

DOE/OR/22012--711

TENNESSEE VALLEY AUTHORITY
TOXICITY TESTING LABORATORY
STANDARD REPORT FORM

STATIC RENEWAL TESTS USING
PIMEPHALES PROMELAS (FATHEAD MINNOWS) AND
CERIODAPHNIA DUBIA (DAPHNIDS)

Test Title: Clinch River - Environmental Restoration Program (CR-ERP)
Study, Ambient Water Toxicity

Principal Investigator: Damien J. Simbeck

Starting Date: April 14, 1994

Ending Date: April 21, 1994

1.0 EXECUTIVE SUMMARY

Clinch River - Environmental Restoration Program (CR-ERP) personnel and Tennessee Valley Authority (TVA) personnel conducted a study during the week of April 14-21, 1994, as described in the Statement of Work (SOW) document. [1] The organisms specified for testing were larval fathead minnows, Pimephales promelas, and the daphnid, Ceriodaphnia dubia.

Surface water samples were collected by TVA Field Engineering personnel from Poplar Creek Mile 4.3, Poplar Creek Mile 5.1, and Poplar Creek Mile 6.0 on April 13, 15, and 18. Samples were partitioned (split) and provided to the CR-ERP and TVA toxicology laboratories for testing. Exposure of test organisms to these samples resulted in no toxicity (survival or growth) to daphnids in undiluted samples; however, toxicity to fathead minnows (significantly reduced survival) was demonstrated in undiluted samples from Poplar Creek Miles 4.3 and 6.0 in testing conducted by TVA based on hypothesis testing of data. Daphnid reproduction was significantly less than controls in 50 percent dilutions of samples from Poplar Creek Miles 4.3 and 6.0, while no toxicity to fathead minnows was shown in diluted (50 percent) samples.

2.0 SAMPLE COLLECTION/TREATMENTS

2.1 Test Sample Identification (Chemical/Effluent/Elutriate, etc.):

Samples were collected for biomonitoring at the following three sites: Poplar Creek Mile 4.3, Poplar Creek Mile 5.1, and Poplar Creek Mile 6.0.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

NH

MASTER

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

**Portions of this document may be illegible
in electronic image products. Images are
produced from the best available original
document.**

Samples used for the CR-ERP Study; April 14-21, 1994, are identified as follows:

Station ID	Collection Date	CR-ERP ID Number	CR-ERP Chain-of-Custody Form Number	Dates Used
PCM 4.3	April 13	12705	0413944	April 14-15
	April 15	12739	0415943	April 16-18
	April 18	12849	0418944	April 19-20
PCM 5.1	April 13	12707	0413944	April 14-15
	April 15	12737	0415943	April 16-18
	April 18	12847	0418944	April 19-20
PCM 6.0	April 13	12709	0413944	April 14-15
	April 15	12735	0415943	April 16-18
	April 18	12845	0418944	April 19-20

- 2.2 Control and/or Dilution Water: Laboratory culture medium consisting of moderately hard reconstituted water (modified for daphnids; see Section 3.2.2) was used as control and dilution water for toxicity tests.
- 2.3 Sample Dates and Times: Test samples were collected on April 13, 15, and 18, 1994. Collection times were between 1000 and 1130 EST.
- 2.4 Sampling Method: All samples were collected using an Isco peristaltic pump with the inlet tubing lowered to approximately 1.5 meters below the surface. Pumping rate was approximately four liters per minute. A 20-L composite was collected at each station and partitioned (split) according to the workplan for shipping to the TVA Toxicity Testing Laboratory (TTL) at Browns Ferry Nuclear Plant site or direct transfer to ORNL (DOE) personnel in the field.
- 2.5 Pertinent Site Conditions: Water levels were high with fast current on April 13 with considerable amounts of debris. Flow and debris amounts decreased each day on April 15 and 18.
- 2.6 Sample Storage/Handling: All samples were placed on ice in ice chests after partitioning. Zero headspace was established in each container by filling full and expressing any air bubbles before sealing. Samples remained on ice until shipped or transferred directly to ORNL (DOE) or TTL personnel. Excess composite sample was discarded. Samples were stored in refrigerators at $\leq 4^{\circ}\text{C}$ after arrival at TTL. Integrity (chain of custody) was maintained in the laboratory through use of custody seals on the storage refrigerator.
- 2.7 Sample Transport: Samples collected on each day were transported to the Browns Ferry Nuclear Plant site by overnight TVA mail courier. Personnel from the TTL picked up samples from the mailroom and transported them to the TTL. All chain of custody security seals on all samples were intact upon receipt of shipments.

- 2.8 Sample Pretreatment: Sample temperature was raised to 25°C in a warm water bath. Adequate water for use in test initiation or daily renewal was poured into 2000-mL beakers, and appropriate dilutions were prepared where applicable.
- 2.9 Test Treatments: Samples from Poplar Creek Mile 4.3, Poplar Creek Mile 5.1, and Poplar Creek Mile 6.0 were tested at 100 percent (undiluted) and 50 percent, diluted using moderately hard reconstituted water.

3.0 TEST ORGANISMS/CULTURING CONDITIONS

- 3.1 Species: Pimephales promelas, Fathead minnow
- 3.1.1 Source: TTL inhouse culture
- 3.1.2 Culture Water: Culture medium consisted of moderately hard reconstituted water. Reagents for reconstituted water were added to reverse osmosis product water. Water was passed through a pack column degasser to bring dissolved gases to saturation. Culture medium was continuously aerated to help ensure aseptic conditions. Total hardness was approximately 95 mg/L as CaCO₃.
- 3.1.3 Temperature of Culture: 25°C ± 1°C
- 3.1.4 General Maintenance: Adult fathead minnows are maintained in glass aquaria in a flow through recirculating system. Flow rate to aquaria used for spawning is one aquarium volume per hour.
- Approximately 20 percent of the water volume is replaced twice weekly. Adults are fed three times daily. Sexually mature fish are placed in 21-L glass aquaria (one male, four females) and reproduction is checked and recorded daily. Spawns are removed from aquaria and incubated in 1-L glass beakers under aeration to the proper stage of development for the target test.
- Fish health is monitored regularly and corrective action is taken if necessary. Spawning frequency from individual aquaria is tracked and sexually spent individuals are replaced as necessary. Every 4-6 months a group of the same age fish from at least three spawns is reared to adults for replacement spawners.
- 3.1.5 Spawn Date: April 9-10, 1994
- 3.1.6 Hatch Date/Time: April 13, 1994/1030 CDT to
April 14, 1994/0930 CDT
- 3.1.7 Culture/Acclimation Water: Moderately hard reconstituted water
- 3.1.8 Acclimation Temperature: 25°C ± 1°C
- 3.1.9 Diseases and Treatment: None.

- 3.1.10 Food and Feeding: Larvae were fed brine shrimp (Artemia) nauplii <24-h old twice daily beginning after hatching to ensure food availability if larvae began feeding prior to test initiation.
- 3.2 Species: Ceriodaphnia dubia, daphnids
- 3.2.1 Source: Inhouse culture, TVA, Aquatic Research Laboratory
- 3.2.2 Culture Water: Moderately hard reconstituted water containing trace elements, macronutrients, and vitamins. [2]
- 3.2.3 Temperature of Culture: 25°C ± 1°C
- 3.2.4 General Maintenance: Adults used to produce neonates for test initiation are selected as neonates from broods as described below on 2 or 3 consecutive days 6-10 days prior to test initiation. (Adults up to 14 days old may be used for neonate production.) These animals are raised individually (a brood may be raised as a group until Day 3 at which time animals are transferred to individual cups), and a record is made of their reproduction. Their fourth brood is generally the second brood with 8 or more young and is the earliest brood used for test initiation.
- Mass cultures may also be maintained in 8-L glass battery jars in light and temperature controlled incubators. New cultures are started weekly (7-10 days) with approximately 50 neonates. These neonates are selected from the third or fourth brood of the adult, from broods containing 8 or more young.
- 3.2.5 Food and Feeding: Ceriodaphnia are fed food made according to methods modified from EPA/600/4-89/001 with tropical fish food substituted for trout chow and alfalfa substituted for Cerophyll. [3] In addition to the yeast/alfalfa/fish food recipe, the alga Selenastrum capricornutum concentrated to 50 x 10⁶ cells/mL is also fed as part of the regular diet. Medium used for algal culture contains 1.0 ppb selenium and vitamins. The feeding rate for mass cultures is 5 mL prepared food and 5 mL algae concentrate at culture initiation and 5 mL prepared food only every other day thereafter. Individual animals contained in cups with 15 mL medium are fed 0.1 mL food and 0.2 mL algae at renewal and 0.1 mL food recipe only on intermediate days.

4.0 TEST METHODS

- 4.1 Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test, EPA Test Method 1000.0. [3]
- 4.1.1 Modifications to/Deviations from Method 1000.0:
- 4.1.1.1 Samples were not pre-filtered or aerated as described in EPA methods and TTL SOP-12 per request of Terry Phipps (comment provided during surveillance on 01/25/94).

- 4.1.2 Date/Time Test Initiated: April 14, 1994/1020 CDT
- 4.1.3 Date/Time Test Terminated: April 21, 1994/1040 CDT
- 4.1.4 Test Chamber: 600-mL borosilicate glass beakers
Volume per chamber: 350 mL
- 4.1.5 Age of Test Organisms at Start of Test: 0.8-23.8 hours
- 4.1.6 Mean Dry Weight of Test Organisms at Start of Test: 0.07 mg
- 4.1.7 Number of Test Organisms per Chamber: 10
- 4.1.8 Number of Replicates per Treatment: 4
- 4.1.9 Dilution Water/Control Water: Moderately hard reconstituted water
- 4.1.10 Renewal Period: 24-h
- 4.1.11 Test Temperature: $25.0^{\circ}\text{C} \pm 1^{\circ}\text{C}$
- 4.1.12 Feeding Regime During Test: Fathead minnow larvae were fed brine shrimp (Artemia) nauplii <24-h old 2 or 3 times daily ad libitum.
- 4.1.13 Physical and Chemical Parameters Measured: Parameters measured daily (initially) on test solutions and control waters were temperature (temperature was adjusted to equal "final" temperature before renewal), DO, pH and conductivity. In addition, alkalinity, hardness, and total residual chlorine were measured on each new sample at the time of first use (4/14, 4/16, and 4/19).
- Final measurements taken daily before renewal were temperature and DO in every test beaker and pH and conductivity in one replicate per treatment. Mean values and ranges are reported in Section 6.3.
- 4.1.14 Statistics:
- Revised statistical procedures contained in the second edition of EPA's short-term chronic toxicity methods require a decision process for testing statistical assumptions before selecting a specific test method to determine toxicity endpoints. [3] Decision processes followed for testing survival and sublethal (growth) effects are shown in Sections 6.1.2.2 and 6.1.3.1. Based on tests for normal distribution and homogenous variance of data, the statistical test used for endpoint determination of survival data was Dunnett's Test and for growth data was Steel's Many-one Rank Test.

- 4.2 Ceriodaphnia Survival and Reproduction Test, EPA Test Method 1002.0. [3]
- 4.2.1 Modifications/Deviations to Method 1002.0:
- 4.2.1.1 Culture medium (see Section 3.2.2.).
- 4.2.1.2 Samples were not pre-filtered or aerated as described in EPA methods and TTL SOP-15 per request of Terry Phipps (comment provided during surveillance on 01/25/94).
- 4.2.2 Date/Time Test Initiated: April 14, 1994/1335 CDT
- 4.2.3 Date/Time Test Terminated: April 21, 1994/1240 CDT
- 4.2.4 Test Chamber: 1-ounce plastic cups (Plastics, Inc., #P.I.-1)
Volume per Chamber: 15 mL
- 4.2.5 Age of Test Organisms at Initiation: 0.5-3.5 hours
- 4.2.6 Number of Test Organisms per Chamber: 1
- 4.2.7 Number of Replicates per Treatment: 10
- 4.2.8 Dilution Water/Control Water: Moderately hard reconstituted water containing trace elements, macronutrients, and vitamins.
- 4.2.9 Renewal Period: 24 hours
- 4.2.10 Test Temperature: $25.0^{\circ}\text{C} \pm 1^{\circ}\text{C}$
- 4.2.11 Feeding Regime During Test: Each organism was fed 0.1 mL of prepared food and algae concentrate daily (added to renewal water before introduction of test organism).
- 4.2.12 Physical and Chemical Parameters Measured: Parameters measured daily ("initial") on test solutions and control waters were temperature (temperature was adjusted to equal "final" temperature before renewal), DO, pH and conductivity. In addition, alkalinity, hardness, and total residual chlorine were measured on each new sample at the time of first use (4/14, 4/16, and 4/19).

"Final" measurements of temperature were made in 10 randomly selected cups when the tray was removed from the incubator. DO and pH were measured daily in 1 cup per treatment following renewal. Mean values and ranges are reported in Section 6.3.
- 4.2.13 Statistics:
- Fisher's Exact Test was used to evaluate Ceriodaphnia survival effects during the study. Revised statistical procedures contained in the second edition of EPA's short-term chronic toxicity methods require decision process for testing statistical assumptions before

selecting a specific statistical test to determine toxicity endpoints. [3] Based on tests for normal distribution and homogenous variance of data, the statistical test used for endpoint determination for reproduction data was Steel's Many-one Rank Test.

5.0 QUALITY ASSURANCE

5.1 Toxicity Test Methods: All phases of the study including, but not limited to, sample collection, handling and storage; glassware preparation; test organism culturing/acquisition and acclimation; test organism handling during test; and maintaining appropriate test conditions were conducted according to the protocol as described in this report, EPA/600/4-89/001, and EPA/600/4-89/001a. [3] Any known deviations were noted during the study and are reported herein.

5.2 Physical and Chemical Methods

5.2.1 Reagents, Titrants, Buffers, etc.: All chemicals were certified products used before expiration dates (where applicable). All TTL chemicals are recorded in a bound Laboratory Chemical Logbook and specific chemicals used were documented on a chemical record sheet contained in the study notebook.

5.2.2 Instruments: All identification, service, calibration, and standardization information pertaining to TTL laboratory instruments is contained in bound Laboratory Instrument Logbooks and specific instruments used were documented on an instrument record sheet contained in the study notebook.

5.2.3 Temperature was measured using glass mercury thermometers. The instrument was standardized and inspected with readings made according to TVA procedures ES-43.8 and ES-42.11. [4]

5.2.4 Dissolved oxygen was measured using a YSI Model 57 oxygen meter. The instrument was standardized (using the Winkler method) and readings were taken according to TVA procedures ES-43.6 and ES-42.4, respectively. [4]

5.2.5 The pH was measured using an Orion Model SA250 meter equipped with an Orion Ross combination electrode. The instrument was standardized and readings were made according to TVA procedures ES-43.7 and ES-42.8, respectively. [4]

5.2.6 Conductance was measured using a YSI Model 32 SCT meter. The instrument was standardized and readings were taken according to TVA procedures ES-43.3 and ES-42.3, respectively. [4]

5.2.7 Alkalinity was measured by titration of 100 mL samples with 0.02 N H₂SO₄ to an end point of 4.5 according to TVA procedure ES-42.1. [4]

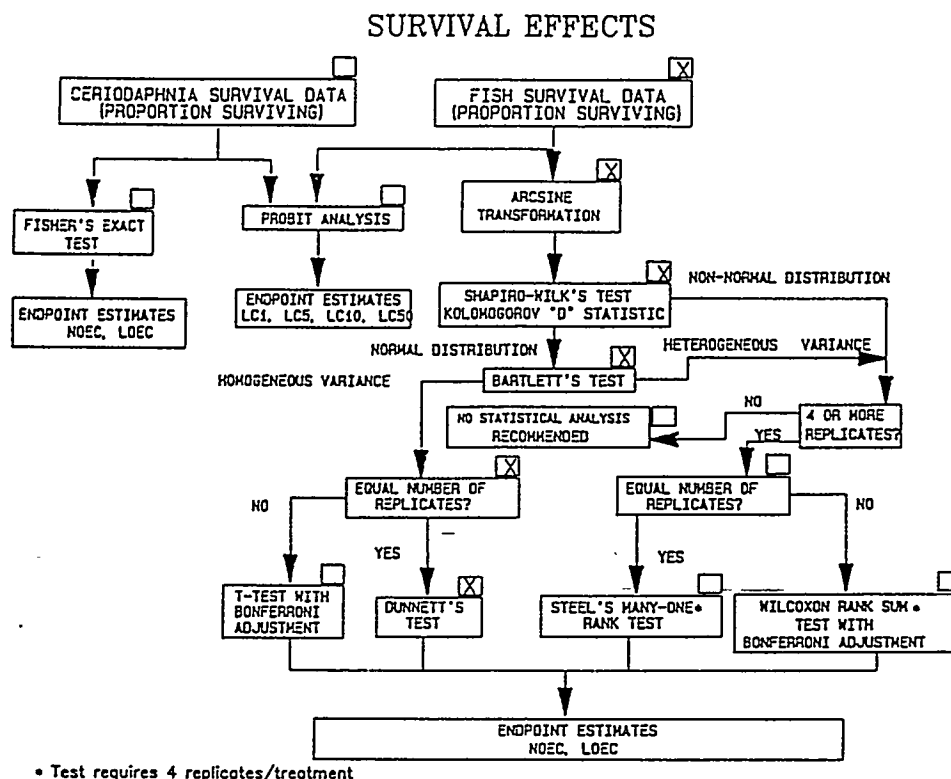
- 5.2.8 Hardness was determined by titration of 50 mL samples with EDTA to a colorimetric endpoint using an indicator (Instructions provided by Reagent Manufacturer [Calgon]), Schwarzenbach Method.
- 5.2.9 Total residual chlorine (TRC) was determined using the DPD Titrimetric Method according to TVA procedure ES-42.9, Rev. 0. [4]
- 5.3 Reference Toxicant Tests
- 5.3.1 Test Type: Fish - 7-day chronic (NOEC)
- 5.3.2 Standard Toxicants Used:
- Copper Sulfate Reference Toxicant Solution
Source/Brand: EPA
- 5.3.3 Dilution Water Used: Moderately hard reconstituted water (modified for daphnids)
- 5.3.4 Statistics: Chronic Test, FH Survival/Growth and Daphnid Reproduction, NOEC - Dunnett's Test or Steel's Many-one Rank Test, EPA Bootstrap Procedure - IC25
Daphnid Survival - Fisher's Exact Test

6.0 RESULTS

- 6.1 Fathead Minnow Larval Survival and Growth Test
- 6.1.1 Summary of Results: No survival or growth effects were demonstrated in fathead minnows exposed to Poplar Creek Mile 5.1 samples during the CR-ERP Ambient Water Toxicity Study conducted April 14-21, 1994. Survival effects were demonstrated in fathead minnows exposed to undiluted Poplar Creek Mile 4.3 and Poplar Creek Mile 6.0 samples. Growth effects were not demonstrated in fathead minnows exposed to 50 percent dilution of samples from these two stations.
- 6.1.2 Results, Survival Data:
- 6.1.2.1 Daily Percent Survival Summary for Fathead Minnow Larval Survival Test, CR-ERP Study, April 14-21, 1994.

Treatment	Total Daily % Survival							
	Day	1	2	3	4	5	6	7
Control		100	100	98	98	98	98	98
PCM 4.3-50%		100	100	95	90	88	83	83
PCM 4.3-100%		100	98	90	78	73	70	68
PCM 5.1-50%		100	100	98	93	88	83	80
PCM 5.1-100%		100	100	88	78	78	78	78
PCM 6.0-50%		100	100	95	85	85	80	75
PCM 6.0-100%		100	100	80	65	65	63	63

6.1.2.2 Statistical Decision Process for Determining Toxicity Endpoints for 7-Day Survival of Fathead Minnows, CR-ERP Study, April 14-21, 1994.



6.1.2.3 Analysis of Survival Data Using Dunnett's Test for Fathead Minnow 7-Day Larval Survival Test, CR-ERP Study, April 14-21, 1994.

Arcsine square-root transformation applied before data analysis. For this set of data, the minimum significant difference is 0.20.

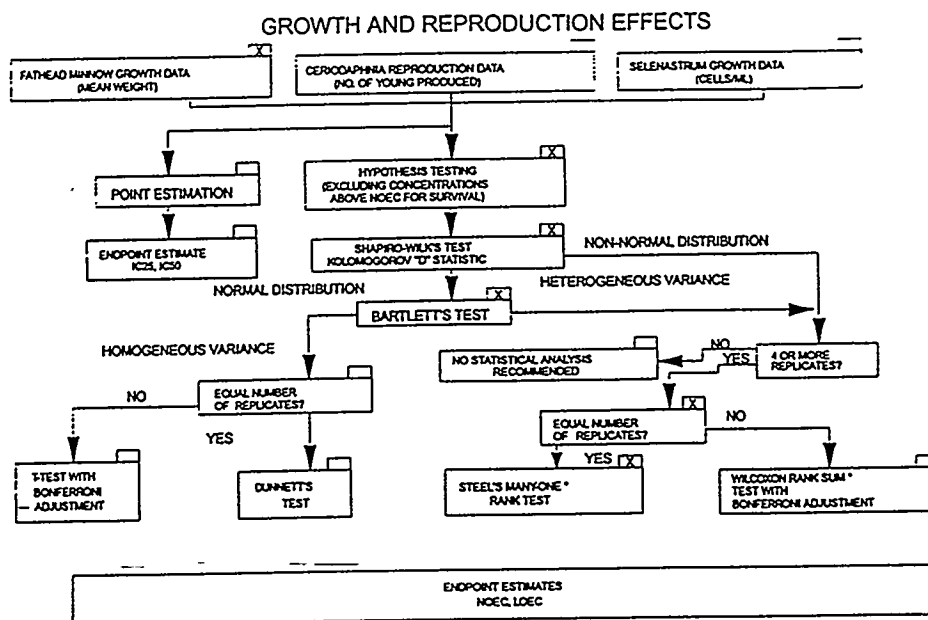
This represents a 21.19% decrease in survival.
 $T = 2.45$ $\alpha = 0.05$ (one-tailed test)

Treatment	Growth Data (mg)										Mean	S*
	Replicate											
	1	2	3	4	5	6	7	8	9	10		
Control	100	100	90	100							98	
PCM 4.3-50%	100	60	80	90							83	
PCM 4.3-100%	50	80	60	80							68	*
PCM 5.1-50%	90	70	70	90							80	
PCM 5.1-100%	70	80	60	100							78	
PCM 6.0-50%	90	60	90	60							75	
PCM 6.0-100%	40	60	80	70							63	*

*Values significantly less than the control (Medium). EMS = 0.033.

6.1.3 Results, Growth Data:

6.1.3.1 Statistical Decision Process for Determining Toxicity Endpoints for 7-Day Growth of Fathead Minnows, CR-ERP Study, April 14-21, 1994.



* Test requires 4 replicates/treatment

6.1.3.2 Analysis of Dry Weight (mg) Data Using Steel's Many-one Rank Test for Fathead Minnow 7-Day Larval Survival Test, CR-ERP Study, April 14-21, 1994.

Survival (%) Data												
Group	Replicate										Mean	S*
	1	2	3	4	5	6	7	8	9	10		
Control	0.32	0.47	0.42	0.43							0.41	
PCM 4.3-50%	0.45	0.44	0.45	0.47							0.45	
PCM 5.1-50%	0.36	0.54	0.50	0.53							0.48	
PCM 5.1-100%	0.44	0.46	0.52	0.43							0.46	
PCM 6.0-50%	0.51	0.52	0.53	0.29							0.46	

Steel's Many-one Rank Test			
Treatment	Replicates	Critical Rank Sum	Rank Sum*
PCM 4.3-50%	4	10	22.5
PCM 5.1-50%	4	10	23.0
PCM 5.1-100%	4	10	22.5
PCM 6.0-50%	4	10	22.0

*Values less than or equal to the Critical Rank Sum are significantly less than the control.

6.2 Ceriodaphnia Survival and Reproduction Test

6.2.1 Summary of Results: No survival or reproduction effects were demonstrated in daphnids exposed to Poplar Creek Mile 4.3, Poplar Creek Mile 5.1, or Poplar Creek Mile 6.0 samples (undiluted) during the CR-ERP Ambient Water Toxicity Study conducted April 14-21, 1994. Significant reproduction effects were demonstrated for the 50 percent dilutions of Poplar Creek Miles 4.3 and 6.0 based on hypothesis testing (Steel's Many-one Rank Test) of data.

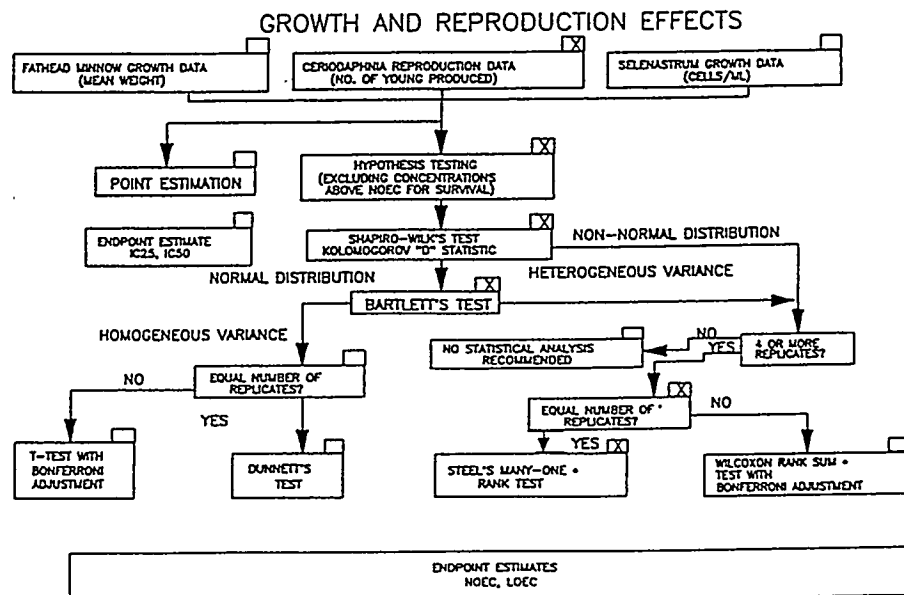
6.2.2 Results, Survival Data:

6.2.2.1 Daily percent survival summary for Ceriodaphnia Survival Test, CR-ERP Study, April 14-21, 1994.

Treatment	Total Daily % Survival						
	1	2	3	4	5	6	7
Control	100	100	100	100	100	100	100
PCM 4.3-50%	100	100	100	100	100	100	100
PCM 4.3-100%	100	100	100	100	100	100	100
PCM 5.1-50%	100	100	100	100	100	100	100
PCM 5.1-100%	100	100	100	100	100	100	100
PCM 6.0-50%	100	90	90	90	90	90	90
PCM 6.0-100%	100	100	100	100	100	100	100

6.2.3 Results, Reproduction Data:

6.2.3.1 Statistical Decision Process for Determining Toxicity Endpoints for 7-Day (3-Brood) Reproduction of Ceriodaphnia, CR-ERP Study, April 14-21, 1994.



* Test requires 4 replicates/treatment

6.2.3.2 Analysis of Reproduction (young/female/3-broods) Data Using Steel's Many-one Rank Test for Ceriodaphnia 7-Day (3-brood) Reproduction Test, CR-ERP Study, April 14-21, 1994.

Group	Survival (%) Data											Mean	S*
	Replicate												
	1	2	3	4	5	6	7	8	9	10			
Control	34	36	37	35	36	34	40	39	35	32	35.8		
PCM 4.3-50%	29	34	31	35	34	34	34	33	34	32	33.0	*	
PCM 4.3-100%	34	35	35	38	34	31	32	34	31	32	33.6		
PCM 5.1-50%	35	33	33	33	36	28	37	34	34	32	33.5		
PCM 5.1-100%	36	32	31	34	38	35	36	34	38	34	34.8		
PCM 6.0-50%	32	34	33	35	0	34	32	34	33	36	30.3	*	
PCM 6.0-100%	33	37	33	34	34	35	32	35	28	34	33.5		

Steel's Many-one Rank Test			
Treatment	Replicates	Critical Rank Sum	Rank Sum*
PCM 4.3-50%	10	74	70.5 *
PCM 4.3-100%	10	74	78.0
PCM 5.1-50%	10	74	80.0
PCM 5.1-100%	10	74	93.5
PCM 6.0-50%	10	74	74.0 *
PCM 6.0-100%	10	74	79.0

*Values less than or equal to the Critical Rank Sum are significantly less than the control (Medium).

6.3 Physical/Chemical Parameters

6.3.1 Overall Test Temperature: Fathead Minnow - 25.1°C (24.5°C-25.7°C)
Daphnid - 25.0°C (24.3°C-25.5°C)

6.3.2 Water chemistry summary for CR-ERP Study, April 14-21, 1994.

See: Appendix A Water Chemistry Mean Values and Ranges for Fathead Minnow and Ceriodaphnia Tests, CR-ERP Study, April 14-21, 1994

6.4 Reference Toxicant Tests

6.4.1 Summary of Results:

Reference toxicant tests conducted prior to CR-ERP Study showed chronic results consistent with TTL control chart ranges for fathead minnows and daphnids.

6.4.2 Fathead Minnows

6.4.2.1 Date/Time of Most Recent Test:
April 5, 1994/0915 CDT to April 12, 1994/0935 CDT

6.4.2.2 LOEC: 0.008 mg Cu/L
NOEC: 0.003 mg Cu/L
IC25: 0.007 mg Cu/L

6.4.2.3 Control Chart Information:

Number of standard tests completed by laboratory: 54

LOEC Range: 0.008-0.02 mg Cu/L (one concentration increment)
NOEC Range: 0.003-0.008 mg Cu/L (one concentration increment)
IC25 Range: 0.004-0.012 mg Cu/L

6.4.3 Ceriodaphnia

6.4.3.1 Date/Time of most recent test:
April 5, 1994/1015 CDT to April 11, 1994/1035 CDT

6.4.3.2 LOEC: 0.05 mg Cu/L
NOEC: 0.02 mg Cu/L
IC25: 0.027 mg Cu/L

6.4.3.3 Control Chart Information:

Number of standard tests completed by laboratory: 56

LOEC Range: 0.008-0.05 mg Cu/L (two concentration increments)
NOEC Range: 0.003-0.02 mg Cu/L (two concentration increments)
IC25 Range: 0.011-0.030 mg Cu/L

7.0 CONCLUSION

Surface water samples were collected by TVA Field Engineering personnel from Poplar Creek Mile 4.3, Poplar Creek Mile 5.1, and Poplar Creek Mile 6.0 on April 13, 15, and 18. Samples were partitioned (split) and provided to the CR-ERP and TVA toxicology laboratories for testing. Exposure of test organisms to these samples resulted in no toxicity (survival or growth) to daphnids in undiluted samples; however, toxicity to fathead minnows (significantly reduced survival) was demonstrated in undiluted samples from Poplar Creek Miles 4.3 and 6.0 in testing conducted by TVA based on hypothesis testing of data. Daphnid reproduction was significantly less than controls in 50 percent dilutions of samples from Poplar Creek Miles 4.3 and 6.0, while no toxicity to fathead minnows was shown in diluted (50 percent) samples.

8.0 REFERENCES

1. Phipps, T. L., and L. A. Kszos, Statement of Work, Environmental Sciences Division, Biomonitoring Group, Oak Ridge National Laboratory (April 1993, revised June 1993).
2. Elendt, B. P., and W. R. Bias. "Trace Nutrient Deficiency in Daphnia Magna Cultured in Standard Medium for Toxicity Testing. Effects of the Optimization of Culture Conditions on Life History Parameters of D. Magna." Water Resources, Great Britain, Vol. 24, No. 9, (1990) pp 1157-1167.
3. Weber, C. I., W. H. Peltier, T. J. Norberg-King, W. B. Horning, F. A. Kessler, J. R. Menkdick, T. W. Neiheisel, P. A. Lewis, D. J. Klemm, Q. H. Pickering, F. L. Robinson, J. M. Lazorchak, L. J. Wymer, and R. W. Freyberg. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. EPA/600/4-89/001 (March 1989) and EPA/600/4-89/001a (September 1989).
4. Field Operations Natural Resource Engineering Procedures Manual, Vol. 1, Division of Natural Resource Operations, Tennessee Valley Authority.

PLARC501-440

Appendix A

Water Chemistry Mean Values and Ranges for Fathead Minnow and Ceriodaphnia Tests,
CR-ERP Study, April 14-21, 1994

Source	Temperature		Dissolved Oxygen			pH		Conductivity			Alk		Hardness		Chlorine	
	Fish	Cerio	Initial	Final Fish	Final Cerio	Initial	Final Fish	Initial	Final Fish	Final Cerio	Initial	Final	Initial	Final	Initial	Final
	(°C)	(°C)	(mg/L)	(mg/L)	(mg/L)	(S.U.)	(S.U.)	(µmhos)	(µmhos)	(S.U.)	(µmhos)	(µmhos)	*	*	(mg/L)	(mg/L)
PCM 4.3-50% w/F. Medium†	25.0 (24.5-25.4)	-	8.9 (8.7-9.1)	6.0 (5.6-6.7)	-	7.5 (7.4-7.5)	7.6 (7.5-7.6)	234 (211-246)	238 (214-251)	-	-	-	-	-	-	-
PCM 4.3-50% w/C. Medium‡	-	25.0 (24.3-25.5)	8.9 (8.7-9.1)	-	7.6 (7.4-7.7)	7.5 (7.5-7.6)	-	239 (213-252)	-	7.8 (7.7-7.9)	-	-	-	-	-	-
PCM 4.3-100%	25.1 (24.6-25.6)	25.0 (24.3-25.5)	9.1 (8.8-9.6)	5.9 (5.4-6.5)	7.6 (7.5-7.8)	7.2 (7.1-7.3)	7.4 (7.2-7.6)	141 (89.4-163)	147 (92.7-182)	7.6 (7.4-7.9)	141	147	43 (25-52)	60.0 (40.0-70.0)	<0.1 (<0.1-<0.1)	<0.1 (<0.1-<0.1)
PCM 5.1-50% w/F. Medium†	25.2 (24.7-25.7)	-	9.0 (8.7-9.1)	5.9 (5.2-6.6)	-	7.5 (7.4-7.5)	7.5 (7.4-7.6)	235 (210-248)	237 (212-250)	-	-	-	-	-	-	-
PCM 5.1-50% w/C. Medium‡	-	25.0 (24.3-25.5)	8.9 (8.7-9.1)	-	7.6 (7.5-7.8)	7.5 (7.4-7.6)	-	241 (211-254)	-	7.8 (7.7-7.9)	-	-	-	-	-	-
PCM 5.1-100%	25.0 (24.7-25.4)	25.0 (24.3-25.5)	9.2 (8.9-9.6)	5.8 (5.2-6.4)	7.6 (7.4-7.8)	7.1 (7.1-7.3)	7.4 (7.2-7.5)	144 (88.1-169)	147 (91.3-170)	7.7 (7.4-7.9)	144	147	44 (24-55)	58.7 (40.0-70.0)	<0.1 (<0.1-<0.1)	<0.1 (<0.1-<0.1)
PCM 6.0-50% w/F. Medium†	25.0 (24.8-25.6)	-	9.0 (8.7-9.2)	6.0 (5.5-6.6)	-	7.4 (7.4-7.5)	7.5 (7.4-7.5)	230 (207-243)	231 (211-243)	-	-	-	-	-	-	-
PCM 6.0-50% w/C. Medium‡	-	25.0 (24.3-25.5)	9.0 (8.8-9.2)	-	7.6 (7.4-7.8)	7.5 (7.4-7.5)	-	236 (211-248)	-	7.8 (7.7-7.9)	-	-	-	-	-	-
PCM 6.0-100%	25.0 (24.5-25.5)	25.0 (24.3-25.5)	9.2 (8.8-9.5)	5.9 (4.8-6.7)	7.5 (7.2-7.8)	7.1 (7.0-7.2)	7.4 (7.1-7.5)	131 (83.4-151)	134 (87.2-156)	7.6 (7.3-7.8)	131	134	35 (19-43)	54.7 (34.0-66.0)	<0.1 (<0.1-<0.1)	<0.1 (<0.1-<0.1)
Fish Medium†	25.1 (24.7-25.7)	-	8.3 (8.3-8.4)	5.9 (4.9-6.6)	-	8.1 (8.0-8.2)	7.7 (7.6-7.8)	324 (318-330)	327 (320-334)	-	-	327	64 (61-67)	86.0 (86.0-86.0)	-	-
Cerio Medium‡	-	25.0 (24.3-25.5)	8.2 (8.1-8.3)	-	7.7 (7.4-7.8)	8.1 (8.0-8.2)	-	334 (333-336)	-	7.9 (7.8-8.0)	334	-	68 (68-68)	90.0 (90.0-90.0)	-	-

* mg/L as CaCO₃

† Fathead Minnow Test

‡ Ceriodaphnia Test

PLARC501-441

ATTACHMENT I

CR-ERP AMBIENT WATER TOXICITY STUDY
Chain-of-Custody Forms - Originals

TVR → BFZZZY

FOUO Rev. 03 28JAN94
seals intact on coolers

CR2-00585



TVA → BERRY

[illegible]

ATTACHMENT II

CR-ERP AMBIENT WATER TOXICITY STUDY
Toxicity Test Bench Sheets and Statistical Analyses

TTL CHRONIC TOXICITY TEST MASTER CHECKLIST

CL # 0068Study: CAERPTest Dates: 4/14/94 - 4/21/94Date Issued: 4/11/94 To: DJSReport Due: 5/20/94 By: DJS

1. Test organism availability: FH Minnows-T.L.* M/S C.U.† NA Date 4-12-94
Daphnids - T.L. M/S C.U. M/S Date 4-12-94
2. Sample Collection Coordination: Date 4-12-94 By M/S With L. Graser/
J. Stockburger
3. Glassware availability: T.L. M/S Tech. NA Date 4-12-94
4. Glassware prep. complete: Date 4-13-94 By M/S
5. Data Sheet prep. complete: Date 4-13-94 By M/S
6. Test organism availability verification: FH-OK? M/S Daphnids-OK? M/S
7. Culture Medium Availability: Date 4-12-94 By M/S With MLB
8. FH Minnow acclimation:
Day 1 2
By NA NA

