.6	5.00
Organic Compost	-	34.31	80.5	5.76
"SS-34"	-1	31.57	56.5	7.65
"SS-35"	-2	20.65	55.9	7.93
"SS-36"	-3	25.76	40.5	7.87
"SS-37"	-4	24.01	47.0	7.46
"BG-04"	-5	19.74	60.0	5.58

COMMENTS:

* Samples with "Free Water" on receipt were air dried before % Moisture was calculated.

TABLE 4. Summary of Reference Toxicant Data.
U.S. EPA Project 0002 - L01. March 2000.

Results are Expressed as mg/L Cadmium

Species	LC-50	Historic Mean	Number of Tests	±1 STD Deviation	±2 STD Deviations
Eisenia foetida	8.24	162.3	4	126.4	252.7

APPENDIX A

RAW DATA - BIOASSAY SUPPORT

Eisenia foetida Acute Assay

STUDY NUMBER: 8505
CLIENT: Roy F. Weston

DAY 0:

REP	CONTROLS				TEST SEDIMENTS									
	ARTIFICIAL SOIL		ORGANIC COMPOST		8505-1		8505-2		8505-3		8505-4		8505-5	
	# Added	Weight (g)	# Added	Weight (g)	# Added	Weight (g)	# Added	Weight (g)	# Added	Weight (g)	# Added	Weight (g)	# Added	Weight (g)
A	10	2.3	10	2.9	10	2.6	10	3.7	10	2.7	10	2.5	10	2.4
B	10	2.4	10	2.9	10	3.1	10	2.8	10	2.8	10	3.0	10	2.5
C	10	2.6	10	3.0	10	3.1	10	3.0	10	3.3	10	2.2	10	2.5
D	10	2.9	10	3.2	10	3.0	10	3.1	10	2.3	10	2.3	10	2.6
E	10	2.8	10	3.4	10	2.8	10	2.3	10	3.1	10	3.0	10	2.8
F	10	3.0	10	2.3	10	2.9	10	3.2	10	2.9	10	2.2	10	2.4
G	10	3.2	10	2.5	10	2.6	10	2.6	10	2.3	10	2.5	10	2.1
H	10	2.8	10	3.2	10	3.0	10	2.9	10	3.0	10	2.3	10	2.5
I	10	3.4	10	2.2	10	3.0	10	2.4	10	2.9	10	2.5	10	2.3
J	10	3.3	10	2.7	10	2.7	10	2.7	10	2.1	10	2.3	10	1.6
Initials	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW
Date	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00	3/14/00

NOTES: incub. temp 22°C at start
avg worm weight = 2.7g per vessel

AR100514

Eisenia foetida Acute Assay

STUDY NUMBER: 8505
CLIENT: Roy F. Weston

DAY 14:

REP	CONTROLS				TEST SEDIMENTS									
	ARTIFICIAL SOIL		ORGANIC COMPOST		8505-1		8505-2		8505-3		8505-4		8505-5	
	# Alive	Comments	# Alive	Comments	# Alive	Comments	# Alive	Comments	# Alive	Comments	# Alive	Comments	# Alive	Comments
A	10	3	9	3	9	3	8	3	7	3	8	5	10	3
B	4	2	8	3,4	7	3	7	3	9	3	9	5,3	10	3
C	6	3	10	3	6	3	8	3	10	3	9	5,3	7	3
D	8	3	9	3,4	6	3	10	3	7	3	9	5,3	10	3
E	8	2	9	3	7	3	8	3	8	3	10	5,3	7	3
F	9	1	10	3	4	3	6	3	8	5,3	9	5,3	9	3
G	6	1	10	3	7	3	7	3,4	8	3	7	5,3,6	8	3
H	7	3	8	3	8	3	5	2	10	3	10	5,3	8	3
I	8	1	10	3	8	3	6	2	9	3	7	5,3	6	3
J	8	2	10	3	7	3	4	3	8	3	7	5,3	8	3
Initials	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW
Date	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00	3/28/00

NOTES: 1: lethargic 6 - odor
2 = soil very wet
3 = survivors very perky
4 = cocoons present
5 = seedlings present

AR100515

Eisenia foetida Bioaccumulation Assay

STUDY NUMBER: 8505R **CLIENT:** Roy F. Weston

DAY	TEMP °C	INIT.	GENERAL OBSERVATIONS
0	22	KW	worms in, lights on
1	21	KW	Squirrel reading 19.5°C, lights + worms OK.
2	22	KW	Squirrel reading 19.7°C, lights OK + has seedlings
3	21	KW	Squirrel reading 19.4°C lights + worms O.K.
4	21	LL	Squirrel @ 19.0°C, lights + worms OK
5	21	CW	Squirrel @ 19.2°C, lights + worms OK
6	21	LL	Squirrel @ 19.3°C, lights + worms OK
7	21	[illegible]	Squirrel @ 19.5°C; lights + worms OK
8	21	LL	Squirrel @ 19.3°C; lights + worms OK
9		[illegible]	Squirrel @ 19.2°C; lights + worms OK
10	21	KW	Squirrel @ 19.4°C; lights + worms O.K.
11	21	BB	Squirrel @ 19.3°C lights + worms O.K
12	21	LL	Squirrel @ 19.4 lights + worms OK.
13	21	LL	Squirrel @ 19.3 lights + worms OK
14	21	KW	Squirrel @ 19.7°C, lights + worms OK

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv Transform: ARC SINE(SQUARE ROOT(Y

ANOVA Table

SOURCE	DF	SS	MS	F
Between	6	0.6528	0.1088	4.0756
Within (Error)	63	1.6819	0.0267	
Total	69	2.3347		

(p-value = 0.0016

Critical F = 3.1028 (alpha = 0.01, df = 6,63)
= 2.2464 (alpha = 0.05, df = 6,63)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv Transform: ARC SINE(SQUARE ROOT(Y

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	S 0
1	COMPOST	1.3022	0.9300		
2	ARTIFICIAL	1.0538	0.7400	3.3992	*
3	SS-34	1.0191	0.7200	3.8733	*
4	SS-35	1.0264	0.7200	3.7731	*
5	SS-36	1.1733	0.8400	1.7634	
6	BG-04	1.1901	0.8500	1.5337	
7	SS-37	1.1675	0.8300	1.8429	

Dunnett critical value = 2.3400 (1 Tailed, alpha = 0.05, df [used] = 6,6
(Actual df = 6,6

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv Transform: ARC SINE(SQUARE ROOT(Y

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENC FROM CONTR
1	COMPOST	10			
2	ARTIFICIAL	10	0.1107	11.9	0.190C
3	SS-34	10	0.1107	11.9	0.210C
4	SS-35	10	0.1107	11.9	0.210C
5	SS-36	10	0.1107	11.9	0.090C
6	BG-04	10	0.1107	11.9	0.080C
7	SS-37	10	0.1107	11.9	0.100C

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv Transform: ARC SINE(SQUARE ROOT(Y)

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	COMPOST	10	1.1071	1.4120	1.3022
2	ARTIFICIAL	10	0.6847	1.4120	1.0538
3	SS-34	10	0.8861	1.2490	1.0191
4	SS-35	10	0.7854	1.4120	1.0264
5	SS-36	10	0.9912	1.4120	1.1733
6	BG-04	10	0.9912	1.4120	1.1901
7	SS-37	10	0.8861	1.4120	1.1675

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv Transform: ARC SINE(SQUARE ROOT(Y

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	COMPOST	0.0161	0.1269	0.0401	9.7432
2	ARTIFICIAL	0.0416	0.2039	0.0645	19.3511
3	SS-34	0.0120	0.1094	0.0346	10.7326
4	SS-35	0.0299	0.1730	0.0547	16.8571
5	SS-36	0.0233	0.1525	0.0482	12.9975
6	BG-04	0.0264	0.1626	0.0514	13.6647
7	SS-37	0.0376	0.1939	0.0613	16.6073

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv Transform: ARC SINE(SQUARE ROOT(Y

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.
EXPECTED	4.6900	16.9400	26.7400	16.9400	4.69
OBSERVED	3	16	33	13	5

Chi-Square = 3.0635 (p-value = 0.5473)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv Transform: ARC SINE(SQUARE ROOT(Y

Shapiro - Wilk's Test for Normality

******** Shapiro - Wilk's Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 70

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv Transform: ARC SINE(SQUARE ROOT(Y

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 4.8004 (p-value = 0.5697)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 16.8119 (alpha = 0.01, df = 6)
= 12.5916 (alpha = 0.05, df = 6)

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv2 Transform: ARC SINE(SQUARE ROOT(Y

ANOVA Table

SOURCE	DF	SS	MS	F
Between	6	0.6528	0.1088	4.0756
Within (Error)	63	1.6819	0.0267	
Total	69	2.3347		

(p-value = 0.0016

Critical F = 3.1028 (alpha = 0.01, df = 6,63)
= 2.2464 (alpha = 0.05, df = 6,63)

Since F > Critical F REJECT Ho: All equal (alpha = 0.05)

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv2 Transform: ARC SINE(SQUARE ROOT(Y

Dunnett's Test - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	TRANS T STAT	S C
1	artificial	1.0538	0.7400		
2	compost	1.3022	0.9300	-3.3992	
3	SS-34	1.0191	0.7200	0.4741	
4	SS-35	1.0264	0.7200	0.3739	
5	SS-36	1.1733	0.8400	-1.6359	
6	BG-04	1.1901	0.8500	-1.8655	
7	SS-37	1.1675	0.8300	-1.5564	

Dunnett critical value = 2.3400 (1 Tailed, alpha = 0.05, df [used] = 6,6
(Actual df = 6,6

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv2 Transform: ARC SINE(SQUARE ROOT(Y

Dunnett's Test - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	MIN SIG DIFF (IN ORIG. UNITS)	% OF CONTROL	DIFFERENC FROM CONTR
1	artificial	10			
2	compost	10	0.1589	21.0	-0.190C
3	SS-34	10	0.1589	21.0	0.020C
4	SS-35	10	0.1589	21.0	0.020C
5	SS-36	10	0.1589	21.0	-0.100C
6	BG-04	10	0.1589	21.0	-0.110C
7	SS-37	10	0.1589	21.0	-0.090C

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv2 Transform: ARC SINE(SQUARE ROOT(Y

Summary Statistics on Transformed Data TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	artificial	10	0.6847	1.4120	1.0538
2	compost	10	1.1071	1.4120	1.3022
3	SS-34	10	0.8861	1.2490	1.0191
4	SS-35	10	0.7854	1.4120	1.0264
5	SS-36	10	0.9912	1.4120	1.1733
6	BG-04	10	0.9912	1.4120	1.1901
7	SS-37	10	0.8861	1.4120	1.1675

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv2 Transform: ARC SINE(SQUARE ROOT(Y

Summary Statistics on Transformed Data TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM	C.V. %
1	artificial	0.0416	0.2039	0.0645	19.3511
2	compost	0.0161	0.1269	0.0401	9.7432
3	SS-34	0.0120	0.1094	0.0346	10.7326
4	SS-35	0.0299	0.1730	0.0547	16.8571
5	SS-36	0.0233	0.1525	0.0482	12.9975
6	BG-04	0.0264	0.1626	0.0514	13.6647
7	SS-37	0.0376	0.1939	0.0613	16.6073

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv2 Transform: ARC SINE(SQUARE ROOT(Y)

Chi-Square Test for Normality

Actual and Expected Frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.6900	16.9400	26.7400	16.9400	4.690
OBSERVED	3	16	33	13	5

Chi-Square = 3.0635 (p-value = 0.5473)

Critical Chi-Square = 13.277 (alpha = 0.01 , df = 4)
= 9.488 (alpha = 0.05 , df = 4)

Data PASS normality test (alpha = 0.01). Continue analysis.

