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NSWC CRANE
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DEPARTMENT OF THE NAVY
CRANE DIVISION
NAVAL SURFACE WARFARE CENTER
300 HIGHWAY 361
CRANE INDIANA 47522-5001

5-1-2002

IN REPLY REFER TO.

5090
Ser 095/2157
09 MAY 2002

U.S. Environmental Protection Agency, Region V
Waste, Pesticides, & Toxics Division
Waste Management Branch
Corrective Action Section
Attn: Mr. Peter Ramanauskas (DW-8J)
77 West Jackson Blvd.
Chicago, IL 60604

Dear Mr. Ramanauskas:

Crane Division, Naval Surface Warfare Center (NSWC Crane) submits for review and approval the Draft Toxicity Report for Rockeye Munitions Facility Revision 0. Three copies of the report are provided as enclosure (1). Enclosure (2) is the required certification statement.

NSWC Crane point of contact is Ms. Christine D. Freeman, Code 09511, telephone 812-854-4423.

Sincerely,

James M. Hunsicker

JAMES M. HUNSICKER
Director Environmental Protection
Department
By Direction
of The Commander

Encls:
(1) Draft RKI Toxicity Report Rev. 0
(2) Certification Statement

Copy to:
Administrative Record
IDEM (D. Griffin)
SOUTHNAVFACENGCOM (Code ES32)
TolTest Odon (w/o Encls)

Toxicity Report for
Rockeye Munitions Facility SWMU 10/15

Full-Scale Bioremediation
NSWC Crane
Crane, Indiana

Revision 0

May 2002

Southern Division
Naval Facilities Engineering
Command
North Charleston, South Carolina
29419-9010

TOLTEST, INC.

TOXICITY REPORT
For
ROCKEYE MUNITIONS FACILITY SWMU 10/15

FULL-SCALE BIOREMEDIATION
NSWC CRANE
CRANE, INDIANA

Revision 0

May 2002

ENVIRONMENTAL JOB ORDER CONTRACT
N68950-96-D-0052
DELIVERY ORDER #FC08
TolTest Job No. 37324.12

Prepared for

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EXECUTIVE SUMMARY

Explosives contaminated soil at Naval Surface Warfare Center Crane, Indiana, is being treated through a composting bioremediation process. While treatment of the soil in this process results in contaminant reduction to industrial use clean-up levels established by the United States Environmental Protection Agency Region V, the toxic effect of the treated soil, or compost, on the environment remains a concern.

Acute toxicity testing was performed on composted soil from Mine Fill A to determine the toxic effects of the composted soil on the environment. The findings were reported in the *Toxicity Report, Full-Scale Bioremediation, NSWC Crane, Crane, Indiana [MK, 1999]*, and concluded that treated contaminated soil compost did not show a greater toxicity than treated non-contaminated soil compost. The *Supplemental Toxicity Sampling – Sampling and Analysis of Composted Material from Mine Fill A and Mine Fill B [MK, 2000]* was developed to determine if there was a reduction in the toxicity of aged compost. Results of this analysis indicated that compost became less toxic as it aged.

This report summarizes the activities for toxicity sampling and analysis for the Rockeye Munitions Facility, Solid Waste Management Unit 10/15. Analyses were performed on Windrow S-204 and a Control Windrow. Environmental effects were evaluated using two toxicity methods: Earthworm and Microtox® Toxicity; two pathogen tests: fecal coliform and salmonella; and two explosive leaching methods: Toxicity Characteristic Leaching Procedure (TCLP) and Synthetic Precipitation Leaching Procedure (SPLP).

The Earthworm Toxicity analysis subjected earthworms, *Eisenia foetida,* to various concentrations of compost to determine the concentration of compost that would result in a 50% mortality of the sample population. Results showed that compost did not become more toxic as it aged.

Microtox® analysis was used to evaluate the toxic effects of the composted soil on the illuminance of the marine bacterium, *Photobacterium phosphoreum.* This organism was subjected to various concentrations of compost to determine the concentration of compost that resulted in a 50% reduction in the illuminance of the bacteria. The results indicated is that the samples from windrow S-204 are no more toxic than the sample from the Control windrow.

Pathogen analyses were performed based on specifications found in 40 CFR 503.32, which stated that sewage sludge could be used in land application if it met established requirements for fecal coliform and salmonella analysis. The compost resulting from full-scale biofacility operations is intended to be used for land application; therefore, these same standards were applied to the compost. The results from all samples met the requirements for use in land application.

TCLP and SPLP were performed to simulate the leachability of explosive compound contamination expected in a sanitary landfill and natural environment, respectively. Composted soil was subjected to fluids that represent the conditions found in a sanitary landfill and natural environment. The extract was then analyzed for explosive compounds by EPA Method 8330.

The results of these tests demonstrated that leaching of explosive compounds would not be likely to occur in a natural or sanitary landfill environment.

Given these results, the composted soil should be considered acceptable for use as a topsoil or backfill for general land application.

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G Windrow S-204 Daily Process Data

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I Explosive Concentration Summary Report for the Control Windrow

J Control Windrow Daily Process Data

ACRONYMS AND ABBREVIATIONS

1,3-DNB	1,3-dinitrobenzene
1,3,5-TNB	1,3,5-trinitrobenzene
2-A-4,6-DT	2-amino-4,6-dinitrotoluene
2-NT	2-nitrotoluene
2,4-DNT	2,4-dinitrotoluene
2,4,6-TNT	2,4,6-trinitrotoluene
2,6-DNT	2,6-dinitrotoluene
3-NT	3-nitrotoluene
4-A-2,6-DT	4-amino-2,6-dinitrotoluene
4-NT	4-nitrotoluene
ASI	Aqua Survey, Inc.
CFR	Code of Federal Regulations
°C	degrees Centigrade
EC	effective concentration
EC-50	50% reduction in the illuminance of the bacteria
EPA	Environmental Protection Agency
FCR	Field Change Request
FS-QAPP	Full-Scale Quality Assurance Project Plan
HDPE	high-density polyethylene
HMX	cyclotetramethylenetetranitramine
KCl	potassium chloride
LC	lethal concentration
LC-50	50% mortality of the sample population
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
µg/kg	microgram per kilogram
MFA	Mine Fill A
MFB	Mine Fill B
mg/L	milligrams per liter
MK	Morrison Knudsen
ml	milliliter
MPN	most probable number
MS	matrix spike
MSD	matrix spike duplicate
NB	nitrobenzene
NSWC	Naval Surface Warfare Center

pH	potential of hydrogen
ppm	parts per million
PE	Pure Earth Environmental Lab, Inc.
PCBs	Polychlorinated biphenyls
QAPP	Quality Assurance Project Plan
QC	quality control
RDX	cyclotrimethylene trinitramine
RKI	Rockeye Munitions Facility
RPD	Relative Percent Difference
STS-SAP	Supplemental Toxicity Sampling –Sampling and Analysis Plan
SOP	Standard Operating Procedure
SPLP	Synthetic Precipitation Leaching Procedures
su	standard unit
SWMU	Solid Waste Management Unit
TCLP	Toxicity Characteristic Leaching Procedures
TNT	Trinitrotoluene
TT	TolTest, Inc
U.S. EPA	U.S. Environmental Protection Agency

1.0 INTRODUCTION

1.1 PURPOSE AND OBJECTIVES

Full-scale operations of the Soils Bioremediation Facility (Biofacility) at the Naval Surface Warfare Center (NSWC) Crane Division in Crane, Indiana began on April 13, 1998. Acute toxicity testing was performed by Morrison Knudsen, Corp. (MK) on soil from Mine Fill A (MFA) composted in Windrow S-001 to determine the toxic effects of the composted soil on the environment. The findings of this testing were reported in the *Toxicity Report, Full-Scale Bioremediation, NSWC Crane, Crane, Indiana [MK 1999].* Although this toxicity testing verified that treated contaminated soil compost did not show a greater toxicity than treated non-contaminated soil compost, the testing program was not designed to evaluate the effects of toxicity on aged compost.

Consequently, the *Supplemental Toxicity Sampling – Sampling and Analysis Plan of Composted Material from Mine Fill A and Mine Fill B [MK, 2000]* (STS-SAP) was developed to determine if there was a reduction in the toxicity of the treated compost over time. Sampling of the aged compost was completed by TolTest, Inc, (TT) in November of 2000, and results were reported in the *Supplemental Toxicity Report [TT, 2002].* Results of this analysis indicated that compost became less toxic as it aged.

This report summarizes the activities for toxicity sampling and analysis for the Rockeye Munitions Facility (RKI), Solid Waste Management Unit (SWMU) 10/15. Analysis for toxicity was performed on Windrow S-204 and a Control Windrow. The toxic effects were studied using two toxicity methods: Earthworm and Microtox® Toxicity; two pathogen tests: fecal coliform and salmonella; and two explosive leaching methods: Toxicity Characteristic Leaching Procedure (TCLP) and Synthetic Precipitation Leaching Procedure (SPLP).

Details of the earthworm and Microtox® test procedures for Windrow S-204 can be found in the Microtox® and Earthworm Toxicity reports from Aqua Survey, Inc. (ASI), provided in Appendix A (ASI Study #21-290). Details of the earthworm and Microtox® test procedures for the Control Windrow can be found in Appendix B (ASI Study #21-403). Pathogen test results from Pure Earth Environmental Labs, Inc. (PE) for Windrow S-204 and the Control Windrow are provided in Appendix C and D, respectively. Explosives leachability test results for TCLP and SPLP can be found in Appendix E.

1.1.1 Earthworm Toxicity

The objective of the earthworm toxicity testing was to assess the acute toxicity of the composted soil on earthworms. For this test, the lethal concentration (LC) of compost was estimated to determine the concentration of compost that caused 50% mortality of earthworms. This lethal concentration, referred to as the LC-50, was averaged for the five samples collected from Windrow S-204 and compared to the LC-50 of the Control Windrow.

1.1.2 Microtox® Analysis

The objective of the Microtox® toxicity testing was to assess the acute toxicity of the composted soil on the marine bacterium *Photobacterium phosphoreum*. For this test, the effective concentration (EC) of compost was estimated to determine the concentration of compost that caused a 50% decrease in the illuminance of the test organisms. This effective concentration, referred to as the EC-50, was averaged for the five samples collected from Windrow S-204 and compared to the EC-50 of the Control Windrow. EC-50 values for the treated soil compost (i.e. windrow S-204) should be greater than the EC-50 values of the uncontaminated soil (i.e. the Control windrow) to demonstrate acceptable toxicity levels for the Microtox® analysis.

1.1.3 Pathogen Testing and Analysis

The objectives for pathogen testing were based on specifications found in 40 CFR 503.32, which pertained to the use or disposal of sewage sludge. These specifications state that sewage sludge may be used for land application if the sludge contained less than the regulated amounts of fecal coliform and salmonella. The composted soil has been returned to the land; therefore these same standards have been applied to the compost. Objectives for the density of fecal coliform in the compost were less than 1000 Most Probable Number (MPN) per gram of dry solids on a dry weight basis, and salmonella was less than three MPN per four grams of dry solids on a dry weight basis.

1.1.4 Explosive Leaching Analysis

The objective of the explosive leaching analysis was to demonstrate the leachability of explosive compound contamination to the ground, and was based on procedures found in EPA Method 8330. In both the TCLP and SPLP, composted soil from the last day of processing was extracted with a specific fluid representing the conditions that would be encountered in a sanitary landfill and a natural environment, respectively. Following a specified rotation schedule, the liquid phase was removed through a filter, and then the extract was analyzed for explosives.

1.2 WINDROW CONSTRUCTION

Windrow M-203 was the first full-scale windrow to be formed with soil from RKI and was formed on 5/30/01. Windrow S-204 was constructed on 5/31/01 and Windrow M-205 was constructed on 6/7/01. Windrows 206, 207, and 208, the remaining RKI windrows, were not constructed until mid July. Results of Day Zero samples from windrows 203, 204, and 205 indicated that Windrow S-204 had the highest initial level of explosive contamination than did the other two

windrows. Thus Windrow S-204 was selected as the windrow to be sampled for toxicity testing. The Explosive Concentration Summary Report for Windrow S-204 (Day Zero and Day 25 sample results including percent reduction for each compound) is provided in Appendix F. The Daily Process Data for Windrow S-204 is included in Appendix G.

The first windrow for RKI toxicity testing was constructed on June 11, 2001 with borrow source soil obtained from immediately south of the Biofacility. The windrow was formed before characterization analysis of the borrow source soil was received. Analytical results of the soil received on June 29, 2001 revealed that it contained PCBs and was thus unacceptable for use in the Control windrow. Processing and monitoring of this windrow was stopped and the windrow was eventually used as backfill at MFB.

Another borrow source for soil to be used in a Control windrow, this one from within the RKI compound, was sampled on July 12, 2001. Analytical results indicated the soil was not contaminated and it was subsequently excavated for use in the new Control windrow.

The new Control Windrow for RKI toxicity testing was constructed on 8/10/01 and was processed for 25 days, the same number of days that Windrow S-204 was processed. Soil for this windrow was obtained from within RKI. The analytical data for this Borrow Source soil is provided in Appendix H. The Explosive Concentration Summary Report for the Control Window (Day 25) is provided in Appendix I. The Daily Process Data for the Control Windrow is included in Appendix J.

1.3 SAMPLE COLLECTION

For this study, as specified in Section 3.0 Appendix G of the Full-Scale Operations Plan for Soils Bioremediation Facility, five composite samples (one for each of the five cross sections 3, 5, 7, 9, and 11) were collected from Windrow S-204 and one composite sample was collected from the Control Windrow. The composite sample consisted of one sub-sample from each of the three sample points per cross section. All samples were collected on the last day of processing (Day 25).

Samples for Microtox®, pathogens and explosive leaching analyses were contained in 8 ounce glass jars. Samples for earthworm toxicity were contained in 3.5 gallon high density polyethylene (HDPE) pails lined with two plastic bags. All samples were shipped to the appropriate off-site lab in shipping coolers filled with ice.

2.0 EARTHWORM TOXICITY

2.1 TEST METHOD DESCRIPTION

Earthworm Toxicity analysis was performed at ASI using the test organism, *Eisenia foetida,* supplied by Carolina Biological Supply Company. The laboratory standard operating procedure (SOP) followed in performing this analysis is included in the *Full Scale Quality Assurance Project Plan [MK, 1998]* (FS-QAPP), Appendix G, page A-4. Adult earthworms, which were greater than 60 days of age, were received at the laboratory, in a healthy condition, by overnight delivery from the supplier. During the seven day acclimation period, the earthworms were maintained by the laboratory in artificial soil consisting of a mixture of sphagnum moss, clay and silica sand. The earthworm environment was kept at a temperature of 20 $\pm$ 2 degrees Centigrade (°C), during which time the earthworms were fed with Magic Worm Food® prior to use in this analysis. Feedings were documented on ASI's culture laboratory livestock record.

After the seven day acclimation period, the earthworms were exposed to five concentrations of the compost mix: 6.25%, 12.5%, 25%, 50%, and 100%. The varying concentrations of compost were prepared using a grinder to homogenize the appropriate quantity of compost with artificial soil from the laboratory. Artificial soil was prepared from a homogenous mixture of 10% sphagnum peat, 20% colloidal kaolinite clay, and 70% grade 70 silica sand. Prior to initializing the test, the water holding capacity of the compost was determined and the test media was hydrated with deionized water to 75% of its water holding capacity.

For each exposure concentration, three testing vessels, each containing 200 grams of compost and artificial soil, were prepared (total of 15 test vessels). Ten earthworms were placed in each testing vessel by sequential randomization where no more than two earthworms were added into each vessel at a time. Each vessel consisted of a clean one-liter canning jar with a screw top lid with 1/16-inch diameter holes in the top for air. The test was conducted under continuous illumination at a temperature of 20 ± 2°C. The earthworms were exposed to the compost for 14 days in order to permit a more accurate and complete assessment of the environmental impact of the compost. The earthworms were evaluated at 7-day and 14-day intervals from project initiation. The earthworms were not fed during the duration of the analysis.

2.2 TEST RESULTS

The ASI report is provided in Appendix A for Windrow S-204 and Appendix B by for the Control Windrow. Each test vessel was analyzed separately at 7-day and 14-day intervals. The three replicates from a single concentration were added together to determine a live count for the thirty worms that initially were subjected to the concentration. Then, using the five concentrations for a particular sample, the LC-50 was calculated for each sample. The results of the earthworm toxicity analysis on Windrow S-204 and the Control Windrow are summarized in Table 2-1. The values reported represent the concentration of compost that resulted in the mortality of 50% of the earthworms. The results of the five samples collected from Windrow S-204 have been averaged to provide a representative value for the windrow.

In addition to the compost sample vessels, a positive control and a negative control was analyzed to demonstrate that the earthworms for this test reacted similar to other earthworms. The positive control utilized potassium chloride (KCl) as a reference toxicant. The LC-50 for KCl was 7,071.0 parts per million (ppm) on Day 7 and 6,622.0 ppm on Day 14, which was comparable to the published guideline of 6,340 milligrams per liter (mg/L). Mean survival of the negative control was 97% for Windrow S-204 and 100% for the Control Windrow, which equated to a mortality rate that was less than the 10% mortality rate permitted by the method.

Table 2-1
Earthworm Toxicity Results (%)

Sample ID	S204-3	S204-5	S204-7	S204-9	S204-11	S204 Average	Control
7 Day LC50	70.7	64.5	70.7	69.1	67.5	68.5	69.1
14 Day LC50	70.7	61.6	67.9	64.5	60.2	65.0	58.8

2.3 DATA QUALITY CONTROL

All data from the earthworm toxicity analysis was verified, and at least 10% of the samples were validated by TT personnel per the procedures outlined in Section 9.0 of the FS-QAPP. Data was compared with field and laboratory quality control (QC) sample data to assess its usability for supporting operational decisions. The results of data verification and validation are presented in this section.

Data associated with the earthworm toxicity was verified by reviewing chain-of-custody forms, sample preservation records, analytical holding times, requested turnaround times, and sample data, in comparison to analytical quality assurance objectives. In addition, at least 10% of the samples were validated by performing a thorough review of the analytical data, utilizing laboratory analytical records, to assess laboratory performance in relation to the QC criteria and procedural requirements. All samples for both Windrow S-204 and the Control Windrow were received by the laboratory in good condition (i.e., there were no broken containers, and custody seals were intact) and at a recorded temperature of 6 - 9°C.

To monitor the conditions in which this analysis took place, the pH of the testing vessels was recorded initially and at the completion of the analysis. The pH of the compost samples ranged from 5.7 to 9.0 standard units (su) for both Windrow S-204 and the Control Windrow. Recommended test conditions for the earthworm ranged from 4 to 10 su. Therefore, these values were considered acceptable for the test organisms and were not likely to have caused any adverse reactions.

The temperature of the testing vessels was monitored daily during analysis. Temperatures did not show fluctuations on any day of analysis. The laboratory recommended test temperature was 20 ± 2°C, with fluctuation not to exceed more than 3°C on any day of analysis. The highest temperature level recorded for Windrow S-204 was 24.0°C, and the lowest was 18.5°C. Although the highest temperature exceeded the target temperatures for this test, it was not

believed to have affected the outcome of the test since the test temperature for this methodology ranges from 20 °C to 29 °C [ASTM, 1995].

The laboratory performed method blank, laboratory control sample (LCS), and replicate analyses to evaluate accuracy and precision. A laboratory method blank was prepared using the artificial soil generated in the laboratory, which was utilized as a dilutant to the compost mixture. This blank was prepared and analyzed with the samples, in order to evaluate potential interference from laboratory sources, as well as to determine if the earthworms met established laboratory criteria. One blank was analyzed for each set of data during this test. These analyses showed 0% mortality of the earthworms in the artificial soil for the Control Windrow, and 3% mortality for Windrow S-204. Both blanks were less than the 10% blank mortality rate defined for this project. Results of the method blanks have been considered acceptable for all analyses.

The LCS sample was prepared in the laboratory and consisted of artificial soil spiked with known amounts of target analytes which were processed through the same preparation as field samples. In this analysis, KCl was used as a reference toxicant. The KCl was utilized as a positive control to evaluate the sensitivity of each batch of organisms. Varying concentrations of KCl contaminated soil were prepared to determine the LC-50 of the KCl contaminated soil. The LC-50 for the KCl was calculated to be 7,071.0 mg/L for the 7-day test period, and 6,622.0 mg/L for the 14-day testing period, for both Windrow S-204 and the Control Windrow. These values represented the concentration of KCl which resulted in 50% mortality of the earthworms and was comparable with the published guideline of 6,340 mg/L. In addition, these results paralleled previous laboratory data and verified that the earthworms reacted at similar sensitivities as other batches of *Eisenia foetida*. The accuracy of this LCS met established acceptance limits for this procedure.

The consistency between the three vessels created for each compost concentration was evaluated to determine the precision of this analysis. A linear correlation should have been seen in the dose responses and the observed mortality for the test samples. This would have been demonstrated by an increased mortality as a higher concentration of compost was utilized in the testing vessels. This correlation was not observed in the sample results. There was actually a very slight increase in survivability in Windrow S-204 and the Control Windrow, as the concentration increased from 6.25% to 12.5%, which was considered insignificant. The survivability then dropped to zero at 100% concentration in both Windrow S-204 and the Control Windrow.

The QC data demonstrated that these analyses exhibited acceptable accuracy and precision when compared to the project's data quality objectives as specified in Appendix G of the FS-QAPP. Acceptable values for both positive and negative controls, as well as consistent values between replicates, demonstrated that project data quality objectives were met for the earthworm analysis. The data quality objectives established for this project were met and have, therefore, been considered usable to support project decisions.

2.4 SUMMARY

The data presented in Table 2-1 suggests that the toxic effect of the compost from Windrow S-204 upon the test organism did not change as it aged. The Relative Percent Difference (RPD) between the Day 7 and Day 14 samples was only 5.2. However, the compost from the Control Windrow appeared to elicit a slightly more toxic effect on the test organisms as it aged (RPD of 16.2). This difference in toxicity could have been attributed to several factors: 1) the possibility that there was a lower concentration of chicken manure in the compost from Windrow S-204 than the Control Windrow that could have produced a lower toxic effect due to lower levels of excess nitrogen; 2) the presence of cyclotrimethylene trinitramine (RDX) in the Control Windrow sample may have had an effect on toxicity (RDX was detected at 1.23 ppm, possibly caused by cross-contamination from the SCARAB windrow turner).

3.0 MICROTOX® ANALYSIS

3.1 TEST METHOD DESCRIPTION

ASI performed Microtox® Toxicity analysis by exposing the marine bacterium *Photobacterium phosphoreum* to various concentrations of elutriate from compost for 5 and 15 minutes, according to the SOP in the FS-QAPP, Appendix G, page A-11.

The elutriate was prepared by adding 50 grams dry weight of compost to 500 milliliter (ml) of deionized water. This mixture was agitated in the dark for 48 hours at 20± 2°C. After agitation, the suspension was centrifuged and the elutriate fraction was decanted and used to prepare the test solutions.

Test organisms were obtained from Azur Environmental in freeze dried cultures. Prior to the analysis, the organisms were reconstituted and maintained in a reagent well at a temperature of 5°C for a period of less than two hours. Volumes of organisms were transferred to test cuvettes and acclimated to Microtox® diluents at the test temperature of 15°C for 15 minutes prior to test initiation. The test began as the organisms were introduced to method blanks and four elutriate test concentrations of 5.63%, 11.25%, 22.5%, and 45.0%. Observations of light output for each sample were made five and fifteen minutes after test initiation using a Model 500 Microtox® Unit.

3.2 TEST RESULTS

The results of the Microtox® Toxicity Analysis are summarized in Table 3-1. The ASI report is provided in Appendix A for Windrow S-204 and Appendix B by for the Control Windrow. The values reported represented the effective concentration of compost which resulted in a 50% reduction in the light output (EC50) of the marine bacterium *Photobacterium phosphoreum*. Results of the five samples collected from Windrow S-204 (S204-3, S204-5, S204-7, S204-9, and S204-11) have been averaged to provide a representative sample for the windrow. The results of the control windrow have been provided for comparison.

Table 3-1
Microtox® Results (%)

Sample ID	S204-3	S204-5	S204-7	S204-9	S204-11	S204 Average	Control
5 Min. EC50	68.28	67.02	50.02	61.75	72.76	63.97	>45.0
15 Min. EC50	75.44	64.29	48.62	58.96	70.81	63.62	>45.0

3.3 DATA QUALITY CONTROL

All data from the Microtox® Toxicity Analysis were verified and at least 10% of the samples were validated by TT personnel per the procedures outlined in Section 9.0 of the FS-QAPP. All data was compared with field and laboratory QC sample data in order to assess its usability for supporting operational decisions. The results of data verification and validation are presented in this section.

Data associated with the Microtox® analysis were verified by reviewing chain-of-custody forms, sample preservation records, analytical holding times, requested turnaround times, and sample data in comparison to analytical quality assurance objectives. In addition, at least 10% of the samples were validated by performing a thorough review of the analytical data utilizing laboratory analytical records to assess laboratory performance in relation to the quality control criteria and procedural requirements. All samples were received by the laboratory in good condition (i.e., there were no broken containers, and custody seals were intact) and at a recorded temperature of between 6° to 9°C. This temperature would not have adversely affected either the Microtox analysis since it was performed at 20°C.

Laboratory method blanks consisting of dilutant water were analyzed with each sample. Blank ratios were calculated by dividing the initial blank reading by the blank reading at the appropriate time interval. Blank ratios for the 5-minute interval ranged from 1.00 to 1.44. Blank ratios for the 15-minute interval ranged from 1.02 to 1.57. These values demonstrated consistent readings between analyses and also met method criteria for blank ratios, which were required to be greater than 0.75.

The laboratory reported an approximated value of greater than 45% for the Control Windrow since there was an insignificant dose response to provide an actual number. All five samples from Windrow S-204 exhibited a dose response for both the 5-minute and 15-minute analyses, therefore actual results were reported. The color of the elutriate for both Windrow S-204 and the Control Windrow was so dark that a color correction was performed for the calculation of an EC-50, as reported in the laboratory QC narrative.

The QC performed for the Microtox® analysis has met method requirements for completion and acceptable precision for this analysis. The data met the quality objectives established in Appendix G of the FS-QAPP for this project and are therefore considered usable to support project decisions.

3.4 SUMMARY

Federal guidelines have not been established for evaluating EC-50 values. Since the results for the Control windrow are an estimate, the only conclusion that can be drawn is that the samples from windrow S-204 are no more toxic to this marine bacterium than the sample from the Control windrow.

4.0 PATHOGEN TESTING AND ANALYSIS

4.1 TEST METHOD DESCRIPTION

4.1.1 Salmonella Analysis

Salmonella analysis was performed according to the Pure Earth Environmental Laboratory, Incorporated (PE) SOP in Appendix G of the FS-QAPP. Each sample was prepared with three dilution series and each dilution consisted of a series of five replicate tubes, for a total of 15 tubes per sample. Tubes were incubated for 24 hours in a water bath at 35°C after which time they were examined for turbidity and/or gas production which would indicate a positive result for salmonella.

4.1.2 Fecal Coliform Analysis

Fecal Coliform analysis was performed according to the PE SOP, located in Appendix G of the FS-QAPP. Four dilutions were performed and a series of five replicate tubes were prepared for each dilution, for a total of 20 tubes per sample. Tubes were incubated for 24 hours in a water bath at 44.5°C after which time they were examined for turbidity and/or gas production which would indicate a positive result for fecal coliform.

4.2 TEST RESULTS

The analytical results from PE are included in Appendix C for Windrow S-204 and Appendix D for the Control Windrow. The results for Windrow S-204 are provided for each of the 5 windrow cross sections sampled. The results for all salmonella sample analyses were less than land disposal objective of three MPN per four grams of solid. The results of the fecal coliform analyses were less than the land disposal objective of 1,000 MPN per gram of dry solid. A summary of these results are shown in Table 4-1.

Table 4-1
Pathogen Testing Results
(MPN per 4 grams Solids)

Sample ID	S204-3	S204-5	S204-7	S204-9	S204-11	Control
Salmonella	<0.097	<0.098	<0.105	<0.099	<0.117	<0.101
Fecal Coliform	<2.418	<2.460	<2.621	<2.463	<2.933	<2.525

4.3 DATA QUALITY CONTROL

All data from the pathogen analysis was verified by TT personnel per the procedures outlined in Section 9.0 of the FS-QAPP. Data was compared with field and laboratory QC sample data in

order to assess its usability for supporting operational decisions. The results of the data verification are presented in this section.

Data associated with the pathogen analysis was verified by reviewing chain-of-custody forms, sample preservation records, analytical holding times, requested turnaround times, and sample data, in comparison to analytical quality assurance objectives. All samples were received by the laboratory in good condition (i.e., there were no broken containers, and custody seals were intact) and at a recorded temperature of 4 ± 2°C.

Other QC testing included the analysis of replicates through the use of a dilution series. All replicates showed no presence of salmonella or fecal coliform, which demonstrated acceptable precision for this analysis. Control blanks for Windrow S-204 were negative, which is an acceptable result. A control blank was not analyzed for the Control Windrow.

4.4 SUMMARY

Pathogen tests were performed to evaluate the compost against "503 Class A" sludge. 40 CFR 503.32 has established standards for pathogenic bacteria in sewage sludge, for both salmonella and fecal coliform, of less than 3 MPN per 4 grams of dry solid, and less than 1,000 MPN per 1 gram of dry solids, respectively. The compost samples obtained for this study have met the established criteria for salmonella and fecal coliform.

5.0 EXPLOSIVE LEACHING ANALYSIS

The results of the explosive leaching analysis are presented in this section. Two tests were preformed by Southwest Laboratories to demonstrate the leachability of explosive compound contamination to the ground: TCLP and SPLP. One sample from the Control Windrow and five samples from Windrow S-204 (one composite from each of the five cross sections) were obtained for analysis on the last day of the windrow's life cycle.

5.1 TEST METHOD DESCRIPTION

5.1.1 Toxicity Characteristic Leaching Procedures

Southwest Laboratories performed TCLP extraction to simulate the leachability of explosive compound contamination expected in a sanitary landfill. A copy of the SOP is provided in Appendix G of the FS-QAPP. In this procedure, the composted soil from the last day of processing was removed with an extraction fluid equal to 20 times the weight of the sample. The fluid was acidic in order to represent the conditions that would be encountered in a sanitary landfill. The sample and extraction fluid was rotated for a period of 18 ± 2 hours in a rotator capable of 30 ± 2 revolutions per minute. Following this rotation schedule, the liquid phase was removed through filtering. This extract was then analyzed for explosives using EPA Method 8330.

5.1.2 Synthetic Precipitation Leaching Procedures

Southwest Laboratories performed SPLP extraction to simulate the leachability of explosive compound contamination expected in a natural environment. A copy of the SOP is provided in Appendix G of the FS-QAPP. This procedure used a comparable volume of compost from the last day of processing and extraction fluid. The fluid used was not as acidic as the TCLP extraction fluid which better represented the conditions that would be encountered in a natural environment. Following the rotation schedule described for TCLP extraction, the liquid phase of the SPLP extraction was also filtered. This extract was analyzed for explosives using EPA Method 8330.

5.2 TEST RESULTS

Analytical results of the TCLP and SPLP extract for explosive compounds were either non-detectable or greater than the Method Detection Limit but below the Reporting Limit for the five samples collected from Windrow S-204, except for HMX. HMX was detected in the cross section three sample from Windrow S-204 at 118 ug/l in the SPLP extract and 128 ug/l in the TCLP extract. TCLP analysis revealed that RDX was detected in the single composite sample from the control windrow at 6.19 ug/l. This result was, however, flagged by the laboratory as an estimate.. Analytical data sheets for Windrow S-204 and the Control Windrow are provided in Appendix E.

5.3 DATA QUALITY CONTROL

Data from the leachability analysis and sampling events were verified and at least 10% of the samples were validated by TT personnel per the procedures outlined in Section 9.0 of the FS-QAPP. Data was compared with field and laboratory QC sample data in order to assess its usability for supporting operational decisions. The results of data verification and validation are presented in this section.

The data was verified by reviewing chain-of-custody forms, sample preservation records, analytical holding times, requested turnaround times, sample data in comparison to QC data, and reporting requirements. In addition, at least 10% of the samples were validated by performing a thorough review of the analytical data. This was completed by utilizing laboratory analytical records to assess laboratory performance in relation to QC criteria, data quality objectives, and procedural requirements. Both sample groups were received by the laboratory in good condition (i.e. there were no broken containers, and custody seals were intact). Windrow S-204 samples were received at a recorded temperature of 2.8°C and the Control Windrow samples were received at a recorded temperature of 1.2°C, which was slightly below the required temperature of 4 ± 2°C. Since the Control Windrow samples were not frozen, the lower temperature should not have affected the sample results.

The laboratory performed method blank, matrix spike (MS), matrix spike duplicate (MSD), surrogate, LCS, and laboratory control sample duplicate (LCSD) analyses to evaluate laboratory accuracy and precision. No rinse blanks or field blanks were obtained since no sampling equipment (besides disposable nitrile gloves) was used to obtain the samples.

Laboratory method blanks were prepared and analyzed with the samples in order to evaluate potential target compounds or interferences from laboratory glassware, reagents, and/or solvents used in the preparation and analysis of samples. Laboratory method blanks did not show the presence of any target analytes above the reporting limits in Windrow S-204 or the Control Windrow samples. Results of the method blanks were acceptable for these analyses.

MS and MSD field samples were spiked with a known amount of target analytes and processed through the preparation and analysis with the field samples. Evaluation of the spike recoveries, and the variability between the MS and MSD, gave an indication of analysis accuracy and precision in the sample matrix. MS/MSD accuracy and precision could have been affected by concentrations of both target and non-target compounds present in the original field sample, as well as the matrix of the sample itself. Recovery results for MS/MSD samples were acceptable for most of the target analytes in both Windrow S-204 and the Control Windrow analyses. MS/MSD samples had low recoveries for Tetryl in the SPLP for the Control Windrow, and the MS sample had low recoveries in the SPLP for Windrow S-204 for Tetryl, Trinitrotoluene (TNT) and 2-Nitrotoluene (2-NT). In each case, the LCS/LCSD recoveries for the same analytes were within the laboratory QC limits. These low MS/MSD recoveries did not create an impasse for the data results, therefore the data was considered usable.

Surrogate spikes contained known amounts of non-target compounds, which were spiked into all samples prior to sample preparation, in order to evaluate the efficiency of the sample

preparation and analysis. Surrogate recoveries were acceptable for both Windrow S-204 and the Control Windrow samples.

The LCS and LCSD samples prepared in the laboratory consisted of clean soil or water spiked with known amounts of target analytes, which were processed through the same preparation as field samples. Evaluation of the spike recoveries and the variability between the LCS and LCSD provided an indication of analysis accuracy and precision in a clean matrix. The LCS and LCSD percent recoveries were within the laboratory QC limits in Windrow S-204 and the Control Windrow samples. Laboratory control spike precision and accuracy results were acceptable for the target analytes for these analyses.

The QC data demonstrated acceptable accuracy and precision when compared to the project's data quality objectives established in Appendix G of the FS-QAPP. The data met the quality objectives and were therefore considered usable to support project decisions.

5.4 SUMMARY

The explosive compound concentrations from the TCLP and SPLP extractions showed no leachability of any SWMU-specific contaminants into the soil. The reporting levels were significantly less than the regulatory limits, where established. These results demonstrated that leaching of explosive compounds would not be likely to occur in a natural or sanitary landfill environment.

6.0 CONCLUSION

Acute toxicity testing was performed on composted soil from RKI SWMU 10/15 to determine the toxic effects of the composted soil on the environment. The results verified that treated contaminated soil compost did not show a greater toxicity than treated non-contaminated soil.

Analysis was performed on Windrow S-204 and a Control Windrow. Environmental effects were evaluated using two toxicity methods: Earthworm and Microtox Toxicity; two pathogen tests: fecal coliform and salmonella; and two explosive leaching methods: TCLP and SPLP.

Results of the Earthworm analysis suggested that the toxic effect of the compost from Windrow S-204 did not become more toxic as it aged. However, the compost from the Control Windrow appeared to elicit a slightly more toxic effect on the test organisms as it aged. No explanation is given for this response.

Since the results of the Microtox® toxicity analysis for the Control Windrow are only an estimate, the only conclusion that can be drawn from the data is that the samples from windrow S-204 are no more toxic than the sample from the Control windrow.

The results of the two pathogen tests met the criteria for land disposal and use of sewage sludge for both fecal coliform and salmonella. Fecal coliform results were less than 1,000 MPN per gram of solid and salmonella results were less than three MPN per four grams of solid for all samples.

The results of the TCLP and SPLP analysis showed insignificant or no leachability of any of the explosive compounds into the soil. HMX was the only explosive compound detected (in only one sample from Windrow S-204) in either the TCLP or the SPLP extract. These results demonstrated that leaching of explosive compounds would not be likely to occur in a natural or sanitary landfill environment.

The composting process has demonstrated that bioremediation technology is a safe and effective treatment alternative for detoxifying soil contaminated with explosive compounds. The composted soil has been shown, over a period of time, to support the re-establishment of plants (e.g. grass) in land applications. Indeed, grass has successfully been established on the treated compost that has been placed as backfill at RKI. The compost is suitable for recycling and reuse in accordance with 40 CFR 503.32, and it meets the same requirements as sewage sludge, therefore it should be considered acceptable for use as backfill or top soil in approved land application locations.

7.0 REFERENCES

ASTM, 1995 *Pesticides, Resource Recovery, Hazardous Substances and Oil Spill Responses, Waste Disposal, Biological Effects. Standard Guide for Conducting a Laboratory Soil Toxicity Test with Lumbricoid Earthworm, Eisenia foetida.* American Society for Testing Materials. Volume 11.04.

MK, 1998 *Quality Assurance Project Plan for Full-Scale Operations,* Soils Bioremediation Facility, NSWC Crane, Crane, Indiana. Delivery Order Number 0009, Contract Number N62467-93-D-1106. Prepared by Morrison Knudsen Corporation, March 12, 1998.

MK, 1999 Toxicity Report, Full-Scale Bioremediation, NSWC Crane, Crane, Indiana. Morrison Knudsen Corp., February 1999.

MK, 2000 Sampling and Analysis Plan for Supplemental Toxicity Sampling of Composted Material from Mine Fill A and Mine Fill B, NSWC Crane, Crane, Indiana. Morrison Knudsen Corp., June, 2000.

TT, 2002 Supplemental Toxicity Report, Full-Scale Bioremediation, NSWC Crane, Crane, IN. TolTest Inc, January 2002.

APPENDIX A

Microtox® and Earthworm Toxicity Report for Windrow S-204, Aqua Survey, Inc. (ASI Study #21-290)

Aqua Survey, Inc.

FINAL REPORT

**MICROTOX AND EARTHWORM TOXICITY
OF SOIL/COMPOST MIX
FOR PROJECT #37324
(NSWC CRANE BIOFACILITY)**

8/13/01

STUDY # 21-290

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MICROTOX AND EARTHWORM TOXICITY TESTING OF SOIL/COMPOST MIX FOR PROJECT #37324 (NSWC CRANE BIOFACILITY)

DATA REQUIREMENT

Microtox -Proprietary Method
Earthworm Toxicity - EPA 600/3-88/029

STUDY COMPLETION DATE

8/13/01

PERFORMING LABORATORIES

Aqua Survey, Inc.
469 Point Breeze Road
Flemington, New Jersey 08822

SPONSOR

Toltest, Inc.
300 Highway 361, NSWC CTR-12
Crane, IN 47522

LABORATORY PROJECT ID

STUDY #21-290

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MICROTOX AND EARTHWORM TOXICITY TESTING OF SOIL/COMPOST MIX FOR PROJECT #37324 (NSWC CRANE BIOFACILITY)

I. SUMMARY

Five (5) samples of soil/compost mix were received by this laboratory (ASI) for Microtox and Earthworm toxicity testing. For microtox testing, test organisms were exposed to four (4) concentrations of elutriate prepared by adding deionized water to the soil/compost mix. Earthworms were exposed to five (5) concentrations of the soil/compost mix. Exposure concentrations used throughout this report and in all endpoint calculations are nominal concentrations as percent elutriate for microtox testing or percent soil/compost mix for the earthworm toxicity testing. Exposure concentrations were 5.625, 11.25, 22.5 and 45 percent and 6.25, 12.5, 25, 50 and 100 percent for the microtox and earthworm test, respectively. The results are as follows:

Table 1: Summary of Results

Sample ID	ASI #	Earthworm Toxicity (%)		Microtox (%)	
		7-Day LC_{50}	14-Day LC_{50}	5-minute EC_{50}	15-minute EC_{50}
BIO-10/15-S204-3	2011301	70.7	70.7	68.28	75.44
BIO-10/15-S204-5	2011302	64.5	61.6	67.02	64.29
BIO-10/15-S204-7	2011303	70.7	67.9	50.02	48.62
BIO-10/15-S204-9	2011304	69.1	64.5	61.75	58.96
BIO-10/15-S204-11	2011305	67.5	60.2	72.76	70.81

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II. INTRODUCTION

The marine bacterium, *Photobacterium phosphoreum* was exposed to concentrations of elutriate of soil/compost mix or the soil/compost mix for 15 minutes and the earthworm *Eisenia foetida* was exposed to concentrations of a soil/compost mix for 14 days in order to permit a more accurate and complete assessment of its environmental impact. Test organisms used for testing were chosen on the basis of their ecological importance. The objectives of the test were:

1) To determine if acute exposure to concentrations of elutriate or soil/compost mix would adversely affect *Photobacterium phosphoreum* or *Eisenia foetida.*

2) If appropriate, provide an estimate of the five (5) and 15 minute EC_{50} for *Photobacterium phosphoreum* and seven (7) and 14-day LC_{50} for *Eisenia foetida.*

For the purpose of calculating or estimating an EC_{50} or LC_{50} a reduction in light levels or mortality would serve as the requisite end point.