9. Test Initiation: FH-Date/Time 4-14-94/1020 Daphnid-Date/Time 4-14-94/1335
Initial FH Sample SPP

10. Daily:	Day #:	0	1	2	3	4	5	6	7
Initial Chem. -	T.L.	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>NA</u>
	T.M.#	<u>SPP</u>	<u>NA</u>	<u>SPP</u>	<u>NA</u>	<u>TS</u>	<u>M/S</u>	<u>SPP</u>	<u>NA</u>
Final Chem. -	T.L.	<u>NA</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S*</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>
	T.M.	<u>NA</u>	<u>NA</u>	<u>SPP</u>		<u>TS</u>	<u>TS</u>	<u>TS/SPP</u>	<u>SPP</u>
F.H. -	T.L.	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>
	T.M.	<u>TS/SPP</u>	<u>NA</u>	<u>SPP</u>		<u>TS</u>	<u>TS</u>	<u>TS/SPP</u>	<u>SPP</u>
Daphnid -	T.L.	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>
	T.M.	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
Log Samples -	T.L.	<u>M/S</u>	<u>NA</u>	<u>M/S</u>	<u>NA</u>	<u>NA</u>	<u>M/S</u>	<u>NA</u>	<u>NA</u>
	T.M.	<u>OK</u>	<u>OK</u>	<u>OK</u>	<u>OK</u>	<u>OK</u>	<u>OK</u>	<u>OK</u>	<u>NA</u>
Security Seals	T.M.	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>M/S</u>	<u>NA</u>
		<u>4-13-94</u>							

No Cerio
Final Che

11. Test Termination: FH-Date/Time 4-21-94/1020 Daphnid-Date/Time 4-20-94/1430
Clean-up, By: M/S, 4-21-94

12. Weigh Fish: Date 5-3-94 By M/S
13. Run Stats: Date 05-04-94 By NA

14. Report Prep.: Assigned To DJS Date 5-11-94 By M/S

15. Report Final: Date 5-18-94 By Jm Approved: NA

*Team Leader †Culture Unit #Team Member

PLARC501-1266(1)(Rev 12/93)

CHRONIC STUDY - FATHEAD MINNOW RECORD SHEET

Study CR-ERP April 1994 Test Organism Pimephales promelas
 Beginning Date/Time 4-14-94/1020 Ending Date/Time 4-21-94/1040
 Personnel Simbeck, Posey, Sesler, Control/Dilution Water F-MED
Russell

Test Treatment

Site	Concentrations:
<u>PCM 4.3</u>	<u>50%, 100%</u>
<u>PCM 5.1</u>	<u>50%, 100%</u>
<u>PCM 6.0</u>	<u>50%, 100%</u>

		Site: <u>PCM 4.3</u>	<u>PCM 5.1</u>	<u>PCM 6.0</u>	
Day	Date	Log #'s	Log #'s	Log #'s	Log #'s
<u>0</u>	<u>4-14-94</u>	<u>12705</u>	<u>12707</u>	<u>12709</u>	
<u>1</u>	<u>4-15-94</u>	<u>12705</u>	<u>12707</u>	<u>12709</u>	
<u>2</u>	<u>4-16-94</u>	<u>12739</u>	<u>12737</u>	<u>12735</u>	
<u>3</u>	<u>4-17-94</u>	<u>12739</u>	<u>12737</u>	<u>12735</u>	
<u>4</u>	<u>4-18-94</u>	<u>12739</u>	<u>12737</u>	<u>12735</u>	
<u>5</u>	<u>4-19-94</u>	<u>12849</u>	<u>12847</u>	<u>12845</u>	
<u>6</u>	<u>4-20-94</u>	<u>12849</u>	<u>12847</u>	<u>12845</u>	

Spawn Date	Tile #	Hatch Date/Time to Date/Time
<u>4-9-94</u>	<u>11,12,13,14,17</u>	<u>4-13-94/1030</u> <u>4-14-94/0930</u>
	<u>18,20,23,26</u>	
<u>4-10-94</u>	<u>9,10,13,16,17</u>	
	<u>18,23</u>	

Test # 11
 LOEC 11
 NOEC 11

Notes:

4/9 11 12

4/9 13 14

(PLARC501-256)

4/9 17,18

4/9 20,25

4/9 26

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

Study CR-ERP April 1994

Beginning Date/Time 4-14-94/1020

Ending Date/Time 4-21-94/1040

Personnel

Page 1 of 2

Simbeck

Posey, Sosler,

Russell

-- Number Alive --

Treatment	Rep	- Day -						
		1	2	3	4	5	6	7
F-MED	Log #	1674	1674	1674	1674	1677	1677	1677
	1	10	10	10	10	10	10	10
	2	10	10	10	10	10	10	10
	3	10	10	9	9	9	9	9
	4	10	10	10	10	10	10	10
	By:	MS	MS	MS	TS	TS	TS	MS
PCM 4.3	Log #							
	1	10	10	10	10*	10	10	10
	2	10	10	9	8	7	6	6
	3	10	10	10	9	9	8	8
	4	10	10	9	9	9	9	9
	By:	MS	MS	MS	TS	TS	TS	MS
PCM 4.3	Log #	12705	12705	12739	12739	12739	12849	12849
	1	10	9	8	7	6	6	5
	2	10	10	9	9	9	8	8
	3	10	10	9	7	6	6	6
	4	10	10	10	8	8	8	8
	By:	MS	MS	MS	TS	TS	TS	MS
PCM 5.1	Log #							
	1	10	10	10	10	10	9	9
	2	10	10	9	9	7	7	7
	3	10	10	10	9	9	8	7
	4	10	10	10	9	9	9	9
	By:	MS	MS	MS/JPP	MS/TS	MS/TS	TS/MS	MS
PCM 5.1	Log #	12707	12707	12737	12737	12737	12847	12847
	1	10	10	8	7	7	7	7
	2	10	10	8	8	8	8	8
	3	10	10	9	6	6	6	6
	4	10	10	10	10	10	10	10
	By:	MS/CUR	JPP	JPP	MS	MS	MS	JPP

Notes:

Notes:

* injured one

Notes:

Notes:

Notes:

(PLARC501-257)

Renewal Time:

Fed- Time/By:

Dilution Water ID:

Reviewed By:

0 1 2 3 4 5 6
1030-1145 1045-1140 0935-1030 1010-1105 0950-1040 1010-1100

NA 0725/MS 0630/CUR 0815/MS 0415/CUR 0635/MS 0640/MS
1050/JPP 1150/MS 1145/MS 1040 0935/JPP 1105/MS 1050/MS 1110/TS
1600/JPP 1530/CUR 1600/CUR 1400/MS 1525/MS 1600/CUR 1645/MS

1674 1674 1674 1674 1677 1677 1677
MS MS MS MS MS MS MS

FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

Study CR-ERP April 1994

Beginning Date/Time 4-14-94/1020

Ending Date/Time 4-21-94/1040

Personnel

Page 2 of 2

Simbeck

Posey, Sessler,
Russell

Treatment	Rep	-- Number Alive --						
		- Day -						
		1	2	3	4	5	6	7
	Log #							
	1	10	10	10	9	9	9	9
PCM 6.0	2	10	10	8	7	7	6	6
50%	3	10	10	10	9	9	9	9
	4	10	10	10	9	9	8	6
	By:	CR	JPP	JPP	O/S	O/S	O/S	JPP
	Log #							
	12709	12709	12709	12735	12735	12735	12845	12845
	1	10	10	6	4	4	4	4
PCM 6.0	2	10	10	6	6	6	6	6
100%	3	10	10	10	9	9	8	8
	4	10	10	10	7	7	7	7
	By:	CR	JPP	JPP	O/S	O/S	O/S/JPP	JPP
	Log #							
	.1							
	2							
	3							
	4							
	By:							
	Log #							
	1							
	2							
	3							
	4							
	By:							
	Log #							
	1							
	2							
	3							
	4							
	By:							

Notes:

A nonfeeder died

Notes:

Notes:

Notes:

Notes:

(PLARC501-257)

Renewal Time:

Fed- Time/By:

Dilution Water ID:

Reviewed By:

0 1 2 3 4 5 6
 1030-1145 1045-1140 0935-1030 100-1105 0950-1040 1010-1100
 NA 0725/NA 0630/CCR 0815/MS 0615/CCR 0635/MS 0640/MS
 1050/JPP 1150/MS 1145/MS 1040/JP 1105/MS 1050/MS 1110/MS
 1600/JPP 1530/NA 1600/CCR 1400/MS 1525/MS 1600/NA 1645/NA
 1674 1674 1674 1674 1677 1677 1677
 MS MS MS MS MS MS MS

FATHEAD DRY WEIGHT RECORD SHEET

Page 1 of 2Study/Date CR-ERP April 1994Pans: Date/Time of Drying 5-2-94/0715-1000 By gjs Fish: Date/Time of Drying 5-3-94/0710-0930 By gjsOven Temperature: In 98 Out 100 By gjs Oven Temperature: In 100°C Out 99°C By gjsPans: Date/Time of Weighing 5-2-94/1130-1325 By gjs Fish: Date/Time of Weighing 5-3-94/1015-1220 By gjs

Sample ID	Tare Wt.	Tare + Fish Wt.	Fish Wt.	# Fish	Mean Wt.	Difference	
Initial	1. 1.11496	1.11570		10	.074		
	2. 1.09450	1.09523		10	.073		
	3. 1.11694	1.116765		10	.071		
	4. 1.09800	1.09872		10	.072		
Initial Mean Weight							
F-MED	1. 1.10389	1.10710		10	.32		
	2. 1.10879	1.11350		10	.47		
	3. 1.09525	1.09904		9	.42		
	4. 1.11782	1.12209		10	.43		
PCM 4.3 50%	1. 1.10848	1.11294		10	.45		
	2. 1.09763	1.10024	---	6	.44		
	3. 1.11810	1.12166		8	.45		
	4. 1.09190	1.09610		9	.47		
PCM 4.3 100%	1. 1.10087	1.10338		5	.50		
	2. 1.11052	1.11461		8	.51		
	3. 1.11121	1.11374		6	.42		
	4. 1.11527	1.11914		8	.48		
PCM 5.1 50%	1. 1.11137	1.11461		9	.36		
	2. 1.09862	1.10239		7	.54		
	3. 1.10688	1.11036		7	.50		
	4. 1.10487*	1.09940		9			
PCM 5.1 100%	1. 1.12108	1.12416		7	.44		
	2. 1.09844	1.10211		8	.46		
	3. 1.10135	1.10446		6	.52		
	4. 1.10603	1.11031		10	.43		
PCM 6.0 50%	1. 1.10888	1.11350		9	.51		
	2. 1.10584	1.10898		6	.52		
	3. 1.10204	1.10677		9	.53		
	4. 1.11691	1.11867		6	.29		

Notes:

reweigh

reweigh

reweigh

(PLARC501-266) * write down wrong
initial weight. use reweigh
data

Reviewed By: CU

FATHEAD DRY WEIGHT RECORD SHEET

Page 2 of 2

Study/Date CR-ERP April 1994

Pans:Date/Time of Drying _____ By _____

Fish:Date/Time of Drying _____ By _____

Oven Temperature: In _____ Out _____ By _____

Oven Temperature: In _____ Out _____ By _____

Pans:Date/Time of Weighing _____ By _____

Fish:Date/Time of Weighing _____ By _____

Sample ID	Tare Wt.	Tare + Fish Wt.	Fish Wt.	# Fish	Mean Wt.	Difference
Initial 1.						
2.						
3.						
4.						

Notes:

Initial
Mean Weight

1.	1.10830	1.10972		4	.36	
2.	1.11252	1.11513		6	.44	
3.	1.11077	1.11468		8	.49	
4.	1.11960	1.12273		7	.45	

reweigh

1.						
2.						
3.						
4.						

1.						
2.						
3.						
4.						

1.						
2.						
3.						
4.						

1.						
2.						
3.						
4.						

1.						
2.						
3.						
4.						

(PLARC501-266)

Reviewed By: Cal

FATHEAD DRY WEIGHT RECORD SHEET

Study/Date: ^{C E}
ZR-ZRP APRIL
0205-04-94

Personnel: DJS

Pans:Date/Time of Drying: 05-02-94/0815-1000

Fish:Date/Time of Drying: 05-03-94/0710-0930

TEMP: IN 98°C- OUT 100°C

TEMP: IN 100°C- OUT 99°C

Pans:Date/Time of Weighing: 05-02-94/1135-1325

Fish:Date/Time of Weighing: 05-03-94/1015-1220

Notes:

Sample ID	Tare Wt.	Tare + Fish Wt.	Fish Wt.	# Fish	Mean Wt. grams	Mean Wt. Difference	Mean Wt. mg
Initial	1.	1.11496	1.11570	10	0.000074	-	-
	2.	1.09450	1.09523	10	0.000073	-	-
	3.	1.11694	1.11765	10	0.000071	-	-
	4.	1.09800	1.09872	10	0.000072	-	-
Initial Mean Wt.					0.0000725		
MEDIUM	1.	1.10389	1.10710	10	0.000321	0.000249	0.321
	2.	1.10879	1.11350	10	0.000471	0.000399	0.471
	3.	1.09525	1.09904	9	0.000421	0.000349	0.421
	4.	1.11782	1.12209	10	0.000427	0.000355	0.427
PCM 4.3 50%	1.	1.10848	1.11294	10	0.000446	0.000374	0.446
	2.	1.09763	1.10024	6	0.000435	0.000363	0.435
	3.	1.11810	1.12166	8	0.000445	0.000373	0.445
	4.	1.09190	1.09610	9	0.000467	0.000394	0.467

reweigh

05-04-94 cm

PCH 4.3 100%	1.	1.10087	1.10338	0.00251	5	0.000502	0.000430	0.502
	2.	1.11052	1.11461	0.00409	8	0.000511	0.000439	0.511
	3.	1.11121	1.11374	0.00253	6	0.000422	0.000349	0.422
	4.	1.11527	1.11914	0.00387	8	0.000484	0.000411	0.484
PCH 5.1 50%	1.	1.11137	1.11461	0.00324	9	0.000360	0.000288	0.360
	2.	1.09862	1.10239	0.00377	7	0.000539	0.000466	0.539
	3.	1.10688	1.11036	0.00348	7	0.000497	0.000425	0.497
	4.	1.10487	1.09940	-0.00547	9	-0.000608	-0.000680	-0.608
PCH 5.1 100%	1.	1.12108	1.12416	0.00308	7	0.000440	0.000368	0.440
	2.	1.09844	1.10211	0.00367	8	0.000459	0.000386	0.459
	3.	1.10135	1.10446	0.00311	6	0.000518	0.000446	0.518
	4.	1.10603	1.11031	0.00428	10	0.000428	0.000355	0.428

rwei

05-04-94 OK

PCH 6.0 50%	1.	1.10888	1.11350	0.00462	9	0.000513	0.000441	0.513
	2.	1.10584	1.10898	0.00314	6	0.000523	0.000451	0.523
	3.	1.10204	1.10677	0.00473	9	0.000526	0.000453	0.526
	4.	1.11691	1.11867	0.00176	6	0.000293	0.000221	0.293
PCH 6.0 100%	1.	1.10830	1.10972	0.00142	4	0.000355	0.000283	0.355
	2.	1.11252	1.11513	0.00261	6	0.000435	0.000363	0.435
	3.	1.11077	1.11468	0.00391	8	0.000489	0.000416	0.489
	4.	1.11960	1.12273	0.00313	7	0.000447	0.000375	0.447

Rework

Rework

Reviewed By: Russell

05-04-94 CR

this is only reweigh used in analysis. 05-04-94
CER

PCM 5.1 50%	1.	1.10804	1.11143	0.00339	9	0.000377	0.000304	0.377
	2.	1.11411	1.11810	0.00399	7	0.000570	0.000498	0.570
	3.	1.10688	1.11036	0.00348	7	0.000497	0.000425	0.497
	4.	1.11668	1.12141	0.00473	9	0.000526	0.000453	0.526

FATHEAD DRY WEIGHT RECORD SHEET

Study/Date CR-ERP April 94 RerweighPans: Date/Time of Drying 5-3-94 / -5-4-94/0620 By W/S Fish: Date/Time of Drying 5-4-94 / 0825-1025 By W/SOven Temperature: In 102° Out 98° By W/S Oven Temperature: In 98°C Out 100°C By W/SPans: Date/Time of Weighing 5-4-94 / 0745-0810 By W/S Fish: Date/Time of Weighing 5-4-94 / 1145-1215 By W/S

Sample ID	Tare Wt.	Tare + Fish Wt.	Fish Wt.	# Fish	Mean Wt.	Difference	
Initial	1.						
	2.						
	3.						
	4.						
Initial Mean Weight							
F-med	①	1.11506	1.11841				
	②	1.09482	1.09965				
	3.						
	4.						
PCM 5.1 50%	①	1.10804	1.11143	9	.38	.32	+0.02
	②	1.11411	1.11801	7	.56	.54	+0.02
	3.						
	④	1.11668	1.12141	9	.53	*	
PCM 6.0 50%	1.						
	2.						
	③	1.11788	1.12248	9	.51	.53	-0.02
	④	1.10166	1.10337	6	.29	.29	Ø
PCM 6.0 100%	①	1.10980	1.11131	4	.38	.36	+0.02
	2.						
	③	1.11970	1.12364	8	.49	.49	Ø
	4.						
	1.						
	2.						
	3.						
	4.						
	1.						
	2.						
	3.						
	4.						

Notes:

Analysis of Survival

CR-ERP APRIL
Starting Date: 04/14/94

Analysis of Survival (%) Data Dunnett's Test

Arcsine square-root transformation applied before data analysis.
For this set of data, the minimum significant difference is 0.20

This represents a 21.19 % reduction in Survival (%).

T = 2.45 ALPHA = 0.05

Survival (%) Data

TREATMENT	Replicate										MEAN	S
	1	2	3	4	5	6	7	8	9	10		
1 CONTROL	100	100	90	100	.	.	.	.	.	.	96.07	
2 PCM 4.3-50%	100	60	80	90	.	.	.	.	.	.	84.31	
3 PCM 4.3-100%	50	80	60	80	.	.	.	.	.	.	68.18 *	
4 PCM 5.1-50%	90	70	70	90	.	.	.	.	.	.	81.03	
5 PCM 5.1-100%	70	80	60	100	.	.	.	.	.	.	79.35	
6 PCM 6.0-50%	90	60	90	60	.	.	.	.	.	.	76.74	
7 PCM 6.0-100%	40	60	80	70	.	.	.	.	.	.	63.04 *	

Asterisk (*) indicates values significantly less than control (CONTROL).

Analysis of Variance

Source	DF	Sum OF Sq.	Mean Sq.	Calc F	F(0.05)
Among	6	0.516	0.086	2.590	0.0489
Within	21	0.698	0.033		
Total	27	0.000			

Analysis of survival data (arcsine transformation is used)

1

9:40 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL
ST_DATE=041494
PARM=MINS
DUNNETT'S TEST
T = 2.45 ALPHA = 0.05

TREATMENT	N	TRANSFORMED MEAN	UNTRANSFORMED MEAN	SIGNIFICANT DIFFERENCE
CONTROL	4	1.37	0.96	
PCM 4.3-50%	4	1.16	0.84	
PCM 4.3-100%	4	0.97	0.68	*
PCM 5.1-50%	4	1.12	0.81	
PCM 5.1-100%	4	1.10	0.79	
PCM 6.0-50%	4	1.07	0.77	
PCM 6.0-100%	4	0.92	0.63	*

MINIMUM SIGNIFINANT DIFFERENCE = 0.20

THIS REPRESENTS A 21.19 % DECREASE IN SURVIVAL FROM THE CONTROL

9:40 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL
ST_DATE=041494
PARM=MINS
DUNNETT'S TEST
T = 2.45 ALPHA = 0.05

TREATMENT	REPLICATE										MEAN	S
	1	2	3	4	5	6	7	8	9	10		
1 CONTROL	100	100	90	100	.	.	.	.	.	.	96.07	
2 PCM 4.3-50%	100	60	80	90	.	.	.	.	.	.	84.31	
3 PCM 4.3-100%	50	80	60	80	.	.	.	.	.	.	68.18	*
4 PCM 5.1-50%	90	70	70	90	.	.	.	.	.	.	81.03	
5 PCM 5.1-100%	70	80	60	100	.	.	.	.	.	.	79.35	
6 PCM 6.0-50%	90	60	90	60	.	.	.	.	.	.	76.74	
7 PCM 6.0-100%	40	60	80	70	.	.	.	.	.	.	63.04	*

MINIMUM SIGNIFINANT DIFFERENCE = 0.20

THIS REPRESENTS A 21.19 % DECREASE IN SURVIVAL FROM THE CONTROL

Analysis of survival data (arcsine transformation is used)

3

9:40 Wednesday, April 15, 1992

General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	7	CONTROL PCM 4.3-100% PCM 4.3-50% PCM 5.1-100% PCM 5.1-50% PCM 6.0-100% PCM 6.0-50%

Number of observations in data set = 70

NOTE: Due to missing values, only 28 observations can be used in this analysis.

9:40 Wednesday, April 15, 1992

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	0.51595098	0.08599183	2.59	0.0489
Error	21	0.69769973	0.03322380		
Corrected Total	27	1.21365071			

R-Square	C.V.	Root MSE	RESP Mean
0.425123	16.54817	0.1822740	1.10147519

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	6	0.51595098	0.08599183	2.59	0.0489

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	6	0.51595098	0.08599183	2.59	0.0489

TEST FOR NORMAL DISTRIBUTION

9:37 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=MINS -----

UNIVARIATE PROCEDURE

Variable=CENTER

Moments

N	28	Sum Wgts	28
Mean	0	Sum	0
Std Dev	0.160751	Variance	0.025841
Skewness	0.048801	Kurtosis	-1.04708
USS	0.6977	CSS	0.6977
CV	.	Std Mean	0.030379
T:Mean=0	0	Prob> T	1.0000
Sgn Rank	-2	Prob> S	0.9647
Num ^= 0	28		
W:Normal	0.961631	Prob<W	0.4134

Quantiles(Def=5)

100% Max	0.312916	99%	0.312916
75% Q3	0.132325	95%	0.248444
50% Med	0.024396	90%	0.189873
25% Q1	-0.12894	10%	-0.21302
0% Min	-0.27749	5%	-0.23256
		1%	-0.27749
Range	0.590411		
Q3-Q1	0.26127		
Mode	0.040743		

Extremes

Lowest	Obs	Highest	Obs
-0.27749(	12)	0.181484(	51)
-0.23256(	61)	0.181484(	53)
-0.21302(	43)	0.189873(	63)
-0.18605(	21)	0.248444(	11)
-0.18148(	54)	0.312916(	44)

Missing Value

Count 42

% Count/Nobs 60.00

Tests of assumptions for survival data (arcsine transformed)

2

TEST FOR NORMAL DISTRIBUTION

9:37 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL ST_DATE=041494 PARM=MINS

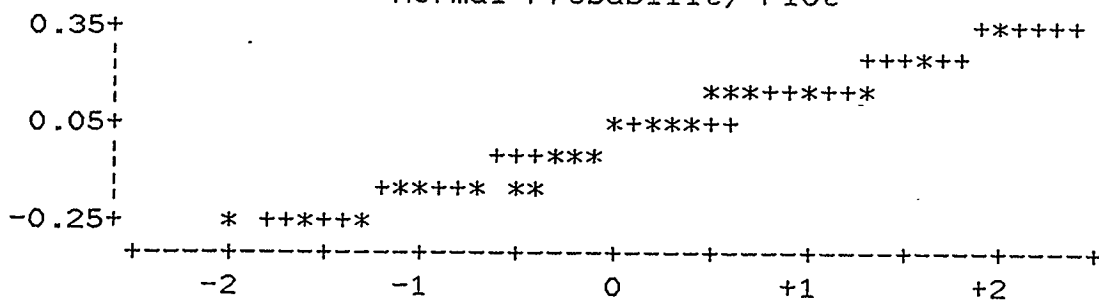
UNIVARIATE PROCEDURE

Variable=CENTER

Stem Leaf	#	Boxplot
3 1	1	
2 5	1	
1 3344889	7	+-----+
0 144479	6	*---+---*
-0 963	3	
-1 9883321	7	+-----+
-2 831	3	

Multiply Stem.Leaf by 10**-1

Normal Probability Plot

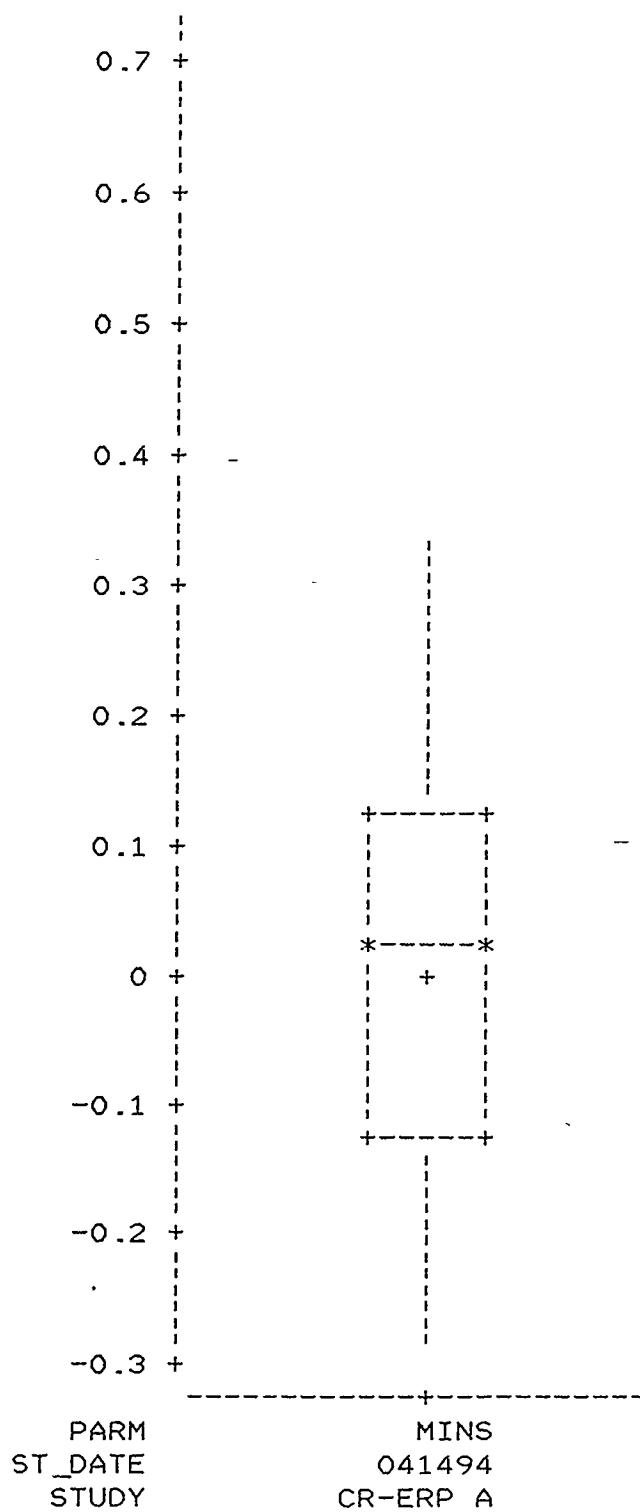


TEST FOR NORMAL DISTRIBUTION

9:37 Wednesday, April 15, 1992

UNIVARIATE PROCEDURE
Schematic Plots

Variable=CENTER

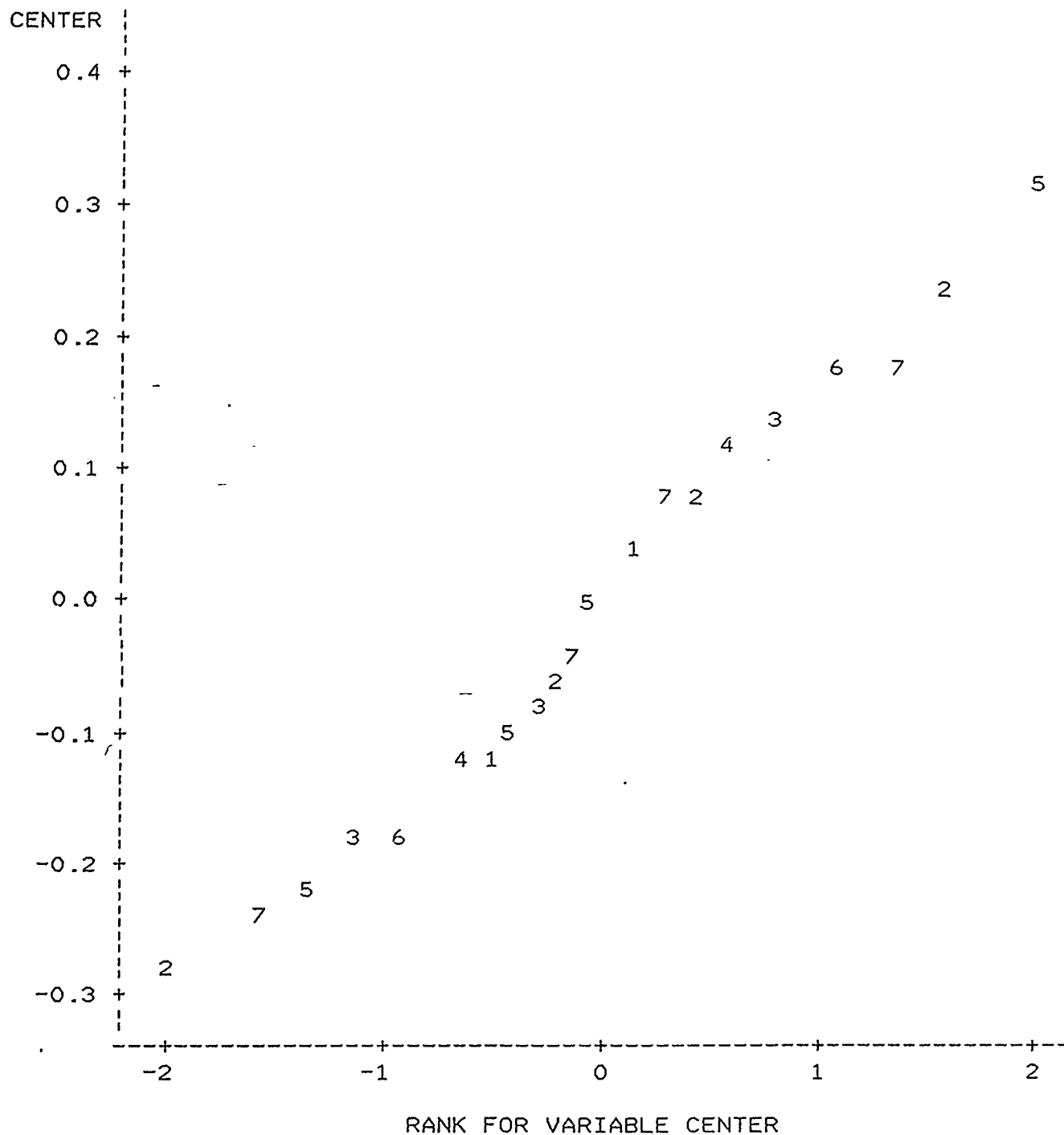


TEST FOR NORMAL DISTRIBUTION

9:37 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=MINS -----

Plot of CENTER*RANKIT. Symbol is value of TRT_NO.



NOTE: 42 obs had missing values. 7 obs hidden.

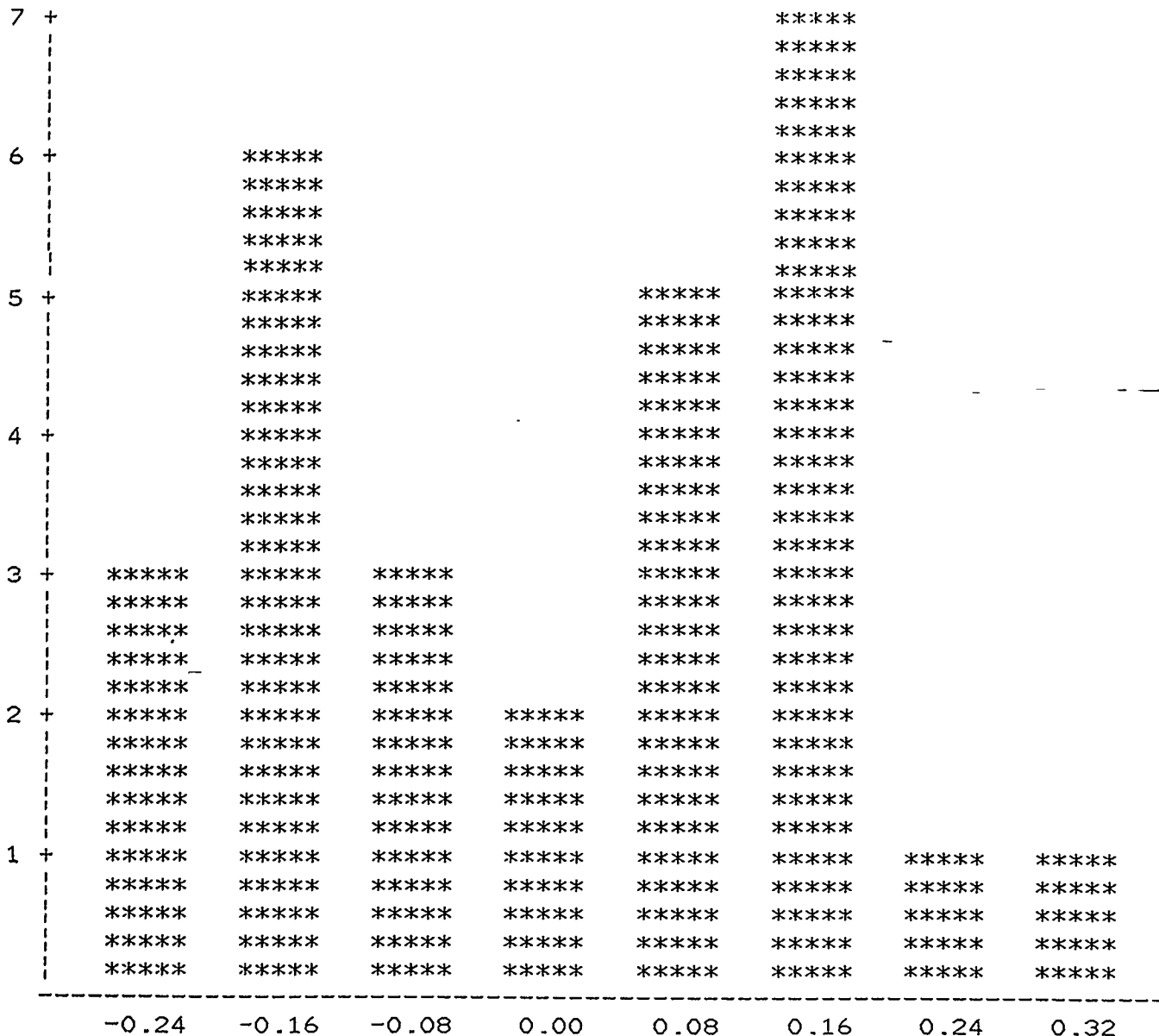
TEST FOR NORMAL DISTRIBUTION

9:37 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL ST_DATE=041494 PARM=MINS

FREQUENCY OF CENTER

FREQUENCY



CENTER MIDPOINT

Tests of assumptions for survival data (arcsine transformed)
BARTLETT'S TEST FOR HOMOGENEOUS VARIANCE

6

9:37 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL
ST_DATE=041494
PARM=MINS

TREATMENT	N	MEAN	VARIANCE
CONTROL	4	1.37	0.007
PCM 4.3-5	4	1.16	0.050
PCM 4.3-1	4	0.97	0.026
PCM 5.1-5	4	1.12	0.022
PCM 5.1-1	4	1.10	0.052
PCM 6.0-5	4	1.07	0.044
PCM 6.0-1	4	0.92	0.032

BARTLETT'S TEST STATISTIC = 3.083
PROB>B = 0.798

Analysis of Growth

CR-ERP APRIL
Starting Date: 04/14/94

Growth Data

Treatment	Replicate										Mean
	1	2	3	4	5	6	7	8	9	10	
1 CONTROL	0.32	0.47	0.42	0.43	.	.	.	.	.	.	0.41
2 PCM 4.3-50%	0.45	0.44	0.45	0.47	.	.	.	.	.	.	0.45
3 PCM 5.1-50%	0.36	0.54	0.50	0.53	.	.	.	.	.	.	0.48
4 PCM 5.1-100%	0.44	0.46	0.52	0.43	.	.	.	.	.	.	0.46
5 PCM 6.0-50%	0.51	0.52	0.53	0.29	.	.	.	.	.	.	0.46

Steel's Many-One Rank Test

Treatment	No. of Replicates	Critical Rank Sum	Rank Sum*
PCM 4.3-50%	4	10	22.5
PCM 5.1-50%	4	10	23.0
PCM 5.1-100%	4	10	22.5
PCM 6.0-50%	4	10	22.0

* Values less than Critical Rank Sum significantly less than the control (CONTROL).