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv2 Transform: ARC SINE(SQUARE ROOT(Y)

Shapiro - Wilk's Test for Normality

******** Shapiro - Wilk's Test is aborted ********

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 70

Title: 8505 RFW E. FOETIDA SURVIVAL
File: 8505sv2 Transform: ARC SINE(SQUARE ROOT(Y)

Bartlett's Test for Homogeneity of Variance

Calculated B1 statistic = 4.8004 (p-value = 0.5697)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

Critical B = 16.8119 (alpha = 0.01, df = 6)
= 12.5916 (alpha = 0.05, df = 6)

Channel 1 Statistics

Sample Period
Start 24-Feb-00 18:06:00. Finish 28-Mar-00 14:06:00.

Range : 0.000 to 30.000 degC
Minimum Value : 18.960 degC at 13-Mar-00 07:06:00.
Maximum Value : 21.480 degC at 24-Feb-00 18:06:00.
Mean : 19.343 degC
Standard Deviation : 0.178
Variance : 0.032

Channel Readings

Data file - 8505EF

Logger details:
- Logger number : 10076
- Logger type : 8-bit

Run details:
- Site ID :
- Run number : 1
- Channels used : 1
- Recording interval : 00:60:00.
- Recording period :
  - Start : 24-Feb-00 17:06:00.
  - Finish : 29-Mar-00 14:06:00.
- Readings per channel: 814

All readings

Rdg no	Date and Time	Ch1 degC
2	24-Feb-00 18:06:00.	21.480
3	24-Feb-00 19:06:00.	20.160
4	24-Feb-00 20:06:00.	19.800
5	24-Feb-00 21:06:00.	19.800
6	24-Feb-00 22:06:00.	19.800
7	24-Feb-00 23:06:00.	19.800
8	25-Feb-00 00:06:00.	19.680
9	25-Feb-00 01:06:00.	19.680
10	25-Feb-00 02:06:00.	19.680
11	25-Feb-00 03:06:00.	19.680
12	25-Feb-00 04:06:00.	19.680
13	25-Feb-00 05:06:00.	19.560
14	25-Feb-00 06:06:00.	19.560
15	25-Feb-00 07:06:00.	19.560
16	25-Feb-00 08:06:00.	19.560
17	25-Feb-00 09:06:00.	19.560
18	25-Feb-00 10:06:00.	19.560
19	25-Feb-00 11:06:00.	19.560
20	25-Feb-00 12:06:00.	19.560
21	25-Feb-00 13:06:00.	19.560
22	25-Feb-00 14:06:00.	19.560
23	25-Feb-00 15:06:00.	19.560
24	25-Feb-00 16:06:00.	19.560
25	25-Feb-00 17:06:00.	19.560
26	25-Feb-00 18:06:00.	19.560
27	25-Feb-00 19:06:00.	19.560
28	25-Feb-00 20:06:00.	19.440
29	25-Feb-00 21:06:00.	19.440
30	25-Feb-00 22:06:00.	19.440
31	25-Feb-00 23:06:00.	19.440
32	26-Feb-00 00:06:00.	19.440
33	26-Feb-00 01:06:00.	19.440
34	26-Feb-00 02:06:00.	19.440
35	26-Feb-00 03:06:00.	19.440
36	26-Feb-00 04:06:00.	19.440
37	26-Feb-00 05:06:00.	19.440
38	26-Feb-00 06:06:00.	19.440
39	26-Feb-00 07:06:00.	19.440
40	26-Feb-00 08:06:00.	19.440
41	26-Feb-00 09:06:00.	19.440
42	26-Feb-00 10:06:00.	19.440
43	26-Feb-00 11:06:00.	19.440
44	26-Feb-00 12:06:00.	19.440
45	26-Feb-00 13:06:00.	19.560
46	26-Feb-00 14:06:00.	19.560
47	26-Feb-00 15:06:00.	19.440
48	26-Feb-00 16:06:00.	19.560
49	26-Feb-00 17:06:00.	19.560
50	26-Feb-00 18:06:00.	19.440
51	26-Feb-00 19:06:00.	19.440
52	26-Feb-00 20:06:00.	19.440
53	26-Feb-00 21:06:00.	19.440
54	26-Feb-00 22:06:00.	19.440
55	26-Feb-00 23:06:00.	19.440
56	27-Feb-00 00:06:00.	19.440
57	27-Feb-00 01:06:00.	19.440
58	27-Feb-00 02:06:00.	19.440
59	27-Feb-00 03:06:00.	19.440
60	27-Feb-00 04:06:00.	19.440
61	27-Feb-00 05:06:00.	19.440
62	27-Feb-00 06:06:00.	19.440
63	27-Feb-00 07:06:00.	19.440
64	27-Feb-00 08:06:00.	19.440
65	27-Feb-00 09:06:00.	19.440
66	27-Feb-00 10:06:00.	19.440
67	27-Feb-00 11:06:00.	19.440
68	27-Feb-00 12:06:00.	19.560
69	27-Feb-00 13:06:00.	19.560
70	27-Feb-00 14:06:00.	19.560
71	27-Feb-00 15:06:00.	19.680
72	27-Feb-00 16:06:00.	19.680
73	27-Feb-00 17:06:00.	19.680
74	27-Feb-00 18:06:00.	19.680
75	27-Feb-00 19:06:00.	19.680
76	27-Feb-00 20:06:00.	19.680
77	27-Feb-00 21:06:00.	19.680
78	27-Feb-00 22:06:00.	19.680
79	27-Feb-00 23:06:00.	19.680
80	28-Feb-00 00:06:00.	19.680
81	28-Feb-00 01:06:00.	19.680
82	28-Feb-00 02:06:00.	19.680
83	28-Feb-00 03:06:00.	19.680
84	28-Feb-00 04:06:00.	19.680
85	28-Feb-00 05:06:00.	19.680
86	28-Feb-00 06:06:00.	19.680
87	28-Feb-00 07:06:00.	19.680
88	28-Feb-00 08:06:00.	19.680
89	28-Feb-00 09:06:00.	19.560
90	28-Feb-00 10:06:00.	19.560
91	28-Feb-00 11:06:00.	19.560
92	28-Feb-00 12:06:00.	19.560
93	28-Feb-00 13:06:00.	19.560
94	28-Feb-00 14:06:00.	19.560
95	28-Feb-00 15:06:00.	19.560
96	28-Feb-00 16:06:00.	19.560
97	28-Feb-00 17:06:00.	19.440
98	28-Feb-00 18:06:00.	19.440
99	28-Feb-00 19:06:00.	19.320
100	28-Feb-00 20:06:00.	19.320
101	28-Feb-00 21:06:00.	19.320
102	28-Feb-00 22:06:00.	19.320
103	28-Feb-00 23:06:00.	19.320
104	29-Feb-00 00:06:00.	19.200
105	29-Feb-00 01:06:00.	19.320
106	29-Feb-00 02:06:00.	19.320
107	29-Feb-00 03:06:00.	19.320
108	29-Feb-00 04:06:00.	19.200
109	29-Feb-00 05:06:00.	19.200
110	29-Feb-00 06:06:00.	19.200
111	29-Feb-00 07:06:00.	19.200
112	29-Feb-00 08:06:00.	19.200
113	29-Feb-00 09:06:00.	19.200
114	29-Feb-00 10:06:00.	19.320
115	29-Feb-00 11:06:00.	19.320
116	29-Feb-00 12:06:00.	19.320
117	29-Feb-00 13:06:00.	19.320
118	29-Feb-00 14:06:00.	19.320
119	29-Feb-00 15:06:00.	19.440
120	29-Feb-00 16:06:00.	19.440
121	29-Feb-00 17:06:00.	19.440
122	29-Feb-00 18:06:00.	19.440
123	29-Feb-00 19:06:00.	19.440
124	29-Feb-00 20:06:00.	19.320
125	29-Feb-00 21:06:00.	19.320
126	29-Feb-00 22:06:00.	19.320
127	29-Feb-00 23:06:00.	19.320
128	01-Mar-00 00:06:00.	19.320
129	01-Mar-00 01:06:00.	19.320
130	01-Mar-00 02:06:00.	19.320
131	01-Mar-00 03:06:00.	19.320
132	01-Mar-00 04:06:00.	19.320
133	01-Mar-00 05:06:00.	19.320
134	01-Mar-00 06:06:00.	19.320
135	01-Mar-00 07:06:00.	19.320
136	01-Mar-00 08:06:00.	19.320
137	01-Mar-00 09:06:00.	19.320
138	01-Mar-00 10:06:00.	19.320
139	01-Mar-00 11:06:00.	19.440
140	01-Mar-00 12:06:00.	19.440
141	01-Mar-00 13:06:00.	19.440
142	01-Mar-00 14:06:00.	19.440
143	01-Mar-00 15:06:00.	19.560
144	01-Mar-00 16:06:00.	19.560
145	01-Mar-00 17:06:00.	19.440
146	01-Mar-00 18:06:00.	19.440
147	01-Mar-00 19:06:00.	19.440
148	01-Mar-00 20:06:00.	19.
149	01-Mar-00 21:06:00.	19.
150	01-Mar-00 22:06:00.	19.
151	01-Mar-00 23:06:00.	19.
152	02-Mar-00 00:06:00.	19.
153	02-Mar-00 01:06:00.	19.
154	02-Mar-00 02:06:00.	19.
155	02-Mar-00 03:06:00.	19.
156	02-Mar-00 04:06:00.	19.
157	02-Mar-00 05:06:00.	19.
158	02-Mar-00 06:06:00.	19.
159	02-Mar-00 07:06:00.	19.
160	02-Mar-00 08:06:00.	19.
161	02-Mar-00 09:06:00.	19.
162	02-Mar-00 10:06:00.	19.
163	02-Mar-00 11:06:00.	19.
164	02-Mar-00 12:06:00.	19.
165	02-Mar-00 13:06:00.	19.
166	02-Mar-00 14:06:00.	19.
167	02-Mar-00 15:06:00.	19.
168	02-Mar-00 16:06:00.	19.
169	02-Mar-00 17:06:00.	19.
170	02-Mar-00 18:06:00.	19.
171	02-Mar-00 19:06:00.	19.
172	02-Mar-00 20:06:00.	19.
173	02-Mar-00 21:06:00.	19.
174	02-Mar-00 22:06:00.	19.
175	02-Mar-00 23:06:00.	19.
176	03-Mar-00 00:06:00.	19.
177	03-Mar-00 01:06:00.	19.
178	03-Mar-00 02:06:00.	19.
179	03-Mar-00 03:06:00.	19.
180	03-Mar-00 04:06:00.	19.
181	03-Mar-00 05:06:00.	19.
182	03-Mar-00 06:06:00.	19.
183	03-Mar-00 07:06:00.	19.
184	03-Mar-00 08:06:00.	19.
185	03-Mar-00 09:06:00.	19.
186	03-Mar-00 10:06:00.	19.
187	03-Mar-00 11:06:00.	19.
188	03-Mar-00 12:06:00.	19.
189	03-Mar-00 13:06:00.	19.
190	03-Mar-00 14:06:00.	19.
191	03-Mar-00 15:06:00.	19.
192	03-Mar-00 16:06:00.	19.
193	03-Mar-00 17:06:00.	19.
194	03-Mar-00 18:06:00.	19.
195	03-Mar-00 19:06:00.	19.
196	03-Mar-00 20:06:00.	19.
197	03-Mar-00 21:06:00.	19.
198	03-Mar-00 22:06:00.	19.
199	03-Mar-00 23:06:00.	19.
200	04-Mar-00 00:06:00.	19.
201	04-Mar-00 01:06:00.	19.
202	04-Mar-00 02:06:00.	19.
203	04-Mar-00 03:06:00.	19.
204	04-Mar-00 04:06:00.	19.
205	04-Mar-00 05:06:00.	19.
206	04-Mar-00 06:06:00.	19.
207	04-Mar-00 07:06:00.	19.
208	04-Mar-00 08:06:00.	19.
209	04-Mar-00 09:06:00.	19.
210	04-Mar-00 10:06:00.	19.
211	04-Mar-00 11:06:00.	19.
212	04-Mar-00 12:06:00.	19.
213	04-Mar-00 13:06:00.	19.
214	04-Mar-00 14:06:00.	19.
215	04-Mar-00 15:06:00.	19.
216	04-Mar-00 16:06:00.	19.
217	04-Mar-00 17:06:00.	19.
218	04-Mar-00 18:06:00.	19.
219	04-Mar-00 19:06:00.	19.
220	04-Mar-00 20:06:00.	19.
221	04-Mar-00 21:06:00.	19.
222	04-Mar-00 22:06:00.	19.

