Study Title

Subchronic Toxicity of Dechlorinated City of Las Cruces Effluent to the Fathead Minnow (Pimephales promelas) Under Static Renewal Test Conditions.

Author

Kurt R. Drottar

RECEIVED
SEP 25 1989
CITY OF LAS CRUCES
WASTE WATER

Study Completed On

August 29, 1989

Performing Laboratory

ENSR Consulting and Engineering
Fort Collins Environmental Toxicology Laboratory
1716 Heath Parkway
Fort Collins, CO 80524

Laboratory Project ID

8505-088-004-006

STATEMENT OF GLP COMPLIANCE

This study was conducted and complies with the USEPA (1989) general guidance on good laboratory practices related to effluent toxicity testing.

Kurt R. Drottar
Project Manager/Study Director

9/20/89
Date

STATEMENT OF QUALITY ASSURANCE

The test data were reviewed by the Quality Assurance Unit to assure that the study was performed in accordance with the protocol and standard operating procedures. This report is an accurate reflection of the raw data.

Dan F. Keefe
Quality Assurance Unit

9/21/89
Date

SUMMARY

Sponsor: City of Las Cruces

Project Officer: Craig Andrews

Study Director: Kurt R. Drottar

Test Facility: ENSR Consulting and Engineering, 1716 Heath Parkway, Fort Collins, CO

Location of Data: ENSR Consulting and Engineering, 1716 Heath Parkway, Fort Collins, CO

Test Substance: Dechlorinated effluent

Subject: Fathead Minnow (Pimephales promelas) Larval Survival and Growth Test (USEPA Method 1000.0)

Test Dates: August 22 (12:15) to August 29 (12:15), 1989

Length of Study: 7 days

Test Species: Pimephales promelas

Source of Organisms: Florida Bioassay Supply, Gainesville, FL

Age of Test Organisms: <24 hours

Test Concentrations: 0 (dilution water control), 1, 3, 10, 30, and 100 percent effluent

Dilution Water: Hard reconstituted water (USEPA 1989)

Results: NOEC = 30 percent effluent, LOEC = 100 percent effluent and ChV = 54.8 percent effluent

TABLE OF CONTENTS

	Page
List of Tables	5
1.0 INTRODUCTION	6
2.0 MATERIALS AND METHODS	7
2.1 Test Effluent	7
2.2 Dilution Water	7
2.3 Test Organisms	7
2.4 Test Methods	9
2.5 Data Analysis	10
3.0 RESULTS AND DISCUSSION	11
LITERATURE CITED	13
APPENDIX A - TEST PROTOCOL	14
APPENDIX B - TEST DATA	20

LIST OF TABLES

Table		Page
2-1	Initial chemical characterization of effluent and reconstituted water used in toxicity testing.	8
3-1	Survival and growth of fathead minnows exposed to dechlorinated City of Las Cruces effluent.	12

1.0 INTRODUCTION

A static renewal toxicity test was conducted at ENSR Consulting and Engineering's Fort Collins Environmental Toxicology Laboratory (FCETL) to determine the subchronic toxicity of dechlorinated City of Las Cruces effluent to the fathead minnow (Pimephales promelas). The criterion for effect was a significant reduction in survival or mean dry weight as compared to experimental controls. Test results are expressed as a no observable effect concentration (NOEC), lowest observable effect concentration (LOEC), and chronic value (ChV), the geometric mean between the NOEC and the LOEC.

All study data are maintained in the FCETL archives, 1716 Heath Parkway, Fort Collins, Colorado.

2.0 MATERIALS AND METHODS

2.1 Test Effluent

Three separate dechlorinated effluent samples were delivered to the FCETL via Federal Express. Flow weighted composite effluent samples were received packed on ice at the laboratory on the following dates: 1) August 22, 1989 (collected 13:00 August 20 to 12:00 August 21, 1989) - FCETL sample #993; 2) August 24, 1989 (collected 13:30 August 22 to 12:30 August 23, 1989) - FCETL sample #999; and 3) August 26, 1989 (collected 13:00 August 24 to 12:00 August 25, 1989) - FCETL Sample #1003. Initial chemical characterization of the effluent samples is given in Table 2-1.

2.2 Dilution Water

Dilution water used in testing was hard reconstituted water prepared according to USEPA (1989) guidelines. Chemical characterization of the reconstituted water (FCETL RW #219) is also given in Table 2-1.

2.3 Test Organisms

Fathead minnows were obtained from a commercial supplier (Florida Bioassay Supply, Gainesville, Florida) and were <24 hours old at test initiation. Test organisms (FCETL lot #89-34) appeared to be in good physical condition.

Table 2-1. Initial chemical characterization of effluent and reconstituted water used in toxicity testing.

Sample	Alkalinity	Hardness	Conductivity	TRC[1]	NH_3-N
	(mg/L as $CaCO_3$)		(umhos/cm)	(mg/L)	(mg/L)
Effluent					
08/22/89	154	214	1,099	<0.01	6.8
08/24/89	177	217	1,147	<0.01	8.0
08/26/89	160	232	1,243	<0.01	3.1
Dilution Water					
08/22/89	113	160	570	<0.01	<0.1
08/24/89	114	174	575	<0.01	<0.1
08/26/89	117	180	585	<0.01	<0.1

[1]TRC - Total Residual Chlorine

2.4 Test Methods

The test was conducted according to FCETL Protocol No. 41 (Appendix A) based on USEPA method 1000.0 (USEPA 1989). Testing was conducted in 1-L beakers containing a final volume of 250 ml of test solution. Ten fathead minnows were randomly distributed to each test container and four replicates were tested per treatment. Fathead minnows were exposed to 1, 3, 10, 30, and 100 percent effluent (v:v, effluent:reconstituted dilution water). Test solutions were renewed daily with freshly prepared dilutions of the most recent effluent sample. Fathead minnows were fed 0.1 ml of a concentrated suspension of newly hatched brine shrimp nauplii three times daily during the test. The test was conducted at 25°C under fluorescent lighting with a photoperiod of 16 hours light and 8 hours dark.

In addition to the effluent test, a reference toxicant (sodium dodecyl sulfate) test was also conducted with the same lot of fathead minnows to determine the sensitivity range of the test organisms.

2.5 Data Analysis

All statistical analysis was conducted with an IBM compatible personal computer utilizing Toxstat version 2.1 software (Gulley et al. 1987) supplied by the University of Wyoming. The arcsine squareroot transformation was applied to all survival data. Normality and homogeneity of variance assumptions for survival and mean dry weight data were verified with the chi-square goodness of fit test and Bartlett's test ($p \leq 0.01$). If the data met these assumptions, Dunnett's multiple comparison test was used to compare treatment group responses to control responses. If the data did not meet assumptions of normality and homogeneity, Steel's many-one rank test was used to make the comparisons. The NOEC, LOEC, and ChV were determined using the most sensitive (i.e. showing significance at the lowest effluent concentration, $p \leq 0.05$) of survival and/or mean dry weight. In addition, the LC1 (the percent effluent estimated to produce 1 percent mortality) was calculated using probit analysis where possible.

3.0 RESULTS AND DISCUSSION

Fathead minnow mortality was ≤2.5 percent in all effluent treatment groups after 7 days of exposure (Table 3-1). No control mortality was observed during the test. The chi-square goodness of fit test showed that the survival data was not normal. Accordingly, Steel's many-one rank test was used to make the comparison. Steel's many-one rank test showed no significant reduction in survival in any effluent treatment group in comparison to the control. Dunnett's multiple comparison test showed that mean dry weight was significantly reduced in the 1 and 100 percent effluent treatment groups. Due to this abnormal dose response, Steel's many-one rank test was also applied to the data. Steel's many-one rank test showed that only the 100 percent effluent treatment group showed a significant reduction in mean dry weight. It is the best judgement of the Study Director that the LOEC, based on mean dry weight, was 100 percent effluent. The NOEC was 30 percent effluent and the ChV was calculated to be 54.8 percent effluent.

Throughout the test all water quality parameters remained within acceptable limits. Dissolved oxygen concentrations remained ≥4.4 mg/l (63 percent of saturation at ~4,800 feet elevation above sea level). Test temperature was maintained at

25 ± 1°C and pH ranged from 7.8 - 8.7.

The 24-hour LC50 for the reference toxicant test was 4.6 mg/l sodium dodecyl sulfate as calculated by the binomial method. The FCETL's acceptable range for <24 hour old fathead minnows is 3.4 to 5.7 mg/L sodium dodecyl sulfate. Therefore, the test organisms were within the FCETL's historic sensitivity range.

Table 3-1. Survival and growth of fathead minnows exposed to dechlorinated City of Las Cruces effluent.

Endpoint	Treatment (percent effluent)					
	Control	1	3	10	30	100
% survival	100	100	100	100	100	97.5
mean dry wt. (mg)	0.64	0.54	0.56	0.57	0.60	0.50[1]

[1]Indicates a significant difference from the control using Steel's many-one rank test ($p \leq 0.05$).

LITERATURE CITED

Gulley, D.D., Boelter, A.M., and H.L. Bergman. 1988. Toxstat Version 2.1. Fish Physiology and Toxicology Laboratory. Department of Zoology and Physiology. University of Wyoming. Laramie, Wyoming.

USEPA. 1989. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition. EPA/600/4-89/001.

APPENDIX A
TEST PROTOCOL

Title: Subchronic Toxicity of Effluent to the Fathead Minnow (*Pimephales promelas*) Under Static Renewal Test Conditions.

Study Sponsor: City of Las Cruces
Wastewater Treatment Plant
3300 West Amador
Las Cruces, New Mexico 88005
(505) 526-4997

Project Officer: Craig Andrews

Testing Facility: ENSR Consulting and Engineering
Fort Collins Environmental Toxicology Laboratory
1716 Heath Parkway
Fort Collins, Colorado 80524
(303) 493-8878, Ext. 279

Project Manager/Study Director: Kurt R. Drottar

1.0 INTRODUCTION

1.1 Objective

To determine if the effluent is subchronically toxic to the fathead minnow (*Pimephales promelas*) under static renewal test conditions.

1.2 Test Effluent

A minimum of three 24-hour composite samples will be collected by the sponsor. Samples will be collected in disposable cubitainers, placed on ice, and shipped to ENSR via overnight delivery.

2.0 MATERIALS AND METHODS

2.1 Basis

This protocol is designed to comply with USEPA method 1000.0, Fathead Minnow, *Pimephales promelas*, Larval Survival and Growth Test (USEPA 1989).

2.2 Test Organism

1. Species - Fathead minnows (*Pimephales promelas*)
2. Age - Fathead minnows will be less than 24 hours old.
3. Source - Fathead minnows will be obtained from ENSR's in-house cultures or from a commercial supplier.
4. Feeding - Each fathead minnow test chamber will be fed 0.1-mL of a concentrated suspension of newly hatched brine shrimp nauplii three times daily.

3.0 TEST SYSTEM

3.1 Dilution Water

Dilution water used in toxicity testing will be a standard synthetic laboratory water (USEPA 1989) which has a hardness and alkalinity similar to that of the receiving water.

3.2 Temperature

Test temperature will be 25 ± 1°C. Testing will be conducted in an environmental chamber or a temperature controlled water bath.

3.3 Test Containers

Test containers will be 1-Liter beakers containing 250-mL of test solution.

3.4 Photoperiod

The photoperiod will be 16-hours light and 8-hours dark.

3.5 Dissolved Oxygen Concentrations

Dissolved oxygen concentrations will be maintained ≥40 percent of saturation. If the dissolved oxygen concentration in any test chamber approaches 40 percent saturation, all test chambers will be aerated moderately.

4.0 TEST DESIGN

4.1 Test Concentrations

Test concentrations will be 1, 3, 10, 30 and 100 percent effluent (V:V, effluent:dilution water). A dilution water control will also be conducted concurrently.

4.2 Number of Test Organisms

Forty fathead minnows will be exposed to each test concentration and control. Ten fathead minnows will be randomly assigned to each test chamber and four replicates will be tested per treatment.

4.3 Test Initiation/Renewal Frequency

Testing will be initiated within 36-hours of the time the first sample is collected. Test samples will be renewed on a daily basis with freshly prepared dilutions of the most recent effluent sample.

4.4 Chemical and Physical Monitoring

At a minimum, the following measurements will be made:

1. Dissolved oxygen, temperature and pH will be measured in each treatment and control at the beginning and end of each 24-hour exposure period.
2. Conductivity will be measured in each treatment and control at the beginning of each 24-hour exposure period.
3. Hardness, alkalinity, total ammonia, and total residual chlorine will be measured in 100 percent effluent and the dilution water on each day of new effluent sample receipt.

4.5 Biological Monitoring

Observations of mortality in each test chamber will be made daily.

4.6 Test Duration

The test duration is seven days. At test termination the larvae in each test chamber will be counted and preserved in 4 percent formalin as a group for later dry weight analysis (if they cannot be weighed immediately). The preserved larvae will be rinsed with distilled water prior to dry weight analysis. The group of rinsed larvae from each test chamber will be transferred to a tared weighing boat and dried at 100°C for a minimum of 2-hours. Immediately after removal from the drying oven, the weigh boats will be placed in a desiccator to prevent absorption of moisture from the air, until weighed. The weights will be measured to the nearest 0.1-mg.

4.7 Calculations

Survival data will be transformed by arcsine squareroot. Growth in each replicate will be determined by the mean dry weight per surviving fish. Normality and homogeneity assumptions of survival and growth data will be evaluated by the chi-square test and Bartlett's test, respectively ($p \leq 0.01$). If the data meet the assumptions, Dunnett's procedure will be used to make the comparison. If the data do not meet the assumptions Steel's many-one rank test will be used to make the comparison. The no observable effect concentration (NOEC), lowest observable effect concentration (LOEC), and ChV will be calculated on the basis of survival and/or growth.

4.8 Quality Criterion

The test will not be considered valid if control mortality exceeds 20 percent or if mean dry weight per surviving control fish is <0.25 mg.

5.0 TEST REPORT

The report will be a typed document describing the results of the test and will be signed by the Study Director and Quality Assurance Unit. The report will include, but not be limited to the following:

- USEPA Region VI summary sheets
- A copy of all raw data.
- Name of test, Study Director, and laboratory.
- Test organism scientific name, age, and diet.
- A description of the experimental design and the test chambers, the number of test organisms, replicates per treatment, and the lighting.
- The source and characterization of the dilution water, and a description of any pretreatment.

- A detailed description of the effluent including its source, time of collection, composition, known physical and chemical properties, and any information that appears on the sample container or has been provided by the sponsor.
- A description of any aeration performed on test solutions before or during the test.
- Percentage of test organisms that died in all treatments.
- The calculated NOEC, LOEC, and ChV values and a reference to calculation methods.
- The minimum dissolved oxygen concentration, range in test temperature and pH, and all visual observations of test solutions.
- Any deviations from protocol.

6.0 LITERATURE CITED

USEPA. 1989. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition. EPA/600/4-89/001.

7.0 GOOD LABORATORY PRACTICES

All test procedures, documentation, records, and reports will comply with USEPA (1989) general guidance on Good Laboratory Practices related to effluent toxicity testing. To this end, random audits of the test may be scheduled while the test is in progress. The raw data will be checked and compared to protocol requirements and Standard Operating Procedures, and the final report will be audited for accuracy and signed, if satisfactory, by the individual responsible from the Quality Assurance Unit.

8.0 PROTOCOL AMENDMENTS AND DEVIATIONS

All changes (i.e., amendments, deviations, and final report revisions) of the approved protocol plus the reasons for the changes must be documented in writing. The changes will be signed and dated by the Study Director and maintained with the protocol. All amendments must be authorized in advance by the Sponsor.