Non-parametric analysis of toxicity data

2

12:49 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=MING TEST=STEEL -----

OBS	TREATMENT	N CONTROL	N EFFLUENT	RANK SUM	CRITICAL RANK SUM	SIGNIFICANT DIFFERENCE
1	PCM 4.3-50%	4	4	22.5	10	
2	PCM 5.1-50%	4	4	23.0	10	
3	PCM 5.1-100%	4	4	22.5	10	
4	PCM 6.0-50%	4	4	22.0	10	

Non-parametric analysis of toxicity data

12:49 Wednesday, April 15, 1992

1

OBS	STUDY	SITE	PARAM	COPY	TYPE	FREQ	CONF	MINT	MCNT	MCNT	MCNT	MCNT	TEST	TNO	TRT	SUMRANK	
1	CR-ERP	APRIL	041494	MING	2	0	10	4	4	4	4	4	4	STEEL	1	PCM 4.3-50%	13.5
2	CR-ERP	APRIL	041494	MING	2	0	10	4	4	4	4	4	4	STEEL	2	PCM 4.3-50%	22.5
3	CR-ERP	APRIL	041494	MING	3	0	10	4	4	4	4	4	4	STEEL	1	PCM 5.1-50%	13.0
4	CR-ERP	APRIL	041494	MING	3	0	10	4	4	4	4	4	4	STEEL	3	PCM 5.1-50%	23.0
5	CR-ERP	APRIL	041494	MING	4	0	10	4	4	4	4	4	4	STEEL	1	PCM 5.1-100%	13.5
6	CR-ERP	APRIL	041494	MING	4	0	10	4	4	4	4	4	4	STEEL	4	PCM 5.1-100%	22.5
7	CR-ERP	APRIL	041494	MING	5	0	10	4	4	4	4	4	4	STEEL	1	PCM 6.0-50%	14.0
8	CR-ERP	APRIL	041494	MING	5	0	10	4	4	4	4	4	4	STEEL	5	PCM 6.0-50%	22.0

Test for Normal Distribution

12:46 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=MING -----

UNIVARIATE PROCEDURE

Variable=CENTER

Moments

N	20	Sum Wgts	20
Mean	0	Sum	0
Std Dev	0.064195	Variance	0.004121
Skewness	-1.41914	Kurtosis	1.79771
USS	0.0783	CSS	0.0783
CV	.	Std Mean	0.014355
T:Mean=0	0	Prob> T	1.0000
Sgn Rank	18	Prob> S	0.5156
Num ^= 0	20		
W:Normal	0.849141	Prob<W	0.0044

Quantiles(Def=5)

100% Max	0.0675	99%	0.0675
75% Q3	0.0525	95%	0.06375
50% Med	0.01375	90%	0.05875
25% Q1	-0.0175	10%	-0.10625
0% Min	-0.1725	5%	-0.1475
		1%	-0.1725
Range	0.24		
Q3-Q1	0.07		
Mode	-0.0025		

Extremes

Lowest	Obs	Highest	Obs
-0.1725(	44)	0.0575(	42)
-0.1225(	21)	0.0575(	22)
-0.09(	1)	0.0575(	33)
-0.0325(	34)	0.06(	2)
-0.0225(	31)	0.0675(	43)

Missing Value

Count 30

% Count/Nobs 60.00

Tests of assumptions for untransformed data

Test for Normal Distribution

12:46 Wednesday, April 15, 1992

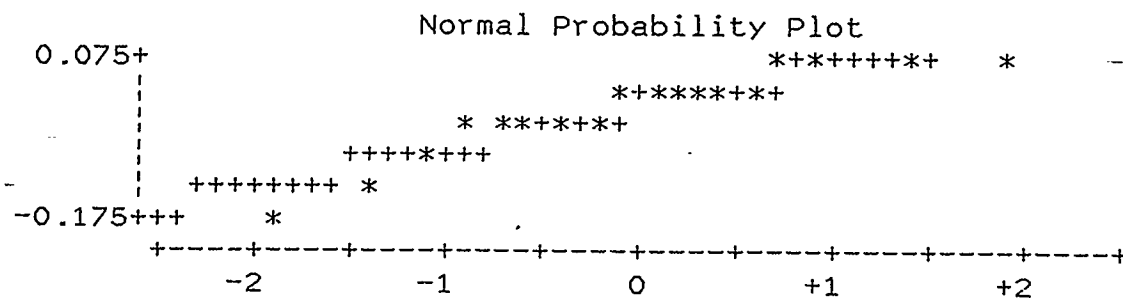
STUDY=CR-ERP APRIL ST_DATE=041494 PARM=MING

UNIVARIATE PROCEDURE

Variable=CENTER

Stem Leaf	#	Boxplot
0 5566667	7	+-----+
0 1222	4	*--+--*
-0 321000	6	+-----+
-0 9	1	
-1 2	1	
-1 7	1	0

-----+-----+-----+-----+
Multiply Stem.Leaf by 10** -1



Tests of assumptions for untransformed data

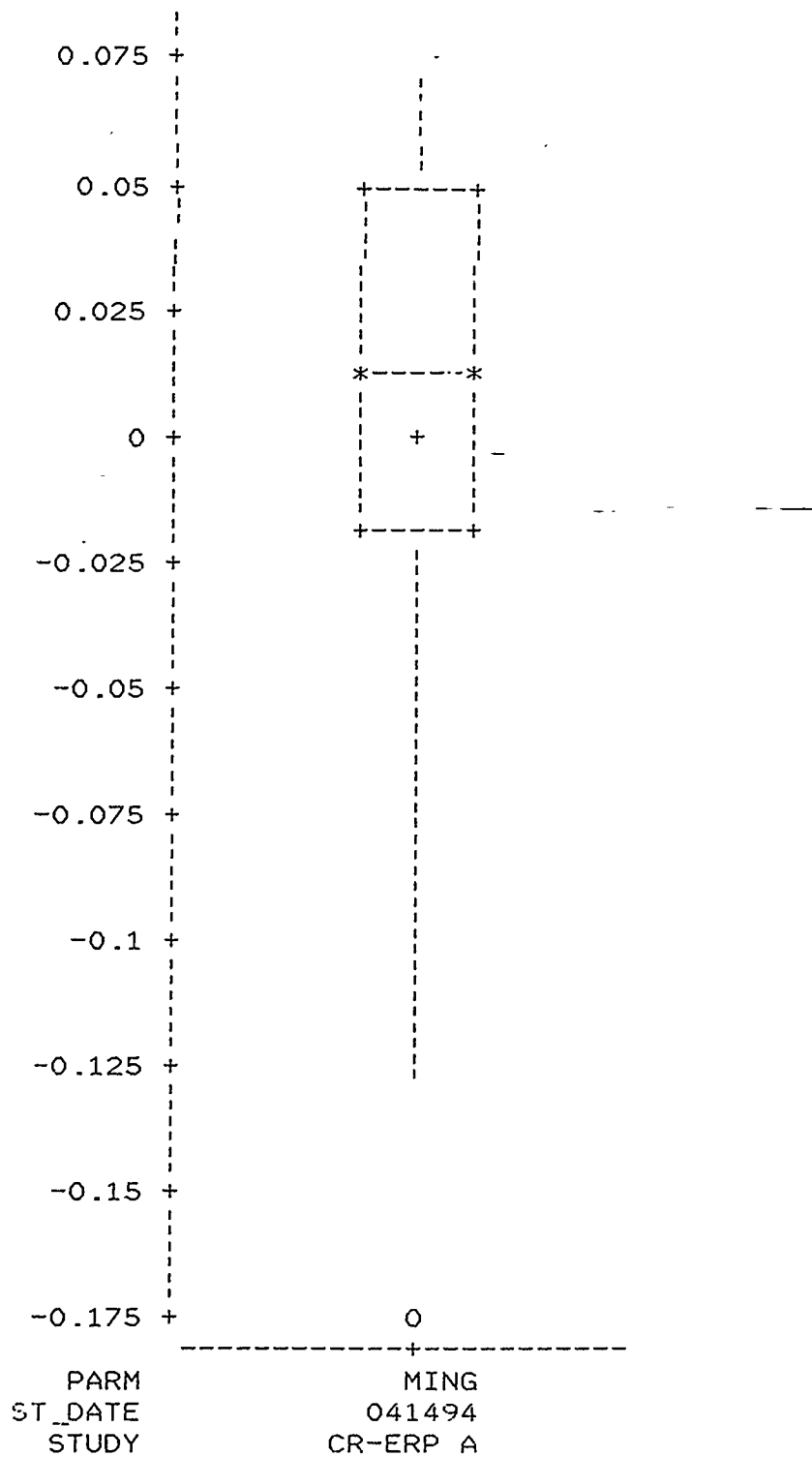
3

Test for Normal Distribution

12:46 Wednesday, April 15, 1992

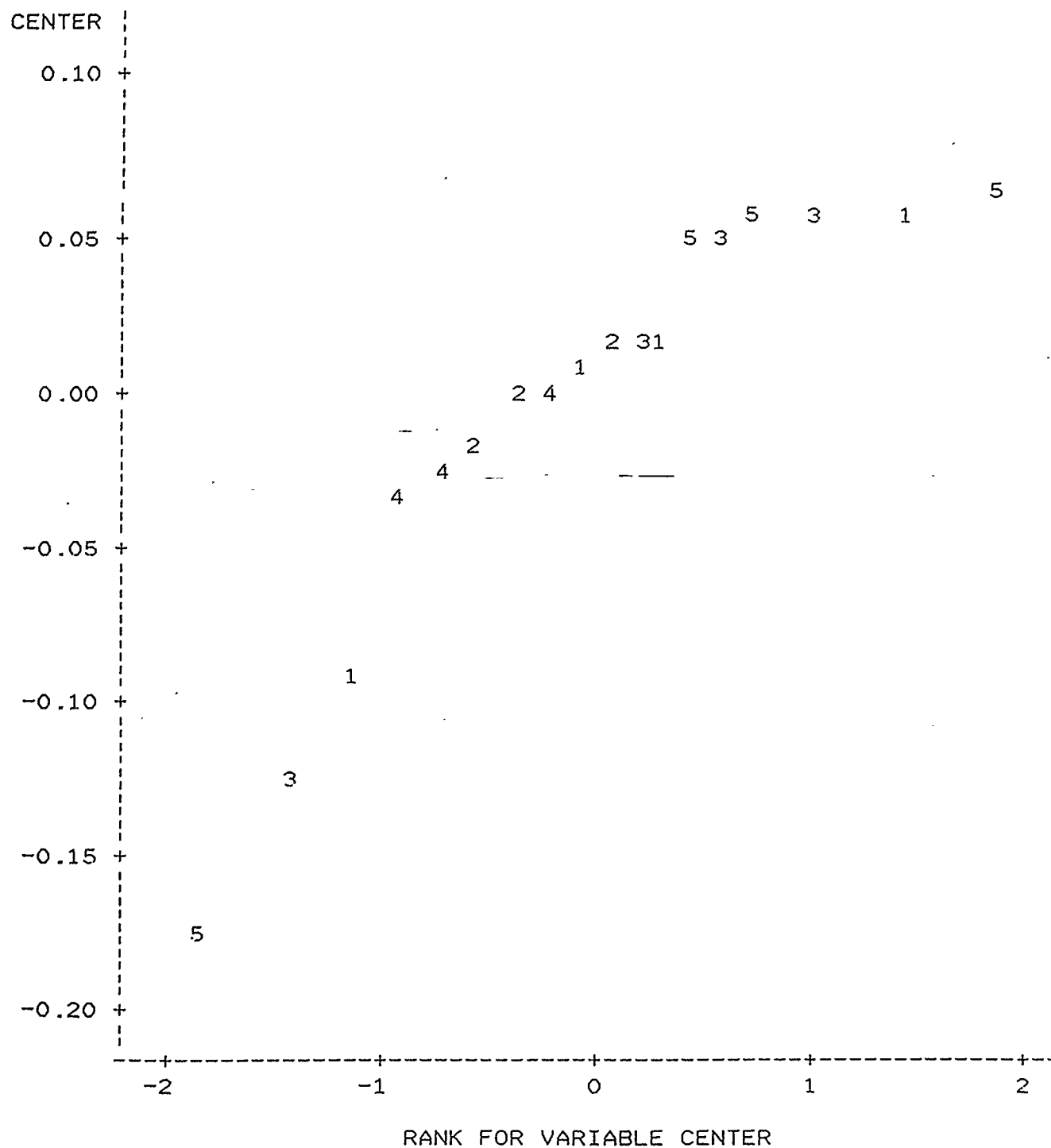
UNIVARIATE PROCEDURE
Schematic Plots

Variable=CENTER



STUDY=CR-ERP APRIL ST_DATE=041494 PARM=MING

Plot of CENTER*RANKIT. Symbol is value of TRT_NO.



NOTE: 30 obs had missing values. 2 obs hidden.

Bartlett's Test for Homogeneous Variance

: 12:46 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL
ST_DATE=041494
PARM=MING

TREATMENT	N	MEAN	VARIANCE
CONTROL	4	0.41	0.004
PCM 4.3-5	4	0.45	0.000
PCM 5.1-5	4	0.48	0.007
PCM 5.1-1	4	0.46	0.002
PCM 6.0-5	4	0.46	0.013

BARTLETT'S TEST STATISTIC = 9.768
PROB>B = 0.045

CR-ERP APRIL	041494 MINS	1 CONTROL	10.00	10.00
9.00	10.00			
	INITIAL NUMBER		10.00	10.00
10.00	10.00			
CR-ERP APRIL	041494 MINS	2 PCM 4.3-50%	10.00	6.00
8.00	9.00			
	INITIAL NUMBER		10.00	10.00
10.00	10.00			
CR-ERP APRIL	041494 MINS	3 PCM 4.3-100%	5.00	8.00
6.00	8.00			
	INITIAL NUMBER		10.00	10.00
10.00	10.00			
CR-ERP APRIL	041494 MINS	4 PCM 5.1-50%	9.00	7.00
7.00	9.00			
	INITIAL NUMBER		10.00	10.00
10.00	10.00			
CR-ERP APRIL	041494 MINS	5 PCM 5.1-100%	7.00	8.00
6.00	10.00			
	INITIAL NUMBER		10.00	10.00
10.00	10.00			
CR-ERP APRIL	041494 MINS	6 PCM 6.0-50%	9.00	6.00
9.00	6.00			
	INITIAL NUMBER		10.00	10.00
10.00	10.00			
CR-ERP APRIL	041494 MINS	7 PCM 6.0-100%	4.00	6.00
8.00	7.00			
	INITIAL NUMBER		10.00	10.00
10.00	10.00			

CR-ERP APRIL	041494	MING	1	CONTROL	0.32	0.47
0.42	0.43					
CR-ERP APRIL	041494	MING	2	PCM 4.3-50%	0.45	0.44
0.45	0.47					
CR-ERP APRIL	041494	MING	3	PCM 5.1-50%	0.36	0.54
0.50	0.53					
CR-ERP APRIL	041494	MING	4	PCM 5.1-100%	0.44	0.46
0.52	0.43					
CR-ERP APRIL	041494	MING	5	PCM 6.0-50%	0.51	0.52
0.53	0.29					

CR-ERP AMBIENT WATER TOXICITY STUDY
Toxicity Test Bench Sheets and Statistical Analyses

ATTACHMENT II

CHRONIC STUDY - DAPHNID RECORD SHEET

Study CR-ERP April 1994 Test Organism Ceriodaphnia dubia
 Beginning Date/Time 4-14-94/1335 Ending Date/Time 4-20-94/1430 ^{21 1240 825} 5-9-94
 Personnel Simbeck Control/Dilution Water C-MED

Test Treatments:

Site	Concentrations:
PCM 4.3	50%, 100%
PCM 5.1	50%, 100%
PCM 6.0	50%, 100%

Day	Date	Site: PCM 4.3	PCM 5.1	PCM 6.0	
		LOG #'s	LOG #'s	LOG #'s	LOG #'s
0	4-14-94	12705	12707	12709	
1	4-15-94	12705	12707	12709	
2	4-16-94	12739	12737	12735	
3	4-17-94	12739	12737	12735	
4	4-18-94	12739	12737	12735	
5	4-19-94	12849	12847	12845	
6	4-20-94	12849	12847	12845	
7					

Released From:

Date 4-14-94 Time 1000

To:

Date 4-14-94 Time 1300

Test # N/A

LOEC N/A

NOEC N/A

Notes:

(PLARC501-309)

CERIODAPHNIA SURVIVAL AND REPRODUCTION TEST

Study: CR-ERP April 1994Page 1 of 2Beginning Date: 4-14-94Time: 1335Personnel: SimbeckEnding Date: 4-20-94Time: 1430 1240 5-1-94

Number of Young/Day

Treatment	By Rep.	Log #	1	2	3	4	5	6	7	8	9	10	Total Young	6 Day	7 Day
			1676	1676	1676	1676	1676	1676	1676	1676	1676	1676			
	1		0	0	0	5	12	0	0	17			17	34	
	2					7	12	0	17	0			36	36	
	3					6	12	2	17	0			37	37	
C-MED	4					6	11	0	18	0			35	35	
	5					6	12	11	7	0			36	36	
(1)	6					6	10	18	0	0			34	34	
	7					7	14	19	0	0			40	40	6 Day
	8					4	15	20	0	0			39	39	7 Day
	9					5	11	19	0	0			35	35	
	10		↓	↓	↓	7	12	13	0	0			32	32	341 358
	Log #														
	1		0	0	0	5	9	15	0	0			29	29	
	2					6	12	0	0	16			18	34	
	3					6	9	0	0	16			15	31	
PCM 4.3	4					6	11	0	0	18			17	35	
50%	5					6	12	16	0	0			34	34	
	6					6	10	0	0	18			16	34	
(2)	7					6	12	16	0	0			34	34	
	8					6	11	16	0	0			33	33	
	9					6	12	16	0	0			34	34	
	10		↓	↓	↓	6	9	17	0	0			293 34	262 330	32 340 344
	Log #														
12705	1		0	0		5	12	0	0	17			17	34	
	2					6	13	0	16	0			35	35	
	3					5	13	17	0	0			35	35	
PCM 4.3	4					6	13	0	19	0			38	38	
100%	5					4	14	16	0	0			34	34	
	6					5	15	11	0	0			31	31	
(3)	7					5	12	15	0	0			32	32	
	8					5	10	19	0	0			34	34	
	9					5	12	14	0	0			31	31	
	10		↓	↓	↓	6	11	15	0	0			32	32	319 336
	Log #														
	1		0	0	0	6	11	0	0	18			17	35	
	2					5	11	17	0	0			33	33	
95 4-13-94	3					6	13	0	14	0			33	33	
PCM 4.3 5.1	4					6	11	0	16	0			33	33	
50%	5					7	11	0	0	18			18	36	
	6					4	10	14	0	0			28	28	
(4)	7					7	13	1	14	2			35	37	
	8					6	12	16	0	0			34	34	
	9					6	11	17	0	0			34	34	
	10		↓	↓	↓	6	11	15	0	0			32	32	297 335
	0		1	2	3	4	5	6	7	8					

Chow ID#: CF18-3 CF18-3 CF18-3 CF18-3 CF18-3 CF18-3 CF18-4

Algae ID#: A0552 A0552 A0553 A0553 A0553 A0554 A0554

Dilution Water ID#: 1676 1676 1676 1676 1676 1676 1676

Time: 1335 1245-1205 1240-1200 1245-1205 1250-1310 1245-1300 1210-1320

Reviewed By: MS MS MS MS MS MS MS

Notes: MS MS MS MS MS MS MS

Totals: MS

Verified: CLL

Study: CR-ERP April 1994
 Beginning Date: 4-14-94
 Ending Date: 4-20-94

CERIODAPHNIA SURVIVAL AND REPRODUCTION TEST

Page 2 of 2
 Personnel: Simbeck

Time: 1335
 Time: 1430 1240 5-9-94

		Number of Young/Day										6 Day 7 Day	
Treatment	By Rep.	1	2	3	4	5	6	7	8	9	10	Total Young	
12707 ← Log #		12707	12707	12737	12737	12737	12847	12847	12847	12847	12847		
	1	0	0	0	6	13	0	0	17			19	36
	2				6	10	0	0	16			16	32
	3				5	11	15	0	0			31	31
PCM 5.1	4				6	12	0	15	1			33	34
100%	5				7	13	0	18	0			38	38
	6				6	13	16	0	0			35	35
(5)	7				6	12	18	0	0			36	36
	8				6	11	17	0	0			34	34
	9				6	13	0	19	0			38	38
	10	↓	↓	↓	6	13	15	0	0			34	34
Log #													
	1	0	0	0	5	11	0	0	16			16	32
	2				6	12	16	0	0			34	34
	3				5	13	15	0	0			33	33
PCM 6.0	4				7	12	15	1	0			35	35
50%	5		D/O									0	0
	6		0	0	7	12	1	14	0			34	34
(6)	7				5	12	2	13	0			32	32
	8				6	13	15	0	0			34	34
	9				6	12	15	0	0			33	33
	10	↓	↓	↓	6	13	17	0	0			36	36
12709 ← Log #		12709	12709	12735	12735	12735	12845						
	1	0	0	0	5	11	0	0	17			16	33
	2				6	13	0	17	1			36	37
	3				5	11	0	16	1			32	33
PCM 6.0	4				5	12	0	0	17			17	34
100%	5				6	12	0	0	16			18	34
	6				6	12	17	0	0			35	35
(7)	7				5	10	17	0	0			32	32
	8				5	13	0	16	1			34	35
	9				5	10	0	0	13			15	28
	10	↓	↓	↓	5	11	0	16	2			32	34
Log #													
	1												
	2												
	3												
	4												
	5												
	6												
	7												
	8												
	9												
	10												

0 1 2 3 4 5 6 7 8 (PLARC501-310)

Chow ID#: CF18-3 CF18-3 CF18-3 CF18-3 CF18-3 CF18-3 CF18-4

Algae ID#: A0552 A0552 A0553 A0553 A0553 A0554 A0554

Dilution Water ID#: 1676 1676 1676 1676 1676 1676 1676

Time: 1335 1245-1305 1240-1300 1245-1305 1250-1300 1245-1300 1310-1320

Reviewed By: 0/5 0/5 0/5 0/5 0/5 0/5 0/5

Notes: Totals: 4/5
 Verified: 0/5

7-day Test
05-01-94 CCR

Analysis of Reproduction (# young/female/⁷/₈ days)
Ccr 05-01-94

CR-ERP APRIL
Starting Date: 04/14/94

Reproduction (# young/female/⁷/₈ days) Data
Ccr 05-01-94

Treatment	Replicate										Mean
	1	2	3	4	5	6	7	8	9	10	
1 CONTROL	34.0	36.0	37.0	35.0	36.0	34.0	40.0	39.0	35.0	32.0	35.80
2 PCM 4.3-50%	29.0	34.0	31.0	35.0	34.0	34.0	34.0	33.0	34.0	32.0	33.00
3 PCM 4.3-100%	34.0	35.0	35.0	38.0	34.0	31.0	32.0	34.0	31.0	32.0	33.60
4 PCM 5.1-50%	35.0	33.0	33.0	33.0	36.0	28.0	37.0	34.0	34.0	32.0	33.50
5 PCM 5.1-100%	36.0	32.0	31.0	34.0	38.0	35.0	36.0	34.0	38.0	34.0	34.80
6 PCM 6.0-50%	32.0	34.0	33.0	35.0	0.0	34.0	32.0	34.0	33.0	36.0	30.30
7 PCM 6.0-100%	33.0	37.0	33.0	34.0	34.0	35.0	32.0	35.0	28.0	34.0	33.50

Steel's Many-One Rank Test

Treatment	No. of Replicates	Critical Rank Sum	Rank Sum*
PCM 4.3-50%	10	74	70.5 *
PCM 4.3-100%	10	74	78.0
PCM 5.1-50%	10	74	80.0
PCM 5.1-100%	10	74	93.5
PCM 6.0-50%	10	74	74.0 *
PCM 6.0-100%	10	74	79.0

* Values less than Critical Rank Sum significantly less than the control (CONTROL).

Non-parametric analysis of toxicity data

2

9:27 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=CERR TEST=STEEL -----

OBS	TREATMENT	N CONTROL	N EFFLUENT	RANK SUM	CRITICAL RANK SUM	SIGNIFICANT DIFFERENCE
1	PCM 4.3-50%	10	10	70.5	74	*
2	PCM 4.3-100%	10	10	78.0	74	
3	PCM 5.1-50%	10	10	80.0	74	
4	PCM 5.1-100%	10	10	93.5	74	
5	PCM 6.0-50%	10	10	74.0	74	*
6	PCM 6.0-100%	10	10	79.0	74	

Non-parametric analysis of toxicity data

1

9:27 Wednesday, April 15, 1992

OBS	STUDY	ST_DATE	PARM	COMP	_TYPE_	_FREQ_	CONT	EFF	MINN
1	CR-ERP	APRIL	041494	CERR	2	0	10	10	10
2	CR-ERP	APRIL	041494	CERR	2	0	10	10	10
3	CR-ERP	APRIL	041494	CERR	3	0	10	10	10
4	CR-ERP	APRIL	041494	CERR	3	0	10	10	10
5	CR-ERP	APRIL	041494	CERR	4	0	10	10	10
6	CR-ERP	APRIL	041494	CERR	4	0	10	10	10
7	CR-ERP	APRIL	041494	CERR	5	0	10	10	10
8	CR-ERP	APRIL	041494	CERR	5	0	10	10	10
9	CR-ERP	APRIL	041494	CERR	6	0	10	10	10
10	CR-ERP	APRIL	041494	CERR	6	0	10	10	10
11	CR-ERP	APRIL	041494	CERR	7	0	10	10	10
12	CR-ERP	APRIL	041494	CERR	7	0	10	10	10

OBS	NCONT	MAXN	N_TRT	K	TEST	TRT_NO	TRT	SUMRANK
1	10	10	6	6	STEEL	1	PCM 4.3-50%	139.5
2	10	10	6	6	STEEL	2	PCM 4.3-50%	70.5
3	10	10	6	6	STEEL	1	PCM 4.3-100%	132.0
4	10	10	6	6	STEEL	3	PCM 4.3-100%	78.0
5	10	10	6	6	STEEL	1	PCM 5.1-50%	130.0
6	10	10	6	6	STEEL	4	PCM 5.1-50%	80.0
7	10	10	6	6	STEEL	1	PCM 5.1-100%	116.5
8	10	10	6	6	STEEL	5	PCM 5.1-100%	93.5
9	10	10	6	6	STEEL	1	PCM 6.0-50%	136.0
10	10	10	6	6	STEEL	6	PCM 6.0-50%	74.0
11	10	10	6	6	STEEL	1	PCM 6.0-100%	131.0
12	10	10	6	6	STEEL	7	PCM 6.0-100%	79.0

Tests of assumptions for untransformed data
 Test for Normal Distribution

1

9:24 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=CERR -----

UNIVARIATE PROCEDURE

/variable=CENTER

Moments

N	70	Sum Wgts	70
Mean	0	Sum	0
Std Dev	4.3584	Variance	18.99565
Skewness	-4.96217	Kurtosis	34.07328
USS	1310.7	CSS	1310.7
CV	.	Std Mean	0.520928
T:Mean=0	0	Prob> T	1.0000
Sgn Rank	223	Prob> S	0.1843
Num ^= 0	69		
W:Normal	0.624034	Prob<W	0.0

Quantiles(Def=5)

100% Max	5.7	99%	5.7
75% Q3	1.7	95%	4.2
50% Med	0.5	90%	3.6
25% Q1	-0.8	10%	-2.7
0% Min	-30.3	5%	-4
		1%	-30.3
Range	36		
Q3-Q1	2.5		
Mode	-0.8		

Extremes

Lowest	Obs	Highest	Obs
-30.3(	55)	3.7(	58)
-5.5(	69)	4.2(	7)
-5.5(	36)	4.4(	24)
-4(	11)	4.7(	54)
-3.8(	43)	5.7(	60)

Tests of assumptions for untransformed data

2

Test for Normal Distribution

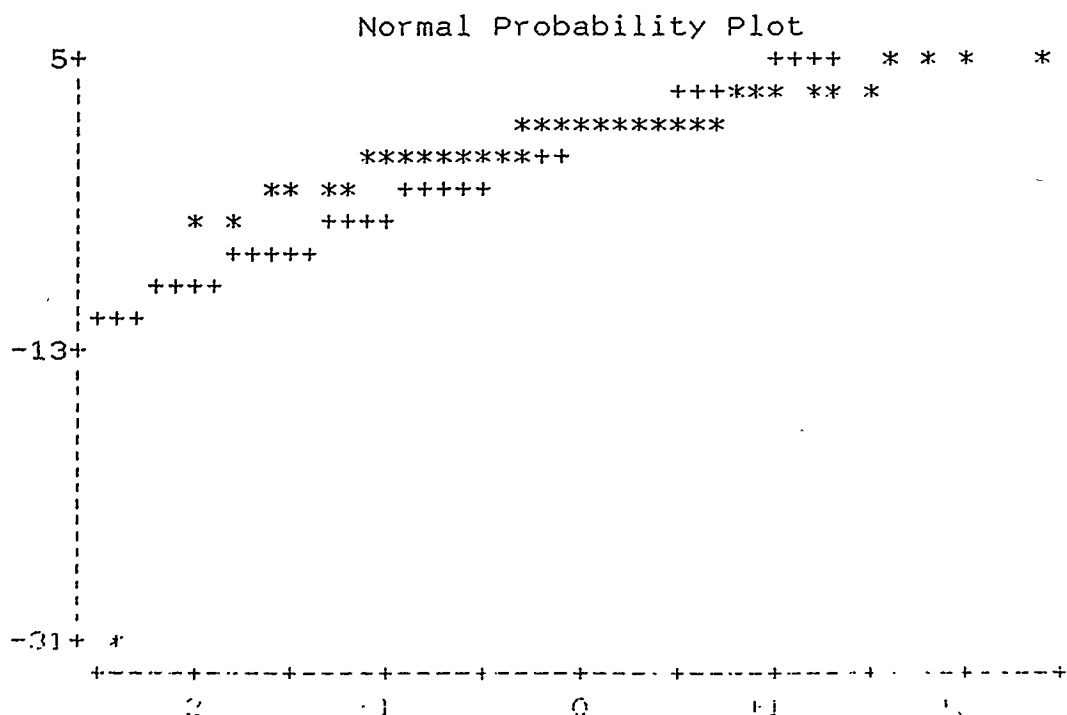
9:24 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL ST_DATE=041494 PARM=CERR

UNIVARIATE PROCEDURE

Variable=CENTER

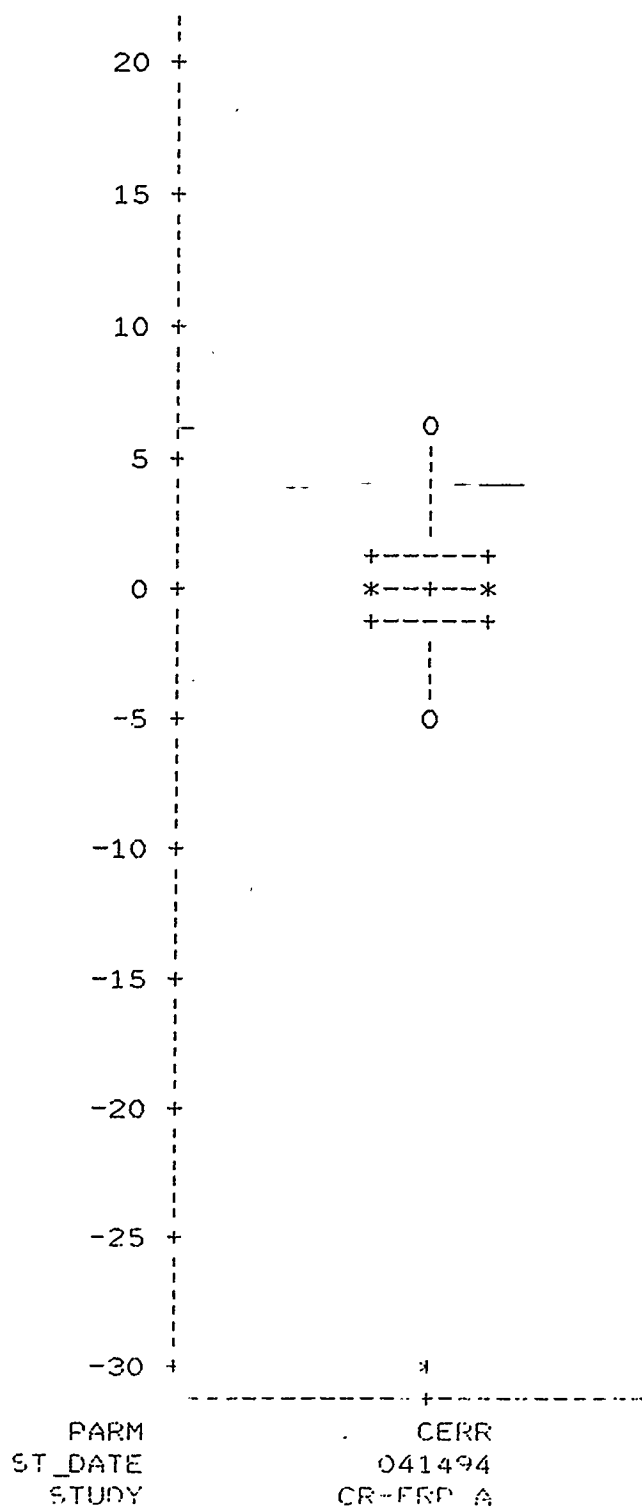
Stem	Leaf	#	Boxplot
4	2477	4	0
2	057722255777	12	
0	022244455555000002224455577	27	+--+ +--+
-0	88665508888855555	17	+-----+
-2	888660	6	
-4	550	3	0
-6			
-8			
-10			
-12			
-14			
-16			
-18			
-20			
-22			
-24			
-26			
-28			
-30	3	1	*



Test for Normal Distribution

9:24 Wednesday, April 15, 1992

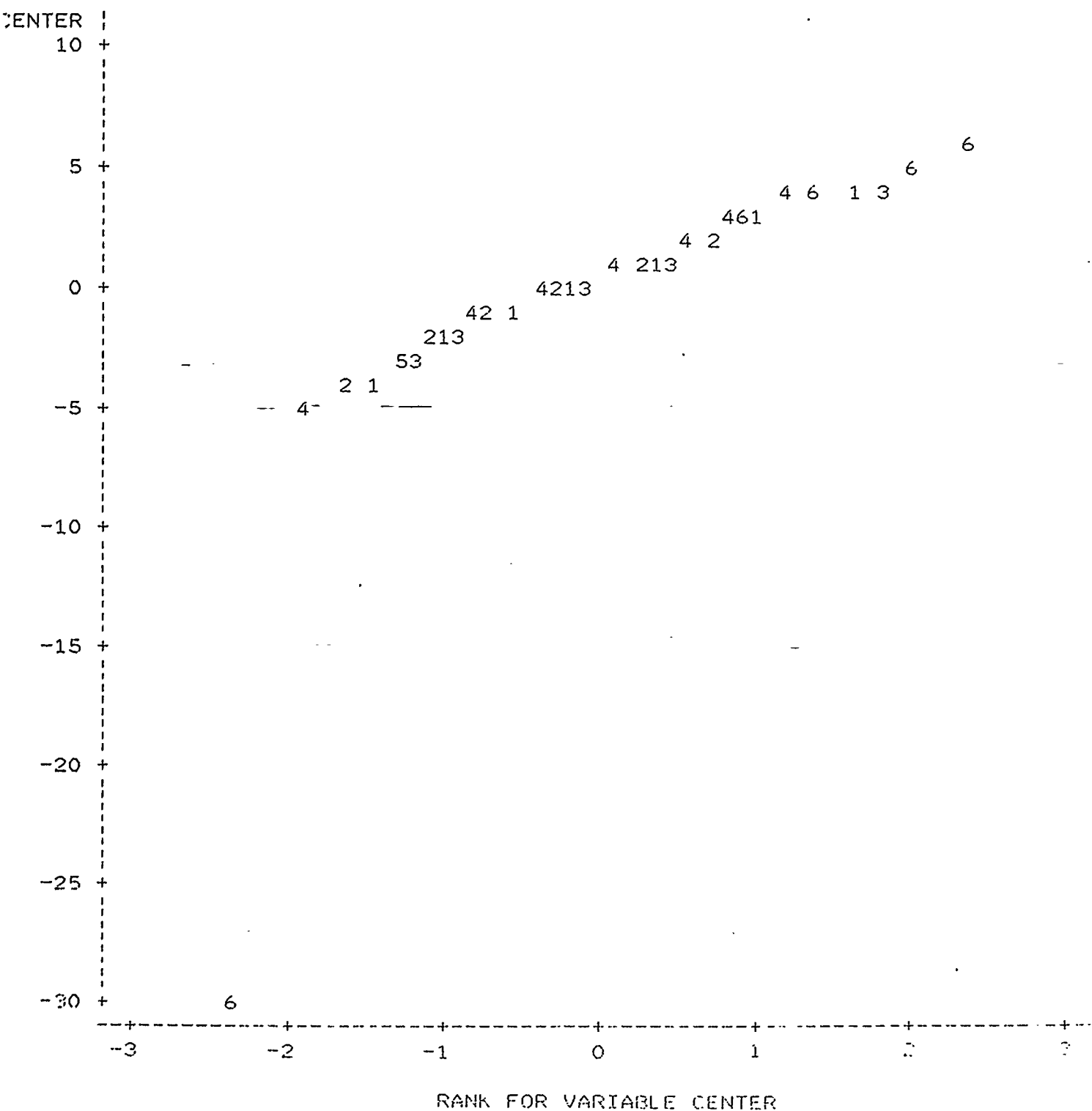
```
/variable=CENTER
```



.. 9:24 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=CERR -----

Plot of CENTER*RANKIT. Symbol is value of TRT_NO.



NOTE: 39 obs. hidden.