448	14-Mar-00	08:06:00.	19.080	523	17-Mar-00	11:06:00.	19.200	598	20-Mar-00	14:06:00.	1
449	14-Mar-00	09:06:00.	19.080	524	17-Mar-00	12:06:00.	19.200	599	20-Mar-00	15:06:00.	1
450	14-Mar-00	10:06:00.	19.080	525	17-Mar-00	13:06:00.	19.200	600	20-Mar-00	16:06:00.	1
451	14-Mar-00	11:06:00.	19.200	526	17-Mar-00	14:06:00.	19.200	601	20-Mar-00	17:06:00.	1
452	14-Mar-00	12:06:00.	19.200	527	17-Mar-00	15:06:00.	19.200	602	20-Mar-00	18:06:00.	1
453	14-Mar-00	13:06:00.	19.320	528	17-Mar-00	16:06:00.	19.200	603	20-Mar-00	19:06:00.	1
454	14-Mar-00	14:06:00.	19.320	529	17-Mar-00	17:06:00.	19.200	604	20-Mar-00	20:06:00.	1
455	14-Mar-00	15:06:00.	19.320	530	17-Mar-00	18:06:00.	19.200	605	20-Mar-00	21:06:00.	1
456	14-Mar-00	16:06:00.	19.560	531	17-Mar-00	19:06:00.	19.080	606	20-Mar-00	22:06:00.	1
457	14-Mar-00	17:06:00.	19.800	532	17-Mar-00	20:06:00.	19.080	607	20-Mar-00	23:06:00.	1
458	14-Mar-00	18:06:00.	19.560	533	17-Mar-00	21:06:00.	19.080	608	21-Mar-00	00:06:00.	1
459	14-Mar-00	19:06:00.	19.560	534	17-Mar-00	22:06:00.	19.080	609	21-Mar-00	01:06:00.	1
460	14-Mar-00	20:06:00.	19.440	535	17-Mar-00	23:06:00.	19.080	610	21-Mar-00	02:06:00.	1
461	14-Mar-00	21:06:00.	19.440	536	18-Mar-00	00:06:00.	19.080	611	21-Mar-00	03:06:00.	1
462	14-Mar-00	22:06:00.	19.320	537	18-Mar-00	01:06:00.	19.080	612	21-Mar-00	04:06:00.	1
463	14-Mar-00	23:06:00.	19.320	538	18-Mar-00	02:06:00.	19.080	613	21-Mar-00	05:06:00.	1
464	15-Mar-00	00:06:00.	19.320	539	18-Mar-00	03:06:00.	18.960	614	21-Mar-00	06:06:00.	1
465	15-Mar-00	01:06:00.	19.320	540	18-Mar-00	04:06:00.	19.080	615	21-Mar-00	07:06:00.	1
466	15-Mar-00	02:06:00.	19.320	541	18-Mar-00	05:06:00.	18.960	616	21-Mar-00	08:06:00.	1
467	15-Mar-00	03:06:00.	19.320	542	18-Mar-00	06:06:00.	19.080	617	21-Mar-00	09:06:00.	1
468	15-Mar-00	04:06:00.	19.320	543	18-Mar-00	07:06:00.	19.080	618	21-Mar-00	10:06:00.	1
469	15-Mar-00	05:06:00.	19.320	544	18-Mar-00	08:06:00.	19.080	619	21-Mar-00	11:06:00.	1
470	15-Mar-00	06:06:00.	19.320	545	18-Mar-00	09:06:00.	19.080	620	21-Mar-00	12:06:00.	1
471	15-Mar-00	07:06:00.	19.200	546	18-Mar-00	10:06:00.	18.960	621	21-Mar-00	13:06:00.	1
472	15-Mar-00	08:06:00.	19.320	547	18-Mar-00	11:06:00.	18.960	622	21-Mar-00	14:06:00.	1
473	15-Mar-00	09:06:00.	19.320	548	18-Mar-00	12:06:00.	18.960	623	21-Mar-00	15:06:00.	1
474	15-Mar-00	10:06:00.	19.320	549	18-Mar-00	13:06:00.	19.080	624	21-Mar-00	16:06:00.	1
475	15-Mar-00	11:06:00.	19.320	550	18-Mar-00	14:06:00.	19.080	625	21-Mar-00	17:06:00.	1
476	15-Mar-00	12:06:00.	19.320	551	18-Mar-00	15:06:00.	19.080	626	21-Mar-00	18:06:00.	1
477	15-Mar-00	13:06:00.	19.320	552	18-Mar-00	16:06:00.	19.080	627	21-Mar-00	19:06:00.	1
478	15-Mar-00	14:06:00.	19.320	553	18-Mar-00	17:06:00.	19.200	628	21-Mar-00	20:06:00.	1
479	15-Mar-00	15:06:00.	19.320	554	18-Mar-00	18:06:00.	19.080	629	21-Mar-00	21:06:00.	1
480	15-Mar-00	16:06:00.	19.320	555	18-Mar-00	19:06:00.	19.080	630	21-Mar-00	22:06:00.	1
481	15-Mar-00	17:06:00.	19.440	556	18-Mar-00	20:06:00.	19.080	631	21-Mar-00	23:06:00.	1
482	15-Mar-00	18:06:00.	19.440	557	18-Mar-00	21:06:00.	19.080	632	22-Mar-00	00:06:00.	1
483	15-Mar-00	19:06:00.	19.440	558	18-Mar-00	22:06:00.	19.080	633	22-Mar-00	01:06:00.	1
484	15-Mar-00	20:06:00.	19.440	559	18-Mar-00	23:06:00.	19.080	634	22-Mar-00	02:06:00.	1
485	15-Mar-00	21:06:00.	19.320	560	19-Mar-00	00:06:00.	19.080	635	22-Mar-00	03:06:00.	1
486	15-Mar-00	22:06:00.	19.320	561	19-Mar-00	01:06:00.	19.080	636	22-Mar-00	04:06:00.	1
487	15-Mar-00	23:06:00.	19.320	562	19-Mar-00	02:06:00.	19.080	637	22-Mar-00	05:06:00.	1
488	16-Mar-00	00:06:00.	19.320	563	19-Mar-00	03:06:00.	19.080	638	22-Mar-00	06:06:00.	1
489	16-Mar-00	01:06:00.	19.320	564	19-Mar-00	04:06:00.	19.080	639	22-Mar-00	07:06:00.	1
490	16-Mar-00	02:06:00.	19.320	565	19-Mar-00	05:06:00.	19.080	640	22-Mar-00	08:06:00.	1
491	16-Mar-00	03:06:00.	19.320	566	19-Mar-00	06:06:00.	18.960	641	22-Mar-00	09:06:00.	1
492	16-Mar-00	04:06:00.	19.320	567	19-Mar-00	07:06:00.	19.080	642	22-Mar-00	10:06:00.	1
493	16-Mar-00	05:06:00.	19.440	568	19-Mar-00	08:06:00.	19.080	643	22-Mar-00	11:06:00.	1
494	16-Mar-00	06:06:00.	19.440	569	19-Mar-00	09:06:00.	19.080	644	22-Mar-00	12:06:00.	1
495	16-Mar-00	07:06:00.	19.320	570	19-Mar-00	10:06:00.	19.080	645	22-Mar-00	13:06:00.	1
496	16-Mar-00	08:06:00.	19.440	571	19-Mar-00	11:06:00.	19.200	646	22-Mar-00	14:06:00.	1
497	16-Mar-00	09:06:00.	19.440	572	19-Mar-00	12:06:00.	19.200	647	22-Mar-00	15:06:00.	1
498	16-Mar-00	10:06:00.	19.440	573	19-Mar-00	13:06:00.	19.320	648	22-Mar-00	16:06:00.	1
499	16-Mar-00	11:06:00.	19.560	574	19-Mar-00	14:06:00.	19.320	649	22-Mar-00	17:06:00.	1
500	16-Mar-00	12:06:00.	19.560	575	19-Mar-00	15:06:00.	19.320	650	22-Mar-00	18:06:00.	1
501	16-Mar-00	13:06:00.	19.560	576	19-Mar-00	16:06:00.	19.320	651	22-Mar-00	19:06:00.	1
502	16-Mar-00	14:06:00.	19.560	577	19-Mar-00	17:06:00.	19.320	652	22-Mar-00	20:06:00.	1
503	16-Mar-00	15:06:00.	19.560	578	19-Mar-00	18:06:00.	19.320	653	22-Mar-00	21:06:00.	1
504	16-Mar-00	16:06:00.	19.560	579	19-Mar-00	19:06:00.	19.320	654	22-Mar-00	22:06:00.	1
505	16-Mar-00	17:06:00.	19.560	580	19-Mar-00	20:06:00.	19.320	655	22-Mar-00	23:06:00.	1
506	16-Mar-00	18:06:00.	19.680	581	19-Mar-00	21:06:00.	19.320	656	23-Mar-00	00:06:00.	1
507	16-Mar-00	19:06:00.	19.680	582	19-Mar-00	22:06:00.	19.320	657	23-Mar-00	01:06:00.	1
508	16-Mar-00	20:06:00.	19.680	583	19-Mar-00	23:06:00.	19.320	658	23-Mar-00	02:06:00.	1
509	16-Mar-00	21:06:00.	19.560	584	20-Mar-00	00:06:00.	19.320	659	23-Mar-00	03:06:00.	1
510	16-Mar-00	22:06:00.	19.560	585	20-Mar-00	01:06:00.	19.320	660	23-Mar-00	04:06:00.	1
511	16-Mar-00	23:06:00.	19.560	586	20-Mar-00	02:06:00.	19.320	661	23-Mar-00	05:06:00.	1
512	17-Mar-00	00:06:00.	19.440	587	20-Mar-00	03:06:00.	19.320	662	23-Mar-00	06:06:00.	1
513	17-Mar-00	01:06:00.	19.440	588	20-Mar-00	04:06:00.	19.320	663	23-Mar-00	07:06:00.	1
514	17-Mar-00	02:06:00.	19.320	589	20-Mar-00	05:06:00.	19.320	664	23-Mar-00	08:06:00.	1
515	17-Mar-00	03:06:00.	19.320	590	20-Mar-00	06:06:00.	19.320	665	23-Mar-00	09:06:00.	1
516	17-Mar-00	04:06:00.	19.320	591	20-Mar-00	07:06:00.	19.320	666	23-Mar-00	10:06:00.	1
517	17-Mar-00	05:06:00.	19.320	592	20-Mar-00	08:06:00.	19.320	667	23-Mar-00	11:06:00.	1
518	17-Mar-00	06:06:00.	19.320	593	20-Mar-00	09:06:00.	19.320	668	23-Mar-00	12:06:00.	1
519	17-Mar-00	07:06:00.	19.200	594	20-Mar-00	10:06:00.	19.320	669	23-Mar-00	13:06:00.	1
520	17-Mar-00	08:06:00.	19.200	595	20-Mar-00	11:06:00.	19.320	670	23-Mar-00	14:06:00.	1
521	17-Mar-00	09:06:00.	19.320	596	20-Mar-00	12:06:00.	19.320	671	23-Mar-00	15:06:00.	1
522	17-Mar-00	10:06:00.	19.320	597	20-Mar-00	13:06:00.	19.320	672	23-Mar-00	16:06:00.	1