III. TEST ADMINISTRATION

A. Sponsor

Toltest, Inc.
300 Highway 361, NSWC CTR-12
Crane, IN 47522

B. Testing Facility

Aqua Survey, Inc.
469 Point Breeze Road
Flemington, NJ 08822

C. Dates of Experiment

Sample ID	ASI #	Collection Date	Microtox	Earthworm
BIO-10/15-S204-3	2011301	6/25/01	6/29/01	6/28/01
BIO-10/15-S204-5	2011302	6/25/01	6/29/01	6/28/01
BIO-10/15-S204-7	2033303	6/25/01	6/29/01	6/28/01
BIO-10/15-S204-9	2011304	6/25/01	6/29/01	6/28/01
BIO-10/15-S204-11	2011305	6/25/01	6/29/01	6/28/01

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D. Study Participants

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G. Stephen Hornberger
Michelle Thomas
Matthew Stengel
Chris Doyle
Karen Fahy
Kelly Wischner

IV. TEST AND CONTROL SUBSTANCES

A. Test Substance

The soil/compost samples used in this test were received by Aqua Survey on June 26, 2001. Samples were received in coolers containing ice. One plastic container of each sample was received and the coolers environmental temperatures ranged from 6° – 9°C. The samples were identified as follows and assigned the following ASI sample numbers:

Sample ID #	ASI Sample ID #
BIO-10/15-S204-3	2011301
BIO-10/15-S204-5	2011302
BIO-10/15-S204-7	2011303
BIO-10/15-S204-9	2011304
BIO-10/15-S204-11	2011305

B. Control Substance(s)

Negative Control
Microtox: Diluent Control
Earthworm: Control Soil

C. Reference Toxicant

Earthworm: Potassium Chloride (KCl)

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V. MATERIALS AND METHODS

A. Test System

The Microtox test system utilizes the marine bacterium, *Photobacterium phosphoreum*. These organisms were obtained from Azur Environmental, F.O.B., Carlsbad, California USA.

The earthworms utilized in these tests were adult *Eisenia foetida* obtained from Carolina Biological Supply Company, Burlington, North Carolina 27215-3398.

B. Source of Diluent/Control Soil

Microtox diluent is a 2% NaCl solution, used for diluting the samples and reagent. All Microtox diluent was obtained from Azur Environmental, Carlsbad, CA.

The control soil used to dilute test soil samples for the earthworm toxicity test was artificial soil prepared by this laboratory (ASI), and consisted of, by weight 10% (approximately 2.5 mm screened) sphagnum peat moss, 20% colloidal Kaolinite Clay, and 70% grade 70 silica sand.

C. Acclimation Procedure

The Microtox Reagent (organisms) is a freeze-dried culture of a specially developed strain of the marine bacterium, *Photobacterium phosphoreum*. One vial of reagent contains roughly one hundred million test organisms. Organisms were reconstituted in one ml of diluent, and placed in the reagent well with the temperature maintained at 5° C. The sensitivity of the reagent remains essentially unchanged for 1-2 hours after reconstitution at this temperature. A 10 µl volume of organisms was transferred to each test cuvette via a pipette and acclimated to Microtox diluent and test temperature (15° C) for 15 minutes prior to test initiation.
Earthworms were acclimated to test conditions (i.e. temperature and control soil) for 7 days prior to testing.

D. Diet

E. foetida were fed Magic Worm Food® during holding, and were not fed throughout the duration of testing.

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E. Apparatus and Test Conditions

The Microtox Toxicity Test was conducted using a Model 500 Microtox Unit. Organisms were exposed in 2.5 ml cuvettes containing 1 ml of test solution and the test temperature was 15°C.

The Earthworm Toxicity Test was conducted in one-quart canning jars with screw-top lids with 1/16 inch diameter holes for air. The test was conducted under continuous illumination, The test temperature was 20±2°C.

F. Preparation of Test Solution and Concentrations

The elutriate used for Microtox testing was prepared by adding 50 grams dry weight of test soil/compost mix to 500 ml of deionized water. Test samples were agitated for 48 hours at 20±2° C in total darkness. After agitation was complete, the suspension was poured into centrifuge bottles and centrifuged at approximately 4200 rpm for approximately 20 minutes. The elutriate fraction was decanted and used to prepare the test solutions.

Test solutions were prepared by adding appropriate volumes of elutriate to Microtox diluent in test cuvettes. Test concentrations were 5.625, 11.25, 22.5, and 45.0%.

The concentrations for the Earthworm Toxicity test were prepared by determining the moisture fractions and water holding capacity of the soil/compost mix as well as the control/diluent soil (e.g., artificial soil). Appropriate amounts of test soil were added to artificial soil to prepare 700 grams of a geometric series of test soil concentrations (e.g., 6.25, 12.5, 25.0, 50.0, and 100.0% dry weight.) An artificial soil (only) control was also prepared. All test concentrations as well as controls were homogenized using a blender. After homogenization, 200 grams (dry weight) of each control and test concentration was placed in each of three replicate vessels for each concentration, at which time all replicate concentrations were hydrated to 75% of its respective water holding capacity using deionized water.

G. Test Procedure

The procedures used for these tests were based on accepted methodologies (1-4). Observation for light output (bioluminescence) of the Microtox organisms were made at five and fifteen minutes after test initiation. The test was initiated when the test organisms were challenged with each of four-test concentrations plus diluent control.

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Observation of earthworm survival was made on days seven and fourteen after test initiation. The pH of the soil was measured at test initiation in the 100% concentration. At day 7 there was no survival of the worms in the 100% concentration, so the pH was measured then rather than at day 14. The temperature of the test room environment was measured continuously for the duration of the test. The test started when ten test organisms were placed into each of three replicate test and control vessels. In addition, ten organisms were placed into each of three replicates for each of five concentrations of a reference toxicant (KCl) to determine the sensitivity of the test organisms.

H. EC_{50} and LC_{50} Calculations

The Microtox system is most frequently used to find the effective concentration (EC_{50}) of a sample at which the light output of the reagent is reduced by a specified percentage (i.e., the EC_{50} is the effect concentration of a sample causing a 50% decrease in the Microtox Reagent light output under defined conditions of exposure time). A computer program supplied by Microbics corporation (Azur Environmental) was used to compute point and interval (i.e., confidence interval) estimate of the EC_{50} (see Appendix I). The color of the elutriate from all five samples ASI # 2011301 - 2011305 was so dark, that a color correction was needed for the calculation of an EC_{50}. A program was provided by Azur Environmental that enabled this to be accomplished.

A computer program developed by C.E. Stephans and ASTM was used to compute point and interval (confidence) estimate of the LC_{50} for earthworms. The program requires the following data: the concentration of the test substance; the number of organisms exposed; and the number of organisms that died (see Appendix II). In this test, the LC_{50} is the concentration of test substance, calculated from experimentally-derived mortality that is lethal to 50% of the test population during continuous exposure over a specified period of time.

VI. Test Results

The EC_{50} value for Microtox and LC_{50} value for earthworms are summarized in Table 1. Mortality and pH for the earthworm Toxicity Tests are summarized in Tables 3-4. Raw data and LC_{50} calculations for the earthworm test are presented in Appendix II. Raw data and EC_{50} calculations for the Microtox test are presented in Appendix I.

VII. Test Validity

The following criteria for a valid test were met during the study:

A. Mean survival for the earthworm controls was 97%.

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B. No abnormal occurrences (i.e., laboratory accidents) that might have influenced the outcome of the test were noted.

VIII. Discussion

During Microtox testing, observation for light output was made at five and fifteen minutes. Nothing noteworthy was observed.

Earthworms were observed for mortality at days seven and fourteen. A dose response was observed for mortality for all test samples. After fourteen days, 100% mortality was observed in the 100% concentration of all 5 samples. The pH of soil samples (including the control) measured at test initiation and at day seven ranged from 5.7 to 9.0. These values are considered to be acceptable for these organisms (1) and are not likely to have caused any adverse effects. The temperature of the test room was recorded continuously (hourly) for the duration of the test. For a period of a few hours on days 2, 3 and 4 the temperature rose above the test temperature of 20±2° C, with the extreme being 24.0° C. Although this temperature was higher than the target temperature for this test, it is not believed to have affected the outcome of the test.

IX. References

1. United States Environmental Protection Agency. 1988. Protocols For Short Term Toxicity Screening of Hazardous Waste Sites. EPA/600/3-88/029.

2. American Society for Testing and Materials (ASTM). Annual Book of ASTM Standards. 1995 Volume 11.04 "Pesticides, Resource Recovery, Hazardous Substances and Oil Spill Responses, Waste Disposal, Biological Effects. Standard Guide for Conducting a Laboratory Soil Toxicity Test with Lumbricoid Earthworm, *Eisenia foetida.*

3. United States Environmental Protection Agency. Federal Register, 40 CFR Part 503.32.

4. Microtox Manual. A Toxicity Testing Handbook. 1992. Microbics Corporation (Azur Environmental), 2232 Rutherford Road, Carlsbad, CA 92008-8883.

5. Stephan, D.E. 1977. Method for Calculating an LC_{50}. In: F.L. Mayer and J. L. Hamelink, Eds., Aquatic Toxicology and Hazard Evaluation, Spec. Tech. Publ. No. 634, American Society for Testing and Materials, Philadelphia, Pennsylvania, pp. 65-84.

6. American Society for Testing and Materials. 1988. Proposed New Standard Practice for Using Probit Analysis. ASTM Subcommittee E-47.07. Draft #4, June, 1988.

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Results of Toxicity Testing with *Eisenia foetida*

All tests were stocked with 3 replicates per concentration, 10 organisms per replicate.

Table 2: Standard Reference Toxicant Test Results: *E. foetida*

Concentration KCl	7-day Total Live Count	14-day Total Live Count
Control	30	30
1250 ppm	30	29
2500 ppm	30	30
5000 ppm	30	27
10000 ppm	0	0
20000 ppm	0	0
LC_{50}	7071.0 ppm	6622.0 ppm

Table 3: Summary of *E. foetida* % Survival

Conc. %	BIO-10/15-S204-3 % Survival		BIO-10/15-S204-5 % Survival		BIO-10/15-S204-7 % Survival		BIO-10/15-S204-9 % Survival		BIO-10/15-S204-11 % Survival	
	7-Day	14-Day	7-Day	14-Day	7-Day	14-Day	7-Day	14-Day	7-Day	14-Day
Control	97	97	97	97	97	97	97	97	97	97
6.25	100	97	100	100	100	93	100	100	100	100
12.5	100	100	100	100	100	100	100	100	100	100
25	100	100	100	100	100	100	100	93	100	100
50	100	100	87	80	100	93	97	63	93	77
100	0	0	0	0	0	0	0	0	0	0
LC_{50} (%)	70.7	70.7	64.5	61.6	70.7	67.9	69.1	64.5	67.5	60.2

469 Point Breeze Road, Flemington, NJ 08822 ◆ (T) 908/788-8700 ◆ (F) 908/788-9165 ◆ mail@aquasurvey.com ◆ aquasurvey.com

Table 4: Summary of pH values

Sample	Initil pH	Final pH
Control	5.7	7.1
BIO-10/15-S204-3	8.8	8.7
BIO-10/15-S204-5	8.9	8.4
BIO-10/15-S204-7	9.0	8.4
BIO-10/15-S204-9	9.0	8.7
BIO-10/15-S204-11	8.9	8.6

Results of Microtox Testing with *Photobacterium phosphoreum*

Table 5: Results of Microtox Testing

Sample	ASI #	5 minute EC_{50}	15-minute EC_{50}
BIO-10/15-S204-3	2011301	68.28	75.44
BIO-10/15-S204-5	2011302	67.02	64.29
BIO-10/15-S204-7	2011303	50.02	48.62
BIO-10/15-S204-9	2011304	61.75	58.96
BIO-10/15-S204-11	2011305	72.76	70.81

asi 469 Point Breeze Road, Flemington, NJ 08822 ◆ (T) 908/788-8700 ◆ (F) 908/788-9165 ◆ mail@aquasurvey.com ◆ aquasurvey.com

SIGNATURE PAGE

MICROTOX AND EARTHWORM TOXICITY
OF SOIL/COMPOST MIX FOR PROJECT # 37324
(NSWC CRANE BIOFACILITY)

This report as well as all records and raw data were audited and found to be an accurate reflection of the study. Copies of raw data will be maintained by Aqua Survey, Inc, 469 Point Breeze Road, Flemington, New Jersey, 08822.

Joanne DerPilbosian
Quality Assurance Officer

8/13/01
Date

Thomas J. Dolce
Study Director

8/13/01
Date

James M. Todd
Vice President

8/13/01
Date

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APPENDIX I

Microtox Toxicity Test

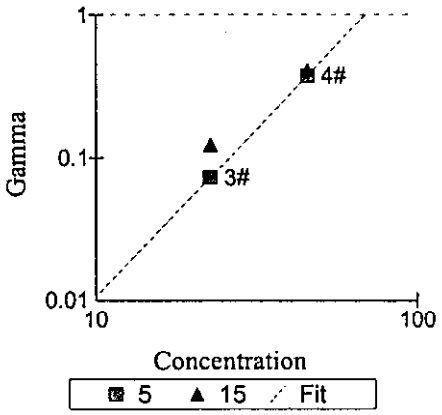
Raw Data

MicrotoxOmni Test Report

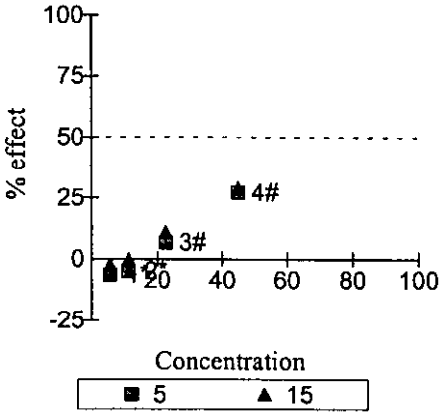
Date: - - 8/8/01

Test Protocol: Basic-type Test
Sample: -
Toxicant: -
Reagent Lot no.: -
Test description: 21-290-3 TOL S204-3 ASI #2011301
Test name: 5204-3
Database file: C:\PROGRAM FILES\MICROTOXOMNI\db1.mdb

Plot of Gamma vs Concentration



Plot of %Effect vs Concentration



			5 mins Data:			15 mins Data:			
Sample	Conc	Io	It	Gamma	% effect	It	Gamma	% effect	ABSx
Control	0.000	93.00	75.00	0.8065 #		72.00	0.7742 #		
1	5.625	81.00	65.00	-0.0606 *	-6.452%	60.00	-0.0230 *	-2.358%	0.0780
2	11.25	81.00	60.00	-0.0472 *	-4.959%	55.00	-0.0022 *	-0.2216%	0.1560
3	22.50	83.00	48.00	0.0720 #	6.717%	44.00	0.1227 #	10.93%	0.3150
4	45.00	87.00	31.00	0.3722 #	27.12%	29.00	0.4082 #	28.99%	0.6290

- used in calculation; * - invalid data; D - deleted from calcs.

Calculations on 5 mins data:
EC50 Concentration:68.28%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.4220 x LOG G +1.834
Slope: 2.370
Correction Factor: 0.8065

Calculations on 15 mins data:
EC50 Concentration:75.44%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.5766 x LOG G +1.878
Slope: 1.734
Correction Factor: 0.7742

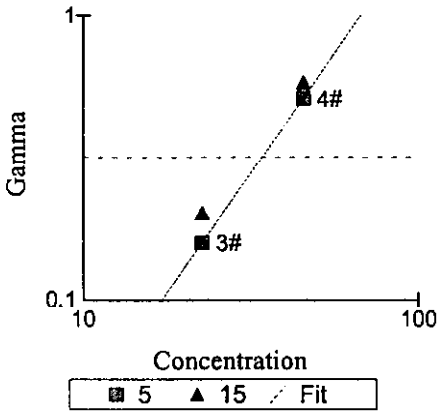
There is no QA data available for this test.

MicrotoxOmni Test Report

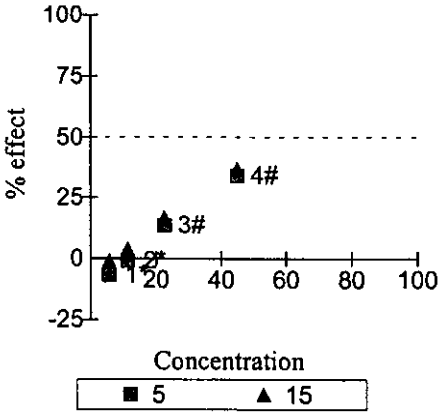
Date: - - 8/8/01

Test Protocol: Basic-type Test
Sample: -
Toxicant: -
Reagent Lot no.: -
Test description: 21-290-5 TOL S204-5 ASI #2011302
Test name: 5204-5
Database file: C:\PROGRAM FILES\MICROTOXOMNI\db1.mdb

Plot of Gamma vs Concentration



Plot of %Effect vs Concentration



			5 mins Data:			15 mins Data:			
Sample	Conc	Io	It	Gamma	% effect	It	Gamma	% effect	ABSx
Control	0.000	84.00	67.00	0.7976 #		64.00	0.7619 #		
1	5.625	93.00	72.00	-0.0628 *	-6.705%	65.00	-0.0083 *	-0.8464%	0.1100
2	11.25	83.00	56.00	-0.0098 *	-0.9992%	51.00	0.0385 *	3.707%	0.2090
3	22.50	77.00	38.00	0.1578 #	13.63%	35.00	0.2008 #	16.72%	0.4050
4	45.00	82.00	23.00	0.5098 #	33.77%	21.00	0.5795 #	36.69%	0.8200

- used in calculation; * - invalid data; D - deleted from calcs.

Calculations on 5 mins data:
EC50 Concentration:67.02%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.5912 x LOG G +1.826
Slope: 1.691
Correction Factor: 0.7976

Calculations on 15 mins data:
EC50 Concentration:64.29%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.6540 x LOG G +1.808
Slope: 1.529
Correction Factor: 0.7619

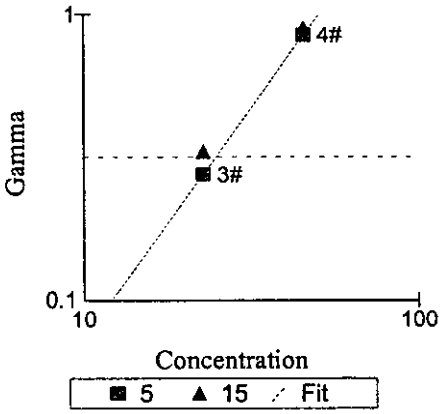
There is no QA data available for this test.

MicrotoxOmni Test Report

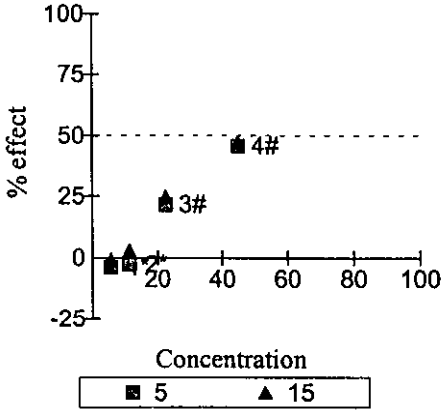
Date: - - 8/8/01

Test Protocol: Basic-type Test
Sample: -
Toxicant: -
Reagent Lot no.: -
Test description: 21-290-7 TOL S204-7 ASI #2011303
Test name: S204-7
Database file: C:\PROGRAM FILES\MICROTOXOMNI\db1.mdb

Plot of Gamma vs Concentration



Plot of %Effect vs Concentration



			5 mins Data:			15 mins Data:			
Sample	Conc	Io	It	Gamma	% effect	It	Gamma	% effect	ABSx
Control	0.000	76.00	59.00	0.7763 #		56.00	0.7368 #		
1	5.625	86.00	63.00	-0.0376 *	-3.913%	58.00	-0.0078 *	-0.7908%	0.1120
2	11.25	73.00	48.00	-0.0264 *	-2.718%	43.00	0.0314 *	3.053%	0.2280
3	22.50	78.00	33.00	0.2738 #	21.50%	30.00	0.3299 #	24.81%	0.4460
4	45.00	61.00	13.00	0.8425 #	45.73%	12.00	0.8945 #	47.22%	0.8930

- used in calculation; * - invalid data; D - deleted from calcs.

Calculations on 5 mins data:
EC50 Concentration:50.02%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.6167 x LOG G +1.699
Slope: 1.621
Correction Factor: 0.7763

Calculations on 15 mins data:
EC50 Concentration:48.62%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.6950 x LOG G +1.687
Slope: 1.439
Correction Factor: 0.7368

There is no QA data available for this test.

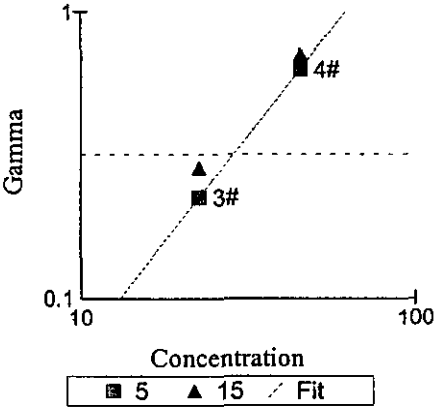
AFTER COLOR CORRECTION

MicrotoxOmni Test Report

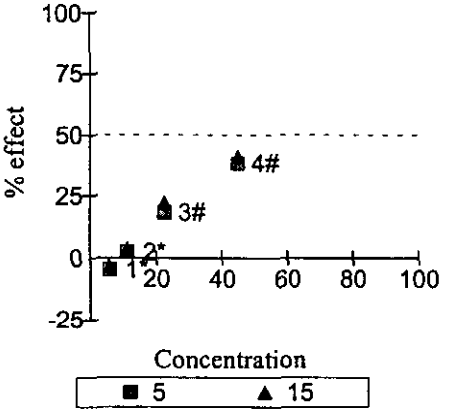
Date: -- 8/8/01

Test Protocol: Basic-type Test
Sample: -
Toxicant:
Reagent Lot no.:
Test description: 21-290-9 TOL S205-9 ASI #2011304
Data File: 21-290-9.K5; 21-290-9.K15;

Plot of Gamma vs Concentration



Plot of %Effect vs Concentration



			5 mins Data:			15 mins Data:			
Sample	Conc	Io	It	Gamma	% effect	It	Gamma	% effect	ABSx
Control	0.000	94.00	76.00	0.8085 #		73.00	0.7766 #		
1	5.625	101.00	78.00	-0.0444 *	-4.652%	74.00	-0.0325 *	-3.365%	0.1060
2	11.25	88.00	58.00	0.0240 *	2.346%	55.00	0.0372 *	3.592%	0.2130
3	22.50	100.00	47.00	0.2229 #	18.23%	43.00	0.2839 #	22.11%	0.4150
4	45.00	92.00	24.00	0.6247 #	38.45%	22.00	0.7024 #	41.26%	0.8390

- used in calculation; * - invalid data; D - deleted from calcs.

Calculations on 5 mins data:
EC50 Concentration:61.75%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.6726 x LOG G +1.791
Slope: 1.487
Correction Factor: 0.8085

Calculations on 15 mins data:
EC50 Concentration:58.96%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.7651 x LOG G +1.771
Slope: 1.307
Correction Factor: 0.7766

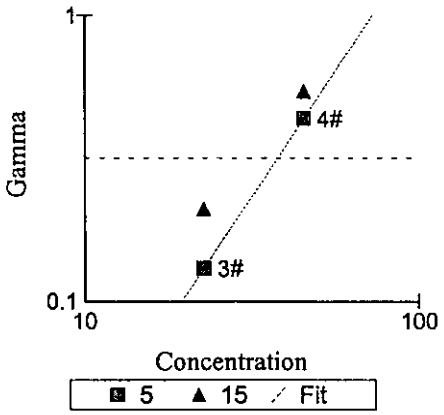
There is no QA data available for this test.

MicrotoxOmni Test Report

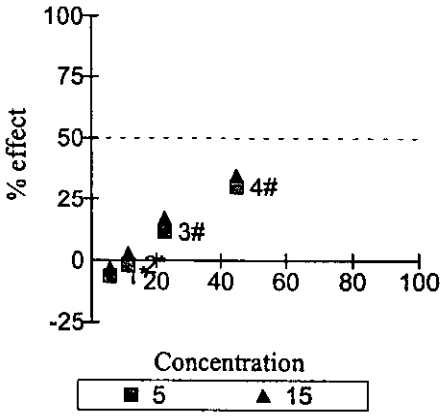
Date: - - 8/8/01

Test Protocol: Basic-type Test
Sample: -
Toxicant:
Reagent Lot no.:
Test description: 21-29011 TOL S204-11 ASI #2011305
Data File: 21-29011.K5; 21-29011.K15;

Plot of Gamma vs Concentration



Plot of %Effect vs Concentration



			5 mins Data:			15 mins Data:			
Sample	Conc	Io	It	Gamma	% effect	It	Gamma	% effect	ABSx
Control	0.000	95.00	75.00	0.7895 #		72.00	0.7579 #		
1	5.625	94.00	71.00	-0.0604 *	-6.429%	66.00	-0.0296 *	-3.057%	0.1240
2	11.25	91.00	59.00	-0.0185 *	-1.889%	54.00	0.0294 *	2.860%	0.2560
3	22.50	84.00	39.00	0.1298 #	11.49%	35.00	0.2086 #	17.26%	0.5040
4	45.00	74.00	19.00	0.4335 #	30.24%	17.00	0.5381 #	34.98%	1.020

- used in calculation; * - invalid data; D - deleted from calcs.

Calculations on 5 mins data:
EC50 Concentration:72.76%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.5749 x LOG G +1.862
Slope: 1.739
Correction Factor: 0.7895

Calculations on 15 mins data:
EC50 Concentration:70.81%
Calculated from two data points, therefore no confidence range given.
Estimating Equation:LOG C =0.7315 x LOG G +1.850
Slope: 1.367
Correction Factor: 0.7579

There is no QA data available for this test.

Microtox Data Sheet

Client: TOL Job #: 21-290

Date Sample ~~Collected~~ Prepared: 6/27/01 TD Received: 6/26/01 TD Tested: 6/29/01

Osmotic djustment

Sample #	Light Reading	Blank	5.6	11.3	22.5	45	Initial
ASI # 2011301 5204-3	Initial (1,0)	93	81	81	83	87	
	5 minute (1,5)	75	65	60	48	31	
	15 minute (1,15)	72	60	55	44	29	

No ___ es X

Sample #	Light Reading	Blank	5.6	11.3	22.5	45	Initial
ASI # 2011302 5204-5	Initial (1,0)	84	93	83	77	82	
	5 minute (1,5)	67	72	56	38	23	
	15 minute (1,15)	64	65	51	35	21	

Yes X

Sample #	Light Reading	Blank	5.6	11.3	22.5	45	Initial
ASI # 2011303 5204-7	Initial (1,0)	76	86	73	78	61	
	5 minute (1,5)	59	63	48	33	13	
	15 minute (1,15)	56	58	43	30	12	

Yes X

Sample #	Light Reading	Blank	5.6	11.3	22.5	45	Initial
ASI # 2011304 5204-9	Initial (1,0)	94	101	88	100	92	
	5 minute (1,5)	76	78	58	47	24	
	15 minute (1,15)	73	74	55	43	22	

Yes X

Sample #	Light Reading	Blank	5.6	11.3	22.5	45	Initial
ASI # 2011705 5204-11	Initial (1,0)	95	94	91	84	74	
	5 minute (1,5)	75	71	59	39	19	
	15 minute (1,15)	72	66	54	35	17	

Yes X

Sample #	Light Reading	Blank					Initial
ASI #	Initial (1,0)						
	5 minute (1,5)						
	15 minute (1,15)						

Yes ___

Sample #	Light Reading	Blank					Initial
	Initial (1,0)						
	5 minute (1,5)						
	15 minute (1,15)						

Ye ___

% ~~Transmissi~~ Transmittance (ABS$_x$)

TOL Job #

6/29/01

Sample #	5204-3		5204-9
0			
5.6	0.078	5.6	0.106
11.3	0.156	11.3	0.213
22.5	0.315	22.5	0.415
45	0.629	45	0.839
KW		KF	

5204-5		5204-11	
0	~~0.11~~		
5.6	0.110	5.6	0.124
11.3	0.209	11.3	~~0.251~~ 0.256
22.5	0.405	22.5	0.504
45	0.820	45	1.020
KW		KF	

5204-7	
5.6	0.112
11.3	0.228
22.5	0.446
45	0.893
KW	

	2011 305	200	control		204s each rep in control	each rep 200 dry weight
6.25	53	(15)	669	(191)		206
12.5	106	(30)	624	(178)		208
25	212	(61)	535	(153)		214
50	424	(121)	357	(102)		223
100	849		0			243

204g each rep in control

each rep 200 day weight

2011301

		200	CONTROL		
6.25	52	(15)	669	(191)	206
2.5	104	(30)	624	(178)	208
25	208	(59)	535	(153)	212
50	415	(119)	357	(102)	221
100	830.		0		237

2011302

		200			
6.25	54	(15)	669	(191)	206
12.5	107	(31)	624	(178)	209
25	214	(61)	535	(153)	214
50	428	(122)	357	(102)	224
100	857		0		245

2011303

		200			
6.25	54	(16)	669	(191)	207
12.5	108	(31)	624	(178)	209
25	216	(62)	535	(153)	215
50	433	(124)	357	(102)	226
100	866		0		247

2011304

		200			
6.25	53	(15)	669	(191)	206
12.5	106	(30)	624	(178)	208
25	211	(60)	535	(153)	213
50	422	(121)	357	(102)	223
100	844		0		241

700

	TEST	CONTROL
6.25	43.75	656.25
12.5	87.5	612.5
25	175	525
50	350	350
100	700	0

200

	TEST	CONTROL
6.25	12.5	187.5 (191)
12.5	25	175 (178)
25	50	150 (153)
50	100	100 (102)
100	200	0

Calculation of Hydration Water For Soil Tests 5204-11 ASI# 2011305

Just replace the soil characteristics and the concentrations in the shaded areas and the spreadsheet will do the rest!

NOTE: Hydration Water is for 100 gm, adjust accordingly!!!

Water Holding Capacity of Test Soil =	69.7 mL/100 gm
Water Holding Capacity of Control Soil =	60.5 mL/100 gm
Moisture Fraction of Test Soil =	17.53 mL/100 gm
Moisture Fraction of Control Soil =	1.92 mL/100 gm
Fraction of Hydration Needed = (0.85 for lettuce, 0.75 for earthworms)	0.75

Concentration Series Needed	Hydration Water Needed (mLs/100gm)
0 percent	43
6.25 percent	43
12.5 percent	42
25 percent	41
50 percent	39
100 percent	35

Calculation of Hydration Water For Soil Tests 5204-9 ASI# 2011304
Just replace the soil characteristics and the concentrations
in the shaded areas and the spreadsheet will do the rest!

NOTE: Hydration Water is for 100 gm, adjust accordingly!!!

Water Holding Capacity of Test Soil =	56.6 mL/100 gm
Water Holding Capacity of Control Soil =	60.5 mL/100 gm
Moisture Fraction of Test Soil =	17.1 mL/100 gm
Moisture Fraction of Control Soil =	1.92 mL/100 gm
Fraction of Hydration Needed =	0.75
(0.85 for lettuce, 0.75 for earthworms)	

Concentration Series Needed	Hydration Water Needed (mLs/100gm)
0 percent	43
6.25 percent	42
12.5 percent	41
25 percent	39
50 percent	34
100 percent	25

Calculation of Hydration Water For Soil Tests 5204-7 ASI# 2011303
Just replace the soil characteristics and the concentrations
in the shaded areas and the spreadsheet will do the rest!

NOTE: Hydration Water is for 100 gm, adjust accordingly!!!

Water Holding Capacity of Test Soil =	68.6 mL/100 gm
Water Holding Capacity of Control Soil =	60.5 mL/100 gm
Moisture Fraction of Test Soil =	19.15 mL/100 gm
Moisture Fraction of Control Soil =	1.92 mL/100 gm
Fraction of Hydration Needed =	0.75
(0.85 for lettuce, 0.75 for earthworms)	

Concentration Series Needed	Hydration Water Needed (mLs/100gm)
0 percent	43
6.25 percent	43
12.5 percent	42
25 percent	41
50 percent	38
100 percent	32

Calculation of Hydration Water For Soil Tests 5204-5 ASI# 2011302
Just replace the soil characteristics and the concentrations
in the shaded areas and the spreadsheet will do the rest!

NOTE: Hydration Water is for 100 gm, adjust accordingly!!!

Water Holding Capacity of Test Soil =	68.3 mL/100 gm
Water Holding Capacity of Control Soil =	60.5 mL/100 gm
Moisture Fraction of Test Soil =	18.29 mL/100 gm
Moisture Fraction of Control Soil =	1.92 mL/100 gm
Fraction of Hydration Needed =	0.75
(0.85 for lettuce, 0.75 for earthworms)	

Concentration Series Needed	Hydration Water Needed (mLs/100gm)
0 percent	43
6.25 percent	43
12.5 percent	42
25 percent	41
50 percent	38
100 percent	33

Calculation of Hydration Water For Soil Tests 5204-3 ASI# 2011301
Just replace the soil characteristics and the concentrations
in the shaded areas and the spreadsheet will do the rest!

NOTE: Hydration Water is for 100 gm, adjust accordingly!!!

Water Holding Capacity of Test Soil =	66.4 mL/100 gm
Water Holding Capacity of Control Soil =	60.5 mL/100 gm
Moisture Fraction of Test Soil =	15.67 mL/100 gm
Moisture Fraction of Control Soil =	1.92 mL/100 gm
Fraction of Hydration Needed =	0.75
(0.85 for lettuce, 0.75 for earthworms)	

Concentration Series Needed	Hydration Water Needed (mLs/100gm)
0 percent	43
6.25 percent	43
12.5 percent	42
25 percent	41
50 percent	39
100 percent	34

Calculation of Hydration Water For Soil Tests Control ASI# 2011246

Just replace the soil characteristics and the concentrations in the shaded areas and the spreadsheet will do the rest!

NOTE: Hydration Water is for 100 gm, adjust accordingly!!!

Water Holding Capacity of Test Soil =	60.5 mL/100 gm
Water Holding Capacity of Control Soil =	60.5 mL/100 gm
Moisture Fraction of Test Soil =	1.92 mL/100 gm
Moisture Fraction of Control Soil =	1.92 mL/100 gm
Fraction of Hydration Needed =	0.75
(0.85 for lettuce, 0.75 for earthworms)	

Concentration Series Needed	Hydration Water Needed (mLs/100gm)
0 percent	43 86
6.25 percent	43
12.5 percent	43
25 percent	43
50 percent	43
100 percent	43

AQUA SURVEY, INC.
PERCENT MOISTURE & HYDROSCOPIC CORRECTION FACTOR
BENCHSHEET

Balance: Sartorious Calibration: (Yes) No Client: TDL

Drying Oven: QL Model 40 Temperature: degrees C 105°C Job #: 21-290

	Sample #	A	① B	C	D	E	% Moisture*	HMCF**
CONTROL	2011246	74.1	239.8	309.3			1.92	
S 204-3	2011301	67.1	233.6	264.1			15.67	
204-5	2011302	69.3	208.9	240.0			18.29	
204-7	2011303	77.3	218.8	254.2			19.15	
204-9	2011304	73.9	243.8	276.0			17.10	
204-11	2011305	60.6	213.3	236.5			17.53	
Initials		TD / TD	TD / TD	KW			KW	
Date		6/25/01 / 6/26/01	6/27/01 / 6/26/01	6/27/01			6/27/01	

① Wet soil weight only.

A = Pan Weight (g)

B = Wet Sample + Pan (g)

C = Air Dry Sample + Pan Weight (g)

D = First Oven Dry Sample + Pan Weight (g)

E = Second Oven Dry Weight + Pan Weight (g)

$$* \% \text{ Moisture} = \frac{B - E \times 100}{B - A}$$

** HMCF = (E - A)/ (C-A)

2 1-290
TOL

TD 6/26/01
TD 6/27/01

Determination of Water Holding Capacity of Soils and Sediments

	ASI #	Initial Dry Wt. (g) A	Funnel Wt. (g) B	Total Wt. (g) C	Water added (mL) D	Funnel Wt. after 3 hs. E	Water holding capacity F
50 TOL	2011246	100.0	157.3	257.3	109.0	317.8	60.5
52 1-3	2011301	100.2	168.9	269.1	103.0	335.5	66.4
204-5	2011302	100.3	169.5	269.8	107.0	338.1	68.3
2 1-7	2011303	100.1	169.2	269.3	107.0	337.9	68.6
204-9	2011304	100.1	171.4	271.5	100.0	328.1	56.6
2 1-11	2011305	100.6	168.0	268.6	100.0	338.3	69.7

A = Dry weight of soil

B = Funnel weight including wet filter paper

C = Total weight of dry soil and funnel including weight of filter paper (A + B)

D = Volume of deionized water added to dry soil (A)

E = Total weight of funnel containing wet soil after 3-hours (A + B + C)

F = Water holding capacity mL/100g (E - C)

SPEARMAN-KARBER

TRIM:	.00%
LC50:	67.517
95% LOWER CONFIDENCE:	63.387
95% UPPER CONFIDENCE:	71.918

CONC. Percent	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	0.	.00	.9313D-07
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	2.	6.67	.4340D-04
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 66.794

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 6/28/01 TEST NUMBER: 21-290 DURATION: 7 Days
SAMPLE: ~~Effluent~~ Soil /compost SPECIES: E.foetida
AS # 2011305

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	66.794	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	67.517	63.387	71.918	8.531

**** = LIMIT DOES NOT EXIST

JP 4/9/07

SPEARMAN-KARBER

TRIM:	.00%
LC50:	69.096
95% LOWER CONFIDENCE:	66.027
95% UPPER CONFIDENCE:	72.307

CONC. Percent	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	0.	.00	.9313D-07
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	1.	3.33	.2887D-05
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 68.260

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 6/28/01 TEST NUMBER: 21-290 DURATION: 7 Days
SAMPLE: ~~Effluent~~ Soil/compost SPECIES: E.foetida
ASI# 2011304

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	68.260	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	69.096	66.027	72.307	6.281

**** = LIMIT DOES NOT EXIST

JD.

SPEARMAN-KARBER

TRIM: .00%
LC50: 70.711
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC. Percent	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	0.	.00	.9313D-07
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	0.	.00	.9313D-07
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 70.711

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 6/28/01 TEST NUMBER: 21-290 DURATION: 7 Days
SAMPLE: ~~Effluent~~ Soil/compost SPECIES: E.foetida
ASI # 2011303

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	70.711	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	70.711	*******	*******	*******

**** = LIMIT DOES NOT EXIST

SPEARMAN-KARBER

TRIM:	.00%
LC50:	64.469
95% LOWER CONFIDENCE:	59.154
95% UPPER CONFIDENCE:	70.261

CONC. Percent	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	0.	.00	.9313D-07
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	4.	13.33	.2974D-02
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9970 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 64.277

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 6/28/01 TEST NUMBER: 21-290 DURATION: 7 Days
SAMPLE: ~~Effluent~~ Soil/Compost SPECIES: E.foetida
ASI # 2011302

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	64.277	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	64.469	59.154	70.261	11.107

**** = LIMIT DOES NOT EXIST

JN 3/19

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: .00%
LC50: 70.711
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC. Percent	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	0.	.00	.9313D-07
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	0.	.00	.9313D-07
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 70.711

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 6/28/01 TEST NUMBER: 21-290 DURATION: 7 Days
SAMPLE: ~~Effluent~~ Soil/Compost SPECIES: E.foetida
ABI # 2011301

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	70.711	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	70.711	*******	*******	*******

**** = LIMIT DOES NOT EXIST

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: .00%
LC50: 60.151
95% LOWER CONFIDENCE: 54.045
95% UPPER CONFIDENCE: 66.948

CONC. %	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	0.	.00	.9313D-07
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	7.	23.33	.2611D+00
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.7389 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 60.743

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 6/28/01 TEST NUMBER: 5 DURATION: 14 days
SAMPLE: 2011305 SPECIES: E. foetida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	60.743	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	60.151	54.045	66.948	12.903

**** = LIMIT DOES NOT EXIST

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: .00%
LC50: 64.469
95% LOWER CONFIDENCE: 58.962
95% UPPER CONFIDENCE: 70.489

CONC. %	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	0.	.00	.9313D-07
12.50	30.	0.	.00	.9313D-07
25.00	30.	2.	6.67	.4340D-04
50.00	30.	2.	6.67	.4340D-04
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 66.794

RESULTS USING MOVING AVERAGE

SPAN	G	LC50	95% CONFIDENCE LIMIT	
2	.044	63.10	55.51	73.28

****** RESULTS CALCULATED BY PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT
11	3.117	9.90	.00

A PROBABILITY OF 0 MEANS LESS THAN 0.001

SLOPE = 6.46
95% CONFIDENCE LIMITS: -4.94 AND 17.87

LC50= 61.77
95% CONFIDENCE LIMITS: 0 AND + INFINITY

LC1 = 26.95
95% CONFIDENCE LIMITS: 0 AND 54.71

DATE: 6/28/01 TEST NUMBER: $4 DURATION: 14 days
SAMPLE: 2011304 SPECIES: E. foetida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	66.794	50.000	100.000	50.000
MAA	63.095	55.510	73.275	17.765
PROBIT	61.770	*******	*******	*******
SPEARMAN	64.469	58.962	70.489	11.528

**** = LIMIT DOES NOT EXIST

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: 2.22%
LC50: 67.931
95% LOWER CONFIDENCE: 63.409
95% UPPER CONFIDENCE: 72.775

CONC. %	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	2.	6.67	.4340D-04
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	2.	6.67	.4340D-04
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 66.794

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES AVERAGE ANGLES BRACKETING 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

NO CONVERGENCE IN 25 ITERATIONS. PROBIT METHOD PROBABLY CAN NOT BE USE WITH THIS SET OF DATA.

DATE: 6/28/01 TEST NUMBER: 3 DURATION: 14 days
SAMPLE: 2011303 SPECIES: E. foetida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	66.794	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	67.931	63.409	72.775	9.365

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

**** = LIMIT DOES NOT EXIST

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: .00%
LC50: 61.557
95% LOWER CONFIDENCE: 55.630
95% UPPER CONFIDENCE: 68.116

CONC. %	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	0.	.00	.9313D-07
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	6.	20.00	.7155D-01
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9285 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 61.919

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 6/28/01 TEST NUMBER: 2 DURATION: 14 ~~hours~~ days
SAMPLE: 2011302 SPECIES: E. fortida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	61.919	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	61.557	55.630	68.116	12.485

**** = LIMIT DOES NOT EXIST

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: .83%
LC50: 70.505
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC. %	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	1.	3.33	.2887D-05
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	0.	.00	.9313D-07
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 70.711

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 6/28/01 TEST NUMBER: 1 DURATION: 14 days
SAMPLE: 2011301 SPECIES: E. fortida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	70.711	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	70.505	*******	*******	*******

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

**** = LIMIT DOES NOT EXIST

AQUA SURVEY, INC.