Tests of assumptions for untransformed data

5

Bartlett's Test for Homogeneous Variance

9:24 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL

ST_DATE=041494

PARM=CERR

TREATMENT	N	MEAN	VARIANCE
CONTROL	10	35.80	5.733
PCM 4.3-5	10	33.00	3.333
PCM 4.3-1	10	33.60	4.711
PCM 5.1-5	10	33.50	6.056
PCM 5.1-1	10	34.80	5.289
<u>PCM</u> 6.0-5	10	30.30	114.900
PCM 6.0-1	10	33.50	5.611

BARTLETT'S TEST STATISTIC = 58.807

PROB>8 = 0.000

Analysis of Reproduction (# young/female/6 days)

CR-ERP APRIL
Starting Date: 04/14/94

Reproduction (# young/female/6 days) Data

Treatment	Replicate										Mean
	1	2	3	4	5	6	7	8	9	10	
1 CONTROL	17.0	36.0	37.0	35.0	36.0	34.0	40.0	39.0	35.0	32.0	34.10
2 PCM 4.3-50%	29.0	18.0	15.0	17.0	34.0	16.0	34.0	33.0	34.0	32.0	26.20
3 PRM 4.3-100%	17.0	35.0	35.0	38.0	34.0	31.0	32.0	34.0	31.0	32.0	31.90
4 PCM 5.1-50%	17.0	33.0	33.0	33.0	18.0	28.0	35.0	34.0	34.0	32.0	29.70
5 PCM 5.1-100%	19.0	16.0	31.0	33.0	38.0	35.0	36.0	34.0	38.0	34.0	31.40
6 PCM 6.0-50%	16.0	34.0	33.0	35.0	0.0	34.0	32.0	34.0	33.0	36.0	28.70
7 PCM 6.0-100%	16.0	36.0	32.0	17.0	18.0	35.0	32.0	34.0	15.0	32.0	26.70

Steel's Many-One Rank Test

Treatment	No. of Replicates	Critical Rank Sum	Rank Sum*
PCM 4.3-50%	10	74	68.5 *
PRM 4.3-100%	10	74	81.5
PCM 5.1-50%	10	74	74.0 *
PCM 5.1-100%	10	74	90.0
PCM 6.0-50%	10	74	78.0
PCM 6.0-100%	10	74	73.5 *

* Values less than Critical Rank Sum significantly less than the control (CONTROL).

Non-parametric analysis of toxicity data

1

9:15 Wednesday, April 15, 1992

OBS	STUDY	ST_DATE	PARM	COMP	_TYPE_	_FREQ_	CONT	EFF	MINN
1	CR-ERP	APRIL	041494	CERR	2	0	10	10	10
2	CR-ERP	APRIL	041494	CERR	2	0	10	10	10
3	CR-ERP	APRIL	041494	CERR	3	0	10	10	10
4	CR-ERP	APRIL	041494	CERR	3	0	10	10	10
5	CR-ERP	APRIL	041494	CERR	4	0	10	10	10
6	CR-ERP	APRIL	041494	CERR	4	0	10	10	10
7	CR-ERP	APRIL	041494	CERR	5	0	10	10	10
8	CR-ERP	APRIL	041494	CERR	5	0	10	10	10
9	CR-ERP	APRIL	041494	CERR	6	0	10	10	10
10	CR-ERP	APRIL	041494	CERR	6	0	10	10	10
11	CR-ERP	APRIL	041494	CERR	7	0	10	10	10
12	CR-ERP	APRIL	041494	CERR	7	0	10	10	10

OBS	NCONT	MAXN	N_TRT	K	TEST	TRT_NO	TRT	SUMRANK
1	10	10	6	6	STEEL	1	PCM 4.3-50%	141.5
2	10	10	6	6	STEEL	2	PCM 4.3-50%	68.5
3	10	10	6	6	STEEL	1	PRM 4.3-100%	128.5
4	10	10	6	6	STEEL	3	PRM 4.3-100%	81.5
5	10	10	6	6	STEEL	1	PCM 5.1-50%	136.0
6	10	10	6	6	STEEL	4	PCM 5.1-50%	74.0
7	10	10	6	6	STEEL	1	PCM 5.1-100%	120.0
8	10	10	6	6	STEEL	5	PCM 5.1-100%	90.0
9	10	10	6	6	STEEL	1	PCM 6.0-50%	132.0
10	10	10	6	6	STEEL	6	PCM 6.0-50%	78.0
11	10	10	6	6	STEEL	1	PCM 6.0-100%	136.5
12	10	10	6	6	STEEL	7	PCM 6.0-100%	73.5

Non-parametric analysis of toxicity data 2
: 9:15 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=CERR TEST=STEEL -----

OBS	TREATMENT	N CONTROL	N EFFLUENT	RANK SUM	CRITICAL RANK SUM	SIGNIFICANT DIFFERENCE
1	PCM 4.3-50%	10	10	68.5	74	*
2	PRM 4.3-100%	10	10	81.5	74	
3	PCM 5.1-50%	10	10	74.0	74	*
4	PCM 5.1-100%	10	10	90.0	74	
5	PCM 6.0-50%	10	10	78.0	74	
6	PCM 6.0-100%	10	10	73.5	74	*

Tests of assumptions for untransformed data

1

Test for Normal Distribution

9:10 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL ST_DATE=041494 PARM=CERR

UNIVARIATE PROCEDURE

Variable=CENTER

Moments

N	70	Sum Wgts	70
Mean	0	Sum	0
Std Dev	7.774074	Variance	60.43623
Skewness	-1.40077	Kurtosis	1.6173
USS	4170.1	CSS	4170.1
CV	.	Std Mean	0.92918
T:Mean=0	0	Prob> T	1.0000
Sgn Rank	203.5	Prob> S	0.2363
Num ^= 0	70		
W:Normal	0.830355	Prob<W	0.0001

Quantiles(Def=5)

100% Max	9.3	99%	9.3
75% Q3	5.3	95%	7.8
50% Med	2.85	90%	7.05
25% Q1	-1.7	10%	-12.05
0% Min	-28.7	5%	-14.9
		1%	-28.7
Range	38		
Q3-Q1	7		
Mode	5.3		

Extremes

Lowest	Obs	Highest	Obs
-28.7(	55)	7.8(	15)
-17.1(	1)	7.8(	17)
-15.4(	42)	7.8(	19)
-14.9(	21)	8.3(	66)
-12.7(	51)	9.3(	62)

Tests of assumptions for untransformed data
 Test for Normal Distribution

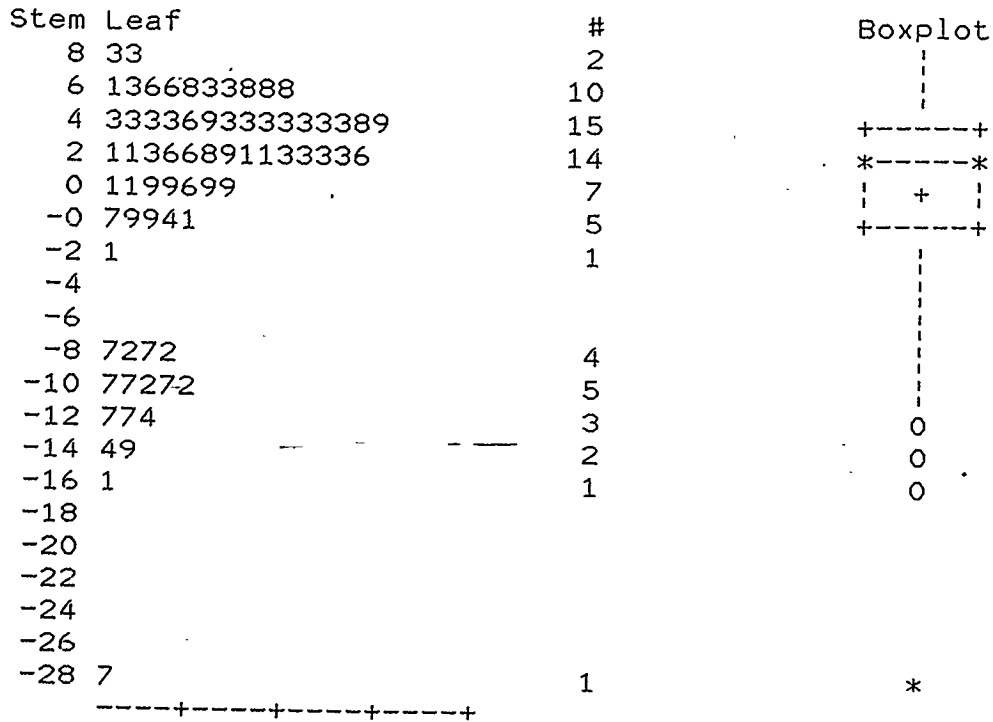
2

9:10 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=CERR -----

UNIVARIATE PROCEDURE

Variable=CENTER



Tests of assumptions for untransformed data

3

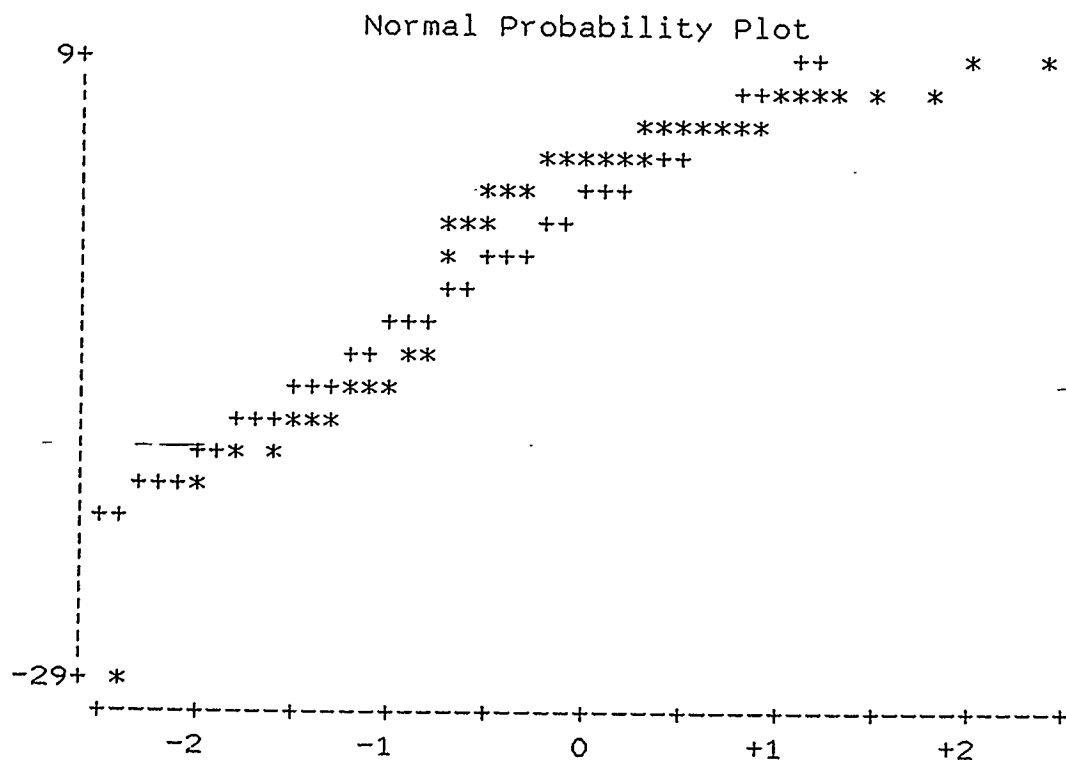
Test for Normal Distribution

9:10 Wednesday, April 15, 1992

----- STUDY=CR-ERP APRIL ST_DATE=041494 PARM=CERR -----

UNIVARIATE PROCEDURE

Variable=CENTER

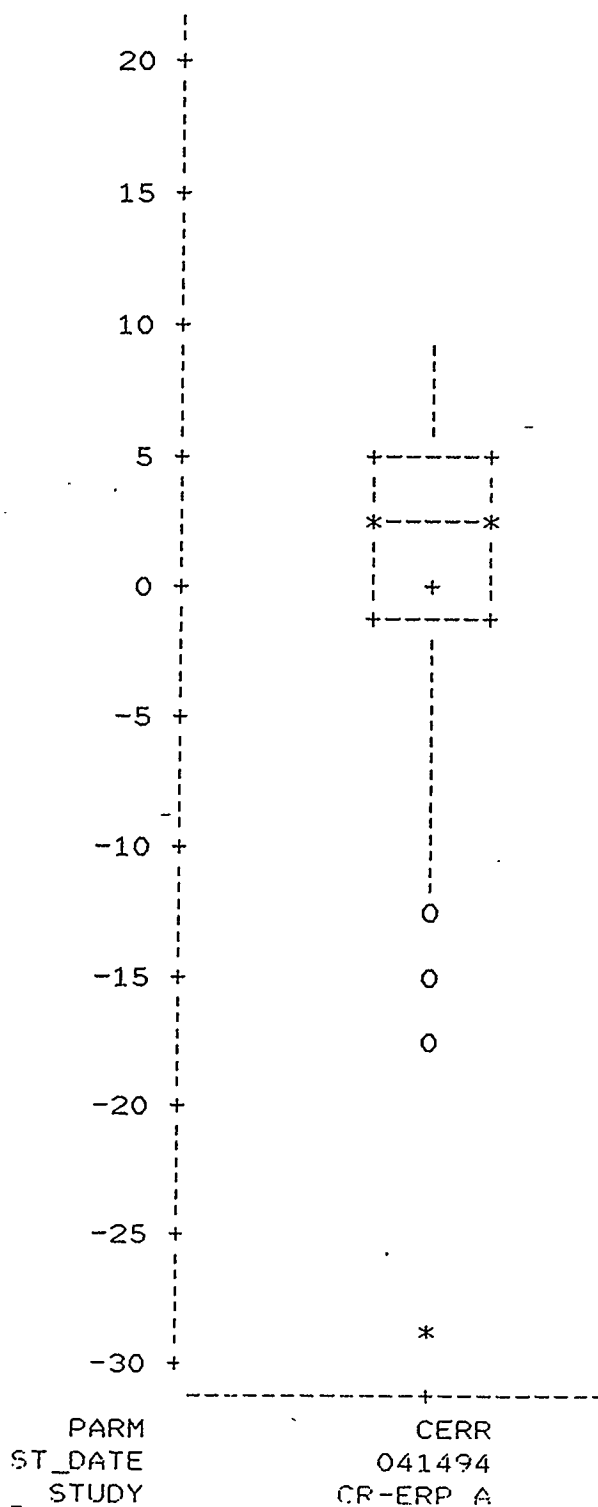


Test for Normal Distribution

9:10 Wednesday, April 15, 1992

UNIVARIATE PROCEDURE
Schematic Plots

Variable=CENTER

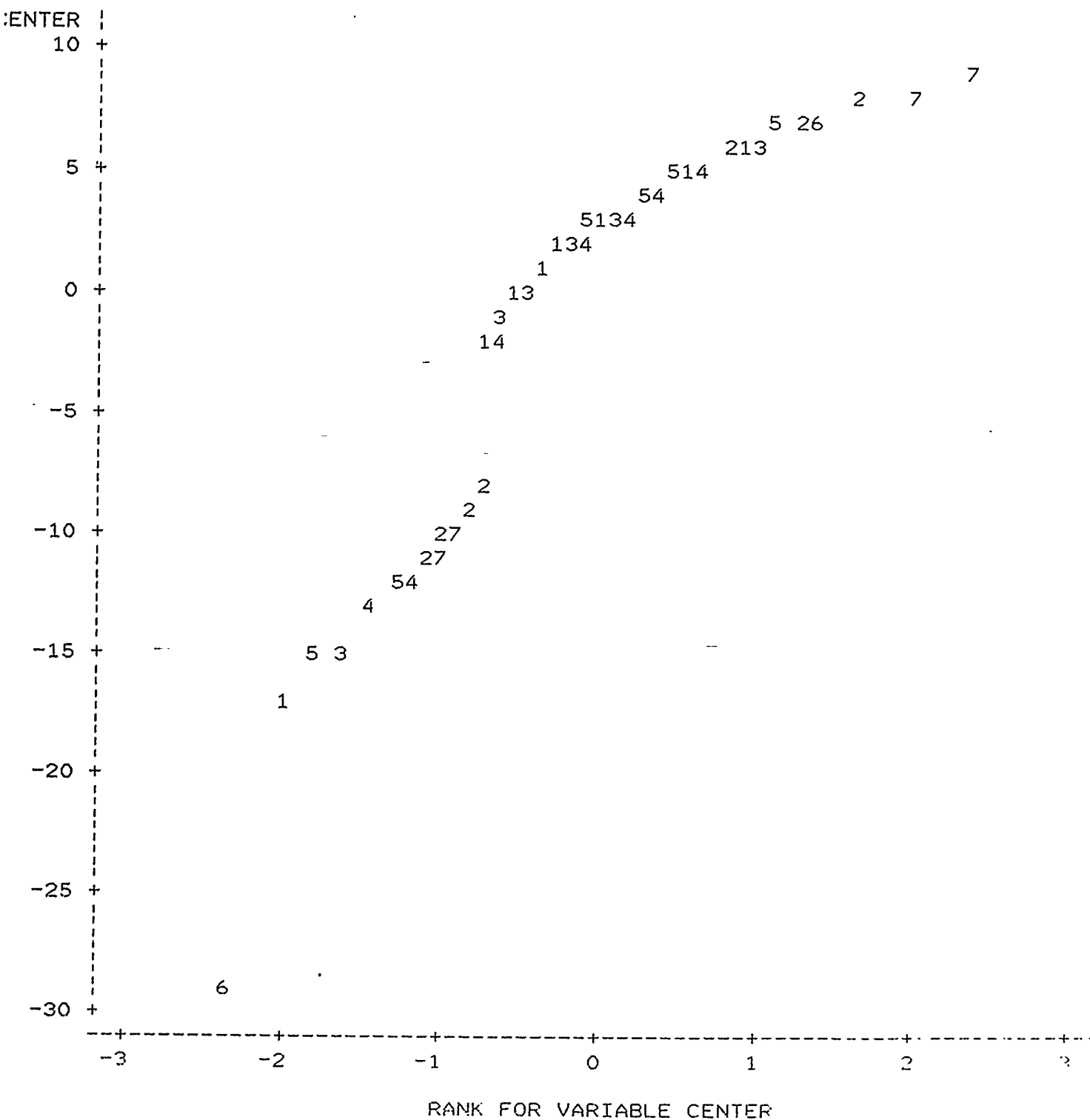


Tests of assumptions for untransformed data

5
9:10 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL ST_DATE=041494 PARM=CERR

Plot of CENTER*RANKIT. Symbol is value of TRT_NO.



NOTE: 30 obs hidden.

Tests of assumptions for untransformed data

6

Bartlett's Test for Homogeneous Variance

9:10 Wednesday, April 15, 1992

STUDY=CR-ERP APRIL

ST_DATE=041494

PARM=CERR

TREATMENT	N	MEAN	VARIANCE
CONTROL	10	34.10	41.433
PCM 4.3-5	10	26.20	72.400
PRM 4.3-1	10	31.90	32.100
PCM 5.1-5	10	29.70	44.900
PCM 5.1-1	10	31.40	58.711
PCM 6.0-5	10	28.70	134.456
PCM 6.0-1	10	26.70	79.344

BARTLETT'S TEST STATISTIC = 6.223
 PROB>B = 0.399

CR-ERP	APRIL	041494	CERR	1	CONTROL	17.00	36.00	
37.00	35.00	36.00	34.00	40.00	39.00	35.00	32.	
00								
CR-ERP	APRIL	041494	CERR	2	PCM 4.3-50%	29.00	18.00	
15.00	17.00	34.00	16.00	34.00	33.00	34.00	32.	
00								
CR-ERP	APRIL	041494	CERR	3	PRM 4.3-100%	17.00	35.00	
35.00	38.00	34.00	31.00	32.00	34.00	31.00	32.	
00								
CR-ERP	APRIL	041494	CERR	4	PCM 5.1-50%	17.00	33.00	
33.00	33.00	18.00	28.00	35.00	34.00	34.00	32.	
00								
CR-ERP	APRIL	041494	CERR	5	PCM 5.1-100%	19.00	16.00	
31.00	33.00	38.00	35.00	36.00	34.00	38.00	34.	
00								
CR-ERP	APRIL	041494	CERR	6	PCM 6.0-50%	16.00	34.00	
33.00	35.00	0.00	34.00	32.00	34.00	33.00	36.	
00								
CR-ERP	APRIL	041494	CERR	7	PCM 6.0-100%	16.00	36.00	
32.00	17.00	18.00	35.00	32.00	34.00	15.00	32.	
00								

6-day test —
05-04-94 cur

7-day test

05-04-94
CER

CR-ERP APRIL	041494	CERR	1	CONTROL		34.00	36.00
37.00	35.00	36.00	34.00	40.00	39.00	35.00	
32.00							
CR-ERP APRIL	041494	CERR	2	PCM 4.3-50%		29.00	34.00
31.00	35.00	34.00	34.00	34.00	33.00	34.00	
32.00							
CR-ERP APRIL	041494	CERR	3	PCM 4.3-100%		34.00	35.00
35.00	38.00	34.00	31.00	32.00	34.00	31.00	
32.00							
CR-ERP APRIL	041494	CERR	4	PCM 5.1-50%		35.00	33.00
33.00	33.00	36.00	28.00	37.00	34.00	34.00	
32.00							
CR-ERP APRIL	041494	CERR	5	PCM 5.1-100%		36.00	32.00
31.00	34.00	38.00	35.00	36.00	34.00	38.00	
34.00							
CR-ERP APRIL	041494	CERR	6	PCM 6.0-50%		32.00	34.00
33.00	35.00	0.00	34.00	32.00	34.00	33.00	
36.00							
CR-ERP APRIL	041494	CERR	7	PCM 6.0-100%		33.00	37.00
33.00	34.00	34.00	35.00	32.00	35.00	28.00	
34.00							

CERIODAPHNIA RANDOMIZATION

Study CR-ERP April 1994

Beginning Date 4-14-94

Ending Date 4-20-94

Personnel Simbeck

Rep	Treatment									
	1	2	3	4	5	6	7	8	9	10
1	3	8	1	4	5	6	7	2		
2	7	4	1	2	6	3	5	8		
3	1	6	2	5	3	4	8	7		
4	6	2	3	8	7	1	5	4		
5	2	3	8	7	5	4	1	6		
6	4	7	5	1	3	2	6	8		
7	7	2	7	3	1	8	6	4		
8	8	2	6	4	3	5	1	7		
9	2	5	4	1	7	3	6	8		
10	4	5	1	2	8	7	6	3		

Treatment Identification:

Notes:

1. C-MED (Control)
2. PCM 4.3 50%
3. PCM 4.3 100%
4. PCM 5.1 50%
5. PCM 5.1 100%
6. PCM 6.0 50%
7. PCM 6.0 100%
8. Temperature
9. _____
10. _____

CERIODAPHNIA BROOD RECORD SHEET

Batch ID: C211 Tray #: 4 Personnel: YLB

Row	<u>A</u>	Brood Source				<u>A201</u>	<u>A-7</u>	<u>8</u>	(# Young)							
10				6	9	0	15	19	16	0	24	19				
9				6	7	0	12	22	15	0	22	21				
8				4	13	0	17	12	11	0	20	18				
7				6	8	0	14	19	11	0	24	22				
6				4	6	0	14	16	0							
5				5	9	0	14	18	11	11	14	23				
4				10	9	0	12	16	19	0	20	23				
3				3	0	6	11	17	14	0	20	20				
2				7	10	0	9	20	17	0	23	22				
1				6	8	0	13	18	16	10	20	0	22			
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	

Row	<u>B</u>	Brood Source								<u>A201 / A-5 / 8</u>		(# Young)			
10				5	11	0	10	19	17	0	25	25			
9				6	7	0	13	19	19	0	22	28			
8				4	11	0	14	18	15	0	20	22			
7				5	5	0	13	20	17	0	25	24			
6				6	9	0	12	17	17	21	0	21			
5				6	9	0	11	17	17	0	18	15			
4				5	8	0	16	16	19	20	0	25			
3				4	8	0	11	14	17	21	0	20			
2				5	8	0	11	16	14	19	0	24			
1				4	10	0	14	13	16	23	0	22			
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Row	C	Brood Source										A201 / B 5 / 8	(# Young)			
10				6	0	8	11	14	9	0	12	97	22			
9				4	0	8	12	18	19	0	24	97	25			
8				4	0	8	12	16	15	0	24	97	22			
7				6	0	9	10	16	18	0	22	97	22			
6				3	0	9	8	11	18	0	16	97	21			
5				6	0	9	8	15	17	18	0	21	97			
4				5	7	9	10	14	18	19	0	22	97			
3				5	9	0	13	17	19	20	10	23	0			
2				5	8	0	15	17	19	0	19	97	21			
1				6	0	8	12	17	17	0	20	97	21			
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	

Time	1330	0925	1010	1145	0950	1105	0940	1035	0830	0770
Temp	24.5	25.3	25.0	25.6	25.9	24.8	25.1	24.8	24.5	25.4
Med.	1664	1664	1664	1664	1664	1675	1675	1675	1675	1679
Food	CF182	CF182	CF182	CF182	CF182	CF182	CF182	CF182	CF182	CF182
Alga	POSS4	POSS4	POSS4	POSS4	POSS4	POSS4	POSS4	POSS4	POSS4	POSS4

NOTES: 9-7 broods came b/n 9pm 4/15 and 7am 4/16 → 4/16 Acute PART I → 4/16 Acute PART II → Ref Tox (A) 4/15

1656 / CF 18-1 Acute → COLBERT (A) 4/15

+ = Young present in brood cup at 3 days or more than one brood present in individual cup at renewal - 4/14 C.R.F.P. Chemo * broods came between 9pm 4/12 and 91 6am 4/13

CERIODAPHNIA BROOD RECORD SHEET

Batch ID: 5212

Tray #: 4

Personnel: MTB

Row	Brood Source								Personnel:				
	A-20 / B-3 / 8 (# Young)												
10				5	7	0	16	18	18	0	24	19-7	
9				4	9	0	14	17	18	0	22	19-7	
8				5	7	0	13	17	18	0	21	19-7	
7				6	8	0	15	17	18	0	21	19-7	
6				7	6	0	14	17	18	0	21	19-7	
5				4	8	0	16	17	18	0	21	19-7	
4				4	8	0	14	17	18	0	21	19-7	
3				4	9	0	15	17	18	0	22	19-7	
2				5	8	0	14	18	19	0	24	19-7	
1				3	7	0	13	20	22	17	0	21	
Day	0	1	2	3	4	5	6	7	8	9	10	11	12

Row	Brood Source										A 20		B 10		8		(# Young)	
10					2	6	0	12	14	14	0	25	19	22				
9					5	9	0	13	19	19	0	20	17	0	19	22		
8					5	9	0	13	13	16	0	18	9	22				
7					4	7	0	12	18	16	0	20	9	22				
6					0	0	5	0	11	0	8	21	13	0				
5					4	5	2	2	16	18	20	0	19	20				
4					5	8	2	3	17	18	20	0	4	24				
3					6	9	0	11	19	20	0	22	9	19				
2					5	6	0	13	17	21	0	22	9	21				
1					3	7	0	14	17	20	20	0	4	22				
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	

[illegible][illegible]

NOTES:

+ = Young present in brood cup at 3 days or more than one brood present in individual cup at renewal.

INITIAL CHEMISTRY

Page 1 of 7Study CR-ERP April 1994Personnel SimbeckBeginning Date 4-14-94Date 4-14-94Fish 4-21-94PoseyEnding Date Cerio 4-20-94

By	DJS	DJS/JPP	DJS/JPP	DJS/JPP	DJS/JPP	DJS	DJS	JPP	JPP	DJS	DJS
Sample ID/Log #	Initial Temp.	Warmed Temp.	DO	pH	Cond.	Hard	x17.1 20.0	Alk	x10	TRC	x 1.0
F-MED #1674	22.6	25.1	8.3	8.2	326	4.3	86	6.7	67		
C-MED #1676	22.5	25.2	8.3	8.1	333	4.5	90	6.8	68		
Fish											
PCM 4.3 50%		24.8	8.7	7.4	211						
PCM 4.3 100% (TTL #283)	0.4	24.7	8.8	7.1	89.4	2.0	40	2.5	25	<0.1	<0.1
Log #12705											
PCM 5.1 50%		24.7	8.7	7.5	210						
PCM 5.1 100% (TTL #0284)	0.5	24.6	8.9	7.1	88.1	2.0	40	2.4	24	<0.1	<0.1
Log #12707											
PCM 6.0 50%		24.6	8.7	7.5	208						
PCM 6.0 100% (TTL #0285)	0.6	24.8	8.8	7.0	83.4	1.7	34	*1.9	19	<0.1	<0.1
Log #12709											
Cerio											
PCM 4.3 50%		25.2	8.7	7.6	213						
5.1 4-13-94 PCM 4.3 50%		25.0	8.9	7.6	211						
PCM 6.0 50%		24.9	8.9	7.5	211						

NOTES:

* checked twice

Reviewed By: DJS
PLARC501-252

INITIAL CHEMISTRY

Page 2 of 7Study CR-ERP April 1994Date 4-15-94Personnel SimbeckBeginning Date 4-14-94Fish 4-21-94PoseyEnding Date Cerio 4-20-94

By	D/S	D/S	D/S	D/S	D/S						
Sample ID/Log #	Initial Temp.	Warmed Temp.	DO	pH	Cond.	Hard	x17.1 20.0	Alk	x10	TRC	x 1.0
F-MED #1674	23.0	25.3	8.3	8.2	326						
C-MED #1676	23.1	25.2	8.1	8.2	333						
Fish											
PCM 4.3 50%		25.2	8.8	7.5	211						
PCM 4.3 100% (TTL # 0283) Log # 12705	2.6	25.0	8.9	7.1	89.7						
PCM 5.1 50%		25.3	8.8	7.5	210						
PCM 5.1 100% (TTL # 0284) Log # 12707	3.3	25.4	9.0	7.1	88.5						
PCM 6.0 50%		25.1	8.8	7.5	207 213 by 4-15-94						
PCM 6.0 100% (TTL # 0285) Log # 12709	1.9	25.0	9.1	7.0	83.5						
Cerio											
PCM 4.3 50%		25.1	8.8	7.6	218						
5.1 by 4-15-94 PCM 4.3 50%		25.2	8.7	7.5	215						
PCM 6.0 50%		25.3	8.8	7.5	213						

NOTES:

Reviewed By: JS
PLARC501-252

INITIAL CHEMISTRY

Page 3 of 7Study CR-ERP April 1994Date 4-16-94Personnel SimbeckBeginning Date 4-14-94Fish 4-20-94PoseyEnding Date Cerio 4-20-94

By	<u>D/S</u>	<u>D/S</u> / <u>JPP</u>	<u>D/S</u> / <u>JPP</u>	<u>D/S</u> / <u>JPP</u>	<u>D/S</u> / <u>JPP</u>	<u>NA</u> / <u>JPP</u>	<u>NA</u> / <u>JPP</u>	<u>NA</u> / <u>JPP</u>	<u>NA</u> / <u>JPP</u>	<u>JPP</u>	<u>JPP</u>
Sample ID/Log #	Initial Temp.	Warmed Temp.	DO	pH	Cond.	Hard	<u>x17.1</u> <u>20.0</u>	Alk	x10	TRC	x 1.0
F-MED #1674	22.6	24.9	8.3	8.1	330						
C-MED #1676	22.8	24.8	8.2	8.1	334						
Fish											
PCM 4.3 50%		25.0	8.7	7.4	246						
PCM 4.3 100% (TTL # 0288) Log # 12739	0.4	24.7	9.0	7.1	161	3.5	70	5.2	52	<0.1	<0.1
PCM 5.1 50%		24.7	8.9	7.4	248						
PCM 5.1 100% (TTL # 0287) Log # 12737	0.3	24.8	9.1	7.1	167	3.3	66	5.5	55	<0.1	<0.1
PCM 6.0 50%		25.3	9.0	7.4	242						
PCM 6.0 100% (TTL # 0288) Log # 12735	0.2	24.9	9.3	7.1	149	3.3	66	4.3	43	<0.1	<0.1
Cerio											
PCM 4.3 50%		24.8	8.7	<u>7.5</u> <u>8.1</u>	250						
PCM <u>5.1</u> <u>50%</u> <u>4-15-94</u>		24.8	8.9	7.4	253						
PCM 6.0 50%		24.6	8.9	7.4	244						

NOTES:

Reviewed By: 4/8
PLARC501-252

INITIAL CHEMISTRY

Page 4 of 7Study CR-ERP April 1994Date 4-17-94Personnel SimbeckBeginning Date 4-14-94Fish 4-21-94PoseyEnding Date Cerio 4-26-94

By											
Sample ID/Log #	Initial Temp.	Warmed Temp.	DO	pH	Cond.	Hard	x17.1	Alk	x10	TRC	x 1.0
F-MED #1674	22.4	25.3	8.3	8.2	330						
C-MED #1676	22.6	25.6	8.1	8.1	335						
Fish											
PCM 4.3 50%	-	25.2	8.9	7.5	246						
PCM 4.3 100% (TTL #0286)	2.8	25.0	9.1	7.1	163						
Log #12739											
PCM 5.1 50%		25.3	9.0	7.4	248						
PCM 5.1 100% (TTL #0287)	2.6	24.9	9.1	7.1	167						
Log #12737											
PCM 6.0 50%		25.3	9.0	7.4	243						
PCM 6.0 100% (TTL #0288)	3.1	25.3	9.2	7.0	150						
Log #12735											
Cerio											
PCM 4.3 50%		24.9	8.7	7.5	250						
5.1 4-15-94											
PCM 4.3 50%		25.0	8.9	7.5	252						
PCM 6.0 50%		25.1	8.9	7.4	245						

NOTES:

Reviewed By: AS
PLARC501-252

INITIAL CHEMISTRY

Study CR-ERP April 1994Date 4-18-94Personnel SimbeckBeginning Date 4-14-94Fish 4-21-94PoseyEnding Date Cerio 4-20-94Sesler

By	Initial Temp.	Warmed Temp.	DO	pH	Cond.	Hard	TS	Alk	x10	TRC	x 1.0
Sample ID/Log #											
F-MED #1677	22.6	25.2	8.3	8.0	319	4.3	86	6.1	61		
C-MED #1676	22.7	25.6	8.1	8.1	335						
Fish											
PCM 4.3 50%		25.4	9.1	7.5	240						
PCM 4.3 100% (TTL # 0286)	3.1	25.1	9.6	7.2	159						
Log #12739											
PCM 5.1 50%		25.4	9.1	7.4	243						
PCM 5.1 100% (TTL #0287)	2.9	25.5	9.6	7.1	169						
Log #12737											
PCM 6.0 50%		25.2	9.1	7.4	235						
PCM 6.0 100% (TTL #0288)	3.3	25.1	9.5	7.1	148						
Log #12735											
Cerio											
PCM 4.3 50%		25.3	9.0	7.5	252						
PCM 5.1 50% 4-15-94		25.3	8.9	7.5	254						
PCM 6.0 50%		25.5	9.0	7.5	244						

NOTES:

Reviewed By: AS
PLARC501-252

INITIAL CHEMISTRY

Study CR-ERP April 1994Date 4-19-94Personnel SimbeckBeginning Date 4-14-94Fish 4-21-94PoseyEnding Date Cerio 4-20-94Sesler

By	<u>TS</u>	<u>TS</u>	<u>TS</u>	<u>TS</u>	<u>TS</u>	<u>TS</u>	<u>TS</u>	<u>TS</u>	<u>TS</u>	<u>TS</u>	<u>TS</u>
Sample ID/Log #	Initial Temp.	Warmed Temp.	DO	pH	Cond.	Hard	<u>*17.1</u> <u>x20.0</u>	Alk	x10	TRC	x 1.0
E-MED #1677	22.0	25.2	8.4	8.0	318						
C-MED #1676	22.1	25.5	8.2	8.1	336						
<u>Fish</u>											
PCM 4.3 50%		25.5	9.0	7.5	241						
PCM 4.3 100% (TTC #0292) Log #12849	0.6	25.0	9.2	7.3	162	3.5	70	6.1	51	<0.1	<0.1
PCM 5.1 50%		25.0	9.1	7.5	242						
PCM 5.1 100% (TTC #0293) Log #12847	0.6	25.0	9.3	7.3	<u>TS 4-19</u> 2165	3.5	<u>TS 4-19</u> 70	5.2	52	<0.1	<0.1
PCM 6.0 50%		25.0	9.0	7.5	<u>237</u> <u>1472</u>						
PCM 6.0 100% (TTC #0294) Log #12845	0.4	25.0	9.3	7.2	150	3.2	64	4.3	43	<0.1	<0.1
<u>Cerio</u>											
PCM 4.3 50%		25.4	9.0	7.6	250						
PCM <u>5.1</u> <u>4-18-94</u> 4.3 50%		25.0	9.1	7.5	250						
PCM 6.0 50%		25.3	9.0	7.5	246						

NOTES:

Reviewed By: TS
PLARC501-252

INITIAL CHEMISTRY

Page 7 of 7Study CR-ERP April 1994Personnel SimbeckBeginning Date 4-14-94Date 4-20-94Fish 4-21-94PoseyEnding Date Cerio 4-20-94

By	<u>DS</u>	<u>DS</u>	<u>DS</u>	<u>DS</u>	<u>DS</u>						
	<u>D.O.</u>	<u>warmed</u>	<u>DS</u>	<u>DS</u>							
Sample ID/Log #	Initial Temp.	Warmed Temp.	<u>-DO-</u> Temp.	pH	Cond.	Hard	x17.1	Alk	x10	TRC	x 1.0
F-MED #1677	21.6	8.4	<u>25.3</u> <u>8.0</u>	8.0	321						
C-MED #1676	21.8	8.3	25.2	8.0	334						
Fish											
PCM 4.3 50%		9.1	25.5	7.5	243						
PCM 4.3 100% (TTL #0292) Log # 12849	1.7	9.3	25.2	7.2	163						
PCM 5.1 50%		9.1	25.3	7.5	245						
PCM 5.1 100% (TTL #0893) Log #12847	1.7	9.5	25.3	7.2	164						
PCM 6.0 50%		9.2	25.2	7.4	237						
PCM 6.0 100% (TTL #0294) Log #12845	3.3	9.5	25.0	7.2	151						
Cerio											
PCM 4.3 50%		9.1	25.1	7.5	243						
5.1 <u>4-15-94</u> PCM 4.3 50%		9.1	25.3	7.5	252						
PCM 6.0 50%		9.2	25.1	7.5	248						