223	04-Mar-00 23:06:00.	19.200	298	08-Mar-00 02:06:00.	19.320	373	11-Mar-00 05:06:00.	19.3
224	05-Mar-00 00:06:00.	19.200	299	08-Mar-00 03:06:00.	19.320	374	11-Mar-00 06:06:00.	19.3
225	05-Mar-00 01:06:00.	19.200	300	08-Mar-00 04:06:00.	19.320	375	11-Mar-00 07:06:00.	19.3
226	05-Mar-00 02:06:00.	19.200	301	08-Mar-00 05:06:00.	19.320	376	11-Mar-00 08:06:00.	19.3
227	05-Mar-00 03:06:00.	19.200	302	08-Mar-00 06:06:00.	19.320	377	11-Mar-00 09:06:00.	19.3
228	05-Mar-00 04:06:00.	19.200	303	08-Mar-00 07:06:00.	19.320	378	11-Mar-00 10:06:00.	19.3
229	05-Mar-00 05:06:00.	19.200	304	08-Mar-00 08:06:00.	19.320	379	11-Mar-00 11:06:00.	19.3
230	05-Mar-00 06:06:00.	19.200	305	08-Mar-00 09:06:00.	19.320	380	11-Mar-00 12:06:00.	19.3
231	05-Mar-00 07:06:00.	19.200	306	08-Mar-00 10:06:00.	19.320	381	11-Mar-00 13:06:00.	19.3
232	05-Mar-00 08:06:00.	19.200	307	08-Mar-00 11:06:00.	19.320	382	11-Mar-00 14:06:00.	19.3
233	05-Mar-00 09:06:00.	19.320	308	08-Mar-00 12:06:00.	19.440	383	11-Mar-00 15:06:00.	19.3
234	05-Mar-00 10:06:00.	19.320	309	08-Mar-00 13:06:00.	19.440	384	11-Mar-00 16:06:00.	19.3
235	05-Mar-00 11:06:00.	19.320	310	08-Mar-00 14:06:00.	19.440	385	11-Mar-00 17:06:00.	19.3
236	05-Mar-00 12:06:00.	19.320	311	08-Mar-00 15:06:00.	19.440	386	11-Mar-00 18:06:00.	19.3
237	05-Mar-00 13:06:00.	19.320	312	08-Mar-00 16:06:00.	19.440	387	11-Mar-00 19:06:00.	19.3
238	05-Mar-00 14:06:00.	19.320	313	08-Mar-00 17:06:00.	19.440	388	11-Mar-00 20:06:00.	19.4
239	05-Mar-00 15:06:00.	19.320	314	08-Mar-00 18:06:00.	19.440	389	11-Mar-00 21:06:00.	19.3
240	05-Mar-00 16:06:00.	19.320	315	08-Mar-00 19:06:00.	19.440	390	11-Mar-00 22:06:00.	19.3
241	05-Mar-00 17:06:00.	19.320	316	08-Mar-00 20:06:00.	19.440	391	11-Mar-00 23:06:00.	19.4
242	05-Mar-00 18:06:00.	19.320	317	08-Mar-00 21:06:00.	19.440	392	12-Mar-00 00:06:00.	19.3
243	05-Mar-00 19:06:00.	19.320	318	08-Mar-00 22:06:00.	19.440	393	12-Mar-00 01:06:00.	19.4
244	05-Mar-00 20:06:00.	19.320	319	08-Mar-00 23:06:00.	19.440	394	12-Mar-00 02:06:00.	19.4
245	05-Mar-00 21:06:00.	19.320	320	09-Mar-00 00:06:00.	19.440	395	12-Mar-00 03:06:00.	19.4
246	05-Mar-00 22:06:00.	19.200	321	09-Mar-00 01:06:00.	19.440	396	12-Mar-00 04:06:00.	19.4
247	05-Mar-00 23:06:00.	19.320	322	09-Mar-00 02:06:00.	19.440	397	12-Mar-00 05:06:00.	19.5
248	06-Mar-00 00:06:00.	19.200	323	09-Mar-00 03:06:00.	19.320	398	12-Mar-00 06:06:00.	19.4
249	06-Mar-00 01:06:00.	19.320	324	09-Mar-00 04:06:00.	19.440	399	12-Mar-00 07:06:00.	19.4
250	06-Mar-00 02:06:00.	19.200	325	09-Mar-00 05:06:00.	19.320	400	12-Mar-00 08:06:00.	19.4
251	06-Mar-00 03:06:00.	19.200	326	09-Mar-00 06:06:00.	19.320	401	12-Mar-00 09:06:00.	19.3
252	06-Mar-00 04:06:00.	19.080	327	09-Mar-00 07:06:00.	19.440	402	12-Mar-00 10:06:00.	19.4
253	06-Mar-00 05:06:00.	19.080	328	09-Mar-00 08:06:00.	19.440	403	12-Mar-00 11:06:00.	19.3
254	06-Mar-00 06:06:00.	19.200	329	09-Mar-00 09:06:00.	19.440	404	12-Mar-00 12:06:00.	19.3
255	06-Mar-00 07:06:00.	19.200	330	09-Mar-00 10:06:00.	19.560	405	12-Mar-00 13:06:00.	19.3
256	06-Mar-00 08:06:00.	19.200	331	09-Mar-00 11:06:00.	19.560	406	12-Mar-00 14:06:00.	19.3
257	06-Mar-00 09:06:00.	19.200	332	09-Mar-00 12:06:00.	19.560	407	12-Mar-00 15:06:00.	19.3
258	06-Mar-00 10:06:00.	19.320	333	09-Mar-00 13:06:00.	19.680	408	12-Mar-00 16:06:00.	19.3
259	06-Mar-00 11:06:00.	19.320	334	09-Mar-00 14:06:00.	19.680	409	12-Mar-00 17:06:00.	19.3
260	06-Mar-00 12:06:00.	19.320	335	09-Mar-00 15:06:00.	19.680	410	12-Mar-00 18:06:00.	19.3
261	06-Mar-00 13:06:00.	19.320	336	09-Mar-00 16:06:00.	19.680	411	12-Mar-00 19:06:00.	19.3
262	06-Mar-00 14:06:00.	19.320	337	09-Mar-00 17:06:00.	19.680	412	12-Mar-00 20:06:00.	19.3
263	06-Mar-00 15:06:00.	19.320	338	09-Mar-00 18:06:00.	19.680	413	12-Mar-00 21:06:00.	19.3
264	06-Mar-00 16:06:00.	19.200	339	09-Mar-00 19:06:00.	19.680	414	12-Mar-00 22:06:00.	19.3
265	06-Mar-00 17:06:00.	19.320	340	09-Mar-00 20:06:00.	19.680	415	12-Mar-00 23:06:00.	19.3
266	06-Mar-00 18:06:00.	19.320	341	09-Mar-00 21:06:00.	19.680	416	13-Mar-00 00:06:00.	19.3
267	06-Mar-00 19:06:00.	19.320	342	09-Mar-00 22:06:00.	19.680	417	13-Mar-00 01:06:00.	19.2
268	06-Mar-00 20:06:00.	19.200	343	09-Mar-00 23:06:00.	19.680	418	13-Mar-00 02:06:00.	19.2
269	06-Mar-00 21:06:00.	19.200	344	10-Mar-00 00:06:00.	19.680	419	13-Mar-00 03:06:00.	19.0
270	06-Mar-00 22:06:00.	19.200	345	10-Mar-00 01:06:00.	19.680	420	13-Mar-00 04:06:00.	19.0
271	06-Mar-00 23:06:00.	19.200	346	10-Mar-00 02:06:00.	19.680	421	13-Mar-00 05:06:00.	19.0
272	07-Mar-00 00:06:00.	19.200	347	10-Mar-00 03:06:00.	19.560	422	13-Mar-00 06:06:00.	19.0
273	07-Mar-00 01:06:00.	19.200	348	10-Mar-00 04:06:00.	19.560	423	13-Mar-00 07:06:00.	18.9
274	07-Mar-00 02:06:00.	19.080	349	10-Mar-00 05:06:00.	19.560	424	13-Mar-00 08:06:00.	18.9
275	07-Mar-00 03:06:00.	19.080	350	10-Mar-00 06:06:00.	19.440	425	13-Mar-00 09:06:00.	19.0
276	07-Mar-00 04:06:00.	19.080	351	10-Mar-00 07:06:00.	19.440	426	13-Mar-00 10:06:00.	19.0
277	07-Mar-00 05:06:00.	19.080	352	10-Mar-00 08:06:00.	19.320	427	13-Mar-00 11:06:00.	19.0
278	07-Mar-00 06:06:00.	19.080	353	10-Mar-00 09:06:00.	19.320	428	13-Mar-00 12:06:00.	19.0
279	07-Mar-00 07:06:00.	19.080	354	10-Mar-00 10:06:00.	19.440	429	13-Mar-00 13:06:00.	19.0
280	07-Mar-00 08:06:00.	19.080	355	10-Mar-00 11:06:00.	19.320	430	13-Mar-00 14:06:00.	19.0
281	07-Mar-00 09:06:00.	19.080	356	10-Mar-00 12:06:00.	19.440	431	13-Mar-00 15:06:00.	19.0
282	07-Mar-00 10:06:00.	19.200	357	10-Mar-00 13:06:00.	19.440	432	13-Mar-00 16:06:00.	19.0
283	07-Mar-00 11:06:00.	19.320	358	10-Mar-00 14:06:00.	19.440	433	13-Mar-00 17:06:00.	19.0
284	07-Mar-00 12:06:00.	19.320	359	10-Mar-00 15:06:00.	19.440	434	13-Mar-00 18:06:00.	19.0
285	07-Mar-00 13:06:00.	19.320	360	10-Mar-00 16:06:00.	19.440	435	13-Mar-00 19:06:00.	19.0
286	07-Mar-00 14:06:00.	19.320	361	10-Mar-00 17:06:00.	19.440	436	13-Mar-00 20:06:00.	19.0
287	07-Mar-00 15:06:00.	19.320	362	10-Mar-00 18:06:00.	19.320	437	13-Mar-00 21:06:00.	19.0
288	07-Mar-00 16:06:00.	19.320	363	10-Mar-00 19:06:00.	19.320	438	13-Mar-00 22:06:00.	19.
289	07-Mar-00 17:06:00.	19.320	364	10-Mar-00 20:06:00.	19.320	439	13-Mar-00 23:06:00.	19.
290	07-Mar-00 18:06:00.	19.320	365	10-Mar-00 21:06:00.	19.320	440	14-Mar-00 00:06:00.	19.0
291	07-Mar-00 19:06:00.	19.320	366	10-Mar-00 22:06:00.	19.320	441	14-Mar-00 01:06:00.	19.0
292	07-Mar-00 20:06:00.	19.320	367	10-Mar-00 23:06:00.	19.320	442	14-Mar-00 02:06:00.	19.0
293	07-Mar-00 21:06:00.	19.320	368	11-Mar-00 00:06:00.	19.320	443	14-Mar-00 03:06:00.	19.
294	07-Mar-00 22:06:00.	19.320	369	11-Mar-00 01:06:00.	19.320	444	14-Mar-00 04:06:00.	19.0
295	07-Mar-00 23:06:00.	19.320	370	11-Mar-00 02:06:00.	19.320	445	14-Mar-00 05:06:00.	19.0
296	08-Mar-00 00:06:00.	19.320	371	11-Mar-00 03:06:00.	19.320	446	14-Mar-00 06:06:00.	18.9
297	08-Mar-00 01:06:00.	19.320	372	11-Mar-00 04:06:00.	19.320	447	14-Mar-00 07:06:00.	19.0