9.0 SPONSOR AND STUDY DIRECTOR APPROVAL

Sponsor Approval: _____ Date: 8/21/89

Study Director: _____ Date: 8/21/89

8/22/89

APPENDIX B
TEST DATA

TABLE 1 (Continued)

BIOMONITORING REPORTING

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)

Composite collected FROM: 1:00 pm am/pm 8-20-89 1st sample, 8-22-89 2nd ", 8-24-89 3rd "date
TO: 12:00 noon am/pm 8-21-89 1st "date, 8-23-89 2nd ", 8-25-89 3rd "date

Test initiated: 1215 pm am/pm 8/22/89

Dilution water used: ____ Receiving water ✓ Reconstituted water (Hard)

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

Effluent Conc (%)	Average Dry Weight in milligrams in replicate chambers A	B	C	D	MEAN DRY WEIGHT (mg)	CV%*
0%	0.55	0.64	0.62	0.77	0.64	14.4
1 ~~32~~%	0.53	0.56	0.51	0.55	0.54	4.1
3 ~~32~~%	0.59	0.63	0.52	0.49	0.56	11.4
10 ~~32~~%	0.59	0.57	0.50	0.62	0.57	8.9
30 ~~32~~%	0.54	0.56	0.67	0.64	0.60	10.3
100%	0.51	0.50	0.50	0.51	~~0.52~~ SB 9/7	1.2
Low Flow %					0.50	
1/2 Low %						

* coefficient of variation = standard deviation x 100/mean

SB 9/7/89

1. Dunnett's Procedure:

Is the mean dry weight (growth) at 7 days effluent significantly different (p=0.05) than the control's dry weight (growth) for the % effluent corresponding to:

a.) LOW FLOW: _____ YES _____ NO
b.) 1/2 LOW FLOW: _____ YES _____ NO

unknown 9/20/89

TABLE 1 (Continued)
BIOMONITORING REPORTING
FATHEAD MINNOW GROWTH AND SURVIVAL TEST

DATA TABLE FOR FATHEAD MINNOW SURVIVAL

Effluent Conc. %	Percent Survival in Replicate Chambers A	B	C	D	MEAN PERCENT SURVIVAL 24h	48h	7 days	CV%*
0%	100	100	100	100	100	100	100	0
1 ~~3~~%	100	100	100	100	100	100	100	0
3 ~~10~~%	100	100	100	100	100	100	100	0
10 ~~20~~%	100	100	100	100	100	100	100	0
30 ~~50~~%	100	100	100	100	100	100	100	0
100%	90	100	100	100	97.5	97.5	97.5	8.3
Low %								
1/2 L.F. %								

* coefficient of variation = standard deviation x 100/mean

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

   Is the mean survival at 7 days significantly different (p=0.05) than the control survival for the % effluent corresponding to:

   a.) LOW FLOW: _____ YES unknown _____ NO
   b.) 1/2 LOW FLOW: _____ YES _____ NO

   FS 9/20/89

3. Enter percent effluent corresponding to each NOEL below and circle lowest number:

   a.) NOEL survival = 100 % effluent
   b.) NOEL growth = 30 % effluent

   9/21/89

4. If you answered NO to 1.a. and 2.a., enter [N]; otherwise enter [Y]: UNK

6. If you answered NO to 1.b. and 2.b., enter [N]; otherwise enter [Y]: UNK

ERT QA Form No. 18
Effective: 3/87

Dechlorinated

SUBJECT: PHYSICAL & CHEMICAL DATA FOR FATHEAD MINNOW SUBCHRONIC TEST

9/20/89

SUBSTANCE: Effluent
BEGINNING: DATE 8/22/89 TIME 1215
CLIENT: Los Cruces
ENDING: DATE 8/29/89 TIME 1215
PROJECT NO. 8505-088-004-006

ENSR #: 993, 999, 1003
Lot # 89-34 / <24 hrs.
RW #: 219
SDS LC50: 4.65 RNG: 3.36-5.72 (Binomial)

CONC.	TEST CONTAINER NUMBER	NO. OF SURVIVING ORGANISMS 0	1	2	3	4	5	6	7	DISSOLVED OXYGEN (mg/l) 0 NEW	1 OLD	1 NEW	2 OLD	2 NEW	3 OLD	3 NEW	4 OLD	4 NEW	5 OLD	5 NEW	6 OLD	6 NEW	7 OLD	TEMPERATURE (C) 0 NEW SOLUTIONS ONLY	1	2	3	4	5	6	7 OLD
Control	A	10	10	10	10	10	10	10	10	6.7	-	7.1*	-	6.6	5.5	7.2*	-	7.0	5.0	6.8	4.9	6.8	4.8	25	25	25	25	25	25	25	25
	B										5.8		5.0		5.5		-		-				4.8								
	C										5.8		-		-		4.9		5.0				-								
	D										-		5.1		-		4.9		-				-								
1	A									6.6	-	7.1*	-	6.6	5.6	7.3*	-	7.0	4.7	6.8	4.6	6.8	4.8								
	B										5.8		5.0		5.5		-		-				4.6								
	C										5.8		-		-		4.7		4.7				-								
	D										-		5.1		-		4.7		-				-								
3	A									6.7	-	7.1*	-	6.6	5.5	7.2*	-	7.0	4.7	6.8	4.9	6.8	4.9								
	B										5.9		4.8		5.6		-		-				4.9								
	C										5.9		-		-		4.7		4.7				-								
	D										-		4.9		-		4.7		-				-								
10	A									6.7	-	7.1*	-	6.6	5.5	7.2*	-	7.0	5.0	6.8	5.0	6.8	5.1								
	B										5.9		4.7		5.8		-		-				5.1								
	C										5.9		-		-		4.7		5.0				-								
	D										-		4.7		-		4.7		-				-								
METER NO.		-	-	-	-	-	-	-	-	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Ther	Ther	Ther	Ther	Ther	Ther	Ther	Ther
DATE		8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/22	8/23	8/23	8/24	8/24	8/25	8/25	8/26	8/26	8/27	8/27	8/28	8/28	8/29	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29
TIME		1215	1100	1340	1110	1130	1110	1620	1215	1200	0900	1110	0830	1340	0950	1115	0840	1130	0845	1115	1030	1420	0929	1205	1100	1340	1115	1130	1115	1420	0945
INITIALS		SB	SB	NP	SWC	SWC	SWC	SWC	SWC	SB	SWC	SB	[illegible]	[illegible]	SWC	SWC	SB	SB	SB	SB	NO	SWC	SB	SB	SB	[illegible]	SWC	SB	SB	SWC	SWC

*Supersat. due to rapid warming (SB)

ak - 9/21/89

SUBJECT: PHYSICAL & CHEMICAL DATA FOR FATHEAD MINNOW SUBCHRONIC TEST

[illegible] 9/20/89

SUBSTANCE: Effluent BEGINNING: DATE 8-22-89 TIME 1215

CLIENT: Las Cruces ENDING: DATE 8/29/89 TIME 1215

PROJECT NO. 8505-088-004-006

CONC.	TEST CONTAINER NUMBER	NO. OF SURVIVING ORGANISMS 0	1	2	3	4	5	6	7	DISSOLVED OXYGEN (mg/l) 0 NEW	1 OLD	1 NEW	2 OLD	2 NEW	3 OLD	3 NEW	4 OLD	4 NEW	5 OLD	5 NEW	6 OLD	6 NEW	7 OLD	TEMPERATURE (C) 0 NEW SOLUTIONS ONLY	1	2	3	4	5	6	7 OLD
30	A	10	10	10	10	10	10	10	10	6.7	–	7.2*	–	6.6	5.4	7.5*	–	7.1*	4.8	6.8	5.3	6.9	5.0	25	25	25	25	25	25	25	25
	B										5.8		4.6		5.4				–				5.0								
	C										5.8		–		–		4.7		4.8				–								
	D										–		4.4		–		4.7		–				–								
100	A		9	9	9	9	9	9	9	7.0	–	7.4*	–	6.8	5.3	7.5*	–	7.4*	4.8	7.2*	4.6	2.3*	4.9								
	B		10	10	10	10	10	10	10		5.5		4.5		5.3		–		–				4.9								
	C		10	10	10	10	10	10	10		5.5		–		–		4.8		4.8				–								
	D		10	10	10	10	10	10	10		–		4.7		–		4.8		–				–								
METER NO.		–	–	–	–	–	–	–	–	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Ther	Ther	Ther	Ther	Ther	Ther	Ther	Ther
DATE		8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/22	8/23	8/23	8/24	8/24	8/25	8/25	8/26	8/26	8/27	8/27	8/28	8/28	8/29	8/22	8/23	8/24	8/24	8/24	8/27	8/28	8/29
TIME		1215	1100	1340	1110	1130	1110	1120	1215	1200	0900	1110	0830	1340	0900	1115	0840	1130	0845	1115	1030	1420	0920	1205	1100	0940	1130	1130	1115	1420	0910
INITIALS		SB	SB	ND	SWC	SWC	SWC	SWC	SWC	SB	SWC	SB	[illegible]	[illegible]	SWC	SWC	SB	SB	SB	SB	ND	SWC	SB	SB	SB	[illegible]	SB	SB	SB	SWC	SWC

*Supersat. due to rapid warming (SB)

[illegible] 9/21/89

ERT QA Form No. 19
Effective: 3/87

SUBJECT: CHEMICAL DTA FOR FATHEAD MINNOW SUBCHRONIC TEST

9/20/89

SUBSTANCE: Effluent BEGINNING: DATE 8-22-89 TIME 1215

CLIENT: City of Las Cruces ENDING: DATE 8-29-89 TIME 1215

PROJECT NO. 8505-088-004-006

CONC.	TEST CONTAINER NUMBER	pH 0 (NEW SOLUTIONS ONLY)	pH 1	pH 2	pH 3	pH 4	pH 5	pH 6	pH 7 (OLD)	CONDUCTIVITY (umhos/cm) 0 (NEW SOLUTIONS ONLY)	1	2	3	4	5	6	7 (OLD)	ALKALINITY (mg/l) 0 (NEW SOLUTIONS ONLY)	1	2	3	4	5	6	7	HARDNESS (mg/l) 0 (NEW SOLUTIONS ONLY)	1	2	3	4	5	6	7
Control	A	8.6	8.5	8.7	8.7	8.7	8.7	8.7	–	570	585	575	556	559	517	574	N/A	113		114		117				160		174		160			
	B								8.3																								
	C								–																								
	D								–																								
1	A	8.7	8.6	8.7	8.7	8.7	8.7	8.7	–	604	611	584	591	595	595	595																	
	B								8.2																								
	C								–																								
	D								–																								
3	A	8.7	8.5	8.7	8.7	8.7	8.7	8.7	–	617	623	611	604	607	611	611																	
	B								8.3																								
	C								–																								
	D								–																								
10	A	8.6	8.5	8.6	8.6	8.6	8.6	8.6	–	655	660	655	652	659	654	654																	
	B								8.3																								
	C								–																								
	D								–																								
	METER NO.	26	26	26	26	26	26	26	26	9	9	9	9	9	9	9		T		T		T				T		T		T			
	DATE	8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/22	8/23	8/24	8/25	8/26	8/27	8/28		8/22		8/24		8/26				8/22		8/24		8/26			
	TIME	1210	1105	1350	1115	1130	1115	1120	1215	1215	1115	1350	1115	1130	1115	1120		1355		1320		1230				1355		1320		1230			
	INITIALS	SB	SB	[illegible]	SBC	SB	SB	SBC	SBC	SB	SB	[illegible]	SBC	SB	SB	SBC		SB		MO		SBC				SB		MO		SBC			

ERT QA Form No. 19
Effective: 3/87

SUBJECT: CHEMICAL DTA FOR FATHEAD MINNOW SUBCHRONIC TEST

9/20/89

SUBSTANCE: Effluent

BEGINNING: DATE 8-22-89 TIME 1215

CLIENT: Las Cruces

ENDING: DATE 8-29-89 TIME 1215

PROJECT NO. 8505-088-004-006

CONC.	TEST CONTAINER NUMBER	pH 0 (NEW SOLUTIONS ONLY)	pH 1	pH 2	pH 3	pH 4	pH 5	pH 6	pH 7 (OLD)	CONDUCTIVITY (umhos/cm) 0 (NEW SOLUTIONS ONLY)	1	2	3	4	5	6	7 (OLD)	ALKALINITY (mg/l) 0 (NEW SOLUTIONS ONLY)	1	2	3	4	5	6	7	HARDNESS (mg/l) 0 (NEW SOLUTIONS ONLY)	1	2	3	4	5	6	7
30	A	8.4	8.3	8.4	8.4	8.3	8.4	8.3	–	747	762	749	771	783	784	783	N/A																
	B								8.3																								
	C								–																								
	D								–																								
100	A	8.0	8.0	7.9	8.0	7.8	8.0	7.7	–	1099	1092	1147	1170	1243	1218	1217		154		177		160				214		217		250			
	B								8.0																								
	C								–																								
	D								–																								
METER NO.		26	26	26	26	26	26	26	26	9	9	9	9	9	9	9		T		T		T				T		T		T			
DATE		8/22	8/23	8/24	8/25	8/26	8/27	8/28	8/29	8/22	8/23	8/24	8/25	8/26	8/27	8/28		8/22		8/24		8/26				8/22		8/24		8/26			
TIME		1210	1105	1330	1115	1130	1115	1420	1015	1215	1115	1350	1115	1130	1115	1420		1359		1320		1231				1359		1520		1231			
INITIALS		SB	SB	[illegible]	[illegible]	SB	SB	[illegible]	[illegible]	SB	SB	[illegible]	[illegible]	SB	SB	[illegible]		SB		MO		[illegible]				SB		MO		[illegible]			

dlc 9/21/89

ERT TOXICOLOGY GROUP
FT. COLLINS, COLORADO

ERT QA Form No. 15
Effective: 3/87

SUBJECT: DAILY LOG 8505-088-004-006

ALL ENTRIES MUST BE INITIALLED WITH DATE AND TIME: [initials] 9/20/89

8/22/89 TRC: (C) <0.01 (100) <0.01 (AT, 1100, SB)
NH_3: (C) <0.1 (100) 6.80 (#1, 1150, RH)

8/23/89 Old pH's (C) 8.5 (1) 8.5 (3) 8.5 (10) 8.5 (30) 8.6 (100) 8.5 #26 Therm } 0915 SB
Old Temp's: 25°C

8/24/89 Old pH's (C) 8.4 (1) 8.4 (3) 8.3 (10) 8.4 (30) 8.4 (100) 8.3 #26 Therm } 0330 SWC
Old Temps 25°C

8/24/89 ~~OL~~ TRC: (C) <0.01 (100) <0.01 (AT, 1130, SB)
SB 8/24 NH_3: (C) <0.1 (100) 7.96 (#1, 1410, RH)

8/25/89 Old pH's (C) 8.3 (1) 8.3 (3) 8.5 (10) 8.4 (30) 8.4 (100) 8.5 #26 Therm @ 0955 SW
Old Temps: 25°C

8/26/89 Old pH's (C) 8.3 (1) 8.3 (3) 8.2 (10) 8.3 (30) 8.3 (100) 8.4 #26 Therm @ 0835 SWC
Old Temps: 25°C

8/26/89 TRC: (C) <0.01 (100) <0.01 (AT, 1300, SB)
NH_3: (C) <0.1 (100) 3.1 (#1, 1320, SB)

8/27/89 Old pH's (C) 8.3 (1) 8.3 (3) 8.4 (10) 8.4 (30) 8.3 (100) 8.4 #26 Therm @ 08[illegible] SW
Old Temp's: 26°C

8/28/89 OLD pH's (C) 8.2 (1) 8.2 (3) 8.2 (10) 8.3 (30) 8.4 (100) 8.2 #26 @ 10[illegible] Therm
OLD ~~pH's~~ NH_3 8-28 Temp: 25°C

dh 9/21/89

Ked

ERT QA Form no. [illegible]
Effective: 3/87

SUBJECT: TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

9/20/89

SPONSOR: Las Cruces
TEST SUBSTANCE: Effluent - Dechlorinated
DATA BY: SB DATE 8/29/89 TIME 1630

PROJECT NO: 8505-088-004-006
SPECIES: Pimephales promelas
LOT/BATCH NO: 89-34 / < 24 hrs.

NO.	LENGTH TYPE		WEIGHT: TYPE Dry TARE	GROSS	NET	(mg) X/fis
1	Control	A	1.3287	1.3342	0.0055	0.55
2		B	1.3304	1.3368	0.0064	0.64
3		C	1.3299	1.3361	0.0062	0.62
4		D	1.3055	1.3132	0.0077	0.77
5	1.0	A	1.3068	1.3121	0.0053	0.5
6		B	1.3045	1.3101	0.0056	0.56
7		C	1.3107	1.3158	0.0051	0.5
8		D	1.3207	1.3262	0.0055	0.5
9	3.0	A	1.3078	1.3137	0.0059	0.59
10		B	1.2857	1.2920	0.0063	0.63
11		C	1.2852	1.2904	0.0052	0.5
12		D	1.2856	1.2905	0.0049	0.49
13	10	A	1.2955	1.3014	0.0059	0.59
14		B	1.3075	1.3132	0.0057	0.5
15		C	1.3181	1.3231	0.0050	0.5
16		D	1.3250	1.3312	0.0062	0.6
17	30	A	1.3199	1.3253	0.0054	0.5
18		B	1.3160	1.3216	0.0056	0.5
19		C	1.3009	1.3076	0.0067	0.6
20		D	1.3013	1.3077	0.0064	0.6
RANGE						
MEAN						
S						

ck 9/6/

TEST SOLUTION VOLUME _____ LOADING RATE _____

Red

ERT QA Form No. [illegible]
Effective: 3/87

Page 7 of 12

SUBJECT: TEST ORGANISM LENGTHS, WEIGHTS, AND LOADING

9/20/89

SPONSOR: Las Cruces
TEST SUBSTANCE: Effluent - Dechlorinated
DATA BY: SB DATE 8/29/89 TIME 1630

PROJECT NO: 8505-088-004-006
SPECIES: Pimephales promelas
LOT/BATCH NO: 89-34 / <24 hrs.

NO.	LENGTH TYPE		WEIGHT: TYPE TARE	GROSS	NET
21	100	A	1.3014	1.3060	0.0046
22		B	1.3068	1.3118	0.0050
23		C	1.3218	1.3268	0.0050
24		D	1.3141	1.3192	0.0051
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
RANGE					
MEAN					
S					

TEST SOLUTION VOLUME _____ LOADING RATE _____

page 8 of 12
[illegible] 9/20/89

3505-088-004-006 Fathead Minnow Survival
File: A:004.oS Transform: ARC SINE(SQUARE ROOT(Y))

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	1	23	0	0

Calculated Chi-Square goodness of fit test statistic = 33.8729
Table Chi-Square value (alpha = 0.01) = 13.277

Data FAIL normality test. Try another transformation.

Warning - The two homogeneity tests are sensitive to non-normal data and should not be performed.