CULTURE LABORATORY RECEIVING FORM

RECEIVING LOG #: 21-023 DATE: 6/21/01

SHIPPING CARRIER: UPS Ground CARRIER LOG #: N/A

SPECIES: E. foetida NUMBER SHIPPED: 2000+

LIVESTOCK SOURCE/SHIPPER: Carolina Bio Supply

SHIPPER INVOICE #: N/A PACKER'S NAME: N/A

ASI ORDER REF. DATE: 6/12/01 ASI REF. INITIALS: CD

AGE/CHARACTERISTICS: adults

TAXONOMIC VERIFICATION LOG #: N/A DATE: N/A

RECEIVING/WATER QUALITY PARAMETERS

D.O: * TEMP: 23.8°C NH_3/NO_2: **

SALINITY/HARDNESS: * ALK: * pH: *

WATER - CLEAR/CLOUDY CONTAINER SIZE/NUMBER: Styrofoam cups / 20

OF BLUE ICE®: Ø TYPE OF PACKING: box

OBSERVATION/CONDITION OF LIVESTOCK: 1 container was mostly dead (on top) → discarded. The rest were appearing healthy.

RECEIVING TECH. INIT.: CD SUPERVISORS'S INIT.: CD

APPENDIX II

E. foetida Toxicity Test

Raw Data

Reporting time: Thursday, July 12, 2001, 13:59

Recorder ID: 7005762 Deploy No: 12
State: Run
Span: 14 days, 2 hours
Interval: one hour
Samples: 337
Delay: 0 seconds
Start: 6/28/2001 13:06:11
Recover: 7/12/2001 13:57
Data source: Unit '7005762'
Trip Average: 68.9°F= 20.5°C
Trip Std Dev: 1.8°F= 1.0°C
Window: 64.4°F= 18.0°C 71.6°F= 22.0°C
Extremes: 65.3°F= 18.5°C 75.2°F= 24.0°C
Description: 6/28/2001 12:03 21-290 Toltest, 14 day Acute t
est, E. foetida, Small waterbath Room Bath B

Notes:

Daily summary

Date	Samples	Min	Max	Under	Over	Daily Average
6/28/2001	10	68.0°F= 20.0°C	71.6°F= 22.0°C	0	0	68.9°F= 20.5°C
6/29/2001	24	68.0°F= 20.0°C	71.6°F= 22.0°C	0	0	68.9°F= 20.5°C
6/30/2001	24	69.8°F= 21.0°C	75.2°F= 24.0°C	0	18	72.5°F= 22.5°C
7/1/2001	24	68.9°F= 20.5°C	72.5°F= 22.5°C	0	7	70.7°F= 21.5°C
7/2/2001	24	68.9°F= 20.5°C	72.5°F= 22.5°C	0	4	69.8°F= 21.0°C
7/3/2001	24	68.0°F= 20.0°C	68.9°F= 20.5°C	0	0	68.0°F= 20.0°C
7/4/2001	24	68.9°F= 20.5°C	69.8°F= 21.0°C	0	0	68.9°F= 20.5°C
7/5/2001	24	68.0°F= 20.0°C	68.9°F= 20.5°C	0	0	68.9°F= 20.5°C
7/6/2001	24	67.1°F= 19.5°C	68.9°F= 20.5°C	0	0	68.0°F= 20.0°C
7/7/2001	24	65.3°F= 18.5°C	68.0°F= 20.0°C	0	0	67.1°F= 19.5°C
7/8/2001	24	66.2°F= 19.0°C	68.0°F= 20.0°C	0	0	67.1°F= 19.5°C
7/9/2001	24	67.1°F= 19.5°C	68.0°F= 20.0°C	0	0	67.1°F= 19.5°C
7/10/2001	24	66.2°F= 19.0°C	69.8°F= 21.0°C	0	0	67.1°F= 19.5°C
7/11/2001	24	67.1°F= 19.5°C	71.6°F= 22.0°C	0	0	68.9°F= 20.5°C
7/12/2001	15	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C

Page: 1

PACKING LIST

IF APPLICABLE NOTIFY YOUR PAYING OFFICE ON RECEIPT OF MERCHANDISE.

7099886

ACCOUNTS PAYABLE
AQUA SURVEY
499 POINT BREEZE RD
FLEMINGTON NJ 08822

FROM: CAROLINA BIOLOGICAL SUPPLY COMPANY
2700 YORK ROAD
BURLINGTON, NC 27215-3398

Tel: 800-334-5551
Fax: 336-584-3399

SHIP TO: 8

CHRIS DOYLE
AQUA SURVEY INC
469 POINT BREEZE RD
FLEMINGTON NJ 08822-4717

Dept 3767

Quote No.	Pick List No.	Requested Delivery Date	Ship Date	Ship Method	Our Order No.	Customer Purchase Order No.
	10		06/19/01	APP	1830875	DOYLE

Line	Ctg No.	Ordered	Shipped	W/O	Catalog No.	Description	Unit	Price	Extension
1		20	20		CE 141650	L409-REDWORMS RIGHT QTY	EACH		
2		1	1		CE 141672	L399B-MAGIC WORM FOOD	EACH		

AQUA SURVEY, INC.

CULTURE LABORATORY RECEIVING FORM

RECEIVING LOG #: 21-023 DATE: 6/21/01

SHIPPING CARRIER: UPS Ground CARRIER LOG #: N/A

SPECIES: E. foetida NUMBER SHIPPED: 2000+

LIVESTOCK SOURCE/SHIPPER: Carolina Bio Supply

SHIPPER INVOICE #: N/A PACKER'S NAME: N/A

ASI ORDER REF. DATE: 6/12/01 ASI REF. INITIALS: CD

AGE/CHARACTERISTICS: adults

TAXONOMIC VERIFICATION LOG #: N/A DATE: N/A

RECEIVING/WATER QUALITY PARAMETERS

D.O: * TEMP: 23.8°C NH_3/NO_2: **

SALINITY/HARDNESS: * ALK: * pH: *

WATER - CLEAR/CLOUDY CONTAINER SIZE/NUMBER: Styrofoam cups / 20

OF BLUE ICE®: Ø TYPE OF PACKING: box

OBSERVATION/CONDITION OF LIVESTOCK: 1 container was mostly dead (on top) → discarded. The rest were appearing healthy.

RECEIVING TECH. INIT.: CD SUPERVISORS'S INIT.: CD

AQUA SURVEY, INC.
CULTURE LABORATORY

15 Day - General Species Status Log

Species: E. foetida

Dates: 6/21/01 →

Receiving [X] Culture [ ] Log #: 21-023

Initial Stock @: 2000+

Test Job #: 21-290

Client: TOL

Food Type: Magic Worm

Date	Day Number	Temp/DO	NH_3/NO_2	pH	Sal/Hardness	Alkalinity	Mortality	Remarks/Initials
6/21	1	23.8°C/–	–/–	6.4 (1)	—	—	(2)	(3) Fed Magic worm food CI
6/22	2	22.5°C/–	–/–	—	—	—	—	Moistened Trays CI
6/23	3	22.0°C/–	–/–	—	—	—	—	Fed CI
6/24	4	22.0°C/–	–/–	—	—	—	—	Moistened Trays CI
6/25	5	22.5°C/–	–/–	—	—	—	—	Fed Trays CI
6/26	6	22.0°C/–	–/–	6.7 (1)	—	—	—	Fed/Moistened Trays CI
6/27	7	22.5°C/–	–/–	—	—	—	—	Fed CI
6/28	8	22.0°C/–	–/–	—	—	—	—	1000+ to Test. CI Remained combined in one tray
	9							
	10							
	11							
	12							
	13							
	14							
	15							

(1) soil pH

(2) one container (of 20) discarded due to mortality on arrival.

(3) Held in (2) trays w/ moist peat moss (pH adjusted).

AQUA SURVEY, INC.

CULTURE LAB DISTRIBUTION FORM

DATE: 6/28/01

TEST JOB#: SCT CLIENT: In house

TEST LOCATION: IN-LAB [X] FIELD [ ]

TEST SPECIES: E. foetida

TOTAL NUMBER ORGANISMS TRANSFERRED: 140+

AQUA SURVEY, INC. CULTURE LAB INVESTIGATORS: CD

A. ORGANISMS

1. ASI CULTURE/HOLDING UNIT: (2) worm ranches

2. RECEIVING LOG #: 21-023 Carolina Bio supply

3. CULTURE LOG #: 21-0361

4. AGE/SIZE INFORMATION: adults

B. HOLDING [Y] CULTURE [ ] WATER PARAMETERS

1. TEMPERATURE: 22.0°C

2. SALINITY: N/A

3. WATER SOURCE: N/A (1)

C. TRANSFER CUSTODY & TRANSFER

1. LIVESTOCK RELINQUISHMENT DATE: 6/28/01
TIME: 1315 hrs
BY: CD

2. LIVESTOCK RECEIVING DATE: 6/28/01
TIME: 1315 hrs
BY: [illegible]

3. CULTURE SUPERVISOR OR SENIOR TECH. INITIALS: CD

REMARKS: (1) Held in pH adjusted peat moss.

AQUA SURVEY, INC.
EARTHWORM LIVE COUNT

Start Date: 6/28/01

Start Time: 1400

Job #: 21-290

Sample ID: S.ET/KCl

Sample ID	Rep	DAY 0	DAY 7	DAY 14
Control	1	10	10	10
	2	10	10	10
	3	10	10	10
pH INITIAL 5.7	FINAL 7.1		xx	xx
18250 ppm	1	10	10	9
	2	10	10	10
	3	10	10	10
pH			xx	xx
2500 ppm	1	10	10	10
	2	10	10	10
	3	10	10	10
pH			xx	xx
5000 ppm	1	10	10	10
	2	10	10	9
	3	10	10	8
pH			xx	xx
10,000 ppm	1	10	0	—
	2	10	0	—
	3	10	0	—
pH			xx	xx
20,000 ppm	1	10	0	—
	2	10	0	—
	3	10	0	—
pH			xx	xx
Initials		NF	NF	TD
Date		6/28/01	7/5/01	7/12/01

	Temperature	Initials
Day 0:	21.5	NF
Day 1:		
Day 2:		
Day 3:		
Day 4:		
Day 5:		
Day 6:		
Day 7:		
Day 8:		
Day 9:		
Day 10:		
Day 11:		
Day 12:		
Day 13:		
Day 14:	21.0	TD

Notes:

ACUTE 14 DAY STANDARD REFERENCE TOXICANT

Stock and Treatments Preparation Sheet
**** ALL UNITS ARE MG/L UNLESS OTHERWISE SPECIFIED****

Source of Dilution Water: DI H_2O
Date: 6/28/01

Species: *E. foetida* or *L. terrestris*
Location: ASI Flemington, NJ

TOXICANT: Potassium chloride

Source/Lot No.: 19909A0

Prepare Stock Solution (mg/L) by adding
50 g to 500 ml volumetric flask with DI water

Conc. ppm	*E. foetida* ml Stock solution	*L. terrestis* ml of Stock solution	Total Volume, ml
0	0	0	Hydration volume 86
1250	2.5	6.25	
2500	5.0	12.5	
5000	10.0	25.0	
10000	20.0	50.0	
20000	40.0	100.0	

Each volume of stock solution is added as part of total hydration water, which is then added to 200 g dry weight of artificial soil for each *E. foetida* replicate, and 500 g dry weight of artificial soil for *L. terrestis* replicate.

Prepared by: TD/MT

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM:	1.67%
LC50:	6.622
95% LOWER CONFIDENCE:	6.111
95% UPPER CONFIDENCE:	7.176

CONC. ppt	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
1.25	30.	1.	3.33	.2887D-05
2.50	30.	0.	.00	.9313D-07
5.00	30.	3.	10.00	.4215D-03
10.00	30.	30.	100.00	.9313D-07
20.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 5.00 AND 10.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9996 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 6.550

RESULTS USING MOVING AVERAGE

SPAN	G	LC50	95% CONFIDENCE LIMIT	
4	.040	6.16	5.13	7.52

****** RESULTS CALCULATED BY PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT
11	61.347	235.78	.00

A PROBABILITY OF 0 MEANS LESS THAN 0.001

SLOPE = 5.62
95% CONFIDENCE LIMITS: -38.43 AND 49.67

LC50= 6.18
95% CONFIDENCE LIMITS: 0 AND + INFINITY

LC1 = 2.38
95% CONFIDENCE LIMITS: 0 AND + INFINITY

DATE: 6/28/01 TEST NUMBER: SRT 21-2 DURATION: 14 Days
SAMPLE: KCl SPECIES: E. foetida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	6.550	5.000	10.000	5.000
MAA	6.158	5.131	7.519	2.387
PROBIT	6.177	*******	*******	*******
SPEARMAN	6.622	6.111	7.176	1.065

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

**** = LIMIT DOES NOT EXIST

X 1000 to convert to ppm.
JRD 7/12/01

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: .00%
LC50: 7.071
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
1.25	30.	0.	.00	.9313D-07
2.50	30.	0.	.00	.9313D-07
5.00	30.	0.	.00	.9313D-07
10.00	30.	30.	100.00	.9313D-07
20.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 5.00 AND 10.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 7.071

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

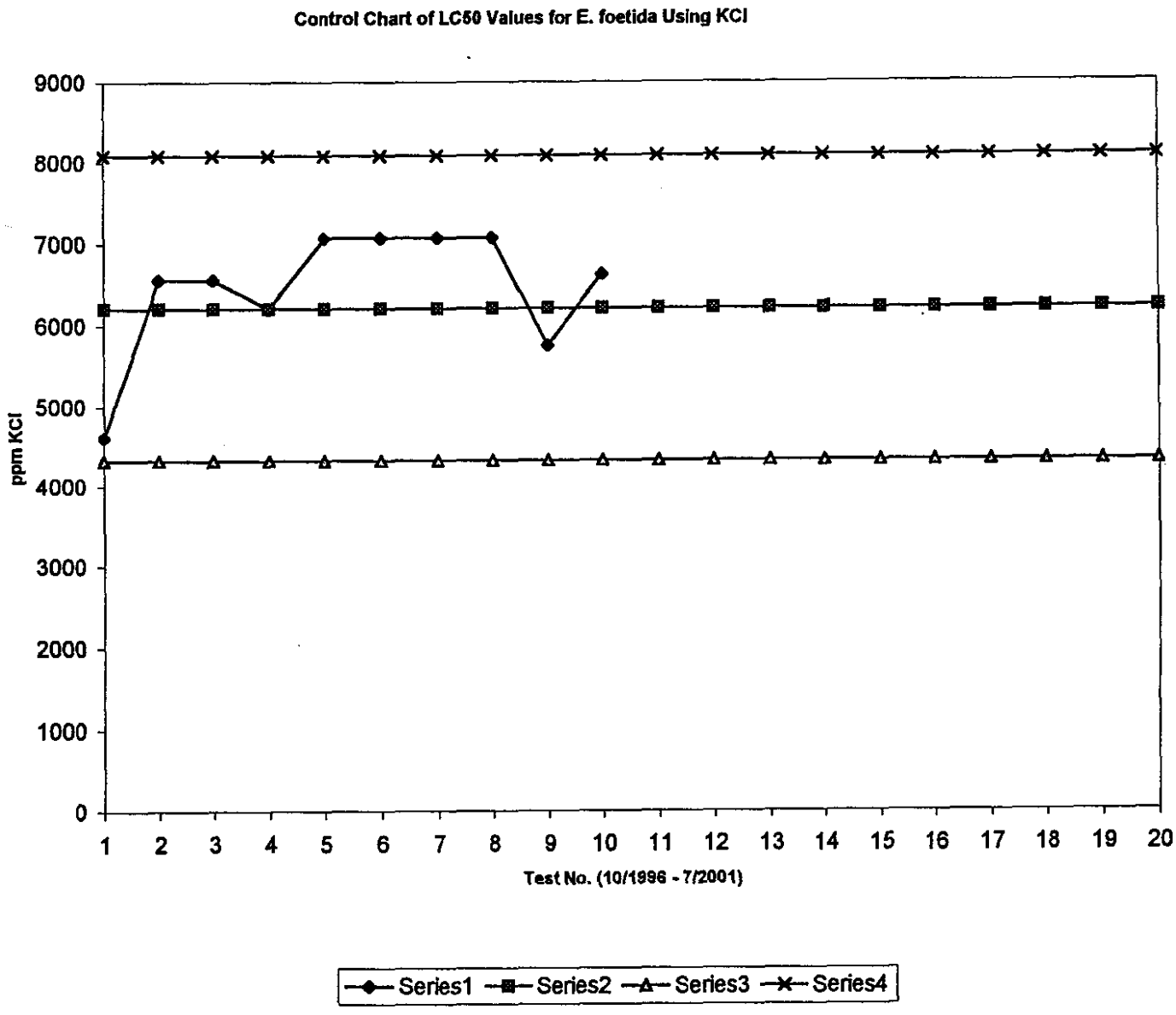
DATE: 6/28/01 TEST NUMBER: DURATION: 7 days
SAMPLE: KCl SPECIES: E. foetida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	7.071	5.000	10.000	5.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	7.071	*******	*******	*******

**** = LIMIT DOES NOT EXIST

Control Chart of LC50 values for E. foetida using KCl

Date	Test No	ppm LC50	Mean LC50	SD	Lower 95% CL	Upper 95% CL
10/21/1996	1	4613	6200,8	940.08	4320.648	8080.95
2/19/1997		6559	6200.8		4320.648	8080.95
10/16/1998	3	6559	6200.8		4320.648	8080.95
3/5/1999		6202	6200.8		4320.648	8080.95
4/16/1999	5	7071	6200.8		4320.648	8080.95
9/13/1999		7071	6200.8		4320.648	8080.95
10/25/1999	7	7071	6200.8		4320.648	8080.95
11/16/1999		7071	6200.8		4320.648	8080.95
11/28/2000	9	5748	6200.8		4320.648	8080.95
6/28/2001		6622	6200.8		4320.648	8080.95
	11		6200.8		4320.648	8080.95
			6200.8		4320.648	8080.95
	13		6200.8		4320.648	8080.95
			6200.8		4320.648	8080.95
	15		6200.8		4320.648	8080.95
			6200.8		4320.648	8080.95
	17		6200.8		4320.648	8080.95
			6200.8		4320.648	8080.95
	19		6200.8		4320.648	8080.95
			6200.8		4320.648	8080.95


Control Chart of LC50 Values for E. foetida Using KCl
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
ppm KCl
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Test No. (10/1996 - 7/2001)
Series1
Series2
Series3
Series4

PACKING LIST

IF APPLICABLE NOTIFY YOUR PAYING OFFICE ON RECEIPT OF MERCHANDISE.

. 7099886

ACCOUNTS PAYABLE
AQUA SURVEY
499 POINT BREEZE RD
FLEMINGTON NJ 08822

FROM: CAROLINA BIOLOGICAL SUPPLY COMPANY
2700 YORK ROAD
BURLINGTON, NC 27215-3398

Tel: 800-[illegible]51
Fax: 336-584-3399

SHIP TO: 8

CHRIS DOYLE
AQUA SURVEY INC
469 POINT BREEZE RD
FLEMINGTON NJ 08822-4717

Dept 3767

Quote No.	Pick List No.	Requested Delivery Date	Ship Date	Ship Method	Our Order No.	Customer Purchase Order No.
	10		06/19/01	APP	1830875	DOYLE

Line	Ctn No.	Ordered	Shipped	B/O	Catalog No.	Description	Unit	Price	Extension
1		20	20		CE 141650	L409-REDWORMS RIGHT QTY	EACH		
2		1	1		CE 141672	L399B-MAGIC WORM FOOD	EACH		

AQUA SURVEY, INC.
CULTURE LABORATORY

15 Day - General Species Status Log

Species: E. foetida

Dates: 6/21/01-2

Receiving [X] Culture [ ] Log #: 21-023

Initial Stock @: 2000+

Test Job #: 21-290

Client: TOL

Food Type: Magic Worm

Date	Day Number	Temp/DO	NH_3/NO_2	pH	Sal/Hardness	Alkalinity	Mortality	Remarks/Initials
6/21	1	23.8°C/-	-/-	6.4 (1)	—	—	(2)	(3) CD Fed Magic worm food
6/22	2	22.5°C/-	-/-	—	—	—	—	Moistened Trays CD
6/23	3	22.0°C/-	-/-	—	—	—	—	Fed CD
6/24	4	22.0°C/-	-/-	—	—	—	—	Moistened Trays CD
6/25	5	22.5°C/-	-/-	—	—	—	—	Fed Trays CD
6/26	6	22.0°C/-	-/-	6.7 (1)	—	—	—	Fed/Moistened Trays CD
6/27	7	22.5°C/-	-/-	—	—	—	—	Fed CD
6/28	8	22.0°C/-	-/-	—	—	—	—	1000+ to Test. CD Remained combined in one tray
	9							
	10							
	11							
	12							
	13							
	14							
	15							

(1) Soil pH
(2) one container (of 20) discarded due to mortality on arrival.
(3) Held in (2) trays w/ moist peat moss (pH adjusted).

AQUA SURVEY, INC.

CULTURE LAB DISTRIBUTION FORM

DATE: 6/28/01

TEST JOB#: 21-290 CLIENT: TOC

TEST LOCATION: IN-LAB [X] FIELD [ ]

TEST SPECIES: E. foetida

TOTAL NUMBER ORGANISMS TRANSFERRED: 960+

AQUA SURVEY, INC. CULTURE LAB INVESTIGATORS: CD

A. ORGANISMS

1. ASI CULTURE/HOLDING UNIT: (2) worm ranches
2. RECEIVING LOG #: 21-023 Carolina Bio Supply
3. CULTURE LOG #: 21-0360
4. AGE/SIZE INFORMATION: adults

B. HOLDING [X] CULTURE [ ] WATER PARAMETERS

1. TEMPERATURE: 22.0°C
2. SALINITY: N/A
3. WATER SOURCE: N/A (1)

C. TRANSFER CUSTODY & TRANSFER

1. LIVESTOCK RELINQUISHMENT DATE: 6/28/01
   TIME: 1315 hrs
   BY: CD

2. LIVESTOCK RECEIVING DATE: 6/28/01
   TIME: 1315 hrs
   BY: AF

3. CULTURE SUPERVISOR OR SENIOR TECH. INITIALS: CD

REMARKS: (1) Held in pH adjusted peat moss.

AQUA SURVEY, INC.
LENGTH AND WEIGHT

JOB #: 21-290

CLIENT: TDL

TEST SPECIES: E. foetida

TEST DATES: 6/28-7/12/01

	Length mm	Weight mg g		Length mm	Weight mg g
1		0.367	11		0.547
2		0.282	12		0.441
3		0.303	13		0.542
4		0.504	14	N	0.567
5	N	0.450	15	A	0.539
6	A	0.328	16		0.500
7		0.481	17		0.521
8		0.453	18		0.466
9		0.526	19		0.427
10		0.531	20		0.527

$\bar{x} = 0.465$

Signature: Tom Dike

Date: 6/28/01

AQUA SURVEY, INC.

Client: TOL

Test Start Date: 6/28/01

Job #: 21-290

Organism: *E. foetida*

Key: D = Dead S = Surface N = Nothing Unusual

Beaker	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
61	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
62	N	N	N	N	1S	N	N	N	N	N	N	N	N	N	N
63	10S	8D	D	D	D	D	D	D	—	—	—	—	—	—	—
64	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
65	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
66	N	N	N	N	2S	1S	6	1D	N	N	N	N	N	N	N
67	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
68	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
69	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
70	10S	8D	D	D	D	D	D	D	—	—	—	—	—	—	—
71	N	N	N	N	N	N	N	10	N	N	N	N	N	N	N
72	N	N	N	N	N	N	N	10	N	N	N	N	N	N	N
73	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
74	N	N	N	N	N	1S	N	N	N	N	N	N	N	N	N
75	10S	8D	D	D	D	D	D	D	—	—	—	—	—	—	—
76	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
77	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
78	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
79															
80															
Date	6/28/01	6/29/01	6/30	7/1	7/2/01	7/3/01	7/4/01	7/5/01	7/6/01	7/7/01	7/8/01	7/9/01	7/10/01	7/11/01	7/12/01
Initials	KW	KW	KW	KW	KW	KW	RF	SOT	KW	MH	[illegible]	KW	KW	KW	TD

AQUA SURVEY, INC.

Client: TOL

Test Start Date: 6/28/01

Job #: 21-290

Organism: *E. foetida*

Key: D = Dead S = Surface N = Nothing Unusual

Beaker	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
41	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
42	N	1S	N	N	N	N	N	N	N	N	N	N	N	N	N
43	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
44	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
45	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
46	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
47	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
48	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
49	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
50	10S	6D	D	D	D	D	D	D	—	—	—	—	—	—	—
51	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
52	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
53	1S	N	N	1S	N	N	N	N	N	N	N	N	N	N	N
54	5S	N	N	1S	N	N	1S	~~2D~~ N	N	N	N	N	N	N	N
55	1S	N	N	4S	2S	3S	4S	2D	1S	N	N	N	N	N	N
56	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
57	1S	N	N	N	N	N	N	N	N	N	N	N	N	N	N
58	10S	8D	D	D	D	D	D	D	—	—	—	—	—	—	—
59	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
60	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Date	6/28/01	6/29/01	6/30	7/1	7/2/01	7/3/01	7/4/01	7/5/01	7/6/01	7/7/01	7/8/01	7/9/01	7/10/01	7/11/01	7/12/01
Initials	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	KW	TD

AQUA SURVEY, INC.

Client: TDL

Test Start Date: 6/28/01

Job #: 21-290

Organism: *E. foetida*

Key: D = Dead S = Surface N = Nothing Unusual

Beaker	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
21	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
22	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
23	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
24	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
25	N	8D	D	D	D	D	D	D	—	—	—	—	—	—	—
26	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
27	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
28	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
29	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
30	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
31	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
32	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
33	4S	5D	D	D	D	D	D	D	—	—	—	—	—	—	—
34	10S	10D	D	D	D	D	D	D	—	—	—	—	—	—	—
35	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
36	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
37	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
38	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
39	N	N	N	N	1S	N	N	N	N	N	N	N	N	N	N
40	1S	1S	N	5S	3D 2S	4D	4D/2S	D	N	N	N	N	N	N	N
Date	6/28/01	6/29/01	6/30	7/1	7/2/01	7/3/01	7/4/01	7/5/01	7/6/01	7/7/01	7/8/01	7/9/01	7/10/01	7/11/01	7/12/01
Initials	KW	KW	KW	KW	KW	KW	KF	TD	KW	MH	[illegible]	KW	KW	KW	TD

AQUA SURVEY, INC.

Client: TOL

Test Start Date: 6/28/01

Job #: 21-290

Organism: *E. foetida*

Key: D = Dead S = Surface N = Nothing Unusual

Beaker	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
2	3S	6D	D	D	D	D	D	D	—	—	—	—	—	—	—
3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
6	N	8D	D	D	D	D	D	D	—	—	—	—	—	—	—
7	5S	7D	D	D	D	D	D	D	—	—	—	—	—	—	—
8	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
10	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
11	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
12	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
13	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
14	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
15	8S	8D	D	D	D	D	D	D	—	—	—	—	—	—	—
16	8S	8D	D	D	D	D	D	D	—	—	—	—	—	—	—
17	N	N	N	N	1S	N	N	N	N	N	N	N	N	N	N
18	N	N	N	1S	N	N	N	N	N	N	N	N	N	N	N
19	10S	7D	D	D	D	D	D	D	—	—	—	—	—	—	—
20	10S	10D	D	D	D	D	D	D	—	—	—	—	—	—	—
Date	6/28/01	6/29/01	6/30	7/1	7/2/01	7/3/01	7/4/01	7/5/01	7/6/01	7/7/01	7/8/01	7/9/01	7/10/01	7/11/01	7/12/01
Initials	KW	KW	KF	KF	KW	KW	KF	TD	KW	KW	KW	KW	KW	KW	TD

AQUA SURVEY, INC.

Client: TOL

Test Start Date: 6/28/01

Job #: 21-290

Organism: *E. foetida*

Test Chamber #	ID	Initial pH	Final pH	Initial Live Count	7 Day Live Count	14 Day Live Count
61	see randomization			10	10	10
62				10	10	10
63				10	0	—
64				10	10	10
65				10	~~9~~ 10	10
66				10	9	8
67				10	10	10
68				10	10	10
69				10	10	10
70				10	0	—
71				10	10	10
72				10	10	10
73				10	10	10
74				10	10	10
75				10	0	—
76				10	10	9
77				10	10	10
78				10	10	10
79						
80						
Date				6/28/01	7/5/01	7/12/01
Initials				RF	AA	TD

AQUA SURVEY, INC.

Client: TDL

Test Start Date: 6/28/01

Job #: 21-290

Organism: *E. foetida*

Test Chamber #	ID	Initial pH	Final pH	Initial Live Count	7 Day Live Count	14 Day Live Count
41	see randomization			10	10	10
42				10	10	10
43				10	10	10
44				10	10	10
45				10	10	10
46				10	10	10
47				10	10	10
48				10	10	10
49				10	10	10
50	2011392 (100%)	8.9	8.4	10	0	—
51	see randomization			10	10	10
52				10	10	10
53				10	10	10
54				10	HA wrong spot ~~8~~ 10	8
55				10	8	3
56				10	10	10
57				10	10	10
58				10	0	—
59				10	10	10
60				10	10	10
Date	6/28/01	6/28/01	7/6/01	6/28/01	7/5/01	7/12/01
Initials	TD	TD	TD	HA	HA	TD

AQUA SURVEY, INC.

Client: TDL

Test Start Date: 6/28/01

Job #: 21-290

Organism: *E. foetida*

Test Chamber #	ID	Initial pH	Final pH	Initial Live Count	7 Day Live Count	14 Day Live Count
21	see randomization			10	10	10
22				10	10	10
23				10	10	10
24				10	10	10
25	2011305 (100%)	8.9	8.6	10	0	—
26	see randomization			10	10	10
27				10	10	10
28				10	10	10
29				10	10	9
30				10	10	10
31				10	10	9
32				10	10	10
33				10	0	—
34				10	0	—
35				10	10	10
36				10	10	10
37				10	10	10
38				10	10	9
39				10	10	10
40				10	~~5~~ 6	4
Date	6/28/01	6/28/01	7/6/01	6/28/01	7/5/01	7/12/01
Initials	TD	TD	TD	[illegible]	TD	TD

AQUA SURVEY, INC.

Client: TDL

Test Start Date: 6/28/01

Job #: 21-290

Organism: *E. foetida*

Test Chamber #	ID	Initial pH	Final pH	Initial Live Count	7 Day Live Count	14 Day Live Count
1	CONTROL	5.7	7.1	10	9	9
2	2011301 (100%)	8.8	8.7	10	0	—
3	see randomization			10	10	10
4				10	10	10
5				10	10	9
6				10	0	—
7	2011304 (100%)	9.0	8.7	10	0	—
8	see randomization			10	10	10
9				10	10	10
10				10	10	10
11				10	10	10
12				10	10	10
13				10	10	10
14				10	10	10
15	2011303 (100%)	9.0	8.4	10	0	—
16	see randomization			10	0	—
17				10	10	10
18				10	10	10
19				10	0	—
20				10	0	—
Date	6/28/01	6/28/01	7/6/01 / 7/12/01	6/28/01	7/5/01	7/12/01
Initials	TD	TD	TD TD	[illegible]	TD	TD

21-290 TOLTEST 14 DAY ACUTE E. foetida

Random	SAmp No	ASI ID	Concen	Replic	
13	20.1	*	50 %	A	
74	20.2	*		B	
66	20.3	*		C	
19	21.1	*	100 %	A	
16	21.2	*		B	
7	21.3	*		C	
71	22.1	2011305	6.25 %	A	
32	22.2			B	
49	22.3			C	
24	23.1		12.5 %	A	
28	23.2			B	
52	23.3			C	
44	24.1		25 %	A	
11	24.2			B	
12	24.3			C	
55	25.1		50 %	A	
72	25.2			B	
39	25.3			C	
58	26.1		100 %	A	
33	26.2			B	
25	26.3			C	

21-290 TOLTEST 14 DAY ACUTE E. foetida

Random	SAmp No	ASI ID	Concen	Replic	
9	1.1	2011246	Control	A	
1	1.2	*		B	
42	1.3	*		C	
5	2.1	2011301	6.25	A	
22	2.2	*		B	
64	2.3	*		C	
65	3.1	*	12.5	A	
37	3.2	*		B	
68	3.3	*		C	
78	4.1	*	25	A	
3	4.2	*		B	
4	4.3	*		C	
18	5.1	*	50	A	
61	5.2	*		B	
45	5.3	*		C	
2	6.1	*	100 %	A	
34	6.2	*		B	
6	6.3	*		C	
59	7.1	2011302	6.25 %	A	
23	7.2	*		B	
26	7.3	*		C	
57	8.1	*	12.5 %	A	
48	8.2	*		B	
69	8.3	*		C	
67	9.1	*	25 %	A	
35	9.2	*		B	
77	9.3	*		C	
40	10.1	*	50 %	A	
8	10.2	*		B	
62	10.3	*		C	
75	11.1	*	100 %	A	
63	11.2	*		B	
50	11.3	*		C	
73	12.1	2011303	6.25 %	A	
76	12.2	*		B	
38	12.3	*		C	
10	13.1	*	12.5 %	A	
27	13.2	*		B	
41	13.3	*		C	
56	14.1	*	25 %	A	
30	14.2	*		B	
36	14.3	*		C	
17	15.1	*	50 %	A	
53	15.2	*		B	
54	15.3	*		C	
15	16.1	*	100 %	A	
20	16.2	*		B	
70	16.3	*		C	
51	17.1	2011304	6.25 %	A	
60	17.2	*		B	
43	17.3	*		C	
47	18.1	*	12.5 %	A	
21	18.2	*		B	
14	18.3	*		C	
46	19.1	*	25 %	A	
29	19.2	*		B	
31	19.3	*		C	

Readings

Sample	Date	Time	°F	°C
1	6/28/2001	13:06:11	71.6	22.0
2	6/28/2001	14:06:11	69.8	21.0
3	6/28/2001	15:06:11	69.8	21.0
4	6/28/2001	16:06:11	68.9	20.5
5	6/28/2001	17:06:11	68.9	20.5
6	6/28/2001	18:06:11	68.9	20.5
7	6/28/2001	19:06:11	68.9	20.5
8	6/28/2001	20:06:11	68.0	20.0
9	6/28/2001	21:06:11	68.0	20.0
10	6/28/2001	22:06:11	68.0	20.0
11	6/28/2001	23:06:11	68.0	20.0
12	6/29/2001	00:06:11	68.9	20.5
13	6/29/2001	01:06:11	68.9	20.5
14	6/29/2001	02:06:11	68.9	20.5
15	6/29/2001	03:06:11	68.9	20.5
16	6/29/2001	04:06:11	68.9	20.5
17	6/29/2001	05:06:11	68.9	20.5
18	6/29/2001	06:06:11	68.9	20.5
19	6/29/2001	07:06:11	68.9	20.5
20	6/29/2001	08:06:11	68.9	20.5
21	6/29/2001	09:06:11	68.9	20.5
22	6/29/2001	10:06:11	68.9	20.5
23	6/29/2001	11:06:11	68.0	20.0
24	6/29/2001	12:06:11	68.0	20.0
25	6/29/2001	13:06:11	68.0	20.0
26	6/29/2001	14:06:11	68.0	20.0
27	6/29/2001	15:06:11	68.9	20.5
28	6/29/2001	16:06:11	68.9	20.5
29	6/29/2001	17:06:11	68.9	20.5
30	6/29/2001	18:06:11	69.8	21.0
31	6/29/2001	19:06:11	69.8	21.0
32	6/29/2001	20:06:11	69.8	21.0
33	6/29/2001	21:06:11	70.7	21.5
34	6/29/2001	22:06:11	71.6	22.0
35	6/29/2001	23:06:11	72.5	22.5
36	6/30/2001	00:06:11	72.5	22.5
37	6/30/2001	01:06:11	72.5	22.5
38	6/30/2001	02:06:11	72.5	22.5
39	6/30/2001	03:06:11	72.5	22.5
40	6/30/2001	04:06:11	72.5	22.5
41	6/30/2001	05:06:11	72.5	22.5
42	6/30/2001	06:06:11	72.5	22.5
43	6/30/2001	07:06:11	72.5	22.5
44	6/30/2001	08:06:11	72.5	22.5
45	6/30/2001	09:06:11	73.4	23.0
46	6/30/2001	10:06:11	73.4	23.0
47	6/30/2001	11:06:11	74.3	23.5
48	6/30/2001	12:06:11	74.3	23.5
49	6/30/2001	13:06:11	75.2	24.0
50	6/30/2001	14:06:11	74.3	23.5
51	6/30/2001	15:06:11	73.4	23.0
52	6/30/2001	16:06:11	72.5	22.5
53	6/30/2001	17:06:11	71.6	22.0
54	6/30/2001	18:06:11	70.7	21.5
55	6/30/2001	19:06:11	69.8	21.0
56	6/30/2001	20:06:11	69.8	21.0
57	6/30/2001	21:06:11	69.8	21.0
58	6/30/2001	22:06:11	69.8	21.0
59	6/30/2001	23:06:11	69.8	21.0
60	7/1/2001	00:06:11	70.7	21.5
61	7/1/2001	01:06:11	71.6	22.0
62	7/1/2001	02:06:11	71.6	22.0
63	7/1/2001	03:06:11	72.5	22.5
64	7/1/2001	04:06:11	72.5	22.5
65	7/1/2001	05:06:11	72.5	22.5
66	7/1/2001	06:06:11	72.5	22.5
67	7/1/2001	07:06:11	72.5	22.5
68	7/1/2001	08:06:11	72.5	22.5
69	7/1/2001	09:06:11	71.6	22.0
70	7/1/2001	10:06:11	70.7	21.5
71	7/1/2001	11:06:11	70.7	21.5
72	7/1/2001	12:06:11	69.8	21.0
73	7/1/2001	13:06:11	69.8	21.0
74	7/1/2001	14:06:11	68.9	20.5
75	7/1/2001	15:06:11	68.9	20.5
76	7/1/2001	16:06:11	68.9	20.5
77	7/1/2001	17:06:11	68.9	20.5
78	7/1/2001	18:06:11	69.8	21.0
79	7/1/2001	19:06:11	70.7	21.5
80	7/1/2001	20:06:11	71.6	22.0
81	7/1/2001	21:06:11	71.6	22.0
82	7/1/2001	22:06:11	72.5	22.5
83	7/1/2001	23:06:11	72.5	22.5
84	7/2/2001	00:06:11	72.5	22.5
85	7/2/2001	01:06:11	72.5	22.5
86	7/2/2001	02:06:11	72.5	22.5
87	7/2/2001	03:06:11	71.6	22.0
88	7/2/2001	04:06:11	71.6	22.0
89	7/2/2001	05:06:11	70.7	21.5
90	7/2/2001	06:06:11	70.7	21.5
91	7/2/2001	07:06:11	69.8	21.0
92	7/2/2001	08:06:11	69.8	21.0
93	7/2/2001	09:06:11	69.8	21.0
94	7/2/2001	10:06:11	69.8	21.0
95	7/2/2001	11:06:11	68.9	20.5
96	7/2/2001	12:06:11	68.9	20.5
97	7/2/2001	13:06:11	68.9	20.5
98	7/2/2001	14:06:11	68.9	20.5
99	7/2/2001	15:06:11	68.9	20.5
100	7/2/2001	16:06:11	68.9	20.5

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Sample	Date	Time	°F	°C
1	7/2/2001	17:06:11	68.9	20.5
2	7/2/2001	18:06:11	68.9	20.5
103	7/2/2001	19:06:11	68.9	20.5
104	7/2/2001	20:06:11	68.9	20.5
105	7/2/2001	21:06:11	68.9	20.5
106	7/2/2001	22:06:11	68.9	20.5
107	7/2/2001	23:06:11	68.9	20.5
108	7/3/2001	00:06:11	68.9	20.5
109	7/3/2001	01:06:11	68.0	20.0
110	7/3/2001	02:06:11	68.0	20.0
111	7/3/2001	03:06:11	68.0	20.0
112	7/3/2001	04:06:11	68.0	20.0
113	7/3/2001	05:06:11	68.0	20.0
114	7/3/2001	06:06:11	68.0	20.0
115	7/3/2001	07:06:11	68.0	20.0
116	7/3/2001	08:06:11	68.0	20.0
117	7/3/2001	09:06:11	68.0	20.0
118	7/3/2001	10:06:11	68.0	20.0
119	7/3/2001	11:06:11	68.0	20.0
120	7/3/2001	12:06:11	68.0	20.0
121	7/3/2001	13:06:11	68.0	20.0
122	7/3/2001	14:06:11	68.0	20.0
123	7/3/2001	15:06:11	68.0	20.0
124	7/3/2001	16:06:11	68.0	20.0
125	7/3/2001	17:06:11	68.9	20.5
126	7/3/2001	18:06:11	68.9	20.5
127	7/3/2001	19:06:11	68.9	20.5
128	7/3/2001	20:06:11	68.9	20.5
129	7/3/2001	21:06:11	68.9	20.5
130	7/3/2001	22:06:11	68.9	20.5
131	7/3/2001	23:06:11	68.9	20.5
132	7/4/2001	00:06:11	68.9	20.5
133	7/4/2001	01:06:11	68.9	20.5
134	7/4/2001	02:06:11	68.9	20.5
135	7/4/2001	03:06:11	68.9	20.5
136	7/4/2001	04:06:11	68.9	20.5
137	7/4/2001	05:06:11	68.9	20.5
138	7/4/2001	06:06:11	68.9	20.5
139	7/4/2001	07:06:11	68.9	20.5
140	7/4/2001	08:06:11	68.9	20.5
141	7/4/2001	09:06:11	68.9	20.5
142	7/4/2001	10:06:11	68.9	20.5
143	7/4/2001	11:06:11	68.9	20.5
144	7/4/2001	12:06:11	68.9	20.5
145	7/4/2001	13:06:11	68.9	20.5
146	7/4/2001	14:06:11	68.9	20.5
147	7/4/2001	15:06:11	68.9	20.5
148	7/4/2001	16:06:11	68.9	20.5
149	7/4/2001	17:06:11	68.9	20.5
150	7/4/2001	18:06:11	68.9	20.5
151	7/4/2001	19:06:11	69.8	21.0
152	7/4/2001	20:06:11	68.9	20.5
153	7/4/2001	21:06:11	68.9	20.5
154	7/4/2001	22:06:11	68.9	20.5
155	7/4/2001	23:06:11	68.9	20.5
156	7/5/2001	00:06:11	68.9	20.5
157	7/5/2001	01:06:11	68.9	20.5
158	7/5/2001	02:06:11	68.9	20.5
159	7/5/2001	03:06:11	68.9	20.5
160	7/5/2001	04:06:11	68.9	20.5
161	7/5/2001	05:06:11	68.9	20.5
162	7/5/2001	06:06:11	68.9	20.5
163	7/5/2001	07:06:11	68.9	20.5
164	7/5/2001	08:06:11	68.9	20.5
165	7/5/2001	09:06:11	68.9	20.5
166	7/5/2001	10:06:11	68.9	20.5
167	7/5/2001	11:06:11	68.9	20.5
168	7/5/2001	12:06:11	68.9	20.5
169	7/5/2001	13:06:11	68.9	20.5
170	7/5/2001	14:06:11	68.9	20.5
171	7/5/2001	15:06:11	68.9	20.5
172	7/5/2001	16:06:11	68.9	20.5
173	7/5/2001	17:06:11	68.0	20.0
174	7/5/2001	18:06:11	68.0	20.0
175	7/5/2001	19:06:11	68.0	20.0
176	7/5/2001	20:06:11	68.0	20.0
177	7/5/2001	21:06:11	68.0	20.0
178	7/5/2001	22:06:11	68.9	20.5
179	7/5/2001	23:06:11	68.0	20.0
180	7/6/2001	00:06:11	68.0	20.0
181	7/6/2001	01:06:11	68.0	20.0
182	7/6/2001	02:06:11	68.0	20.0
183	7/6/2001	03:06:11	68.0	20.0
184	7/6/2001	04:06:11	68.0	20.0
185	7/6/2001	05:06:11	68.0	20.0
186	7/6/2001	06:06:11	68.0	20.0
187	7/6/2001	07:06:11	68.0	20.0
188	7/6/2001	08:06:11	68.0	20.0
189	7/6/2001	09:06:11	68.0	20.0
190	7/6/2001	10:06:11	68.0	20.0
191	7/6/2001	11:06:11	68.0	20.0
192	7/6/2001	12:06:11	68.0	20.0
193	7/6/2001	13:06:11	68.9	20.5
194	7/6/2001	14:06:11	68.0	20.0
195	7/6/2001	15:06:11	68.0	20.0
196	7/6/2001	16:06:11	68.0	20.0
197	7/6/2001	17:06:11	67.1	19.5
198	7/6/2001	18:06:11	67.1	19.5
199	7/6/2001	19:06:11	67.1	19.5
200	7/6/2001	20:06:11	67.1	19.5