673	23-Mar-00 17:06:00.	19.320
674	23-Mar-00 18:06:00.	19.320
675	23-Mar-00 19:06:00.	19.320
676	23-Mar-00 20:06:00.	19.320
677	23-Mar-00 21:06:00.	19.320
678	23-Mar-00 22:06:00.	19.320
679	23-Mar-00 23:06:00.	19.320
680	24-Mar-00 00:06:00.	19.320
681	24-Mar-00 01:06:00.	19.320
682	24-Mar-00 02:06:00.	19.200
683	24-Mar-00 03:06:00.	19.200
684	24-Mar-00 04:06:00.	19.200
685	24-Mar-00 05:06:00.	19.200
686	24-Mar-00 06:06:00.	19.200
687	24-Mar-00 07:06:00.	19.200
688	24-Mar-00 08:06:00.	19.200
689	24-Mar-00 09:06:00.	19.200
690	24-Mar-00 10:06:00.	19.200
691	24-Mar-00 11:06:00.	19.320
692	24-Mar-00 12:06:00.	19.320
693	24-Mar-00 13:06:00.	19.320
694	24-Mar-00 14:06:00.	19.320
695	24-Mar-00 15:06:00.	19.320
696	24-Mar-00 16:06:00.	19.320
697	24-Mar-00 17:06:00.	19.320
698	24-Mar-00 18:06:00.	19.320
699	24-Mar-00 19:06:00.	19.320
700	24-Mar-00 20:06:00.	19.320
701	24-Mar-00 21:06:00.	19.320
702	24-Mar-00 22:06:00.	19.320
703	24-Mar-00 23:06:00.	19.320
704	25-Mar-00 00:06:00.	19.320
705	25-Mar-00 01:06:00.	19.320
706	25-Mar-00 02:06:00.	19.200
707	25-Mar-00 03:06:00.	19.200
708	25-Mar-00 04:06:00.	19.200
709	25-Mar-00 05:06:00.	19.200
710	25-Mar-00 06:06:00.	19.200
711	25-Mar-00 07:06:00.	19.200
712	25-Mar-00 08:06:00.	19.200
713	25-Mar-00 09:06:00.	19.200
714	25-Mar-00 10:06:00.	19.320
715	25-Mar-00 11:06:00.	19.320
716	25-Mar-00 12:06:00.	19.320
717	25-Mar-00 13:06:00.	19.440
718	25-Mar-00 14:06:00.	19.440
719	25-Mar-00 15:06:00.	19.440
720	25-Mar-00 16:06:00.	19.440
721	25-Mar-00 17:06:00.	19.440
722	25-Mar-00 18:06:00.	19.440
723	25-Mar-00 19:06:00.	19.440
724	25-Mar-00 20:06:00.	19.440
725	25-Mar-00 21:06:00.	19.440
726	25-Mar-00 22:06:00.	19.440
727	25-Mar-00 23:06:00.	19.440
728	26-Mar-00 00:06:00.	19.440
729	26-Mar-00 01:06:00.	19.440
730	26-Mar-00 02:06:00.	19.440
731	26-Mar-00 03:06:00.	19.440
732	26-Mar-00 04:06:00.	19.440
733	26-Mar-00 05:06:00.	19.440
734	26-Mar-00 06:06:00.	19.440
735	26-Mar-00 07:06:00.	19.440
736	26-Mar-00 08:06:00.	19.440
737	26-Mar-00 09:06:00.	19.440
738	26-Mar-00 10:06:00.	19.440
739	26-Mar-00 11:06:00.	19.440
740	26-Mar-00 12:06:00.	19.440
741	26-Mar-00 13:06:00.	19.440
742	26-Mar-00 14:06:00.	19.440
743	26-Mar-00 15:06:00.	19.440
744	26-Mar-00 16:06:00.	19.320
745	26-Mar-00 17:06:00.	19.440
746	26-Mar-00 18:06:00.	19.320
747	26-Mar-00 19:06:00.	19.320
748	26-Mar-00 20:06:00.	19.320
749	26-Mar-00 21:06:00.	19.320
750	26-Mar-00 22:06:00.	19.320
751	26-Mar-00 23:06:00.	19.320
752	27-Mar-00 00:06:00.	19.320
753	27-Mar-00 01:06:00.	19.320
754	27-Mar-00 02:06:00.	19.320
755	27-Mar-00 03:06:00.	19.320
756	27-Mar-00 04:06:00.	19.320
757	27-Mar-00 05:06:00.	19.320
758	27-Mar-00 06:06:00.	19.320
759	27-Mar-00 07:06:00.	19.320
760	27-Mar-00 08:06:00.	19.320
761	27-Mar-00 09:06:00.	19.320
762	27-Mar-00 10:06:00.	19.320
763	27-Mar-00 11:06:00.	19.320
764	27-Mar-00 12:06:00.	19.320
765	27-Mar-00 13:06:00.	19.440
766	27-Mar-00 14:06:00.	19.440
767	27-Mar-00 15:06:00.	19.440
768	27-Mar-00 16:06:00.	19.440
769	27-Mar-00 17:06:00.	19.440
770	27-Mar-00 18:06:00.	19.440
771	27-Mar-00 19:06:00.	19.440
772	27-Mar-00 20:06:00.	19.440
773	27-Mar-00 21:06:00.	19.440
774	27-Mar-00 22:06:00.	19.440
775	27-Mar-00 23:06:00.	19.440
776	28-Mar-00 00:06:00.	19.440
777	28-Mar-00 01:06:00.	19.440
778	28-Mar-00 02:06:00.	19.440
779	28-Mar-00 03:06:00.	19.440
780	28-Mar-00 04:06:00.	19.440
781	28-Mar-00 05:06:00.	19.440
782	28-Mar-00 06:06:00.	19.440
783	28-Mar-00 07:06:00.	19.440
784	28-Mar-00 08:06:00.	19.440
785	28-Mar-00 09:06:00.	19.560
786	28-Mar-00 10:06:00.	19.560
787	28-Mar-00 11:06:00.	19.560
788	28-Mar-00 12:06:00.	19.440
789	28-Mar-00 13:06:00.	19.560
790	28-Mar-00 14:06:00.	19.560

CLIENT: Roy F. Weston
ESI #: 8505R
DATE: 3/15/00
INITIALS: KCB

pH MEASUREMENTS

SAMPLE ID	Beaker ID	pH VALUES in SU at START
CONTROL - Artificial Soil	42	5.00
-1	325	7.65
-2	202	7.93
-3	200	7.87
-4	199	7.846
-5	322	5.56
Compost	41	5.76
-4 Duplicate	2	7.45

NOTES:

DOCUMENTATION FORM

STUDY No.: 8505 R STUDY DIRECTOR: _____

PROJECT TITLE: Roy F. Weston

GENERATED BY: XRB DATE: 3/13/00

The following information is
- ☐ Miscellaneous Documentation
- ☐ A Deviation from the Protocol
- ☐ A Deviation from SOP _____

Sample ID.	Soil Wt. (g)	Water Vol. Calculated to Add (ml)	Water Vol. Added (ml)
-1	2485.8	308 ml	150 ml
-2	3391.3 (Large Rocks may lower Vol. Needed)	721 ml	300 ml
-3	3310.2	Not Needed	0 ml
-4	2500.9	281 ml	200 ml
-5	2174.7	549 ml	549 ml
Control	1618.5	703 ml	703 ml
Compost	1750.3	Between 761 ml and 3077 ml — Probably to High Due to WHC being Run with old technique 3/13/00 XRB	900 ml
↓ if WHC = Control's			

-5 - Due to Low pH 10g ~~20g~~ of Calcium Carbonate was added to Sample. (3/13/00 XRB)

APPROVED BY: _____ DATE: _____

AR100529

DOCUMENTATION FORM

STUDY No.: 8505 STUDY DIRECTOR: Ken Simon

PROJECT TITLE: Roy F. Weston - Initial Description of Sample

GENERATED BY: Karen Byrnes DATE: 2/16/00

The following information is
- ☒ Miscellaneous Documentation
- ☐ A Deviation from the Protocol
- ☐ A Deviation from SOP _____

Soil Content

-1- Good Dark Mud mixed well with clay, Moisture content Good. Some Roots present.

-2- Standing water on top. Black muck with a Lot of Large Rocks, and chunks of glass. Rocks picked out by hand, dryed on Counter

-3- Full of "Junk Yard" Hash. Rubber and Iron hose and/or Pipes, glass, Iron chunks, and random unidentifiable items. Wire also present. Mud was sifted through 1/4 screen with about 1/4 of sample not passing through. When pH was taken about 1/2 of sample remained on the stir magnet when it was removed. Standing in Dryed on Counter.

-4- Good dark mud, well mixed with sand, Moisture Content is a Little dry, may need a water adjustment.

-5- Soil mixed with clay in Large chunks. Very dry broken up by hand and passed through 1/4 inch Screen.

APPROVED BY: _____ DATE: _____

AR100530

CLIENT: Roy F. Weston
ESI #: 8505
DATE: 2/16/00 - 2/22/00
INITIALS: XEB

TOTAL ORGANIC CARBON BY LOSS ON IGNITION

Artificial Soil

Sample ID	Crucible ID	Crucible Weight (g)	Crucible + Pre-Ignition Wt (g)	Crucible + Post-Ignition Wt (g)	Net Ignition Weight (g)	Total Loss on Ignition (g lost per g sample)
Control	I	25.2728	35.6474	34.5624	1.0850	0.1046
-1	II	27.8438	38.4524	37.5677	0.8847	0.0834
-2	III	25.9640	36.2888	35.5529	0.7359	0.0713
-3	IV	29.0167	49.4830	48.5989	0.8841	0.0432
-4	V	29.3315	39.8932	39.1072	0.7860	0.0744
BLK	VI	28.3773	38.6486	38.6475	0.0011	0.0001
Re-check	IV	29.0167	48.5989	(B) 48.6084	(B) -0.0095	(B) 0.0005
Date & Initials	—	2/16/00 XEB	2/16/00 XEB	2/17/00 XEB (B) 2/22/00 XEB	2/17/00 XEB (B) 2/22/00 XEB	2/17/00 XEB (B) 2/22/00 XEB

COMMENTS: _____

Net Ignition Weight = (Crucible + Pre-Ignition Weight) - (Crucible + Post-Ignition Weight)

Total Loss on Ignition = $\frac{\text{Net Ignition Weight}}{\text{Soil Weight}}$

Soil weight = (Crucible + Pre-Ignition Weight) - Crucible Weight

CLIENT: Roy F. Weston
ESI #: 8505
DATE:
INITIALS:

TOTAL ORGANIC CARBON BY LOSS ON IGNITION

Sample ID	Crucible ID	Crucible Weight (g)	Crucible + Pre-Ignition Wt (g)	Crucible + Post-Ignition Wt (g)	Net Ignition Weight (g)	Total Loss on Ignition (g lost per g sample)
-4 Dup.	I	25.2737	35.3420	34.7756	0.5664	0.0563
-5	II	27.8438	37.8570	37.0961	0.7609	0.0760
BLK	VI	28.3773	38.6475	38.6467	0.0008	0.0001
Re-Check	II	27.8438	(*) 37.0961	(*) 37.0830	(*) 0.0131	(*) 0.0014
Date & Initials		2/17/00 XKB	2/17/00 XKB (*) 2/22/00 XKB	(*) 2/23/00 XKB 2/22/00 XKB	(*) 2/22/00 XKB 2/22/00 XKB	(*) 2/23/00 XKB 2/22/00 XKB

COMMENTS: -4 Dup & Difference = 13.85%

Net Ignition Weight = (Crucible + Pre-Ignition Weight) - (Crucible + Post-Ignition Weight)

Total Loss on Ignition = $\frac{\text{Net Ignition Weight}}{\text{Soil Weight}}$

Soil weight = (Crucible + Pre-Ignition Weight) - Crucible Weight

CLIENT: Roy F. Weston
ESI #: 8505 R

REQUIRED SOIL HYDRATION

Hydration Water To Be Added (mL/100g) = THW_{ts} - $\%M_{ts}$

THW_{ts} = PHYD * WHC_{ts}

THW_{ts}	=	Total Soil Hydration Water Desired in mL/100g
PHYD	=	Proportion of Hydration Required (0.75)
WHC_{ts}	=	Water Holding Capacity of the Test Soil in mL/100g
$\%M_{ts}$	=	%Moisture of the Test Soil (% Moisture)

SAMPLE I.D.	PHYD	WHC_{ts} (mL/100g)	THW_{ts}	$\%M_{ts}$	Water To Be Added: THW_{ts} - $\%M_{ts}$ (mL/100g)
Control	0.75	60.6	45.45	~~31.57~~ 2.0%	43.45
-1	0.75	56.5	42.38	31.57 ← use 29.98	~~10.81~~ 12.40
-2	0.75	55.9	41.92	20.65	21.27
-3	0.75	40.5	30.38	25.76	4.62 No Adj. Needed
-4	0.75	47.0	35.25	24.01	11.24
-5	0.75	60.0	45.00	19.74	25.26
-1 Dup.	0.75	56.5	42.38	28.39	—

NOTES: -1 Avg. Dup - 29.98 Diff% Dup. = 5.30% 3/13/00 KLB

Compost	0.75	247.7	185.78	10%	175.78

Data from Previous test. 3/13/00 KLB

Probably to High Due to old technique. 3/13/00 KLB

AR100533

CLIENT: Roy F. Weston
ESI #: 8505

WATER HOLDING CAPACITY OF SOIL

$$\text{WHC (mL } H_2O\text{/100 g Soil)} = \frac{\text{Final wt (g) - Initial wt (g)}}{\text{Soil wt (g)}} \times 100$$

Initial wt(g): Soil Dry Wt.(g) + Wet Filter Paper + Funnel + Cup

Sample ID	Funnel ID	Soil Dry Wt (g)	Wet Filter Paper + Funnel + Cup (g)	Initial Wt (g)	Final Wt (g)	WHC (mL H_2O/100 g Soil)
Artificial Soil Control	1	100.0	332.8	432.8	493.4	60.6
-1	2	↓	165.5 No Cup.	265.5	322.0	56.5
-2	3	↓	193.1 No Cup	293.1	349.0	55.9
-3	4	↓	60.3	160.3	200.8	40.5
-4	5	↓	57.6	157.6	204.6	47.0
-5	6	↓	60.2	160.2	220.2	60.0
-2 Dup.	10	↓	57.4	157.4	205.5	48.1
Date & Initials	2/17/00 KEB	2/17/00 KEB	2/17/00 KEB	2/17/00 KEB	2/18/00 DR	2/22/00 KEB

NOTES (Eil) 2/22/00 KEB Control mud will not drain in 4hrs. so to keep times consistent all soils were weighed after sitting over night. -1, -2, -3 were weighed for comparison at 3hrs.

	Sample ID	Final Wt	WHC 2/22/00 KEB
2/17/00 KEB	-1	323.2	57.7
	-2	355.6	62.5
	-3	214.0	53.7

-2 Dup. % Difference = 7.5%

AR100534

CLIENT: Roy F. Weston
ESI #: 8505R

SOIL DRYING PROCESS

Sample I.D.	Beaker I.D.	Dry Weight #1 (g)	Dry Weight #2 (g)	Dry Weight #3 (g)
	NA			
Date & Initials				

COMMENTS: _____

PERCENT MOISTURE

Sample I.D.	Beaker I.D.	Beaker Wt. (g)	Soil Wet Wt.(g)	Dry Wt. #1 (g)	Dry Wt. #2 (g)	Dry Wt. #3 (g)	% Moisture
-1	1 O	28.8993	39.1658	35.9246	35.9248	—	31.57
-2	2	30.16~~55~~ 78	40.5904	38.2785	38.2807	—	20.65
-3	3 O	29.9945	40.3159	37.6576	37.6574	—	25.76
-4	4 E	29.1432	39.9189	37.3301	37.3338	—	24.01
-5	5 E	29.0244	39.5616	37.4804	37.4827	—	19.74
Dup. -1	6A	28.9380	39.0042	36.1450	36.1478	—	28.39
Compost	Guest Guess	→					10%
Date & Initials		3/13/00 KRB	3/13/00 KRB	3/13/00 KRB	3/13/00 KRB		3/13/00 KRB

COMMENTS: Control has No change in sim use old calculations.

$$\frac{(\text{Wet Wt.} - \text{Beaker Wt.}) - (\text{Dry Wt.} - \text{Beaker Wt.})}{(\text{Wet Wt.} - \text{Beaker Wt.})} \times 100 = \%\ \text{moisture}$$

AR100535

CLIENT: Roy F. Weston
ESI #: 8505

SOIL DRYING PROCESS

Sample I.D.	Beaker I.D.	Dry Weight #1 (g)	Dry Weight #2 (g)	Dry Weight #3 (g)
Control	15	73.2795	~~72.9186~~ 73.2802	—
-1	327	65.228	65.242	—
-2	353	59.525	59.529	—
-3	32	70.757	70.754	—
-4	112	62.1706	62.167	—
-5	192	68.936	68.919	—
Date & Initials	2/16/00 XRB	2/16/00 XRB	2/16/00 XRB	—

COMMENTS: _____

PERCENT MOISTURE

Sample I.D.	Beaker I.D.	Beaker Wt. (g)	Soil Wet Wt.(g)	Dry Wt. #1 (g)	Dry Wt. #2 (g)	Dry Wt. #3 (g)	% Moisture
Control	6A	28.9377	38.9379	38.7476	38.7375	—	1.95 ←*
-1	10	28.8991	38.3043	35.4448	35.4331	—	30.47
-2	1	28.6743	38.6527	36.3365	36.3279	—	23.26
-3	1E	29.1682	39.7200	36.9764	36.9693	—	26.03
-4	2C	28.4476	38.4455	36.2069	36.1970	—	22.44
-5	5E	29.0242	39.0821	37.0410	37.0321	—	20.34
Dup.-1	4E	29.1429	39.1690	36.0291	36.0180	—	31.37
Date & Initials	2/17/00 XRB	2/17/00 XRB	2/17/00 XRB	2/22/00 XRB	2/22/00 XRB		

COMMENTS: -1 Dup. % Difference = 1.46%

$$\frac{(\text{Wet Wt.} - \text{Beaker Wt.}) - (\text{Dry Wt.} - \text{Beaker Wt.})}{(\text{Wet Wt.} - \text{Beaker Wt.})} \times 100 = \%\ \text{moisture}$$

* Calculated % moisture of control used in assay starting 3/16/00. Other % moistures re-calculat

AR100536

Eisenia foetida Bioaccumulation Assay

WATER HOLDING CAPACITY & REQUIRED SOIL HYDRATION

Control Organic Compost

SAMPLE ID	FUNNEL I.D.	Soil Dry Wt (g)	Wet FP + Funnel + (3)	Initial Wt (g)	Final Wt (g)	WHC mL/100g	PHYD	WHC_m (mL/100g)	THW_m	$\%M_m$	Water To Be Added:
OC031400	1	100g	33.1	133.1g	213.6	80.5	0.75	NA	6038	34.31	26 mL/100g

PERCENT MOISTURE Calculation

Sample I.D.	Beaker I.D.	Beaker Wt. (g)	Soil Wet Wt.(g)	Dry Wt. #1 (g)	Dry Wt. #2 (g)	Dry Wt. #3 (g)	% Moisture
OC031400	354	54.5090	64.8813	61.2538	61.2542	—	34.31

AR100537

Eisenia foetida Acute Assay

STUDY NUMBER: 8505
CLIENT: Roy F. Weston

DAY 0:

REP	CONTROL		8505-1		8505-2		8505-3		8505-4		8505-5	
	# Added	Weight (g)	# Added	Weight (g)	# Added	Weight (g)	# Added	Weight (g)	# Added	Weight (g)	# Added	Weight (g)
A	10	3.5	10	3.3	10	3.3	10	3.1	10	3.2	10	3.0
B	10	2.9	10	3.4	10	3.3	10	3.2	10	3.1	10	3.2
C	10	3.2	10	3.4	10	3.1	10	2.8	10	3.2	10	3.3
D	10	3.3	10	3.2	10	3.5	10	2.7	10	3.3	10	3.4
E	10	3.1	10	3.4	10	3.6	10	3.6	10	3.5	10	2.9
F	10	3.2	10	3.0	10	3.4	10	2.7	10	3.3	10	3.6
G	10	2.7	10	3.3	10	3.1	10	2.9	10	2.3	10	2.9
H	10	3.5	10	3.2	10	3.2	10	2.8	10	3.4	10	2.9
I	10	3.4	10	3.5	10	3.3	10	2.4	10	2.7	10	3.7
J	10	2.7	10	3.3	10	3.1	10	3.0	10	2.9	10	3.4
Initials	KW	KW	KW	KW	[illegible]	[illegible]	KW	KW	[illegible]	[illegible]	KW	KW
Date	2/24/00	2/24	2/24	2/24	2/24/00	2/24/00	2/24	2/24	2/24/00	2/24/00	2/24	2/24

NOTES: Failed Lab Control Survival

AR100538

Eisenia foetida Acute Assay

STUDY NUMBER: 8505
CLIENT: Roy F. Weston

DAY 14:

REP	CONTROL		8505-1		8505-2		8505-3		8505-4		8505-5	
	# Alive	Comments	# Alive	Comments	# Alive	Comments	# Alive	Comments	# Alive	Comments	# Alive	Comments
A	7	3,4	3	3	7	3,5	10	3	4	6,2,5,3	10	3
B	8	3,4	6	3,5	9	3,4	10	3	7	3,5	9	3
C	10	3,4	6	3,5	7	3,5	10	3	7	5,3	7	3
D	5	3	6	3,5,4	7	2,3	10	1	8	5,2,3	9	3
E	10	3	6	3,4,5	6	3	7	3,4	5	5,6,2,3	10	3
F	10	3,4	8	3,4	4	1	7	3	8	5,2,3	7	3
G	8	3	8	3,4,5	4	2,1	7	1	6	5,3	8	3
H	9	3	7	3,5	7	2,3	9	3	9	5,2,3	8	3
I	7	3,4	8	3,5	5	1	6	3	8	5,3,2	10	3
J	6	3	7	3,5	5	3	7	3	7	5,2,3	8	3
Initials	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW
Date	3/9/00	3/9	3/9	3/9	3/9	3/9	3/9	3/9	3/9	3/9	3/9	3/9