NOTES:

Reviewed By: DS
PLARC501-252

FINAL CHEMISTRY

Page 1 of 7Study CR-ERP April 1994Date 4-15-94Personnel SimbeckBeginning Date 4-14-94PoseyEnding Date Fish 4-21-94 Cerio 4-20-94Russell

Sample ID/Log #	By Rep.	Fish			
		Temp.	DO	pH	Cond.
	1	25.1	6.6	7.8	
F-MED	2	25.3	6.6		327
1674	3	25.4	6.3		
	4	25.0	6.6		
	1	25.2	6.6	7.6	
PCM 4.3	2	25.1	6.7		218
50%	3	25.1	6.3		
	4	24.9	6.5		
	1	25.6	6.3	7.2	
PCM 4.3	2	24.9	6.3		97.4
100%	3	25.3	6.4		
12705	4	25.3	6.5		
	1	25.3	6.6	7.5	
PCM 5.1	2	25.7	6.6		214
50%	3	25.3	6.6		
	4	25.2	6.4		
	1	25.4	6.1	7.2	
PCM 5.1	2	25.0	6.0		96.3
100%	3	25.4	5.9		
12707	4	25.1	6.4		
	1	25.1	6.6	7.5	
PCM 6.0	2	25.0	6.6		213
50%	3	25.1	6.5		
	4	25.1	6.6		
	1	24.7	6.7	7.3	
PCM 6.0	2	25.4	6.2		90.2
100%	3	25.0	6.2		
12709	4	25.3	6.5		

NOTES:

Ceriodaphnia			
Temp.	Sample ID	DO	pH
24.9	① C-MED	7.4	8.0
24.7	② PCM 4.3 50%	7.4	7.8
24.5	③ PCM 4.3 100%	7.5	7.4
25.0	④ PCM 5.1 50%	7.5	7.7
25.0	⑤ PCM 5.1 100%	7.4	7.5
25.1	⑥ PCM 6.0 50%	7.4	7.7
25.2	⑦ PCM 6.0 100%	7.4	7.3
25.0			
24.8			
25.2			

Reviewed By: DS

PLARC501-255

FINAL CHEMISTRY

Page 2 of 7Study CR-ERP April 1994Beginning Date 4-14-94Date 4-16-94Personnel SimbeckPoseyEnding Date Fish 4-21-94 Cerio 4-20-94

Sample ID/Log #	By Rep.	Fish			
		Temp.	DO	pH	Cond.
	1	25.0	6.1		
F-MED	2	25.0	6.1	7.7	
#1674	3	25.7	5.7		333
	4	25.1	5.9		
	1	25.4	5.9		
PCM 4.3	2	24.8	6.1	7.5	
50%	3	25.3	5.7		214
	4	25.2	5.7		
	1	25.5	5.6		
PCM 4.3	2	25.1	5.6	7.2	
100%	3	25.2	5.7		92.7
12705	4	25.1	5.5		
	1	25.2	5.8		
PCM 5.1	2	25.1	5.7	7.4	
- 50%	3	25.5	5.6		212
12707 ^{MSR}	4	25.4	5.8		
	1	25.0	6.2		
PCM 5.1	2	25.1	6.0	7.2	
100%	3	25.1	5.7		91.3
12707	4	25.3	5.6		
	1	24.9	6.1		
PCM 6.0	2	25.1	5.6	7.4	
50%	3	24.9	5.6		211
	4	24.8	6.1		
	1	24.6	5.3		
PCM 6.0	2	25.5	5.9	7.1	
100%	3	25.1	5.7		87.2
12709	4	25.0	5.5		

NOTES:

Ceriodaphnia			
Temp.	Sample ID	DO	pH
25.5	① C-MED	7.6	7.8
24.9	② PCM 4.3 50%	7.5	7.7
25.1	③ PCM 4.3 100%	7.5	7.4
25.2	④ PCM 5.1 50%	7.5	7.7
24.8	⑤ PCM 5.1 100%	7.4	7.4
25.1	⑥ PCM 6.0 50%	7.5	7.7
25.1	⑦ PCM 6.0 100%	7.2	7.4
24.8			
24.8 ^{MSR}	T-16-94		
25.1			

Reviewed By: AS

PLARC501-255

Study CR-ERP April 1994Beginning Date 4-14-94Date 4-17-94Personnel Simbeck
PoseyEnding Date Fish 4-21-94 Cerio 4-20-94

Sample ID/Log #	By Rep.	Fish				
		SPP	W/S/SPP	W/S/SPP	W/S/SPP	Cond.
		Temp.	DO	pH		
	1	25.1	5.2			
F-MED	2	25.0	5.3			
1674	3	25.0	5.1	7.6 5.6		
	4	25.6	5.3	SP 4-17-94		334
	1	24.6	6.0			
PCM 4.3	2	25.0	6.1			
50%	3	25.1	5.6	7.5		
	4	24.5	6.1			248
	1	24.7	6.3			
PCM 4.3	2	25.0	5.8			
100%	3	25.3	5.9	7.4		
12739	4	25.2	5.7			165
	1	25.2	5.2			
PCM 5.1	2	25.3	5.5			
50%	3	24.7	6.0	7.5		
	4	25.0	5.6			250
	1	25.1	5.8			
PCM 5.1	2	25.0	5.2			
100%	3	25.2	5.3	7.4		
12737	4	24.7	5.8			168
	1	25.0	5.7			
PCM 6.0	2	25.1	5.6			
50%	3	25.0	5.7	7.4		
	4	24.9	5.8			241
	1	24.5	6.0			
PCM 6.0	2	25.2	4.8			
100%	3	24.9	5.7	7.3		
12735	4	24.9	5.7			147

NOTES:

Ceriodaphnia			
Temp.	Sample ID	DO	pH
25.3	① C-MED		
25.2	② PCM 4.3 50%		
24.9	③ PCM 4.3 100%		
25.4	④ PCM 5.1 50%		
25.2	⑤ PCM 5.1 100%		
25.4	⑥ PCM 6.0 50%		
25.5	⑦ PCM 6.0 100%		
25.4			
25.3			
25.5			

Reviewed By: [Signature]

PLARC501-255

* Forgot to take final
DO and pH before
samples were dumped.

FINAL CHEMISTRY

Page 4 of 7

Study CR-ERP April 1994

Date 4-18-94

Personnel Simbeck

Beginning Date 4-14-94

Posey

Ending Date Fish 4-21-94 Cerio 4-20-94

Scsler

Sample ID/Log #	By Rep.	Fish			
		Temp.	DO	pH	Cond.
	1	25.5	5.4		331
F-MED	2	25.6	5.6		
1674	3	25.0	5.6		
	4	24.9	5.5	7.6	
	1	25.2	5.6		251
PCM 4.3	2	24.8	6.0		35 4/18/94
50%	3	24.9	5.7		
	4	25.0	6.0	7.6	
	1	25.6	5.8		165
PCM 4.3	2	25.0	5.8		
100%	3	24.9	5.5		
12739	4	24.9	5.8	7.5	
	1	25.3	5.8		249
PCM 5.1	2	25.2	5.8		
50%	3	25.3	6.1		
	4	25.1	5.9	7.6	
	1	25.0	5.8		170
PCM 5.1	2	25.1	5.9		
100%	3	25.0	5.4		
12737	4	24.9	5.5	7.5	
	1	25.6	5.5		243
PCM 6.0	2	25.1	5.7		
50%	3	24.9	6.0		
	4	25.1	5.9	7.5	
	1	25.1	6.0		152
PCM 6.0	2	25.0	6.2		
100%	3	25.1	6.1		
12735	4	25.2	5.5	7.4	

NOTES:

Ceriodaphnia			
Temp.	Sample ID	DO	pH
25.1	① C-MED	7.8	7.9
25.0	② PCM 4.3 50%	7.6	7.9
24.7	③ PCM 4.3 100%	7.6	7.6
25.2	④ PCM 5.1 50%	7.7	7.8
25.1	⑤ PCM 5.1 100%	7.7	7.8
25.3	⑥ PCM 6.0 50%	7.6	7.8
25.4	⑦ PCM 6.0 100%	7.6	7.8
25.3			
25.2			
25.4			

Reviewed By: W/S

PLARC501-255

Study CR-ERP April 1994Beginning Date 4-14-94Date 4-19-94Personnel SimbeckPoseyEnding Date Fish 4-21-94 Cerio 4-20-94Sciler

Sample ID/Log #	By	Fish			
		Rep.	Temp.	DO	pH
	1		25.3	6.0	7.8
F-MED	2		25.2	5.9	321
1677	3		25.0	6.2	
	4		24.9	6.0	
	1		24.9	5.8	7.6
PCM 4.3	2		24.8	6.5	245
50%	3		25.0	5.9	
	4		24.8	5.8	
---	1		25.1	6.3	7.6
PCM 4.3	2		25.1	6.0	164
100%	3		25.6	6.4	
12739	4		25.1	6.4	
	1		25.1	5.9	7.6
PCM 5.1	2		24.9	5.8	244
50%	3		24.9	6.1	
	4		25.3	5.9	
	1		24.9	5.9	7.5
PCM 5.1	2		25.1	6.0	170
100%	3		24.7	6.0	
12737	4		24.7	5.9	
	1		24.8	5.5	7.5
PCM 6.0	2		24.8	6.4	236
50%	3		24.9	6.1	
	4		24.8	6.2	
	1		25.0	6.3	7.5
PCM 6.0	2		25.3	5.6	152
100%	3		24.8	6.0	
12735	4		25.1	6.2	

NOTES:

Ceriodaphnia			
Temp.	Sample ID	DO	pH
24.8	① C-MED	7.7	8.0
24.7	② PCM 4.3 50%	7.7	7.9
24.4	③ PCM 4.3 100%	7.7	7.9
24.8	④ PCM 5.1 50%	7.7	7.9
24.7	⑤ PCM 5.1 100%	7.7	7.9
24.8	⑥ PCM 6.0 50%	7.7	7.9
24.9	⑦ PCM 6.0 100%	7.7	7.8
24.9			
24.8			
25.0			

Reviewed By: gjs

PLARC501-255

Study CR-ERP April 1994Beginning Date 4-14-94Date 4-20-94Personnel SimbeckPoseyEnding Date Fish 4-21-94 Cerio 4-20-94

Sample ID/Log #	Fish				
	By	KSP/O/S	O/S/JSP	O/S/JSP	O/S/JSP
	Rep.	Temp.	DO	pH	Cond.
	1	25.0	4.9		
F-MED	2	25.0	6.0	7.7	
1677	3	24.8	5.8		320
	4	24.7	6.1		
	1	25.2	5.6		
PCM 4.3	2	24.8	5.9	7.6	
50%	3	25.0	6.0		246
	4	24.8	5.6		
	1	24.6	5.8		
PCM 4.3	2	25.1	5.4	7.4	
100%	3	24.8	5.7		182
12849	4	24.8	5.7		
	1	25.1	5.5		
PCM 5.1	2	24.7	5.5	7.4	
50%	3	24.9	5.3		245
	4	24.9	5.6		
	1	24.7	6.1		
PCM 5.1	2	25.0	5.5	7.4	
100%	3	24.8	5.7		167
12847	4	24.7	5.8		
	1	25.0	5.5		
PCM 6.0	2	25.2	6.0	7.5	
50%	3	24.8	5.7		237
	4	24.9	6.1		
	1	24.7	5.9		
PCM 6.0	2	24.9	5.7	7.4	
100%	3	25.2	5.3		155
12845	4	24.8	5.6		

NOTES:

Ceriodaphnia			
O/S	O/S	O/S	O/S
Temp.	Sample ID	DO	pH
24.9	① C-MED	7.7	7.8
25.0	② PCM 4.3 50%	7.7	7.8
24.6	③ PCM 4.3 100%	7.8	7.7
25.0	④ PCM 5.1 50%	7.8	7.8
25.0	⑤ PCM 5.1 100%	7.8	7.7
25.1	⑥ PCM 6.0 50%	7.8	7.7
25.2	⑦ PCM 6.0 100%	7.8	7.7
25.1			
25.2			
25.2			

Reviewed By: [Signature]

PLARC501-255

4-20-94
O/S

Study CR-ERP April 1994Beginning Date 4-14-94Date 4-21-94Personnel SimbeckPoseyEnding Date Fish 4-21-94 Cerio 4-20-94

Sample ID/Log #	By	Fish				
		SPP/0/5	SPP/0/5	SPP/0/5	SPP	
	Rep.	Temp.	DO	pH	Cond.	
	1	25.4	6.1			
F-MED	2	25.0	5.7			
	3	24.7	6.3	7.7		
	4	24.8	6.1		323	
	1	25.1	6.1			
PCM 4.3	2	24.9	6.2			
50%	3	25.2	6.4	7.6		
	4	25.1	6.1		246	
	1	25.0	6.4			
PCM 4.3	2	25.0	6.1			
100%	3	25.0	5.9	7.5		
	4	25.0	5.9		166	
	1	25.1	5.9			
PCM 5.1	2	24.9	6.1			
50%	3	25.0	6.1	7.6		
	4	25.6	5.6		245	
	1	25.1	5.9			
PCM 5.1	2	25.1	6.3			
100%	3	25.3	5.7	7.5		
	4	25.1	5.7		167	
	1	24.8	5.9			
PCM 6.0	2	25.3	6.1			
50%	3	25.3	6.1	7.5		
	4	25.0	6.0		236	
	1	24.9	6.2			
PCM 6.0	2	24.9	6.3			
100%	3	25.2	6.2	7.5		
	4	25.0	6.0		156	

NOTES:

Ceriodaphnia			
SPP		SPP	SPP
Temp.	Sample ID	DO	pH
24.8	① C-MED	7.7	7.8
25.0	② PCM 4.3 50%	7.6	7.8
24.4	③ PCM 4.3 100%	7.5	7.7
25.0	④ PCM 5.1 50%	7.6	7.7
25.0	⑤ PCM 5.1 100%	7.5	7.7
25.0	⑥ PCM 6.0 50%	7.5	7.7
25.2	⑦ PCM 6.0 100%	7.4	7.6
25.1			
25.1			
25.0			

Reviewed By: Q/S

PLARC501-255

DOE - 04 / 94 -- APRIL 14-21, 1994 -- INITIAL AND FINAL CHEMISTRY

INITIAL CHEMISTRY

MEDIUM (FISH)

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	22.6	25.1	8.3	8.2	326	86.0	67	---
1	23.0	25.3	8.3	8.2	326	---	---	---
2	22.6	24.9	8.3	8.1	330	---	---	---
3	22.4	25.3	8.3	8.2	330	---	---	---
4	22.6	25.2	8.3	8.0	319	86.0	61	---
5	22.0	25.2	8.4	8.0	318	---	---	---
6	21.6	25.3	8.4	8.0	321	---	---	---
MEAN	22.4	25.2	8.3	8.1	324	86.0	64	---
MIN	21.6	24.9	8.3	8.0	318	86.0	61	---
MAX	23.0	25.3	8.4	8.2	330	86.0	67	---

PCM 4.3 50% W/C-MEDIUM

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	--	25.2	8.7	7.6	213	---	---	---
1	--	25.1	8.8	7.6	218	---	---	---
2	--	24.8	8.7	7.5	250	---	---	---
3	--	24.9	8.7	7.5	250	---	---	---
4	--	25.3	9.0	7.5	252	---	---	---
5	--	25.4	9.0	7.6	250	---	---	---
6	--	25.1	9.1	7.5	243	---	---	---
MEAN	0.0	25.1	8.9	7.5	239	0.0	0	---
MIN	0.0	24.8	8.7	7.5	213	0.0	0	---
MAX	0.0	25.4	9.1	7.6	252	0.0	0	---

MEDIUM (CERIO)

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	22.5	25.2	8.3	8.1	333	90.0	68	---
1	23.1	25.2	8.1	8.2	333	---	---	---
2	22.8	24.8	8.2	8.1	334	---	---	---
3	22.6	25.6	8.1	8.1	335	---	---	---
4	22.7	25.6	8.1	8.1	335	---	---	---
5	22.1	25.5	8.2	8.1	336	---	---	---
6	21.8	25.2	8.3	8.0	334	---	---	---
MEAN	22.5	25.3	8.2	8.1	334	90.0	68	---
MIN	21.8	24.8	8.1	8.0	333	90.0	68	---
MAX	23.1	25.6	8.3	8.2	336	90.0	68	---

PCM 4.3 100%

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	0.4	24.7	8.8	7.1	89.4	40.0	25	<0.1
1	2.6	25.0	8.9	7.1	89.7	---	---	---
2	0.4	24.7	9.0	7.1	161	70.0	52	<0.1
3	2.8	25.0	9.1	7.1	163	---	---	---
4	3.1	25.1	9.6	7.2	159	---	---	---
5	0.6	25.0	9.2	7.3	162	70.0	51	<0.1
6	1.7	25.2	9.3	7.2	163	---	---	---
MEAN	1.7	25.0	9.1	7.2	141.0	60.0	43	<0.1
MIN	0.4	24.7	8.8	7.1	89.4	40.0	25	<0.1
MAX	3.1	25.2	9.6	7.3	163.0	70.0	52	<0.1

PCM 4.3 50% W/F-MEDIUM

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	--	24.8	8.7	7.4	211	---	---	---
1	--	25.2	8.8	7.5	211	---	---	---
2	--	25.0	8.7	7.4	246	---	---	---
3	--	25.2	8.9	7.5	246	---	---	---
4	--	25.4	9.1	7.5	240	---	---	---
5	--	25.5	9.0	7.5	241	---	---	---
6	--	25.5	9.1	7.5	243	---	---	---
MEAN	0.0	25.2	8.9	7.5	234	0.0	0	---
MIN	0.0	24.8	8.7	7.4	211	0.0	0	---
MAX	0.0	25.5	9.1	7.5	246	0.0	0	---

PCM 5.1 50% W/F-MEDIUM

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	--	24.7	8.7	7.5	210	---	---	---
1	--	25.3	8.8	7.5	210	---	---	---
2	--	24.7	8.9	7.4	248	---	---	---
3	--	25.3	9.0	7.4	248	---	---	---
4	--	25.4	9.1	7.4	243	---	---	---
5	--	25.0	9.1	7.5	242	---	---	---
6	--	25.3	9.1	7.5	245	---	---	---
MEAN	0.0	25.1	9.0	7.5	235	0.0	0	---
MIN	0.0	24.7	8.7	7.4	210	0.0	0	---
MAX	0.0	25.3	9.1	7.5	248	0.0	0	---

PCM 5.1 50% W/C-MEDIUM

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	--	25.0	8.9	7.6	211	---	--	---
1	--	25.2	8.7	7.5	215	---	--	---
2	--	24.8	8.9	7.4	253	---	--	---
3	--	25.0	8.9	7.5	252	---	--	---
4	--	25.3	8.9	7.5	254	---	--	---
5	--	25.0	9.1	7.5	250	---	--	---
6	--	25.3	9.1	7.5	252	---	--	---
MEAN	0.0	25.1	8.9	7.5	241	0.0	0	---
MIN	0.0	24.8	8.7	7.4	211	0.0	0	---
MAX	0.0	25.3	9.1	7.6	254	0.0	0	---

PCM 6.0 50% W/C-MEDIUM

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	--	24.9	8.9	7.5	211	---	--	---
1	--	25.3	8.8	7.5	213	---	--	---
2	--	24.6	8.9	7.4	244	---	--	---
3	--	25.1	8.9	7.4	245	---	--	---
4	--	25.5	9.0	7.5	244	---	--	---
5	--	25.3	9.0	7.5	246	---	--	---
6	--	25.1	9.2	7.5	248	---	--	---
MEAN	0.0	25.1	9.0	7.5	236	0.0	0	---
MIN	0.0	24.6	8.8	7.4	211	0.0	0	---
MAX	0.0	25.5	9.2	7.5	248	0.0	0	---

PCM 5.1 100%

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	0.5	24.6	8.9	7.1	88.1	40.0	24	<0.1
1	3.3	25.4	9.0	7.1	88.5	---	--	---
2	0.3	24.8	9.1	7.1	167	66.0	55	<0.1
3	2.6	24.9	9.1	7.1	167	---	--	---
4	2.9	25.5	9.6	7.1	169	---	--	---
5	0.6	25.0	9.3	7.3	165	70.0	52	<0.1
6	1.7	25.3	9.5	7.2	164	---	--	---
MEAN	1.7	25.1	9.2	7.1	144	58.7	44	<0.1
MIN	0.3	24.6	8.9	7.1	88.1	40.0	24	<0.1
MAX	3.3	25.5	9.6	7.3	169	70.0	55	<0.1

PCM 6.0 100%

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	0.6	24.8	8.8	7.0	83.4	34.0	19	<0.1
1	1.9	25.0	9.1	7.0	83.5	---	--	---
2	0.2	24.9	9.3	7.1	149	66.0	43	<0.1
3	3.1	25.3	9.2	7.0	150	---	--	---
4	3.3	25.1	9.5	7.1	148	---	--	---
5	0.4	25.0	9.3	7.2	150	64.0	43	<0.1
6	3.3	25.0	9.5	7.2	151	---	--	---
MEAN	1.8	25.0	9.2	7.1	131	54.7	35	<0.1
MIN	0.2	24.8	8.8	7.0	83.4	34.0	19	<0.1
MAX	3.3	25.3	9.5	7.2	151	66.0	43	<0.1

PCM 6.0 50% W/F-MEDIUM

INITIAL WARMED								
DAY	TEMP	TEMP	DO	pH	COND	HARD	ALK	CHLORINE
0	--	24.6	8.7	7.5	208	---	--	---
1	--	25.1	8.8	7.5	207	---	--	---
2	--	25.3	9.0	7.4	242	---	--	---
3	--	25.3	9.0	7.4	243	---	--	---
4	--	25.2	9.1	7.4	235	---	--	---
5	--	25.0	9.0	7.5	237	---	--	---
6	--	25.2	9.2	7.4	237	---	--	---
MEAN	0.0	25.1	9.0	7.4	230	0.0	0	---
MIN	0.0	24.6	8.7	7.4	207	0.0	0	---
MAX	0.0	25.3	9.2	7.5	243	0.0	0	---

F I S H F I N A L

PCM 4.3 50% W/F-MEDIUM

DAY	TEMP	DO	pH	COND
1	25.2	6.6	7.6	
	25.1	6.7		218
	25.1	6.3		
	24.9	6.5		
2	25.4	5.9		
	24.8	6.1	7.5	
	25.3	5.7		214
	25.2	5.7		
3	24.6	6.0		
	25.0	6.1		
	25.1	5.6	7.5	
	24.5	6.1		248
4	25.2	5.6		251
	24.8	6.0		
	24.9	5.7		
	25.0	6.0	7.6	
5	24.9	5.8	7.6	
	24.8	6.5		245
	25.0	5.9		
	24.8	5.8		
6	25.2	5.6		
	24.8	5.9	7.6	
	25.0	6.0		246
	24.8	5.6		
7	25.1	6.1		
	24.9	6.2		
	25.2	6.4	7.6	
	25.1	6.1		246
MEAN	25.0	6.0	7.6	238
MIN	24.5	5.6	7.5	214
MAX	25.4	6.7	7.6	251

PCM 4.3 100%

DAY	TEMP	DO	pH	COND
1	25.6	6.3	7.2	
	24.9	6.3		97.4
	25.3	6.4		
	25.3	6.5		
2	25.5	5.6		
	25.1	5.6	7.2	
	25.2	5.7		92.7
	25.1	5.5		
3	24.7	6.3		
	25.0	5.8		
	25.3	5.9	7.4	
	25.2	5.7		165
4	25.6	5.8		165
	25.0	5.8		
	24.9	5.5		
	24.9	5.8	7.5	
5	25.1	6.3	7.6	
	25.1	6.0		164
	25.6	6.4		
	25.1	6.4		
6	24.6	5.8		
	25.1	5.4	7.4	
	24.8	5.7		182
	24.8	5.7		
7	25.0	6.4		
	25.0	6.1		
	25.0	5.9	7.5	
	25.0	5.9		166
MEAN	25.1	5.9	7.4	147
MIN	24.6	5.4	7.2	92.7
MAX	25.6	6.5	7.6	182 5-11-94

PCM 5.1 50% W/F-MEDIUM

DAY	TEMP	DO	pH	COND
1	25.3	6.6	7.5	
	25.7	6.6		214
	25.3	6.6		
	25.2	6.4		
2	25.2	5.8		
	25.1	5.7	7.4	
	25.5	5.6		212
	25.4	5.8		
3	25.2	5.2		
	25.3	5.5		
	24.7	6.0	7.5	
	25.0	5.6		250
4	25.3	5.8		249
	25.2	5.8		
	25.3	6.1		
	25.1	5.9	7.6	
5	25.1	5.9	7.6	
	24.9	5.8		244
	24.9	6.1		
	25.3	5.9		
6	25.1	5.5		
	24.7	5.5	7.4	
	24.9	5.3		245
	24.9	5.6		
7	25.1	5.9		
	24.9	6.1		
	25.0	6.1	7.6	
	25.6	5.6		245
MEAN	25.2	5.9	7.5	237
MIN	24.7	5.2	7.4	212
MAX	25.7	6.6	7.6	250

PCM 5.1 100%

DAY	TEMP	DO	pH	COND
1	25.4	6.1	7.2	
	25.0	6.0		96.3
	25.4	5.9		
	25.1	6.4		
2	25.0	6.2		
	25.1	6.0	7.2	
	25.1	5.7		91.3
	25.3	5.6		
3	25.1	5.8		
	25.0	5.2		
	25.2	5.3	7.4	
	24.7	5.8		168
4	25.0	5.8		170
	25.1	5.9		
	25.0	5.4		
	24.9	5.5	7.5	
5	24.9	5.9	7.5	
	25.1	6.0		170
	24.7	6.0		
	24.7	5.9		
6	24.7	6.1		
	25.0	5.5	7.4	
	24.8	5.7		167
	24.7	5.8		
7	25.1	5.9		
	25.1	6.3		
	25.3	5.7	7.5	
	25.1	5.7		167
MEAN	25.0	5.8	7.4	147
MIN	24.7	5.2	7.2	91.3
MAX	25.4	6.4	7.5	170

PCM 6.0 50% W/F-MEDIUM

DAY	TEMP	DO	pH	COND
1	25.1	6.6	7.5	
	25.0	6.6		213
	25.1	6.5		
	25.1	6.6		
2	24.9	6.1		
	25.1	5.6	7.4	
	24.9	5.6		211
	24.8	6.1		
3	25.0	5.7		
	25.1	5.6		
	25.0	5.7	7.4	
	24.9	5.8		241
4	25.6	5.5		243
	25.1	5.7		
	24.9	6.0		
	25.1	5.9	7.5	
5	24.8	5.5	7.5	
	24.8	6.4		236
	24.9	6.1		
	24.8	6.2		
6	25.0	5.5		
	25.2	6.0	7.5	
	24.8	5.7		237
	24.9	6.1		
7	24.8	5.9		
	25.3	6.1		
	25.3	6.1	7.5	
	25.0	6.0		236
MEAN	25.0	6.0	7.5	231
MIN	24.8	5.5	7.4	211
MAX	25.6	6.6	7.5	243

PCM 6.0 100%

DAY	TEMP	DO	pH	COND
1	24.7	6.7	7.3	
	25.4	6.2		90.2
	25.0	6.2		
	25.3	6.5		
2	24.6	5.3		
	25.5	5.9	7.1	
	25.1	5.7		87.2
	25.0	5.5		
3	24.5	6.0		
	25.2	4.8		
	24.9	5.7	7.3	
	24.9	5.7		147
4	25.1	6.0		152
	25.0	6.2		
	25.1	6.1		
	25.2	5.5	7.4	
5	25.0	6.3	7.5	
	25.3	5.6		152
	24.8	6.0		
	25.1	6.2		
6	24.7	5.9		
	24.9	5.7	7.4	
	25.2	5.3		155
	24.8	5.6		
7	24.9	6.2		
	24.9	6.3		
	25.2	6.2	7.5	
	25.0	6.0		156
MEAN	25.0	5.9	7.4	134
MIN	24.5	4.8	7.1	87.2
MAX	25.5	6.7	7.5	156

MEDIUM

DAY	TEMP	DO	pH	COND
1	25.1	6.6	7.8	
	25.3	6.6		327
	25.4	6.3		
	25.0	6.6		
2	25.0	6.1		
	25.0	6.1	7.7	
	25.7	5.7		333
	25.1	5.9		
3	25.1	5.2		
	25.0	5.3		
	25.0	5.1	7.6	
	25.6	5.3		334
4	25.5	5.4		331
	25.6	5.6		
	25.0	5.6		
	24.9	5.5	7.6	
5	25.3	6.0	7.8	
	25.2	5.9		321
	25.0	6.2		
	24.9	6.0		
6	25.0	4.9		
	25.0	6.0	7.7	
	24.8	5.8		320
	24.7	6.1		
7	25.4	6.1		
	25.0	5.7		
	24.7	6.3	7.7	
	24.8	6.1		323
MEAN	25.1	5.9	7.7	327
MIN	24.7	4.9	7.6	320
MAX	25.7	6.6	7.8	334

MEAN TEMPERATURE 25.1

MINIMUM: 24.5

MAXIMUM: 25.7

CERIO FINAL

=====

PCH 4.3 50%			PCH 4.3 100%			PCH 5.1 50%			PCH 5.1 100%		
DAY	DO	pH	DAY	DO	pH	DAY	DO	pH	DAY	DO	pH
1	7.4	7.8	1	7.5	7.4	1	7.5	7.7	1	7.4	7.5
2	7.5	7.7	2	7.5	7.4	2	7.5	7.7	2	7.4	7.4
3	-	-	3	-	-	3	-	-	3	-	-
4	7.6	7.9	4	7.6	7.6	4	7.7	7.8	4	7.7	7.8
5	7.7	7.9	5	7.7	7.9	5	7.7	7.9	5	7.7	7.9
6	7.7	7.8	6	7.8	7.7	6	7.8	7.8	6	7.8	7.7
7	7.6	7.8	7	7.5	7.7	7	7.6	7.7	7	7.5	7.7
MEAN	7.6	7.8	MEAN	7.6	7.6	MEAN	7.6	7.8	MEAN	7.6	7.7
MIN	7.4	7.7	MIN	7.5	7.4	MIN	7.5	7.7	MIN	7.4	7.4
MAX	7.7	7.9	MAX	7.8	7.9	MAX	7.8	7.9	MAX	7.8	7.9

PCH 6.0 50%			PCH 6.0 100%			MEDIUM		
DAY	DO	pH	DAY	DO	pH	DAY	DO	pH
1	7.4	7.7	1	7.4	7.3	1	7.4	8.0
2	7.5	7.7	2	7.2	7.4	2	7.6	7.8
3	-	-	3	-	-	3	-	-
4	7.6	7.8	4	7.6	7.8	4	7.8	7.9
5	7.7	7.9	5	7.7	7.8	5	7.7	8.0
6	7.8	7.7	6	7.8	7.7	6	7.7	7.8
7	7.5	7.7	7	7.4	7.6	7	7.7	7.8
MEAN	7.6	7.8	MEAN	7.5	7.6	MEAN	7.7	7.9
MIN	7.4	7.7	MIN	7.2	7.3	MIN	7.4	7.8
MAX	7.8	7.9	MAX	7.8	7.8	MAX	7.8	8.0

FINAL TEMP

24.9	25.5	25.3	25.1	24.8	24.9	24.8	
24.7	24.9	25.2	25.0	24.7	25.0	25.0	
24.5	25.1	24.9	24.7	24.4	24.6	24.4	
25.0	25.2	25.4	25.2	24.8	25.0	25.0	
25.0	24.8	25.2	25.1	24.7	25.0	25.0	MEAN: 25.0
25.1	25.1	25.4	25.3	24.8	25.1	25.0	
25.2	25.1	25.5	25.4	24.9	25.2	25.2	MIN: 24.3
25.0	24.8	25.4	25.3	24.9	25.1	25.1	MAX: 25.5
24.8	24.3	25.3	25.2	24.8	25.2	25.1	
25.2	25.1	25.5	25.4	25.0	25.2	25.0	

Reviewed by JS 5-11-94 (GGE-0494)

Project Instrument Record Sheet

Project Study CR-ERP April 1994

Beginning Date 4-14-94

Ending Date 4-21-94

DO Meter

Model YSI Model 57

TVA Tag 531047

Calibration Date 3-7-94

pH Meter(s)

Model Orion Research Model SA250

TVA Tag 8147 / 7483

Calibration Date 9-9-93 / 10-20-93

Model Orion Research Model 399A

TVA Tag 543347

Calibration Date 11-16-93

* 8147 used
4-19 to
4-21
4-20-94
5-4-94

Conductivity Meter

Model YSI Model 32

TVA Tag 577780

Calibration Date 5-2 11-1-93

ys

Thermometer(s)

Model SAMA CT 40

TVA Tag m206

Calibration Date 5-20-93

Model SAMA CT 40

TVA Tag m216

Calibration Date 11-30-93

PROJECT REAGENT RECORD SHEET

Project/Study: CR-ERP April 1994
Personnel: Simbeck, Posey

Beginning Date: 4-14-94
Ending Date: 4-21-94

WINKLER TITRATION METHOD

Alkaline-Iodide-Azide:

Brand Fisher
Lot # 935045-24
Exp. 9-95

Manganous Sulfate:

Brand Fisher
Lot # 931266-24
Exp. 2-95

Sodium Thiosulfate:

Brand Ricca
Lot # M158
Exp. 9-94

Sulfuric Acid:

Brand Mallinckrodt
Lot # 2876 KJCM
Exp. NA

Thyodene:

Brand Fisher
Lot # 912254
Exp. NA

pH BUFFER SOLUTIONS

pH 4:

Brand Mallinckrodt
Lot # D097 KLEA
Exp. 9-94

pH 7:

Brand Mallinckrodt
Lot # D098 KLPE
Exp. 7-95

pH 10:

Brand Whatman
Lot # 3483
Exp. 10-95

pH _____:

Brand _____
Lot # _____
Exp. _____

CONDUCTIVITY STANDARD SOLUTIONS

200 μ mhos:

Brand Biopharm
Lot # J302C
Exp. 11-94

720 μ mhos:

Brand Whatman
Lot # 3143
Exp. 10-95

200 μ mhos:

Brand Biopharm
Lot # F1438
Exp. 6-95

ALKALINITY TITRATION

Sulfuric Acid Solution N/50:

Brand Fisher
Lot # 935306
Exp. NA

HARDNESS TITRATION

Hardness Titrating Solution:

Brand Calgon
Lot # R20377001b
Exp. NA

Hardness Indicator:

Brand Calgon
Lot # 01E9B
Exp. NA

Hardness Buffer Solution:

Brand Calgon
Lot # 2666B
Exp. NA

CHLORINE TITRATION

DPD Powder Pillows:

Brand Hach
Lot # D3CM
Exp. NA

Potassium Iodide:

Brand EM
Lot # 9139
Exp. NA

FAS:

Brand Ricca
Lot # M319
Exp. 4-28-94

CUSTODY SEAL LOG

Project Study	<u>CR-ERP April 1994</u>	Location	<u>Lab Trailer Refridge #1</u>
Beginning Date	<u>7th 4-14-94</u>	Ending Date	<u>4-21-94</u>
Personnel	<u>Simbeck</u>		

[illegible]

Notes:

ATTACHMENT III

CR-ERP AMBIENT WATER TOXICITY STUDY
Meter Calibration - Copies of Logbook Pages

pH METER STANDARDIZATION

77

METER ID: #6 7413

DATE: <u>4-12-94</u>	TIME: <u>0726</u>	BY: <u>GKK</u>	DATE: <u>4-12-94</u>	TIME: <u>1010</u>	BY: <u>MAB</u>
Buffer Temp: <u>22.7</u>			Buffer Temp: <u>23.0</u>		
pH 7.0 BUFFER Initial Reading: <u>6.99</u>			pH 7.0 BUFFER Initial Reading: <u>7.02</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.00</u>		
pH 4.0/10.0 BUFFER Initial Reading: <u>9.99</u>			pH 4.0/10.0 BUFFER Initial Reading: <u>9.97</u>		
Corrected Reading: <u>10.00</u>			Corrected Reading: <u>10.00</u>		
% Slope: <u>99.3%</u>			% Slope: <u>98.6</u>		
ADDITIONAL Reading -15 Sec: <u>7.70</u>			ADDITIONAL Reading -15 Sec: <u>8.31</u>		
STANDARD Reading - 1 Min: <u>7.71</u>			STANDARD Reading - 1 Min: <u>8.30</u>		

NOTES:

DATE: <u>4-12-94</u>	TIME: <u>0824</u>	BY: <u>GKK</u>	DATE: <u>4-13-94</u>	TIME: <u>0910</u>	BY: <u>MAB</u>
Buffer Temp: <u>22.7</u>			Buffer Temp: <u>22.3</u>		
pH 7.0 BUFFER Initial Reading: <u>6.99</u>			pH 7.0 BUFFER Initial Reading: <u>7.01</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.00</u>		
pH 4.0/10.0 BUFFER Initial Reading: <u>10.01</u>			pH 4.0/10.0 BUFFER Initial Reading: <u>9.97</u>		
Corrected Reading: <u>10.00</u>			Corrected Reading: <u>10.00</u>		
% Slope: <u>99.3%</u>			% Slope: <u>98.6</u>		
ADDITIONAL Reading -15 Sec: <u>7.71</u>			ADDITIONAL Reading -15 Sec: <u>8.30</u>		
STANDARD Reading - 1 Min: <u>7.74</u>			STANDARD Reading - 1 Min: <u>8.29</u>		