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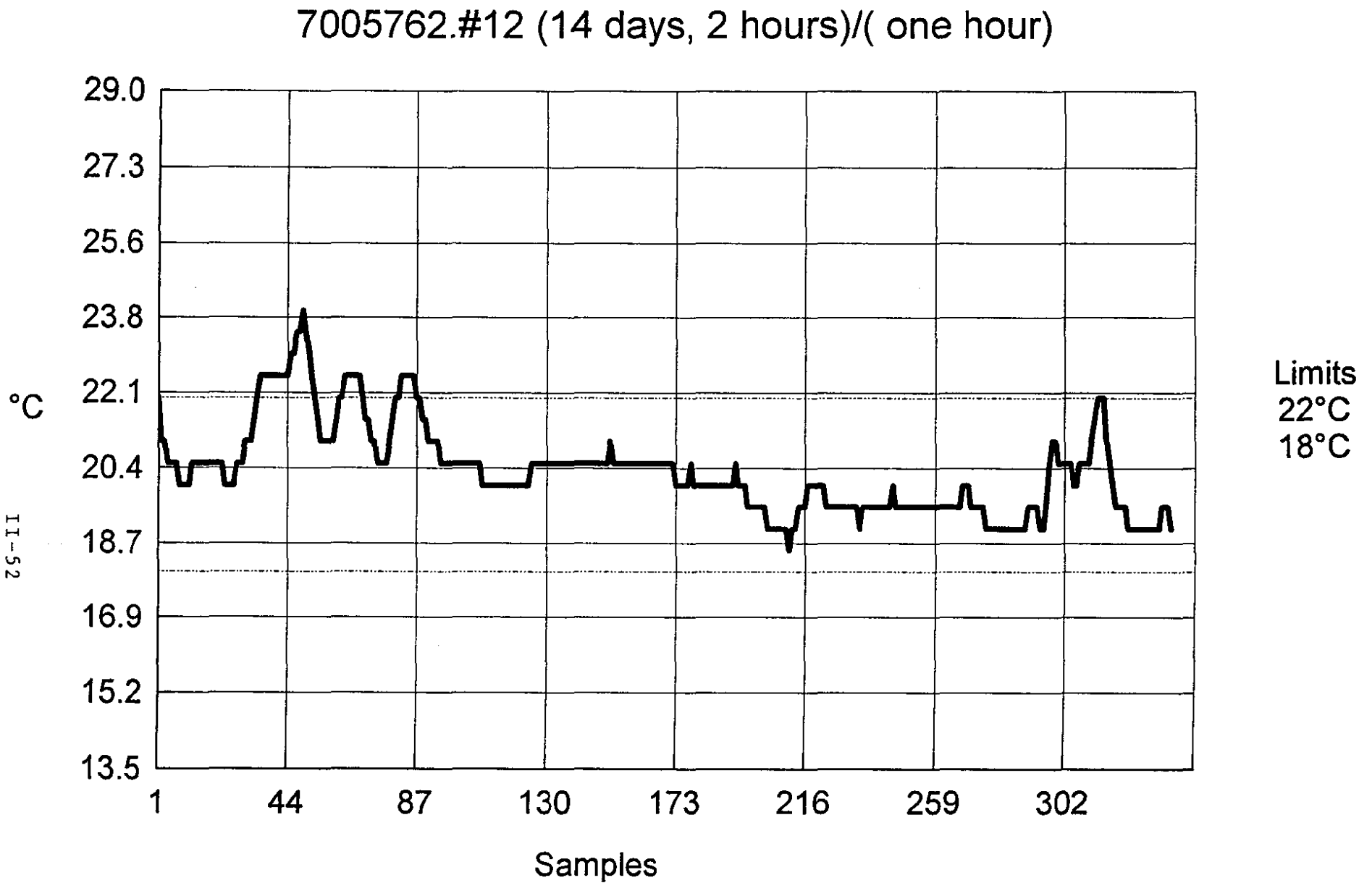
Sample	Date	Time	°F	°C	Sample	Date	Time	°F	°C
01	7/6/2001	21:06:11	67.1	19.5	251	7/8/2001	23:06:11	67.1	19.5
02	7/6/2001	22:06:11	67.1	19.5	252	7/9/2001	00:06:11	67.1	19.5
203	7/6/2001	23:06:11	67.1	19.5	253	7/9/2001	01:06:11	67.1	19.5
204	7/7/2001	00:06:11	66.2	19.0	254	7/9/2001	02:06:11	67.1	19.5
205	7/7/2001	01:06:11	66.2	19.0	255	7/9/2001	03:06:11	67.1	19.5
206	7/7/2001	02:06:11	66.2	19.0	256	7/9/2001	04:06:11	67.1	19.5
207	7/7/2001	03:06:11	66.2	19.0	257	7/9/2001	05:06:11	67.1	19.5
208	7/7/2001	04:06:11	66.2	19.0	258	7/9/2001	06:06:11	67.1	19.5
209	7/7/2001	05:06:11	66.2	19.0	259	7/9/2001	07:06:11	67.1	19.5
210	7/7/2001	06:06:11	66.2	19.0	260	7/9/2001	08:06:11	67.1	19.5
211	7/7/2001	07:06:11	65.3	18.5	261	7/9/2001	09:06:11	67.1	19.5
212	7/7/2001	08:06:11	66.2	19.0	262	7/9/2001	10:06:11	67.1	19.5
213	7/7/2001	09:06:11	66.2	19.0	263	7/9/2001	11:06:11	67.1	19.5
214	7/7/2001	10:06:11	67.1	19.5	264	7/9/2001	12:06:11	67.1	19.5
215	7/7/2001	11:06:11	67.1	19.5	265	7/9/2001	13:06:11	67.1	19.5
216	7/7/2001	12:06:11	67.1	19.5	266	7/9/2001	14:06:11	67.1	19.5
217	7/7/2001	13:06:11	68.0	20.0	267	7/9/2001	15:06:11	67.1	19.5
218	7/7/2001	14:06:11	68.0	20.0	268	7/9/2001	16:06:11	68.0	20.0
219	7/7/2001	15:06:11	68.0	20.0	269	7/9/2001	17:06:11	68.0	20.0
220	7/7/2001	16:06:11	68.0	20.0	270	7/9/2001	18:06:11	68.0	20.0
221	7/7/2001	17:06:11	68.0	20.0	271	7/9/2001	19:06:11	67.1	19.5
222	7/7/2001	18:06:11	68.0	20.0	272	7/9/2001	20:06:11	67.1	19.5
223	7/7/2001	19:06:11	67.1	19.5	273	7/9/2001	21:06:11	67.1	19.5
224	7/7/2001	20:06:11	67.1	19.5	274	7/9/2001	22:06:11	67.1	19.5
225	7/7/2001	21:06:11	67.1	19.5	275	7/9/2001	23:06:11	67.1	19.5
226	7/7/2001	22:06:11	67.1	19.5	276	7/10/2001	00:06:11	66.2	19.0
227	7/7/2001	23:06:11	67.1	19.5	277	7/10/2001	01:06:11	66.2	19.0
228	7/8/2001	00:06:11	67.1	19.5	278	7/10/2001	02:06:11	66.2	19.0
229	7/8/2001	01:06:11	67.1	19.5	279	7/10/2001	03:06:11	66.2	19.0
230	7/8/2001	02:06:11	67.1	19.5	280	7/10/2001	04:06:11	66.2	19.0
231	7/8/2001	03:06:11	67.1	19.5	281	7/10/2001	05:06:11	66.2	19.0
232	7/8/2001	04:06:11	67.1	19.5	282	7/10/2001	06:06:11	66.2	19.0
33	7/8/2001	05:06:11	67.1	19.5	283	7/10/2001	07:06:11	66.2	19.0
234	7/8/2001	06:06:11	66.2	19.0	284	7/10/2001	08:06:11	66.2	19.0
235	7/8/2001	07:06:11	67.1	19.5	285	7/10/2001	09:06:11	66.2	19.0
236	7/8/2001	08:06:11	67.1	19.5	286	7/10/2001	10:06:11	66.2	19.0
237	7/8/2001	09:06:11	67.1	19.5	287	7/10/2001	11:06:11	66.2	19.0
238	7/8/2001	10:06:11	67.1	19.5	288	7/10/2001	12:06:11	66.2	19.0
239	7/8/2001	11:06:11	67.1	19.5	289	7/10/2001	13:06:11	66.2	19.0
240	7/8/2001	12:06:11	67.1	19.5	290	7/10/2001	14:06:11	67.1	19.5
241	7/8/2001	13:06:11	67.1	19.5	291	7/10/2001	15:06:11	67.1	19.5
242	7/8/2001	14:06:11	67.1	19.5	292	7/10/2001	16:06:11	67.1	19.5
243	7/8/2001	15:06:11	67.1	19.5	293	7/10/2001	17:06:11	67.1	19.5
244	7/8/2001	16:06:11	67.1	19.5	294	7/10/2001	18:06:11	66.2	19.0
245	7/8/2001	17:06:11	68.0	20.0	295	7/10/2001	19:06:11	66.2	19.0
246	7/8/2001	18:06:11	67.1	19.5	296	7/10/2001	20:06:11	67.1	19.5
247	7/8/2001	19:06:11	67.1	19.5	297	7/10/2001	21:06:11	68.9	20.5
248	7/8/2001	20:06:11	67.1	19.5	298	7/10/2001	22:06:11	69.8	21.0
249	7/8/2001	21:06:11	67.1	19.5	299	7/10/2001	23:06:11	69.8	21.0
250	7/8/2001	22:06:11	67.1	19.5	300	7/11/2001	00:06:11	68.9	20.5

Page: 4

Sample	Date	Time	°F	°C
301	7/11/2001	01:06:11	68.9	20.5
302	7/11/2001	02:06:11	68.9	20.5
303	7/11/2001	03:06:11	68.9	20.5
304	7/11/2001	04:06:11	68.9	20.5
305	7/11/2001	05:06:11	68.0	20.0
306	7/11/2001	06:06:11	68.0	20.0
307	7/11/2001	07:06:11	68.9	20.5
308	7/11/2001	08:06:11	68.9	20.5
309	7/11/2001	09:06:11	68.9	20.5
310	7/11/2001	10:06:11	68.9	20.5
311	7/11/2001	11:06:11	69.8	21.0
312	7/11/2001	12:06:11	70.7	21.5
313	7/11/2001	13:06:11	71.6	22.0
314	7/11/2001	14:06:11	71.6	22.0
315	7/11/2001	15:06:11	71.6	22.0
316	7/11/2001	16:06:11	69.8	21.0
317	7/11/2001	17:06:11	68.9	20.5
318	7/11/2001	18:06:11	68.0	20.0
319	7/11/2001	19:06:11	67.1	19.5
320	7/11/2001	20:06:11	67.1	19.5
321	7/11/2001	21:06:11	67.1	19.5
322	7/11/2001	22:06:11	67.1	19.5
323	7/11/2001	23:06:11	66.2	19.0
324	7/12/2001	00:06:11	66.2	19.0
325	7/12/2001	01:06:11	66.2	19.0
326	7/12/2001	02:06:11	66.2	19.0
327	7/12/2001	03:06:11	66.2	19.0
328	7/12/2001	04:06:11	66.2	19.0
329	7/12/2001	05:06:11	66.2	19.0
330	7/12/2001	06:06:11	66.2	19.0
331	7/12/2001	07:06:11	66.2	19.0
332	7/12/2001	08:06:11	66.2	19.0
333	7/12/2001	09:06:11	66.2	19.0
334	7/12/2001	10:06:11	67.1	19.5
335	7/12/2001	11:06:11	67.1	19.5
336	7/12/2001	12:06:11	67.1	19.5
337	7/12/2001	13:06:11	66.2	19.0


7005762.#12 (14 days, 2 hours)/(one hour)
29.0
27.3
25.6
23.8
22.1
20.4
18.7
16.9
15.2
13.5
°C
1
44
87
130
173
216
259
302
Samples
Limits
22°C
18°C

APPENDIX III

Chains of Custody

TOTE, INC. Tel ex 8266 2266 (OU) 9 11 — 7 — 29 — B10-451

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Aqua Survey

Chain of Custody Record

30030 Page 1 of 1

Project No.: 37324.01

Client:

P.O. No.:

Project/Location: NSWC Crane Bioffacility

Project Mgr.:

Sampler's Name: Peter J. Chevalier

Phone No.

Sampler's Signature: [signature]

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Earthworm Tox.	Microtox.							Preserved Yes/No	LAB USE ONLY Lab #
1	B10-10/15-S204-3	6/25/01	1310	C	Compost	Cross section 3 2011301	1	✓	✓								
2	B10-10/15-S204-5		1325			5	1	✓	✓								
3	B10-10/15-S204-7		1340			7	1	✓	✓								
4	B10-10/15-S204-9		1400			9	1	✓	✓								
5	B10-10/15-S204-11		1415			11	1	✓	✓								
6																	
7																	
8																	
9																	
10																	

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	6/25/01 1530	Tom Dohe	6/26/01 11:00

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____ °C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

Tel CX 8262260/4-79 21-290

TOLTEST, INC. 1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259 B10-451

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

1949 Survey

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Custody Record

30030 Page 1 of 1

Project No.: 37324.01

Client:

P.O. No.:

Project/Location: NSWC Crane Bioffacility

Project Mgr.:

Sampler's Name: Peter J. Chevalier

Phone No.:

Sampler's Signature: [signature]

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Earthworm Tox.	Microtox.							Preserved Yes/No	LAB USE ONLY Lab #
1	B10-R/15-S204-3	6/25/01	1310	C	compost	cross section 3	1	✓	✓								
2	B10-R/15-S204-5		1325			2011302 5	1	✓	✓								
3	B10-R/15-S204-7		1340			7	1	✓	✓								
4	B10-R/15-S204-9		1400			9	1	✓	✓								
5	B10-R/15-S204-11		1415			11	1	✓	✓								
6																	
7																	
8																	
9																	
10																	

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	6/25/01 1530	Tom Dell	6/26/01 1100

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____ °C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT _____

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

Fed Ex 8260 a 06 4 0 1 4 58 — 7 - 20 -

TOLTEST, INC. 1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259 B10-451

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

944 Survey

Chain of Custody Record

30030 Page 1 of 1

Project No.: 37324.01	Client:		
P.O. No.:	Project/Location: NSWC Crane Biofacility		
Project Mgr.:		Sampler's Name	Peter J. Chevalier
Phone No.		Sampler's Signature	[signature]

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Parameters: Earthworm Tx.	Parameters: Microtox.							Preserved Yes/No	LAB USE ONLY Lab #
1	B10-10/15-S204-3	6/25/01	1310	C	Compost	Cross section 3	1	✓	✓								
2	B10-10/15-S204-5		1325			5	1	✓	✓								
3	B10-10/15-S204-7		1340			2011303 7	1	✓	✓								
4	B10-10/15-S204-9		1400			9	1	✓	✓								
5	B10-10/15-S204-11		1415			11	1	✓	✓								
6																	
7																	
8																	
9																	
10																	

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	6/25/01 1530	Tom Dolce	6/26/01 1100

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____ °C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT _____

Distribution: Original plus one accompanies shipment (white); copy to coordinator field files (pink)

Rev. 4/99

TOLTEST, INC. Tel EX 8 26 2 26 60 (92) 21-290 B10-451

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

944 Survey

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Project No.: 37324.01	Client:		
P.O. No.:	Project/Location: NSWC Crane Bioffacility		
Project Mgr.:		Sampler's Name	Peter J. Chevalier
Phone No.		Sampler's Signature	[signature]

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Earthworm Tx.	Microtox.		
1	B10-10/15-S204-3	6/25/01	1310	C	Compost	Cross section 3	1	✓	✓		
2	B10-10/15-S204-5		1325			5	1	✓	✓		
3	B10-10/15-S204-7		1340			7	1	✓	✓		
4	B10-10/15-S204-9		1400			2011304 9	1	✓	✓		
5	B10-10/15-S204-11		1415			11	1	✓	✓		
6											
7											
8											
9											
10											

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	6/25/01 1530	Tom Dale	6/26/01 1100
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time

Were samples delivered
Were samples preserved
Temp of samples
Did samples arrive intac
Were proper containers u
Was container labeled pr
Were samples packaged
Was shipping label comp
(49 CFR 170, etc.)

Comments: _____

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

TOLTES, INC. Tel ex 8 ove a 2/6/01 1-116 71-790

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259 B10-451

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

944 Survey

Chain of Custody Record

30030 Page 1 of 1

Project No.: 37324.01

Client:

P.O. No.:

Project/Location: NSWC Crane Bioffacility

Project Mgr.:

Sampler's Name: Peter J. Chevalier

Phone No.

Sampler's Signature: [signature]

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Parameters: Earthworm Tox.	Parameters: Microtox.							Preserved Yes/No	LAB USE ONLY	Lab #
1	B10-10/15-S204-3	6/25/01	1310	C	Compost	Cross section 3	1	✓	✓									
2	B10-10/15-S204-5		1325			5	1	✓	✓									
3	B10-10/15-S204-7		1340			7	1	✓	✓									
4	B10-10/15-S204-9		1400			9	1	✓	✓									
5	B10-10/15-S204-11		1415			2011305 11	1	✓	✓									
6																		
7																		
8																		
9																		
10																		

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	6/25/01 1530	Tom Dube	6/26/01 1100
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____ °C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT _____

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

TOLTEST INC. Fed Ex 826226601971

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259 B10-451

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Custody Record

30030 Page 1 of 1

Aqua Survey

Project No.: 37324.01	Client:		
P.O. No.:	Project/Location: NSWC Crane Biofacility		
Project Mgr.:		Sampler's Name	Peter J. Chevalier
Phone No.		Sampler's Signature	

Parameters: Total No. of Containers; Earthworm Tx.; Microtox.; Preserved Yes/No; LAB USE ONLY

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Earthworm Tx.	Microtox.	Preserved Yes/No	LAB USE ONLY	Lab #
1	B10-N/15-S204-3	6/25/01	1310	C	Compost	Cross section 3	1	✓	✓			
2	B10-N/15-S204-5		1325			5	1	✓	✓			
3	B10-N/15-S204-7		1340			7	1	✓	✓			
4	B10-N/15-S204-9		1400			9	1	✓	✓			
5	B10-N/15-S204-11		1415			11	1	✓	✓			
6												
7												
8												
9												
10												

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
		6/25/01 1530		

LAB USE ONLY

Were samples delivered ☐ i

Were samples preserved ☐ i

Temp of samples

Did samples arrive intact and sealed?

Were proper containers used?

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT

NATURE SAVER™ FAX MEMO 01616

Date 6/25 | # of pages ▶ 5

From Peter C.

Co. Toltest

Phone #

Fax #

To James Tuck

Co./Dept. Tom Oake

Phone # Aqua Survey

Fax # 508-785-9154

TOLTEST inc. FedEx 826226605949 B10-451

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Aqua Survey

Chain of Custody Record

30030 Page 1 of 1

Project No.: 37324.01 | Client:

P.O. No.: | Project/Location: NSWC Crane Biofacility

Project Mgr.: | Sampler's Name: Peter J. Chevalier

Phone No. | Sampler's Signature: [signature]

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Parameters: Earthworm Tox.	Parameters: Microtox.	Preserved Yes/No	LAB USE ONLY Lab #
1	B10-N/15-S204-3	6/25/01	1310	C	Compost	Cross section 3	1	✓	✓		
2	B10-N/15-S204-5		1325			5	1	✓	✓		
3	B10-N/15-S204-7		1340			7	1	✓	✓		
4	B10-N/15-S204-9		1400			9	1	✓	✓		
5	B10-N/15-S204-11		1415			11	1	✓	✓		
6											
7											
8											
9											
10											

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	6/25/01 1520		

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____ °C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT

TOLEDO INC. Fed Ex 826 2266 1938 B10-451

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259
Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

949 Survey

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other

Project No.: 37324.01	Client:
P.O. No.:	Project/Location: NSWC Crane Biofacility
Project Mgr.:	Sampler's Name: Peter J. Chevalier
Phone No.	Sampler's Signature: [signature]

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Earthworm Tox.	Microtox.		
1	B10-N/15-S204-3	6/25/01	1310	C	Compost	Cross section 3	1	✓	✓		
2	B10-N/15-S204-5		1325			5	1	✓	✓		
3	B10-N/15-S204-7		1340			7	1	✓	✓		
4	B10-N/15-S204-9		1400			9	1	✓	✓		
5	B10-N/15-S204-11		1415			11	1	✓	✓		
6											
7											
8											
9											
10											

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	6/25/01 1530		
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time

Were samples delivered
Were samples preserved
Temp of samples
Did samples arrive intact
Were proper containers
Was container labeled p
Were samples packaged
Was shipping label com
(49 CFR 170, etc.)

Comments:

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

TOLTEST, INC. FedEx 826226601927 B10-451

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Custody Record

1919 Survey

30030 Page 1 of 1

Project No.: 37304.01

Client:

P.O. No.:

Project/Location: NSWC Crane Biofacility

Project Mgr.:

Sampler's Name: Peter J. Chevalier

Phone No.

Sampler's Signature: [signature]

Parameters: Total No. of Containers; Earthworm Tox.; Microtox.; Preserved Yes/No; LAB USE ONLY

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Earthworm Tox.	Microtox.	Preserved Yes/No	LAB USE ONLY	Lab #
1	B10-N/15-S204-3	6/25/01	1310	C	Compost	Cross section 3	1	✓	✓			
2	B10-N/15-S204-5		1325			5	1	✓	✓			
3	B10-N/15-S204-7		1340			7	1	✓	✓			
4	B10-N/15-S204-9		1400			9	1	✓	✓			
5	B10-N/15-S204-11		1415			11	1	✓	✓			
6												
7												
8												
9												
10												

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	6/25/01 1530		

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____°C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT

Original accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

TOLTEST inc. FedEx 826226601916

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259 B10-451

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Custody Record

30030 Page 1 of 1

Survey

Project No.: 37324.01	Client:		
P.O. No.:	Project/Location: NSWC Crane Biofacility		
Project Mgr.:		Sampler's Name	Peter J. Chevalier
Phone No.		Sampler's Signature	[signature]

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Parameters: Earthworm Tox.	Parameters: Microtox.							Preserved Yes/No	LAB USE ONLY Lab #
1	B10-N/15-S204-3	6/25/01	1310	C	Compost	Cross section 3	1	✓	✓								
2	B10-N/15-S204-5		1325			5	1	✓	✓								
3	B10-N/15-S204-7		1340			7	1	✓	✓								
4	B10-N/15-S204-9		1400			9	1	✓	✓								
5	B10-N/15-S204-11		1415			11	1	✓	✓								
6																	
7																	
8																	
9																	
10																	

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	[signature]	6/25/01 1530		

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____ °C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT

ASI, INC.
SAMPLE RECEIVING FORM

Client: TOL	Job #: 21-290
Shipped Via: Fed Ex	# of Shipping Containers: 5
Type of Shipping Container: Cooler	Custody Seal: Present ✓ Absent __ Broken __ / Condition of Shipping Containers: Acceptable ✓ Unacceptable __

	ASI #	Sample ID	Type of Container	Number of Containers	Condition of Samples †	Temp. °C	Ice +	Type of Sample *
1.	2011301	Soil ①	Plastic Bag	1	A	6°C	I	Soil
2.	2011302	B10-10/15-S204-5	↓	1	A	8°C	↓	↓
3.	2011303	" -S204-7	↓	1	A	7°C	↓	↓
4.	2011304	" -S204-9	↓	1	A	9°C	↓	↓
5.	2011305	" -S204-11	↓	1	A	9°C	↓	↓
6.								
7.								
8.								
9.								
10.								

NOTES: (Discrepancies Between Sample Label and COC Record)
① B10-10/15-S204-3 of 6/20/01

OPENED/ RECEIVED BY:	DATE/ TIME:
1. Michelle Fromm / Jim Dolce	6/20/01 1100
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

* S= Soil
SD= Sediment
SL= Sludge
W= Water
E= Effluent

† A= Acceptable
U= Unusable or Contaminated

\+ I= Ice
B= Blue Ice
D= Dry Ice
N= None

152

FedEx Express USA Airbill

FedEx Tracking Number 826226601971

1 From This portion can be removed for Recipient's records.

Date 6/25/01 FedEx Tracking Number 826226601971

Sender's Name ~~GLORIA MOWERY~~ PETER CHEVALIER Phone 812 854-0941

Company TOLTEST

Address 300 HWY 361 NSWC-CTR-12 Dept./Floor/Suite/Room

City CRANE State IN ZIP 47522

RECIPIENT: PEEL HERE

2 Your Internal Billing Reference

3 To Recipient's Name Aqua Survey JAMES TODD Phone 908 788-8700

Company AQUA SURVEY INC.

Address 499 POINT BREEZE Rd.

To "HOLD" at FedEx location, print FedEx address. We cannot deliver to P.O. boxes or P.O. ZIP codes.

SAMPLE RECEIVING Dept./Floor/Suite/Room

City FLEMINGTON State NJ ZIP 08822

8262 2660 1971

0175191495

4a Express Package Service

- [X] FedEx Priority Overnight — Next business morning
- [ ] FedEx 2Day* — Second business day

4b Express Freight Service

- [ ] FedEx 1Day Freight* — Next business day

* Call for Confirmation:

5 Packaging

- [ ] FedEx Envelope/Letter*

6 Special Handling

- [ ] SATURDAY Delivery — Available only for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
- [ ] SUNDAY D — Available only f Overnight to se

Does this shipment contain dangerous go

One box must be checked.

- [X] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Yes — Shipp not re

Dangerous Goods cannot be shipped in FedEx packag

7 Payment *Bill to:* Enter FedEx A

- [X] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient

Total Packages 1 Total Weig 60

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8 Release Signature Sign to authorize

By signing you authorize us to deliver this and agree to indemnify and hold us harm

Questions? Visit our Web

or call 1-800-Go-FedEx (800)463-333

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CUSTODY SEAL

Date 6/25/01

Signature

III-13

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FedEx Express USA Airbill — FedEx Tracking Number 826226601916

Recipient's Copy

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Date 6/25/01 FedEx Tracking Number 826226601916

Sender's Name GLORIA MOWERY Phone 812 854-0941

Company TOLTEST

Address 300 HWY 361 NSWC-CTR-12 Dept./Floor/Suite/Room

City CRANE State IN ZIP 47522

2 Your Internal Billing Reference

3 To Recipient's Name AQUA SURVEY JAMES TODD Phone 908 788-8700

Company AQUA SURVEY INC

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City FLEMINGTON State NJ ZIP 08822

8262 2660 1916

0175191495

4a Express Package Service *Packages up to 150 lbs.* Delivery commitment may be later in some areas.

- [x] FedEx Priority Overnight — Next business morning
- [ ] FedEx Standard Overnight — Next business afternoon
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations
- [ ] FedEx 2Day* — Second business day
- [ ] FedEx Express Saver* — Third business day

* FedEx Envelope/Letter Rate not available. Minimum charge: One-pound rate

4b Express Freight Service *Packages over 150 lbs.* Delivery commitment may be later in some areas.

- [ ] FedEx 1Day Freight* — Next business day
- [ ] FedEx 2Day Freight — Second business day
- [ ] FedEx 3Day Freight — Third business day

* Call for Confirmation:

5 Packaging * Declared value limit $500

- [ ] FedEx Envelope/Letter*
- [ ] FedEx Pak*
- [x] Other Pkg. — Includes FedEx Box, FedEx Tube, and customer pkg.

6 Special Handling Include FedEx address in Section 3.

- [ ] SATURDAY Delivery — Available only for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
- [ ] SUNDAY Delivery — Available only for FedEx Priority Overnight to select ZIP codes
- [ ] HOLD Weekday at FedEx Location — Not available with FedEx First Overnight
- [ ] HOLD Saturday at FedEx Location — Available only for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods? One box must be checked.

- [x] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Yes — Shipper's Declaration not required
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous Goods cannot be shipped in FedEx packaging.

- [ ] Cargo Aircraft Only

7 Payment *Bill to:* Enter FedEx Acct. No. or Credit Card No. below.

- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check
- [ ] Obtain Recip. Acct. No.

Total Packages	Total Weight	Total Charges
1	60#	Credit Card Auth.

†Our liability is limited to $100 unless you declare a higher value. See the *FedEx Service Guide* for details.

8 Release Signature *Sign to authorize delivery without obtaining signature.*

By signing you authorize us to deliver this shipment without obtaining a signature and agree to indemnify and hold us harmless from any resulting claims.

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III-14

CUSTODY SEAL

Date 6-25-01

Signature

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FedEx Express USA Airbill

FedEx Tracking Number 826226601949

Recipient's Copy

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Date 6/25/01 FedEx Tracking Number 826226601949

Sender's Name ~~GLORIA MOWERY~~ PETER CHEVALIER Phone 812 854-0941

Company TOLTEST

Address 300 HWY 361 NSWC-CTR-12

Dept./Floor/Suite/Room

City CRANE State IN ZIP 47522

2 Your Internal Billing Reference

3 To Recipient's Name Aqua Survey JAMES TODD Phone 908 788-8700

Company Aqua Survey

Address 499 POINT BREEZE Rd.

To "HOLD" at FedEx location, print FedEx address. We cannot deliver to P.O. boxes or P.O. ZIP codes.

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Dept./Floor/Suite/Room

City FLEMINGTON State NJ ZIP 08822

4a Express Package Service *Packages up to 150 lbs.* Delivery commitment may be later in some areas.

- [x] FedEx Priority Overnight — Next business morning
- [ ] FedEx Standard Overnight — Next business afternoon
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations
- [ ] FedEx 2Day* — Second business day
- [ ] FedEx Express Saver* — Third business day

* FedEx Envelope/Letter Rate not available. Minimum charge: One-pound rate

4b Express Freight Service *Packages over 150 lbs.* Delivery commitment may be later in some areas.

- [ ] FedEx 1Day Freight* — Next business day
- [ ] FedEx 2Day Freight — Second business day
- [ ] FedEx 3Day Freight — Third business day

* Call for Confirmation: _____

5 Packaging * Declared value limit $500

- [ ] FedEx Envelope/Letter*
- [ ] FedEx Pak*
- [x] Other Pkg. — Includes FedEx Box, FedEx Tube, and customer pkg.

6 Special Handling Include FedEx address in Section 3.

- [ ] SATURDAY Delivery — Available only for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
- [ ] SUNDAY Delivery — Available only for FedEx Priority Overnight to select ZIP codes
- [ ] HOLD Weekday at FedEx Location — Not available with FedEx First Overnight
- [ ] HOLD Saturday at FedEx Location — Available only for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods? One box must be checked.

- [x] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Yes — Shipper's Declaration not required
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous Goods cannot be shipped in FedEx packaging.

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- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check
- [ ] Obtain Recip. Acct. No.

Total Packages 1 Total Weight 60# Total Charges

Credit Card Auth.

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CUSTODY SEAL

Date 6.25.01

Signature

III-15

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FedEx Express *USA Airbill*

FedEx Tracking Number 826226601927

Recipient's Copy

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Date 6/25/01 FedEx Tracking Number 826226601927

Sender's Name ~~GLORIA MINERY~~ PETER CHEVALIER Phone 812 854-0941

Company TOLTEST

Address 300 HWY 361 NSWC-CTR-12

Dept./Floor/Suite/Room

City CRANE State IN ZIP 47522

2 Your Internal Billing Reference

3 To

Recipient's Name Aqua Survey JAMESTOWN Phone 908 788-8700

Company AQUA SURVEY

Address 499 POINT BREEZE Rd.

To "HOLD" at FedEx location, print FedEx address. We cannot deliver to P.O. boxes or P.O. ZIP codes.

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Dept./Floor/Suite/Room

City FLEMINGTON State NJ ZIP 08822

9

8262 2660 1927

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4a Express Package Service — *Packages up to 150 lbs.* Delivery commitment may be later in some areas.

- [X] FedEx Priority Overnight — Next business morning
- [ ] FedEx Standard Overnight — Next business afternoon
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations
- [ ] FedEx 2Day* — Second business day
- [ ] FedEx Express Saver* — Third business day

* FedEx Envelope/Letter Rate not available. Minimum charge: One-pound rate

4b Express Freight Service — *Packages over 150 lbs.* Delivery commitment may be later in some areas.

- [ ] FedEx 1Day Freight* — Next business day
- [ ] FedEx 2Day Freight — Second business day
- [ ] FedEx 3Day Freight — Third business day

* Call for Confirmation: _____

5 Packaging — * Declared value limit $500

- [ ] FedEx Envelope/Letter*
- [ ] FedEx Pak*
- [X] Other Pkg. — Includes FedEx Box, FedEx Tube, and customer pkg.

6 Special Handling — Include FedEx address in Section 3.

- [ ] SATURDAY Delivery — Available only for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
- [ ] SUNDAY Delivery — Available only for FedEx Priority Overnight to select ZIP codes
- [ ] HOLD Weekday at FedEx Location — Not available with FedEx First Overnight
- [ ] HOLD Saturday at FedEx Location — Available only for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods? (One box must be checked.)

- [X] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Yes — Shipper's Declaration not required
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous Goods cannot be shipped in FedEx packaging.

7 Payment *Bill to:* (Enter FedEx Acct. No. or Credit Card No. below.)

- [X] Sender — Acct. No. in Section 1 will be billed
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check
- [ ] Obtain Recip. Acct. No.

[redacted]

Total Packages 1 Total Weight 60# [redacted] Total Charges

Credit Card Auth.

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CUSTODY SEAL

Date 6-25-01

Signature [illegible]

USA Airbill

FedEx Tracking Number 826226601938

Recipient's Copy

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01 FedEx Tracking Number 826226601938

A MONTRY PETER CHEVALIER Phone 812 854-0941

ST

WY 361 NSWC-CTR-12

Dept./Floor/Suite/Room

State IN ZIP 47522

Reference

a Survey JAMES TODD Phone 908 788-8700

4 SURVEY

G POINT BREEZE Rd.

Ex address. We cannot deliver to P.O. boxes or P.O. ZIP codes.

PLE RECEIVING

Dept./Floor/Suite/Room

INGTON State NJ ZIP 08822

8262 2660 1938

0175191495

4a Express Package Service — *Packages up to 150 lbs.* Delivery commitment may be later in some areas.

- [x] FedEx Priority Overnight — Next business morning
- [ ] FedEx Standard Overnight — Next business afternoon
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations
- [ ] FedEx 2Day* — Second business day
- [ ] FedEx Express Saver* — Third business day

* FedEx Envelope/Letter Rate not available. Minimum charge: One-pound rate

4b Express Freight Service — *Packages over 150 lbs.* Delivery commitment may be later in some areas.

- [ ] FedEx 1Day Freight* — Next business day
- [ ] FedEx 2Day Freight* — Second business day
- [ ] FedEx 3Day Freight — Third business day

* Call for Confirmation: _____

5 Packaging — * Declared value limit $500

- [ ] FedEx Envelope/Letter*
- [ ] FedEx Pak*
- [x] Other Pkg. — Includes FedEx Box, FedEx Tube, and customer pkg.

6 Special Handling — Include FedEx address in Section 3.

- [ ] SATURDAY Delivery — Available only for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
- [ ] SUNDAY Delivery — Available only for FedEx Priority Overnight to select ZIP codes
- [ ] HOLD Weekday at FedEx Location — Not available with FedEx First Overnight
- [ ] HOLD Saturday at FedEx Location — Available only for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods? One box must be checked.

- [x] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Yes — Shipper's Declaration not required
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous Goods cannot be shipped in FedEx packaging.

7 Payment *Bill to:* Enter FedEx Acct. No. or Credit Card No. below.

- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check
- [ ] Obtain Recip. Acct. No.

Total Packages	Total Weight	Total Charges
1	60#	Credit Card Auth.

†Our liability is limited to $100 unless you declare a higher value. See the *FedEx Service Guide* for details.

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CUSTODY SEAL

Date 6-25-01

Signature

APPENDIX B

Microtox® and Earthworm Toxicity Report for the Control Windrow, Aqua Survey, Inc. (ASI Study #21-403)

Aqua Survey, Inc.

FINAL REPORT

**MICROTOX AND EARTHWORM TOXICITY
OF SOIL/COMPOST MIX
FOR PROJECT #37324.12
(NSWC CRANE BIOFACILITY)**

October 10, 2001

STUDY # 21-403

469 Point Breeze Road
Flemington, NJ 08822

Phone: 908/788-8700
Fax: 908/788-9165
mail@aquasurvey.com
aquasurvey.com

asi

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Signature Page 11

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C. Chains of Custody

469 Point Breeze Road, Flemington, NJ 08822 ◆ (T) 908/788-8700 ◆ (F) 908/788-9165 ◆ mail@aquasurvey.com ◆ aquasurvey.com

MICROTOX AND EARTHWORM TOXICITY TESTING OF SOIL/COMPOST MIX FOR PROJECT #37324.12 (NSWC CRANE BIOFACILITY)

DATA REQUIREMENT

Microtox -Proprietary Method
Earthworm Toxicity - EPA 600/3-88/029

STUDY COMPLETION DATE

October 10, 2001

PERFORMING LABORATORIES

Aqua Survey, Inc.
469 Point Breeze Road
Flemington, New Jersey 08822

SPONSOR

Toltest, Inc.
300 Highway 361, NSWC CTR-12
Crane, IN 47522

LABORATORY PROJECT ID

STUDY #21-403

MICROTOX AND EARTHWORM TOXICITY TESTING OF SOIL/COMPOST MIX FOR PROJECT #37324-12 (NSWC CRANE BIOFACILITY)

I. SUMMARY

One (1) sample of soil/compost mix was received by this laboratory (ASI) on 9/5/01for Microtox and Earthworm toxicity testing. For microtox testing, test organisms were exposed to four (4) concentrations of elutriate prepared by adding deionized water to the soil/compost mix. Earthworms were exposed to five (5) concentrations of the soil/compost mix. Exposure concentrations used throughout this report and in all endpoint calculations are nominal concentrations as percent elutriate for microtox testing or percent soil/compost mix for the earthworm toxicity testing. Exposure concentrations were 5.625, 11.25, 22.5 and 45 percent and 6.25, 12.5, 25, 50 and 100 percent for the microtox and earthworm test, respectively. The results are as follows:

Table 1: Summary of Results

Sample ID	ASI #	Earthworm Toxicity (%)		Microtox (%)	
		7-Day LC_{50}	14-Day LC_{50}	5-minute EC_{50}	15-minute EC_{50}
BIO-10/15-Control	2011761	69.1	58.8	>45.0	>45.0

II. INTRODUCTION

The marine bacterium, *Photobacterium phosphoreum* was exposed to concentrations of elutriate of soil/compost mix for 15 minutes and the earthworm, *Eisenia foetida* was exposed to concentrations of a soil/compost mix for 14 days in order to permit a more accurate and complete assessment of its environmental impact. Test organisms used for testing were chosen on the basis of their ecological importance. The objectives of the test were:

1) To determine if acute exposure to concentrations of elutriate or soil/compost mix would adversely affect *Photobacterium phosphoreum* or *Eisenia foetida.*

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2) If appropriate, provide an estimate of the five (5) and 15 minute EC_{50} for *Photobacterium phosphoreum* and seven (7) and 14-day LC_{50} for *Eisenia foetida.*

For the purpose of calculating or estimating an EC_{50} or LC_{50} a reduction in light levels or mortality would serve as the requisite end points, resepectively.

III. TEST ADMINISTRATION

A. Sponsor

Toltest, Inc.
300 Highway 361, NSWC CTR-12
Crane, IN 47522

B. Testing Facility

Aqua Survey, Inc.
469 Point Breeze Road
Flemington, NJ 08822

C. Dates of Experiment

Sample ID	ASI #	Collection Date	Microtox	Earthworm
BIO-10/15-Control	2011761	9/4/01	9/14/01	9/7/01

D. Study Participants

Thomas Dolce
Michelle Thomas
Chris Doyle
York Terrell

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IV. TEST AND CONTROL SUBSTANCES

A. Test Substance

The soil/compost sample used in this test was received by Aqua Survey on September 5, 2001. The sample was received in a cooler containing ice. One plastic container of the sample was received and the cooler's environmental temperatures was 7°C. The sample was identified as follows and assigned the following ASI sample number:

Sample ID #	ASI Sample ID #
BIO-10/15-Control	2011761

B. Control Substance(s)

Negative Control
Microtox: Diluent Control
Earthworm: Control Soil

C. Reference Toxicant

Earthworm: Potassium Chloride (KCl)

V. MATERIALS AND METHODS

A. Test System

The Microtox test system utilizes the marine bacterium, *Photobacterium phosphoreum*. These organisms were obtained from Azur Environmental, F.O.B., Carlsbad, California USA.

The earthworms utilized in these tests were adult *Eisenia foetida* obtained from Carolina Biological Supply Company, Burlington, North Carolina 27215-3398.

B. Source of Diluent/Control Soil

Microtox diluent is a 2% NaCl solution, used for diluting the samples and reagent. All Microtox diluent was obtained from Azur Environmental, Carlsbad, CA.