NOTES: (1) - lethargic (6) odor
(2) - soil very wet
(3) - survivors very perky
(4) - cocoons present
(5) - seedlings present

AR100539

Eisenia foetida Bioaccumulation Assay

STUDY NUMBER: 8505 **CLIENT:** Roy F. Weston

DAY	TEMP °C	INIT.	GENERAL OBSERVATIONS
0	21	[illegible]	Lights set for 24hrs On; Squirrel Started.
1	21	[illegible]	Squirrel reads 19.7°C; Lights fine, No action in any rep.
2	21	CL	Squirrel reads 19.5°C. Lights OK
3	21	WL	Squirrel reads 19.5°C, lights OK, worms quiet
4	21	WL	Squirrel reads 19.5°C, lights OK
5	21	WL	Squirrel reads 19.3°C, lights + worms OK
6	21	KW	Squirrel reads 19.7°C, worms + lights OK
7	21	WL	Squirrel reads 19.4°C, worms + lights OK
8	21	KW	Squirrel reads 19.4°C, worms + lights OK
9	21	CL	Squirrel reads 19.3°C, worms + lights OK
10	21	WL	Squirrel reads 19.2, worms + lights fine
11	21	KW	Squirrel reads 19.4°C, lights + worms ok
12	21	BB	Squirrel reads 19.5°C, lights + worms ok
13	21	KW	Squirrel reading 19.5°C, lights + worms O.K
14	22	KW	Squirrel reading 19.6°C, lights + worms ok.

Sediment 4 has many seedlings

DOCUMENTATION FORM

STUDY No.: 8505 STUDY DIRECTOR: _____

PROJECT TITLE: RFW

GENERATED BY: Karen Byrne DATE: 2/22/00

The following information is
- [x] Miscellaneous Documentation
- [ ] A Deviation from the Protocol
- [ ] A Deviation from SOP _____

Sample ID.	Soil Wt. (g)	Water Vol. to Be Added (ml)	Water Vol. Actual Added
Control	1062g	462ml	462 ml
-1	2202g	262ml	100 ml
-2	2190g	345ml	150ml
-3	2210g	Needs Adj.	—
-4	2210g	283ml	200ml
-5	2210g	545ml	475ml
Control 2nd Bag	602g	262ml	262 ml

APPROVED BY: _____ DATE: _____

AR100541

CLIENT: Roy F. Weston
ESI #: 8505

SOIL DRYING PROCESS

Sample I.D.	Beaker I.D.	Dry Weight #1 (g)	Dry Weight #2 (g)	Dry Weight #3 (g)
Control	15	73.2795	~~72.9136~~ 73.2802	—
-1	327	65.228	65.242	—
-2	353	59.525	59.529	—
-3	32	70.757	70.754	—
-4	112	62.1706	62.167	—
-5	192	68.936	68.919	—
Date & Initials	2/16/00 XGB	2/16/00 XGB	2/16/00 XGB	—

COMMENTS: _____

PERCENT MOISTURE

Sample I.D.	Beaker I.D.	Beaker Wt. (g)	Soil Wet Wt.(g)	Dry Wt. #1 (g)	Dry Wt. #2 (g)	Dry Wt. #3 (g)	% Moisture
Control	6A	23.7377	38.9579	38.7476	38.7375	—	1.95 ← *
-1	10	28.8791	38.3043	35.4448	35.4331	—	30.47
-2	1	28.6743	38.6527	36.3365	36.3279	—	23.26
-3	1E	29.1682	39.7200	36.9764	36.9693	—	26.03
-4	2C	28.4476	38.4455	36.2069	36.1970	—	22.44
-5	5E	29.0242	39.0821	37.0410	37.0321	—	20.34
Dup.-1	4E	29.1429	39.1690	36.0291	36.0180	—	31.37
Date & Initials	2/17/00 XGB	2/17/00 XGB	2/17/00 XGB	2/22/00 XGB	2/22/00 XGB		

COMMENTS: -1 Dup. % Difference = 1.46%

$$\frac{(\text{Wet Wt.- Beaker Wt.}) - (\text{Dry Wt. - Beaker Wt.})}{(\text{Wet Wt. -Beaker Wt.})} \times 100 = \%\ \text{moisture}$$

* calculated % moisture of control used in assay starting 3/16/00. Other % moistures re-calculat.

AR100542

CLIENT: Roy F. Weston
ESI #: 8505

REQUIRED SOIL HYDRATION

Hydration Water To Be Added (mL/100g) = THW_{ts} - $\%M_{ts}$

THW_{ts} = PHYD * WHC_{ts}

THW_{ts}	=	Total Soil Hydration Water Desired in mL/100g
PHYD	=	Proportion of Hydration Required (0.75)
WHC_{ts}	=	Water Holding Capacity of the Test Soil in mL/100g
$\%M_{ts}$	=	%Moisture of the Test Soil (% Moisture)

SAMPLE I.D.	PHYD	WHC_{ts} (mL/100g)	THW_{ts}	$\%M_{ts}$	Water To Be Added: THW_{ts} - $\%M_{ts}$ (mL/100g)
Control	0.75	60.6	45.45	1.95	43.50
-1	0.75	2/24/00 ~~57.7~~ 56.5	42.38	30.47	11.91
-2	0.75	52.0	39.00	23.26	15.74
-3	0.75	40.5	30.38	26.03	4.35 Do Not Adjust.
-4	0.75	47.0	35.25	22.44	12.81
-5	0.75	60.0	45.00	20.34	24.66
Date + Initials	0.75	2/22/00	2/22/00	31.37	

NOTES: 2/22/00 all Dup. Results were Averaged since different samples were used for Dup. in ~~sample~~ individual tests. 2/24/00

If <10 no Adjustment Needed.

LABORATORY SAMPLE RECEIVING LOG

1. ESI Sample Number 8505 -1

2. Sponsor Name and Address Roy F. Weston Inc. (RFW)
   5 Underwood Court
   Delran, New Jersey 08075-1229

3. Sponsor Sample Identification According to Chain of Custody "TS-SS-34"

4. Sample Container Label Data 2/14/00 1110

5. Data Received 2/15/00 6. Time Received 0930

7. Method of Shipment/ Pick Up From RFW
   Via Fed. Ex

8. Description of Shipping / Packing Containers(s) 1 5gal plastic bucket
   (Number, Type, Size)

9. Description of Sample Container(s) same as above.
   (Number, Type, Size)

10. Sample Storage Location and Required Storage Conditions Refrigerator "F"
    Locked, 4°C & Dark

11. Signature L. Hawkes Date 2/15/00

12. Notes

13. Date and Description of Final Sample Removal / Disposal

LABORATORY SAMPLE RECEIVING LOG

1. ESI Sample Number 8505 -2

2. Sponsor Name and Address Roy F. Weston Inc. (RFW)

   5 Underwood Court

   Delran, New Jersey 08075-1229

3. Sponsor Sample Identification According to Chain of Custody "TS-SS-35"

4. Sample Container Label Data 2/14/00 1120

5. Data Received 2/15/00 6. Time Received 0930

7. Method of Shipment/ Pick Up From RFW

   Via Fed. Ex.

8. Description of Shipping / Packing Containers(s) 5gal plastic bucket (1)
   (Number, Type, Size)

9. Description of Sample Container(s) same as above
   (Number, Type, Size)

10. Sample Storage Location and Required Storage Conditions Refrigerator "F"

    Locked, 4°C & Dark

11. Signature Lisa Hauke Date 02/15/00

12. Notes

13. Date and Description of Final Sample Removal / Disposal

CLIENT: Roy F. Weston
ESI #: 8505
DATE: 2/15/00
INITIALS: XRB

pH MEASUREMENTS

SAMPLE ID	Beaker ID	pH VALUES In SU at START
CONTROL - Artificial Soil	218	4.76
-1	26	7.87
-2	81	7.90
-3	92	7.93
-4	24	7.63
-5	60	3.83
-5 Duplicate	61	3.82

NOTES: -5 Needs to be Brought up to 4 pH.
-5 : pH 4.01 meter SC probe 21 2/29/00 XRB.

AR100546

LABORATORY SAMPLE RECEIVING LOG

1. ESI Sample Number 8505-3

2. Sponsor Name and Address Roy F. Weston Inc. (RFW)
   5 Underwood Court
   Delran, New Jersey 08075-1229

3. Sponsor Sample Identification According to Chain of Custody "TS-SS-36"

4. Sample Container Label Data 2/4/00 1130

5. Data Received 2/15/00 6. Time Received 0930

7. Method of Shipment/ Pick Up From RFW
   Via Fed. Ex.

8. Description of Shipping / Packing Containers(s) 1- 5gal plastic bucket
   (Number, Type, Size)

9. Description of Sample Container(s) same as above
   (Number, Type, Size)

10. Sample Storage Location and Required Storage Conditions Refrigerator "F"
    Locked, 4°C & Dark

11. Signature L. Hurley Date 2/15/00

12. Notes

13. Date and Description of Final Sample Removal / Disposal

LABORATORY SAMPLE RECEIVING LOG

1. ESI Sample Number 8505-4

2. Sponsor Name and Address Roy F. Weston Inc. (RFW)
   5 Underwood Court
   Delran, New Jersey 08075-1229

3. Sponsor Sample Identification According to Chain of Custody "TS-SS-37"

4. Sample Container Label Data 2/14/00 1200

5. Data Received 2/15/00 6. Time Received 0930

7. Method of Shipment/ Pick Up From RFW
   Via Fed Ex.

8. Description of Shipping / Packing Containers(s) 1- 5 gal plastic bucket
   (Number, Type, Size)

9. Description of Sample Container(s) same as above
   (Number, Type, Size)

10. Sample Storage Location and Required Storage Conditions Refrigerator "F"
    Locked, 4°C & Dark

11. Signature [illegible] Date 2/15/00

12. Notes

13. Date and Description of Final Sample Removal / Disposal

LABORATORY SAMPLE RECEIVING LOG

1. ESI Sample Number 8505 -5
2. Sponsor Name and Address Roy F. Weston Inc. (RFW)
   5 Underwood Court
   Delran, New Jersey 08075-1229
3. Sponsor Sample Identification According to Chain of Custody "TS-BG-04"
4. Sample Container Label Data 2/14/00 1145
5. Data Received 2/15/00 6. Time Received 0930
7. Method of Shipment/ Pick Up From RFW
   Via Fed. Ex
8. Description of Shipping / Packing Containers(s) 5gal plastic bucket -1
   (Number, Type, Size)
9. Description of Sample Container(s) same as above
   (Number, Type, Size)
10. Sample Storage Location and Required Storage Conditions Refrigerator "F"
    Locked, 4°C & Dark
11. Signature [signature] Date 2/15/00
12. Notes
13. Date and Description of Final Sample Removal / Disposal

ENVIRONME[illegible]L PR[illegible]TECTION AGENCY
Office of Enforcement

REGIO[illegible]
841 Chestnut St.
Philadelphia, Pennsylvania 19107

CHAIN OF CUSTODY RECORD

PROJ. NO. 6187

PROJECT NAME 0002-L01

[redacted] (b) (4)