[illegible] 9/21/89

3505-088-004-006 Fathead Minnow Survival
File: A:004.oS Transform: ARC SINE(SQUARE ROOT(Y))

Hartley test for homogeneity of variance
Bartletts test for homogeneity of variance

These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

9/20/89

8505-088-004-006 Fathead Minnow Survival
File: A:004.6S Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	1.412	1.412	1.412
2	1	4	1.412	1.412	1.412
3	3	4	1.412	1.412	1.412
4	10	4	1.412	1.412	1.412
5	30	4	1.412	1.412	1.412
6	100	4	1.249	1.412	1.371

8505-088-004-006 Fathead Minnow Survival
File: A:004.6S Transform: ARC SINE(SQUARE ROOT(Y))

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.000	0.000	0.000
2	1	0.000	0.000	0.000
3	3	0.000	0.000	0.000
4	10	0.000	0.000	0.000
5	30	0.000	0.000	0.000
6	100	0.007	0.081	0.041

dkh 9/20/89

8505-088-004-006 Fathead Minnow Survival
File: A:004.6S Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	1.412				
2	1	1.412	18.00	10.00	4.00	
3	3	1.412	18.00	10.00	4.00	
4	10	1.412	18.00	10.00	4.00	
5	30	1.412	18.00	10.00	4.00	
6	100	1.371	16.00	10.00	4.00	

Critical values use k = 5, are 1 tailed, and alpha = 0.05

MW 9/20/89

MW 9/20/89

8505-088-004-~~004~~ 006 Fathead Minnow Mean Dry Weight
File: A:004.6W Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	1.608	5.808	9.168	5.808	1.608
OBSERVED	0	9	5	10	0

Calculated Chi-Square goodness of fit test statistic = 9.8908
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

dh 9/21/89

8505-088-004-004 Fathead Minnow Mean Dry Weight
File: A:004.6W Transform: NO TRANSFORMATION

Bartletts test for homogeneity of variance

Calculated B statistic = 14.18
Table Chi-square value = 15.09 (alpha = 0.01)
Table Chi-square value = 11.07 (alpha = 0.05)

Average df used in calculation ==> df (avg n - 1) = 3.00
Used for Chi-square table value ==> df (#groups-1) = 5

Data PASS homogeneity test at 0.01 level. Continue analysis.

NOTE: If groups have unequal replicate sizes the average replicate size is used to calculate the B statistic (see above).

page 11 of 12
9/20/89

006 9/20/89

3505-088-004-~~004~~ Fathead Minnow Mean Dry Weight
File: A:004.6W Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	Control	4	0.550	0.770	0.645
2	1	4	0.510	0.560	0.537
3	3	4	0.490	0.630	0.557
4	10	4	0.500	0.620	0.570
5	30	4	0.540	0.670	0.602
6	100	4	0.500	0.510	0.505

3505-088-004-004 Fathead Minnow Mean Dry Weight
File: A:004.6W Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	Control	0.008	0.092	0.046
2	1	0.000	0.022	0.011
3	3	0.004	0.064	0.032
4	10	0.003	0.051	0.025
5	30	0.004	0.062	0.031
6	100	0.000	0.006	0.003

9/21/89

3505-088-004-004 Fathead Minnow Mean Dry Weight
File: A:004.6W Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.048	0.010	3.333
Within (Error)	18	0.059	0.003	
Total	23	0.107		

Critical F value = 2.77 (0.05,5,18)
Since F > Critical F REJECT Ho:All groups equal

KM 9/20/89

8505-088-004-~~004~~ Fathead Minnow Mean Dry Weight
File: A:004.6W 006 Transform: NO TRANSFORMATION
KM 9/20/89

DUNNETTS TEST - TABLE 1 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	Control	0.645	0.645		
2	1	0.537	0.537	2.776	*
3	3	0.557	0.557	2.259	
4	10	0.570	0.570	1.936	
5	30	0.602	0.602	1.097	
6	100	0.505	0.505	3.615	*

Dunnett table value = 2.41 (1 Tailed Value, P=0.05, df=18,5)

8505-088-004-004 Fathead Minnow Mean Dry Weight
File: A:004.6W Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	Control	4			
2	1	4	0.093	14.5	0.108
3	3	4	0.093	14.5	0.087
4	10	4	0.093	14.5	0.075
5	30	4	0.093	14.5	0.042
6	100	4	0.093	14.5	0.140

KM 9/21/89

8505-088-004-004 Fathead Minnow Mean Dry Weight
File: A:004.6W Transform: NO TRANSFORM

STEELS MANY-ONE RANK TEST - Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	Control	0.645				
2	1	0.537	11.50	10.00	4.00	
3	3	0.557	13.00	10.00	4.00	
4	10	0.570	13.50	10.00	4.00	
5	30	0.602	16.50	10.00	4.00	
6	100	0.505	10.00	10.00	4.00	*

Critical values use k = 5, are 1 tailed, and alpha = 0.05

City of Las Cruces

September 25, 1989

FED. EXPRESS NO. 2301367670

Mr. Mike Morton (6W-PT)
U. S. Environmental Protection Agency
Region VI
1445 Ross Avenue, Suite 1200
Dallas, TX 75202

Dear Mr. Morton:

RE: Biomonitoring -- NPDES Permit No. NM0023311

Enclosed is a copy of our latest biomonitoring results. The fathead minnow chronic toxicity tests were completed, and the results are satisfactory. We have included for your information the extra dechlorinated sample that the City performed.

The Ceriodaphnia dubia control tests failed due to failure of the control samples. The lab (see cover letter) attributes the failure to the fact that lab reconstituted dilution water was used. Request that the dilution water for future tests be changed to river water. We further request that the dilution series be changed to allow for a broader band in the dilution. Presently, no samples are performed in the band from 30-100 percent effluent. We suggest the dilution series of 100%, 50%, 25%, 12%, and 6% in order to allow for better evaluation of the data.

Since the Ceriodaphnia control failed for our August test, we need some guidance from E.P.A. in order to either begin the series again or else to retest. Please contact us as soon as possible with this direction. We are not pursuing further biomonitoring until we receive instructions from the EPA.

Should you have any questions, please call me at 505/526-4997.

Sincerely,

D. Craig Andrews, P. E.
Associate Director of Wastewater

DCA:bh

Enclosures from Lab (3)

c: John Hall, City's Special Counsel (Fed. Express No. 2301367681)
Gladys Gooden-Jackson, EPA (6W-EAT)

OK 9/25

ENSR

RECEIVED
SEP 25 1989
CITY OF LAS CRUCES
WASTE WATER

Formerly ERT

ENSR Consulting
and Engineering

1716 Heath Parkway
Fort Collins, CO 80524
(303) 493-8878

September 22, 1989

Mr. Craig Andrews
City of Las Cruces
3300 West Amador
Las Cruces, New Mexico 88005

Dear Mr. Andrews:

Enclosed are the reports for the fathead minnow short-term chronic tests conducted during August, 1989. As you suspected, the chlorinated effluent was much more toxic than the dechlorinated effluent.

As we discussed on the phone, the Ceriodaphnia dubia chronic tests failed due to poor control performance (Table 1). In order to be a valid test, the controls must have ≤20 percent mortality and produce ≥15 young per female. As you can see, the controls did not even come close to this criteria. The reason for these failures appears to be the use of hard reconstituted water for dilution. Our cultures are maintained in moderately hard reconstituted water and apparently do not do well in the harder water. Several studies for other clients were conducted concurrently with your tests which used moderately hard water and performed well. Therefore, the dilution water seems to be causing the problem. We could try to acclimate the organisms to hard reconstituted water, however, I still do not believe that they will do that well. A better solution would be to use the actual receiving stream for dilution (if no pre-existing instream toxicity exists).

Please talk this over with your EPA contact and see what he recommends. Feel free to have your contact can call me if he has any specific questions. We appreciate this opportunity to be of service.

Sincerely,

Kurt R. Drottar
Aquatic Toxicology Laboratory Manager

KRD

Enclosures

Ref: 8505-088-004

SENT-BY:Xerox Telecopier 7021 ; 9-29-89 ; 16:57 ; 5055260134→ 202 861 3953 # 4

ENSR

RECEIVED
SEP 25 1989
CITY OF LAS CRUCES
WASTE WATER

Table 1. Survival and reproduction of Ceriodaphnia dubia exposed to City of Las Cruces Wastewater Treatment Plant effluent during a chronic test.

	Treatment					
Endpoint	Control	1	3	10	30	100
Chlorinated (8/22)						
% survival	100	90	100	90	0	0
# young/female	1.1	0.0	12.5	26.1	0.0	0.0
Dechlorinated (8/22)						
% survival	90	80	90	90	90	0
# young/female	4.6	5.4	6.2	18.0	22.2	3.2
Chlorinated (9/6)						
% survival	80	100	100	100	0	0
# young/female	1.8	15.4	27.2	26.8	0.0	0.0
Dechlorinated (9/6)						
% survival	90	100	90	80	100	0
# young/female	1.9	13.4	22.5	20.4	26.6	2.0

Enclosure 5

EID/SWQ-88/7

INTENSIVE WATER QUALITY SURVEY OF THE RIO GRANDE IN THE VICINITY OF LAS CRUCES, NEW MEXICO

AUGUST 8-11, 1988

Steven T. Pierce

Surveillance and Standards Section
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
Harold Runnels Building - 1190 St. Francis Drive
Santa Fe, New Mexico 87503

February 1989

EID/SWQ-88/7

INTENSIVE WATER QUALITY SURVEY OF THE RIO GRANDE IN THE VICINITY OF LAS CRUCES, NEW MEXICO AUGUST 8-11, 1988

Steven T. Pierce

Surveillance and Standards Section
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
Harold Runnels Building
1190 St. Francis Drive
Santa Fe, New Mexico 87503

February 1989

SUMMARY AND CONCLUSIONS

During the week of August 8, 1988, the Surveillance and Standards Section conducted a four-day water quality survey of a 55-mile reach of the Rio Grande, with an additional sampling station at the Las Cruces wastewater treatment facility effluent discharge. This reach of the Rio Grande is contained in water quality segment 2-101. The objectives of this survey were: (1) to assess the water quality of the lower Rio Grande, (2) to determine any effects of the effluent from the Las Cruces WWTF, and (3) to determine whether water quality standards are attained in segment 2-101. Chemical, physical and microbiological data collected during this intensive survey are presented and discussed in this report. Conclusions reached were as follows:

1. This stretch of the lower Rio Grande was warm, moderately to highly turbid, slightly alkaline and contained moderate amounts of most chemical constituents and nutrients. Exceptions were iron and manganese, which occurred in high concentrations at all Rio Grande stations and in extremely high concentrations at stations 1, 8 and 9.

2. Samples collected from the Las Cruces WWTF met all NPDES permit requirements.

3. Samples collected from stations 2, 4, 8 and 9 for biocides analyses revealed no detectable levels of 34 common biocides.

4. During the four-day survey of the Rio Grande there were no violations or exceedances of the numeric or general water quality standards of segment 2-101.

ACKNOWLEDGEMENTS

Don R. Ditmore assisted in conducting the four-day field sampling effort. Carl Young and Paul Koska of EPA Region VI collected sediment and water samples from the Rio Grande for chronic toxicity testing. Craig Andrews and the staff of the Las Cruces wastewater treatment facility were helpful in sampling this facility, provided necessary information and conducted biomonitoring on the effluent in conjunction with this intensive survey. In addition, the laboratory staff of the WWTF analyzed a

series of samples for fecal coliform organisms during this study. David F. Tague provided suggestions and useful criticisms that strengthened the manuscript. The Scientific Laboratory Division (SLD) performed the analyses for water chemistry and one series of fecal coliform bacteria. Rick Meyerhein and Ken Sherrell of the SLD took special pains to analyze a series of samples for the presence of various biocides. Each of these individuals provided important contributions to the informational value of this report and their efforts are gratefully acknowledged.

INTRODUCTION

The information in this section is essential to a basic understanding of the physical and hydrologic setting of the lower Rio Grande. The subsections of this introduction give the segment boundaries and water quality standards of segment 2-101, and describe physical and hydrologic characteristics of the watercourse.

Water Quality Standards

The designated uses and numeric and narrative standards of segment 2-101 are as follows (NMWQCC 1988):

2-101. The main stem of the Rio Grande from the International Boundary and Water Commission sampling station above American Dam upstream to one mile below Percha Dam.[1]

A. Designated Uses: irrigation, limited warmwater fishery, livestock and wildlife watering, and secondary contact recreation.

B. Standards:

1. In any single sample: dissolved oxygen shall be greater than 5.0 mg/l, pH shall be within the range of 6.6 to 8.8, and temperature shall not exceed 34 C (93.2 F).

2. The monthly logarithmic mean of fecal coliform bacteria shall not exceed 1,000/100 ml; no single sample shall exceed 2,000/100 ml (see 1-103.B).

3. At mean monthly flows above 350 cfs, the monthly average concentration for: TDS shall be less than 2,000 mg/l, sulfate shall be less than 500 mg/l, and chlorides shall be less than 400 mg/l.

---

[1] Sustained flow in the Rio Grande below Caballo Reservoir is dependent on release from Caballo Reservoir during the irrigation season; at other times of the year, there may be little or no flow.

The general standards (Section 1-102) are also applicable to segment 1-101. Relevant paragraphs are as follows:

1-102. GENERAL STANDARDS.

A. Stream Bottom Deposits: The stream shall be free of water contaminants from other than natural causes that will settle and adversely inhibit the growth of normal flora and fauna or significantly alter the physical or chemical properties of the bottom. Siltation resulting from the reasonable operation of irrigation and flood control facilities is not subject to these standards.

B. Floating Solids, Oil and Grease: Receiving water shall be free of objectionable oils, scum, grease and other floating materials resulting from other than natural causes.

C. Color: Color-producing materials resulting from other than natural causes shall not create an aesthetically undesirable condition nor should color impair the use of the water by desirable aquatic life presently common in New Mexico waters

E. Plant Nutrients: Plant nutrients from other than natural causes shall not be present in concentrations which will produce undesirable aquatic life or result in dominance of nuisance species in receiving waters.

Description of Watercourse

The Rio Grande arises high in the mountains of Colorado and flows south-southwest through New Mexico to the Texas state line

near El Paso (Fig. 1). The river is the largest in New Mexico and has been of immense historical importance in the development of towns and ranches along its course and in the overall settlement of the state. The lower Rio Grande basin consists of a narrow strip of green land with arid desert and semi-arid mountainous regions on both sides. The Rio Grande has been channelized from Caballo Dam to the Texas state line with contiguous flood plains on either side of the main channel, all contained between levees. The flood plain of the Rio Grande varies from less than one mile to five miles in width. Although there are numerous ephemeral tributaries running from the west down to the Rio Grande, there are no natural perennial streams or rivers within the basin except the Rio Grande. The river system from Percha Dam to Sunland Park consists of the natural river channel and several roughly parallel irrigation ditches. At times these ditches convey more water than the natural channel and rarely these ditches convey all of the water. Water is withdrawn between Caballo Dam and the Texas state line for the irrigation of approximately 100,000 acres in the Rincon and Mesilla valleys. Approximately 80 percent of the lower Rio Grande basin is between 4,000 and 6,000 feet in altitude and is in the lower Sonoran life zone. Except for irrigated lands along the river, this area is characterized by semi-arid brush, chiefly creosote bush, tarbrush and mesquite (NMWQCC 1975).