The control soil used to dilute test soil samples for the earthworm toxicity test was artificial soil prepared by this laboratory (ASI), and consisted of, by weight 10% (approximately 2.5 mm screened) sphagnum peat moss, 20% colloidal Kaolinite Clay, and 70% grade 70 silica sand.

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C. Acclimation Procedure

The Microtox Reagent (organisms) is a freeze-dried culture of a specially developed strain of the marine bacterium, *Photobacterium phosphoreum.* One vial of reagent contains roughly one hundred million test organisms. Organisms were reconstituted in one ml of diluent, and placed in the reagent well with the temperature maintained at 5° C. The sensitivity of the reagent remains essentially unchanged for 1-2 hours after reconstitution at this temperature. A 10 µl volume of organisms was transferred to each test cuvette via a pipette and acclimated to Microtox diluent and test temperature (15° C) for 15 minutes prior to test initiation.

Earthworms were received at Aqua Survey on June 21, 2001and were acclimated to test conditions (i.e. temperature and control soil) until the start of the test on September 7, 2001.

D. Diet

E. foetida were fed Magic Worm Food® during holding, and were not fed throughout the duration of testing.

E. Apparatus and Test Conditions

The Microtox Toxicity Test was conducted using a Model 500 Microtox Unit. Organisms were exposed in 2.5 ml cuvettes containing 1 ml of test solution and the test temperature was 15°C.

The Earthworm Toxicity Test was conducted in one-quart canning jars with screw-top lids with 1/16 inch diameter holes for air. The test was conducted under continuous illumination, The test temperature was 20±2°C.

F. Preparation of Test Solution and Concentrations

The elutriate used for Microtox testing was prepared by adding 50 grams dry weight of test soil/compost mix to 500 ml of deionized water. Test samples were agitated for 48 hours at 20±2° C in total darkness. After agitation was complete, the suspension was poured into centrifuge bottles and centrifuged at approximately 4200 rpm for approximately 20 minutes. The elutriate fraction was decanted and used to prepare the test solutions.

Test solutions were prepared by adding appropriate volumes of elutriate to Microtox diluent in test cuvettes. Test concentrations were 5.625, 11.25, 22.5, and 45.0%.

The concentrations for the Earthworm Toxicity test were prepared by determining the moisture fractions and water holding capacity of the soil/compost mix as well as the control/diluent soil (e.g., artificial soil). Appropriate amounts of test soil were added to artificial soil to prepare 700 grams of a geometric series of test soil concentrations (e.g., 6.25, 12.5, 25.0, 50.0, and 100.0% dry weight.) An artificial soil (only) control was also prepared. All test concentrations as well as controls were homogenized using a blender. After homogenization, 200 grams (dry weight) of each control and test concentration was placed in each of three replicate vessels for each concentration, at which time all replicate concentrations were hydrated to 75% of its respective water holding capacity using deionized water.

G. Test Procedure

The procedures used for these tests were based on accepted methodologies (1-4). Observation for light output (bioluminescence) of the Microtox organisms were made at five and fifteen minutes after test initiation. The test was initiated when the test organisms were challenged with each of four-test concentrations plus diluent control.

Observation of earthworm survival was made on days seven and fourteen after test initiation. The pH of the soil was measured in the 100% concentration at test initiation. At day 7 there was no survival of the worms in the 100% concentration, so the pH was measured then, rather than at day 14. The temperature of the test room environment was measured continuously for the duration of the test. The test started when ten test organisms were placed into each of three replicate test and control vessels. In addition, ten organisms were placed into each of three replicates for each of five concentrations of a reference toxicant (KCl) to determine the sensitivity of the test organisms.

H. EC_{50} and LC_{50} Calculations

The Microtox system is most frequently used to find the effective concentration (EC_{50}) of a sample at which the light output of the reagent is reduced by a specified percentage (i.e., the EC_{50} is the effect concentration of a sample causing a 50% decrease in the Microtox Reagent light output under defined conditions of exposure time). A computer program supplied by Microbics corporation (Azur Environmental) was used to compute point and interval (i.e., confidence interval) estimate of the EC_{50} (see Appendix I). The color of the elutriate from the test sample was so dark, that a color correction was needed for the calculation of an EC_{50}. A program was provided by Azur Environmental that enabled this to be accomplished.

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A computer program developed by C.E. Stephans and ASTM was used to compute point and interval (confidence) estimate of the LC_{50} for earthworms. The program requires the following data: the concentration of the test substance; the number of organisms exposed; and the number of organisms that died (see Appendix II). In this test, the LC_{50} is the concentration of test substance, calculated from experimentally-derived mortality that is lethal to 50% of the test population during continuous exposure over a specified period of time.

VI. Test Results

The EC_{50} value for Microtox and LC_{50} value for earthworms are summarized in Table 1. Mortality and pH for the earthworm Toxicity Tests are summarized in Tables 3-4. Raw data and LC_{50} calculations for the earthworm test are presented in Appendix II. Raw data and EC_{50} calculations for the Microtox test are presented in Appendix I.

VII. Test Validity

The following criteria for a valid test were met during the study:

A. Mean survival for the earthworm controls was 100%.

B. No abnormal occurrences (i.e., laboratory accidents) that might have influenced the outcome of the test were noted.

VIII. Discussion

During Microtox testing, observation for light output was made at five and fifteen minutes. Nothing noteworthy was observed.

Earthworms were observed for mortality at days seven and fourteen. A mortality dose response was observed for the test sample. After fourteen days, 100% mortality was observed in the 100% concentration. The pH of soil samples (including the control) measured at test initiation and at day seven ranged from 6.2 to 9.0. These values are considered to be acceptable for these organisms (1) and are not likely to have caused any adverse effects. The temperature of the test room was recorded continuously (hourly) for the duration of the test.

IX. References

1. United States Environmental Protection Agency. 1988. Protocols For Short Term Toxicity Screening of Hazardous Waste Sites. EPA/600/3-88/029.

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2. American Society for Testing and Materials (ASTM). Annual Book of ASTM Standards. 1995 Volume 11.04 "Pesticides, Resource Recovery, Hazardous Substances and Oil Spill Responses, Waste Disposal, Biological Effects. Standard Guide for Conducting a Laboratory Soil Toxicity Test with Lumbricoid Earthworm, *Eisenia foetida.*

3. United States Environmental Protection Agency. Federal Register, 40 CFR Part 503.32.

4. Microtox Manual. A Toxicity Testing Handbook. 1992. Microbics Corporation (Azur Environmental), 2232 Rutherford Road, Carlsbad, CA 92008-8883.

5. Stephan, D.E. 1977. Method for Calculating an LC_{50}. In: F.L. Mayer and J. L. Hamelink, Eds., Aquatic Toxicology and Hazard Evaluation, Spec. Tech. Publ. No. 634, American Society for Testing and Materials, Philadelphia, Pennsylvania, pp. 65-84.

6. American Society for Testing and Materials. 1988. Proposed New Standard Practice for Using Probit Analysis. ASTM Subcommittee E-47.07. Draft #4, June, 1988.

Results of Toxicity Testing with *Eisenia foetida*

All tests were stocked with 3 replicates per concentration, 10 organisms per replicate.

Table 2: Standard Reference Toxicant Test Results: *E. foetida*

Concentration KCl	7-day Total Live Count	14-day Total Live Count
Control	30	30
1250 ppm	30	29
2500 ppm	30	30
5000 ppm	30	27
10000 ppm	0	0
20000 ppm	0	0
LC_{50}	7071.0 ppm	6622.0 ppm

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Table 3: Summary of *E. foetida* % Survival

Concentration (%)	BIO-10/15 Control % Survival 7-day	14-Day
Control	100	100
6.25	100	96.7
12.5	100	100
25	100	100
50	96.7	73.3
100	0	0
LC_{50} (%)	69.1	58.8

Table 4: Summary of pH values

Sample	Initial pH	Final pH
Control	6.2	6.6
BIO-10/15 Control	9.0	8.5

Results of Microtox Testing with *Photobacterium phosphoreum*

Table 5: Results of Microtox Testing

Sample	ASI #	5 minute EC_{50}	15-minute EC_{50}
BIO-10/15-Control	2011761	>45.0	>45.0

SIGNATURE PAGE

MICROTOX AND EARTHWORM TOXICITY
OF SOIL/COMPOST MIX FOR PROJECT # 37324.12
(NSWC CRANE BIOFACILITY)

This report as well as all records and raw data were audited and found to be an accurate reflection of the study. Copies of raw data will be maintained by Aqua Survey, Inc, 469 Point Breeze Road, Flemington, New Jersey, 08822.

Joanne DerPilbosian — Date 10/10/01
Quality Assurance Officer

Thomas J. Dolce — Date 10/10/01
Study Director

Jon Doi, Ph.D. — Date 10-10-01
Vice President

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APPENDIX A

Microtox Toxicity Test

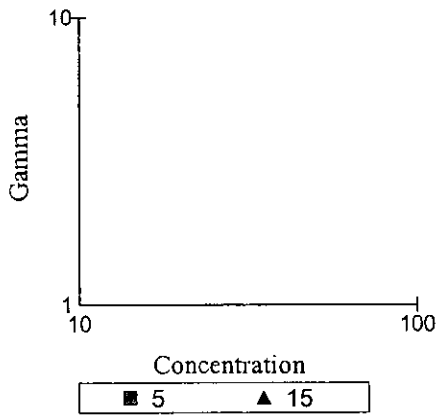
Raw Data

TOL 2011761 21-403 Color Corrected

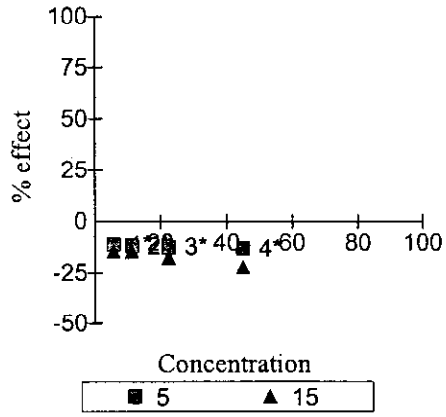
Date: 9/17/2001 09:29 AM

Test Protocol: Basic Test
Sample: TOL 2011761
Toxicant: -
Reagent Lot no.: -
Test description: TOL 21-403
Test name: TOL 21-403
Database file: C:\PROGRAM FILES\MICROTOXOMNI\db1.mdb

Plot of Gamma vs Concentration



Plot of %Effect vs Concentration



			5 Mins Data:			15 Mins Data:			
Sample	Conc	Io	It	Gamma	% effect	It	Gamma	% effect	ABSx
Control	0.000	94.00	69.00	0.7340 #		62.00	0.6596 #		
1	5.625	94.00	68.00	-0.1000 *	-11.12%	63.00	-0.1272 *	-14.57%	0.1400
2	11.25	100.00	64.00	-0.1063 *	-11.89%	59.00	-0.1289 *	-14.79%	0.2980
3	22.50	99.00	51.00	-0.1101 *	-12.37%	48.00	-0.1504 *	-17.70%	0.5880
4	45.00	97.00	34.00	-0.1166 *	-13.20%	33.00	-0.1821 *	-22.27%	1.184

- used in calculation; * - invalid data; D - deleted from calcs.

Satistical calculations could not be performed on the 5 Mins data.
Recommend re-testing at lower initial concentration or with additional dilutions.
Hormesis detected.
Lowest % effect: -13.20%

Satistical calculations could not be performed on the 15 Mins data.
Recommend re-testing at lower initial concentration or with additional dilutions.
Hormesis detected.
Lowest % effect: -22.27%

There is no QA data available for this test.

Signature:_____

Microtox Data Sheet

Client: TOL Job #: 21-403

Date Sample Collected: _____ Received: 9/5/01 Tested: 9/14/01

Osmotic Adjustment

No ___
Yes ✓

Sample #	Light Reading	Blank	5.6%	11.3%	22.5%	45%	Initial
ASI 2011761	Initial (1,0)	94	94	100	99	97	VT 9/14/01
	5 minute (1,5)	69	68	64	51	34	
	15 minute (1,15)	62	63	59	48	33	

No ___
Yes ___

Sample #	Light Reading	Blank					Initial
	Initial (1,0)						
	5 minute (1,5)						
	15 minute (1,15)						

No ___
Yes ___

Sample #	Light Reading	Blank					Initial
	Initial (1,0)						
	5 minute (1,5)						
	15 minute (1,15)						

No ___
Yes ___

Sample #	Light Reading	Blank					Initial
	Initial (1,0)						
	5 minute (1,5)						
	15 minute (1,15)						

No ___
Yes ___

Sample #	Light Reading	Blank					Initial
	Initial (1,0)						
	5 minute (1,5)						
	15 minute (1,15)						

No ___
Yes ___

Sample #	Light Reading	Blank					Initial
	Initial (1,0)						
	5 minute (1,5)						
	15 minute (1,15)						

No ___
Yes ___

Sample #	Light Reading	Blank					Initial
	Initial (1,0)						
	5 minute (1,5)						
	15 minute (1,15)						

% Transmittance (ABSx)

9/14/01 21-403 TOL #2011761

0

5.6 - .140

11.3 - .298

22.5 - .588

45 - 1.184

APPENDIX B

E. foetida Toxicity Test

Raw Data

SPEARMAN-KARBER

TRIM: .00%
LC50: 69.096
95% LOWER CONFIDENCE: 66.027
95% UPPER CONFIDENCE: 72.307

CONC. %	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	0.	.00	.9313D-07
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	1.	3.33	.2887D-05
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 68.260

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 9/7/01 TEST NUMBER: 21-403 DURATION: 7 days
SAMPLE: ASI #2011761 SPECIES: E. foetida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	68.260	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	69.096	66.027	72.307	6.281

**** = LIMIT DOES NOT EXIST

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: 1.11%
LC50: 58.765
95% LOWER CONFIDENCE: 52.368
95% UPPER CONFIDENCE: 65.944

CONC. %	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
6.25	30.	1.	3.33	.2887D-05
12.50	30.	0.	.00	.9313D-07
25.00	30.	0.	.00	.9313D-07
50.00	30.	8.	26.67	.8062D+00
100.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 50.00 AND 100.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.1938 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 59.552

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES AVERAGE ANGLES BRACKETING 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

NO CONVERGENCE IN 25 ITERATIONS. PROBIT METHOD PROBABLY CAN NOT BE USE WITH THIS SET OF DATA.

DATE: 9/7/01 TEST NUMBER: 21-403 DURATION: 14 days
SAMPLE: ASI #2011761 SPECIES: E. foetida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	59.552	50.000	100.000	50.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	58.765	52.368	65.944	13.576

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

**** = LIMIT DOES NOT EXIST

Determination of Water Holding Capacity of Soils and Sediments

ASI #	Initial Dry Wt. (g) A	Funnel Wt. (g) B	Total Wt. (g) C	Water added (mL) D	Funnel Wt. after 3 hs. E	Water holding capacity F
20117611	100.0g	157.1g	~~157.1g~~ ① 257.1g	~~100~~ 109mL	338.0g	~~100.9~~ 80.9 mL

① 257.1g 9/4/01

A = Dry weight of soil

B = Funnel weight including wet filter paper

C = Total weight of dry soil and funnel including weight of filter paper (A + B)

D = Volume of deionized water added to dry soil (A)

E = Total weight of funnel containing wet soil after 3-hours ~~(A + B + C)~~

F = Water holding capacity mL/100g (E - C)

AQUA SURVEY, INC.
PERCENT MOISTURE & HYDROSCOPIC CORRECTION FACTOR
BENCHSHEET

Balance: Sartorious Calibration: (Yes) No Client: TDL

Drying Oven: QL Model 40 Temperature: degrees C 105°C Job #: 21-403

Sample #	A	B	C	D	E	% Moisture*	HMCF**
2011761	62.2	351.3	289.1			~~78.5~~	21.5 JD mistake 9/6.
Initials			JD				
Date			9/6/01				

A = Pan Weight (g)

B = Wet Sample + Pan (g)

C = Air Dry Sample + Pan Weight (g)

D = First Oven Dry Sample + Pan Weight (g)

E = Second Oven Dry Weight + Pan Weight (g)

* % Moisture = $\frac{B - E \times 100}{B - A}$

** HMCF = (E -A)/ (C-A)

Calculation of Hydration Water For Soil Tests ASI#2011761

Just replace the soil characteristics and the concentrations in the shaded areas and the spreadsheet will do the rest!

NOTE: Hydration Water is for 100 gm, adjust accordingly!!!

Water Holding Capacity of Test Soil =	80.9 mL/100 gm
Water Holding Capacity of Control Soil =	60.5 mL/100 gm
Moisture Fraction of Test Soil =	21.5 mL/100 gm
Moisture Fraction of Control Soil =	1.92 mL/100 gm
Fraction of Hydration Needed =	0.75

(0.85 for lettuce, 0.75 for earthworms)

Concentration Series Needed	Hydration Water Needed (mLs/100gm)
0 percent	43
6.25 percent	43
12.5 percent	43
25 percent	42
50 percent	41
100 percent	39

2011761

204 gram each rep in control

		200	control		each rep 200 dry weig
6.25	56	(16)	669	(191)	207
12.5	111	(32)	624	(178)	210
25	223	(64)	535	(153)	217
50	446	(127)	357	(102)	229
100	892		0		255

21-403 Toltest, 14 Day Definitive, acute, E. foetida

Random	Samp ID	ASI No.	Samp Rep
4	Control	2011246	1.1
17		*	1.2
10		*	1.3
16	6.25 %	2011761	2.1
15		*	2.2
8		*	2.3
7	12.5 %	2011761	3.1
9		*	3.2
3		*	3.3
11	25 %	2011761	4.1
18		*	4.2
12		*	4.3
2	50 %	2011761	5.1
1		*	5.2
5		*	5.3
14	100 %	2011761	6.1
13			6.2
6			6.3

AQUA SURVEY, INC.

Client: TOL

Test Start Date: 9/7/01

Job #: 21-403

Organism: *E. foetida*

2011761

Test Chamber #	ID	Initial pH	Final pH	Initial Live Count	7 Day Live Count	14 Day Live Count
1				10	9	3
2				10	10	10
3				10	10	10
4	CONTROL	6.2	6.6	10	10	10
5				10	10	9
6	100%	9.0	8.5	10	0 10	—
7				10	10	10
8				10	10	10
9				10	10	10
10				10	10	~~9~~ ①
11				10	10	10
12				10	10	10
13				10	0 10	—
14				10	0 10	—
15				10	10	9
16				10	10	10
17				10	10	10
18				10	10	10
19						
20						
Date		9/7/01	9/14/01	9/7/01	9/14/01	9/21/01
Initials		TD	MT	YT	M	TD

① 10 TD 9/21/01

AQUA SURVEY, INC.

Client: TOC

Test Start Date: 9/7/01

Job #: 21-403

Organism: *E. foetida*

Key: D = Dead S = Surface N = Nothing Unusual

Beaker	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	N	N	N	IS	N	N	N	*9	~~N~~ 3S	~~N~~ 4S	D	D	D	D	D
2	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
3	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
4	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
6	S	D/S	D	D	D	D	D	—	—	—	—	—	—	—	—
7	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
8	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
9	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
10	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
11	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
12	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
13	S	D/S	D	D	D	D	D	—	—	—	—	—	—	—	—
14	S	D/S	D	D	D	D	D	—	—	—	—	—	—	—	—
15	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
16	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
17	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
18	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
19															
20															
Date	9/7/01	9/8/01	9/9/01	9/10/01	9/11/01	9/12/01	9/13/01	9/14/01	9/15/01	9/16/01	9/17/01	9/18/01	9/19/01	9/20/01	9/21/01
Initials	TD	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	MA	TD

* hook very weak & thin

AQUA SURVEY, INC.
LENGTH AND WEIGHT

JOB #: 21-~~430~~ 403

CLIENT: TOC

TEST SPECIES: E. Foetida

TEST DATES: 9/7/01

	Length mm	Weight ~~mg~~ gm		Length mm	Weight mg
1		0.23	11		
2		0.14	12		
3		0.29	13		
4		0.30	14		
5		0.28	15		
6		0.27	16		
7		0.25	17		
8		0.21	18		
9		0.19	19		
10		0.21	20		

Signature: [illegible]

Date: 9/7/01

Reporting time: Friday, September 21, 2001, 14:38

Recorder ID: 7005768 Deploy No: 25
State: Run
Span: 25 days, 0 hours
Interval: one hour
Samples: 599
Delay: 0 seconds
Start: 8/27/2001 15:36:06
Recover: 9/21/2001 14:36
Data source: Unit '7005768'
Trip Average: 67.1°F= 19.5°C
Trip Std Dev: 0.9°F= 0.5°C
Window: 64.4°F= 18.0°C 71.6°F= 22.0°C
Extremes: 65.3°F= 18.5°C 70.7°F= 21.5°C
Description: 8/27/2001 14:31 21-367 ACOE-KVK Reach 1 & 2,
Solid Phase
A. abdita, Bath A

Notes:

Daily summary

Date	Samples	Min	Max	Under	Over	Daily Average
8/27/2001	8	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
8/28/2001	24	67.1°F= 19.5°C	68.0°F= 20.0°C	0	0	67.1°F= 19.5°C
8/29/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	67.1°F= 19.5°C
8/30/2001	24	65.3°F= 18.5°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
8/31/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	67.1°F= 19.5°C
9/1/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	67.1°F= 19.5°C
9/2/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	67.1°F= 19.5°C
9/3/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
9/4/2001	24	66.2°F= 19.0°C	68.9°F= 20.5°C	0	0	67.1°F= 19.5°C
9/5/2001	24	68.0°F= 20.0°C	69.8°F= 21.0°C	0	0	68.9°F= 20.5°C
9/6/2001	24	67.1°F= 19.5°C	69.8°F= 21.0°C	0	0	68.0°F= 20.0°C
9/7/2001	24	67.1°F= 19.5°C	70.7°F= 21.5°C	0	0	68.9°F= 20.5°C
9/8/2001	24	67.1°F= 19.5°C	67.1°F= 19.5°C	0	0	67.1°F= 19.5°C
9/9/2001	24	67.1°F= 19.5°C	68.0°F= 20.0°C	0	0	67.1°F= 19.5°C
9/10/2001	24	66.2°F= 19.0°C	68.0°F= 20.0°C	0	0	67.1°F= 19.5°C
9/11/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	67.1°F= 19.5°C
9/12/2001	24	65.3°F= 18.5°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
9/13/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
9/14/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
9/15/2001	24	65.3°F= 18.5°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
9/16/2001	24	65.3°F= 18.5°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
9/17/2001	24	65.3°F= 18.5°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
9/18/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	66.2°F= 19.0°C
9/19/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	67.1°F= 19.5°C
9/20/2001	24	66.2°F= 19.0°C	67.1°F= 19.5°C	0	0	67.1°F= 19.5°C
9/21/2001	15	67.1°F= 19.5°C	68.0°F= 20.0°C	0	0	67.1°F= 19.5°C

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Readings

Sample	Date	Time	°F	°C	Sample	Date	Time	°F	°C
1	8/27/2001	15:36:06	66.2	19.0	51	8/29/2001	17:36:06	67.1	19.5
2	8/27/2001	16:36:06	66.2	19.0	52	8/29/2001	18:36:06	66.2	19.0
3	8/27/2001	17:36:06	66.2	19.0	53	8/29/2001	19:36:06	66.2	19.0
4	8/27/2001	18:36:06	67.1	19.5	54	8/29/2001	20:36:06	66.2	19.0
5	8/27/2001	19:36:06	66.2	19.0	55	8/29/2001	21:36:06	66.2	19.0
6	8/27/2001	20:36:06	67.1	19.5	56	8/29/2001	22:36:06	66.2	19.0
7	8/27/2001	21:36:06	66.2	19.0	57	8/29/2001	23:36:06	65.3	18.5
8	8/27/2001	22:36:06	66.2	19.0	58	8/30/2001	00:36:06	65.3	18.5
9	8/27/2001	23:36:06	67.1	19.5	59	8/30/2001	01:36:06	65.3	18.5
10	8/28/2001	00:36:06	67.1	19.5	60	8/30/2001	02:36:06	65.3	18.5
11	8/28/2001	01:36:06	67.1	19.5	61	8/30/2001	03:36:06	65.3	18.5
12	8/28/2001	02:36:06	67.1	19.5	62	8/30/2001	04:36:06	65.3	18.5
13	8/28/2001	03:36:06	67.1	19.5	63	8/30/2001	05:36:06	66.2	19.0
14	8/28/2001	04:36:06	67.1	19.5	64	8/30/2001	06:36:06	66.2	19.0
15	8/28/2001	05:36:06	67.1	19.5	65	8/30/2001	07:36:06	66.2	19.0
16	8/28/2001	06:36:06	67.1	19.5	66	8/30/2001	08:36:06	66.2	19.0
17	8/28/2001	07:36:06	67.1	19.5	67	8/30/2001	09:36:06	66.2	19.0
18	8/28/2001	08:36:06	68.0	20.0	68	8/30/2001	10:36:06	66.2	19.0
19	8/28/2001	09:36:06	68.0	20.0	69	8/30/2001	11:36:06	66.2	19.0
20	8/28/2001	10:36:06	68.0	20.0	70	8/30/2001	12:36:06	67.1	19.5
21	8/28/2001	11:36:06	68.0	20.0	71	8/30/2001	13:36:06	67.1	19.5
22	8/28/2001	12:36:06	68.0	20.0	72	8/30/2001	14:36:06	67.1	19.5
23	8/28/2001	13:36:06	68.0	20.0	73	8/30/2001	15:36:06	67.1	19.5
24	8/28/2001	14:36:06	68.0	20.0	74	8/30/2001	16:36:06	67.1	19.5
25	8/28/2001	15:36:06	68.0	20.0	75	8/30/2001	17:36:06	67.1	19.5
26	8/28/2001	16:36:06	67.1	19.5	76	8/30/2001	18:36:06	67.1	19.5
27	8/28/2001	17:36:06	67.1	19.5	77	8/30/2001	19:36:06	67.1	19.5
28	8/28/2001	18:36:06	67.1	19.5	78	8/30/2001	20:36:06	67.1	19.5
29	8/28/2001	19:36:06	67.1	19.5	79	8/30/2001	21:36:06	67.1	19.5
30	8/28/2001	20:36:06	67.1	19.5	80	8/30/2001	22:36:06	67.1	19.5
31	8/28/2001	21:36:06	67.1	19.5	81	8/30/2001	23:36:06	67.1	19.5
32	8/28/2001	22:36:06	67.1	19.5	82	8/31/2001	00:36:06	67.1	19.5
33	8/28/2001	23:36:06	67.1	19.5	83	8/31/2001	01:36:06	67.1	19.5
34	8/29/2001	00:36:06	67.1	19.5	84	8/31/2001	02:36:06	67.1	19.5
35	8/29/2001	01:36:06	67.1	19.5	85	8/31/2001	03:36:06	67.1	19.5
36	8/29/2001	02:36:06	67.1	19.5	86	8/31/2001	04:36:06	67.1	19.5
37	8/29/2001	03:36:06	67.1	19.5	87	8/31/2001	05:36:06	67.1	19.5
38	8/29/2001	04:36:06	67.1	19.5	88	8/31/2001	06:36:06	67.1	19.5
39	8/29/2001	05:36:06	67.1	19.5	89	8/31/2001	07:36:06	67.1	19.5
40	8/29/2001	06:36:06	67.1	19.5	90	8/31/2001	08:36:06	67.1	19.5
41	8/29/2001	07:36:06	67.1	19.5	91	8/31/2001	09:36:06	67.1	19.5
42	8/29/2001	08:36:06	67.1	19.5	92	8/31/2001	10:36:06	67.1	19.5
43	8/29/2001	09:36:06	67.1	19.5	93	8/31/2001	11:36:06	67.1	19.5
44	8/29/2001	10:36:06	67.1	19.5	94	8/31/2001	12:36:06	67.1	19.5
45	8/29/2001	11:36:06	67.1	19.5	95	8/31/2001	13:36:06	67.1	19.5
46	8/29/2001	12:36:06	67.1	19.5	96	8/31/2001	14:36:06	67.1	19.5
47	8/29/2001	13:36:06	67.1	19.5	97	8/31/2001	15:36:06	67.1	19.5
48	8/29/2001	14:36:06	67.1	19.5	98	8/31/2001	16:36:06	67.1	19.5
49	8/29/2001	15:36:06	67.1	19.5	99	8/31/2001	17:36:06	67.1	19.5
50	8/29/2001	16:36:06	67.1	19.5	100	8/31/2001	18:36:06	67.1	19.5

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Sample	Date	Time	°F	°C
1	8/31/2001	19:36:06	66.2	19.0
102	8/31/2001	20:36:06	67.1	19.5
103	8/31/2001	21:36:06	67.1	19.5
104	8/31/2001	22:36:06	67.1	19.5
105	8/31/2001	23:36:06	67.1	19.5
106	9/1/2001	00:36:06	67.1	19.5
107	9/1/2001	01:36:06	67.1	19.5
108	9/1/2001	02:36:06	67.1	19.5
109	9/1/2001	03:36:06	67.1	19.5
110	9/1/2001	04:36:06	67.1	19.5
111	9/1/2001	05:36:06	67.1	19.5
112	9/1/2001	06:36:06	67.1	19.5
113	9/1/2001	07:36:06	67.1	19.5
114	9/1/2001	08:36:06	67.1	19.5
115	9/1/2001	09:36:06	67.1	19.5
116	9/1/2001	10:36:06	67.1	19.5
117	9/1/2001	11:36:06	67.1	19.5
118	9/1/2001	12:36:06	67.1	19.5
119	9/1/2001	13:36:06	67.1	19.5
120	9/1/2001	14:36:06	67.1	19.5
121	9/1/2001	15:36:06	67.1	19.5
122	9/1/2001	16:36:06	67.1	19.5
123	9/1/2001	17:36:06	67.1	19.5
124	9/1/2001	18:36:06	67.1	19.5
125	9/1/2001	19:36:06	67.1	19.5
126	9/1/2001	20:36:06	66.2	19.0
127	9/1/2001	21:36:06	66.2	19.0
128	9/1/2001	22:36:06	66.2	19.0
129	9/1/2001	23:36:06	66.2	19.0
130	9/2/2001	00:36:06	66.2	19.0
131	9/2/2001	01:36:06	67.1	19.5
2	9/2/2001	02:36:06	67.1	19.5
133	9/2/2001	03:36:06	67.1	19.5
134	9/2/2001	04:36:06	67.1	19.5
135	9/2/2001	05:36:06	66.2	19.0
136	9/2/2001	06:36:06	66.2	19.0
137	9/2/2001	07:36:06	66.2	19.0
138	9/2/2001	08:36:06	67.1	19.5
139	9/2/2001	09:36:06	67.1	19.5
140	9/2/2001	10:36:06	67.1	19.5
141	9/2/2001	11:36:06	67.1	19.5
142	9/2/2001	12:36:06	67.1	19.5
143	9/2/2001	13:36:06	67.1	19.5
144	9/2/2001	14:36:06	67.1	19.5
145	9/2/2001	15:36:06	67.1	19.5
146	9/2/2001	16:36:06	67.1	19.5
147	9/2/2001	17:36:06	67.1	19.5
148	9/2/2001	18:36:06	67.1	19.5
149	9/2/2001	19:36:06	67.1	19.5
150	9/2/2001	20:36:06	67.1	19.5

Sample	Date	Time	°F	°C
151	9/2/2001	21:36:06	67.1	19.5
152	9/2/2001	22:36:06	67.1	19.5
153	9/2/2001	23:36:06	67.1	19.5
154	9/3/2001	00:36:06	66.2	19.0
155	9/3/2001	01:36:06	66.2	19.0
156	9/3/2001	02:36:06	66.2	19.0
157	9/3/2001	03:36:06	66.2	19.0
158	9/3/2001	04:36:06	66.2	19.0
159	9/3/2001	05:36:06	66.2	19.0
160	9/3/2001	06:36:06	66.2	19.0
161	9/3/2001	07:36:06	66.2	19.0
162	9/3/2001	08:36:06	66.2	19.0
163	9/3/2001	09:36:06	66.2	19.0
164	9/3/2001	10:36:06	66.2	19.0
165	9/3/2001	11:36:06	67.1	19.5
166	9/3/2001	12:36:06	67.1	19.5
167	9/3/2001	13:36:06	67.1	19.5
168	9/3/2001	14:36:06	67.1	19.5
169	9/3/2001	15:36:06	66.2	19.0
170	9/3/2001	16:36:06	66.2	19.0
171	9/3/2001	17:36:06	66.2	19.0
172	9/3/2001	18:36:06	66.2	19.0
173	9/3/2001	19:36:06	66.2	19.0
174	9/3/2001	20:36:06	66.2	19.0
175	9/3/2001	21:36:06	66.2	19.0
176	9/3/2001	22:36:06	66.2	19.0
177	9/3/2001	23:36:06	66.2	19.0
178	9/4/2001	00:36:06	66.2	19.0
179	9/4/2001	01:36:06	66.2	19.0
180	9/4/2001	02:36:06	66.2	19.0
181	9/4/2001	03:36:06	66.2	19.0
182	9/4/2001	04:36:06	66.2	19.0
183	9/4/2001	05:36:06	66.2	19.0
184	9/4/2001	06:36:06	66.2	19.0
185	9/4/2001	07:36:06	67.1	19.5
186	9/4/2001	08:36:06	66.2	19.0
187	9/4/2001	09:36:06	66.2	19.0
188	9/4/2001	10:36:06	67.1	19.5
189	9/4/2001	11:36:06	67.1	19.5
190	9/4/2001	12:36:06	67.1	19.5
191	9/4/2001	13:36:06	67.1	19.5
192	9/4/2001	14:36:06	67.1	19.5
193	9/4/2001	15:36:06	67.1	19.5
194	9/4/2001	16:36:06	66.2	19.0
195	9/4/2001	17:36:06	67.1	19.5
196	9/4/2001	18:36:06	67.1	19.5
197	9/4/2001	19:36:06	68.0	20.0
198	9/4/2001	20:36:06	68.0	20.0
199	9/4/2001	21:36:06	68.0	20.0
200	9/4/2001	22:36:06	68.9	20.5

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Sample	Date	Time	°F	°C
201	9/4/2001	23:36:06	68.9	20.5
202	9/5/2001	00:36:06	68.9	20.5
203	9/5/2001	01:36:06	68.9	20.5
204	9/5/2001	02:36:06	68.9	20.5
205	9/5/2001	03:36:06	68.9	20.5
206	9/5/2001	04:36:06	68.9	20.5
207	9/5/2001	05:36:06	68.0	20.0
208	9/5/2001	06:36:06	68.0	20.0
209	9/5/2001	07:36:06	68.0	20.0
210	9/5/2001	08:36:06	68.0	20.0
211	9/5/2001	09:36:06	68.0	20.0
212	9/5/2001	10:36:06	68.0	20.0
213	9/5/2001	11:36:06	68.9	20.5
214	9/5/2001	12:36:06	68.9	20.5
215	9/5/2001	13:36:06	68.9	20.5
216	9/5/2001	14:36:06	68.9	20.5
217	9/5/2001	15:36:06	68.9	20.5
218	9/5/2001	16:36:06	68.9	20.5
219	9/5/2001	17:36:06	68.9	20.5
220	9/5/2001	18:36:06	69.8	21.0
221	9/5/2001	19:36:06	69.8	21.0
222	9/5/2001	20:36:06	69.8	21.0
223	9/5/2001	21:36:06	68.9	20.5
224	9/5/2001	22:36:06	68.9	20.5
225	9/5/2001	23:36:06	68.9	20.5
226	9/6/2001	00:36:06	68.0	20.0
227	9/6/2001	01:36:06	68.0	20.0
228	9/6/2001	02:36:06	68.0	20.0
229	9/6/2001	03:36:06	68.0	20.0
230	9/6/2001	04:36:06	67.1	19.5
231	9/6/2001	05:36:06	67.1	19.5
232	9/6/2001	06:36:06	67.1	19.5
233	9/6/2001	07:36:06	67.1	19.5
234	9/6/2001	08:36:06	67.1	19.5
235	9/6/2001	09:36:06	67.1	19.5
236	9/6/2001	10:36:06	67.1	19.5
237	9/6/2001	11:36:06	68.0	20.0
238	9/6/2001	12:36:06	68.0	20.0
239	9/6/2001	13:36:06	68.0	20.0
240	9/6/2001	14:36:06	68.0	20.0
241	9/6/2001	15:36:06	68.0	20.0
242	9/6/2001	16:36:06	68.9	20.5
243	9/6/2001	17:36:06	68.9	20.5
244	9/6/2001	18:36:06	68.9	20.5
245	9/6/2001	19:36:06	68.9	20.5
246	9/6/2001	20:36:06	69.8	21.0
247	9/6/2001	21:36:06	69.8	21.0
248	9/6/2001	22:36:06	69.8	21.0
249	9/6/2001	23:36:06	68.9	20.5
250	9/7/2001	00:36:06	68.9	20.5

Sample	Date	Time	°F	°C
251	9/7/2001	01:36:06	68.9	20.5
252	9/7/2001	02:36:06	68.9	20.5
253	9/7/2001	03:36:06	68.0	20.0
254	9/7/2001	04:36:06	68.0	20.0
255	9/7/2001	05:36:06	68.0	20.0
256	9/7/2001	06:36:06	68.0	20.0
257	9/7/2001	07:36:06	68.0	20.0
258	9/7/2001	08:36:06	68.0	20.0
259	9/7/2001	09:36:06	68.0	20.0
260	9/7/2001	10:36:06	68.0	20.0
261	9/7/2001	11:36:06	68.9	20.5
262	9/7/2001	12:36:06	69.8	21.0
263	9/7/2001	13:36:06	70.7	21.5
264	9/7/2001	14:36:06	70.7	21.5
265	9/7/2001	15:36:06	69.8	21.0
266	9/7/2001	16:36:06	68.9	20.5
267	9/7/2001	17:36:06	68.9	20.5
268	9/7/2001	18:36:06	68.0	20.0
269	9/7/2001	19:36:06	68.0	20.0
270	9/7/2001	20:36:06	68.0	20.0
271	9/7/2001	21:36:06	67.1	19.5
272	9/7/2001	22:36:06	67.1	19.5
273	9/7/2001	23:36:06	67.1	19.5
274	9/8/2001	00:36:06	67.1	19.5
275	9/8/2001	01:36:06	67.1	19.5
276	9/8/2001	02:36:06	67.1	19.5
277	9/8/2001	03:36:06	67.1	19.5
278	9/8/2001	04:36:06	67.1	19.5
279	9/8/2001	05:36:06	67.1	19.5
280	9/8/2001	06:36:06	67.1	19.5
281	9/8/2001	07:36:06	67.1	19.5
282	9/8/2001	08:36:06	67.1	19.5
283	9/8/2001	09:36:06	67.1	19.5
284	9/8/2001	10:36:06	67.1	19.5
285	9/8/2001	11:36:06	67.1	19.5
286	9/8/2001	12:36:06	67.1	19.5
287	9/8/2001	13:36:06	67.1	19.5
288	9/8/2001	14:36:06	67.1	19.5
289	9/8/2001	15:36:06	67.1	19.5
290	9/8/2001	16:36:06	67.1	19.5
291	9/8/2001	17:36:06	67.1	19.5
292	9/8/2001	18:36:06	67.1	19.5
293	9/8/2001	19:36:06	67.1	19.5
294	9/8/2001	20:36:06	67.1	19.5
295	9/8/2001	21:36:06	67.1	19.5
296	9/8/2001	22:36:06	67.1	19.5
297	9/8/2001	23:36:06	67.1	19.5
298	9/9/2001	00:36:06	67.1	19.5
299	9/9/2001	01:36:06	67.1	19.5
300	9/9/2001	02:36:06	67.1	19.5

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Sample	Date	Time	°F	°C	Sample	Date	Time	°F	°C
1	9/9/2001	03:36:06	67.1	19.5	351	9/11/2001	05:36:06	67.1	19.5
302	9/9/2001	04:36:06	67.1	19.5	352	9/11/2001	06:36:06	67.1	19.5
303	9/9/2001	05:36:06	67.1	19.5	353	9/11/2001	07:36:06	67.1	19.5
304	9/9/2001	06:36:06	67.1	19.5	354	9/11/2001	08:36:06	67.1	19.5
305	9/9/2001	07:36:06	67.1	19.5	355	9/11/2001	09:36:06	67.1	19.5
306	9/9/2001	08:36:06	67.1	19.5	356	9/11/2001	10:36:06	67.1	19.5
307	9/9/2001	09:36:06	67.1	19.5	357	9/11/2001	11:36:06	67.1	19.5
308	9/9/2001	10:36:06	67.1	19.5	358	9/11/2001	12:36:06	67.1	19.5
309	9/9/2001	11:36:06	67.1	19.5	359	9/11/2001	13:36:06	67.1	19.5
310	9/9/2001	12:36:06	67.1	19.5	360	9/11/2001	14:36:06	66.2	19.0
311	9/9/2001	13:36:06	67.1	19.5	361	9/11/2001	15:36:06	66.2	19.0
312	9/9/2001	14:36:06	68.0	20.0	362	9/11/2001	16:36:06	66.2	19.0
313	9/9/2001	15:36:06	67.1	19.5	363	9/11/2001	17:36:06	66.2	19.0
314	9/9/2001	16:36:06	68.0	20.0	364	9/11/2001	18:36:06	66.2	19.0
315	9/9/2001	17:36:06	67.1	19.5	365	9/11/2001	19:36:06	66.2	19.0
316	9/9/2001	18:36:06	67.1	19.5	366	9/11/2001	20:36:06	66.2	19.0
317	9/9/2001	19:36:06	67.1	19.5	367	9/11/2001	21:36:06	66.2	19.0
318	9/9/2001	20:36:06	67.1	19.5	368	9/11/2001	22:36:06	66.2	19.0
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324	9/10/2001	02:36:06	67.1	19.5	374	9/12/2001	04:36:06	66.2	19.0
325	9/10/2001	03:36:06	67.1	19.5	375	9/12/2001	05:36:06	66.2	19.0
326	9/10/2001	04:36:06	67.1	19.5	376	9/12/2001	06:36:06	66.2	19.0
327	9/10/2001	05:36:06	67.1	19.5	377	9/12/2001	07:36:06	66.2	19.0
328	9/10/2001	06:36:06	67.1	19.5	378	9/12/2001	08:36:06	66.2	19.0
329	9/10/2001	07:36:06	68.0	20.0	379	9/12/2001	09:36:06	66.2	19.0
330	9/10/2001	08:36:06	67.1	19.5	380	9/12/2001	10:36:06	67.1	19.5
331	9/10/2001	09:36:06	67.1	19.5	381	9/12/2001	11:36:06	67.1	19.5
332	9/10/2001	10:36:06	68.0	20.0	382	9/12/2001	12:36:06	67.1	19.5
333	9/10/2001	11:36:06	68.0	20.0	383	9/12/2001	13:36:06	66.2	19.0
334	9/10/2001	12:36:06	68.0	20.0	384	9/12/2001	14:36:06	66.2	19.0
335	9/10/2001	13:36:06	68.0	20.0	385	9/12/2001	15:36:06	66.2	19.0
336	9/10/2001	14:36:06	67.1	19.5	386	9/12/2001	16:36:06	66.2	19.0
337	9/10/2001	15:36:06	67.1	19.5	387	9/12/2001	17:36:06	66.2	19.0
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339	9/10/2001	17:36:06	67.1	19.5	389	9/12/2001	19:36:06	66.2	19.0
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341	9/10/2001	19:36:06	67.1	19.5	391	9/12/2001	21:36:06	66.2	19.0
342	9/10/2001	20:36:06	67.1	19.5	392	9/12/2001	22:36:06	66.2	19.0
343	9/10/2001	21:36:06	67.1	19.5	393	9/12/2001	23:36:06	66.2	19.0
344	9/10/2001	22:36:06	66.2	19.0	394	9/13/2001	00:36:06	66.2	19.0
345	9/10/2001	23:36:06	66.2	19.0	395	9/13/2001	01:36:06	66.2	19.0
346	9/11/2001	00:36:06	67.1	19.5	396	9/13/2001	02:36:06	66.2	19.0
347	9/11/2001	01:36:06	67.1	19.5	397	9/13/2001	03:36:06	66.2	19.0
348	9/11/2001	02:36:06	67.1	19.5	398	9/13/2001	04:36:06	66.2	19.0
349	9/11/2001	03:36:06	67.1	19.5	399	9/13/2001	05:36:06	66.2	19.0
350	9/11/2001	04:36:06	67.1	19.5	400	9/13/2001	06:36:06	66.2	19.0