NOTES:

cleaned probe

DATE: <u>4-14-94</u>	TIME: <u>0905</u>	BY: <u>MAB</u>	DATE: <u>4-15-94</u>	TIME: <u>0910</u>	BY: <u>DJS</u>
Buffer Temp: <u>21.8°C</u>			Buffer Temp: <u>22.8</u>		
pH 7.0 BUFFER Initial Reading: <u>7.06</u>			pH 7.0 BUFFER Initial Reading: <u>6.99</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.00</u>		
pH 4.0/10.0 BUFFER Initial Reading: <u>10.00</u>			pH 4.0/10.0 BUFFER Initial Reading: <u>9.98</u>		
Corrected Reading: <u>10.00</u>			Corrected Reading: <u>10.00</u>		
% Slope: <u>98.6</u>			% Slope: <u>98.9%</u>		
ADDITIONAL Reading -15 Sec: <u>8.18</u>			ADDITIONAL Reading -15 Sec: <u>7.83</u>		
STANDARD Reading - 1 Min: <u>8.18</u>			STANDARD Reading - 1 Min: <u>7.84</u>		

NOTES: *used within one hour*

DATE: <u>4-15-94</u>	TIME: <u>1330</u>	BY: <u>DJS</u>	DATE: <u>4-16-94</u>	TIME: <u>0750</u>	BY: <u>GKK</u>
Buffer Temp: <u>23.0</u>			Buffer Temp: <u>20.4</u>		
pH 7.0 BUFFER Initial Reading: <u>7.00</u>			pH 7.0 BUFFER Initial Reading: <u>7.01</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.00</u>		
pH 4.0/10.0 BUFFER Initial Reading: <u>9.99</u>			pH 4.0/10.0 BUFFER Initial Reading: <u>9.99</u>		
Corrected Reading: <u>10.00</u>			Corrected Reading: <u>10.00</u>		
% Slope: <u>98.9%</u>			% Slope: <u>99.6</u>		
ADDITIONAL Reading -15 Sec: <u>7.86</u>			ADDITIONAL Reading -15 Sec: <u>8.00</u>		
STANDARD Reading - 1 Min: <u>7.88</u>			STANDARD Reading - 1 Min: <u>8.02</u>		

NOTES:

DATE: <u>04-16-94</u>	TIME: <u>1712</u>	BY: <u>CK</u>	DATE: <u>4-17-94</u>	TIME: <u>0845</u>	BY: <u>JPP</u>
Buffer Temp: <u>22.1°C</u>			Buffer Temp: <u>20.7°C</u>		
pH 7.0 BUFFER Initial Reading: <u>6.99</u>			pH 7.0 BUFFER Initial Reading: <u>7.05</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.00</u>		
pH 4.0/10.0 BUFFER Initial Reading: <u>9.98</u>			pH 4.0/10.0 BUFFER Initial Reading: <u>9.99</u>		
Corrected Reading: <u>10.00</u>			Corrected Reading: <u>10.00</u>		
% Slope: <u>99.1%</u>			% Slope: <u>99.1%</u>		
ADDITIONAL Reading -15 Sec: <u>7.79</u>			ADDITIONAL Reading -15 Sec: <u>8.01</u>		
STANDARD Reading - 1 Min: <u>7.86</u>			STANDARD Reading - 1 Min: <u>8.04</u>		

NOTES: *cleaned probe 04.16.94 CK*

pH METER STANDARDIZATION

78

METER ID: Fl 7413

DATE: <u>04-17-94</u>	TIME: <u>1510</u>	BY: <u>cur</u>	DATE: <u>04/18/94</u>	TIME: <u>0915</u>	BY: <u>TS</u>
Buffer Temp: <u>21.6 °C</u>			Buffer Temp: <u>21.5</u>		
pH 7.0 BUFFER Initial Reading: <u>6.95</u>			pH 7.0 BUFFER Initial Reading: <u>7.01</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.0</u>		
pH 4.0/ <u>10.0</u> Initial Reading: <u>10.00</u>			pH 4.0/10.0 Initial Reading: <u>9.99</u>		
BUFFER Corrected Reading: <u>10.00</u>			BUFFER Corrected Reading: <u>10.0</u>		
% Slope: <u>99.17</u>			% Slope: <u>99.2</u>		
ADDITIONAL Reading -15 Sec: <u>7.74</u>			ADDITIONAL Reading -15 Sec: <u>7.89</u>		
STANDARD Reading - 1 Min: <u>7.77</u>			STANDARD Reading - 1 Min: <u>7.88</u>		

NOTES:

DATE: <u>4.18.94</u>	TIME: <u>1215</u>	BY: <u>MAB</u>	DATE: <u>4/18/94</u>	TIME: <u>1400</u>	BY: <u>TS</u>
Buffer Temp: <u>21.7</u>			Buffer Temp: <u>20.7</u>		
pH 7.0 BUFFER Initial Reading: <u>6.99</u>			pH 7.0 BUFFER Initial Reading: <u>7.0</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.0</u>		
pH 4.0/10.0 Initial Reading: <u>9.99</u>			pH 4.0/10.0 Initial Reading: <u>9.96</u>		
BUFFER Corrected Reading: <u>10.00</u>			BUFFER Corrected Reading: <u>10.0</u>		
% Slope: <u>99.2</u>			% Slope: <u>98.07</u>		
ADDITIONAL Reading -15 Sec: <u>7.95</u>			ADDITIONAL Reading -15 Sec: <u>7.85</u>		
STANDARD Reading - 1 Min: <u>7.96</u>			STANDARD Reading - 1 Min: <u>7.85</u>		

NOTES:

DATE: <u>4.19.94</u>	TIME: <u>0908</u>	BY: <u>MAB</u>	DATE: <u>4-20-94</u>	TIME: <u>0735</u>	BY: <u>GKK</u>
Buffer Temp: <u>21.1</u>			Buffer Temp: <u>20.6</u>		
pH 7.0 BUFFER Initial Reading: <u>7.03</u>			pH 7.0 BUFFER Initial Reading: <u>7.03</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.00</u>		
pH 4.0/10.0 Initial Reading: <u>10.03</u>			pH 4.0/10.0 Initial Reading: <u>9.98</u>		
BUFFER Corrected Reading: <u>10.00</u>			BUFFER Corrected Reading: <u>10.00</u>		
% Slope: <u>99.1</u>			% Slope: <u>99.1</u>		
ADDITIONAL Reading -15 Sec: <u>7.80</u>			ADDITIONAL Reading -15 Sec: <u>7.80</u>		
STANDARD Reading - 1 Min: <u>7.83</u>			STANDARD Reading - 1 Min: <u>7.83</u>		

NOTES:

DATE: <u>5-10-94</u>	TIME: <u>0810</u>	BY: <u>AS</u>	DATE: <u>5-11-94</u>	TIME: <u>0803</u>	BY: <u>MAB</u>
Buffer Temp: <u>21.1</u>			Buffer Temp: <u>20.9</u>		
pH 7.0 BUFFER Initial Reading: <u>7.00</u>			pH 7.0 BUFFER Initial Reading: <u>6.98</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.00</u>		
pH 4.0/10.0 Initial Reading: <u>9.98</u>			pH 4.0/10.0 Initial Reading: <u>9.93</u>		
BUFFER Corrected Reading: <u>10.00</u>			BUFFER Corrected Reading: <u>10.00</u>		
% Slope: <u>100.0%</u>			% Slope: <u>100.00</u>		
ADDITIONAL Reading -15 Sec: <u>7.70</u>			ADDITIONAL Reading -15 Sec: <u>8.31</u>		
STANDARD Reading - 1 Min: <u>7.81</u>			STANDARD Reading - 1 Min: <u>8.32</u>		

NOTES: used within one hour probe cleaned 5-10-94

DATE: <u>5-11-94</u>	TIME: <u>0955</u>	BY: <u>MAB</u>	DATE: <u>5-12-94</u>	TIME: <u>0755</u>	BY: <u>MAB</u>
Buffer Temp: <u>21.5</u>			Buffer Temp: <u>25.2</u>		
pH 7.0 BUFFER Initial Reading: <u>6.99</u>			pH 7.0 BUFFER Initial Reading: <u>6.99</u>		
Corrected Reading: <u>7.00</u>			Corrected Reading: <u>7.00</u>		
pH 4.0/10.0 Initial Reading: <u>9.92</u>			pH 4.0/10.0 Initial Reading: <u>9.98</u>		
BUFFER Corrected Reading: <u>10.00</u>			BUFFER Corrected Reading: <u>10.00</u>		
% Slope: <u>97.4</u>			% Slope: <u>97.4</u>		
ADDITIONAL Reading -15 Sec: <u>8.34</u>			ADDITIONAL Reading -15 Sec: <u>8.45</u>		
STANDARD Reading - 1 Min: <u>8.34</u>			STANDARD Reading - 1 Min: <u>8.45</u>		

NOTES:

pH METER STANDARDIZATION

66

METER ID: 67 ¹¹⁴³ 8147

DATE: <u>4-7-94</u> TIME: <u>1158</u> BY: <u>MAK</u>	DATE: <u>4-13-94</u> TIME: <u>1217</u> BY: <u>GKK</u>
Buffer Temp: <u>22.3</u>	Buffer Temp: <u>22.3</u>
pH 7.0 BUFFER Initial Reading: <u>7.00</u>	pH 7.0 BUFFER Initial Reading: <u>6.95</u>
Corrected Reading: <u>7.00</u>	Corrected Reading: <u>7.00</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>9.93</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>9.99</u>
Corrected Reading: <u>10.00</u>	Corrected Reading: <u>10.00</u>
% Slope: <u>99.1</u>	% Slope: <u>99.6%</u>
ADDITIONAL Reading -15 Sec: <u>8.11</u>	ADDITIONAL Reading -15 Sec: <u>7.72</u>
STANDARD Reading - 1 Min: <u>8.07</u>	STANDARD Reading - 1 Min: <u>7.74</u>
NOTES:	

DATE: <u>04-13-94</u> TIME: <u>1740</u> BY: <u>Cu</u>	DATE: <u>4-14-94</u> TIME: <u>0930</u> BY: <u>GKK</u>
Buffer Temp: <u>23.1°C</u>	Buffer Temp: <u>22.6</u>
pH 7.0 BUFFER Initial Reading: <u>7.00</u>	pH 7.0 BUFFER Initial Reading: <u>7.03</u>
Corrected Reading: <u>7.00</u>	Corrected Reading: <u>7.00</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>10.03</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>9.96</u>
Corrected Reading: <u>10.00</u>	Corrected Reading: <u>10.00</u>
% Slope: <u>101.1%</u>	% Slope: <u>96.7%</u>
ADDITIONAL Reading -15 Sec: <u>7.81</u>	ADDITIONAL Reading -15 Sec: <u>7.78</u>
STANDARD Reading - 1 Min: <u>7.81</u>	STANDARD Reading - 1 Min: <u>7.80</u>
NOTES: <u>Cleaned probe 04-11-94 Cu</u>	

DATE: <u>04-14-94</u> TIME: <u>1524</u> BY: <u>Cu</u>	DATE: <u>04-15-94</u> TIME: <u>1418</u> BY: <u>Cu</u>
Buffer Temp: <u>23.5°C</u>	Buffer Temp: <u>23.3°C</u>
pH 7.0 BUFFER Initial Reading: <u>7.01</u>	pH 7.0 BUFFER Initial Reading: <u>7.01</u>
Corrected Reading: <u>7.00</u>	Corrected Reading: <u>7.00</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>10.08</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>10.12</u>
Corrected Reading: <u>10.00</u>	Corrected Reading: <u>10.00</u>
% Slope: <u>95.8%</u>	% Slope: <u>99.1%</u>
ADDITIONAL Reading -15 Sec: <u>7.82</u>	ADDITIONAL Reading -15 Sec: <u>7.74</u>
STANDARD Reading - 1 Min: <u>7.83</u>	STANDARD Reading - 1 Min: <u>7.77</u>
NOTES:	<u>used w/in 1 hr of cal.</u>

DATE: <u>4-18-94</u> TIME: <u>0950</u> BY: <u>GKK</u>	DATE: <u>4-19-94</u> TIME: <u>0927</u> BY: <u>MAK</u>
Buffer Temp: <u>21.3</u>	Buffer Temp: <u>21.0</u>
pH 7.0 BUFFER Initial Reading: <u>7.03</u>	pH 7.0 BUFFER Initial Reading: <u>7.05</u>
Corrected Reading: <u>7.00</u>	Corrected Reading: <u>7.00</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>10.01</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>9.96</u>
Corrected Reading: <u>10.00</u>	Corrected Reading: <u>10.00</u>
% Slope: <u>100.0%</u>	% Slope: <u>98.9%</u>
ADDITIONAL Reading -15 Sec: <u>8.25</u>	ADDITIONAL Reading -15 Sec: <u>8.18</u>
STANDARD Reading - 1 Min: <u>8.28</u>	STANDARD Reading - 1 Min: <u>8.23</u>
NOTES: <u>Used within 1 hr of standardization</u>	

DATE: <u>4/19/94</u> TIME: <u>1350</u> BY: <u>TS</u>	DATE: <u>4-20-94</u> TIME: <u>0735</u> BY: <u>GKK</u>
Buffer Temp: <u>21.5</u>	Buffer Temp: <u>20.6</u>
pH 7.0 BUFFER Initial Reading: <u>6.94</u>	pH 7.0 BUFFER Initial Reading: <u>7.03</u>
Corrected Reading: <u>7.0</u>	Corrected Reading: <u>7.00</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>10.0</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>9.98</u>
Corrected Reading: <u>10.0</u>	Corrected Reading: <u>10.00</u>
% Slope: <u>99.2</u>	% Slope: <u>99.1</u>
ADDITIONAL Reading -15 Sec: <u>7.92</u>	ADDITIONAL Reading -15 Sec: <u>7.86</u>
STANDARD Reading - 1 Min: <u>7.92</u>	STANDARD Reading - 1 Min: <u>7.83</u>
NOTES:	

pH METER STANDARDIZATION

METER ID: 7 8147

DATE: 4/20/93 TIME: 1132 BY: MKB DATE: 4/20/94 TIME: 1425 BY: TS

Buffer Temp: <u>21.9</u>	Buffer Temp: <u>22.4</u>
pH 7.0 BUFFER Initial Reading: <u>6.93</u>	pH 7.0 BUFFER Initial Reading: <u>6.94</u>
Corrected Reading: <u>7.00</u>	Corrected Reading: <u>7.0</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>9.98</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>10.0</u>
Corrected Reading: <u>10.00</u>	Corrected Reading: <u>10.0</u>
% Slope: <u>98.8</u>	% Slope: <u>98.9</u>
ADDITIONAL Reading -15 Sec: <u>7.48</u>	ADDITIONAL Reading -15 Sec: <u>7.53</u>
STANDARD Reading - 1 Min: <u>7.65</u>	STANDARD Reading - 1 Min: <u>7.54</u>

NOTES: _____

DATE: 04-21-94 TIME: 0647 BY: CR DATE: 04/21/94 TIME: 0815 BY: MKB

Buffer Temp: <u>21.4°C</u>	Buffer Temp: <u>21.1</u>
pH 7.0 BUFFER Initial Reading: <u>7.01</u>	pH 7.0 BUFFER Initial Reading: <u>7.00</u>
Corrected Reading: <u>7.00</u>	Corrected Reading: <u>7.00</u>
pH 4.0/ <u>10.0</u> BUFFER Initial Reading: <u>10.00</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>9.99</u>
Corrected Reading: <u>10.00</u>	Corrected Reading: <u>10.00</u>
% Slope: <u>98.6%</u>	% Slope: <u>98.9%</u>
ADDITIONAL Reading -15 Sec: <u>7.25</u>	ADDITIONAL Reading -15 Sec: <u>7.77</u>
STANDARD Reading - 1 Min: <u>7.40</u>	STANDARD Reading - 1 Min: _____

NOTES: _____

DATE: 4/21/94 TIME: 1440 BY: TS DATE: 04-22-94 TIME: 0725 BY: CR

Buffer Temp: <u>22.1</u>	Buffer Temp: <u>22.1°C</u>
pH 7.0 BUFFER Initial Reading: <u>7.01</u>	pH 7.0 BUFFER Initial Reading: <u>7.01</u>
Corrected Reading: <u>7.0</u>	Corrected Reading: <u>7.00</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>9.99</u>	pH 4.0/ <u>10.0</u> BUFFER Initial Reading: <u>9.99</u>
Corrected Reading: <u>10.0</u>	Corrected Reading: <u>10.00</u>
% Slope: <u>98.7</u>	% Slope: <u>99.9%</u>
ADDITIONAL Reading -15 Sec: <u>7.61</u>	ADDITIONAL Reading -15 Sec: <u>7.51</u>
STANDARD Reading - 1 Min: <u>7.62</u>	STANDARD Reading - 1 Min: <u>7.56</u>

NOTES: _____

DATE: 04-22-94 TIME: 1136 BY: CR DATE: 4-23-94 TIME: 0715 BY: CRK

Buffer Temp: <u>21.7°C</u>	Buffer Temp: <u>20.2</u>
pH 7.0 BUFFER Initial Reading: <u>6.99</u>	pH 7.0 BUFFER Initial Reading: <u>7.01</u>
Corrected Reading: <u>7.00</u>	Corrected Reading: <u>7.00</u>
pH 4.0/ <u>10.0</u> BUFFER Initial Reading: <u>9.97</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>10.01</u>
Corrected Reading: <u>10.00</u>	Corrected Reading: <u>10.00</u>
% Slope: <u>98.6%</u>	% Slope: <u>99.3</u>
ADDITIONAL Reading -15 Sec: <u>7.52</u>	ADDITIONAL Reading -15 Sec: <u>7.65</u>
STANDARD Reading - 1 Min: <u>7.56</u>	STANDARD Reading - 1 Min: <u>7.88</u>

NOTES: _____

DATE: 04-23-94 TIME: 1147 BY: CR DATE: 04-24-94 TIME: 0700 BY: CR

Buffer Temp: <u>21.8°C</u>	Buffer Temp: <u>21.5°C</u>
pH 7.0 BUFFER Initial Reading: <u>7.00</u>	pH 7.0 BUFFER Initial Reading: <u>7.00</u>
Corrected Reading: <u>7.00</u>	Corrected Reading: <u>7.00</u>
pH 4.0/ <u>10.0</u> BUFFER Initial Reading: <u>9.98</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>10.01</u>
Corrected Reading: <u>10.00</u>	Corrected Reading: <u>10.00</u>
% Slope: <u>98.6%</u>	% Slope: <u>98.7%</u>
ADDITIONAL Reading -15 Sec: <u>7.92</u>	ADDITIONAL Reading -15 Sec: <u>7.86</u>
STANDARD Reading - 1 Min: <u>7.81</u>	STANDARD Reading - 1 Min: <u>7.98</u>

NOTES: _____

pH METER STANDARDIZATION

31

METER ID: #3 543347

DATE: <u>4-10-94</u> TIME: <u>1011</u> BY: <u>GKK</u>	DATE: <u>4-10-94</u> TIME: <u>1135</u> BY: <u>TS</u>
Buffer Temp: <u>24.3</u>	Buffer Temp: <u>25.2</u>
pH 7.0 BUFFER Initial Reading: <u>7.0</u>	pH 7.0 BUFFER Initial Reading: <u>7.0</u>
Corrected Reading: <u>7.0</u>	Corrected Reading: <u>7.0</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u>
Corrected Reading: <u>4.0</u>	Corrected Reading: <u>4.0</u>
% Slope: <u>98.5%</u>	% Slope: <u>98.5</u>
ADDITIONAL Reading -15 Sec: <u>7.9</u>	ADDITIONAL Reading -15 Sec: <u>7.5</u>
STANDARD Reading - 1 Min: <u>8.1</u>	STANDARD Reading - 1 Min: <u>7.6</u>
NOTES: <u>used within 1 hr of standardization.</u>	

DATE: <u>4-11-94</u> TIME: <u>0720</u> BY: <u>MAB</u>	DATE: <u>4-11-94</u> TIME: <u>1055</u> BY: <u>GKK</u>
Buffer Temp: <u>24.1</u>	Buffer Temp: <u>24.1</u>
pH 7.0 BUFFER Initial Reading: <u>7.0</u>	pH 7.0 BUFFER Initial Reading: <u>7.0</u>
Corrected Reading: <u>7.0</u>	Corrected Reading: <u>7.0</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u>
Corrected Reading: <u>4.0</u>	Corrected Reading: <u>4.0</u>
% Slope: <u>98.5</u>	% Slope: <u>98.5%</u>
ADDITIONAL Reading -15 Sec: <u>7.4</u>	ADDITIONAL Reading -15 Sec: <u>7.4</u>
STANDARD Reading - 1 Min: <u>7.6</u>	STANDARD Reading - 1 Min: <u>7.5</u>
NOTES:	

DATE: <u>4-12-94</u> TIME: <u>0810</u> BY: <u>MAB</u>	DATE: <u>4-12-94</u> TIME: <u>1001</u> BY: <u>GKK</u>
Buffer Temp: <u>heated to 25.0°C</u>	Buffer Temp: <u>23.9</u>
pH 7.0 BUFFER Initial Reading: <u>7.0</u>	pH 7.0 BUFFER Initial Reading: <u>7.0</u>
Corrected Reading: <u>7.0</u>	Corrected Reading: <u>7.0</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u>
Corrected Reading: <u>4.0</u>	Corrected Reading: <u>4.0</u>
% Slope: <u>97.5%</u>	% Slope: <u>97.5%</u>
ADDITIONAL Reading -15 Sec: <u>6.9 8.0</u>	ADDITIONAL Reading -15 Sec: <u>7.5</u>
STANDARD Reading - 1 Min: <u>8.1</u>	STANDARD Reading - 1 Min: <u>7.7</u>
NOTES:	

DATE: <u>4-13-94</u> TIME: <u>1345</u> BY: <u>JPP</u>	DATE: <u>4-14-94</u> TIME: <u>1205</u> BY: <u>JPP</u>
Buffer Temp: <u>23.6°C</u>	Buffer Temp: <u>24.0°C</u>
pH 7.0 BUFFER Initial Reading: <u>7.0</u>	pH 7.0 BUFFER Initial Reading: <u>6.95</u>
Corrected Reading: <u>7.0</u>	Corrected Reading: <u>7.00</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>3.98</u>
Corrected Reading: <u>4.0</u>	Corrected Reading: <u>4.00</u>
% Slope: <u>97.5%</u>	% Slope: <u>97.5%</u>
ADDITIONAL Reading -15 Sec: <u>7.0</u>	ADDITIONAL Reading -15 Sec: <u>7.60</u>
STANDARD Reading - 1 Min: <u>7.5</u>	STANDARD Reading - 1 Min: <u>7.80</u>
NOTES: <u>cleaned probe</u>	

DATE: <u>4-15-94</u> TIME: <u>1020</u> BY: <u>MAB</u>	DATE: <u>4-16-94</u> TIME: <u>1200</u> BY: <u>JPP</u>
Buffer Temp: <u>24.5</u>	Buffer Temp: <u>22.1°C</u>
pH 7.0 BUFFER Initial Reading: <u>7.10</u>	pH 7.0 BUFFER Initial Reading: <u>6.9</u>
Corrected Reading: <u>7.00</u>	Corrected Reading: <u>7.0</u>
pH 4.0/10.0 BUFFER Initial Reading: <u>4.00</u>	pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u>
Corrected Reading: <u>4.00</u>	Corrected Reading: <u>4.0</u>
% Slope: <u>97.5%</u>	% Slope: <u>97.5%</u>
ADDITIONAL Reading -15 Sec: <u>7.40</u>	ADDITIONAL Reading -15 Sec: <u>7.70</u>
STANDARD Reading - 1 Min: <u>7.60</u>	STANDARD Reading - 1 Min: <u>7.85</u>
NOTES:	

PH METER STANDARDIZATION

32

METER ID: # 3 543347

===== DATE: <u>4-16-94</u> TIME: <u>1430</u> BY: <u>GKK</u> DATE: <u>4-18-94</u> TIME: <u>1158</u> BY: <u>UFB</u>			
Buffer Temp: <u>23.9</u> pH 7.0 BUFFER Initial Reading: <u>7.0</u> Corrected Reading: <u>7.0</u> pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u> Corrected Reading: <u>4.0</u> % Slope: <u>97.5%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>7.8</u> Reading - 1 Min: <u>8.0</u> NOTES: _____	Buffer Temp: <u>25.0°C</u> pH 7.0 BUFFER Initial Reading: <u>7.0</u> Corrected Reading: <u>7.0</u> pH 4.0/10.0 BUFFER Initial Reading: <u>3.95</u> Corrected Reading: <u>4.00</u> % Slope: <u>98%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>10.90</u> Reading - 1 Min: <u>7.25</u> NOTES: <u>used within one hr of standardization / cleaning probe out</u>		
=====			
DATE: <u>4-19-94</u> TIME: <u>0942</u> BY: <u>UFB</u> DATE: <u>4-19-94</u> TIME: <u>1150</u> BY: <u>TS</u>			
Buffer Temp: <u>heated to 25.0°C</u> pH 7.0 BUFFER Initial Reading: <u>7.00</u> Corrected Reading: <u>7.00</u> pH 4.0/10.0 BUFFER Initial Reading: <u>4.00</u> Corrected Reading: <u>4.00</u> % Slope: <u>98.0%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>7.95</u> Reading - 1 Min: <u>7.95</u> NOTES: _____	Buffer Temp: <u>22.4°</u> pH 7.0 BUFFER Initial Reading: <u>7.0</u> Corrected Reading: <u>7.0</u> pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u> Corrected Reading: <u>4.0</u> % Slope: <u>98%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>8.0</u> Reading - 1 Min: <u>8.0</u> NOTES: _____		
=====			
DATE: <u>4-20-94</u> TIME: <u>1034</u> BY: <u>GKK</u> DATE: <u>4-21-94</u> TIME: <u>0821</u> BY: <u>UFB</u>			
Buffer Temp: <u>22.0</u> pH 7.0 BUFFER Initial Reading: <u>7.0</u> Corrected Reading: <u>7.0</u> pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u> Corrected Reading: <u>4.0</u> % Slope: <u>98%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>7.4</u> Reading - 1 Min: <u>7.5</u> NOTES: <u>Used within 1 hr of standardization</u>	Buffer Temp: <u>heated to 25°C</u> pH 7.0 BUFFER Initial Reading: <u>7.0</u> Corrected Reading: <u>7.0</u> pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u> Corrected Reading: <u>4.0</u> % Slope: <u>98%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>7.3</u> Reading - 1 Min: <u>7.5</u> NOTES: _____		
=====			
DATE: <u>4-21-94</u> TIME: <u>1040</u> BY: <u>GKK</u> DATE: <u>4-22-94</u> TIME: <u>100950</u> BY: <u>GKK</u>			
Buffer Temp: <u>22.5</u> pH 7.0 BUFFER Initial Reading: <u>7.0</u> Corrected Reading: <u>7.0</u> pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u> Corrected Reading: <u>4.0</u> % Slope: <u>98%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>7.4</u> Reading - 1 Min: <u>7.5</u> NOTES: _____	Buffer Temp: <u>21.8</u> pH 7.0 BUFFER Initial Reading: <u>7.0</u> Corrected Reading: <u>7.0</u> pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u> Corrected Reading: <u>4.0</u> % Slope: <u>98%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>7.7</u> Reading - 1 Min: <u>7.8</u> NOTES: _____		
=====			
DATE: <u>4-23-94</u> TIME: <u>015</u> BY: <u>GKK</u> DATE: <u>4-24-94</u> TIME: <u>0716</u> BY: <u>GKK</u>			
Buffer Temp: <u>Warm to 25.0°C</u> pH 7.0 BUFFER Initial Reading: <u>7.0</u> Corrected Reading: <u>7.0</u> pH 4.0/10.0 BUFFER Initial Reading: <u>4.0</u> Corrected Reading: <u>4.0</u> % Slope: <u>98%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>7.7</u> Reading - 1 Min: <u>7.9</u> NOTES: <u>Used within 1 hr of standardization</u>	Buffer Temp: <u>22.1</u> pH 7.0 BUFFER Initial Reading: <u>7.0</u> Corrected Reading: <u>7.0</u> pH 4.0/10.0 BUFFER Initial Reading: <u>3.9</u> Corrected Reading: <u>4.0</u> % Slope: <u>99%</u> ADDITIONAL STANDARD Reading -15 Sec: <u>7.8</u> Reading - 1 Min: <u>7.9</u> NOTES: _____		

DO METER STANDARDIZATION

METER ID: #1 531087

DATE: 04-14-94 TIME: 0905 BY: JPP
 INITIAL READING: 7.4
 WATER TEMP: 21.7 °C
 WINKLER #1: 7.4 #2: 7.4
 X: 7.4
 CORRECTED READING: 7.4

DATE: 04-14-94 TIME: 1510 BY: CR
 INITIAL READING: 7.8
 WATER TEMP: 21.8 °C
 WINKLER #1: 7.8 #2: 7.8
 X: 7.8
 CORRECTED READING: 7.8

NOTES: used within one hour

DATE: 4-15-94 TIME: 0900 BY: DJS
 INITIAL READING: 7.9
 WATER TEMP: 22.3
 WINKLER #1: 7.9 #2: 8.0
 X: 7.95
 CORRECTED READING: 8.7.9
015 4-15-94

DATE: 04-15-94 TIME: 1405 BY: CR
 INITIAL READING: 7.8
 WATER TEMP: 21.4 °C
 WINKLER #1: 7.8 #2: 7.9
 X: 7.85
 CORRECTED READING: 7.8

NOTES:

DATE: 4-16-94 TIME: 0758 BY: GKL
 INITIAL READING: 7.5
 WATER TEMP: 21.3
 WINKLER #1: 7.4 #2: 7.5
 X: 7.45
 CORRECTED READING: 7.5

DATE: 04-16-94 TIME: 1743 BY: CR
 INITIAL READING: 7.0
 WATER TEMP: 22.1 °C
 WINKLER #1: 7.0 #2: 7.1
 X: 7.05
 CORRECTED READING: 7.0

NOTES:

DATE: 4-17-94 TIME: 0930 BY: JPP
 INITIAL READING: 7.9
 WATER TEMP: 22.1
 WINKLER #1: 7.9 #2: 8.0
 X: 7.95
 CORRECTED READING: 7.9

DATE: 4-17-94 TIME: 1335 BY: DJS
 INITIAL READING: 7.9
 WATER TEMP: 22.1
 WINKLER #1: 8.0 #2: 7.9
 X: 7.95
 CORRECTED READING: 7.9

NOTES:

DATE: 04/17/94 TIME: 0900 BY: TS
 INITIAL READING: 7.5
 WATER TEMP: 21.9
 WINKLER #1: 7.6 #2: 7.5
 X: 7.55
 CORRECTED READING: 7.5

DATE: 4/18/94 TIME: 1340 BY: TS
 INITIAL READING: 7.5
 WATER TEMP: 22.1
 WINKLER #1: 7.6 #2: 7.6
 X: 7.6
 CORRECTED READING: 7.6

NOTES:

DO METER STANDARDIZATION

40

METER ID: #1 531047

DATE: 4/19/94 TIME: 0900 BY: TS
INITIAL READING: 8.0
WATER TEMP: 21.9
WINKLER #1: 7.9 #2: 8.1
X: 8.0
CORRECTED READING: 8.0

DATE: 4/19/94 TIME: 1340 BY: TS
INITIAL READING: 7.8
WATER TEMP: 21.6
WINKLER #1: 7.9 #2: 7.9
X: 7.9
CORRECTED READING: 7.9

NOTES: _____

DATE: 4-20-94 TIME: 0720 BY: GKK
INITIAL READING: 7.9
WATER TEMP: 21.3
WINKLER #1: 7.9 #2: 7.9
X: 7.9
CORRECTED READING: 7.9

DATE: 4/20/94 TIME: 1425 BY: TS
INITIAL READING: 7.6
WATER TEMP: 21.8
WINKLER #1: 7.6 #2: 7.5
X: 7.55
CORRECTED READING: 7.5

NOTES: _____

DATE: 04-21-94 TIME: 0702 BY: ux
INITIAL READING: 7.6
WATER TEMP: 21.5°C
WINKLER #1: 7.6 #2: 7.5
X: 7.55
CORRECTED READING: 7.6

DATE: 4/21/94 TIME: 1420 BY: TS
INITIAL READING: 7.4
WATER TEMP: 21.9
WINKLER #1: 7.4 #2: 7.4
X: 7.4
CORRECTED READING: 7.4

NOTES: _____

DATE: 4-22-94 TIME: 7:04 BY: OH
INITIAL READING: 7.5
WATER TEMP: 22.0°C
WINKLER #1: 7.4 #2: 7.5
X: 7.45
CORRECTED READING: 7.5

DATE: 4/22/94 TIME: 1040 BY: TS
INITIAL READING: 7.3
WATER TEMP: 21.6
WINKLER #1: 7.3 #2: 7.4
X: 7.35
CORRECTED READING: 7.3

NOTES: _____

DATE: 4-23-94 TIME: 16:56 BY: 1014
INITIAL READING: 7.2
WATER TEMP: 21.1
WINKLER #1: 7.2 #2: 7.3
X: 7.25
CORRECTED READING: 7.2

DATE: 04-23-94 TIME: 1150 BY: ux
INITIAL READING: 7.1
WATER TEMP: 21.5°C
WINKLER #1: 7.2 #2: 7.1
X: 7.15
CORRECTED READING: 7.1

NOTES: _____

CONDUCTIVITY METER STANDARDIZATION

48

METER ID: 3 577780DATE: 4-11-94 TIME: 0705 BY: MAH DATE: 4-11-94 TIME: 1056 BY: GKK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 24.1
METER READING 198
720 μ MHo STD. TEMP 24.1
METER READING 719

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 23.6
METER READING 200
720 μ MHo STD. TEMP 23.6
METER READING 720

NOTES: _____

DATE: 4-12-94 TIME: 0724 BY: GKK DATE: 4-12-94 TIME: 1024 BY: GKK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 23.8
METER READING 200
720 μ MHo STD. TEMP 23.8
METER READING 726

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 23.8
METER READING 199
720 μ MHo STD. TEMP 23.9
METER READING 724

NOTES: _____

DATE: 4-13-94 TIME: 0726 BY: GKK DATE: 4-13-94 TIME: 0910 BY: MAH

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 23.5
METER READING 199
720 μ MHo STD. TEMP 23.5
METER READING 723

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP _____
METER READING _____
720 μ MHo STD. TEMP _____
METER READING _____

NOTES: Used within 1 hr.DATE: 4-14-94 TIME: 0925 BY: JPP DATE: 4-15-94 TIME: 0906 BY: DT5

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 23.2
METER READING 199
720 μ MHo STD. TEMP 23.2
METER READING 721

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 23.7
METER READING 198
720 μ MHo STD. TEMP 23.7
METER READING 719

NOTES: used within one hourDATE: 4-15-94 TIME: 1325 BY: MAH DATE: 4-16-94 TIME: 0755 BY: GKK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 23.1
METER READING 199
720 μ MHo STD. TEMP 23.2
METER READING 721

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 21.3
METER READING 199
720 μ MHo STD. TEMP 21.8
METER READING 721

NOTES: _____

CONDUCTIVITY METER STANDARDIZATION

49

METER ID: #3 577780DATE: 04-16-94 TIME: 1710 BY: CUE

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 23.4°C
METER READING 200 nAos
720 μ MHo STD. TEMP 23.6°C
METER READING 717 nAos

NOTES: _____

DATE: 04-17-94 TIME: 0840 BY: JPP

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.7°C
METER READING 202
720 μ MHo STD. TEMP 22.7°C
METER READING 722

DATE: 04-17-94 TIME: 1305 BY: CUE

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.3°C
METER READING 200 nAos
720 μ MHo STD. TEMP 22.4°C
METER READING 729 nAos

NOTES: _____

DATE: 4/18/94 TIME: 0900 BY: TS

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.8°
METER READING 199
720 μ MHo STD. TEMP 23.0°
METER READING 727

DATE: 4/18/94 TIME: 1400 BY: TS

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 21.6°
METER READING 201
720 μ MHo STD. TEMP 21.8°
METER READING 731

NOTES: _____

DATE: 4.19.94 TIME: 0905 BY: MSS

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 21.8
METER READING 196
720 μ MHo STD. TEMP 21.8
METER READING 712

DATE: 4/19/94 TIME: 1350 BY: TS

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.2°
METER READING 198
720 μ MHo STD. TEMP 22.0
METER READING 724

NOTES: _____

DATE: 4-20-94 TIME: 0744 BY: GHC

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 21.9
METER READING 200
720 μ MHo STD. TEMP 21.8
METER READING 725

DATE: 4-20-94 TIME: 1420 BY: YS

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 23.6
METER READING 200
720 μ MHo STD. TEMP 23.6
METER READING 722

NOTES: _____

DATE: 04-21-94 TIME: 0645 BY: CUE

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.5°C
METER READING 199 nAos
720 μ MHo STD. TEMP 22.4°C
METER READING 718 nAos

CONDUCTIVITY METER STANDARDIZATION

50

METER ID: #3 577780DATE: 4/21/94 TIME: 1435 BY: TS

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.4
METER READING 201
720 μ MHo STD. TEMP 22.4
METER READING 730

NOTES: _____

DATE: 04-22-94 TIME: 0730 BY: CK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 21.8°C
METER READING 200 mhos
720 μ MHo STD. TEMP 22.0°C
METER READING 718 mhos

DATE: 4/22/94 TIME: 1075 BY: TS

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 21.8°C
METER READING 200
720 μ MHo STD. TEMP 22.7°C
METER READING 725

NOTES: _____

DATE: 4-23-94 TIME: 0719 BY: BKK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 21.7
METER READING 200
720 μ MHo STD. TEMP 21.7
METER READING 724

DATE: 04-23-94 TIME: 1145 BY: CK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.6°C
METER READING 200 mhos
720 μ MHo STD. TEMP 22.8°C
METER READING 718 mhos