The Rio Grande in New Mexico is impounded at Cochiti Lake, Elephant Butte Reservoir and Caballo Reservoir. Since 1915 the flow of the lower Rio Grande has been completely regulated by Elephant Butte Dam and since 1938 the flow has also been regulated

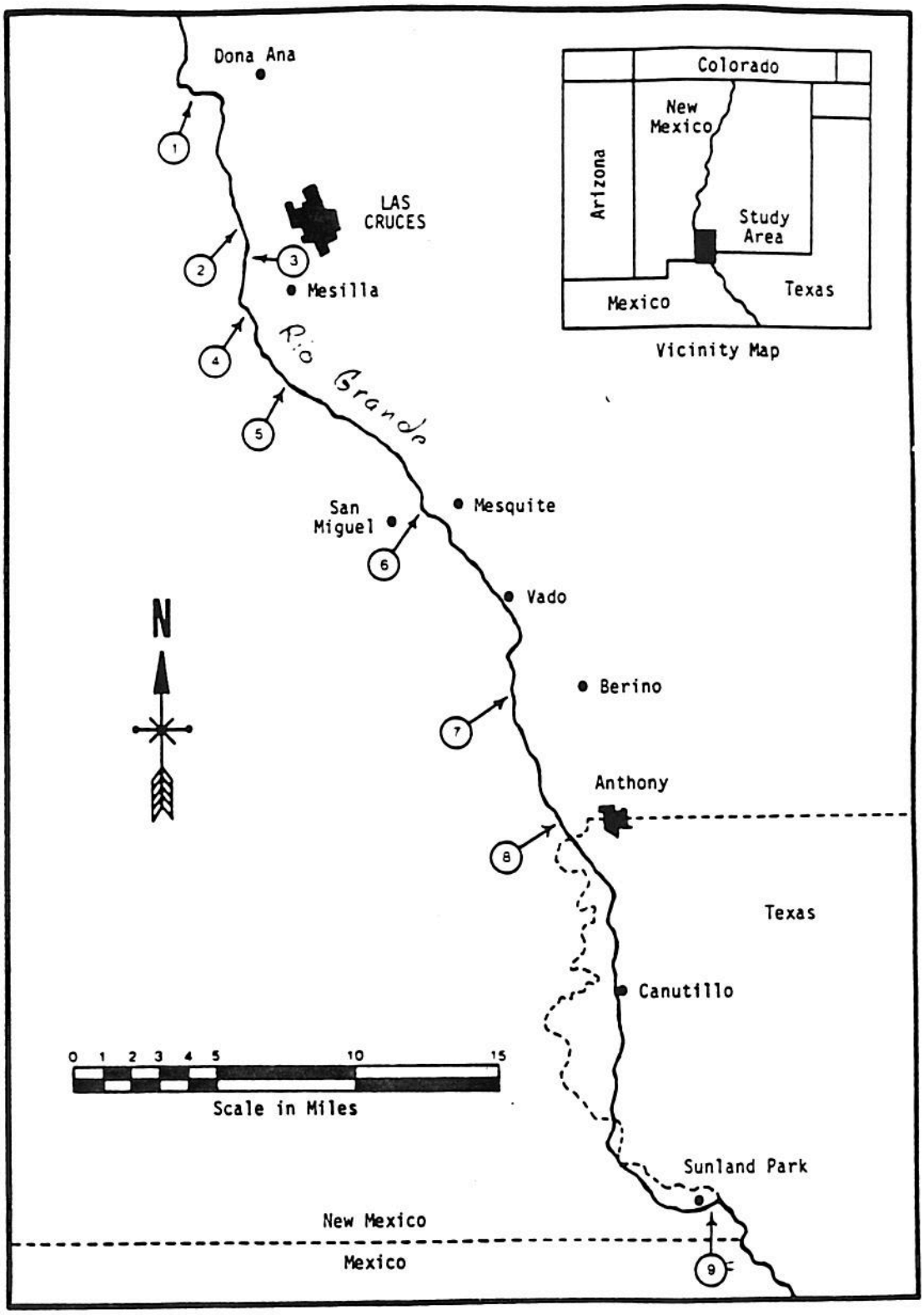


Figure 1. Map of Rio Grande study area, 1988.

by Caballo Dam in conjunction with Elephant Butte Dam. The Rio Grande at Caballo Dam has a drainage area of 30,700 square miles. At the time of the survey the Rio Grande varied from moderately to highly turbid and was carrying a considerable amount of trash and debris. The Rio Grande drops a total of 196 feet from the Shalem Colony Trail bridge near Dona Ana to Sunland Park, a distance of approximately 55 miles, or an average of 3.6 feet per mile.

The Las Cruces area is characterized as arid with an annual precipitation of 8.49 inches and an annual moisture deficit of 25.3 inches (Tuan 1969). During the last 50 years the annual rainfall in the area has varied from a low of 3.4 inches to a high of 19.6 inches. More than 69 percent of the mean annual precipitation in Las Cruces falls during the period from June through October in the form of brief but occasionally heavy thunderstorms. Temperatures in the Las Cruces area are warm with a daily mean temperature of 93.1 F in the summer and 59.1 F in the winter. Daytime summer temperatures range from the upper 80s to the upper 90s with an average of 97 days per year with high temperatures exceeding 90 F. Daytime winter temperatures range from the upper 50s to the mid 60s with an average of only one day per year with a high temperature below the freezing mark. Mean annual snowfall is 3.3 inches (Kunkel 1984).

The lower Rio Grande supports a limited warmwater fishery including bluegill, carp, channel catfish and smallmouth and largemouth bass. The american eel, white bass and walleye are also found here (Table A3).

METHODS AND MATERIALS

During the four-day survey (August 8-11, 1988) six stations on the Rio Grande were sampled five times. Additional samples were collected from the outfall of the Las Cruces wastewater treatment facility and from the Rio Grande near Anthony and near Sunland Park. Samples for 34 biocides were collected from four Rio Grande stations on August 22.

Sampling Stations

The names, STORET[1] identification codes, and location of stations selected for this survey are given below. A map of the study area is presented in Fig. 1.

Station	STORET Code (Secondary)	Location
1	LRG101000150	Rio Grande at Shalem Colony Trail bridge near Dona Ana.
2	LRG101000145	Rio Grande at Picacho Avenue bridge in Las Cruces.
3	LRG101000140	Effluent discharge from the Las Cruces WWTF.
4	LRG101000135	Rio Grande at bridge near La Mesilla.
5	LRG101000130	Rio Grande at Mesilla diversion dam.
6	LRG101000125	Rio Grande at New Mexico Hwy 228 near Mesquite.
7	LRG101000120	Rio Grande at New Mexico Hwy 192 near Berino.
8	LRG101000110	Rio Grande at New Mexico Hwy 225 near Anthony.

[1]STORET is a computer-based data storage and retrieval system of the U.S. Environmental Protection Agency.

9	LRG101000105	Rio Grande at bridge near Sunland Park.

Data Acquisition

Water temperature and conductivity were measured in-situ using a SCT meter (Yellow Springs Instrument Company). Dissolved oxygen concentrations were determined by the Winkler titration procedure (APHA). Hydrogen ion concentrations were measured using a portable pH meter (Orion 250).

Water samples for turbidity measurements were collected in clean 250 ml amber polyethylene bottles and cooled on ice to 4 C. Water samples for determinations of total ammonia, total nitrite plus nitrate, total Kjeldahl nitrogen, total phosphorus, non-filterable and filterable residues, major cations and anions, and trace metals were collected in clean, previously unused one-liter polyethylene containers (Cubitainers). Water samples for bioicide analyses were collected in acid-washed, amber glass containers supplied by the SLD. The samples were preserved as indicated below, cooled on ice to 4 C and transported in ice chests to the Scientific Laboratory Division (SLD) in Albuquerque. Samples for nutrient analyses were preserved at the sampling site with 2 ml of concentrated H_2SO_4; samples for trace-metal analyses were preserved with 5 ml of concentrated HNO_3.

Water samples for determination of densities of fecal coliform bacteria were collected in sterile, wide-mouth 100 ml polypropylene bottles containing sodium thiosulfate, cooled on ice to 4 C and transported in ice chests to either the Las Cruces WWTF laboratory or to the SLD within six hours of the sampling time.

The Scientific Laboratory Division performs all analyses in accordance with currently approved procedures in the latest editions of "Standard Methods for the Examination of Water and Wastewater" (APHA), "Methods for Chemical Analysis of Water and Wastes" (USEPA), or "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act" (40 CFR Part 136). The validity of all environmental measurements was ensured by strict adherence to the procedures given in "Quality Assurance Project Plan for Water Pollution Control Programs" (NMEID 1986). Total organic nitrogen (TON) was calculated as total Kjeldahl nitrogen (TKN) minus total ammonia, total inorganic nitrogen (TIN) as the sum of total nitrate plus nitrite plus total ammonia, and total nitrogen (TN) as total organic plus total inorganic nitrogen. These water quality data were transferred to STORET for storage and retrieval. Sample types, parameters, and STORET codes of environmental measurements performed during this water quality survey are summarized in Table A1.

RESULTS AND DISCUSSION

Watercourse Habitat

The first station on the Rio Grande (station 1) was located downstream from the Shalem Colony Trail bridge near the village of Dona Ana. The elevation here was 3,925 feet above mean sea level. The river was swift, turbid (turbidity averaged 74 NTU) and warm (temperature averaged 24.7 C). The watercourse here was approximately 100 feet in width and the grass-covered undercut banks were two to four feet in height. Station 2 was located on the Rio Grande downstream from the Picacho Avenue bridge in Las Cruces. The elevation here was 3,890 feet above sea level. The river was swift, highly turbid (turbidity averaged 97 NTU) and warm (temperature averaged 24.5 C). The watercouse was approximately 100 feet in width and the grass-covered undercut banks were three to five feet in height.

Station 3 was at the effluent discharge from the Las Cruces wastewater treatment facility at 3,885 feet above mean sea level. This facility was completed in 1986 with a design average daily flow of 8.9 mgd. Actual flows nave averaged 6.24 mgd and peaked at 7.3 mgd. The flow sequence consists of bar screening, grit removal, primary sedimentation using clarifiers, biological treatment using roughing filters and activated sludge, followed by secondary clarification and chlorination. The effluent from the Las Cruces WWTF has generally been in compliance with the requirements of its NPDES permit No. NM0023311. The effluent from the WWTF was warm (temperature averaged 27.3 C) and clear (turbidity averaged 3 NTU).

Station 4 was located on the Rio Grande upstream from a bridge near La Mesilla. The elevation here was 3,880 feet above sea level. The river was swift, highly turbid (turbidity averaged 113 NTU) and warm (temperature averaged 24.4 C). The watercourse was approximately 100 feet in width and the grass-covered undercut banks were three to five feet in height. Station 5 was located on the Rio Grande upstream from the Mesilla diversion dam at 3,870 feet above sea level. The river was moderately swift, highly turbid (turbidity averaged 136 NTU) and warm (temperature averaged 24.6 C). The watercourse was approximately 100 feet in width and the muddy banks were one to two feet in height.

Station 6 was located on the Rio Grande at the State Highway 192 bridge near Mesquite at 3,832 feet above mean sea level. The river here was swift, turbid (turbidity averaged 89 NTU) and warm (temperature averaged 24.8 C). The watercourse here was approximately 100 feet in width and the grass-and-forb-covered banks were three to six feet in height. Station 7 was located on the Rio Grande at State Highway 226 bridge near Berino at 3,810 feet above mean sea level. The river here was swift, moderately turbid (turbidity averaged 55 NTU) and warm (temperature averaged 24.4 C). The river was approximately 80 feet in width and the grass-covered banks were three to five feet in height.

Station 8 was located on the Rio Grande at the State Highway 225 bridge near Anthony at 3,785 feet above sea level. The river here was moderately swift, turbid (turbidity averaged 76 NTU) and warm (temperature averaged 24.2 C). The river was approximately 100 feet in width and the undercut grass-covered banks were four

to seven feet in height. Station 9 was located on the Rio Grande at a bridge just downstream from Sunland Park at 3,720 feet above mean sea level. The river here was swift, highly turbid (turbidity averaged 99 NTU) and warm (temperature averaged 24.9 C). The river was approximately 80 feet in width and the grass-covered banks were approximately one to two feet in height. Photographs of all sampling stations are appended.

Water Quality Assessment

The water quality data collected during this survey are tabulated in Table A2 and graphically presented in Figs. 2-7. These data are available on STORET and can be retrieved using the selector A=21NMEX and the restrictor IS=883507.

An analysis of the data indicates that this stretch of the lower Rio Grande was warm, moderately to highly turbid, slightly alkaline and contained moderate amounts of most chemical constituents and nutrients. Exceptions were iron and manganese, which occurred in high concentrations at all Rio Grande stations and in extremely high concentrations at stations 1, 8 and 9.

Temperatures in the Rio Grande were warm during the survey, as would be expected in the Las Cruces area in August. Temperatures remained relatively constant although variability decreased in a downstream manner (Fig. 2). The highest and lowest temperatures measured in the Rio Grande during the study were at station 1 (22.6 to 27.0 C). Temperatures at station 3 in the effluent ranged from 26.5 to 28.0 C. Turbidities in the Rio Grande were high and ranged from a low of 26 NTU at station 1 to a high of 290 NTU at station 6. Turbidities in the effluent ranged

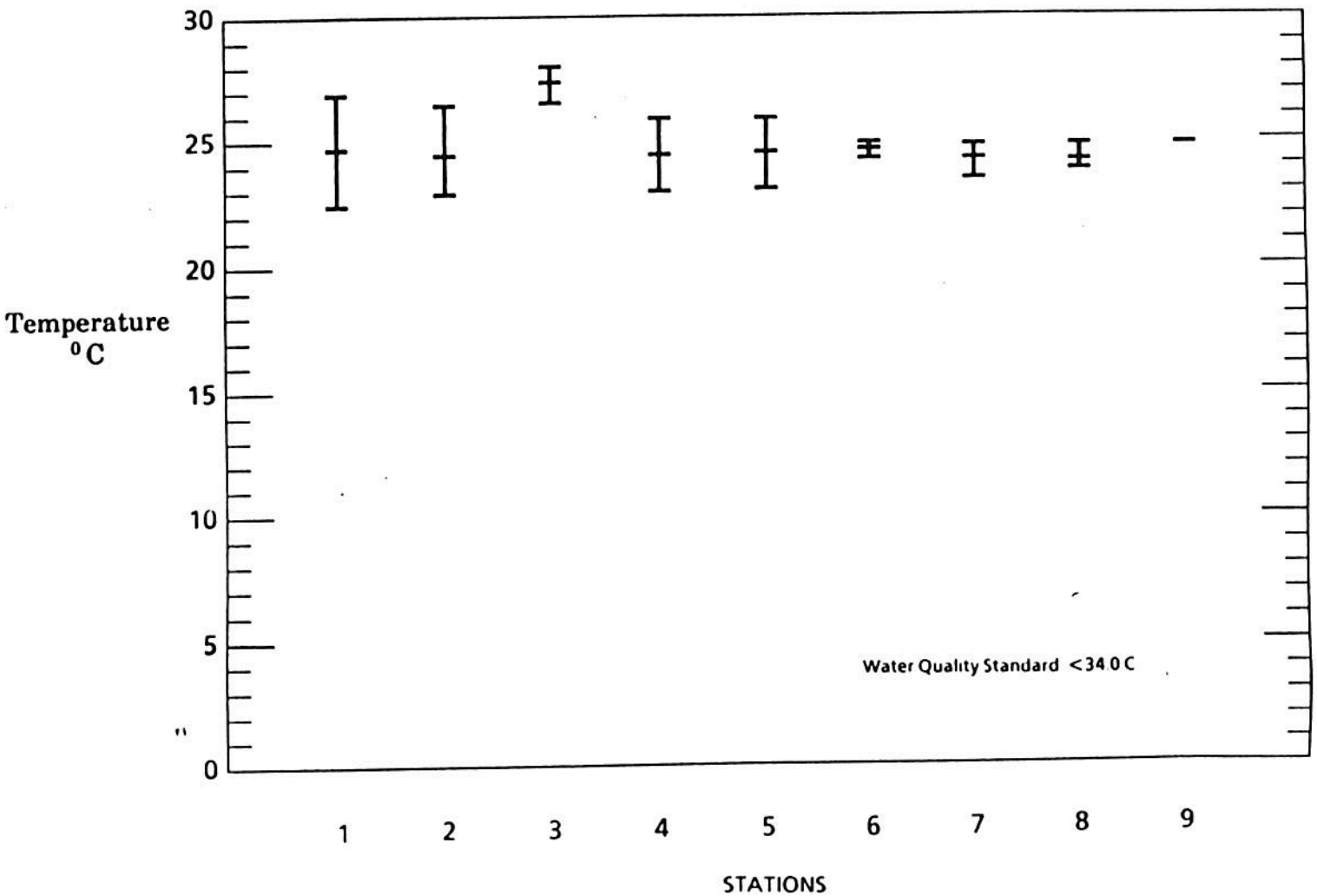


Figure 2. Temperatures (means and ranges) measured at sampling sites on the Rio Grande, August 8-11, 1988.

from 2.5 to 4.0 NTU.

Dissolved oxygen concentrations in the Rio Grande were relatively high and ranged from a low of 6.4 mg/l at station 9 to a high of 7.7 mg/l at station 4, downstream from the Las Cruces WWTF (Fig. 3). Dissolved oxygen concentrations in the effluent ranged from 6.9 to 7.2 mg/l. Conductivity levels in the Rio Grande ranged from a low of 616 umhos/cm at station 4 to a high of 892 umhos/cm at station 9, and from 1,037 to 1,154 umhos/cm in the effluent (Fig. 4). Total dissolved residue levels in the Rio Grande ranged from a low of 350 mg/l at station 2 to a high of 544 mg/l at station 9 and from 542 to 716 mg/l in the effluent (Fig. 5).

The highest and lowest concentrations of total nitrogen measured in the Rio Grande were at station 5, immediately upstream from the Mesilla diversion dam, with relatively low levels and lower variabilities upstream and downstream from station 5 (Fig. 6). Total nitrogen concentrations in the effluent ranged from 8.65 to 11.62 mg/l. Total phosphorus concentrations in the Rio Grande ranged from a low of 0.12 mg/l at station 2 to a high of 3.91 mg/l at station 4 (Fig. 7). Total phosphorus concentrations ranged from 0.81 to 7.38 mg/l in the effluent.

Values for pH in the Rio Grande were well within standards and ranged from 8.19 at station 1 to 8.54 at station 7. Values for pH in the effluent ranged from 7.33 to 7.62. Concentrations of 34 biocides at stations 2, 4, 8 and 9 were all below detection limits.

In conjunction with this intensive survey EPA conducted

Figure 2. Temperatures (means and ranges) measured at sampling sites on the Rio Grande, August 8-11, 1988.