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Sample	Date	Time	°F	°C
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402	9/13/2001	08:36:06	66.2	19.0
403	9/13/2001	09:36:06	66.2	19.0
404	9/13/2001	10:36:06	66.2	19.0
405	9/13/2001	11:36:06	66.2	19.0
406	9/13/2001	12:36:06	67.1	19.5
407	9/13/2001	13:36:06	67.1	19.5
408	9/13/2001	14:36:06	67.1	19.5
409	9/13/2001	15:36:06	66.2	19.0
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422	9/14/2001	04:36:06	67.1	19.5
423	9/14/2001	05:36:06	67.1	19.5
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428	9/14/2001	10:36:06	66.2	19.0
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Sample	Date	Time	°F	°C
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456	9/15/2001	14:36:06	67.1	19.5
457	9/15/2001	15:36:06	67.1	19.5
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464	9/15/2001	22:36:06	66.2	19.0
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466	9/16/2001	00:36:06	66.2	19.0
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468	9/16/2001	02:36:06	66.2	19.0
469	9/16/2001	03:36:06	66.2	19.0
470	9/16/2001	04:36:06	65.3	18.5
471	9/16/2001	05:36:06	65.3	18.5
472	9/16/2001	06:36:06	65.3	18.5
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474	9/16/2001	08:36:06	65.3	18.5
475	9/16/2001	09:36:06	65.3	18.5
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500	9/17/2001	10:36:06	66.2	19.0

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Sample	Date	Time	°F	°C
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502	9/17/2001	12:36:06	67.1	19.5
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506	9/17/2001	16:36:06	67.1	19.5
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516	9/18/2001	02:36:06	66.2	19.0
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586	9/21/2001	00:36:06	67.1	19.5
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593	9/21/2001	07:36:06	68.0	20.0
594	9/21/2001	08:36:06	68.0	20.0
595	9/21/2001	09:36:06	68.0	20.0
596	9/21/2001	10:36:06	67.1	19.5
597	9/21/2001	11:36:06	67.1	19.5
598	9/21/2001	12:36:06	67.1	19.5
599	9/21/2001	13:36:06	67.1	19.5

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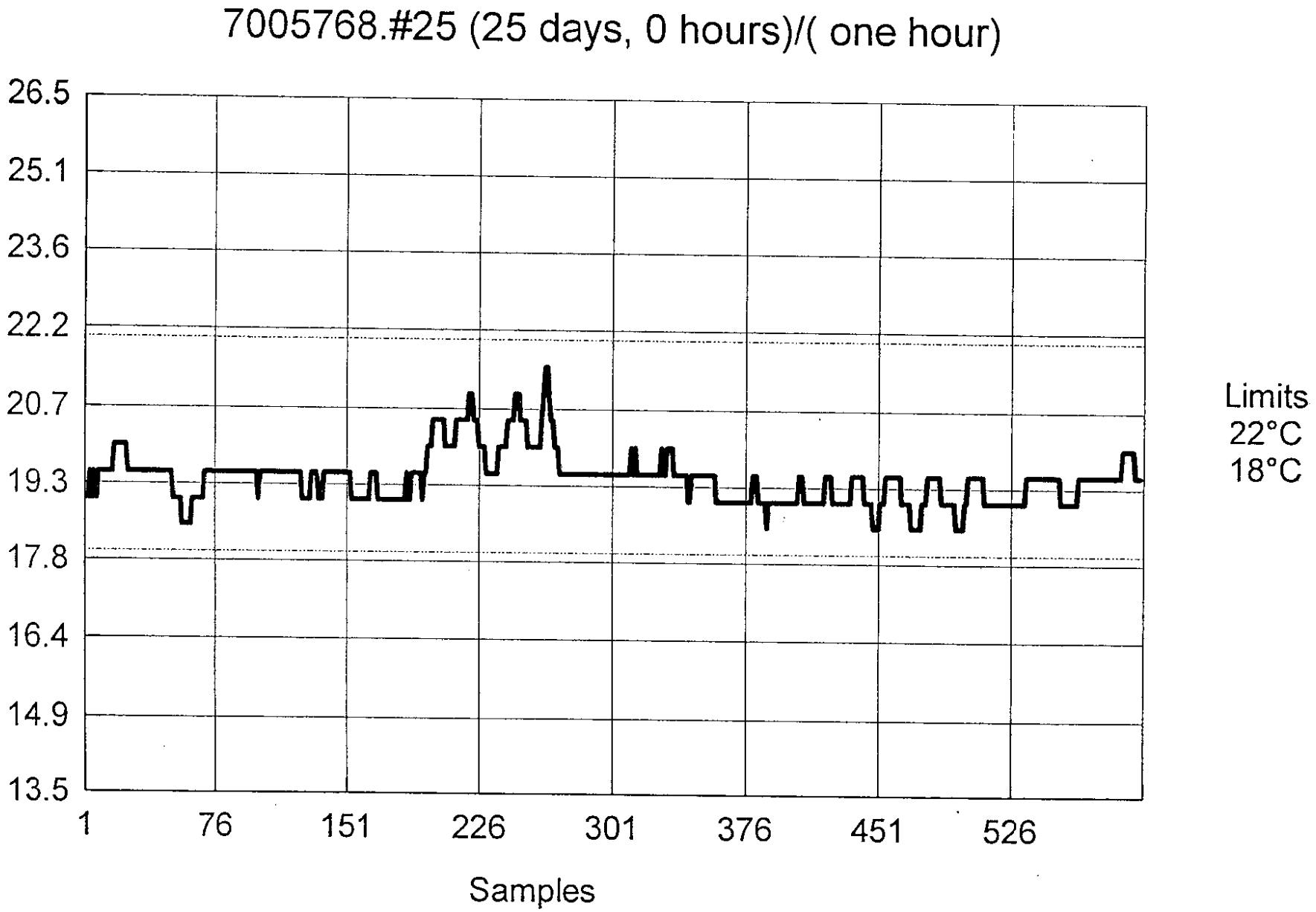
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26.5
25.1
23.6
22.2
20.7
19.3
17.8
16.4
14.9
13.5
C
1
76
151
226
301
376
451
526
Samples
Limits
22°C
18°C

AQUA SURVEY, INC.

CULTURE LABORATORY RECEIVING FORM

RECEIVING LOG #: 21-023 DATE: 6/21/01

SHIPPING CARRIER: UPS Ground CARRIER LOG #: N/A

SPECIES: E. foetida NUMBER SHIPPED: 2000+

LIVESTOCK SOURCE/SHIPPER: Carolina Bio Supply

SHIPPER INVOICE #: N/A PACKER'S NAME: N/A

ASI ORDER REF. DATE: 6/12/01 ASI REF. INITIALS: CD

AGE/CHARACTERISTICS: adults

TAXONOMIC VERIFICATION LOG #: N/A DATE: N/A

RECEIVING/WATER QUALITY PARAMETERS

D.O: * TEMP: 23.8°C NH_3/NO_2: **

SALINITY/HARDNESS: * ALK: * pH: *

WATER - CLEAR/CLOUDY CONTAINER SIZE/NUMBER: styrofoam cups / 20

OF BLUE ICE®: Ø TYPE OF PACKING: box

OBSERVATION/CONDITION OF LIVESTOCK: 1 container was mostly dead (on top) → discarded. The rest were appearing healthy. * shipped in soil

RECEIVING TECH. INIT.: CD SUPERVISORS'S INIT.: CD

PACKING LIST

IF APPLICABLE NOTIFY YOUR PAYING OFFICE ON RECEIPT OF MERCHANDISE.

F..... CA ... NA B. ... GICA . . . PLY . . . PANI
2700 YORK ROAD
BURLINGTON, NC 27215-3398
Tel: (. . . 4-555..
Fax:336-584-3399

7099886

ACCOUNTS PAYABLE
AQUA SURVEY
499 POINT BREEZE RD
FLEMINGTON NJ 08822

SHIP TO: 8

CHRIS DOYLE
AQUA SURVEY INC
469 POINT BREEZE RD
FLEMINGTON NJ 08822-4717

Dept 3767

Quote No.	Pick List No.	Requested Delivery Date	Ship Date	Ship Method	Our Order No.	Customer Purchase Order No.
	10		06/19/01	APP	1830875	DOYLE

Line	Ctn No.	Ordered	Shipped	B/O	Catalog No.	Description	Unit	Price	Extension
1		20	20		CE 141650	L409-REDWORMS RIGHT QTY	EACH		
2		1	1		CE 141672	L399B-MAGIC WORM FOOD	EACH		

AQUA SURVEY, INC.

CULTURE LAB DISTRIBUTION FORM

DATE: 9/7/01

TEST JOB#: 21-403 CLIENT: TOL

TEST LOCATION: IN-LAB [X] FIELD [ ]

TEST SPECIES: E. foetida

TOTAL NUMBER ORGANISMS TRANSFERRED: 180+

AQUA SURVEY, INC. CULTURE LAB INVESTIGATORS: CD

A. ORGANISMS

1. ASI CULTURE/HOLDING UNIT: Worm Ranch
2. RECEIVING LOG #: 21-023 Carolina Bio Supply
3. CULTURE LOG #: 21-0505
4. AGE/SIZE INFORMATION: adults

B. HOLDING [X] CULTURE [ ] WATER PARAMETERS

1. TEMPERATURE: 22.0°C
2. SALINITY: N/A
3. WATER SOURCE: N/A (1)

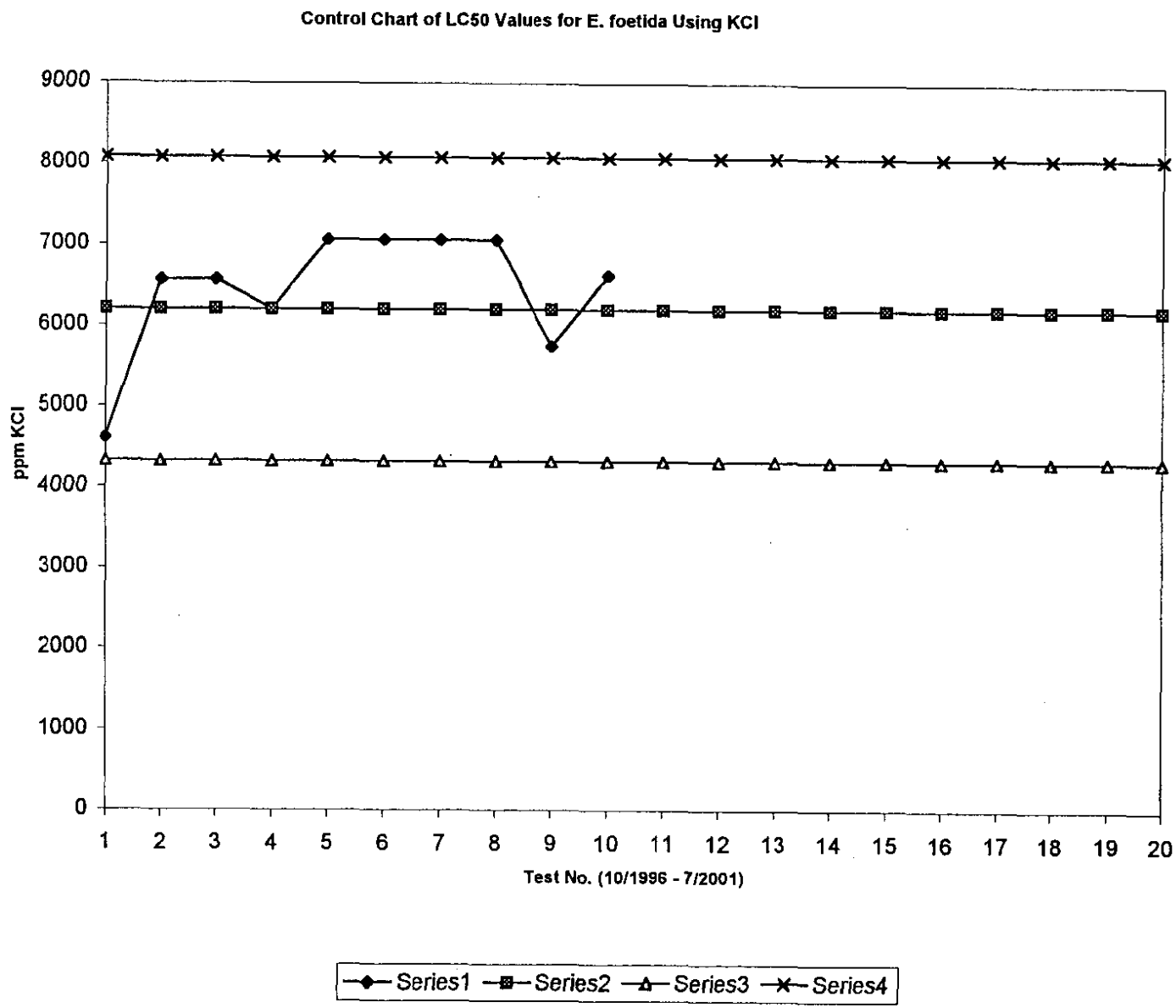
C. TRANSFER CUSTODY & TRANSFER

1. LIVESTOCK RELINQUISHMENT DATE: 9/7/01
   TIME: 1030 hrs
   BY: CD

2. LIVESTOCK RECEIVING DATE: 9/7/01
   TIME: 1030 hrs
   BY: [illegible]

3. CULTURE SUPERVISOR OR SENIOR TECH. INITIALS: CD

REMARKS: (1) organisms held in pH adjusted peat moss/ grannsil mixture.


Control Chart of LC50 Values for E. foetida Using KCl
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
ppm KCl
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Test No. (10/1996 - 7/2001)
Series1
Series2
Series3
Series4

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: .00%
LC50: 7.071
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
1.25	30.	0.	.00	.9313D-07
2.50	30.	0.	.00	.9313D-07
5.00	30.	0.	.00	.9313D-07
10.00	30.	30.	100.00	.9313D-07
20.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 5.00 AND 10.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 100.0000 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 7.071

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISCALLY SOUND RESULTS.

DATE: 6/28/01 TEST NUMBER: DURATION: 7 days
SAMPLE: KCl SPECIES: E. foetida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	7.071	5.000	10.000	5.000
MAA	*******	*******	*******	*******
PROBIT	*******	*******	*******	*******
SPEARMAN	7.071	*******	*******	*******

**** = LIMIT DOES NOT EXIST

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM:	1.67%
LC50:	6.622
95% LOWER CONFIDENCE:	6.111
95% UPPER CONFIDENCE:	7.176

CONC. ppt	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
1.25	30.	1.	3.33	.2887D-05
2.50	30.	0.	.00	.9313D-07
5.00	30.	3.	10.00	.4215D-03
10.00	30.	30.	100.00	.9313D-07
20.00	30.	30.	100.00	.9313D-07

THE BINOMIAL TEST SHOWS THAT 5.00 AND 10.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9996 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 6.550

RESULTS USING MOVING AVERAGE

SPAN	G	LC50	95% CONFIDENCE LIMIT	
4	.040	6.16	5.13	7.52

****** RESULTS CALCULATED BY PROBIT METHOD

ITERATIONS	G	H	GOODNESS OF FIT
11	61.347	235.78	.00

A PROBABILITY OF 0 MEANS LESS THAN 0.001

SLOPE = 5.62
95% CONFIDENCE LIMITS: -38.43 AND 49.67

LC50= 6.18
95% CONFIDENCE LIMITS: 0 AND + INFINITY

LC1 = 2.38
95% CONFIDENCE LIMITS: 0 AND + INFINITY

DATE: 6/28/01 TEST NUMBER: SRT 21-2 DURATION: 14 Days
SAMPLE: KCl SPECIES: E. foetida

METHOD	LC50	CONFIDENCE LIMITS LOWER	UPPER	SPAN
BINOMIAL	6.550	5.000	10.000	5.000
MAA	6.158	5.131	7.519	2.387
PROBIT	6.177	*******	*******	*******
SPEARMAN	6.622	6.111	7.176	1.065

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

**** = LIMIT DOES NOT EXIST

X 1000 to convert to ppm.

JRD
7/12/01

ACUTE 14 DAY STANDARD REFERENCE TOXICANT

Stock and Treatments Preparation Sheet
**** ALL UNITS ARE MG/L UNLESS OTHERWISE SPECIFIED****

Source of Dilution Water: DI H_2O
Date: 6/28/01

Species: *E. foetida* or *L. terrestris*
Location: ASI Flemington, NJ

TOXICANT: Potassium chloride

Source/Lot No.: 19909A0

Prepare Stock Solution (mg/L) by adding
50 g to 500 ml volumetric flask with DI water

Conc. ppm	*E. foetida* ml Stock solution	*L. terrestis* ml of Stock solution	Total Volume, ml
0	0	0	Hydration volume
1250	2.5	6.25	86
2500	5.0	12.5	
5000	10.0	25.0	
10000	20.0	50.0	
20000	40.0	100.0	

Each volume of stock solution is added as part of total hydration water, which is then added to 200 g dry weight of artificial soil for each *E. foetida* replicate, and 500 g dry weight of artificial soil for *L. terrestis* replicate.

Prepared by: TD/MT

AQUA SURVEY, INC.
EARTHWORM LIVE COUNT

Start Date: 6/28/01

Start Time: 1400

Job #: 21-290

Sample ID: SAT/KCl

Sample ID	Rep	DAY 0	DAY 7	DAY 14
Control	1	10	10	10
	2	10	10	10
	3	10	10	10
pH INITIAL 5.7	FINAL 7.1		xx	xx
18250 ppm	1	10	10	9
	2	10	10	10
	3	10	10	10
pH			xx	xx
2500 ppm	1	10	10	10
	2	10	10	10
	3	10	10	10
pH			xx	xx
5000 ppm	1	10	10	10
	2	10	10	9
	3	10	10	8
pH			xx	xx
10,000 ppm	1	10	0	—
	2	10	0	—
	3	10	0	—
pH			xx	xx
20,000 ppm	1	10	0	—
	2	10	0	—
	3	10	0	—
pH			xx	xx
Initials		AF	AF	TD
Date		6/28/01	7/5/01	7/12/01

	Temperature	Initials
Day 0:	21.5	[illegible]
Day 1:		
Day 2:		
Day 3:		
Day 4:		
Day 5:		
Day 6:		
Day 7:		
Day 8:		
Day 9:		
Day 10:		
Day 11:		
Day 12:		
Day 13:		
Day 14:	21.0	TD

Notes:

AQUA SURVEY, INC.

CULTURE LABORATORY RECEIVING FORM

RECEIVING LOG #: 21-023 DATE: 6/21/01

SHIPPING CARRIER: UPS Ground CARRIER LOG #: N/A

SPECIES: E. foetida NUMBER SHIPPED: 2000+

LIVESTOCK SOURCE/SHIPPER: Carolina Bio Supply

SHIPPER INVOICE #: N/A PACKER'S NAME: N/A

ASI ORDER REF. DATE: 6/12/01 ASI REF. INITIALS: CD

AGE/CHARACTERISTICS: adults

TAXONOMIC VERIFICATION LOG #: N/A DATE: N/A

RECEIVING/WATER QUALITY PARAMETERS

D.O: * TEMP: 23.8°C NH_3/NO_2: **

SALINITY/HARDNESS: * ALK: * pH: *

WATER - CLEAR/CLOUDY CONTAINER SIZE/NUMBER: Styrofoam cups / 20

OF BLUE ICE®: Ø TYPE OF PACKING: box

OBSERVATION/CONDITION OF LIVESTOCK: 1 container was mostly dead (on top) → discarded. The rest were appearing healthy.

RECEIVING TECH. INIT.: CD SUPERVISORS'S INIT.: CD

PACKING LIST

IF APPLICABLE NOTIFY YOUR PAYING OFFICE ON RECEIPT OF MERCHANDISE.

7099886

ACCOUNTS PAYABLE
AQUA SURVEY
499 POINT BREEZE RD
FLEMINGTON NJ 08822

FROM: CAROLINA BIOLOGICAL SUPPLY COMPANY
2700 YORK ROAD
BURLINGTON, NC 27215-3398

Tel: 800-334-5551
Fax: 336-584-3399

SHIP TO: 8

CHRIS DOYLE
AQUA SURVEY INC
469 POINT BREEZE RD
FLEMINGTON NJ 08822-4717

Dept 3767

Quote No.	Pick List No.	Requested Delivery Date	Ship Date	Ship Method	Our Order No.	Customer Purchase Order No.
	10		06/19/01	APP	1830875	DOYLE

Line	Cin No.	Ordered	Shipped	B/O	Catalog No.	Description	Unit	Price	Extension
1		20	20		CE 141650	L409-REDWORMS RIGHT QTY	EACH		
2		1	1		CE 141672	L399B-MAGIC WORM FOOD	EACH		

AQUA SURVEY, INC.
CULTURE LABORATORY

15 Day - General Species Status Log

Species: E. foetida Dates: 6/21/01-2

Receiving [X] Culture [ ] Log #: 21-023 Initial Stock @: 2000+

Test Job #: 21-290 Client: TOL Food Type: Magic Worm.

Date	Day Number	Temp/DO	NH_3/NO_3	pH	Sal/Hardness	Alkalinity	Mortality	Remarks/Initials
6/21	1	23.8°C/–	–/–	6.4 (1)	—	—	(2)	(3) CI Fed Magic worm fo
6/22	2	22.5°C/–	–/–	—	—	—	—	Moistened Trays C
6/23	3	22.0°C/–	–/–	—	—	—	—	Fed CI
6/24	4	22.0°C/–	–/–	—	—	—	—	Moistened Trays CI
6/25	5	22.5°C/–	–/–	—	—	—	—	Fed Trays CI
6/26	6	22.0°C/–	–/–	6.7 (1)	—	—	—	Fed/Moistened Trays CI
6/27	7	22.5°C/–	–/–	—	—	—	—	Fed CI
6/28	8	22.0°C/–	–/–	—	—	—	—	1000+ to Test. C Remained combined in
	9							
	10							
	11							
	12							
	13							
	14							
	15							

(1) Soil pH
(2) one container (of 20) discarded due to mortality on arrival.
(3) Held in (2) trays w/ moist peat moss (pH adjusted).

AQUA SURVEY, INC.

CULTURE LAB DISTRIBUTION FORM

DATE: 6/28/01

TEST JOB#: SCT CLIENT: In house

TEST LOCATION: IN-LAB [X] FIELD [ ]

TEST SPECIES: E. foetida

TOTAL NUMBER ORGANISMS TRANSFERRED: 1407

AQUA SURVEY, INC. CULTURE LAB INVESTIGATORS: CD

A. ORGANISMS

1. ASI CULTURE/HOLDING UNIT: (2) worm ranches
2. RECEIVING LOG #: 21-023 Carolina Bio Suppl.
3. CULTURE LOG #: 21-0361
4. AGE/SIZE INFORMATION: adults

B. HOLDING [Y] CULTURE [ ] WATER PARAMETERS

1. TEMPERATURE: 22.0°C
2. SALINITY: N/A
3. WATER SOURCE: N/A (1)

C. TRANSFER CUSTODY & TRANSFER

1. LIVESTOCK RELINQUISHMENT DATE: 6/28/01
   TIME: 1315 hrs
   BY: CD

2. LIVESTOCK RECEIVING DATE: 6/28/01
   TIME: 1315 hrs
   BY: [illegible]

3. CULTURE SUPERVISOR OR SENIOR TECH. INITIALS: CD

REMARKS: (1) Held in pH adjusted peat moss.

APPENDIX C

Chains of Custody

TOLTEST, INC. Fedex 827102644613 BKU-463

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Custody Record

36652 Page 1 of 1

Aqua Survey

Project No.: 37324.12	Client:
P.O. No.:	Project/Location: NSWC Crane Bioffacility
Project Mgr.:	Sampler's Name John Lytle
Phone No.	Sampler's Signature

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Parameters: Earthworm Tox	Parameters: Microtox							Preserved Yes/No	LAB USE ONLY Lab #
1	BKU-10/15 Control	9/4/01	1305	C	compost	Control window	1	✓	✓								
2	2011761																
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	John Lytle	9/4/01 1530	Tom Dohe	9/5/01 1130

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____ °C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

ASI, INC.
SAMPLE RECEIVING FORM

Client: TOL	Job #: 21-403
Shipped Via: FEDEX	# of Shipping Containers: 1
Type of Shipping Container: Cooler	Custody Seal: Present X ~~Absent X~~ Broken __ / Condition of Shipping Containers: Acceptable X Unacceptable __

	ASI #	Sample ID	Type of Container	Number of Containers	Condition of Samples †	Temp. °C	Ice +	Type of Sample *
1.	201761	Bio-10/15-CONTROL	plastic bucket	1	A	7°C	I	S
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								

NOTES: (Discrepancies Between Sample Label and COC Record)

OPENED/ RECEIVED BY:	DATE/TIME:
1. Tom Doke	9/5/01 1130
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

*	†	+
S= Soil	A= Acceptable	I= Ice
SD= Sediment	U= Unusable or Contaminated	B= Blue Ice
SL= Sludge		D= Dry Ice
W= Water		N= None
E= Effluent		

FedEx. USA Airbill Express

FedEx Tracking Number 8277 0264 4613

Recipient's Copy

RECIPIENT: PEEL HERE

1 From This portion can be removed for Recipient's records.

Date 9/4/01 FedEx Tracking Number 8277 0264 4613

Sender's Name Peter Chevalier Phone 812 854-0941

Company TOLTEST

Address 300 HWY 361 NSWC-CTR-12 Dept./Floor/Suite/Room

City CRANE State IN ZIP 47522

2 Your Internal Billing Reference 37324.12

3 To

Recipient's Name Tom Dolce Phone 908 788-8700

Company Aqua Survey

Address 469 Point Breeze Rd.

To "HOLD" at FedEx location, print FedEx address. We cannot deliver to P.O. boxes or P.O. ZIP codes.

Dept./Floor/Suite/Room

City Flemington State NJ ZIP 08822

8277 0264 4613

0185692928

4a Express Package Service — Packages up to 150 lbs. Delivery commitment may be later in some areas.

- [x] FedEx Priority Overnight — Next business morning
- [ ] FedEx Standard Overnight — Next business afternoon
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations
- [ ] FedEx 2Day — Second business day
- [ ] FedEx Express Saver — Third business day
- [ ] NEW FedEx Extra Hours — Later drop-off with next business afternoon delivery for select locations

FedEx Envelope rate not available. Minimum charge: One-pound rate

4b Express Freight Service — Packages over 150 lbs. Delivery commitment may be later in some areas.

- [ ] FedEx 1Day Freight* — Next business day
- [ ] FedEx 2Day Freight — Second business day
- [ ] FedEx 3Day Freight — Third business day

* Call for Confirmation:

5 Packaging

- [ ] FedEx Envelope*
- [ ] FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak
- [x] Other Pkg. — Includes FedEx Box, FedEx Tube, and customer pkg.

* Declared value limit $500

6 Special Handling

Include FedEx address in Section 3.

- [ ] SATURDAY Delivery — Available only for FedEx Priority Overnight and FedEx 2Day to select ZIP codes
- [ ] SUNDAY Delivery — Available only for FedEx Priority Overnight to select ZIP codes
- [ ] HOLD Weekday at FedEx Location — Not available with FedEx First Overnight
- [ ] HOLD Saturday at FedEx Location — Available only for FedEx Priority Overnight and FedEx 2Day to select locations

Does this shipment contain dangerous goods? One box must be checked.

- [x] No
- [ ] Yes — As per attached Shipper's Declaration
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous Goods (incl. Dry Ice) cannot be shipped in FedEx packaging or with FedEx Extra Hours service.

7 Payment Bill to: Enter FedEx Acct. No. or Credit Card No. below.

- [x] Sender — Acct. No. in Section 1 will be billed
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check
- [ ] Obtain Recip. Acct. No.

[redacted]

Total Packages 1 Total Weight 60 # [redacted] Total Charges

Credit Card Auth.

†Our liability is limited to $100 unless you declare a higher value. See the *FedEx Service Guide* for details.

8 Release Signature — *Sign to authorize delivery without obtaining signature.*

By signing you authorize us to deliver this shipment without obtaining a signature and agree to indemnify and hold us harmless from any resulting claims.

Questions? Visit our Web site at fedex.com or call 1-800-Go-FedEx® (800)463-3339.

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APPENDIX C

Pathogen Testing Results for Windrow S-204, Pure Earth Environmental Lab, Inc.

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343231
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-3

FECAL COLI/BIOSOLIDS

FECAL COLIFORM/GRAM SOLID	<2.418	MPN/g

Method:
40 CFR PART 503;
18TH ED STANDARD METHODS
9221E.1, 9221 C
Allowable Limits:
<1000 MPN/g TOTAL DRY WEIGHT

TOTAL SOLIDS % DRY WEIGHT	82.7	%

REPORT AMMENDED
ANALYST JJ
DATE JUL 27 2001
REASON typo

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343231
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-3

SALMONELLA SP

SALMONELLA sp	<0.097	MPN/4g

Method:
40 CFR PART 503; 18TH ED
STANDARD METHODS 9260D.1

Allowable Limits:
CLASS A NOT TO EXCEED
3 MPN/4g TOTAL DRY WEIGHT

Report Date/Time 07/27/01 15:59:14

REPORT AMMENDED
ANALYST JJ
DATE JUL 27 2001
REASON typo

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343232
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-5

FECAL COLI/BIOSOLIDS

FECAL COLIFORM/GRAM SOLID	<2.460	MPN/g

Method:
40 CFR PART 503;
18TH ED STANDARD METHODS
9221E.1, 9221 C
Allowable Limits:
<1000 MPN/g TOTAL DRY WEIGHT

TOTAL SOLIDS % DRY WEIGHT	81.3	%

REPORT AMMENDED
ANALYST JJ
DATE JUL 27 2001
REASON TYPO

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343232
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-5

SALMONELLA SP

SALMONELLA sp	<0.098	MPN/4g

Method:
40 CFR PART 503; 18TH ED
STANDARD METHODS 9260D.1

Allowable Limits:
CLASS A NOT TO EXCEED
3 MPN/4g TOTAL DRY WEIGHT

Report Date/Time 07/27/01 15:59:14

REPORT AMMENDED
ANALYST
DATE JUL 27 2001
REASON FYDU

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343233
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-7

FECAL COLI/BIOSOLIDS

FECAL COLIFORM/GRAM SOLID	<2.621	MPN/g

Method:
40 CFR PART 503;
18TH ED STANDARD METHODS
9221E.1, 9221 C
Allowable Limits:
<1000 MPN/g TOTAL DRY WEIGHT

TOTAL SOLIDS % DRY WEIGHT	76.3	%

REPORT AMMENDED
ANALYST
DATE JUL 27 2001
REASON Typo

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343233
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-7

SALMONELLA SP

SALMONELLA sp	<0.105	MPN/4g

Method:
40 CFR PART 503; 18TH ED
STANDARD METHODS 9260D.1

Allowable Limits:
CLASS A NOT TO EXCEED
3 MPN/4g TOTAL DRY WEIGHT

Report Date/Time 07/27/01 15:59:14

REPORT AMMENDED
ANALYST
DATE JUL 27 2001
REASON typo

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343234
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-9

FECAL COLI/BIOSOLIDS

FECAL COLIFORM/GRAM SOLID	<2.463	MPN/g

Method:
40 CFR PART 503;
18TH ED STANDARD METHODS
9221E.1, 9221 C
Allowable Limits:
<1000 MPN/g TOTAL DRY WEIGHT

TOTAL SOLIDS % DRY WEIGHT	81.2	%

REPORT AMMENDED
ANALYST
DATE JUL 27 2001
REASON typo

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343234
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-9

SALMONELLA SP

SALMONELLA sp	<0.099	MPN/4g

Method:
40 CFR PART 503; 18TH ED
STANDARD METHODS 9260D.1

Allowable Limits:
CLASS A NOT TO EXCEED
3 MPN/4g TOTAL DRY WEIGHT

Report Date/Time 07/27/01 15:59:14

REPORT AMMENDED
ANALYST JJ
DATE JUL 27 2001
REASON typo

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343235
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-11

FECAL COLI/BIOSOLIDS

FECAL COLIFORM/GRAM SOLID	<2.933	MPN/g

Method:
40 CFR PART 503;
18TH ED STANDARD METHODS
9221E.1, 9221 C
Allowable Limits:
<1000 MPN/g TOTAL DRY WEIGHT

TOTAL SOLIDS % DRY WEIGHT	68.2	%

REPORT AMMENDED
ANALYST
DATE JUL 27 2001
REASON TYPO

PURE EARTH ENVIRONMENTAL LAB., INC.
7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343235
Date Collected 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-S204-11

SALMONELLA SP

SALMONELLA sp	<0.117	MPN/4g

Method:
40 CFR PART 503; 18TH ED
STANDARD METHODS 9260D.1

Allowable Limits:
CLASS A NOT TO EXCEED
3 MPN/4g TOTAL DRY WEIGHT

Report Date/Time 07/27/01 15:59:14

REPORT AMMENDED
ANALYST
DATE JUL 27 2001
REASON typo

PURE EARTH ENVIRONMENTAL LAB., INC.

7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343236
Date Collected: 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BLANK

FECAL COLI/BIOSOLIDS

FECAL COLIFORM/GRAM SOLID	NEG	MPN/g

Method:
40 CFR PART 503;
18TH ED STANDARD METHODS
9221E.1, 9221 C
Allowable Limits:
<1000 MPN/g TOTAL DRY WEIGHT

TOTAL SOLIDS % DRY WEIGHT	N/A	%

Theodore J Passon PhD
Laboratory Director

PURE EARTH ENVIRONMENTAL LAB., INC.

7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01065196
Accession No.: 343236
Date Collected: 06/25/01
Date Received: 06/26/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BLANK

SALMONELLA SP

SALMONELLA sp	NEG	MPN/4g

Method:
40 CFR PART 503; 18TH ED
STANDARD METHODS 9260D.1

Allowable Limits:
CLASS A NOT TO EXCEED
3 MPN/4g TOTAL DRY WEIGHT

Report Date/Time 07/06/01 10:51:00

Theodore J Passon Jr PhD
Laboratory Director

TOLTEST INC.

FedEx 826226651960

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 7 175, Fax (419) 321-6259 BKU-450

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other

PureEarth

Chain of Custody Record

30031 Page 1 of 1

Project No.: 37304.01	Client:
P.O. No.:	Project/Location: NSWC Crane Bio facility
Project Mgr.:	Sampler's Name: Peter J. Chevalier
Phone No.	Sampler's Signature:

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Salmonella	Fecal Coliform							Preserved Yes/No	LAB USE ONLY Lab #
1	BKU-10/15-S204-3	6/25/01	1310	C	composit	cross section 3	1	✓	✓								
2	BKU-10/15-S204-5		1325			5	1	✓	✓								
3	BKU-10/15-S204-7		1340			7	1	✓	✓								
4	BKU-N/15-S204-9		1400			9	1	✓	✓								
5	BKU-N/15-S204-11		1415			11	1	✓	✓								
6	blank	6/25/01	1430	—	—	trip blank	1	✓	✓								
7				analysis		by 40CFR Part 503											
8																	
9																	
10																	

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	Peter J. Chevalier	6/25/01 1530		

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples ____ °C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments:

TAT

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

APPENDIX D

Pathogen Testing Results for the Control Windrow, Pure Earth Environmental Lab, Inc.

PURE EARTH ENVIRONMENTAL LAB., INC.

7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01096150
Accession No.: 349678
Date Collected: 09/04/01
Date Received: 09/05/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-CONTROL

FECAL COLI/BIOSOLIDS

FECAL COLIFORM/GRAM SOLID	<2.525	MPN/g

Method:
40 CFR PART 503;
18TH ED STANDARD METHODS
9221E.1, 9221 C
Allowable Limits:
<1000 MPN/g TOTAL DRY WEIGHT

TOTAL SOLIDS % DRY WEIGHT	79.2	%

Theodore J Passon Jr, Ph.D
Laboratory Director

PURE EARTH ENVIRONMENTAL LAB., INC.