NOTES: _____

DATE: 04-24-94 TIME: 0655 BY: CK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.6°C
METER READING 199 mhos
720 μ MHo STD. TEMP 22.8°C
METER READING 725 mhos

DATE: 04-24-94 TIME: 1050 BY: CK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 21.4°C
METER READING 200 mhos
720 μ MHo STD. TEMP 21.5°C
METER READING 721 mhos

NOTES: _____

DATE: 4-25-94 TIME: 7:46 BY: OK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.5
METER READING 200
720 μ MHo STD. TEMP 23.0
METER READING 725

DATE: 04-25-94 TIME: 1245 BY: CK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.9°C
METER READING 199 mhos
720 μ MHo STD. TEMP 22.8°C
METER READING 722 mhos

NOTES: _____

DATE: 04-26-94 TIME: 0750 BY: CK

75 μ MHo STD. TEMP _____
METER READING _____
200 μ MHo STD. TEMP 22.9°C
METER READING 198 mhos
720 μ MHo STD. TEMP 23.1°C
METER READING 720 mhos

ATTACHMENT IV

CR-ERP AMBIENT WATER TOXICITY STUDY
Reference Toxicant Test Information

TTL CHRONIC TOXICITY TEST MASTER CHECKLIST

CL # 0063Study: CuSO₄ Ref ToxTest Dates: 4-5-94 - 4-12-94Date Issued: 4-5-94 To: JPP/TCSReport Due: ASAP By: CLR

1. Test organism availability: FH Minnows-T.L.* JPP C.U.* TS Date 3-30-94
Daphnids - T.L. JPP C.U. MRS Date 3-30-94 Jm
2. Sample Collection Coordination: Date N/A By — With —
3. Glassware availability: T.L. JPP Tech. EEP Date 3-30-94
4. Glassware prep. complete: Date 3-30-94 By JPP
5. Data Sheet prep. complete: Date 4-4-94 By JPP
6. Test organism availability verification: FH-OK? ✓ Daphnids-OK? ✓
7. Culture Medium Availability: Date 4-4-94 By JPP With MRS
8. FH Minnow acclimation:
Day 1 2
By N/A N/A
9. Test Initiation: FH-Date/Time 4-5-94/0915 Daphnid-Date/Time 4-5-94/1015
Initial FH Sample TS
10. Daily:
- | Day #: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------------------|------------|---------------|------------|------------|------------|------------|------------|------------|
| Initial Chem. - T.L. | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>—</u> |
| T.M.* <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>—</u> |
| Final Chem. - T.L. | <u>—</u> | <u>—</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> |
| T.M. | <u>—</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> |
| F.H. - T.L. | <u>JPP</u> | <u>GKK</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> | <u>JPP</u> |
| T.M. | <u>TS</u> | <u>TS/GKK</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> | <u>TS</u> |
| Daphnid - T.L. | <u>JPP</u> | <u>OS</u> | <u>OS</u> | <u>OS</u> | <u>OS</u> | <u>OS</u> | <u>DRH</u> | <u>—</u> |
| T.M. | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> |
| Log Samples - T.L. | <u>N/A</u> | <u>N/A</u> | <u>N/A</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> |
| T.M. | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> | <u>—</u> |
11. Test Termination: FH-Date/Time 4-12-94/0815 Daphnid-Date/Time 4-11-94/1035
Clean-up, By: JPP
12. Weigh Fish: Date — By —
13. Run Stats: Date 04-20-94 By CLR
04-14-94 By CLR
Control chart
Date 04-14-94 By CLR
File 04-20-94
14. Report Prep.: Assigned To CLR Date 04-14-94 By CLR
15. Report Final: Date 4-14-94 By — Approved: —

*Team Leader †Culture Unit #Team Member

PLARC501-1266(1)(Rev 12/93)

Chronic Reference Toxicant Record Sheet

Study Cu Ref Tox (April)
 Test Organism Fathead
 Beginning Date/Time 4-5-94 / 0915
 Ending Date/Time 4/12/94 / 0935
 Personnel Sesler, Posey

Toxicant Copper
 Source EPA
 Lot # 188
 Concentration 50 mg/ml

Stock Concentration(s) 0.3 mg/l, 0.9, 2.4, 6.0, 15.0
0.001, 0.003, 0.008, 0.0 JP 4-12-94
 Test Concentrations Control, 0.001, 0.003, 0.008, 0.02, 0.05 mg/l
 Dilution Water F-Med

Spawn Date	Tile #	Hatch Date
3/31 17, 18, 20, 24, 21, 28	4/1 12, 14, 17, 20, 23, 24, 25, 26	4/4 AF 0935
		BF 0703 4/5

Test # 54
 NOEC 0.003
 LOEC 0.008

Notes:
 $IC_{25} \Rightarrow 0.0074$

Study Cu Ref tox

Ending Date/Time 4/12/94; 0935

Personnel

Page 1 of 2
Renard, Sister
Casey

-- Number Alive --

Notes:

Notes:

Notes:

Notes:

Notes:

Renewal Time:

Fed- Time/By:

Dilution Water ID:

Reviewed By:

[illegible]

Study Cu Reflex

Ending Date/Time 4-12-94/0935

Personnel

Page 2 of 2
Kind, Sister
Posey

-- Number Alive --

Notes:

Notes:

+ - one non-feeder died

Notes:

Notes:

Notes:

Renewal Time:

Fed- Time/By:

Dilution Water ID:

Reviewed By:

<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
JPP	JPP	JPP	JPP	JPP	JPP	JPP

04-14-94 Cur

Analysis of Survival

REFTOX #54
Starting Date: 04/05/94

Survival (%) Data

Treatment.	Replicate										Mean
	1	2	3	4	5	6	7	8	9	10	
CONTROL	0.90	1.00	1.00	1.00	.	.	.	.	.	.	0.98
0.001	1.00	0.90	1.00	1.00	.	.	.	.	.	.	0.98
0.003	1.00	1.00	1.00	1.00	.	.	.	.	.	.	1.00
0.008	0.90	0.90	1.00	1.00	.	.	.	.	.	.	0.95
0.02	0.50	1.00	0.80	0.70	.	.	.	.	.	.	0.75
0.05	0.30	0.20	0.40	0.40	.	.	.	.	.	.	0.32
MB	1.00	0.90	1.00	1.00	.	.	.	.	.	.	0.98

Steel's Many-One Rank Test

Treatment	No. of Replicates	Critical Rank Sum	Rank Sum*
0.001	4	10	18.0
0.003	4	10	20.0
0.008	4	10	16.0
0.02	4	10	12.5
0.05	4	10	10.0 *
MB	4	10	18.0

* Values less than Critical Rank Sum significantly less than the control (CONTROL).

Non-parametric analysis of toxicity data

2

2:41 Thursday, March 26, 1992

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MINS TEST=STEEL -----

OBS	TREATMENT	N CONTROL	N EFFLUENT	RANK SUM	CRITICAL RANK SUM	SIGNIFICANT DIFFERENCE
1	0.001	4	4	18.0	10	
2	0.003	4	4	20.0	10	
3	0.008	4	4	16.0	10	
4	0.02	4	4	12.5	10	
5	0.05	4	4	10.0	10	*
6	MB	4	4	18.0	10	

1.

2:41 Thursday, March 26, 1992

OBS	S	T	D	P	C	Y	R	C	M	C	M	N	N	T	R	T	S	T	N	R	T	S	U
1	REFTOX	#54	040594	MINS	2	0	10	4	4	4	4	4	4	6	6	STEEL	1	0.001	18.0				
2	REFTOX	#54	040594	MINS	2	0	10	4	4	4	4	4	6	6	STEEL	2	0.001	18.0					
3	REFTOX	#54	040594	MINS	3	0	10	4	4	4	4	4	6	6	STEEL	1	0.003	16.0					
4	REFTOX	#54	040594	MINS	3	0	10	4	4	4	4	4	6	6	STEEL	3	0.003	20.0					
5	REFTOX	#54	040594	MINS	4	0	10	4	4	4	4	4	6	6	STEEL	1	0.008	20.0					
6	REFTOX	#54	040594	MINS	4	0	10	4	4	4	4	4	6	6	STEEL	4	0.008	16.0					
7	REFTOX	#54	040594	MINS	5	0	10	4	4	4	4	4	6	6	STEEL	1	0.02	23.5					
8	REFTOX	#54	040594	MINS	5	0	10	4	4	4	4	4	6	6	STEEL	5	0.02	12.5					
9	REFTOX	#54	040594	MINS	6	0	10	4	4	4	4	4	6	6	STEEL	1	0.05	26.0					
10	REFTOX	#54	040594	MINS	6	0	10	4	4	4	4	4	6	6	STEEL	6	0.05	10.0					
11	REFTOX	#54	040594	MINS	7	0	10	4	4	4	4	4	6	6	STEEL	1	MB	18.0					
12	REFTOX	#54	040594	MINS	7	0	10	4	4	4	4	4	6	6	STEEL	7	MB	18.0					

Tests of assumptions for survival data (arcsine transformed) . 1.

TEST FOR NORMAL DISTRIBUTION

2:37 Thursday, March 26, 1992

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MINS -----

UNIVARIATE PROCEDURE

Variable=CENTER

Moments

N	28	Sum Wgts	28
Mean	0	Sum	0
Std Dev	0.109738	Variance	0.012042
Skewness	0.228725	Kurtosis	3.457262
USS	0.325146	CSS	0.325146
CV	.	Std Mean	0.020739
T:Mean=0	0	Prob> T	1.0000
Sgn Rank	1	Prob> S	0.9779
Num ^= 0	24		
W:Normal	0.88198	Prob<W	0.0041

Quantiles(Def=5)

100% Max	0.338086	99%	0.338086
75% Q3	0.040743	95%	0.081538
50% Med	0.036981	90%	0.081538
25% Q1	-0.08149	10%	-0.12223
0% Min	-0.28853	5%	-0.13953
		1%	-0.28853
Range	0.626618		
Q3-Q1	0.122228		
Mode	0.040743		

Extremes

Lowest	Obs	Highest	Obs
-0.28853(	41)	0.081485(	33)
-0.13953(	52)	0.081485(	34)
-0.12223(	62)	0.081538(	53)
-0.12223(	12)	0.081538(	54)
-0.12223(	1)	0.338086(	42)

Missing Value	.
Count	42
% Count/Nobs	60.00

Tests of assumptions for survival data (arcsine transformed)

2

TEST FOR NORMAL DISTRIBUTION

2:37 Thursday, March 26, 1992

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MINS -----

UNIVARIATE PROCEDURE

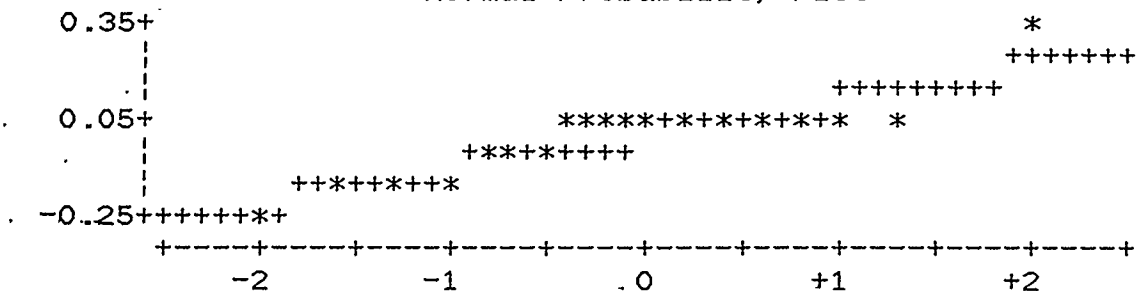
/variable=CENTER

Stem Leaf	#	Boxplot
3 4	1	0
2		
1		
0 000034444444448888	18	+---+---+
-0 8882	4	+-----+
-1 4222	4	
-2 9	1	0

-----+-----+-----+-----+

Multiply Stem.Leaf by 10**-1

Normal Probability Plot

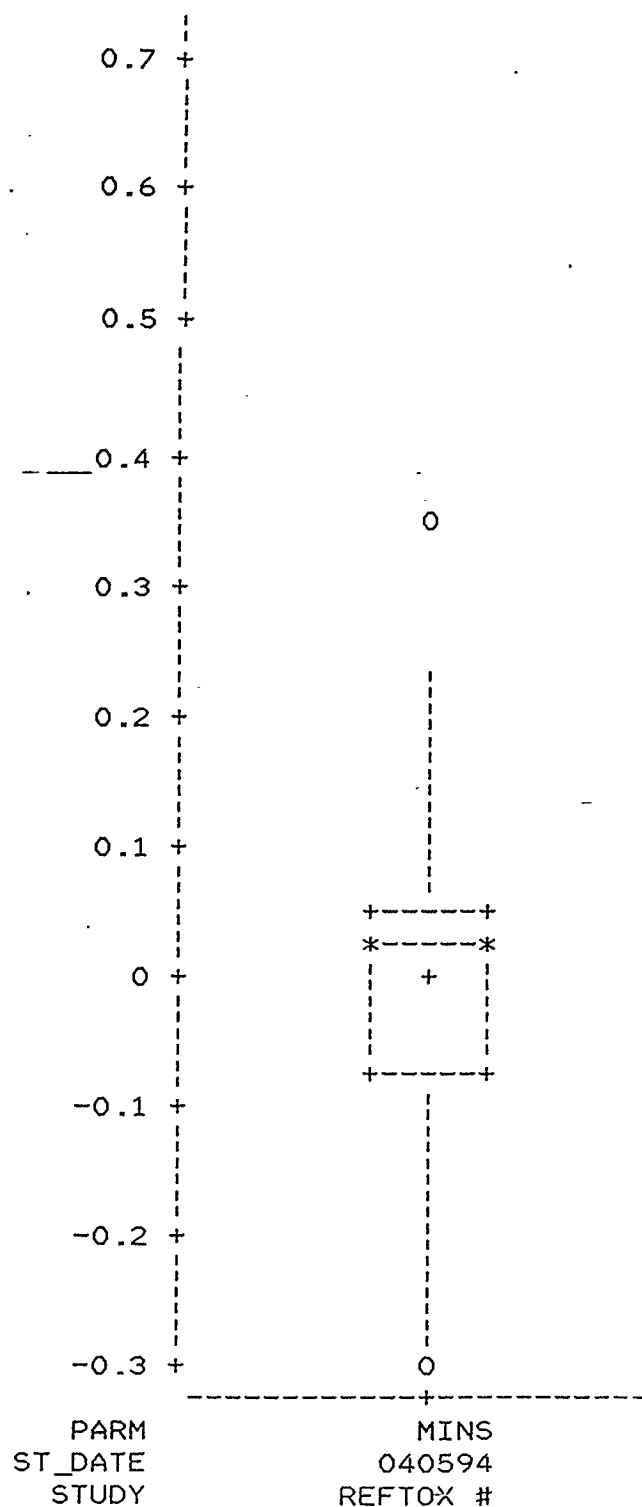


TEST FOR NORMAL DISTRIBUTION

2:37 Thursday, March 26, 1992

UNIVARIATE PROCEDURE
Schematic Plots

/variable=CENTER



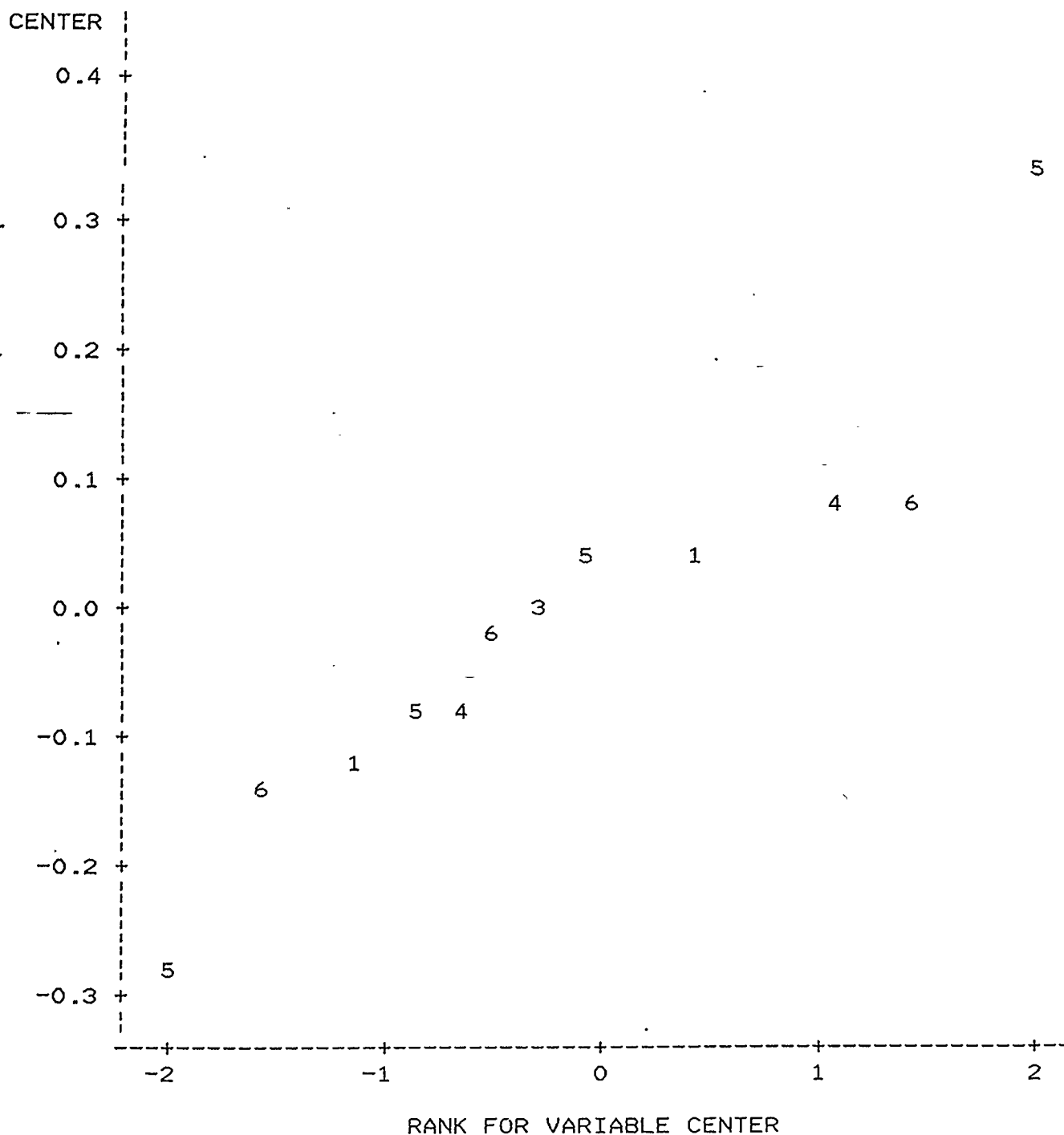
Tests of assumptions for survival data (arcsine transformed)
TEST FOR NORMAL DISTRIBUTION

4

2:37 Thursday, March 26, 1992

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MINS -----

Plot of CENTER*RANKIT. Symbol is value of TRT_NO.



NOTE: 42 obs had missing values. 16 obs hidden.

Tests of assumptions for survival data (arcsine transformed)
 TEST FOR NORMAL DISTRIBUTION

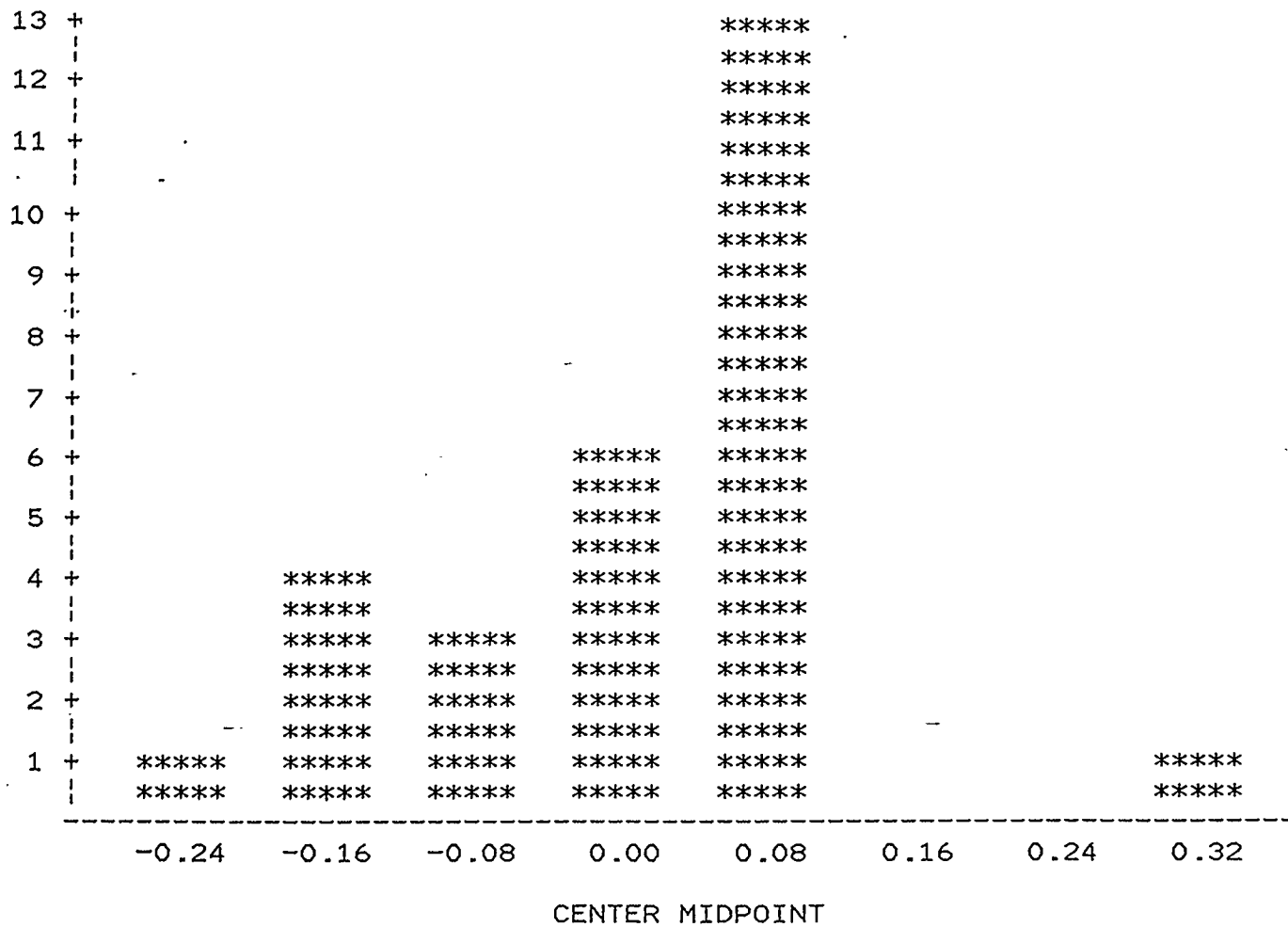
5

2:37 Thursday, March 26, 1992

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MINS -----

FREQUENCY OF CENTER

FREQUENCY



Tests of assumptions for survival data (arcsine transformed)6
TEST FOR NORMAL DISTRIBUTION

..2:37.Thursday, March 26, 1992.

VARIANCE EQUAL TO ZERO FOR ONE OR MORE TREATMENTS
BARTLETT'S TEST CAN NOT BE CALCULATED

LEVENE'S TEST WILL BE USED

Tests of assumptions for survival data (arcsine transformed)
LEVENE'S TEST FOR HOMOGENEITY OF VARIANCE

.7...

2:37 Thursday, March 26, 1992

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MINS -----

General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	7	0.001 0.003 0.008 0.02 0.05 CONTROL MB

Number of observations in by group = 70

NOTE: Due to missing values, only 28 observations can be used in this analysis...

Tests of assumptions for survival data (arcsine transformed) . . . 8 .
 LEVENE'S TEST FOR HOMOGENEITY OF VARIANCE
 2:37 Thursday, March 26, 1992

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MINS -----

General Linear Models Procedure

Dependent Variable: ABS_VAL

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	0.07410088	0.01235015	2.90	0.0319
Error	21	0.08930704	0.00425272		
Corrected Total	27	0.16340792			

R-Square	C.V.	Root MSE	ABS_VAL Mean
0.453472	85.80363	0.065213	0.07600244

Source	DF	Type I SS	Mean Square	F Value	Pr > F
RT	6	0.07410088	0.01235015	2.90	0.0319

Source	DF	Type III SS	Mean Square	F Value	Pr > F
RT	6	0.07410088	0.01235015	2.90	0.0319

FATHEAD DRY WEIGHT RECORD SHEET

Study/Date: CU REF TOX APR 1994

Personnel TS

Pans:Date/Time of Drying: 04-12-94;0700

Fish:Date/Time of Drying: 04-13-94;0800

Pans:Date/Time of Weighing: 04-12-94;1050

Fish:Date/Time of Weighing: 04-13-94;1000

=====								
Sample ID	Tare Wt.	Tare + Fish Wt.	Fish Wt.	# Fish	Mean Wt. grams	Mean Wt. Difference	Mean Wt. mg	

Initial	1.	1.11586	1.11636	0.00050	10	0.000050	-	-
	2.	1.11035	1.11076	0.00041	10	0.000041	-	-
	3.	1.12420	1.12470	0.00050	10	0.000050	-	-
	4.	1.10608	1.10667	0.00059	10	0.000059	-	-
=====								
Initial	0.00005							
Mean Wt.								
=====								
Control	1.	1.12198	1.12439	0.00241	9	0.000268	0.000218	0.268
	2.	1.09845	1.10124	0.00279	10	0.000279	0.000229	0.279
	3.	1.11639	1.11980	0.00341	10	0.000341	0.000291	0.341
	4.	1.10379	1.10702	0.00323	10	0.000323	0.000273	0.323
=====								
0.001	1.	1.11354	1.11685	0.00331	10	0.000331	0.000281	0.331
	2.	1.11223	1.11520	0.00297	9	0.000330	0.000280	0.330
	3.	1.11732	1.12060	0.00328	10	0.000328	0.000278	0.328
	4.	1.10955	1.11321	0.00366	10	0.000366	0.000316	0.366
=====								
0.003	1.	1.10462	1.10788	0.00326	10	0.000326	0.000276	0.326
	2.	1.11272	1.11639	0.00367	10	0.000367	0.000317	0.367

0.008	3.	1.09670	1.10015	0.00345	10	0.000345	0.000295	0.345
	4.	1.11349	1.11674	0.00325	10	0.000325	0.000275	0.325
	1.	1.11565	1.11809	0.00244	9	0.000271	0.000221	0.271
	2.	1.12208	1.12385	0.00177	9	0.000197	0.000147	0.197
0.02	3.	1.12986	1.13261	0.00275	10	0.000275	0.000225	0.275
	4.	1.11572	1.11800	0.00228	10	0.000228	0.000178	0.228
	1.	1.10086	1.10141	0.00055	5	0.000110	0.000060	0.110
	2.	1.10863	1.10980	0.00117	10	0.000117	0.000067	0.117
0.05	3.	1.13013	1.13112	0.00099	8	0.000124	0.000074	0.124
	4.	1.11356	1.11414	0.00058	7	0.000083	0.000033	0.083
	1.	1.11548	1.11537	-0.00011	3	-0.000037	-0.000087	-0.037
	2.	1.09986	1.09985	-0.00001	2	-0.000005	-0.000055	-0.005
	3.	1.11882	1.11895	0.00013	4	0.000032	-0.000018	0.032
	4.	1.09388	1.09406	0.00018	4	0.000045	-0.000005	0.045

Reviewed By: TS

Reweight
values used
in IC25
Cue
04-20-54

FATHEAD DRY WEIGHT RECORD SHEET

Study/Date MARGARET RET TOXPans: Date/Time of Drying 4/12/94 - 0700 By TS Fish: Date/Time of Drying 4/13/94 - 0800 By TSOven Temperature: In 98 Out 98 By TS Oven Temperature: In 96 Out 95 By TSPans: Date/Time of Weighing 1443 By TS Fish: Date/Time of Weighing 1420 By TS

Sample ID	Tare Wt.	Tare + Fish Wt.	Fish Wt.	# Fish	Mean Wt.	Difference	
1.							
Initial 2.	*	See Cu Ret box	April 1994	*			
3.							
4.							
Initial Mean Weight							
<u>M</u> 1.	1.12441	1.12759	0.00318	10			0.318
2.	1.11517	1.11830	0.00313	9			0.348
3.	1.11113	1.11473	0.00360	10			0.360
4.	1.10964	1.11293	0.00329	9 *			0.366
1.							
2.							
3.							
4.							
1.							
2.							
3.							
4.							
1.							
2.							
3.							
4.							
1.							
2.							
3.							
4.							

Notes:

0.348 x 0.04-20-54

(PLARC501-266)

Reviewed By: ux

* 1 fish lost in screw top of alcohol container

FATHEAD DRY WEIGHT RECORD SHEET

Study/Date Lu. Ref. to Cor. 194Pans: Date/Time of Drying 4/12/94; 0700By TSFish: Date/Time of Drying 4/13/94; 0800By TSOven Temperature: In 98 Out 98By TSOven Temperature: In 96 Out 95By TSPans: Date/Time of Weighing 4/12/94; 1050By TSFish: Date/Time of Weighing 4/13/94; 1000By TS

Sample ID	Tare Wt.	Tare + Fish Wt.	Fish Wt.	# Fish	Mean Wt.	Difference	
Initial	1. 1.11586	1.11636		10			
	2. 1.11035	1.11076		10			
	3. 1.12420	1.12476		10			
	4. 1.10608	1.10667		10			
Initial Mean Weight							
<u>C</u>	1. 1.12198	1.12439		9			
	2. 1.09845	1.10124		10			
	3. 1.11639	1.11980		10			
	4. 1.10379	1.10702		10			
<u>0.001</u>	1. 1.11354	1.11685		10			
	2. 1.11223	1.11520		9			
	3. 1.11732	1.12060		10			
	4. 1.10955	1.11321		10			
<u>0.003</u>	1. 1.10462	1.10788		10			
	2. 1.11272	1.11639		10			
	3. 1.09670	1.10015		10			
	4. 1.11349	1.11674		10			
<u>0.008</u>	1. 1.11565	1.11809		9			
	2. 1.12208	1.12385		9			
	3. 1.12986	1.13261		10			
	4. 1.11572	1.11800		10			
<u>0.02</u>	1. 1.10086	1.10141		5			
	2. 1.10863	1.10980		10			
	3. 1.13013	1.13112		8			
	4. 1.11356	1.11414		7			
<u>0.05</u>	1. 1.11548	1.11537		3			
	2. 1.09986	1.09985		2			
	3. 1.11882	1.11895		4			
	4. 1.09388	1.09406		4			

Notes:

(PLARC501-266)

Reviewed By: TS

FATHEAD DRY WEIGHT RECORD SHEET

Study/Date C. R. Lopez 4/94 RemeighPans: Date/Time of Drying 4/14/94; 0930By TSFish: Date/Time of Drying 4/14/94; 1230By TSOven Temperature: In 98 Out 98By TSOven Temperature: In 102 Out 100By TSPans: Date/Time of Weighing 4/14/94; 1145By TSFish: Date/Time of Weighing 4/14/94; 1335By TS

Sample ID	Tare Wt.	Tare + Fish Wt.	Fish Wt.	# Fish	Mean Wt.	Difference	
1.							
Initial X 2.	1.11415	1.11475		10		0.00006	
3.							
X 4.	1.13110	1.13184		10		0.000074	
Initial Mean Weight							
1.							
.008 ②	1.10663	1.10855		9			.213
③	1.12230	1.12508		10			.278
4.							
1.							
.02 2.							
③	1.11997	1.12099		8			.127
④	1.13780	1.13858		7			.111
1.							
.05 ①	1.11440	1.11443	0.00003	3			.010
②	1.10526	1.10532	0.00006	2			.030
3.							
④	1.10574	1.10603		4			.073
1.							
2.							
3.							
4.							
1.							
2.							
3.							
4.							
1.							
2.							
3.							
4.							

Notes:

Analysis of 7-day Larval Growth Test

REFTOX #54
Starting Date: 04/05/94

Analysis of Dry Weight (mg) Data Dunnett's Test

No transformation applied before data analysis.
For this set of data, the minimum significant difference is 0.04

This represents a 14.64 % reduction in Dry Weight (mg).

$$T = 2.41 \text{ ALPHA} = 0.05$$

Dry Weight (mg) Data

TREATMENT	Replicate										MEAN	S
	1	2	3	4	5	6	7	8	9	10		
1 CONTROL	0.27	0.28	0.34	0.32	.	.	.	.	.	.	0.30	
2 0.001	0.33	0.33	0.33	0.37	.	.	.	.	.	.	0.34	
3 0.003	0.33	0.37	0.35	0.33	.	.	.	.	.	.	0.34	
4 0.008	0.27	0.20	0.28	0.23	.	.	.	.	.	.	0.25	*
5 0.02	0.11	0.12	0.12	0.08	.	.	.	.	.	.	0.11	*
6 MB	0.32	0.35	0.36	0.37	.	.	.	.	.	.	0.35	

Asterisk (*) indicates values significantly less than control (CONTROL).

Analysis of Variance

Source	DF	Sum OF Sq.	Mean Sq.	Calc F	F(0.05)
Among	5	0.177	0.035	52.380	0.0001
Within	18	0.012	0.001		
Total	23	0.000			

Analysis of untransformed data

1
13:44 Wednesday, April 1, 1992

STUDY=REFTOX #54
ST_DATE=040594
PARM=MING
DUNNETT'S TEST
T = 2.41 ALPHA = 0.05

TREATMENT	N	MEAN	SIGNIFICANT DIFFERENCE
CONTROL	4	0.30	
0.001	4	0.34	
0.003	4	0.34	
0.008	4	0.25	*
0.02	4	0.11	*
MB	4	0.35	

MINIMUM SIGNIFINANT DIFFERENCE = 0.04
THIS REPRESENTS A 14.64 % DECREASE IN SURVIVAL FROM THE CONTROL

Analysis of untransformed data

13:44 Wednesday, April 1, 1992 2.

STUDY=REFTOX #54
ST_DATE=040594
PARM=MING
DUNNETT'S TEST
T = 2.41 ALPHA = 0.05

TREATMENT	REPLICATE										MEAN	.S
	1	2	3	4	5	6	7	8	9	10		
1 CONTROL	0.27	0.28	0.34	0.32	.	.	.	.	.	.	0.30	
2 0.001	0.33	0.33	0.33	0.37	.	.	.	.	.	.	0.34	
3 0.003	0.33	0.37	0.35	0.33	.	.	.	.	.	.	0.34	
4 0.008	0.27	0.20	0.28	0.23	.	.	.	.	.	.	0.25	*
5 0.02 -	0.11	0.12	0.12	0.08	.	.	.	.	.	.	0.11	*
6 MB	0.32	0.35	0.36	0.37	.	.	.	.	.	.	0.35	

MINIMUM SIGNIFINANT DIFFERENCE = 0.04
THIS REPRESENTS A 14.64 % DECREASE IN SURVIVAL FROM THE CONTROL

Analysis of untransformed data

13:44 Wednesday, April 1, 1992

3

General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	6	0.001 0.003 0.008 0.02 CONTROL MB

Number of observations in data set = 60

NOTE: Due to missing values, only 24 observations can be used in this analysis.

Analysis of untransformed data

13:44 Wednesday, April 1, 1992⁴

General Linear Models Procedure

Dependent Variable: RESP

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	0.17678333	0.03535667	52.38	0.0001
Error	18	0.01215000	0.00067500		
Corrected Total	23	0.18893333			
	R-Square	C.V.	Root MSE		RESP Mean
	0.935692	9.223939	0.0259808		0.28166667

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	0.17678333	0.03535667	52.38	0.0001
Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.17678333	0.03535667	52.38	0.0001

Tests of assumptions for untransformed data

1 .