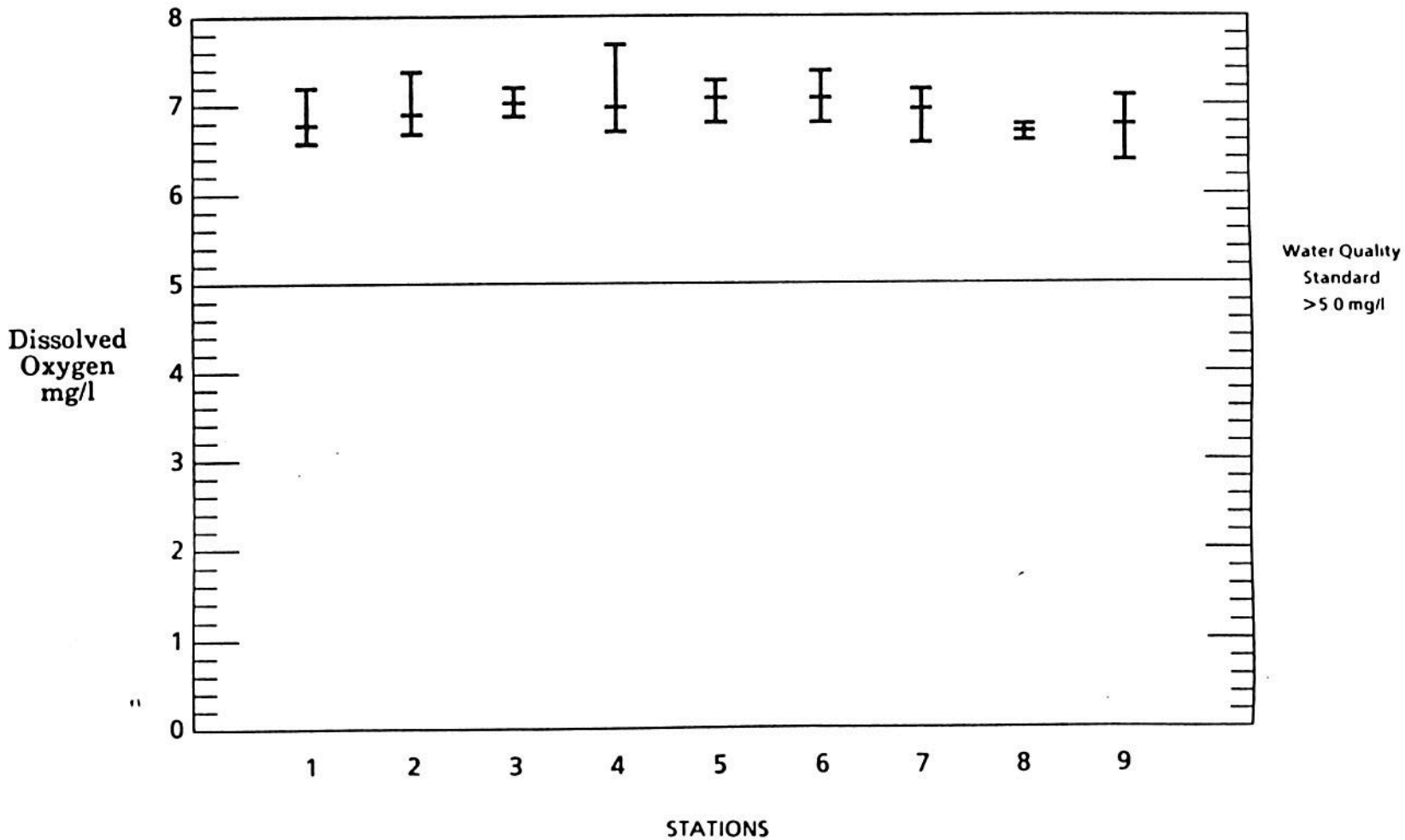


Figure 3. Dissolved oxygen concentrations (means and ranges) measured at sampling sites on the Rio Grande, August 8-11, 1989.

sampling sites on the Rio Grande, August 8-11, 1988.

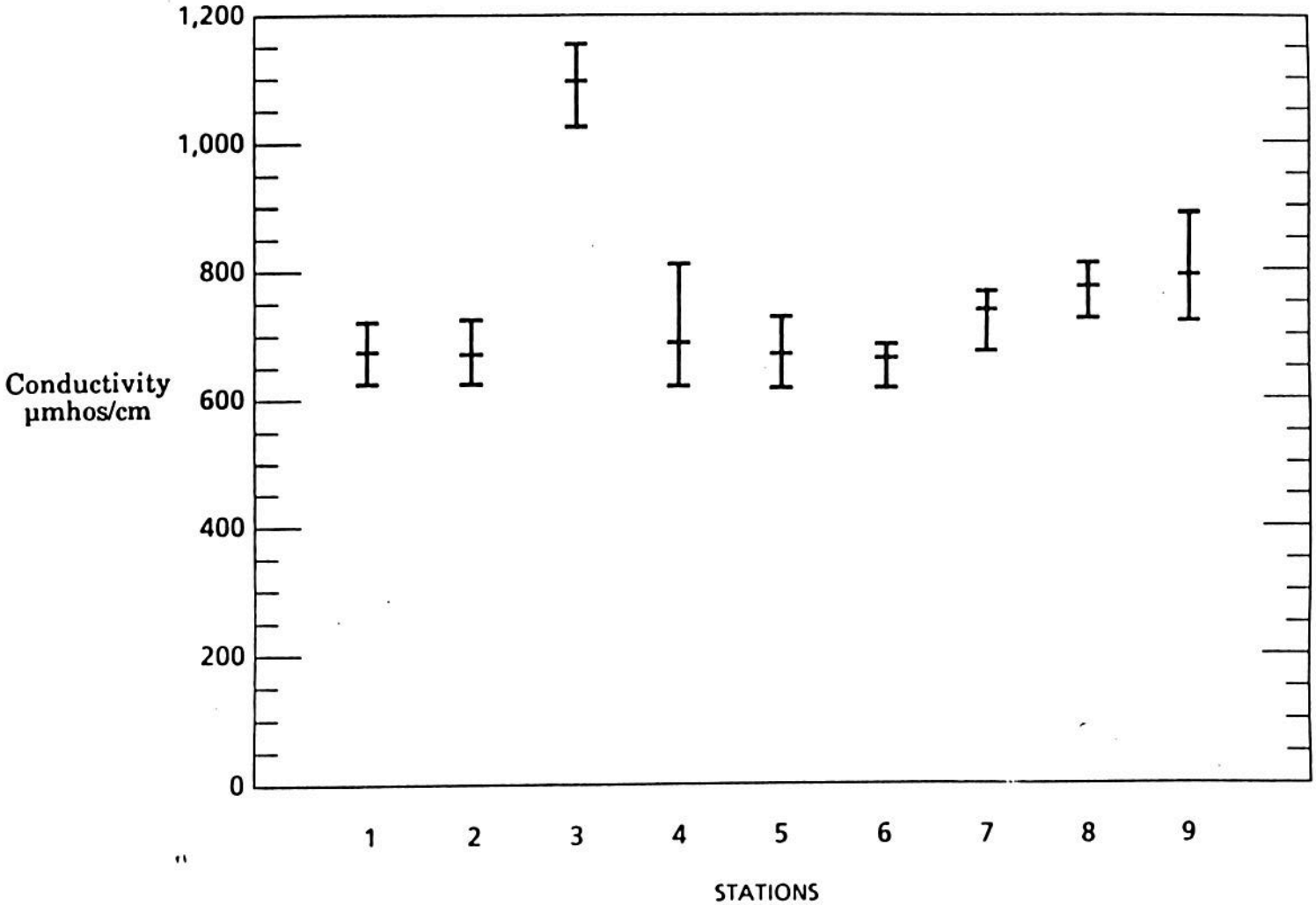


Figure 4. Conductivity levels (means and ranges) measured at sampling sites on the Rio Grande, August 8-11, 1988.

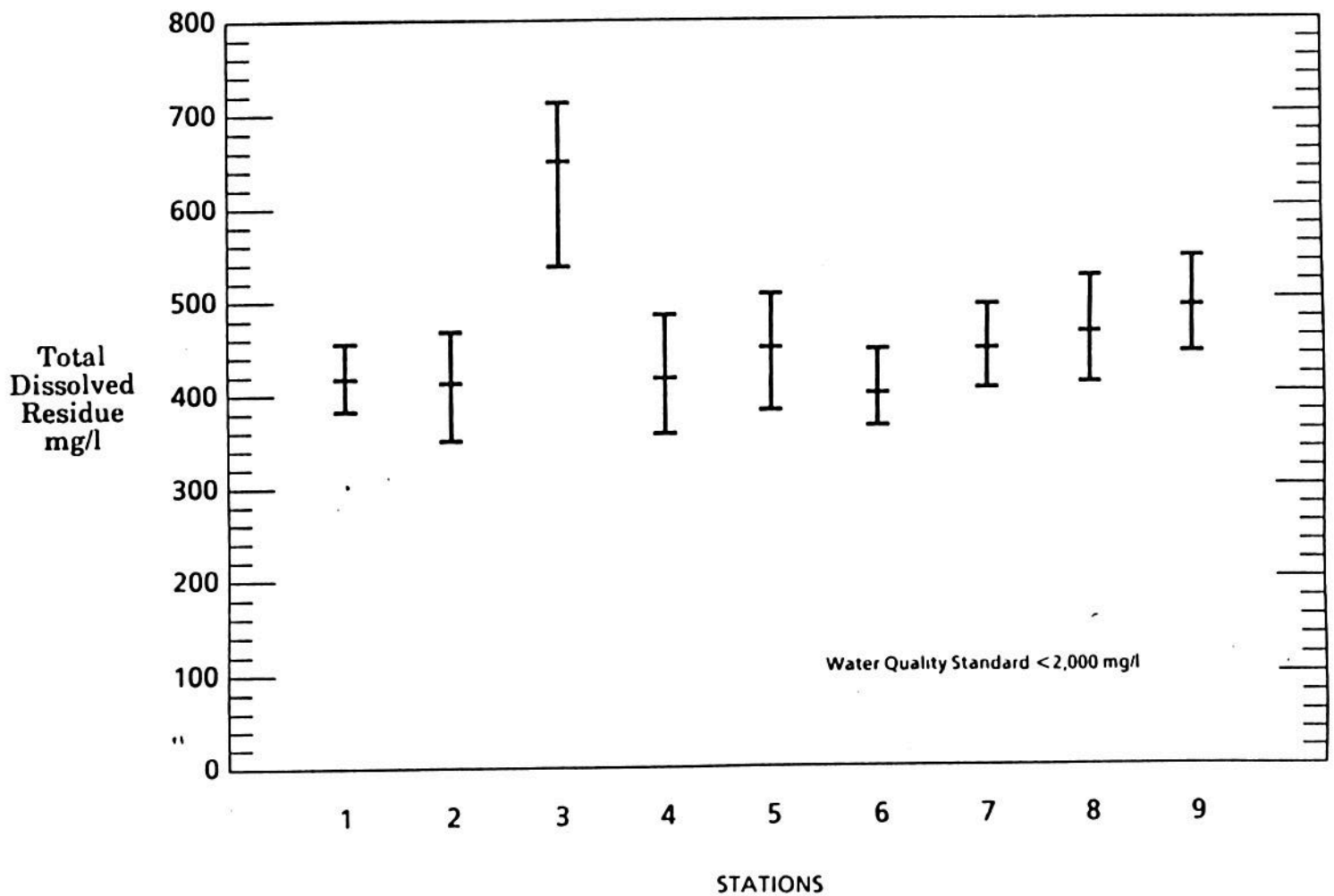


Figure 5. Total dissolved residue levels (means and ranges) measured at sampling sites on the Rio Grande, August 8-11, 1988.

sampling sites on the Rio Grande, August 8-11, 1988.

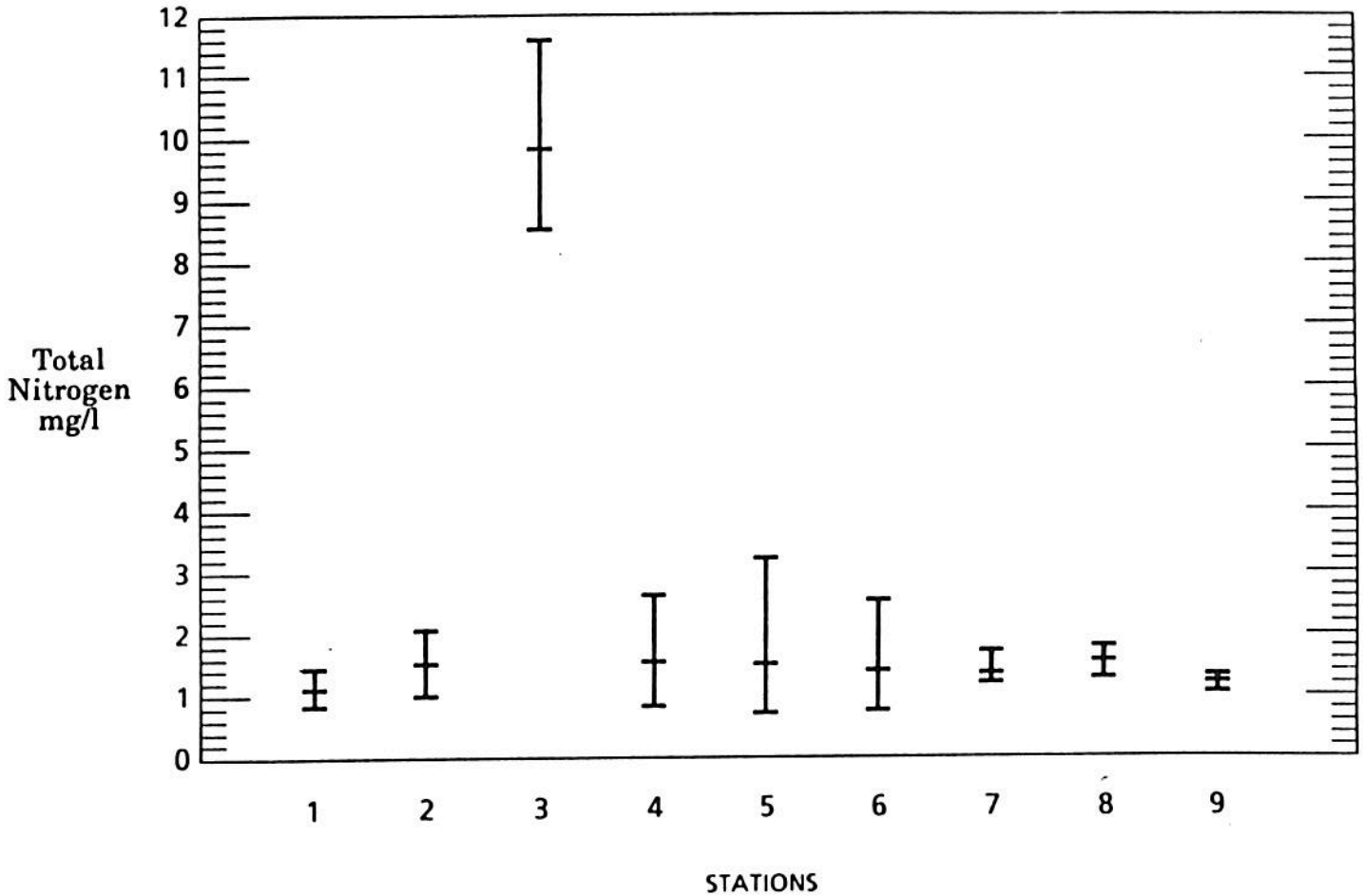


Figure 6. Total nitrogen concentrations (means and ranges) measured at sampling sites on the Rio Grande, August 8-11, 1988.