STA. NO.	DATE (2000)	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	14-DAY ACUTE TEST on Earthworms							REMARKS	
SS-34	2/14	1110		✓	TS-SS-34	1	1							ASTM E-1676-97	-1
SS-35	2/14	1120		✓	TS-SS-35	1	1								-2
SS-36	2/14	1130		✓	TS-SS-36	1	1								-3
BG-04	2/14	1145		✓	TS-BG-04	1	1								-5
SS-37	2/14	1200		✓	TS-SS-37	1	1								-4

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[redacted] (b) (4)	2/14/00 1530	[redacted] (b) (4)			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
				FedEx 8183 6601 1301	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

AR100550

ATTACHMENT 3
ANALYTICAL SUMMARY

Industrial Soil - U.S. EPA CLP
Inorganic Analysis Data Sheet

Site Name: 12th STREET LANDFILL

Sample ID: TS-SS-34

All units in mg/kg

CAS#	Compound	Results	Q	T	RBC	ERG	RBC Exceedance	ERG Exceedance
7429905	Aluminum	13900		N	200000	20000000	No	No
7440360	Antimony	2	L	N	82	8200	No	No
7440382	Arsenic	73.9		C	3.8	380	Yes	No
7440393	Barium	172		N	14000	1400000	No	No
7440417	Beryllium	0.68	B	N	410	41000	No	No
7440439	Cadmium	4		N	100	10000	No	No
7440702	Calcium	9700		E	NA	NA	No	No
7440473	Chromium	298		N	613.2	61320	No	No
7440484	Cobalt	62.3		N	12000	1200000	No	No
7440508	Copper	2990	J	N	8200	820000	No	No
7439896	Iron	61700		N	61000	6100000	Yes	No
7439921	Lead	7,350	J	C	400	NL	Yes	No
7439954	Magnesium	4320		E	NA	NA	No	No
7439965	Manganese	498	L	N	4088	408800	No	No
7439976	Mercury[1]	0.18		N	61	6100	No	No
7440020	Nickel	71.6	J	N	4100	410000	No	No
7440097	Potassium	1700	J	E	NA	NA	No	No
7782492	Selenium	9.6	J	N	1000	100000	No	No
7440224	Silver	1.1	B	N	1000	100000	No	No
7440235	Sodium	65.8	B	E	NA	NA	No	No
7440280	Thallium	11.3		N	14	1400	No	No
7440622	Vanadium	43.2		N	1400	140000	No	No
7440666	Zinc	1,800		N	61000	6100000	No	No
74908	Cyanide			N	4088	408800	No	No

Note: RBCs are based on a cancer risk of 10^{-6} and a hazard quotient of 0.1 and are taken from the 12 April 1999 RBC table.

ERGs are based on a cancer risk of 10^{-4} and a hazard quotient of 10.

Cancer risk applies to carcinogens and hazard quotient applies to non-carcinogens.

[1] The mercury RBC and ERG are taken from the October 1997 RBC table since the 12 April 1999 table does not provide values.

Industrial Soil - U.S. EPA CLP
Inorganic Analysis Data Sheet

Site Name: 12th STREET LANDFILL

Sample ID: TS-SS-35

All units in mg/kg

CAS#	Compound	Results	Q	T	RBC	ERG	RBC Exceedance	ERG Exceedance
7429905	Aluminum	12400		N	200000	20000000	No	No
7440360	Antimony	2.8	L	N	82	8200	No	No
7440382	Arsenic	114		C	3.8	380	Yes	No
7440393	Barium	279		N	14000	1400000	No	No
7440417	Beryllium	0.5	B	N	410	41000	No	No
7440439	Cadmium	6.3		N	100	10000	No	No
7440702	Calcium	13100		E	NA	NA	No	No
7440473	Chromium	289		N	613.2	61320	No	No
7440484	Cobalt	72.1		N	12000	1200000	No	No
7440508	Copper	405	J	N	8200	820000	No	No
7439896	Iron	75000		N	61000	6100000	Yes	No
7439921	Lead	13,400	J	C	400	NL	Yes	No
7439954	Magnesium	3350		E	NA	NA	No	No
7439965	Manganese	464	L	N	4088	408800	No	No
7439976	Mercury[1]	0.41		N	61	6100	No	No
7440020	Nickel	89.9	J	N	4100	410000	No	No
7440097	Potassium	1140	J	E	NA	NA	No	No
7782492	Selenium	6.1	J	N	1000	100000	No	No
7440224	Silver	1.7	B	N	1000	100000	No	No
7440235	Sodium	38.4	U	E	NA	NA	No	No
7440280	Thallium	13.1		N	14	1400	No	No
7440622	Vanadium	38.1		N	1400	140000	No	No
7440666	Zinc	3,490		N	61000	6100000	No	No
74908	Cyanide			N	4088	408800	No	No

Note: RBCs are based on a cancer risk of 10^{-6} and a hazard quotient of 0.1 and are taken from the 12 April 1999 RBC table.

ERGs are based on a cancer risk of 10^{-4} and a hazard quotient of 10.

Cancer risk applies to carcinogens and hazard quotient applies to non-carcinogens.

[1] The mercury RBC and ERG are taken from the October 1997 RBC table since the 12 April 1999 table does not provide values.

Industrial Soil - U.S. EPA CLP
Inorganic Analysis Data Sheet

Site Name: 12th STREET LANDFILL

Sample ID: TS-SS-36

All units in mg/kg

CAS#	Compound	Results	Q	T	RBC	ERG	RBC Exceedance	ERG Exceedance
7429905	Aluminum	10100		N	200000	20000000	No	No
7440360	Antimony	4.2	L	N	82	8200	No	No
7440382	Arsenic	18.9		C	3.8	380	Yes	No
7440393	Barium	150		N	14000	1400000	No	No
7440417	Beryllium	0.22	B	N	410	41000	No	No
7440439	Cadmium	2.9		N	100	10000	No	No
7440702	Calcium	10200		E	NA	NA	No	No
7440473	Chromium	121		N	613.2	61320	No	No
7440484	Cobalt	8.7	B	N	12000	1200000	No	No
7440508	Copper	1080	J	N	8200	820000	No	No
7439896	Iron	42100		N	61000	6100000	No	No
7439921	Lead	22.600	J	C	400	NL	Yes	No
7439954	Magnesium	2710		E	NA	NA	No	No
7439965	Manganese	561	L	N	4088	408800	No	No
7439976	Mercury[1]	0.12	K	N	61	6100	No	No
7440020	Nickel	83.6	J	N	4100	410000	No	No
7440097	Potassium	496	J	E	NA	NA	No	No
7782492	Selenium	0.58	R	N	1000	100000	No	No
7440224	Silver	0.41	B	N	1000	100000	No	No
7440235	Sodium	548	B	E	NA	NA	No	No
7440280	Thallium	8		N	14	1400	No	No
7440622	Vanadium	21.7		N	1400	140000	No	No
7440666	Zinc	1,730		N	61000	6100000	No	No
74908	Cyanide			N	4088	408800	No	No

Note: RBCs are based on a cancer risk of 10^{-6} and a hazard quotient of 0.1 and are taken from the 12 April 1999 RBC table.

ERGs are based on a cancer risk of 10^{-4} and a hazard quotient of 10.

Cancer risk applies to carcinogens and hazard quotient applies to non-carcinogens.

[1] The mercury RBC and ERG are taken from the October 1997 RBC table since the 12 April 1999 table does not provide values.

Industrial Soil - U.S. EPA CLP
Inorganic Analysis Data Sheet

Site Name: 12th STREET LANDFILL

Sample ID: TS-SS-37

All units in mg/kg

CAS#	Compound	Results	Q	T	RBC	ERG	RBC Exceedance	ERG Exceedance
7429905	Aluminum	5830		N	200000	20000000	No	No
7440360	Antimony	0.71	L	N	82	8200	No	No
7440382	Arsenic	17.4		C	3.8	380	Yes	No
7440393	Barium	98		N	14000	1400000	No	No
7440417	Beryllium	0.43	B	N	410	41000	No	No
7440439	Cadmium	1	B	N	100	10000	No	No
7440702	Calcium	1990		E	NA	NA	No	No
7440473	Chromium	45.4		N	613.2	61320	No	No
7440484	Cobalt	16.8		N	12000	1200000	No	No
7440508	Copper	60.4	J	N	8200	820000	No	No
7439896	Iron	22100		N	61000	6100000	No	No
7439921	Lead	566	J	C	400	NL	Yes	No
7439954	Magnesium	1870		E	NA	NA	No	No
7439965	Manganese	185	L	N	4088	408800	No	No
7439976	Mercury[1]	0.09	K	N	61	6100	No	No
7440020	Nickel	15.6	J	N	4100	410000	No	No
7440097	Potassium	725	J	E	NA	NA	No	No
7782492	Selenium	1.4	J	N	1000	100000	No	No
7440224	Silver	0.17	B	N	1000	100000	No	No
7440235	Sodium	36.6	U	E	NA	NA	No	No
7440280	Thallium	4.6		N	14	1400	No	No
7440622	Vanadium	25.3		N	1400	140000	No	No
7440666	Zinc	551		N	61000	6100000	No	No
74908	Cyanide			N	4088	408800	No	No

Note: RBCs are based on a cancer risk of 10^{-6} and a hazard quotient of 0.1 and are taken from the 12 April 1999 RBC table.

ERGs are based on a cancer risk of 10^{-4} and a hazard quotient of 10.

Cancer risk applies to carcinogens and hazard quotient applies to non-carcinogens.

[1] The mercury RBC and ERG are taken from the October 1997 RBC table since the 12 April 1999 table does not provide values.

Industrial Soil - U.S. EPA CLP
Inorganic Analysis Data Sheet

Site Name: 12th STREET LANDFILL

Sample ID: TS-BG-04

All units in mg/kg

CAS#	Compound	Results	Q	T	RBC	ERG	RBC Exceedance	ERG Exceedance
7429905	Aluminum	13500		N	200000	20000000	No	No
7440360	Antimony		UL	N	82	8200	No	No
7440382	Arsenic	13.8		C	3.8	380	Yes	No
7440393	Barium	73.2		N	14000	1400000	No	No
7440417	Beryllium	0.61	B	N	410	41000	No	No
7440439	Cadmium	0.44	B	N	100	10000	No	No
7440702	Calcium	1120	B	E	NA	NA	No	No
7440473	Chromium	49.6		N	613.2	61320	No	No
7440484	Cobalt	6.1	B	N	12000	1200000	No	No
7440508	Copper	28.7	J	N	8200	820000	No	No
7439896	Iron	23000		N	61000	6100000	No	No
7439921	Lead	29.2	J	C	400	NL	No	No
7439954	Magnesium	3770		E	NA	NA	No	No
7439965	Manganese	179	L	N	4088	408800	No	No
7439976	Mercury[1]	2		N	61	6100	No	No
7440020	Nickel	15.7	J	N	4100	410000	No	No
7440097	Potassium	1590	J	E	NA	NA	No	No
7782492	Selenium		R	N	1000	100000	No	No
7440224	Silver		U	N	1000	100000	No	No
7440235	Sodium	112	B	E	NA	NA	No	No
7440280	Thallium	4.7		N	14	1400	No	No
7440622	Vanadium	35.3		N	1400	140000	No	No
7440666	Zinc	109		N	61000	6100000	No	No
74908	Cyanide			N	4088	408800	No	No

Note: RBCs are based on a cancer risk of 10^{-6} and a hazard quotient of 0.1 and are taken from the 12 April 1999 RBC table.

ERGs are based on a cancer risk of 10^{-4} and a hazard quotient of 10.

Cancer risk applies to carcinogens and hazard quotient applies to non-carcinogens.

[1] The mercury RBC and ERG are taken from the October 1997 RBC table since the 12 April 1999 table does not provide values.