Test for Normal Distribution

13:39 Wednesday, April 1, 1992

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MING -----

UNIVARIATE PROCEDURE

/variable=CENTER

Moments

N	24	Sum Wgts	24
Mean	0	Sum	0
Std Dev	0.022984	Variance	0.000528
Skewness	-0.09962	Kurtosis	-0.92218
USS	0.01215	CSS	0.01215
CV	.	Std Mean	0.004692
T:Mean=0	0	Prob> T	1.0000
Sgn Rank	4	Prob> S	0.9063
Num ^= 0	23		
W:Normal	0.969574	Prob<W	0.6565

Quantiles(Def=5)

100% Max	0.0375	99%	0.0375
75% Q3	0.01875	95%	0.035
50% Med	0.00125	90%	0.03
25% Q1	-0.015	10%	-0.03
0% Min	-0.045	5%	-0.0325
		1%	-0.045
Range	0.0825		
Q3-Q1	0.03375		
Mode	-0.01		

Extremes

Lowest	Obs	Highest	Obs
-0.045(	32)	0.025(	22)
-0.0325(	1)	0.025(	31)
-0.03(	51)	0.03(	14)
-0.0275(	44)	0.035(	33)
-0.0225(	2)	0.0375(	3)

Missing Value

Count	36
% Count/Nobs	60.00

Tests of assumptions for untransformed data

2

Test for Normal Distribution

13:39 Wednesday, April 1, 1992

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MING -----

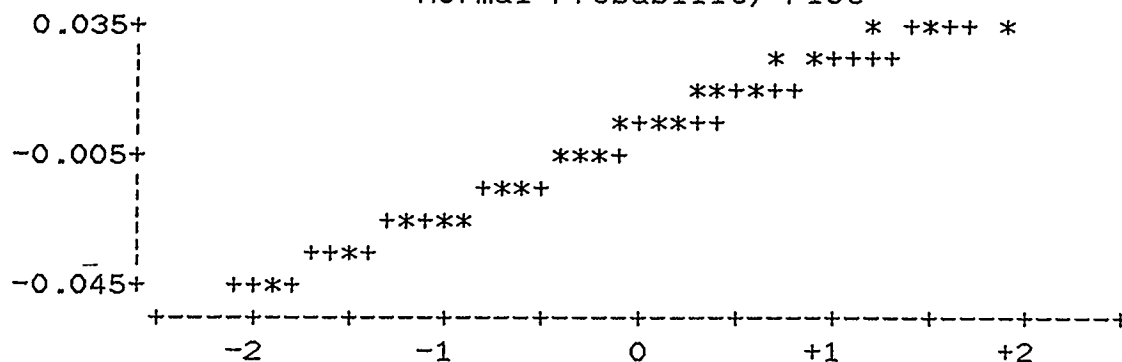
UNIVARIATE PROCEDURE

Variable=CENTER

Stem Leaf	#	Boxplot
3 058	3	<pre> +-----+ *---+---* +-----+ </pre>
2 055	3	
1 0228	4	
0 025	3	
-0		
-1 555000	6	<pre> +-----+ *---+---* +-----+ </pre>
-2 82	2	
-3 20	2	
-4 5	1	

-----+-----+-----+-----+
Multiply Stem.Leaf by 10** -2

Normal Probability Plot



.. .Tests of assumptions for untransformed data

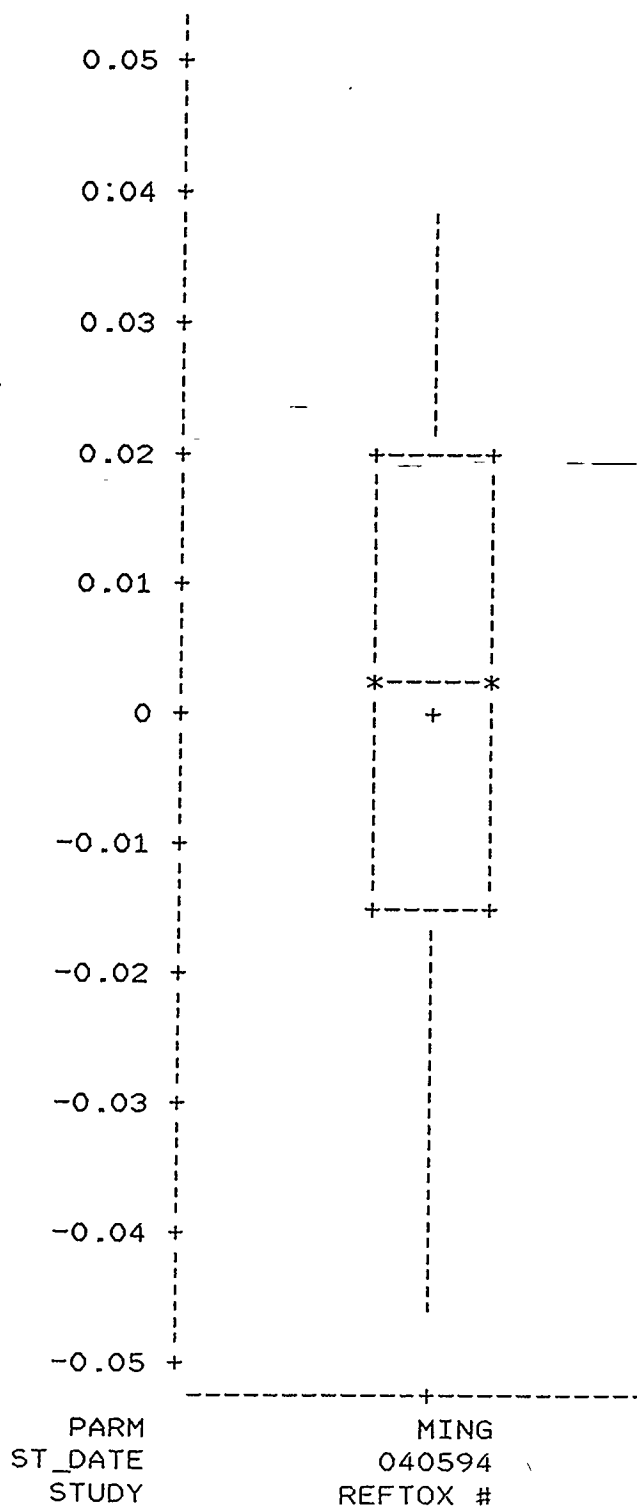
3 ..

Test for Normal Distribution

13:39 Wednesday, April 1, 1992

. UNIVARIATE PROCEDURE
Schematic Plots

Variable=CENTER



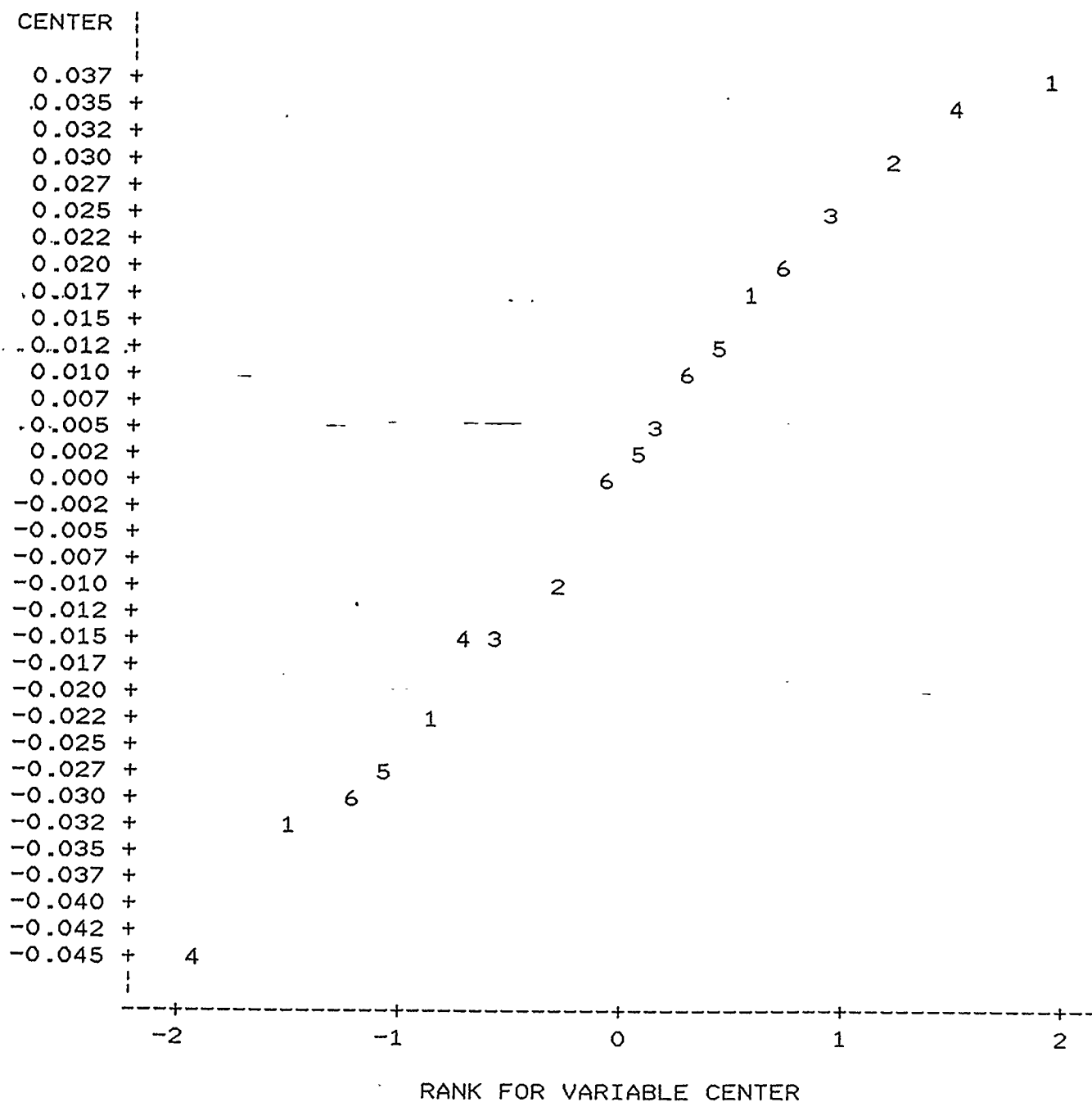
Tests of assumptions for untransformed data

13:39 Wednesday, April 1, 1992

4

----- STUDY=REFTOX #54 ST_DATE=040594 PARM=MING -----

Plot of CENTER*RANKIT. Symbol is value of TRT_NO.



NOTE: 36 obs had missing values. 5 obs hidden.

Tests of assumptions for untransformed data
Bartlett's Test for Homogeneous Variance

5

13:39 Wednesday, April 1, 1992

STUDY=REFTOX #54
ST_DATE=040594
PARM=MING

TREATMENT	N	MEAN	VARIANCE
CONTROL	4	0.30	0.001
0.001	4	0.34	0.000
0.003	4	0.34	0.000
0.008	4	0.25	0.001
0.02	4	0.11	0.000
MB	4	0.35	0.000

BARTLETT'S TEST STATISTIC = 2.522
PROB>B = 0.773

THE NUMBER OF RESAMPLES IS 80

*** LISTING OF GROUP CONCENTRATIONS (% EFF.) AND RESPONSE MEANS ***

CONC. (%EFF)	RESPONSE MEAN	MEAN AFTER POOLING
-----	-----	-----
.000	.296	.322
.001	.331	.322
.003	.341	.322
.008	.231	.231
.020	.082	.082
.050	.010	.010

THE LINEAR INTERPOLATION ESTIMATE OF THE TOTAL IMPACT CONCENTRATION
FROM THE INPUT SAMPLE IS .0074.

.050	.010	.010
------	------	------

THE LINEAR INTERPOLATION ESTIMATE OF THE TOTAL IMPACT CONCENTRATION
FROM THE INPUT SAMPLE IS .0074.

```

*****
*          BOOTSTRAP PROCEDURE TO ESTIMATE VARIABILITY          *
*          OF THE ESTIMATED ICp                                *
*****

```

THE MEAN OF THE BOOTSTRAP ESTIMATES IS .0075.

THE STANDARD DEVIATION OF THE BOOTSTRAP ESTIMATES IS .0008.

AN EMPIRICAL 95.0% CONFIDENCE INTERVAL FOR THE
BOOTSTRAP ESTIMATE IS (.0061, .0092).

: \BOOTSTRP>

Chronic Reference Toxicant Record Sheet

Study Cu Ref tox

Test Organism Ceriod

Beginning Date/Time 4-5-94 / 1015

Ending Date/Time 4-11-94 / 1035

Personnel Sealer, Pacey

Toxicant Copper

Source EPA

Lot # 188

Concentration 50 mg/ml

Stock Concentration(s) Control, 0.3, 0.9, 0.001, 0.002, 0.003, 0.008, 0.02, 0.05 2.4, 6.0, 15.0 mg/l

Test Concentrations Control, 0.001, 0.003, 0.008, 0.02, 0.05

Dilution Water SP 4-12-94 1625, 1661, 1665, C-Med 25% w/o EDTA

Released From

Date

Time

To

Date

Time

4-4-94 1600

4-4-94 2000

Test # 56

NOEC 0.02

LOEC >0.02

Notes: IC₂₅ = 0.0272

Study: Cu Ref to April 94
 Beginning Date: 4-5-94
 Ending Date: 4-11-94

CERIODAPHNIA SURVIVAL AND REPRODUCTION TEST

Page 1 of 2
 Personnel: Posey, Dintick
Holaway

Time: 10:15
 Time: 10:35

Number of Young/Day

Treatment	By Rep.	0.5	0.5	0.5	0.5	0.5	0.001			Total Young
		1	2	3	4	5	6	7	8	
① Control	Log #	0								
	1	0	0	5	11	0	20			36
	2			6	0	14	18			38
	3			6	2	11	21			40
	4			5	11	0	23			39
	5		D/O							0
	6			6	12	23	0			41
	7			6	13	0	23			42
	8			6	0	15	19			40
	9			6	11	0	19			36
	10			6	11	0	20			37
349										
② 0.001	Log #									
	1	0	0	5	12	0	21			38
	2			6	0	16	23			45
	3			6	12	0	23			41
	4			5	9	0	21			35
	5			5	11	0	19			35
	6			4	0	9	13			26
	7			6	14	21	0			41
	8			6	14	0	24			44
	9			6	12	0	20			38
	10			5	0	14	17			36
379										
③ 0.003	Log #									
	1	0	0	5	12	22	0			39
	2			6	0	14	19			39
	3			6	13	0	18			37
	4			6	14	0	19			39
	5			5	12	0	22			39
	6			6	12	0	19			37
	7			4	14	0	22			40
	8			7	0	15	23			45
	9			6	11	0	25			42
	10			6	13	0	18			37
394										
④ 0.008	Log #									
	1	0	0	6	13	0	21			40
	2			5	13	21	0			39
	3			6	13	21	0			40
	4			5	15	0	20			40
	5			5	13	2	21			41
	6			5	12	0	19			36
	7			6	12	0	19			37
	8			5	12	0	22			39
	9			6	11	24	0			41
	10			4	0	11	18			33
386										

Chow ID#: CF18-1 CF18-1 CF18-2 CF18-2 CF18-2 CF18-2
 Algae ID#: A0550 A0550 A0550 A0550 A0551 A0551
 Dilution Water ID#: 1633 1652 1661 1661 1661 1665
 Time: 10:15 10:05-10:20 10:00-10:20 09:45-10:00 09:40-10:57 10:00-10:45
 Reviewed By: JPP AK JS JS JS JS
 Notes: Totals: JP
 Verified: Cue

CERIODAPHNIA SURVIVAL AND REPRODUCTION TEST

Page 2 of 2

Study: Cu Ref tox April 94
 Beginning Date: 4-5-94
 Ending Date: 4-11-94

Time: 1015
 Time: 1035

Personnel: Posey, Sinter
Hawkey

Number of Young/Day

Treatment	By Rep.	1	2	3	4	5	6	7	8	Total Young
	Log #									
0.02	1	0	0	6	15	0	21			42
	2			4	11	0	18			33
	3			4	11	0	18			33
	4			4	11	0	20			35
	5			6	13	0	24			43
	6			6	12	0	19			37
	7			6	12	0	18			36
	8			5	12	0	18			35
	9			6	10	0	21			37
	10			5	11	0	17			33
0.05	1	0	0							0
	2		0	0	0	0	3			3
	3		0							0
	4		0							0
	5		0	0	3	2	0			5
	6		0	0	0	0	0			0
	7		0							0
	8		0	5	0	5	8			18
	9	0								0
	10	0	0							0
	Log #									
	1									
	2									
	3									
	4									
	5									
	6									
	7									
	8									
	9									
	10									
	Log #									
	1									
	2									
	3									
	4									
	5									
	6									
	7									
	8									
	9									
	10									

364

26

(PLARC501-310)

Chow ID#:

Algae ID#:

Dilution Water ID#:

Time:

Reviewed By:

Notes:

Totals: JPPVerified: Cue

Analysis of Reproduction (# young/female/6 days)

RETOX #56

Starting Date: 04/05/94

Reproduction (# young/female/6 days) Data

Treatment	Replicate										Mean
	1	2	3	4	5	6	7	8	9	10	
1 CONTROL	36.0	38.0	40.0	39.0	0.0	41.0	42.0	40.0	36.0	37.0	34.90
2 0.001	38.0	45.0	41.0	35.0	35.0	26.0	41.0	44.0	38.0	36.0	37.90
3 0.003	39.0	39.0	37.0	39.0	39.0	37.0	40.0	45.0	42.0	37.0	39.40
4 0.008	40.0	39.0	40.0	40.0	41.0	36.0	37.0	39.0	41.0	33.0	38.60
5 0.02	42.0	33.0	33.0	35.0	43.0	37.0	36.0	35.0	37.0	33.0	36.40

Steel's Many-One Rank Test

Treatment	No. of Replicates	Critical Rank Sum	Rank Sum*
0.001	10	76	106.0
0.003	10	76	114.0
0.008	10	76	110.5
0.02	10	76	88.5

* Values less than Critical Rank Sum significantly less than the control (CONTROL).

Non-parametric analysis of toxicity data

2

2:54 Thursday, March 26, 1992

----- STUDY=RETOX #56 ST_DATE=040594 PARM=CERR TEST=STEEL -----

OBS	TREATMENT	N CONTROL	N EFFLUENT	RANK SUM	CRITICAL RANK SUM	SIGNIFICANT DIFFERENCE
1	0.001	10	10	106.0	76	
2	0.003	10	10	114.0	76	
3	0.008	10	10	110.5	76	
4	0.02	10	10	88.5	76	

1

2:54 Thursday, March 26, 1992

OBS	STUDY	#	SITE	PARAM	COP	TYPE		CONF	ENF	MIN	CON	NAT		TEST	TRT		SUMRANK	
						Q	Q					NT	NT		NO	TRT		
1	RETOX	#56	040594	CERR	2	0	10	10	10	10	10	10	4	4	STEEL	1	0.001	104.0
2	RETOX	#56	040594	CERR	2	0	10	10	10	10	10	10	4	4	STEEL	2	0.001	106.0
3	RETOX	#56	040594	CERR	3	0	10	10	10	10	10	10	4	4	STEEL	1	0.003	96.0
4	RETOX	#56	040594	CERR	3	0	10	10	10	10	10	10	4	4	STEEL	3	0.003	114.0
5	RETOX	#56	040594	CERR	4	0	10	10	10	10	10	10	4	4	STEEL	1	0.008	99.5
6	RETOX	#56	040594	CERR	4	0	10	10	10	10	10	10	4	4	STEEL	4	0.008	110.5
7	RETOX	#56	040594	CERR	5	0	10	10	10	10	10	10	4	4	STEEL	1	0.02	121.5
8	RETOX	#56	040594	CERR	5	0	10	10	10	10	10	10	4	4	STEEL	5	0.02	88.5

Tests of assumptions for untransformed data

1

Test for Normal Distribution

2:50 Thursday, March 26, 1992

----- STUDY=RETOX #56 ST_DATE=040594 PARM=CERR -----

UNIVARIATE PROCEDURE

Variable=CENTER

Moments

N	50	Sum Wgts	50
Mean	0	Sum	0
Std Dev	6.208947	Variance	38.55102
Skewness	-3.75801	Kurtosis	20.38548
USS	1889	CSS	1889
CV	.	Std Mean	0.878078
T:Mean=0	0	Prob> T	1.0000
Sgn Rank	119	Prob> S	0.2546
Num ^= 0	50		
W:Normal	0.682481	Prob<W	0.0001

Quantiles(Def=5)

100% Max	7.1	99%	7.1
75% Q3	3.1	95%	6.6
50% Med	0.5	90%	5.85
25% Q1	-1.9	10%	-3.4
0% Min	-34.9	5%	-5.6
		1%	-34.9
Range	42		
Q3-Q1	5		
Mode	-0.4		

Extremes

Lowest	Obs	Highest	Obs
-34.9(	5)	6.1(	6)
-11.9(	16)	6.1(	18)
-5.6(	40)	6.6(	45)
-3.4(	50)	7.1(	7)
-3.4(	43)	7.1(	12)

Tests of assumptions for untransformed data
 Test for Normal Distribution

2

2:50 Thursday, March 26, 1992

----- STUDY=RETOX #56 ST_DATE=040594 PARM=CERR -----

UNIVARIATE PROCEDURE

variable=CENTER

Stem	Leaf	#	Boxplot
6	11611	5	<pre> +-----+ *---+---* +-----+ </pre>
4	11166	5	
2	1446111	7	
0	1144666611444	12	
-0	9644444444	9	
-2	444996444	9	<pre> +-----+ *---+---* +-----+ </pre>
-4	6	1	
-6			
-8			
-10	9	1	
-12			0
-14			
-16			
-18			
-20			
-22			
-24			
-26			
-28			
-30			
-32			
-34	9	1	*

-----+-----+-----+-----+

Tests of assumptions for untransformed data

3

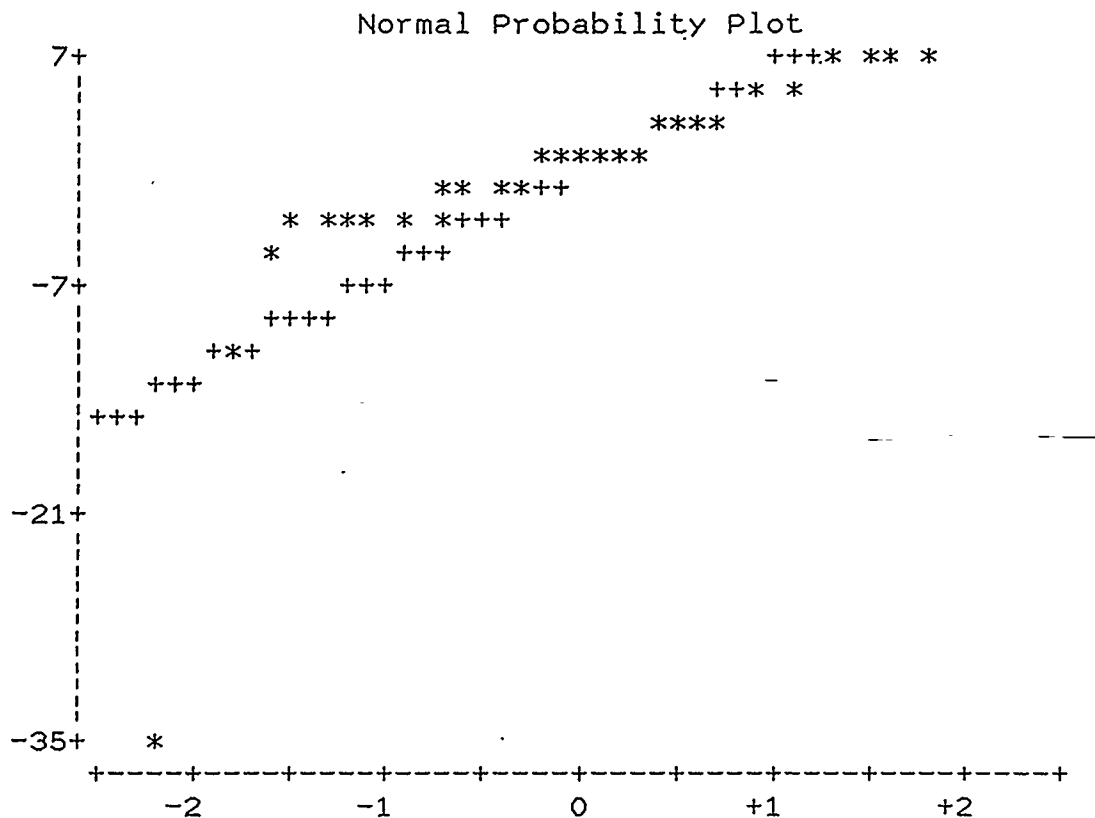
Test for Normal Distribution

2:50 Thursday, March 26, 1992

----- STUDY=RETOX #56 ST_DATE=040594 PARM=CERR -----

UNIVARIATE PROCEDURE

Variable=CENTER



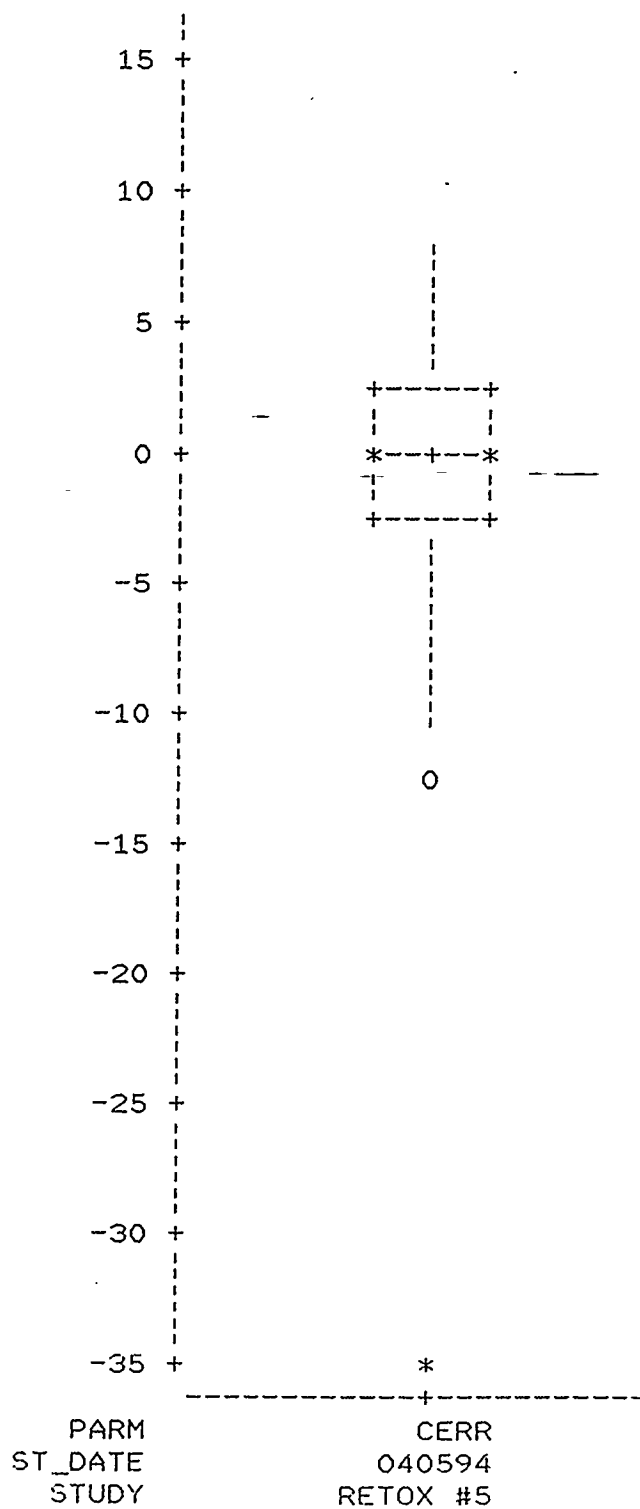
Test for Normal Distribution

2:50 Thursday, March 26, 1992

UNIVARIATE PROCEDURE

Schematic Plots

/variable=CENTER



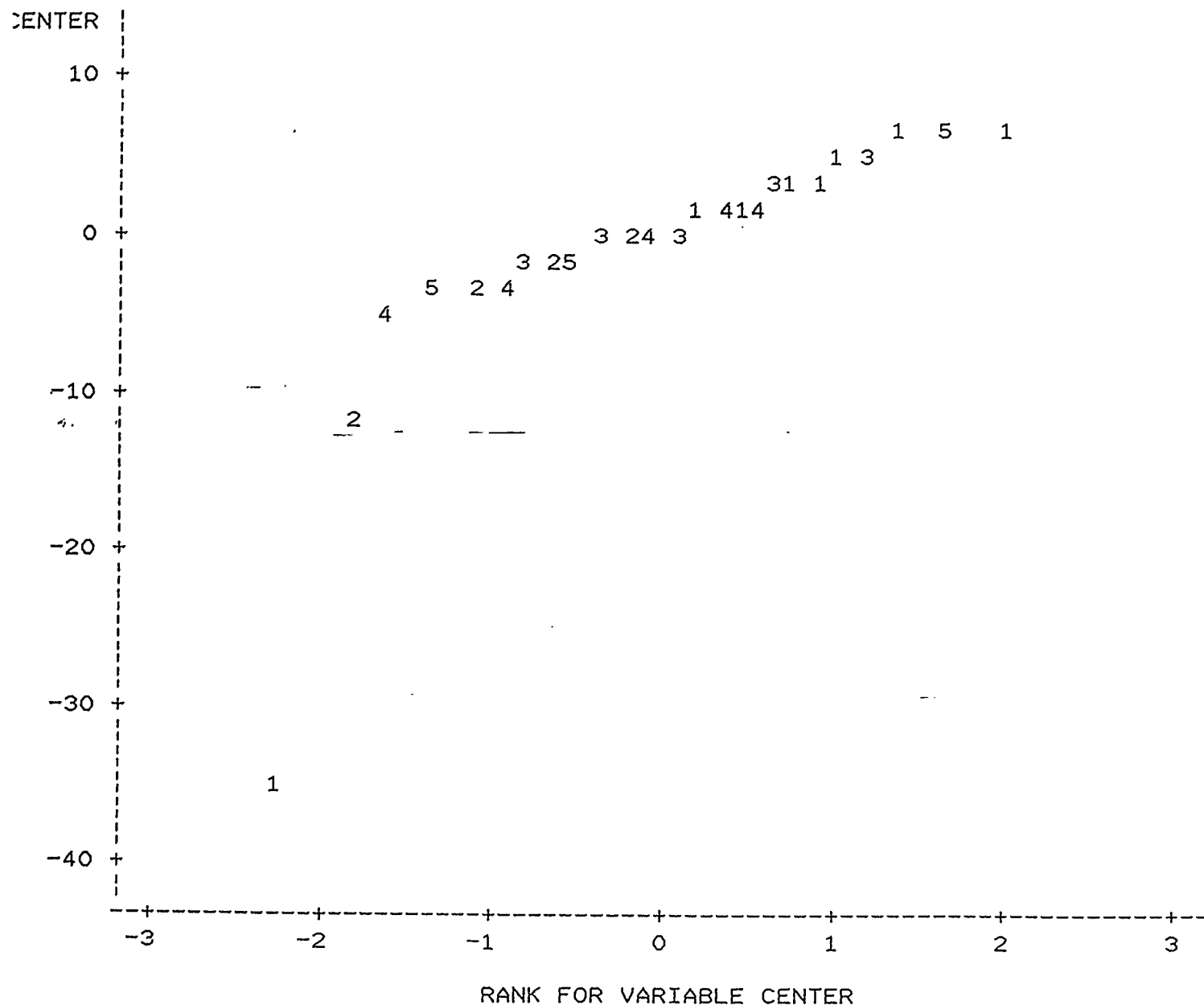
Tests of assumptions for untransformed data

5.

2:50 Thursday, March 26, 1992

----- STUDY=RETOX #56 ST_DATE=040594 PARM=CERR -----

Plot of CENTER*RANKIT. Symbol is value of TRT_NO.



NOTE: 25 obs hidden.

Tests of assumptions for untransformed data
Bartlett's Test for Homogeneous Variance

6

2:50 Thursday, March 26, 1992

STUDY=RETOX #56
ST_DATE=040594
PARM=CERR

TREATMENT	N	MEAN	VARIANCE
CONTROL	10	34.90	154.544
0.001	10	37.90	29.878
0.003	10	39.40	6.267
0.008	10	38.60	6.489
0.02	10	36.40	12.711

BARTLETT'S TEST STATISTIC = 34.471
PROB>B = 0.000

THE NUMBER OF RESAMPLES IS 80

*** LISTING OF GROUP CONCENTRATIONS (% EFF.) AND RESPONSE MEANS ***

CONC. (%EFF.)	RESPONSE MEAN	MEAN AFTER POOLING
-----	-----	-----
.000	34.900	37.700
.001	37.900	37.700
.003	39.400	37.700
.008	38.600	37.700
.020	36.400	36.400
.050	2.600	2.600

THE LINEAR INTERPOLATION ESTIMATE OF THE TOTAL IMPACT CONCENTRATION
FROM THE INPUT SAMPLE IS .0272.

.050	2.600	2.600
------	-------	-------

THE LINEAR INTERPOLATION ESTIMATE OF THE TOTAL IMPACT CONCENTRATION
FROM THE INPUT SAMPLE IS .0272.

* BOOTSTRAP PROCEDURE TO ESTIMATE VARIABILITY *
* OF THE ESTIMATED IC_p *

THE MEAN OF THE BOOTSTRAP ESTIMATES IS .0270.

THE STANDARD DEVIATION OF THE BOOTSTRAP ESTIMATES IS .0010.

AN EMPIRICAL 95.0% CONFIDENCE INTERVAL FOR THE
BOOTSTRAP ESTIMATE IS (.0253, .0285).

: \BOOTSTRP>

CERIODAPHRIA RANDOMIZATION

Study Cu Ref Tot April 94

Beginning Date 4-5-94

Ending Date 4-11-94

Personnel Sessler

Posey

Dimbeck

Haraway

Rep	Treatment											
	1	2	3	4	5	6	7	8				
10	2	4	7	3	5	6	1					
9	2	3	5	6	7	1	4					
8	3	7	1	6	4	5	2					
7	4	3	5	7	1	6	2					
6	7	2	5	4	6	3	1					
5	6	1	3	2	7	5	4					
4	2	5	4	6	3	1	7					
3	5	6	1	3	2	7	4					
2	3	2	7	1	6	5	4					
1	7	1	5	2	4	6	3					

Treatment Identification:

Notes:

1. Control
2. 0.001
3. 0.003
4. 0.008
5. 0.02
6. 0.05
7. Temp
8. _____
9. _____
10. _____

zero date: 3-27-94

CERIODAPHNIA BROOD RECORD SHEET

Batch ID: C199

Tray #: 5

Personnel: MAS

Row	<u>A</u>		Brood Source		<u>B191 / C-5 / ?</u>		(# Young)								
10					↑	6	11	16	0	20x	25				
9						5	12	16	0	19	25				
8						6	12	17	0	20x	23				
7						6	12	17	0	20x	23				
6						5	10	13	0	20	19				
5						4	9	16	18	0	48 25+4				
4						5	10	13	11	0	48 2183				
3						5	8	16	0	16	48 19+2				
2						5	8	12	20	0	48 21+1				
1					0	4	9	16	0	20	26				
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Row	<u>B</u>		Brood Source		<u>B191 / C-2 / ?</u>		(# Young)								
10					↑	5	8	18	0	20x	27				
9						6	10	17	0	20	26				
8						6	9	17	14	0	48	23+8			
7						6	9	13	0	14	22				
6						4	11	15	18	200	48	24+7			
5						5	10	17	22	0	48	26+6			
4						6	10	14	0	820	48	20+5			
3						4	10	13	14	200	48	19			
2						5	10	—	—	—	—	—			
1						0	5	11	14	0	20x	22			
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Row	<u>C</u>			Brood Source	<u>B192 / F-4 / 7</u>				(# Young)						
10				↑	5	10	17	0	20	23					
9					4	9	18	0	20	24					
8					5	9	19	0	19	22					
7					4	9	17	0	20	24					
6					5	8	18	0	20	19					
5					5	10	17	0	20r	20					
4					4	8	17	0	19	21					
3					6	9	18	0	20r	20					
2					5	10	15	0	15	23					
1					0	6	11	19	0	20r	22				
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

	21	26	21	30	31	1	2	3	4	5					
Time			1100	0840	9:35	12:48	1:15	12:15	29:15	0820					
Temp			24.7	25.0	25.0	25.2	25.3	25.1	25.7	25.0					
Med.			1653	1653	1653	1653	1653	1653	1656	1656					
Food			CF178	CF181	CF181	CF181	CF181	CF181	CF181	CF181					
Alga			A0548	A0548	A0548	A0548	A0548	A0548	A0548	A0548					

NOTES: _____

Ref Tox Chronic I ^{4/5}

1653 / PCF178 / A0547

* between 4pm + 8pm ^{4/4}

CERIODAPHNIA BROOD RECORD SHEET

Batch ID: C200

Tray #: 5

Personnel: MRB

Row	<u>D</u>	Brood Source	<u>B192 / P.1 / 7</u>			(# Young)									
10		↑	4	11	14	21 + 0	48 20								
9			4	11	16	17	0	48 19							
8			4	12 +	18	18	4	48 25							
7			4	8	18	18	0	48 21							
6			4	8	18	19 +	0	48 22							
5			4	12 +	16	15	10	48 24							
4			4	9	17	18	0	48 23							
3			4	12 +	16	17	0	48 19							
2			5	11	19	20 +	0	48 21+10							
1		0	5	12	18	19	0	48 21+9							
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Row	<u>E</u>	Brood Source	<u>B192/E.3/7</u>	(# Young)											
10			5 14 18 18	2-4 26-											
9			4 13 18 16	12-2 22											
8			4 12 14 18	12-2 20											
7			5 13 18 14	12-2 23-											
6			5 12 18 14	2-4 23-											
5			4 12 15 16	2-4 23-											
4			4 14 15 18	12-2 28											
3			5 16 18 16	2-4 21-											
2			5 11 16 20	2-2 21											
1			5 11 16 20	2-2 21											
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Row	F	Brood Source	B192/E.9/7	(# Young)											
10			11 18 0	20 48 26											
9			missing												
8			5 12 15 0	23 24											
7			4 12 14 0	22 48 22											
6			5 13 16 0	21 27											
5			5 13 16 0	22 48 26											
4			3 12 14 0	22 22											
3			4 9 15 0	22 25											
2			4 12 17 0	20 48 27											
1			4 12 18 0	17 48 27											
Day	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Time															
Temp															
Med.															
Food															
Alga															

NOTES: _____

10 36
10 38
10 40
10 39
10 0
10 41
10 42
10 40
10 36
10 37
2 .001 38
2 .001 45
2 .001 41
2 .001 35
2 .001 35
2 .001 26
2 .001 41
2 .001 44
2 .001 38
2 .001 36
3 .003 39
3 .003 39
3 .003 37
3 .003 39
3 .003 39
3 .003 37
3 .003 40
3 .003 45
3 .003 42
3 .003 37
4 .008 40
4 .008 39
4 .008 40
4 .008 40
4 .008 41
4 .008 36
4 .008 37
4 .008 39
4 .008 41
4 .008 33
5 .02 42
5 .02 33
5 .02 33
5 .02 35
5 .02 43
5 .02 37
5 .02 36

Reflex Cerio #56

ReFS6C .tx8

04-14-94 CUC

5 .02	35
5 .02	37
5 .02	33
6 .05	0
6 .05	3
6 .05	0
6 .05	0
6 .05	5
6 .05	0
6 .05	0
6 .05	18
6 .05	0
6 .05	0