7184 North Park Drive
Pennsauken, NJ 08110
Phone: (856) 486-1177
FAX: (856) 486-0005

T.J. Passon JR., PH.D.
LABORATORY DIRECTOR

L A B O R A T O R Y R E P O R T

Toltest, Inc.
1915 N. 12TH ST.
PO BOX 2186
TOLEDO OH 43603-2186

(419) 241-7175

Job Number: 01096150
Accession No.: 349678
Date Collected: 09/04/01
Date Received: 09/05/01
Toltest, Inc.
NSWC CRANE BIOFACILI
BIO-10/15-CONTROL

SALMONELLA SP

SALMONELLA sp	<0.101	MPN/4g

Method:
40 CFR PART 503; 18TH ED
STANDARD METHODS 9260D.1

Allowable Limits:
CLASS A NOT TO EXCEED
3 MPN/4g TOTAL DRY WEIGHT

Report Date/Time 09/18/01 09:14:34

Theodore J. Passon PhD
Laboratory Director

TOLTEST INC. Fed Ex 827702644624

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 241-7175, Fax (419) 321-6259 B10-465

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

Pure Earth

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Custody Record

36651 Page 1 of 1

Project No.: 37324 and 12	Client:		
P.O. No.:	Project/Location: NSWC Crane BioFacility		
Project Mgr.:		Sampler's Name John Lytle	
Phone No.		Sampler's Signature John Lytle	

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	Salmonella	Total Coliform	EFCOB	Esolw					Preserved Yes/No	LAB USE ONLY Lab #
1	B10-10/15-Control	9/4/01	1305	C	compost	Control window	2	✓	✓	↓	↓						
2																	
3						analysis by 40CFR Part 503											
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Parameters

Item No.	Relinquished By:	Date	Time	Received By:	Date	Time
	John Lytle	9/4/01	1530	PEEC [signature]	9/5/01	10:00

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____ °C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT _____

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

APPENDIX E

Explosives Leachability Results

Sample Results for SDG: 46839

SiteID: BIO1015S2043 **Field ID:** TCLP
Sample Date: 06/25/01 **Lab Number:** 46839.01

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	128	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

SiteID: BIO1015S2045 **Field ID:** TCLP
Sample Date: 06/25/01 **Lab Number:** 46839.04

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	129 P	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

* = Indicates Result Exceeded Residential Limit ** = Indicates Result Exceeded Industrial Limit

Sample Results for SDG: 46839

SiteID: BIO1015S2047 **Field ID:** TCLP
Sample Date: 06/25/01 **Lab Number:** 46839.05

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	48.9 PJ	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

SiteID: BIO1015S2049 **Field ID:** TCLP
Sample Date: 06/25/01 **Lab Number:** 46839.06

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	51.8 PJ	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

* = Indicates Result Exceeded Residential Limit ** = Indicates Result Exceeded Industrial Limit

Sample Results for SDG: 46839

SiteID: BIO1015S20411 **Field ID:** TCLP
Sample Date: 06/25/01 **Lab Number:** 46839.07

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	40.2 PJ	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

Notes:

B (organics) = detected in corresponding method blank
¯ (metals) = reported value is greater that instrument detection limit but less reporting limit
= secondary dilution required for analysis
E = Value greater than highest calibration standard
J = Estimated value; value greater than MDL but below Reporting Limit
P = Greater than 40% difference detected between the two GC columns
U = Not detected
UGKG = µg/kg or ppb UGL = µg/L or ppb
MGKG = mg/kg or ppm MGL = mg/L or ppm

Sample Results for SDG: 46838

SiteID: BIO1015S2043 **Field ID:** SPLP
Sample Date: 06/25/01 **Lab Number:** 46838.01

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	118	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

SiteID: BIO1015S2045 **Field ID:** SPLP
Sample Date: 06/25/01 **Lab Number:** 46838.04

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	46.4 PJ	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

* = Indicates Result Exceeded Residential Limit ** = Indicates Result Exceeded Industrial Limit

Sample Results for SDG: 46838

SiteID: BIO1015S2047 **Field ID:** SPLP
Sample Date: 06/25/01 **Lab Number:** 46838.05

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	100 U	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

SiteID: BIO1015S2049 **Field ID:** SPLP
Sample Date: 06/25/01 **Lab Number:** 46838.06

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	27 PJ	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

* = Indicates Result Exceeded Residential Limit ** = Indicates Result Exceeded Industrial Limit

Sample Results for SDG: 46838

SiteID: BIO1015S20411 **Field ID:** SPLP
Sample Date: 06/25/01 **Lab Number:** 46838.07

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	22.5 PJ	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

Notes:

B (organics) = detected in corresponding method blank
B (metals) = reported value is greater that instrument detection limit but less reporting limit
= secondary dilution required for analysis
E = Value greater than highest calibration standard
J = Estimated value; value greater than MDL but below Reporting Limit
P = Greater than 40% difference detected between the two GC columns
U = Not detected
UGKG = µg/kg or ppb UGL = µg/L or ppb
MGKG = mg/kg or ppm MGL = mg/L or ppm

TOLL INC. FedEx 826226601950

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 24. .75, Fax (419) 321-6259 BU-449

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

SWL

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Cus' .y Record

30032 Page 1 of 1

Project No.: 37324.01	Client:		
P.O. No.:	Project/Location: NSWC Crane Bio-facility		
Project Mgr.:		Sampler's Name: Peter J. Chevalier	
Phone No.		Sampler's Signature:	

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	TCLP EXP	SPLP EXP						Preserved Yes/No	LAB USE ONLY Lab #
1	BU-N/15-S204-3	6/25/01	1310	C	compost	cross section 3	1	–	–			MS/MSD				
2	BU-N/15-S204-5		1325			5	1	–	–							
3	BU-N/15-S204-7		1340			7	1	–	–							
4	BU-N/15-S204-9		1400			9	1	–	–							
5	BU-N/15-S204-11		1415			11	1	–	–							
6																
7						Full explosives list performed										
8						on leached extract										
9																
10																

Parameters

Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
	Peter J. Chevalier	6/25/01 1530		
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time
Item No.	Relinquished By:	Date / Time	Received By:	Date / Time

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____°C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT _____

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

Sample Results for SDG: 47490

SiteID: BIO1015CONTR
Sample Date: 09/04/01

Field ID: TCLP
Lab Number: 47490.01

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	100 U	UGL		
NITROBENZENE	100 U	UGL		
RDX	6.19 PJ	UGL		
TETRYL	100 U	UGL		

Notes:

B (organics) = detected in corresponding method blank
(metals) = reported value is greater that instrument detection limit but less reporting limit
D = secondary dilution required for analysis
E = Value greater than highest calibration standard
J = Estimated value; value greater than MDL but below Reporting Limit
P = Greater than 40% difference detected between the two GC columns
U = Not detected
UGKG = µg/kg or ppb UGL = µg/L or ppb
MGKG = mg/kg or ppm MGL = mg/L or ppm

Sample Results for SDG: 47489

SiteID: BIO1015CONTR
Sample Date: 09/04/01

Field ID: SPLP
Lab Number: 47489.01

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	100 U	UGL		
1,3-DINITROBENZENE	100 U	UGL		
2,4,6-TRINITROTOLUENE	100 U	UGL		
2,4-DINITROTOLUENE	100 U	UGL		
2,6-DINITROTOLUENE	100 U	UGL		
2-AMINO-4,6-DINITROTOLUENE	100 U	UGL		
2-NITROTOLUENE	100 U	UGL		
3-NITROTOLUENE	100 U	UGL		
4-AMINO-2,6-DINITROTOLUENE	100 U	UGL		
4-NITROTOLUENE	100 U	UGL		
HMX	100 U	UGL		
NITROBENZENE	100 U	UGL		
RDX	100 U	UGL		
TETRYL	100 U	UGL		

Notes:

B (organics) = detected in corresponding method blank
B (metals) = reported value is greater that instrument detection limit but less reporting limit
D = secondary dilution required for analysis
E = Value greater than highest calibration standard
J = Estimated value; value greater than MDL but below Reporting Limit
P = Greater than 40% difference detected between the two GC columns
U = Not detected
UGKG = µg/kg or ppb UGL = µg/L or ppb
MGKG = mg/kg or ppm MGL = mg/L or ppm

TOLTEST, INC. FedEx

1915 N. 12th St., P.O. Box 2186, Toledo, OH 43603-2186; Voice (419) 24 '5, Fax (419) 321-6259 BIU-464

Ship To Address: ATTN: RECEIVING LAB, 1810 N. 12th St., Toledo, OH 43624-1304; Voice (419) 241-7175, Fax (419) 241-1808

SanMarst Labs

Sent From: ☐ Corporate ☐ Plymouth ☐ Pittsburgh ☐ Other _____

Chain of Custody Record

36650 Page 1 of 1

Project No.: 37324.01.12	Client:		
P.O. No.:	Project/Location: NSWC Crane Bio-Facility		
Project Mgr.:		Sampler's Name	John Lythle
Phone No.		Sampler's Signature	

Item No.	Sample I.D.	Date Sampled	Time Sampled	Type	Matrix	Sample Location	Total No. of Containers	8330	TCLP*	SPLP*						Preserved Yes/No	LAB USE ONLY Lab #
1	B/O-10/15-Control	9/4/01	1305	C	compost	Control Window	3	✓	✓	✓							
2																	
3						*Full explosives list performed											
4						on a leached extract											
5																	
6																	
7																	
8																	
9																	
10																	

Item No.	Relinquished By:	Date	Time	Received By:	Date	Time
		9/4/01	1530			

LAB USE ONLY

Were samples delivered ☐ in person ☐ by courier

Were samples preserved ☐ in field ☐ in lab ☐ N/A

Temp of samples _____°C

Did samples arrive intact and sealed? ☐ yes ☐ no ☐ N/A

Were proper containers used? ☐ yes ☐ no

Was container labeled properly for contents? ☐ yes ☐ no

Were samples packaged properly for type of material? ☐ yes ☐ no

Was shipping label completed properly per regulations? (49 CFR 170, etc.) ☐ yes ☐ no

Comments: _____

TAT

Distribution: Original plus one accompanies shipment (white and yellow); copy to coordinator field files (pink)

Rev. 4/99

APPENDIX F

Explosive Concentration Summary Report for Windrow S-204

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG		
135TNB	05/31/01	05/31/01	0	03	1		173	J
					2	LT	476	
					3		122	J
				Average Concentration for Cross Section 03 :			*257*	
135TNB	05/31/01	05/31/01	0	05	1	LT	500	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 05 :			*492*	
135TNB	05/31/01	05/31/01	0	07	1		231	J
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 07 :			*402*	
135TNB	05/31/01	05/31/01	0	09	1	LT	476	
					2	LT	476	
					3	LT	476	
				Average Concentration for Cross Section 09 :			*476*	
135TNB	05/31/01	05/31/01	0	11	1	LT	476	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 11 :			*484*	

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 422

Standard Deviation: 130

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
135TNB	05/31/01	06/25/01	25	03	1	LT	500
					2	LT	500
					3	LT	476
				Average Concentration for Cross Section 03 :			*492*
135TNB	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
135TNB	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*484*
135TNB	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
				Average Concentration for Cross Section 09 :			*469*
135TNB	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 486

Standard Deviation: 17

Percent Reduction of 135TNB: Not Applicable; Sample Results Below Reporting Limit

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration	UGKG
13DNB	05/31/01	05/31/01	0	03	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 03 :			*492*
13DNB	05/31/01	05/31/01	0	05	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
13DNB	05/31/01	05/31/01	0	07	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*492*
13DNB	05/31/01	05/31/01	0	09	1	LT	476
					2	LT	476
					3	LT	476
				Average Concentration for Cross Section 09 :			*476*
13DNB	05/31/01	05/31/01	0	11	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*484*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 487

Standard Deviation: 12

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration	UGKG
13DNB	05/31/01	06/25/01	25	03	1	LT	500
					2	LT	500
					3	LT	476
				Average Concentration for Cross Section 03 :			*492*
13DNB	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
13DNB	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*484*
13DNB	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
				Average Concentration for Cross Section 09 :			*469*
13DNB	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 486

Standard Deviation: 17

Percent Reduction of 13DNB: 0.27

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
246TNT	05/31/01	05/31/01	0	03	1		5800
					2	LT	476
					3		5260
				Average Concentration for Cross Section 03 :			*3845*
246TNT	05/31/01	05/31/01	0	05	1		1990
					2		2410
					3		1760
				Average Concentration for Cross Section 05 :			*2053*
246TNT	05/31/01	05/31/01	0	07	1		7940
					2		1410
					3		3310
				Average Concentration for Cross Section 07 :			*4220*
246TNT	05/31/01	05/31/01	0	09	1		1170
					2		1490
					3		3000
				Average Concentration for Cross Section 09 :			*1887*
246TNT	05/31/01	05/31/01	0	11	1		3880
					2		1370
					3		2330
				Average Concentration for Cross Section 11 :			*2527*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 2906

Standard Deviation: 2046

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
246TNT	05/31/01	06/25/01	25	03	1	LT	500
					2		867
					3	LT	476
				Average Concentration for Cross Section 03 :			*614*
246TNT	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
246TNT	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*484*
246TNT	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
				Average Concentration for Cross Section 09 :			*469*
246TNT	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 510

Standard Deviation: 100

Percent Reduction of 246TNT: 82.44

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
24DNT	05/31/01	05/31/01	0	03	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 03 :			*492*
24DNT	05/31/01	05/31/01	0	05	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
24DNT	05/31/01	05/31/01	0	07	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*492*
24DNT	05/31/01	05/31/01	0	09	1	LT	476
					2	LT	476
					3	LT	476
				Average Concentration for Cross Section 09 :			*476*
24DNT	05/31/01	05/31/01	0	11	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*484*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 487

Standard Deviation: 12

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
24DNT	05/31/01	06/25/01	25	03	1	LT	500
					2	LT	500
					3	LT	476
				Average Concentration for Cross Section 03 :			*492*
24DNT	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
24DNT	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*484*
24DNT	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
				Average Concentration for Cross Section 09 :			*469*
24DNT	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 486

Standard Deviation: 17

Percent Reduction of 24DNT: 0.27

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
26DNT	05/31/01	05/31/01	0	03	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 03 :			*492*
26DNT	05/31/01	05/31/01	0	05	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
26DNT	05/31/01	05/31/01	0	07	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*492*
26DNT	05/31/01	05/31/01	0	09	1	LT	476
					2	LT	476
					3	LT	476
				Average Concentration for Cross Section 09 :			*476*
26DNT	05/31/01	05/31/01	0	11	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*484*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 487

Standard Deviation: 12

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
26DNT	05/31/01	06/25/01	25	03	1	LT	500
					2	LT	500
					3	LT	476
				Average Concentration for Cross Section 03 :			*492*
26DNT	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
26DNT	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*484*
26DNT	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
				Average Concentration for Cross Section 09 :			*469*
26DNT	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 486

Standard Deviation: 17

Percent Reduction of 26DNT: 0.27

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG		
2A46DT	05/31/01	05/31/01	0	03	1		382	J
					2	LT	476	
					3		416	J
				Average Concentration for Cross Section 03 :			*425*	
2A46DT	05/31/01	05/31/01	0	05	1		204	J
					2		251	J
					3	LT	500	
				Average Concentration for Cross Section 05 :			*318*	
2A46DT	05/31/01	05/31/01	0	07	1		562	
					2		137	J
					3		312	J
				Average Concentration for Cross Section 07 :			*337*	
2A46DT	05/31/01	05/31/01	0	09	1	LT	476	
					2	LT	476	
					3	LT	476	
				Average Concentration for Cross Section 09 :			*476*	
2A46DT	05/31/01	05/31/01	0	11	1		332	J
					2	LT	476	
					3		375	J
				Average Concentration for Cross Section 11 :			*394*	

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 390

Standard Deviation: 122

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG		
2A46DT	05/31/01	06/25/01	25	03	1	LT	500	
					2	LT	500	
					3	LT	476	
				Average Concentration for Cross Section 03 :			*492*	
2A46DT	05/31/01	06/25/01	25	05	1		47.8	J
					2		120	J
					3		45.7	J
				Average Concentration for Cross Section 05 :			*71*	
2A46DT	05/31/01	06/25/01	25	07	1	LT	476	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 07 :			*484*	
2A46DT	05/31/01	06/25/01	25	09	1	LT	454	
					2	LT	454	
					3	LT	500	
				Average Concentration for Cross Section 09 :			*469*	
2A46DT	05/31/01	06/25/01	25	11	1	LT	500	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 11 :			*492*	

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 402

Standard Deviation: 173

Percent Reduction of 2A46DT: Not Applicable; Sample Results Below Reporting Limit

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
2NT	05/31/01	05/31/01	0	03	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 03 :			*492*
2NT	05/31/01	05/31/01	0	05	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
2NT	05/31/01	05/31/01	0	07	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*492*
2NT	05/31/01	05/31/01	0	09	1	LT	476
					2	LT	476
					3	LT	476
				Average Concentration for Cross Section 09 :			*476*
2NT	05/31/01	05/31/01	0	11	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*484*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 487

Standard Deviation: 12

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
2NT	05/31/01	06/25/01	25	03	1	LT	500
					2	LT	500
					3	LT	476
				Average Concentration for Cross Section 03 :			*492*
2NT	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
2NT	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*484*
2NT	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
				Average Concentration for Cross Section 09 :			*469*
2NT	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 486

Standard Deviation: 17

Percent Reduction of 2NT: 0.27

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
3NT	05/31/01	05/31/01	0	03	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 03 :			*492*
3NT	05/31/01	05/31/01	0	05	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
3NT	05/31/01	05/31/01	0	07	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*492*
3NT	05/31/01	05/31/01	0	09	1	LT	476
					2	LT	476
					3	LT	476
				Average Concentration for Cross Section 09 :			*476*
3NT	05/31/01	05/31/01	0	11	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*484*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 487

Standard Deviation: 12

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
3NT	05/31/01	06/25/01	25	03	1	LT	500
					2	LT	500
					3	LT	476
				Average Concentration for Cross Section 03 :			*492*
3NT	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
3NT	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*484*
3NT	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
				Average Concentration for Cross Section 09 :			*469*
3NT	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 486

Standard Deviation: 17

Percent Reduction of 3NT: 0.27

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG		
4A26DT	05/31/01	05/31/01	0	03	1		3040	
					2	LT	476	
					3		2860	
				Average Concentration for Cross Section 03 :				*2125*
4A26DT	05/31/01	05/31/01	0	05	1		1220	
					2		1480	
					3		932	
				Average Concentration for Cross Section 05 :				*1211*
4A26DT	05/31/01	05/31/01	0	07	1		4120	
					2		1740	
					3		1860	
				Average Concentration for Cross Section 07 :				*2573*
4A26DT	05/31/01	05/31/01	0	09	1	LT	476	
					2		702	
					3		1150	
				Average Concentration for Cross Section 09 :				*776*
4A26DT	05/31/01	05/31/01	0	11	1		2300	
					2	LT	476	
					3		1430	
				Average Concentration for Cross Section 11 :				*1402*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 1617

Standard Deviation: 1070

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG		
4A26DT	05/31/01	06/25/01	25	03	1	LT	500	
					2	LT	500	
					3	LT	476	
				Average Concentration for Cross Section 03 :				*492*
4A26DT	05/31/01	06/25/01	25	05	1		236	J
					2		265	J
					3		176	J
				Average Concentration for Cross Section 05 :				*226*
4A26DT	05/31/01	06/25/01	25	07	1		187	J
					2		162	J
					3		74.2	J
				Average Concentration for Cross Section 07 :				*141*
4A26DT	05/31/01	06/25/01	25	09	1	LT	454	
					2		124	J
					3	LT	500	
				Average Concentration for Cross Section 09 :				*359*
4A26DT	05/31/01	06/25/01	25	11	1	LT	500	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 11 :				*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 342

Standard Deviation: 168

Percent Reduction of 4A26DT: 78.85

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration	UGKG	
4NT	05/31/01	05/31/01	0	03	1		343	J
					2		565	
					3	LT	500	
					Average Concentration for Cross Section 03 :			*469*
4NT	05/31/01	05/31/01	0	05	1	LT	500	
					2	LT	476	
					3	LT	500	
					Average Concentration for Cross Section 05 :			*492*
4NT	05/31/01	05/31/01	0	07	1	LT	500	
					2	LT	476	
					3	LT	500	
					Average Concentration for Cross Section 07 :			*492*
4NT	05/31/01	05/31/01	0	09	1	LT	476	
					2	LT	476	
					3	LT	476	
					Average Concentration for Cross Section 09 :			*476*
4NT	05/31/01	05/31/01	0	11	1	LT	476	
					2		639	
					3		565	
					Average Concentration for Cross Section 11 :			*560*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 498

Standard Deviation: 63

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration	UGKG
4NT	05/31/01	06/25/01	25	03	1	LT	500
					2	LT	500
					3	LT	476
					Average Concentration for Cross Section 03 :		*492*
4NT	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
					Average Concentration for Cross Section 05 :		*492*
4NT	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
					Average Concentration for Cross Section 07 :		*484*
4NT	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
					Average Concentration for Cross Section 09 :		*469*
4NT	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
					Average Concentration for Cross Section 11 :		*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 486

Standard Deviation: 17

Percent Reduction of 4NT: 2.41

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG
HMX	05/31/01	05/31/01	0	03	1	215000
					2	5920
					3	213000
				Average Concentration for Cross Section 03 :		*144640*
HMX	05/31/01	05/31/01	0	05	1	81500
					2	101000
					3	46200
				Average Concentration for Cross Section 05 :		*76233*
HMX	05/31/01	05/31/01	0	07	1	246000
					2	50300
					3	132000
				Average Concentration for Cross Section 07 :		*142767*
HMX	05/31/01	05/31/01	0	09	1	20300
					2	80200
					3	132000
				Average Concentration for Cross Section 09 :		*77500*
HMX	05/31/01	05/31/01	0	11	1	177000
					2	55300
					3	53900
				Average Concentration for Cross Section 11 :		*95400*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 107308

Standard Deviation: 75551

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG
HMX	05/31/01	06/25/01	25	03	1	LT 500
					2	6680
					3	10300
				Average Concentration for Cross Section 03 :		*5827*
HMX	05/31/01	06/25/01	25	05	1	LT 476
					2	7690
					3	4270
				Average Concentration for Cross Section 05 :		*4145*
HMX	05/31/01	06/25/01	25	07	1	LT 476
					2	2640
					3	750
				Average Concentration for Cross Section 07 :		*1289*
HMX	05/31/01	06/25/01	25	09	1	LT 454
					2	10200
					3	5080
				Average Concentration for Cross Section 09 :		*5245*
HMX	05/31/01	06/25/01	25	11	1	LT 500
					2	900
					3	3520
				Average Concentration for Cross Section 11 :		*1640*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 3629

Standard Deviation: 3608

Percent Reduction of HMX: 96.62

Windrow Number: S204

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration*	UGKG
NB	05/31/01	05/31/01	0	03	1	LT	500
					2	LT	476
					3	LT	500
					Average Concentration for Cross Section 03 :		*492*
NB	05/31/01	05/31/01	0	05	1	LT	500
					2	LT	476
					3	LT	500
					Average Concentration for Cross Section 05 :		*492*
NB	05/31/01	05/31/01	0	07	1	LT	500
					2	LT	476
					3	LT	500
					Average Concentration for Cross Section 07 :		*492*
NB	05/31/01	05/31/01	0	09	1	LT	476
					2	LT	476
					3	LT	476
					Average Concentration for Cross Section 09 :		*476*
NB	05/31/01	05/31/01	0	11	1	LT	476
					2	LT	476
					3	LT	500
					Average Concentration for Cross Section 11 :		*484*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 487

Standard Deviation: 12

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration*	UGKG
NB	05/31/01	06/25/01	25	03	1	LT	500
					2	LT	500
					3	LT	476
					Average Concentration for Cross Section 03 :		*492*
NB	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
					Average Concentration for Cross Section 05 :		*492*
NB	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
					Average Concentration for Cross Section 07 :		*484*
NB	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
					Average Concentration for Cross Section 09 :		*469*
NB	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
					Average Concentration for Cross Section 11 :		*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 486

Standard Deviation: 17

Percent Reduction of NB: 0.27

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG
RDX	05/31/01	05/31/01	0	03	1	31700
					2	2880
					3	43500
				Average Concentration for Cross Section 03 :		*26027*
RDX	05/31/01	05/31/01	0	05	1	15100
					2	15100
					3	48800
				Average Concentration for Cross Section 05 :		*26333*
RDX	05/31/01	05/31/01	0	07	1	42900
					2	14100
					3	23200
				Average Concentration for Cross Section 07 :		*26733*
RDX	05/31/01	05/31/01	0	09	1	9150
					2	19000
					3	25500
				Average Concentration for Cross Section 09 :		*17883*
RDX	05/31/01	05/31/01	0	11	1	32800
					2	24200
					3	12400
				Average Concentration for Cross Section 11 :		*23133*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 24022

Standard Deviation: 13561

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG	
RDX	05/31/01	06/25/01	25	03	1	LT	500
					2	LT	500
					3	LT	476
				Average Concentration for Cross Section 03 :			*492*
RDX	05/31/01	06/25/01	25	05	1	LT	476
					2	LT	500
					3	LT	500
				Average Concentration for Cross Section 05 :			*492*
RDX	05/31/01	06/25/01	25	07	1	LT	476
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 07 :			*484*
RDX	05/31/01	06/25/01	25	09	1	LT	454
					2	LT	454
					3	LT	500
				Average Concentration for Cross Section 09 :			*469*
RDX	05/31/01	06/25/01	25	11	1	LT	500
					2	LT	476
					3	LT	500
				Average Concentration for Cross Section 11 :			*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 486

Standard Deviation: 17

Percent Reduction of RDX: 97.98

Windrow Number: S204

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG		
TETRYL	05/31/01	05/31/01	0	03	1	LT	500	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 03 :				*492*
TETRYL	05/31/01	05/31/01	0	05	1	LT	500	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 05 :				*492*
TETRYL	05/31/01	05/31/01	0	07	1	LT	500	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 07 :				*492*
TETRYL	05/31/01	05/31/01	0	09	1	LT	476	
					2	LT	476	
					3	LT	476	
				Average Concentration for Cross Section 09 :				*476*
TETRYL	05/31/01	05/31/01	0	11	1	LT	476	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 11 :				*484*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 0 : 487

Standard Deviation: 12

Compound	Construction Date	Date Sampled	DaysOld	CrossSection	Location	Concentration UGKG		
TETRYL	05/31/01	06/25/01	25	03	1	LT	500	
					2	LT	500	
					3	LT	476	
				Average Concentration for Cross Section 03 :				*492*
TETRYL	05/31/01	06/25/01	25	05	1		0.588	J
					2		36.8	J
					3	LT	500	
				Average Concentration for Cross Section 05 :				*179*
TETRYL	05/31/01	06/25/01	25	07	1	LT	476	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 07 :				*484*
TETRYL	05/31/01	06/25/01	25	09	1	LT	454	
					2	LT	454	
					3	LT	500	
				Average Concentration for Cross Section 09 :				*469*
TETRYL	05/31/01	06/25/01	25	11	1	LT	500	
					2	LT	476	
					3	LT	500	
				Average Concentration for Cross Section 11 :				*492*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : 423

Standard Deviation: 165

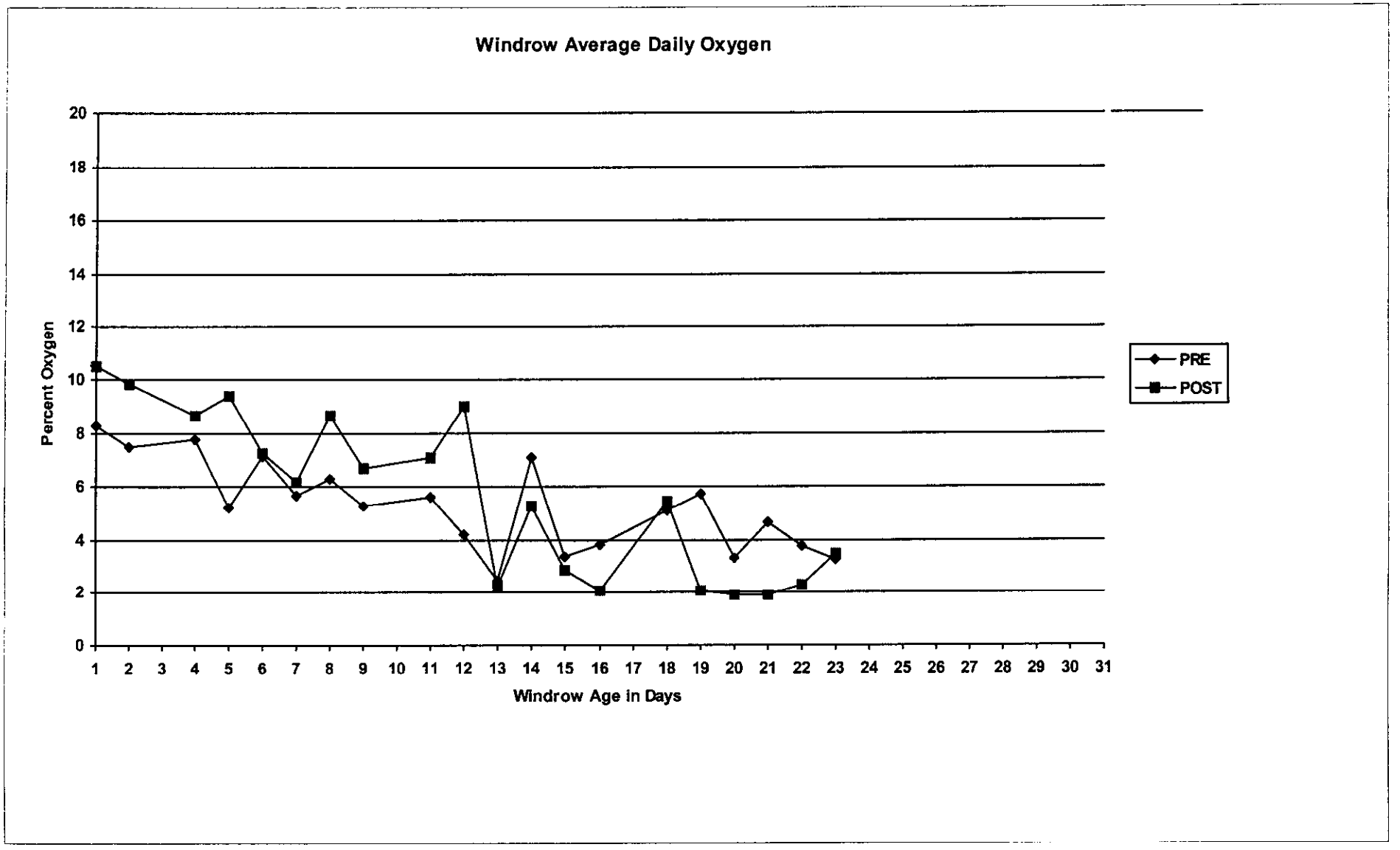
Percent Reduction of TETRYL: 13.12

APPENDIX G

Windrow S-204 Daily Process Data

NSWC Crane BioFacility Full Scale Operations

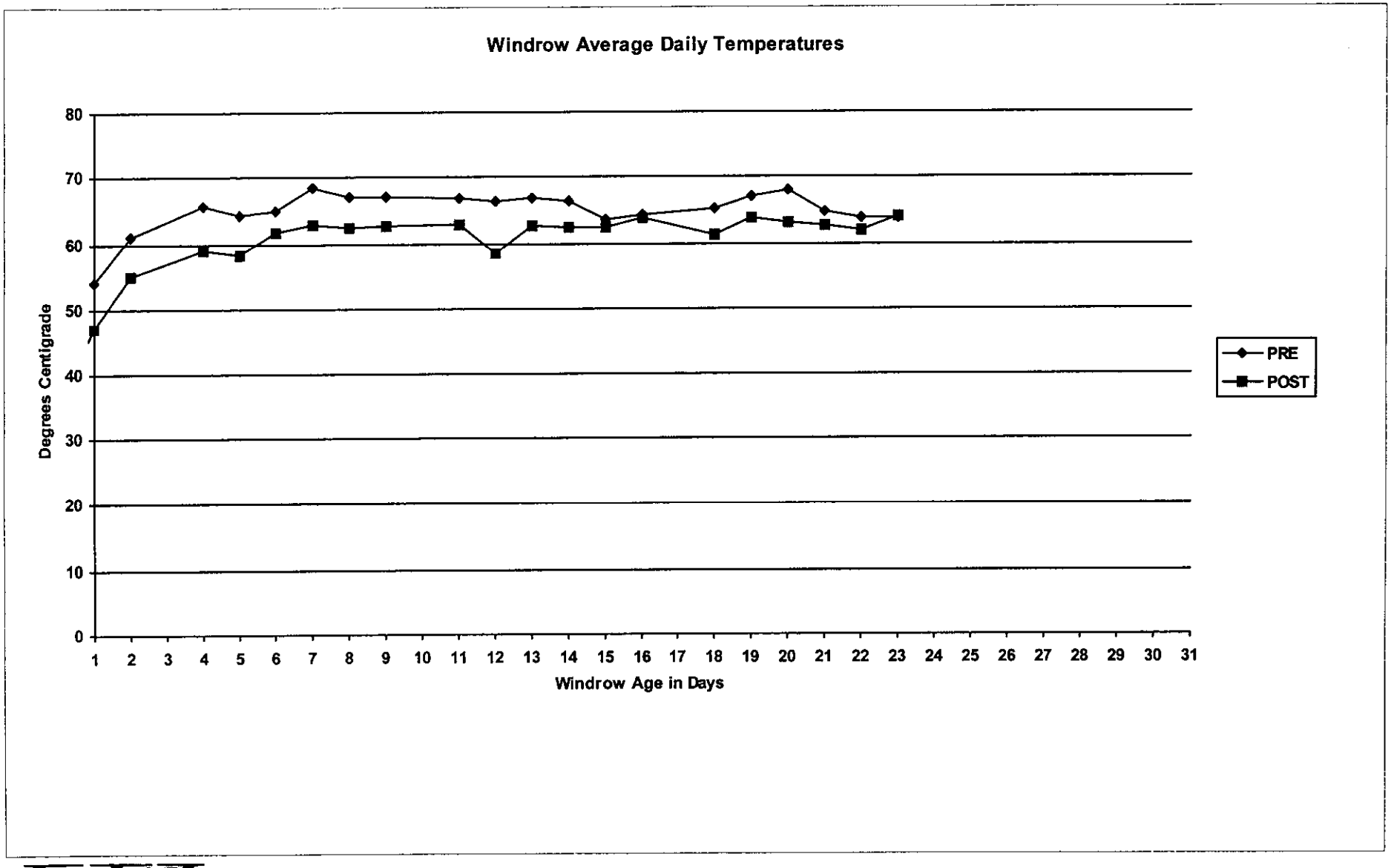
Windrow S204 Average Daily Oxygen



TOLTEST INC.

NSWC Crane BioFacility Full Scale Operations

Windrow S204 Average Daily Temperature



TOLTEST, INC.

Average Daily Windrow Oxygen Summary Report

I drow Number	Construction Date	Date Monitored	Age (Days)	PRE-Turn (%)	POST-Turn (%)
S204	5/31/01	5/31/01	0		10.70
		6/1/01	1	8.23	10.50
		6/2/01	2	7.47	9.83
		6/4/01	4	7.73	8.63
		6/5/01	5	5.20	9.37
		6/6/01	6	7.13	7.27
		6/7/01	7	5.67	6.17
		6/8/01	8	6.30	8.67
		6/9/01	9	5.30	6.67
		6/11/01	11	5.60	7.07
		6/12/01	12	4.20	9.00
		6/13/01	13	2.47	2.27
		6/14/01	14	7.10	5.27
		6/15/01	15	3.37	2.87
		6/16/01	16	3.80	2.10
		6/18/01	18	5.10	5.47
		6/19/01	19	5.73	2.10
		6/20/01	20	3.33	1.93
		6/21/01	21	4.67	1.93
		6/22/01	22	3.77	2.30
		6/23/01	23	3.23	3.50

All average Oxygen values are expressed as a percent

Wednesday, January 16, 2002

Average Daily Windrow Temperature Summary Report

Windrow Number	*Construction Date*	*Date Monitored*	*Age (Days)*	*PRE-Turn (Deg C)*	*POST-Turn (Deg C)*
S204	5/31/01	5/31/01	0		34.97
		6/1/01	1	54.23	47.10
		6/2/01	2	61.00	55.13
		6/4/01	4	65.60	59.00
		6/5/01	5	64.30	58.33
		6/6/01	6	65.03	61.70
		6/7/01	7	68.50	62.83
		6/8/01	8	67.17	62.53
		6/9/01	9	67.17	62.73
		6/11/01	11	66.83	62.90
		6/12/01	12	66.43	58.67
		6/13/01	13	66.93	62.60
		6/14/01	14	66.30	62.50
		6/15/01	15	63.67	62.47
		6/16/01	16	64.40	63.90
		6/18/01	18	65.30	61.33
		6/19/01	19	67.07	63.90
		6/20/01	20	67.90	63.07
		6/21/01	21	64.70	62.67
		6/22/01	22	63.90	62.00
		6/23/01	23	63.83	64.20

All average temperatures are in degrees centigrade

Wednesday, January 16, 2002

Average Daily Windrow WHC Summary Report

Windrow Number	*Construction Date*	*Date Monitored*	*Age (Days)*	*PRE-Turn (%)*	*POST-Turn (%)*
S204	5/31/01	5/31/01	0		
		6/1/01	1		
		6/2/01	2		
		6/4/01	4		
		6/5/01	5		
		6/7/01	7		

All average MWHC values are expressed in percent

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204

Date Monitored: 5/31/01

Age 0

Relative Humidity: 85.0%

Inspected By:

Windrow Height: 5

Ambient Temperature: 12

Performed By: / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

	Start Time	Finish Time
Pre-Turn:		
Post-Turn:	8:50	9:10

Time Turned:

Moisture Added: 0

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
POST	A	1	31		30	6		11				
		2	43	44		9	11					
		3	30	33		13	16					
	B	1	29		32	9		6				
		2	43	49		9	8					
		3	31	33		14	14					
	C	1	29		29	12		11				
		2	40	38		6	8					
		3	33	33		12	10					
	D	1	30		31	12		12				
		2	41	44		12	10					
		3	30	29		12	16					
	E	1	28		30	13		13				
		2	46	43		5	9					
		3	33	34		11	11					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/1/01

Age: 1 **Relative Humidity:** 91.0% **Inspected By:**

Wir. .ow Height: 5.5 **Ambient Temperature:** 12 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

	Start Time	Finish Time
Pre-Turn:	8:50	9:14
Post-Turn:	10:35	11:05

Time Turned: 10:25

Moisture Added: 2000

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	55		45	10		4				
		2	45	55		14	14					
		3	57	51		11	3					
	B	1	52		49	4		2				
		2	64	60		10	6					
		3	58	62		13	6					
	C	1	53		49	6		3				
		2	52	60		15	12					
		3	64	50		12	2					
	D	1	55		51	11		7				
		2	43	51		13	15					
		3	64	55		15	6					
	E	1	55		49	11		5				
		2	65	58		5	4					
		3	55	45		7	1					
POST	A	1	43		42	13		11				
		2	48	49		11	9					
		3	51	51		16	14					
	B	1	33		53	12		6				
		2	52	50		13	13					
		3	48	50		13	13					
	C	1	45		42	8		11				
		2	52	59		10	8					
		3	46	51		10	10					
	D	1	37		43	6		4				
		2	47	52		16	9					
		3	42	44		8	14					
	E	1	40		50	5		1				
		2	53	57		16	16					
		3	42	41		12	7					

Data Entered By: Date: Data Entry Checked By: Date:

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/2/01

Age: 2 **Relative Humidity:** 92.0% **Inspected By:**

Windrow Height: 5.5 **Ambient Temperature:** 16 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

	Start Time	Finish Time
Pre-Turn:	7:42	8:09
Post-Turn:	8:50	9:13

Time Turned: 8:48

Moisture Added: 0

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	62		58	8		3				
		2	68	61		12	3					
		3	61	60		14	7					
	B	1	65		59	12		3				
		2	60	61		16	7					
		3	70	66		7	2					
	C	1	53		53	12		7				
		2	67	62		11	3					
		3	69	61		10	1					
	D	1	58		55	1		1				
		2	65	57		15	1					
		3	58	60		11	2					
	E	1	62		58	17		3				
		2	58	65		12	5					
		3	60	58		14	4					
POST	A	1	52		54	4		2				
		2	57	56		11	5					
		3	52	57		11	15					
	B	1	49		58	4		1				
		2	55	56		17	11					
		3	55	60		15	9					
	C	1	48		51	9		4				
		2	52	56		16	10					
		3	60	62		11	5					
	D	1	50		54	12		8				
		2	56	59		15	12					
		3	58	60		11	5					
	E	1	50		52	14		9				
		2	52	59		18	13					
		3	57	57		11	7					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/4/01

Ag 4 **Relative Humidity:** **Inspected By:**

Winurow Height: 5.5 **Ambient Temperature:** **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

	Start Time	Finish Time
Time Turned: 8:32		
Pre-Turn:	7:49	8:14
Moisture Added: 0		
Post-Turn:	8:40	9:02

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	66		61	5		1				
		2	64	66		14	15					
		3	64	67		15	15					
	B	1	67		64	5		1				
		2	68	71		11	7					
		3	68	71		10	10					
	C	1	69		63	3		1				
		2	67	70		13	7					
		3	68	68		7	4					
	D	1	68		61	1		1				
		2	64	68		10	16					
		3	62	65		14	3					
	E	1	65		57	1		1				
		2	57	66		18	6					
		3	67	66		14	3					
POST	A	1	57		59	7		7				
		2	55	57		13	11					
		3	54	58		13	14					
	B	1	58		60	6		7				
		2	57	63		13	10					
		3	58	63		10	7					
	C	1	56		60	4		5				
		2	60	63		10	7					
		3	59	61		8	8					
	D	1	58		63	4		3				
		2	60	63		12	10					
		3	61	62		9	4					
	E	1	54		62	5		4				
		2	57	58		15	14					
		3	54	60		13	6					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/5/01

Age: 5 **Relative Humidity:** 95.0% **Inspected By:**

Windrow Height: 5.5 **Ambient Temperature:** 17 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

	Start Time	Finish Time
Pre-Turn:	7:45	8:11
Post-Turn:	9:15	

Time Turned: 9:15

Moisture Added: 2000

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	61		59	1		0				
		2	67	65		10	1					
		3	62	64		14	5					
	B	1	61		61	1		0				
		2	65	68		10	7					
		3	68	63		6	1					
	C	1	63		60	1		0				
		2	69	66		10	1					
		3	65	62		12	1					
	D	1	61		60	1		1				
		2	65	69		14	5					
		3	69	64		12	1					
	E	1	65		62	2		1				
		2	64	68		14	8					
		3	68	65		13	3					
POST	A	1	54		56	8		7				
		2	59	59		13	10					
		3	57	59		13	14					
	B	1	56		56	6		7				
		2	57	62		12	12					
		3	58	58		10	8					
	C	1	55		57	6		7				
		2	58	62		13	9					
		3	57	60		11	3					
	D	1	57		57	5		5				
		2	57	59		12	11					
		3	60	61		11	8					
	E	1	60		61	6		6				
		2	56	62		14	10					
		3	58	62		14	10					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204

Date Monitored: 6/6/01

Age: 6

Relative Humidity: 93.0%

Inspected By:

Windrow Height: 5.5

Ambient Temperature: 19

Performed By: JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

Time Turned: 9:14

Moisture Added: 2000

	Start Time	Finish Time
Pre-Turn:	7:27	8:09
Post-Turn:	9:16	9:42

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	55		54	3		1				
		2	67	61		16	2					8.5
		3	70	63		12	2					
	B	1	55		54	4		9				
		2	69	66		15	4					8.4
		3	69	65		10	2					
	C	1	70		64	11		5				
		2	69	63		13	6					8.5
		3	72	62		13	2					
	D	1	64		64	3		3				
		2	69	63		15	2					8.6
		3	72	66		7	7					
	E	1	69		65	10		2				
		2	65	70		16	3					8.9
		3	69	67		14	2					
POST	A	1	55		60	4		4				
		2	60	61		9	2					
		3	57	63		16	6					
	B	1	59		61	6		3				
		2	62	64		8	6					
		3	63	63		8	2					
	C	1	59		61	5		7				
		2	62	62		9	5					
		3	62	63		15	3					
	D	1	59		62	6		4				
		2	62	67		12	8					
		3	62	66		10	6					
	E	1	61		65	8		5				
		2	61	65		15	11					
		3	63	61		9	6					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/7/01

Age: 7 **Relative Humidity:** 93.0% **Inspected By:**

Windrow Height: 5.5 **Ambient Temperature:** 19 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

Time Turned: 8:35

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	7:26	7:53
Post-Turn:	8:47	9:09

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	71		64	3		2				
		2	72	65		8	5					
		3	72	66		13	1					
	B	1	71		64	5		3				
		2	73	64		15	1					
		3	74	68		10	1					
	C	1	71		64	11		2				
		2	71	64		11	3					
		3	72	67		14	1					
	D	1	70		65	3		2				
		2	64	66		17	3					
		3	73	67		5	1					
	E	1	70		65	2		1				
		2	70	72		16	6					
		3	73	67		4	1					
POST	A	1	61		63	2		2				
		2	63	64		10	5					
		3	60	64		10	6					
	B	1	61		63	2		2				
		2	63	66		10	7					
		3	63	65		11	3					
	C	1	62		64	2		3				
		2	63	63		11	3					
		3	62	64		11	4					
	D	1	60		64	3		5				
		2	61	63		13	8					
		3	63	65		10	5					
	E	1	60		61	4		2				
		2	63	66		9	5					
		3	62	63		12	5					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/8/01

Age 8 **Relative Humidity:** 75.0% **Inspected By:**

Windrow Height: 5.5 **Ambient Temperature:** 21 **Performed By:** JL / JL

Windrow Length:

Windrow Width:

Texture: COARSE

Time Turned: 18:40

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	9:48	10:14
Post-Turn:	18:41	19:00

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	70		62	3		2				
		2	62	66		17	3					
		3	68	64		14	2					
	B	1	68		62	1		1				
		2	72	65		14	5					
		3	72	67		14	4					
	C	1	66		63	2		5				
		2	73	64		12	3					
		3	69	71		16	5					
	D	1	70		65	2		1				
		2	64	67		16	1					
		3	73	70		12	4					
	E	1	66		62	1		1				
		2	70	67		14	1					
		3	73	64		12	1					
POST	A	1	62		64	2		3				
		2	64	65		15	3					
		3	63	66		9	4					
	B	1	62		64	3		3				
		2	61	65		14	7					
		3	63	65		10	7					
	C	1	60		64	4		5				
		2	64	64		13	8					
		3	63	64		12	6					
	D	1	60		61	6		9				
		2	62	63		14	11					
		3	63	64		12	8					
	E	1	55		58	11		12				
		2	61	62		14	12					
		3	60	64		14	9					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/9/01

Age: 9 **Relative Humidity:** 78.0% **Inspected By:**

Windrow Height: 5.5 **Ambient Temperature:** 16 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

Time Turned: 7:50

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	7:12	7:32
Post-Turn:	7:59	8:18

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	66		64	2		1				
		2	69	64		15	3					
		3	71	70		14	2					
	B	1	63		64	2		1				
		2	69	66		13	1					
		3	73	66		11	1					
	C	1	64		65	2		2				
		2	72	63		11	1					
		3	72	69		12	1					
	D	1	64		64	1		1				
		2	67	64		15	2					
		3	72	69		12	1					
	E	1	64		63	1		1				
		2	72	67		14	1					
		3	72	67		14	1					
POST	A	1	61		62	3		3				
		2	61	61		10	7					
		3	54	61		16	10					
	B	1	63		64	1		1				
		2	63	65		9	5					
		3	59	65		13	11					
	C	1	60		64	2		1				
		2	62	61		11	4					
		3	63	66		15	11					
	D	1	62		60	1		1				
		2	63	66		9	5					
		3	64	66		11	5					
	E	1	64		62	3		2				
		2	63	65		11	3					
		3	65	67		10	6					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204