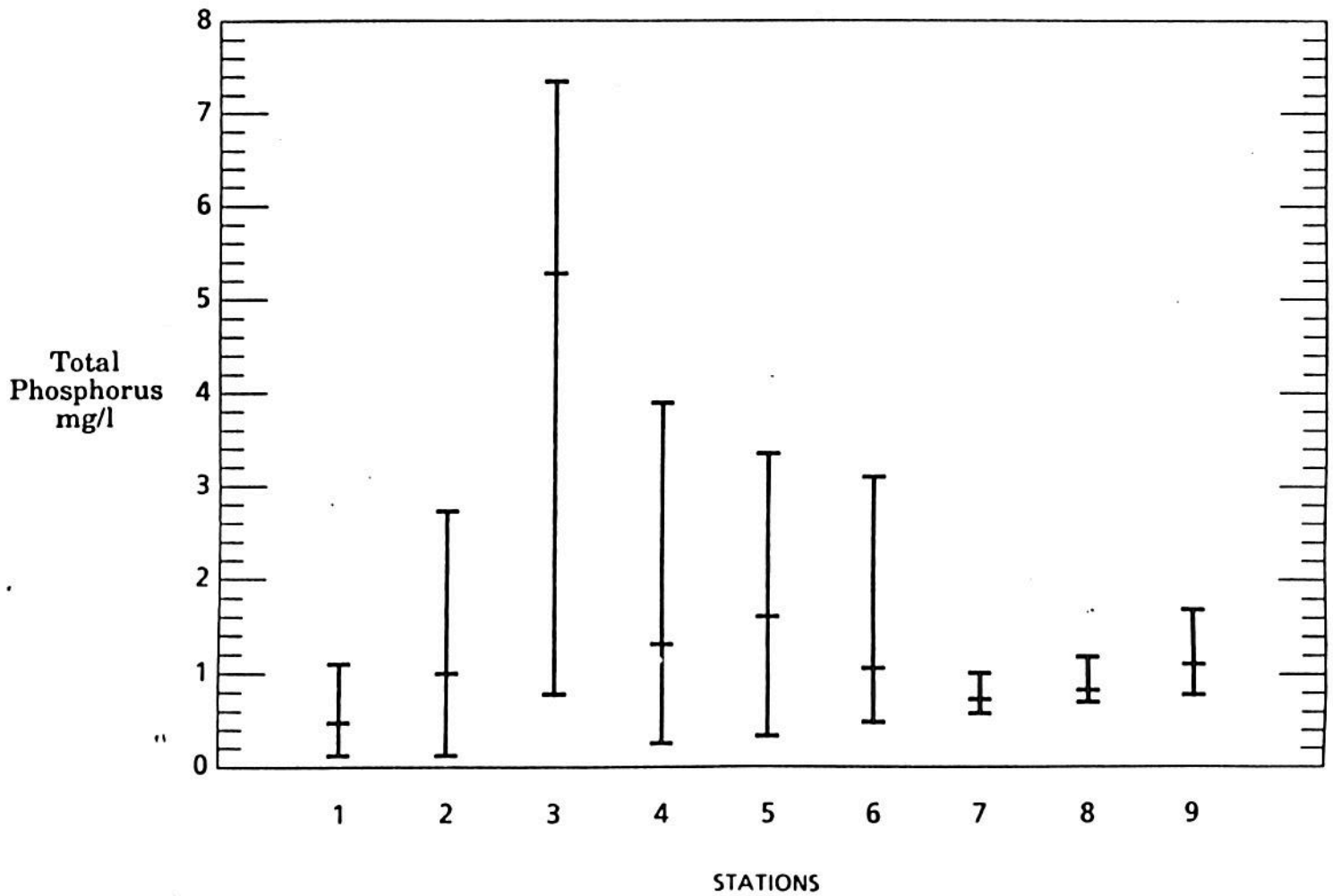


Figure 7. Total phosphorus concentrations (means and ranges) measured at sampling sites on the Rio Grande, August 8-11, 1988.

Figure 7. Total phosphorus concentrations (means and ranges) measured at sampling sites on the Rio Grande, August 8-11, 1988.

biomonitoring on water and sediment samples collected from stations 2, 4, 6, 8 and 9 and the Las Cruces WWTF conducted biomonitoring on the effluent from the treatment plant. The EPA samples "show no significant effect on the water or sediment below the Las Cruces wastewater treatment plant" but did demonstrate toxicity to Ceriodaphnia at station 9, below Sunland Park. The Sunland Park WWTF was not sampled during this study and no possible sources of the observed toxicity are suggested. Biomonitoring samples collected by the Las Cruces WWTF from the effluent also indicated toxicity to Ceriodaphnia. These samples contained an average of 0.76 mg/l total chlorine residual and it was suggested that this was the toxic factor. None of the biomonitoring samples demonstrated any toxicity to fathead minnows.

Discharge Rates

Flow measurements recorded at the USGS gage on the Rio Grande below Caballo Dam (08362500) for August 8-11 were 1,240, 1,258, 1,279 and 1,078 ft^3/sec. The Las Cruces wastewater treatment facility was discharging an average of 10.7 ft^3/sec during the survey, or less than one percent of the average flow of the Rio Grande during the same period.

Water Quality Standards Attainment

No violations or exceedances of the numeric or general standards were observed during the survey in water quality segment 2-101. Samples collected from the Las Cruces wastewater treatment facility effluent met permit requirements for fecal coliform bacteria and total non-filterable residue during the survey. No

samples for BOD were collected during the survey. The average of the total chlorine residual measurements taken from the WWTF effluent during the survey was 0.38 mg/l. EPA has proposed addi the requirement of 0.011 mg/l or "no measurable" total chlorine residual to the NPDES permit for Las Cruces; during the time of the survey there was no limitation for total chlorine residual.

REFERENCES

American Public Health Association. Standard methods for the examination of water and wastewater, latest edition.

Beal, Linda. United States Geological Survey, Subdistrict Albuquerque New Mexico. Flow data recorded at station 08362500. Personal communication.

Clark, Ira G. 1987. Water in New Mexico, a history of its management and use. Albuquerque: University of New Mexico Press. 839 p.

Gabin, V.L., and L.E. Lesperance. 1977. New Mexico climatological data: precipitation, temperature,evaporation, and wind. Monthly and annual means 1850-1975. W.K. Summers and Associates. Socorro, New Mexico. 436 p.

Hem, John D. 1985. Study and interpretation of the chemical characteristics of natural water - third edition. U.S. Geological Survey Water-Supply Paper 2254. 263 p.

Hernandez, John W. 1976. Rio Grande water quality base line study, 1974-1975. New Mexico Water Resources Research Institute Report No. 064.

Jenke, Arthur L. 1974. Evaluation of salinity created by irrigation return flows. Washington, D.C.; USEPA. 128 p.

Kunkel, K.E. 1984. Temperature and precipitation summaries for selected New Mexico locations. Las Cruces, New Mexico Department of Agriculture. 192 p.

New Mexico Bureau of Mines and Mineral Resources. 1977. Mineral and water resources of New Mexico. Socorro, New Mexico. 437 p.

New Mexico Department of Game and Fish. 1988. Operation plan - aquatic management of New Mexico wildlife - 1987-1995. Santa Fe, New Mexico. 188 p.

New Mexico Environmental Improvement Division. 1978. Intensive survey of the Rio Grande near Las Cruces, New Mexico, July 25-27, 1978. Santa Fe, New Mexico. 14 p.

New Mexico Environmental Improvement Division. 1986. Quality assurance project plan for water pollution control programs. Santa Fe, New Mexico. 98 p.

New Mexico Water Quality Control Commission. 1975. Lower Rio Grande basin plan. Santa Fe, New Mexico. 111 p.

New Mexico Water Quality Control Commission. 1988. Water quality standards for interstate and intrastate streams in New Mexico. WQCC 88-1, April 25, 1988. Santa Fe, New Mexico. 48 p.

Platts, W.S., W.F. Megaham, and G.W. Minshall. 1983. Methods fc evaluating stream, riparian and biotic conditions. U.S. Forest Service, Ogden, Utah. INT-138. 70 p.

Sammis, Theodore W. 1980. Demonstration of irrigation return flow water quality in the Mesilla Valley, New Mexico. New Mexico Water Resources Research Institute, Report No. 117. 149 p.

Smolka, L.R., S.J. Oppenheimer and D.F. Tague. 1982. Intensive survey of the Rio Grande near Las Cruces, New Mexico, September 8-11, 1981. NMEID, Santa Fe, New Mexico. EID/SWQ. 33 p.

Tague, David F. 1978. Intensive survey of the Rio Grande, near Las Cruces, New Mexico, July 25-27, 1978. NMEID, Santa Fe, New Mexico. EID/SWQ. 14 p.

Tuan, Y., E.E. Everard, and J.C. Widdison. 1969. The climate o New Mexico. New Mexico State Planning Office. Santa Fe, N Mexico. 165 p.

United States Environmental Protection Agency. Methods for chemical analysis of water and wastes. Environmental Monitoring and Support Laboratory. Cincinnati, Ohio. EPA-600/4-79-200 or latest edition.

United States Environmental Protection Agency. 1973. Biologica field and laboratory methods for measuring the quality of surface waters and effluents. National Environmental Research Center, Cincinnati, Ohio. EPA-670/4-73-001.

United States Environmental Protection Agency. 1985. Short-ter methods for estimating the chronic toxicity of effluents ar receiving waters to freshwater organisms. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio. EPA-600/4-85-014.

Von Eschen, G.F. 1961. The climate of New Mexico - climatologic summaries for 35 weather stations and the state. UNM Colle of Business Administration. Business Information Series: No. 37.

Wierenga, P.J., C. Duffy, R. Senn and L.W. Gelher. 1981. Impac of irrigated agriculture on water quality in the Rio Grande near Albuquerque. New Mexico State University: Socorro, Ne Mexico. 171 p.

Table A1. Summary of sample types, parameter names and STORET codes of environmental measurements performed during the water quality survey of the Rio Grande in the vicinity of Las Cruces, August 8-11, 1988.

Type	Parameter	STORET Code
Physical	Temperature	00010
	Conductivity	00095
	Total filterable residue (TDS)	70300
	Total non-filterable residue (TSS)	00530
	Turbidity	82079
Chemical	pH	00400
	Dissolved oxygen	00300
	Total Kjeldahl nitrogen	00625
	Total ammonia nitrogen	00610
	Total nitrite + nitrate nitrogen	00630
	Total phosphorus	00665
	Total organic carbon	00680
	Total alkalinity	00410
	Total hardness (as $CaCO_3$)	00900
	Sulfate	00945
	Chloride	00940
	Bicarbonate	00440
	Magnesium	00925
	Sodium	00930
	Potassium	00935
	Calcium	00915
	Total arsenic	01002
	Total barium	01007
	Total cadmium	01027
	Total chromium	01034
	Total lead	01051
	Total mercury	71900
	Total selenium	01147
	Total silver	01077
	Total copper	01042
	Total iron	01045
	Total manganese	01055
Biological	Fecal coliform bacteria	31616

Table A1 (cont). Summary of parameter names and STORET codes of biocides samples collected supplemental to the water quality survey of the Rio Grande in the vicinity of Las Cruces, August 22, 1988.

Parameter	STORET Code
ORGANOCHLORINE PESTICIDES	
Lindane (gamma-BHC)	39782
Alpha-BHC	39337
Beta-BHC	39338
Delta-BHC	34259
Aldrin	39330
Chlordane, total	39350
DDT, total	39370
p,p' DDT	39300
o,p' DDT	39305
DDD, total	39360
p,p' DDD	39310
o,p' DDD	39315
DDE, total	39365
p,p' DDE	39320
o,p' DDE	39327
Dieldrin	39380
Endosulfan	39380
Endrin	39390
Heptachlor	39410
Heptachlor epoxide	39420
Toxaphene	39400
Methoxychlor	39480
ORGANOPHOSPHATE PESTICIDES	
Parathion	39540
Methyl parathion	39600
Disulfoton	81888
Malathion	39530
Diazinon	39570
Monocrotophos (Azodrin)	81890
Chloropyrifos, total recoverable	38932
CHLOROPHENOXY ACID HERBICIDES	
2,4-D	39730
2,4,5-T	39740
2,4,5-TP (Silvex)	39760
Picloram (Tordon, Amdon)	39720
TRIAZINE HERBICIDES	
Atrazine	39033

Table A2. Water quality data collected during the intensive survey of the Rio Grande, August 8-11, 1988.

STORET RETRIEVAL DATE 89/02/16 PGM=RET PAGE: 1
LRG045.5 LRG101000150 LC1
32 22 36.0 106 51 21.0 4
RIO GRANDE AT NM HWY 430 NEAR DONA ANA
35013 NEW MEXICO DONA ANA
WESTERN GULF
UPPER RIO GRANDE STATION 1 - RIO GRANDE AT SHALEM COLONY TRAIL BRIDGE
21NMEX 790105 HQ 13030102011 0010.710 OFF
SURFACE WATER SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00095 CNDUCTVY AT 25C MICROMHO	00400 PH SU	00300 DO MG/L	82079 TURBIDTY LAB NTU	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00680 T ORG C C MG/L	00900 TOT HARD CACO3 MG/L	31616 FEC COLI MFM-FCBR /100ML
88/08/08	0840	WATER		24.0	632	8.21	6.6	52.0	382	95	9.14	250	
88/08/09	0805	WATER		22.6	723	8.31	6.7	32.0	445	89			
88/08/09	1415	WATER		26.9	680	8.24	7.0	26.0	458	72			
88/08/10	0755	WATER		23.0	676	8.29	6.6	125.0	396	412	12.10	215	470
88/08/10	1430	WATER		27.0	672	8.19	7.2	135.0	424	442			
88/08/11	1030	WATER											200

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00665 PHOS-TOT MG/L P	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00625 TOT KJEL N MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00410 T ALK CACO3 MG/L	00946 SULFATE SO4-DISS MG/L	00940 CHLORIDE TOTAL MG/L
88/08/08	0840	WATER		.210	.230	.280	.510C	.980	.700C	1.210C	123.0	122.0	52.3
88/08/09	0805	WATER		.180	.290	.120	.410C	.640	.520C	.930C			
88/08/09	1415	WATER		.150	.230	.100K	.330C	.590	.490C	.820C			
88/08/10	0755	WATER		1.120	.350	.300	.650C	1.020	.720C	1.370C			
88/08/10	1430	WATER		.570	.320	.310	.630C	1.150	.840C	1.470C			

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00440 HCO3 ION HCO3 MG/L	00925 MGNSIUM MG,DISS MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01027 CADMIUM CD,TOT UG/L	01034 CHROMIUM CR,TOT UG/L	01051 LEAD PB,TOT UG/L
88/08/08	0840	WATER		144.0	30.5	67.0	6.00	50.0	5K	100	1K	5	10K
88/08/10	0755	WATER							8	200	1K	7	10K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L	01042 COPPER CU,TOT UG/L	01045 IRON FE,TOT UG/L	01055 MANGNESE MN UG/L
88/08/08	0840	WATER		.5K	5K	1K	50K	2800	190
88/08/10	0755	WATER		.5K	5K	1K	50K	8400	300

STORET RETRIEVAL DATE 89/02/16 PGM=RET PAGE: 2
LRG046 LRG101000145 LC2
32 18 36.0 106 49 34.0 4
RIO GRANDE AT PICACHO AVE IN LAS CRUCES
35013 NEW MEXICO DONA ANA
WESTERN GULF 120900
UPPER RIO GRANDE
21NMEX STATION 2 - RIO GRANDE AT PICACHO AVENUE BRIDGE
SURFACE WATER SAMPLES HQ 13030102011 0004.540 OFF

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00095 CNDUCTVY AT 25C MICROMHO	00400 PH SU	00300 DO MG/L	82079 TURBIDTY LAB NTU	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00680 T ORG C C MG/L	00900 TOT HARD CACO3 MG/L	31616 FEC COLI MFM-FCBR /100ML
88/08/08	0905	WATER		24.0	632	8.29	6.7	31.0	350	117	5.35	235	
88/08/09	0830	WATER		23.0	728	8.40	7.0	46.0	452	100			
88/08/09	1355	WATER		26.4	680	8.29	7.4	32.0	468	96			
88/08/10	0820	WATER		22.9	667	8.39	6.7	230.0	396	1017	16.80	245	1200
88/08/10	1410	WATER		26.0	676	8.23	6.7	145.0	418	425			
88/08/11	1015	WATER											200K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00665 PHOS-TOT MG/L P	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00625 TOT KJEL N MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00410 T ALK CACO3 MG/L	00946 SULFATE SO4-DISS MG/L	00940 CHLORIDE TOTAL MG/L
88/08/08	0905	WATER		.120	.170	.810	.980C	1.700	.890C	1.870C	101.0	120.0	52.4
88/08/09	0830	WATER		.180	.320	.210	.530C	.700	.490C	1.020C			
88/08/09	1355	WATER		.620	.330	.290	.620C	.720	.430C	1.050C			
88/08/10	0820	WATER		2.690	.420	.490	.910C	1.740	1.250C	2.160C			
88/08/10	1410	WATER		1.480	.410	.410	.820C	1.330	.920C	1.740C			

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00440 HCO3 ION HCO3 MG/L	00925 MGNSIUM MG,DISS MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01027 CADMIUM CD,TOT UG/L	01034 CHROMIUM CR,TOT UG/L	01051 LEAD PB,TOT UG/L
88/08/08	0905	WATER		114.0	28.1	63.0	6.00	48.0	5K	100	1K	5K	10K
88/08/10	0820	WATER							14	300	3	28	10

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L	01042 COPPER CU,TOT UG/L	01045 IRON FE,TOT UG/L	01055 MANGNESE MN UG/L
88/08/08	0905	WATER		.5K	5K	1K	50K	1900	160
88/08/10	0820	WATER		.5K	5K	1K	50K	16000	530

88/08/08 0905 WATER	.5K	5K	1K	50K	1900	160
88/08/10 0820 WATER	.5K	5K	1K	50K	16000	530

STORET RETRIEVAL DATE 89/02/16 PGM=RET

LRG046.3 LRG101000140 LC3
32 17 33.0 106 49 27.0 4
LAS CRUCES WWTP EFFLUENT DITCH AT RIO GRANDE
35013 NEW MEXICO DONA ANA
WESTERN GULF 120900
UPPER RIO GRANDE ABOVE PECOS RIVER STATION 3 - EFFLUENT FROM LAS CRUCES WWTF
21NMEX 820109 HQ 13030102011 0003.330 OFF
SURFACE WATER SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00095 CNDUCTVY AT 25C MICROMHO	00400 PH SU	00300 DO MG/L	82079 TURBIDTY LAB NTU	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00680 T ORG C C MG/L	00900 TOT HARD CACO3 MG/L	31616 FEC COLI MFM-FCBR /100ML
88/08/08	0935	WATER		27.0	1037	7.43	6.9	2.5	542	72	5.00	233	
88/08/09	0900	WATER		27.0	1104	7.60		2.6	656	3K			
88/08/09	1345	WATER		28.0	1081	7.33		3.3	694	4			
88/08/10	0845	WATER		26.5	1154	7.62	7.2	2.9	664	74	7.10	185	1K
88/08/10	1355	WATER		27.8	1123	7.35		4.0	716	10			
88/08/11	1005	WATER											1K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00665 PHOS-TOT MG/L P	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00625 TOT KJEL N MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	*00410 T ALK CACO3 MG/L	00946 SULFATE SO4-DISS MG/L	00940 CHLORIDE TOTAL MG/L
88/08/08	0935	WATER		7.380	8.300	.160	8.460C	.580	.420C	8.880C		125.0	143.0
88/08/09	0900	WATER		3.880	9.800	.530	10.330C	1.820	1.290C	11.620C			
88/08/09	1345	WATER		6.910	7.800	.980	8.780C	2.530	1.550C	10.330C			
88/08/10	0845	WATER		7.380	6.800	.600	7.400C	1.850	1.250C	8.650C			
88/08/10	1355	WATER		.810	7.950	.590	8.540C	1.990	1.400C	9.940C			