Date Monitored: 6/11/01

Age: 11

Relative Humidity: 80.0%

Inspected By:

Windrow Height: 5

Ambient Temperature: 24

Performed By: JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

Time Turned: 13:45

Moisture Added: 2000

	Start Time	Finish Time
Pre-Turn:	8:41	9:05
Post-Turn:	13:47	14:07

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	70		64	1		1				
		2	44	64		19	4					
		3	71	66		10	1					
	B	1	68		67	14		1				
		2	69	64		2	2					
		3	68	69		11	1					
	C	1	70		63	2		1				
		2	70	65		9	1					
		3	66	71		16	1					
	D	1	70		66	2		1				
		2	72	66		12	3					
		3	69	67		15	1					
	E	1	70		62	3		1				
		2	70	67		15	1					
		3	67	70		16	1					
POST	A	1	64		66	2		1				
		2	63	64		12	4					
		3	58	62		14	8					
	B	1	64		64	1		1				
		2	61	65		11	4					
		3	61	66		13	10					
	C	1	63		65	2		1				
		2	62	64		9	4					
		3	63	64		13	10					
	D	1	63		65	5		5				
		2	62	63		11	5					
		3	63	65		13	9					
	E	1	60		63	3		5				
		2	62	62		8	4					
		3	61	59		15	9					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/12/01

Age: 12 **Relative Humidity:** 83.0% **Inspected By:**

Windrow Height: 5 **Ambient Temperature:** 23 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: COARSE

Time Turned: 15:25

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:42	9:06
Post-Turn:	15:30	15:45

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	69		63	3		1				
		2	65	67		16	1					
		3	70	67		9	1					
	B	1	68		67	4		1				
		2	70	64		4	1					
		3	66	64		11	1					
	C	1	70		66	3		1				
		2	70	64		7	1					
		3	67	66		10	1					
	D	1	70		66	5		2				
		2	62	64		18	1					
		3	68	65		8	1					
	E	1	69		65	6		1				
		2	65	63		2	1					
		3	69	64		3	2					
POST	A	1	56		60	14		5				
		2	54	57		11	8					
		3	54	59		13	3					
	B	1	57		62	12		10				
		2	56	59		14	7					
		3	58	62		9	2					
	C	1	56		58	16		5				
		2	58	61		10	6					
		3	60	61		14	1					
	D	1	57		59	15		4				
		2	57	58		17	9					
		3	60	62		8	1					
	E	1	58		60	11		5				
		2	59	60		16	8					
		3	60	62		14	2					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/13/01

Age: 13 **Relative Humidity:** 81.0% **Inspected By:**

Windrow Height: 5 **Ambient Temperature:** 24 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: MEDIUM

	Start Time	Finish Time
Pre-Turn:	7:42	8:07
Post-Turn:	13:24	13:48

Time Turned: 13:19

Moisture Added: 2000

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	64		61	1		2				
		2	71	65		7	2					
		3	72	66		4	2					
	B	1	63		63	2		2				
		2	72	67		2	1					
		3	73	67		7	2					
	C	1	64		64	2		1				
		2	73	68		6	1					
		3	71	64		3	1					
	D	1	64		61	2		1				
		2	72	66		3	1					
		3	70	63		4	1					
	E	1	69		62	3		1				
		2	72	65		6	1					
		3	71	65		2	1					
POST	A	1	62		60	1		1				
		2	59	64		6	2					
		3	63	64		5	1					
	B	1	62		64	1		3				
		2	64	65		3	1					
		3	64	63		7	1					
	C	1	61		62	1		1				
		2	65	64		2	4					
		3	62	62		2	1					
	D	1	62		61	2		1				
		2	62	63		2	1					
		3	62	63		2	1					
	E	1	62		61	1		1				
		2	62	63		4	3					
		3	63	64		6	1					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/14/01

Age: 14 **Relative Humidity:** 75.0% **Inspected By:**

Windrow Height: 4 **Ambient Temperature:** 27 **Performed By:** SAN / SAN

Windrow Length: 275

Windrow Width: 16

Texture: MEDIUM

Time Turned: 14:25

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	9:45	10:00
Post-Turn:	14:25	14:42

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	Cross Section	Location	1 ft	2.5 ft	3 ft	1 ft	2.5 ft	3 ft	1 ft	2.5 ft	3 ft	2.5 ft
PRE	A	1	47		57	12		9				
		2	65	69		5	7					
		3	68	69		3	10					
	B	1	66		64	5		8				
		2	67	68		10	3					
		3	69	69		8	6					
	C	1	69		67	7		10				
		2	65	68		7	5					
		3	68	70		9	2					
	D	1	68		69	11		6				
		2	69	70		5	8					
		3	66	67		7	6					
	E	1	66		69	5		10				
		2	68	64		6	8					
		3	62	66		4	11					
POST	A	1	63		62	5		4				
		2	63	64		10	6					
		3	59	60		14	9					
	B	1	63		64	2		1				
		2	63	65		9	5					
		3	62	64		11	6					
	C	1	62		64	4		2				
		2	61	63		9	3					
		3	62	62		9	6					
	D	1	62		63	3		1				
		2	62	62		4	1					
		3	62	63		8	3					
	E	1	62		62	1		1				
		2	63	64		9	1					
		3	62	62		9	2					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204

Date Monitored: 6/15/01

Age: 15

Relative Humidity: 79.0%

Inspected By:

Windrow Height: 5

Ambient Temperature: 27

Performed By: JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: MEDIUM

Time Turned: 10:31

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:31	8:53
Post-Turn:	10:33	10:50

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	63		58	1		1				
		2	64	63		15	1					
		3	61	62		1	2					
	B	1	63		63	1		1				
		2	71	62		11	1					
		3	71	66		9	1					
	C	1	63		62	1		1				
		2	68	61		4	1					
		3	68	63		15	1					
	D	1	64		56	1		1				
		2	61	57		1	1					
		3	70	61		6	1					
	E	1	66		61	2		3				
		2	67	63		2	1					
		3	69	63		12	2					
POST	A	1	60		62	1		1				
		2	61	63		4	2					
		3	59	62		3	1					
	B	1	60		62	4		1				
		2	63	64		7	3					
		3	63	65		8	1					
	C	1	59		61	5		2				
		2	64	64		3	1					
		3	63	64		4	2					
	D	1	61		62	2		1				
		2	62	66		5	1					
		3	62	64		6	2					
	E	1	60		61	1		1				
		2	64	66		3	4					
		3	63	64		6	1					

Data Entered By:_____ Date:_____ Data Entry Checked By: Date:

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/16/01

Age: 16 **Relative Humidity:** 85.0% **Inspected By:**

Windrow Height: 5 **Ambient Temperature:** 19 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: MEDIUM

Time Turned: 7:20

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	6:36	6:58
Post-Turn:	7:35	7:51

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	62		60	1		4				
		2	65	64		2	2					
		3	66	59		2	4					
	B	1	68		63	9		2				
		2	70	66		11	3					
		3	69	65		6	4					
	C	1	64		60	5		1				
		2	68	65		3	2					
		3	67	62		9	1					
	D	1	66		61	1		1				
		2	68	64		3	4					
		3	68	65		8	3					
	E	1	62		59	1		2				
		2	66	63		8	1					
		3	66	61		9	2					
POST	A	1	60		60	2		3				
		2	62	61		1	1					
		3	64	61		1	2					
	B	1	65		60	4		1				
		2	68	65		2	2					
		3	68	64		5	3					
	C	1	67		65	4		1				
		2	69	66		2	1					
		3	66	64		1	2					
	D	1	64		61	8		1				
		2	67	65		1	1					
		3	66	64		3	2					
	E	1	60		60	1		1				
		2	64	63		4	1					
		3	65	63		1	1					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/18/01

Age: 18 **Relative Humidity:** 69.0% **Inspected By:**

Wi ow Height: 5 **Ambient Temperature:** 22 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: MEDIUM

Time Turned: 10:55

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:51	9:10
Post-Turn:	10:59	11:20

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	64		66	4		1				
		2	67	64		9	2					
		3	67	65		3	1					
	B	1	66		65	5		1				
		2	68	63		11	2					
		3	67	64		10	4					
	C	1	64		61	7		1				
		2	65	63		16	12					
		3	66	60		4	5					
	D	1	68		65	4		1				
		2	66	67		13	1					
		3	68	64		11	3					
	E	1	64		65	7		1				
		2	69	66		9	1					
		3	68	64		3	1					
POST	A	1	56		61	8		3				
		2	57	62		10	2					
		3	56	63		6	1					
	B	1	59		61	8		3				
		2	61	65		5	1					
		3	60	64		15	5					
	C	1	60		61	11		2				
		2	61	63		4	2					
		3	61	62		16	7					
	D	1	60		61	7		1				
		2	62	64		10	2					
		3	61	63		12	4					
	E	1	60		61	7		2				
		2	63	65		2	1					
		3	63	64		6	1					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/19/01

Age: 19 **Relative Humidity:** 66.0% **Inspected By:**

Windrow Height: 5 **Ambient Temperature:** 26 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: MEDIUM

Time Turned: 10:07

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:41	9:03
Post-Turn:	10:20	10:42

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	65		63	4		1				
		2	68	66		2	2					
		3	67	66		5	1					
	B	1	64		67	7		1				
		2	66	69		10	1					
		3	65	69		14	3					
	C	1	66		65	12		1				
		2	69	67		11	1					
		3	68	67		14	2					
	D	1	67		66	7		2				
		2	69	68		14	3					
		3	69	67		13	1					
	E	1	68		66	9		2				
		2	71	67		14	1					
		3	70	67		11	3					
POST	A	1	63		63	2		1				
		2	67	65		2	1					
		3	65	66		1	3					
	B	1	62		60	1		1				
		2	63	61		4	1					
		3	63	60		1	1					
	C	1	63		62	7		2				
		2	66	65		3	1					
		3	67	66		2	1					
	D	1	64		61	4		1				
		2	65	60		2	2					
		3	65	61		2	2					
	E	1	67		64	5		1				
		2	68	63		4	2					
		3	68	64		1	2					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204

Date Monitored: 6/20/01

Age: 20

Relative Humidity: 89.0%

Inspected By:

Wi ow Height: 4.5

Ambient Temperature: 21

Performed By: JL / JL

Windrow Length: 275

Windrow Width: 17

Texture: MEDIUM

Time Turned: 10:08

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:00	8:21
Post-Turn:	10:08	10:30

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	69		63	2		1				
		2	71	65		6	1					
		3	70	64		3	1					
	B	1	70		68	5		2				
		2	71	65		2	2					
		3	71	66		8	1					
	C	1	71		68	7		2				
		2	72	66		10	1					
		3	70	65		9	1					
	D	1	70		66	4		1				
		2	72	65		9	2					
		3	71	65		7	1					
	E	1	68		64	1		1				
		2	71	66		5	2					
		3	70	64		2	1					
POST	A	1	65		61	1		2				
		2	67	62		3	1					
		3	67	61		1	1					
	B	1	64		60	3		1				
		2	66	63		1	2					
		3	65	62		4	2					
	C	1	66		61	2		1				
		2	68	63		2	1					
		3	67	62		2	1					
	D	1	63		59	3		2				
		2	64	61		3	2					
		3	64	61		1	1					
	E	1	62		58	1		1				
		2	65	60		7	2					
		3	64	61		2	2					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/21/01

Age: 21 **Relative Humidity:** 94.0% **Inspected By:**

Windrow Height: 4.5 **Ambient Temperature:** 19 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: MEDIUM

Time Turned: 9:51

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:10	8:24
Post-Turn:	9:54	10:12

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	63		60	2		1				
		2	65	61		3	1					
		3	64	62		8	1					
	B	1	67		68	9		4				
		2	69	63		7	5					
		3	68	65		11	10					
	C	1	66		61	4		1				
		2	69	63		9	2					
		3	68	64		14	1					
	D	1	64		67	1		2				
		2	67	60		12	3					
		3	66	62		9	1					
	E	1	67		60	9		1				
		2	69	63		2	1					
		3	68	62		3	3					
POST	A	1	65		64	2		2				
		2	66	61		1	2					
		3	66	62		1	2					
	B	1	65		60	4		1				
		2	66	61		3	1					
		3	64	59		1	1					
	C	1	62		58	2		1				
		2	65	61		1	1					
		3	65	60		5	2					
	D	1	61		59	3		2				
		2	63	61		6	1					
		3	64	61		2	1					
	E	1	64		60	2		1				
		2	66	61		2	1					
		3	67	63		3	1					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204 **Date Monitored:** 6/22/01

Age: 22 **Relative Humidity:** 85.0% **Inspected By:**

Wi. .ow Height: 4.5 **Ambient Temperature:** 18 **Performed By:** JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: MEDIUM

	Start Time	Finish Time
Pre-Turn:	7:50	8:11
Post-Turn:	9:40	10:08

Time Turned: 9:38

Moisture Added: 0

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	64		59	5		2				
		2	66	61		2	1					
		3	65	62		1	1					
	B	1	66		62	1		1				
		2	68	64		4	1					
		3	68	65		6	2					
	C	1	61		60	10		1				
		2	63	62		9	2					
		3	62	62		17	2					
	D	1	66		61	4		1				
		2	69	63		10	2					
		3	68	63		9	1					
	E	1	66		60	3		1				
		2	68	63		7	2					
		3	68	62		4	1					
POST	A	1	60		58	3		1				
		2	63	60		4	2					
		3	62	61		2	2					
	B	1	63		60	2		2				
		2	64	61		3	2					
		3	64	60		3	2					
	C	1	62		59	4		2				
		2	63	60		6	1					
		3	63	60		3	2					
	D	1	65		61	4		1				
		2	66	63		2	1					
		3	66	62		2	2					
	E	1	63		60	2		1				
		2	65	61		2	2					
		3	64	61		2	2					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: S204

Date Monitored: 6/23/01

Age: 23

Relative Humidity: 83.0%

Inspected By:

Windrow Height: 4.5

Ambient Temperature: 18

Performed By: JL / JL

Windrow Length: 275

Windrow Width: 18

Texture: MEDIUM

Time Turned: 9:22

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	7:45	8:07
Post-Turn:	9:23	9:46

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	62		64	4		1				
		2	64	61		6	2					
		3	63	62		3	1					
	B	1	69		62	6		1				
		2	68	66		4	1					
		3	68	65		3	2					
	C	1	66		60	4		1				
		2	68	61		4	2					
		3	67	62		6	2					
	D	1	65		60	1		1				
		2	68	64		7	2					
		3	66	62		3	3					
	E	1	62		60	3		1				
		2	65	61		9	4					
		3	64	60		7	3					
POST	A	1	64		62	3		1				
		2	65	63		3	2					
		3	64	61		2	2					
	B	1	67		65	6		1				
		2	67	66		4	2					
		3	65	64		4	2					
	C	1	66		62	7		2				
		2	67	63		5	2					
		3	66	63		2	1					
	D	1	64		60	6		2				
		2	66	64		4	3					
		3	66	63		9	3					
	E	1	63		61	3		1				
		2	64	64		8	1					
		3	66	65		10	4					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

APPENDIX H

Borrow Source Analytical Data

Sample Results for SDG: 46987

SiteID: RKY-BS-001 **Field ID:** RKY BS
Sample Date: 07/12/01 **Lab Number:** 46987.01

Analysis Method: SW6010B

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
BARIUM	70.5	MGKG	5300	100000
CADMIUM	0.2 U	MGKG	38	850
CHROMIUM	16.6	MGKG	210	450
LEAD	12.7	MGKG	400	1000

Analysis Method: SW8082

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
PCB 1242	33 U	UGKG	66	340
PCB 1254	33 U	UGKG	66	19000
PCB 1260	33 U	UGKG	66	340

Analysis Method: SW8260B

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,1,1-TRICHLOROETHANE	4 U	UGKG	1200000	3000000
1,1,2,2-TETRACHLOROETHANE	4 U	UGKG	600	1100
1,1,2-TRICHLOROETHANE	4 U	UGKG	650	1500
1,1-DICHLOROETHANE	4 U	UGKG	500000	1700000
1,1-DICHLOROETHENE	4 U	UGKG	70	80
1,2-DICHLOROETHANE	4 U	UGKG	400	550
1,2-DICHLOROETHYLENES (CIS & TRANS)	4 U	UGKG	350	550
ACETONE	4 U	UGKG	2000000	8800000
CHLOROETHANE	4 U	UGKG	1100000	1600000
CHLOROFORM	4 U	UGKG	30	530
MEK / 2-BUTANONE	4 U	UGKG	7100000	27000000
METHYLENE CHLORIDE	4 U	UGKG	7800	18000
MIBK / 4-METHYL-2-PENTANONE	4 U	UGKG	770000	2800000
TETRACHLOROETHENE	4 U	UGKG	11000	17000
TOLUENE	4 U	UGKG	790000	880000
TRANS-1,3-DICHLOROPROPENE	4 U	UGKG	250	550
TRICHLOROETHENE	4 U	UGKG	5000	7000
VINYL CHLORIDE	4 U	UGKG	30	35

Analysis Method: SW8270C

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
2,4-DINITROTOLUENE	340 U	UGKG	130000	1400000
2,6-DINITROTOLUENE	340 U	UGKG	65000	680000
BENZO[A]ANTHRACENE	340 U	UGKG	900	2600
BENZO[B]FLUORANTHENE	340 U	UGKG	900	2600

* = Indicates Result Exceeded Residential Limit ** = Indicates Result Exceeded Industrial Limit

Sample Results for SDG: 46987

SiteID: RKY-BS-001 **Field ID:** RKY BS
Sample Date: 07/12/01 **Lab Number:** 46987.01

Analysis Method: SW8270C

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
BIS(2-ETHYLHEXYL) PHTHALATE	340 U	UGKG	46000	140000
CHRYSENE	340 U	UGKG	7000	7000
DI-N-BUTYL PHTHALATE	340 U	UGKG	6500000	68000000
FLUORANTHENE	340 U	UGKG	2600000	27000000
N-NITROSODIPHENYLAMINE	340 U	UGKG	130000	390000
NITROBENZENE	340 U	UGKG	18000	94000
PHENANTHRENE	340 U	UGKG	100000	100000
PYRENE	340 U	UGKG	100000	100000

Analysis Method: SW8330

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,3,5-TRINITROBENZENE	476 U	UGKG	3300	34000
1,3-DINITROBENZENE	476 U	UGKG	6500	68000
2,4,6-TRINITROTOLUENE	476 U	UGKG	15000	64000
2,4-DINITROTOLUENE	476 U	UGKG	130000	1400000
2,6-DINITROTOLUENE	476 U	UGKG	65000	680000
2-AMINO-4,6-DINITROTOLUENE	476 U	UGKG	130000	1400000
2-NITROTOLUENE	476 U	UGKG	650000	6800000
3-NITROTOLUENE	476 U	UGKG	650000	6800000
4-AMINO-2,6-DINITROTOLUENE	476 U	UGKG	65000	680000
4-NITROTOLUENE	476 U	UGKG	650000	6800000
HMX	4600	UGKG	3300000	34000000
NITROBENZENE	476 U	UGKG	18000	94000
PETN	476 U	UGKG	250 *	250 **
RDX	476 U	UGKG	4000	17000
TETRYL	476 U	UGKG	650000	6800000

SiteID: RKYTB071201 **Field ID:** TRIP BLK
Sample Date: 07/12/01 **Lab Number:** 46987.02

Analysis Method: SW8260B

Compound	*Result*	*Units*	*Residential Level*	*Industrial Level*
1,1,1-TRICHLOROETHANE	5 U	UGL		
1,1,2-TRICHLOROETHANE	5 U	UGL		
TRANS-1,3-DICHLOROPROPENE	5 U	UGL		

* = Indicates Result Exceeded Residential Limit ** = Indicates Result Exceeded Industrial Limit

APPENDIX I

Explosive Summary Report for the Control Windrow

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
135TNB	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of 135TNB: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration*	UGKG
13DNB	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of 13DNB: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
246TNT	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : *476*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : *476*

Standard Deviation:

Percent Reduction of 246TNT: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
24DNT	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of 24DNT: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
26DNT	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of 26DNT: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
2A46DT	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of 2A46DT: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration*	UGKG
2NT	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of 2NT: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
3NT	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of 3NT: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
4A26DT	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of 4A26DT: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
4NT	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of 4NT: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
HMX	08/10/01	09/04/01	25	ON	T	358	J

Average Concentration for Cross Section ON : ***358***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***358***

Standard Deviation:

Percent Reduction of HMX: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration*	UGKG
NB	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : ***476***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***476***

Standard Deviation:

Percent Reduction of NB: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG
RDX	08/10/01	09/04/01	25	ON	T	1230

Average Concentration for Cross Section ON : ***1230***

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : ***1230***

Standard Deviation:

Percent Reduction of RDX: Not Applicable; No Day 0 Results

Windrow Number: CONTROL2

Compound	*Construction Date*	*Date Sampled*	*DaysOld*	*CrossSection*	*Location*	*Concentration* UGKG	
TETRYL	08/10/01	09/04/01	25	ON	T	LT	476

Average Concentration for Cross Section ON : *476*

AVERAGE CONCENTRATION FOR WINDROW ON DAY 25 : *476*

Standard Deviation:

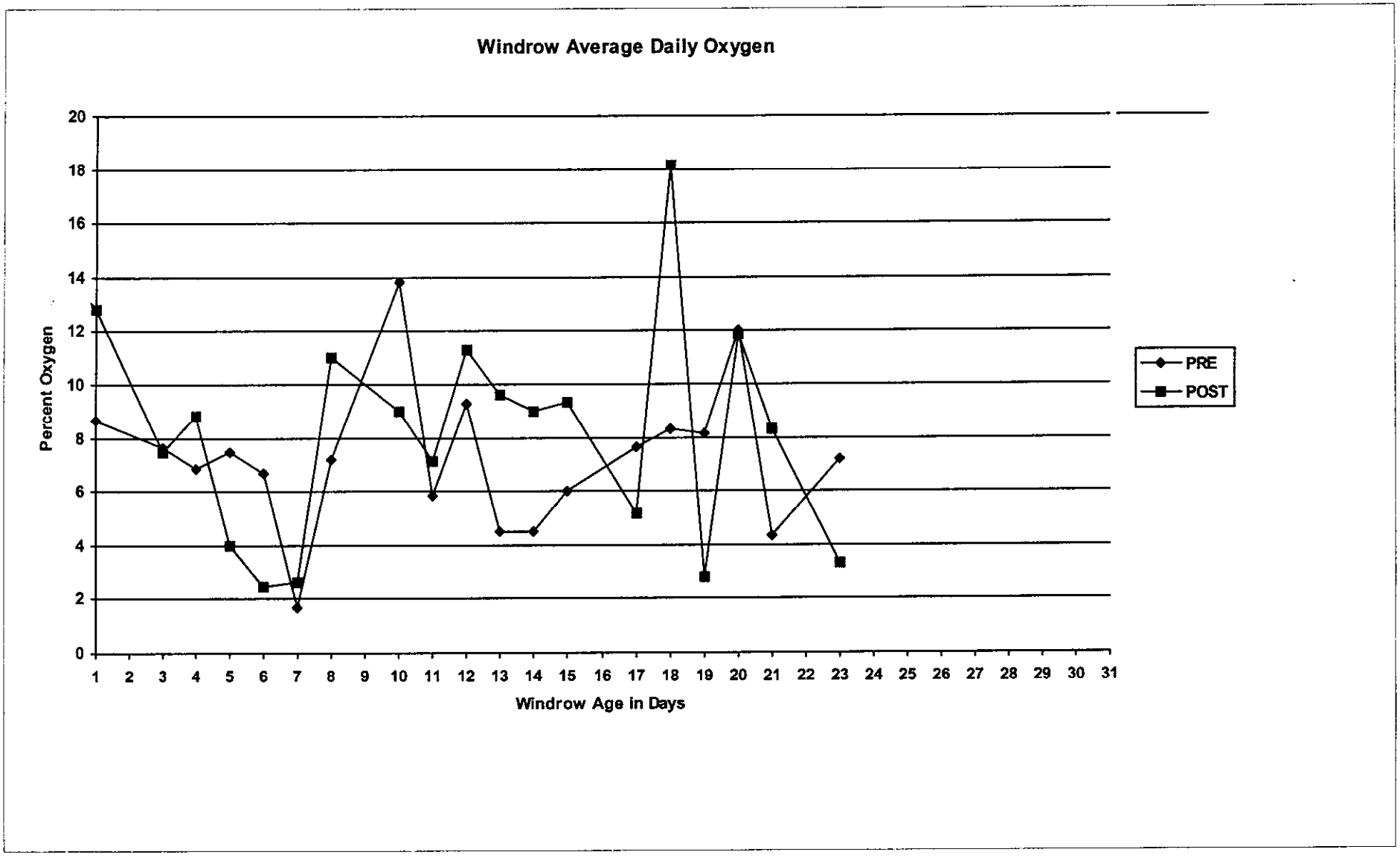
Percent Reduction of TETRYL: Not Applicable; No Day 0 Results

APPENDIX J

Control Windrow Daily Process Data

NSWC Crane BioFacility Full Scale Operations

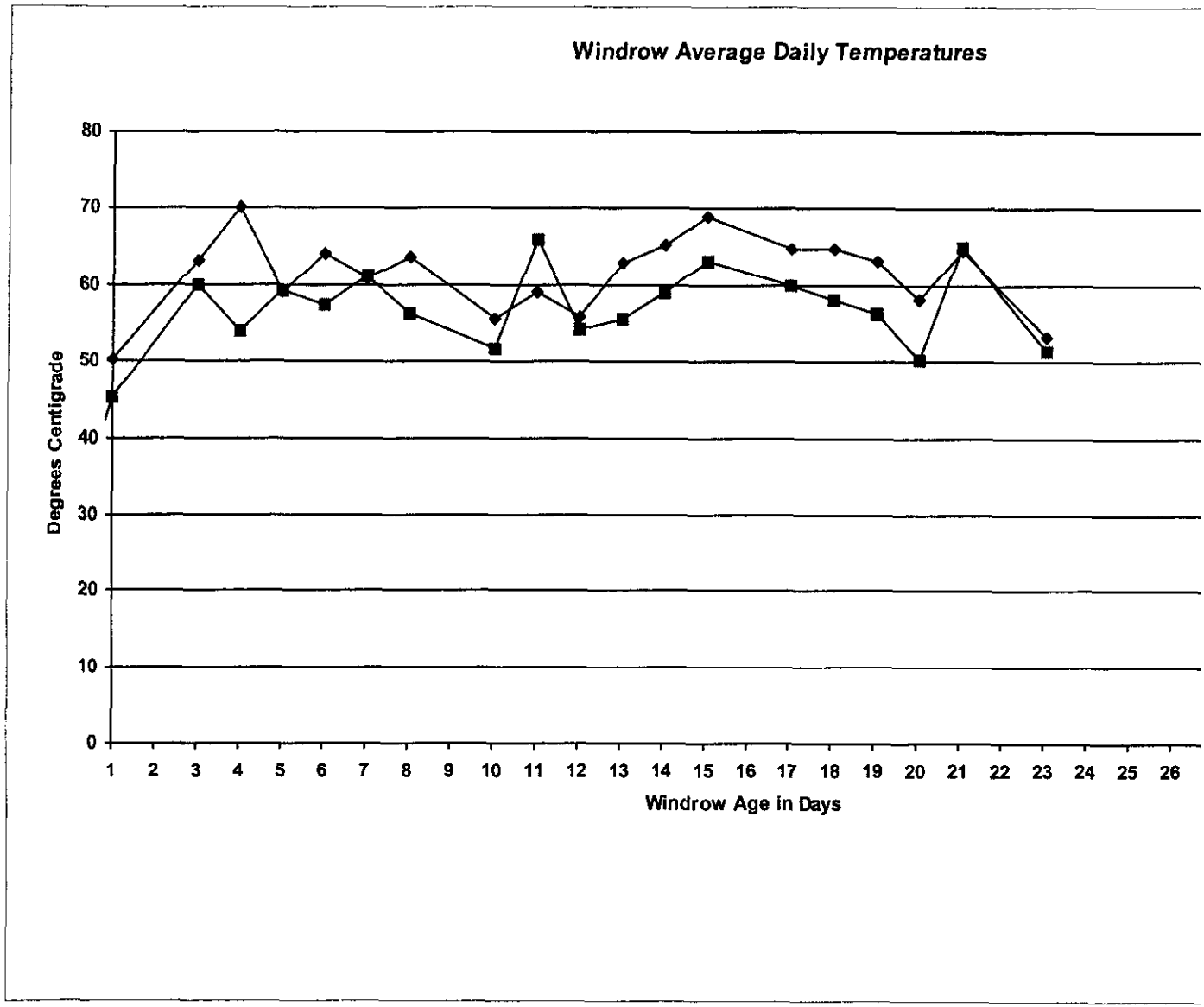
Control Windrow Average Daily Oxygen



TOLTEST, INC.

NSWC Crane BioFacility Full Scale Operations

Control Windrow Average Daily Temperature



TOLTEST, INC.

Average Daily Windrow WHC Summary Report

Windrow Number	*Construction Date*	*Date Monitored*	*Age (Days)*	*PRE-Turn (%)*	*POST-Turn (%)*
CONTROL2	8/10/01	8/10/01	0		55.40
		8/14/01	4		51.10
		8/16/01	6		58.80

All average MWHC values are expressed in percent

Average Daily Windrow Oxygen Summary Report

Windrow Number	*Construction Date*	*Date Monitored*	*Age (Days)*	*PRE-Turn (%)*	*POST-Turn (%)*
CONTROL2	8/10/01	8/10/01	0		14.33
		8/11/01	1	8.67	12.83
		8/13/01	3	7.67	7.50
		8/14/01	4	6.83	8.83
		8/15/01	5	7.50	4.00
		8/16/01	6	6.67	2.50
		8/17/01	7	1.67	2.67
		8/18/01	8	7.17	11.00
		8/20/01	10	13.83	9.00
		8/21/01	11	5.83	7.11
		8/22/01	12	9.28	11.28
		8/23/01	13	4.50	9.61
		8/24/01	14	4.50	9.00
		8/25/01	15	6.00	9.33
		8/27/01	17	7.67	5.17
		8/28/01	18	8.33	18.17
		8/29/01	19	8.17	2.83
		8/30/01	20	12.00	11.83
		8/31/01	21	4.33	8.33
		9/2/01	23	7.17	3.33

All average Oxygen values are expressed as a percent

Wednesday, January 16, 2002

Average Daily Windrow Temperature Summary Report

Windrow Number	*Construction Date*	*Date Monitored*	*Age (Days)*	*PRE-Turn (Deg C)*	*POST-Turn (Deg C)*
CONTROL2	8/10/01	8/10/01	0		28.00
		8/11/01	1	50.33	45.17
		8/13/01	3	63.17	60.00
		8/14/01	4	70.00	54.00
		8/15/01	5	59.00	59.33
		8/16/01	6	64.17	57.50
		8/17/01	7	60.83	61.17
		8/18/01	8	63.67	56.33
		8/20/01	10	55.67	51.56
		8/21/01	11	59.00	65.94
		8/22/01	12	55.72	54.11
		8/23/01	13	63.00	55.61
		8/24/01	14	65.17	59.00
		8/25/01	15	69.00	63.17
		8/27/01	17	64.83	59.83
		8/28/01	18	64.83	58.17
		8/29/01	19	63.17	56.17
		8/30/01	20	58.17	50.33
		8/31/01	21	64.50	65.00
		9/2/01	23	53.33	51.50

All average temperatures are in degrees centigrade

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/10/01

Ag 0

Relative Humidity:

Inspected By:

Winarow Height:

Ambient Temperature:

Performed By: / PJC

Windrow Length:

Windrow Width:

Texture: COARSE

Time Turned: 13:00

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:		
Post-Turn:	13:15	13:20

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
POST	A	1	23		27	15		12				
		2	30	31		12	17			55.4		
		3	25	32		16	14					

Data Entered By:_____ Date: Data Entry Checked By: Date:

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/11/01

Age: 1

Relative Humidity: 81.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 23

Performed By: PJC / PJC

Windrow Length: 25

Windrow Width: 16

Texture: COARSE

Time Turned: 9:25

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:00	8:05
Post-Turn:	9:30	9:35

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	53		48	14		3				
		2	51	43		13	0					
		3	55	52		17	5					
POST		1	45		45	14		12				
		2	44	44		13	10					
		3	46	47		15	13					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/13/01

Age: 3

Relative Humidity: 82.0%

Inspected By:

Windrow Height: 6

Ambient Temperature: 21

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: COARSE

Time Turned: 9:42

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	9:16	9:21
Post-Turn:	9:43	9:48

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	61		66	12		2				
		2	60	66		11	4					
		3	60	66		13	4					
POST		1	59		61	9		4				
		2	59	60		11	4					
		3	60	61		13	4					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/14/01

Age: 4

Relative Humidity: 73.0%

Inspected By:

Windrow Height: 5

Ambient Temperature: 23

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 15

Texture: COARSE

Time Turned: 15:00

Moisture Added: 300

	Start Time	Finish Time
Pre-Turn:	10:29	10:34
Post-Turn:	15:10	15:15

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	71		69	13		3				
		2	72	69		10	2					
		3	71	68		11	2					
POST		1	52		59	10		9				
		2	51	56		11	10			51.1		
		3	53	53		6	7					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/15/01

Ag 5

Relative Humidity: 81.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 19

Performed By: PJC /

Windrow Length: 25

Windrow Width: 18

Texture: COARSE

	Start Time	Finish Time
Pre-Turn:	8:20	8:25
Post-Turn:		

Time Turned:

Moisture Added: 0

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	59		57	17		2				
		2	54	59		15	2					
		3	64	61		9	0					
POST		1	59		59	7		3				
		2	59	58		6	2					
		3	61	60		4	2					

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/16/01

Age: 6

Relative Humidity: 83.0%

Inspected By:

Windrow Height: 4.5

Ambient Temperature: 24

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: COARSE

Time Turned: 11:23

Moisture Added: 300

	Start Time	Finish Time
Pre-Turn:	9:30	9:35
Post-Turn:	11:27	11:32

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	67		62	9		3				
		2	68	63		7	2					
		3	66	59		17	2					
POST		1	59		57	4		2				
		2	58	56		2	2			58.8		
		3	59	56		3	2					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/17/01

Age: 7

Relative Humidity: 83.0%

Inspected By:

Windrow Height: 3.5

Ambient Temperature: 21

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: COARSE

Time Turned: 10:59

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	9:33	9:38
Post-Turn:	11:07	11:13

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	64		58	3		1				
		2	63	58		2	1					
		3	63	59		2	1					
POST		1	61		60	4		2				
		2	62	61		3	2					
		3	62	61		3	2					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/18/01

Age: 8

Relative Humidity: 91.0%

Inspected By:

Windrow Height: 3.5

Ambient Temperature: 27

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: COARSE

Time Turned: 8:36

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:26	8:31
Post-Turn:	8:38	8:43

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	66		63	11		2				
		2	65	62		13	2					
		3	64	62		14	1					
POST		1	55		59	13		5				
		2	55	58		15	7					
		3	54	57		17	9					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/20/01

Age: 10

Relative Humidity: 87.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 23

Performed By: RAD / RAD

Windrow Length: 25

Windrow Width: 16

Texture: COARSE

Start Time **Finish Time**

Time Turned:

Pre-Turn:

Moisture Added: 0

Post-Turn:

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	57		58	12		7				
		2	52	56		17	16					
		3	52	60		16	16					
	B	1	57		61	15		9				
		2	49	49		18	16					
		3	56	61		15	13					
	C	1	52		52	12		10				
		2	50	54		16	14					
		3	63	63		12	15					
POST	A	1	58		56	9		4				
		2	59	56		9	8					
		3	56	57		7	4					
	B	1	53		56	12		7				
		2	51	48		13	14					
		3	54	58		9	6					
	C	1	47		45	7		10				
		2	41	40		14	13					
		3	43	50		10	6					

Data Entered By:_____ Date: Data Entry Checked By: Date:

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/21/01

Age: 11

Relative Humidity: 84.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 24

Performed By: RAD / RAD

Windrow Length: 25

Windrow Width: 16

Texture: COARSE

Time Turned:

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:12	8:18
Post-Turn:	8:50	9:00

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	62		57	2		1				
		2	61	62		7	8					
		3	59	57		10	2					
	B	1	57		57	7		4				
		2	62	63		1	2					
		3	58	58		8	9					
	C	1	58		57	10		2				
		2	62	55		10	2					
		3	57	60		11	9					
POST	A	1	66		67	4		3				
		2	68	68		7	9					
		3	67	69		9	11					
	B	1	68		67	4		3				
		2	66	66		9	7					
		3	70	68		8	6					
	C	1	58		60	16		7				
		2	59	67		5	6					
		3	65	68		5	9					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/22/01

Age: 12

Relative Humidity: 80.0%

Inspected By:

Windrow Height: 3.5

Ambient Temperature: 28

Performed By: RAD / RAD

Windrow Length: 2

Windrow Width: 17

Texture: MEDIUM

Time Turned: 8:00

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	7:10	7:20
Post-Turn:	8:20	8:30

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	58		60	10		4				
		2	56	58		14	4					
		3	49	45		12	10					
	B	1	47		46	14		15				
		2	58	58		15	8					
		3	56	62		9	6					
	C	1	55		56	9		4				
		2	59	58		14	8					
		3	60	62		7	4					
POST	A	1	47		51	15		11				
		2	54	56		9	12					
		3	54	54		6	5					
	B	1	56		56	11		14				
		2	54	54		12	13					
		3	53	54		10	12					
	C	1	54		54	12		14				
		2	55	56		9	14					
		3	59	53		13	11					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/23/01

Age: 13

Relative Humidity: 86.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 30

Performed By: RAD / RAD

Windrow Length: 20

Windrow Width: 16

Texture: MEDIUM

Time Turned: 8:10

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	7:55	8:05
Post-Turn:	8:25	8:30

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	59		60	5		4				
		2	66	62		0	0					
		3	57	58		2	1					
	B	1	59		65	12		8				
		2	68	65		5	7					
		3	58	58		6	1					
	C	1	67		67	3		5				
		2	64	66		8	10					
		3	68	67		3	1					
POST	A	1	52		57	11		9				
		2	57	56		7	13					
		3	57	55		6	8					
	B	1	55		56	13		7				
		2	57	55		9	14					
		3	57	58		9	9					
	C	1	56		56	9		8				
		2	54	55		9	12					
		3	53	55		14	6					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/24/01

Ag 14

Relative Humidity: 85.0%

Inspected By:

Winurow Height: 4

Ambient Temperature: 32

Performed By: JL / JL

Windrow Length: 20

Windrow Width: 16

Texture: MEDIUM

Time Turned: 12:00

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	9:03	9:08
Post-Turn:	12:10	12:14

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	67		64	8		1				
		2	67	61		15	0					
		3	69	63		3	0					
POST		1	57		62	11		5				
		2	56	61		14	7					
		3	56	62		10	7					

Data Entered By: Date: Data Entry Checked By: Date:

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/25/01

Age: 15

Relative Humidity: 83.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 31

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: MEDIUM

Time Turned: 8:00

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	7:35	7:40
Post-Turn:	8:05	8:08

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	67		71	4		2				
		2	69	68		12	2					
		3	68	71		13	3					
POST		1	64		64	9		7				
		2	62	64		11	6					
		3	62	63		15	8					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/27/01

Age: 17

Relative Humidity: 89.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 29

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: MEDIUM

Time Turned: 13:35

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	11:18	11:22
Post-Turn:		

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	66		67	6		1				
		2	63	65		17	2					
		3	63	65		15	5					
POST		1	60		61	3		3				
		2	61	61		8	2					
		3	57	59		11	4					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/28/01

Age: 18

Relative Humidity: 61.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 35

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: MEDIUM

Time Turned: 14:47

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	14:13	14:17
Post-Turn:	14:48	14:53

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	62		62	19		2				
		2	68	66		7	1					
		3	64	67		18	3					
POST		1	61		61	17		18				
		2	61	55		18	19					
		3	54	57		19	18					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/29/01

Age 19

Relative Humidity: 83.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 26

Performed By: PJC / PJC

Windrow Length: 15

Windrow Width: 18

Texture: FINE

Time Turned: 12:50

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	10:00	10:05
Post-Turn:	13:03	13:07

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	65		63	3		1				
		2	62	65		19	10					
		3	61	63		11	5					
POST		1	56		56	3		2				
		2	57	57		6	2					
		3	56	55		2	2					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/30/01

Age: 20

Relative Humidity: 80.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 27

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: MEDIUM

Time Turned: 13:20

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	10:47	10:52
Post-Turn:	13:34	13:39

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	58		59	19		14				
		2	57	55		9	1					
		3	60	60		18	11					
POST		1	50		49	14		12				
		2	52	49		12	9					
		3	53	49		13	11					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 8/31/01

Age: 21

Relative Humidity: 95.0%

Inspected By:

Windrow Height: 4

Ambient Temperature: 29

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: FINE

Time Turned:

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	8:12	8:16
Post-Turn:	9:34	9:39

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	68		64	9		2				
		2	66	62		6	2					
		3	66	61		6	1					
POST		1	65		65	10		4				
		2	65	64		12	5					
		3	66	65		12	7					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

NSWC CRANE
WINDROW PROCESS DATA - DAILY LOG

Windrow Number: CONTRO

Date Monitored: 9/2/01

Age: 23

Relative Humidity: 89.0%

Inspected By:

Windrow Height: 3.5

Ambient Temperature: 24

Performed By: JL / JL

Windrow Length: 25

Windrow Width: 16

Texture: FINE

Time Turned: 7:25

Moisture Added: 0

	Start Time	Finish Time
Pre-Turn:	6:50	6:54
Post-Turn:	7:37	7:42

			Temperature (C)			Oxygen (%)			MWHC (%)			pH
Pre or Post	**Cross Section**	**Location**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**1 ft**	**2.5 ft**	**3 ft**	**2.5 ft**
PRE	A	1	52		56	11		4				
		2	51	54		10	2					
		3	52	55		13	3					
POST		1	49		54	4		2				
		2	49	53		6	2					
		3	50	54		4	2					

Data Entered By:_____ Date:_____ Data Entry Checked By: _____ Date:_____

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James M. Hanrahan

SIGNATURE

DIRECTOR, ENVIRONMENTAL PROTECTION DEPARTMENT
BY DIRECTION OF THE COMMANDER

TITLE

5/9/02

DATE