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00440 HCO3 ION HCO3 MG/L	00925 MGNSIUM MG,DISS MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01027 CADMIUM CD,TOT UG/L	01034 CHROMIUM CR,TOT UG/L	01051 LEAD PB,TOT UG/L
88/08/08	0935	WATER			20.1	114.0	14.00	60.0	5K	100K	1K	5K	10K
88/08/10	0845	WATER							5K	100K	1K	5K	10K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L	01042 COPPER CU,TOT UG/L	01045 IRON FE,TOT UG/L	01055 MANGNESE MN UG/L
88/08/08	0935	WATER		.5K	10K	1K	50K	50K	50K
88/08/10	0845	WATER		.5K	5K	1K	50K	50K	50K

STORET RETRIEVAL DATE 89/02/16 PGM=RET PAGE: 4
LRG046.5 LRG101000135 LC4
32 15 49.0 106 49 [illegible] 4
RIO GRANDE AT BRID[illegible] NEAR LA MESILLA
35013 NEW MEXICO DONA ANA
WESTERN GULF
UPPER RIO GRANDE
21NMEX 790105 HQ 13030102011 0001.080 OFF
SURFACE WATER SAMPLES

STATION 4 - RIO GRANDE AT BRIDGE NEAR MESILLA

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00095 CNDUCTVY AT 25C MICROMHO	00400 PH SU	00300 DO MG/L	82079 TURBIDTY LAB NTU	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00680 T ORG C C MG/L	00900 TOT HARD CACO3 MG/L	31616 FEC COLI MFM-FCBR /100ML
88/08/08	1020	WATER		24.5	616	8.32	6.8	34.0	358	84	5.20	253	
88/08/08	1021	WATER							380	137	7.83	253	
88/08/09	0920	WATER		23.5	814	8.44	7.7	53.0	450	116			
88/08/09	1330	WATER		26.0	725	8.31	7.0	36.0	484	92			
88/08/10	0910	WATER		23.1	633	8.35	6.7	270.0	434	1326	7.80	345	1K
88/08/10	1340	WATER		25.0	680	8.29	6.8	170.0	426	478			
88/08/11	0955	WATER											2000K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00665 PHOS-TOT MG/L P	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00625 TOT KJEL N MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00410 T ALK CACO3 MG/L	00946 SULFATE SO4-DISS MG/L	00940 CHLORIDE TOTAL MG/L
88/08/08	1020	WATER		.390	.220	.290	.510C	.650	.360C	.870C	108.0	119.0	50.5
88/08/08	1021	WATER		.300	.270	.270	.540	.830	.560	1.100	121.0	118.0	50.1
88/08/09	0920	WATER		.750	.420	.250	.670C	.850	.600C	1.270C			
88/08/09	1330	WATER		.540	.480	.510	.990C	.830	.320C	1.310C			
88/08/10	0910	WATER		3.910	.550	.630	1.180C	2.150	1.520C	2.700			
88/08/10	1340	WATER		1.970	.650	.400	1.050C	1.400	1.000C	2.050C			

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00440 HCO3 ION HCO3 MG/L	00925 MGNSIUM MG,DISS MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01027 CADMIUM CD,TOT UG/L	01034 CHROMIUM CR,TOT UG/L	01051 LEAD PB,TOT UG/L
88/08/08	1020	WATER		125.0	37.2	64.5	6.00	40.0	6	100	1K	5K	10K
88/08/08	1021	WATER		144.0	27.5	63.0	5.00	56.0	8	100	1K	5K	10K
88/08/10	0910	WATER							17	300	1K	26	10

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L	01042 COPPER CU,TOT UG/L	01045 IRON FE,TOT UG/L	01055 MANGNESE MN UG/L
88/08/08	1020	WATER		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TO	DAY	MEDIUM	(FT)	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L
88/08/08	1020	WATER		.5K	5K	1K	50K	2300	150
88/08/08	1021	WATER		.5K	5K	1K	50K	3700	120
88/08/10	0910	WATER		.5K	5K	1K	50K	22000	680

STORET RETRIEVAL DATE 89/02/16 PGM=RET PAGE: 5

LRG047 LRG101000130 LC5
32 13 44.0 106 47 54.0 4
RIO GRANDE AT MESILLA DIVERSION DAM
35013 NEW MEXICO DONA ANA
WESTERN GULF 120900
UPPER RIO GRANDE STATION 5 - RIO GRANDE AT MESILLA DIVERSION DAM
21NWEX 13030102002 0042.360 ON
SURFACE WATER SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00095 CNDUCTVY AT 25C MICROMHO	00400 PH SU	00300 DO MG/L	82079 TURBIDTY LAB NTU	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00680 T ORG C C MG/L	00900 TOT HARD CACO3 MG/L	31616 FEC COLI MFM-FCBR /100ML
88/08/08	1055	WATER		24.9	621	8.31	7.2	39.0	384	137	7.50	263	
88/08/09	0940	WATER		23.9	715	8.44	7.1	31.0	454	93			
88/08/09	1315	WATER		26.0	725	8.44	7.3	50.0	488	123			
88/08/10	0930	WATER		23.2	632	8.36	6.8	285.0	508	1510		355	660
88/08/10	1325	WATER		24.8	683	8.29	7.0	275.0	420	885			
88/08/11	0945	WATER											450

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00665 PHOS-TOT MG/L P	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00625 TOT KJEL N MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00410 T ALK CACO3 MG/L	00946 SULFATE SO4-DISS MG/L	00940 CHLORIDE TOTAL MG/L
88/08/08	1055	WATER		.360	.170	.120	.290C	.620	.500C	.790C	124.0	118.0	50.4
88/08/09	0940	WATER		.620	.040	.270	.310C	.680	.410C	.720C			
88/08/09	1315	WATER		.620	.340	.230	.570C	.870	.640C	1.210C			
88/08/10	0930	WATER		3.390	.470	.520	.990C	2.760	2.240C	3.230C			
88/08/10	1325	WATER		3.030	.490	.580	1.070C	1.680	1.100C	2.170C			

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00440 HCO3 ION HCO3 MG/L	00925 MGNSIUM MG,DISS MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01027 CADMIUM CD,TOT UG/L	01034 CHROMIUM CR,TOT UG/L	01051 LEAD PB,TOT UG/L
88/08/08	1055	WATER		146.0	27.5	64.0	5.50	60.0	7	200	1K	5	5K
88/08/10	0930	WATER							27	400	1K	45	20

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L	01042 COPPER CU,TOT UG/L	01045 IRON FE,TOT UG/L	01055 MANGNESE MN UG/L
88/08/10	0930	WATER		.5K	5K	1K	50K	3600	840
88/08/08	1055	WATER		.5K	5K	1K	50K	4000	160

STORET RETRIEVAL DATE 89/02/16 PGM=RET PAGE: 6
LRG101.100125 LRG101100125 LC6
32 09 50.0 106 42 55.0 4
RIO GRANDE NEAR MESQUITE ON HIGHWAY 192 BRIDGE
35013 NEW MEXICO DONA ANA
WESTERN GULF 120900
UPPER RIO GRANDE STATION 6 - RIO GRANDE NEAR MESQUITE
21NWEX 880924 13030102
SURFACE WATER SAMPLES 1168 METERS ELEVATION

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00095 CNDUCTVY AT 25C MICROMHO	00400 PH SU	00300 DO MG/L	82079 TURBIDTY LAB NTU	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00680 T ORG C C MG/L	00900 TOT HARD CACO3 MG/L	31616 FEC COLI MFM-FCBR /100ML
88/08/08	1125	WATER		24.9	621	8.39	7.4	57.0	368	164	13.60	235	
88/08/09	1000	WATER		24.9	691	8.53	7.2	34.0	442	79			
88/08/09	1255	WATER		25.1	689	8.53	7.0	33.0	450	73			
88/08/10	0955	WATER		24.1	672	8.45	7.0	33.0	370	204	10.10	215	130
88/08/10	1305	WATER		25.1	649	8.40	6.8	290.0	384	887			
88/08/11	0935	WATER											200

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00665 PHOS-TOT MG/L P	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00625 TOT KJEL N MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00410 T ALK CACO3 MG/L	00946 SULFATE SO4-DISS MG/L	00940 CHLORIDE TOTAL MG/L
88/08/08	1125	WATER		.540	.220	.250	.470C	.610	.360C	.830C	105.0	120.0	50.8
88/08/09	1000	WATER		.780	.410	.180	.590C	.600	.420C	1.010C			
88/08/09	1255	WATER		.490	.270	.160	.430C	.780	.620C	1.050C			
88/08/10	0955	WATER		.570	.390	.210	.600C	.900	.690C	1.290C			
88/08/10	1305	WATER		3.110	.450	.510	.960C	2.180	1.670C	2.630C			

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00440 HCO3 ION HCO3 MG/L	00925 MGNSIUM MG,DISS MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01027 CADMIUM CD,TOT UG/L	01034 CHROMIUM CR,TOT UG/L	01051 LEAD PB,TOT UG/L
88/08/08	1125	WATER		122.0	30.5	65.0	6.00	44.0	9	200	1K	5K	10K
88/08/10	0955	WATER							6	100	1K	5K	10K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L	01042 COPPER CU,TOT UG/L	01045 IRON FE,TOT UG/L	01055 MANGNESE MN UG/L
88/08/08	1125	WATER		.5K	10K	1K	50K	3600	180
88/08/10	0955	WATER		.5K	5K	1K	50K	1700	180

88/08/08	1125	WATER	.5K	10K	1K	50K	3600	180
88/08/10	0955	WATER	.5K	5K	1K	50K	1700	180

STORET RETRIEVAL DATE 89/02/16 PGM=RET
LRG053 LRG101000120 LC7
32 03 57.0 106 39 45.0 4
RIO GRANDE AT NM HIGHWAY 226 NEAR BERINO
35013 NEW MEXICO DONA ANA
WESTERN GULF 120900
UPPER RIO GRANDE STATION 7 - RIO GRANDE NEAR BERINO
21NMEX 13030102002 0026.150 ON
SURFACE WATER SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00095 CNDUCTVY AT 25C MICROMHO	00400 PH SU	00300 DO MG/L	82079 TURBIDTY LAB NTU	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00680 T ORG C C MG/L	00900 TOT HARD CACO3 MG/L	31616 FEC COLI MFM-FCBR /100ML
88/08/08	1150	WATER		24.9	681	8.27	6.6	103.0	406	257	4.15	263	
88/08/09	1025	WATER		23.5	762	8.48	7.0	48.0	478	127			
88/08/09	1235	WATER		24.8	753	8.45	7.0	46.0	498	120			
88/08/10	1015	WATER		23.9	767	8.49	7.0	42.0	434	116	9.12	265	530
88/08/10	1240	WATER		24.9	762	8.54	7.2	36.0	430	94			
88/08/11	0915	WATER											500

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00665 PHOS-TOT MG/L P	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00625 TOT KJEL N MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00410 T ALK CACO3 MG/L	00946 SULFATE SO4-DISS MG/L	00940 CHLORIDE TOTAL MG/L
88/08/08	1150	WATER		1.010	.290	.270	.560C	.940	.670C	1.230C	123.0	134.0	54.1
88/08/09	1025	WATER		.850	.450	.180	.630C	.800	.620C	1.250C			
88/08/09	1235	WATER		.620	.430	.280	.710C	1.310	1.030C	1.740C			
88/08/10	1015	WATER		.610	.450	.220	.670C	.990	.770C	1.440C			
88/08/10	1240	WATER		.650	.450	.300	.750C	.830	.530C	1.280C			

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00440 HCO3 ION HCO3 MG/L	00925 MGNSIUM MG,DISS MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01027 CADMIUM CD,TOT UG/L	01034 CHROMIUM CR,TOT UG/L	01051 LEAD PB,TOT UG/L
88/08/08	1150	WATER		143.0	34.8	68.0	6.00	48.0	9	200	1K	5	10K
88/08/10	1015	WATER							6	100	1K	7	10K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L	01042 COPPER CU,TOT UG/L	01045 IRON FE,TOT UG/L	01055 MANGNESE MN UG/L
88/08/08	1150	WATER		.5K	5K	1K	50K	6000	300
88/08/10	1015	WATER		.5K	5K	1K	50K	2100	270

LRG101.000110 LRG101000110 LC8
31 59 58.0 106 38 06.0 4
RIO GRANDE NEAR ANTHONY ON NM HIGHWAY 225 BRIDGE
35013 NEW MEXICO DONA ANA
WESTERN GULF 120900
UPPER RIO GRANDE STATION 8 - RIO GRANDE NEAR ANTHONY
21NMEX 880924 13030102
SURFACE WATER SAMPLES 1154 METERS ELEVATION

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00095 CNDUCTVY AT 25C MICROMHO	00400 PH SU	00300 DO MG/L	82079 TURBIDTY LAB NTU	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00680 T ORG C C MG/L	00900 TOT HARD CACO3 MG/L	31616 FEC COLI MFM-FCBR /100ML
88/08/08	1215	WATER		24.9	721	8.33	6.6	120.0	408	361	9.74	263	
88/08/09	1040	WATER		23.8	799	8.42	6.9	58.0	524	139			
88/08/10	1035	WATER		23.9	807	8.42	6.7	49.0	470	115	9.41	225	670
88/08/10	1036	WATER										225	
88/08/11	0905	WATER											650

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00665 PHOS-TOT MG/L P	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00625 TOT KJEL N MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00410 T ALK CACO3 MG/L	00946 SULFATE SO4-DISS MG/L	00940 CHLORIDE TOTAL MG/L
88/08/08	1215	WATER		1.190	.440	.410	.850C	1.030	.620C	1.470C	108.0	149.0	59.1
88/08/09	1040	WATER		.800	.490	.280	.770C	1.050	.770C	1.540C			
88/08/10	1035	WATER		.670	.440	.290	.730C	.910	.620C	1.350C			
88/08/10	1036	WATER		.700	.480	.350	.830	1.360	1.010	1.840			

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00440 HCO3 ION HCO3 MG/L	00925 MGNSIUM MG,DISS MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01027 CADMIUM CD,TOT UG/L	01034 CHROMIUM CR,TOT UG/L	01051 LEAD PB,TOT UG/L
88/08/08	1215	WATER		124.0	34.8	75.0	6.00	48.0	9	200	1K	16	10K
88/08/10	1035	WATER							9	200	1K	5K	10K
88/08/10	1036	WATER							6	100	1K	5K	10K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L	01042 COPPER CU,TOT UG/L	01045 IRON FE,TOT UG/L	01055 MANGNESE MN UG/L
88/08/08	1215	WATER		.5K	5K	1K	50K	9200	380
88/08/10	1035	WATER		.5K	5K	1K	50K	2600	260
88/08/10	1036	WATER		.5K	5K	1K	50K	3600	250

88/08/08	1215	WATER	.5K	5K	1K	50K	9200	380
88/08/10	1035	WATER	.5K	5K	1K	50K	2600	260
88/08/10	1036	WATER	.5K	5K	1K	50K	3600	250

STORET RETRIEVAL DATE 89/02/16 PGM=RET
LRG101.000105 LRG101000105 LC9
31 47 58.0 106 33 08.0 4
RIO GRANDE AT BRIDGE BELOW SUNLAND PARK
35039 NEW MEXICO RIO ARRIBA
WESTERN GULF 120900
UPPER RIO GRANDE STATION 9 - RIO GRANDE NEAR SUNLAND PARK
21NMEX 880924 13030102
SURFACE WATER SAMPLES 1134 METERS ELEVATION

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00095 CNDUCTVY AT 25C MICROMHO	00400 PH SU	00300 DO MG/L	82079 TURBIDTY LAB NTU	70300 RESIDUE DISS-180 C MG/L	00530 RESIDUE TOT NFLT MG/L	00680 T ORG C C MG/L	00900 TOT HARD CACO3 MG/L	31616 FEC COLI MFM-FCBR /100ML
88/08/08	1255	WATER		24.9	721	8.31	6.4	155.0	446	488	10.20	283	
88/08/09	1115	WATER		24.9	782	8.42	6.8	81.0	494	210			
88/08/10	1030	WATER											530
88/08/10	1031	WATER											410
88/08/10	1130	WATER		24.9	892	8.46	7.1	61.0	544	200	9.29	245	
88/08/11	0835	WATER											300
88/08/11	0836	WATER											350

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00665 PHOS-TOT MG/L P	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00640 T INORG. NITROGEN MG/L N	00625 TOT KJEL N MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00410 T ALK CACO3 MG/L	00946 SULFATE SO4-DISS MG/L	00940 CHLORIDE TOTAL MG/L
88/08/08	1255	WATER		1.660	.430	.480	.910C	.580	.100C	1.010C	125.0	150.0	65.0
88/08/09	1115	WATER		.980	.350	.270	.620C	1.020	.750C	1.370C			
88/08/10	1130	WATER		.780	.430	.290	.720C	1.020	.730C	1.450C			

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00440 HCO3 ION HCO3 MG/L	00925 MGNSIUM MG,DISS MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	01002 ARSENIC AS,TOT UG/L	01007 BARIUM BA,TOT UG/L	01027 CADMIUM CD,TOT UG/L	01034 CHROMIUM CR,TOT UG/L	01051 LEAD PB,TOT UG/L
88/08/08	1255	WATER		145.0	32.3	81.0	7.00	60.0	12	300	1K	18	10
88/08/10	1130	WATER							5K	200	1K	5K	10K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L	01042 COPPER CU,TOT UG/L	01045 IRON FE,TOT UG/L	01055 MANGNESE MN UG/L
88/08/08	1255	WATER		.5K	5K	1K	50K	13000	540
88/08/10	1130	WATER		.5K	5K	1K	50K	3500	290

STORET RETRIEVAL DATE 89/02/20 PGM=RET

LRG046 LRG101000145 LC2 PAGE: 10

32 18 36.0 106 49 34.0 4

RIO GRANDE AT PICACHO AVE IN LAS CRUCES

35013 NEW MEXICO DONA ANA

WESTERN GULF 120900

UPPER RIO GRANDE

21NMEX HQ 13030102011 0004.540 OFF STATION 2 - RIO GRANDE AT PICACHO AVENUE

SURFACE SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39782 LINDANE WHL SMPL UG/L	39337 ALPHABHC TOTUG/L	39338 BETA BHC TOTUG/L	34259 DELTABHC TOTUG/L	39330 ALDRIN TOT UG/L	39350 CHLRDANE TECHNMET TOT UG/L	39370 DDT WHL SMPL UG/L	39300 P,P'DDT TOT UG/L	39305 O,P' DDT WHL SMPL UG/L	39360 DDD WHL SMPL UG/L
88/08/22	1650	WATER		.125K	.125K	.125K	.125K	.125K	.500K	.250K	.125K	.125K	.250K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39310 P,P'DDD TOT UG/L	39315 O,P' DDD WHL SMPL UG/L	39365 DDE WHL SMPL UG/L	39320 P,P'DDE TOT UG/L	39327 O P DDE WHL SMPL UG/L	39380 DIELDRIN TOTUG/L	39388 ENDOSULN WHL SMPL UG/L	39390 ENDRIN TOT UG/L	39410 HEPTCHLR TOTUG/L	39420 HPCHLREP TOTUG/L
88/08/22	1650	WATER		.125K	.125K	.250K	.125K	.125K	.125K	.125K	.125K	.125K	.125K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39400 TOXAPHEN TOTUG/L	39480 MTHXYCLR WHL SMPL UG/L	39540 PARATHN WHL SMPL UG/L	39600 MPARATHN WHL SMPL UG/L	81888 DSULFTON WHL HAT UG/L	39530 MALATHN WHL SMPL UG/L	39570 DIAZINON WHL SMPL UG/L	81890 AZODRIN WHL HAT UG/L	38932 CHLORPY-RIFOS TOTUG/L	39033 ATRZ WHL SMPL UG/L
88/08/22	1650	WATER		1.000K	.125K	.500K	.500K	.500K	.500K	.500K	.500K	.500K	.500K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39730 2,4-D WHL SMPL UG/L	39740 2,4,5-T WHL SMPL UG/L	39760 SILVEX WHL SMPL UG/L	39720 PICLORAM WHL SMPL UG/L
88/08/22	1650	WATER		.070K	.070K	.070K	.175K

LRG046.5 LRG101000135 LC4
32 15 49.0 106 49 26.0 4
RIO GRANDE AT BRIDGE NEAR LA MESILLA
35013 NEW MEXICO DONA ANA
WESTERN GULF
UPPER RIO GRANDE
21NMEX 790105 HQ 13030102011 0001.080 OFF
SURFACE SAMPLES

STATION 4 - RIO GRANDE NEAR LA MESILLA

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39782 LINDANE WHL SMPL UG/L	39337 ALPHABHC TOTUG/L	39338 BETA BHC TOTUG/L	34259 DELTABHC TOTUG/L	39330 ALDRIN TOT UG/L	39350 CHLRDANE TECH&MET TOT UG/L	39370 DDT WHL SMPL UG/L	39300 P,P'DDT TOT UG/L	39305 O,P' DDT WHL SMPL UG/L	39360 DDD WHL SMPL UG/L
88/08/22	1630	WATER		.125K	.125K	.125K	.125K	.125K	.500K	.250K	.125K	.125K	.250K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39310 P,P'DDD TOT UG/L	39315 O,P' DDD WHL SMPL UG/L	39365 DDE WHL SMPL UG/L	39320 P,P'DDE TOT UG/L	39327 O P DDE WHL SMP L UG/L	39380 DIELDRIN TOTUG/L	39388 ENDOSULN WHL SMPL UG/L	39390 ENDRIN TOT UG/L	39410 HEPTCHLR TOTUG/L	39420 HPCHLREP TOTUG/L
88/08/22	1630	WATER		.125K	.125K	.250K	.125K	.125K	.125K	.125K	.125K	.125K	.125K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39400 TOXAPHEN TOTUG/L	39480 MTHXYCLR WHL SMPL UG/L	39540 PARATHN WHL SMPL UG/L	39600 MPARATHN WHL SMPL UG/L	81888 DSULFTON WHL WAT UG/L	39530 MALATHN WHL SMPL UG/L	39570 DIAZINON WHL SMPL UG/L	81890 AZODRIN WHL WAT UG/L	38932 CHLORPY-RIFOS TOTUG/L	39033 ATRZ WHL SMPL UG/L
88/08/22	1630	WATER		1.000K	.125K	.500K	.500K	.500K	.500K	.500K	.500K	.500K	.500K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39730 2,4-D WHL SMPL UG/L	39740 2,4,5-T WHL SMPL UG/L	39760 SILVEX WHL SMPL UG/L	39720 PICLORAM WHL SMPL UG/L
88/08/22	1630	WATER		.070K	.070K	.070K	.175K

STORET RETRIEVAL DATE 89/02/20 PGM=RET
LRG101.000110 LRG101000110 LC8
31 59 58.0 106 38 06.0 4
RIO GRANDE NEAR ANTHONY ON NM HIGHWAY 225 BRIDGE
35013 NEW MEXICO DONA ANA
WESTERN GULF 120900
UPPER RIO GRANDE
21NMEX 880924 13030102
SURFACE SAMPLES 1154 METERS ELEVATION

STATION 8 - RIO GRANDE NEAR ANTHONY

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39782 LINDANE WHL SMPL UG/L	39337 ALPHABHC TOTUG/L	39338 BETA BHC TOTUG/L	34259 DELTABHC TOTUG/L	39330 ALDRIN TOT UG/L	39350 CHLRDANE TECH&MET TOT UG/L	39370 DDT WHL SMPL UG/L	39300 P,P'DDT TOT UG/L	39305 O,P' DDT WHL SMPL UG/L	39360 DDD WHL SMPL UG/L
88/08/22	1540	WATER		.125K	.125K	.125K	.125K	.125K	.500K	.250K	.125K	.125K	.250K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39310 P,P'DDD TOT UG/L	39315 O,P' DDD WHL SMPL UG/L	39365 DDE WHL SMPL UG/L	39320 P,P'DDE TOT UG/L	39327 O P DDE WHL SMP L UG/L	39380 DIELDRIN TOTUG/L	39338 ENDOSULN WHL SMPL UG/L	39390 ENDRIN TOT UG/L	39410 HEPTCHLR TOTUG/L	39420 HPCHLREP TOTUG/L
88/08/22	1540	WATER		.125K	.125K	.250K	.125K	.125K	.125K	.125K	.125K	.125K	.125K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39400 TOXAPHEN TOTUG/L	39480 MTHXYCLR WHL SMPL UG/L	39540 PARATHN WHL SMPL UG/L	39600 MPARATHN WHL SMPL UG/L	81888 DSULFTON WHL MAT UG/L	39530 MALATHN WHL SMPL UG/L	39570 DIAZINON WHL SMPL UG/L	81890 AZODRIN WHL MAT UG/L	38932 CHLORPY-RIFOS TOTUG/L	39033 ATRZ WHL SMPL UG/L
88/08/22	1540	WATER		1.000K	.125K	.500K	.500K	.500K	.500K	.500K	.500K	.500K	.500K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39730 2,4-D WHL SMPL UG/L	39740 2,4,5-T WHL SMPL UG/L	39760 SILVEX WHL SMPL UG/L	39720 PICLORAM WHL SMPL UG/L
88/08/22	1540	WATER		.070K	.070K	.070K	.175K

STORET RETRIEVAL DATE 89/02/20 PGM=RET
LRG101.000105 LRG101000105 LC9
31 47 58.0 106 33 08.0 4
RIO GRANDE AT BRIDGE BELOW SUNLAND PARK
35039 NEW MEXICO RIO ARRIBA
WESTERN GULF 120900
UPPER RIO GRANDE
21NMEX 880924 13030102
SURFACE SAMPLES 1134 METERS ELEVATION

STATION 9 - RIO GRANDE BELOW SUNLAND PARK

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39782 LINDANE WHL SMPL UG/L	39337 ALPHABHC TOTUG/L	39338 BETA BHC TOTUG/L	34259 DELTABHC TOTUG/L	39330 ALDRIN TOT UG/L	39350 CHLRDANE TECH&MET TOT UG/L	39370 DDT WHL SMPL UG/L	39300 P,P'DDT TOT UG/L	39305 O,P' DDT WHL SMPL UG/L	39360 DDD WHL SMPL UG/L
88/08/22	1455	WATER		.125K	.125K	.125K	.125K	.125K	.500K	.250K	.125K	.125K	.250K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39310 P,P'DDD TOT UG/L	39315 O,P' DDD WHL SMPL UG/L	39365 DDE WHL SMPL UG/L	39320 P,P'DDE TOT UG/L	39327 O P DDE WHL SMPL UG/L	39380 DIELDRIN TOTUG/L	39388 ENDOSULN WHL SMPL UG/L	39390 ENDRIN TOT UG/L	39410 HEPTCHLR TOTUG/L	39420 HPCHLREP TOTUG/L
88/08/22	1455	WATER		.125K	.125K	.250K	.125K	.125K	.125K	.125K	.125K	.125K	.125K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39400 TOXAPHEN TOTUG/L	39480 MTHXYCLR WHL SMPL UG/L	39540 PARATHN WHL SMPL UG/L	39600 MPARATHN WHL SMPL UG/L	81888 DSULFTON WHL MAT UG/L	39530 MALATHN WHL SMPL UG/L	39570 DIAZINON WHL SMPL UG/L	81890 AZODRIN WHL MAT UG/L	38932 CHLORPY-RIFOS TOTUG/L	39033 ATRZ WHL SMPL UG/L
88/08/22	1455	WATER		1.000K	.125K	.500K	.500K	.500K	.500K	.500K	.500K	.500K	.500K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	39730 2,4-D WHL SMPL UG/L	39740 2,4,5-T WHL SMPL UG/L	39760 SILVEX WHL SMPL UG/L	39720 PICLORAM WHL SMPL UG/L
88/08/22	1455	WATER		.070K	.070K	.070K	.175K

Table A3. The occurrence and status of fish in the Rio Grande drainage of New Mexico (New Mexico Game and Fish 1988).

	Present status within the Rio Grande drainage
NATIVE TAXA	
Anguillidae	
American eel	Restricted
Anguilla rostrata	
Clupeidae	
Gizzard shad	Established
Dorosoma cepedianum	
Cyprinidae	
Red shiner	Stable
Notropis lutrensis	
Fathead minnow	Stable
Pimephales promelas	
Catostomidae	
River carpsucker	Stable
Carpiodes carpio	
Smallmouth buffalo	Diminishing
Ictiobus bubalus	
Ictaluridae	
Blue catfish	Diminishing
Ictalurus furcatus	
Flathead catfish	Diminishing
Pylodictis olivaris	
Poeciliidae	
Mosquitofish	Stable
Gambusia affinis	
Centrarchidae	
Bluegill	Established
Lepomis macrochirus	

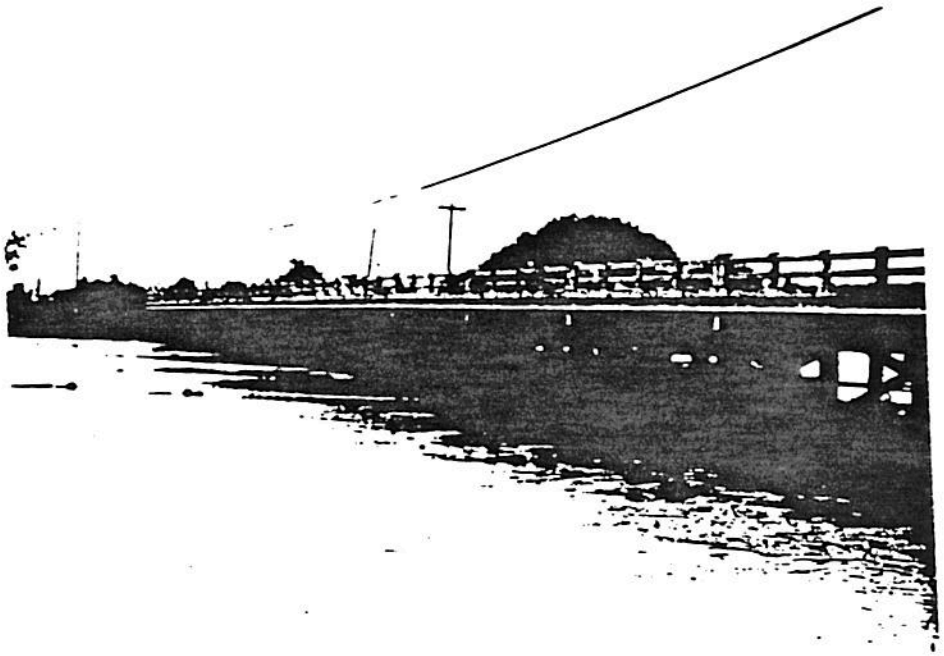
Table A3. Continued.

	Present status within the Rio Grande drainage
NON-NATIVE TAXA	
Clupeidae	
Threadfin shad *Dorosoma petenense*	Established
Cyprinidae	
Carp *Cyprinus carpio*	Established
Bullhead minnow *Pimephales vigilax*	Localized
Ictaluridae	
Black bullhead *Ictalurus melas*	Established
Yellow bullhead *Ictalurus natalis*	Established
Channel catfish *Ictalurus punctatus*	Established
Cyprinodontidae	
Rainwater killifish *Lucania parva*	Localized
Poeciliidae	
Sailfin molly *Poecilia latipinna*	Localized
Percichthyidae	
White bass *Morone chrysops*	Localized
Striped bass *Morone saxatilis*	Reported

Table A3. Continued.

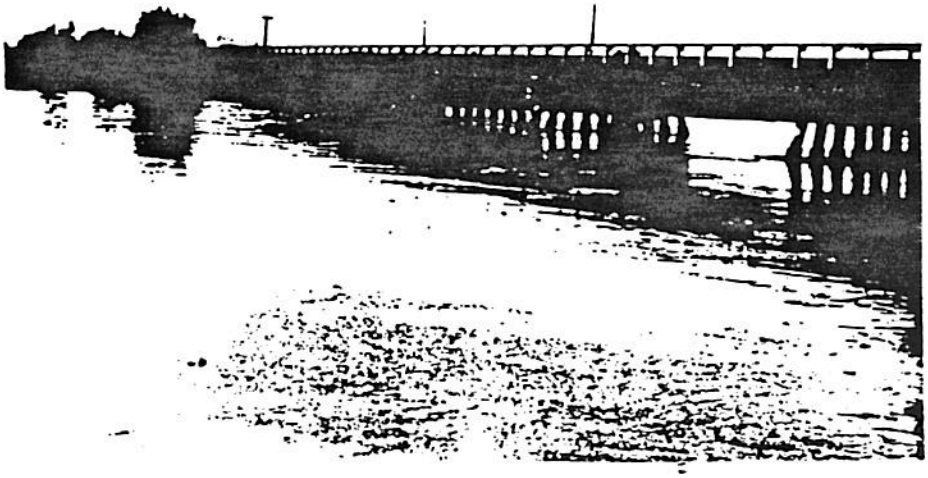
	Present status within the Rio Grande drainage
NON-NATIVE TAXA	
Centrarchidae	
Green sunfish *Lepomis cyanellus*	Established
Warmouth bass *Lepomis gulosus*	Reported
Longear sunfish *Lepomis megalotis*	Reported
Smallmouth bass *Micropterus dolomi*	Established
Largemouth bass *Micropterus salmoides*	Established
White crappie *Pomoxis annualaris*	Established
Percidae	
Yellow perch *Perca flavescens*	Reported
Walleye *Stizostedion vitreum*	Localized

Station 1. Rio Grande at Shalem Colony Trail bridge near Dona Ana.

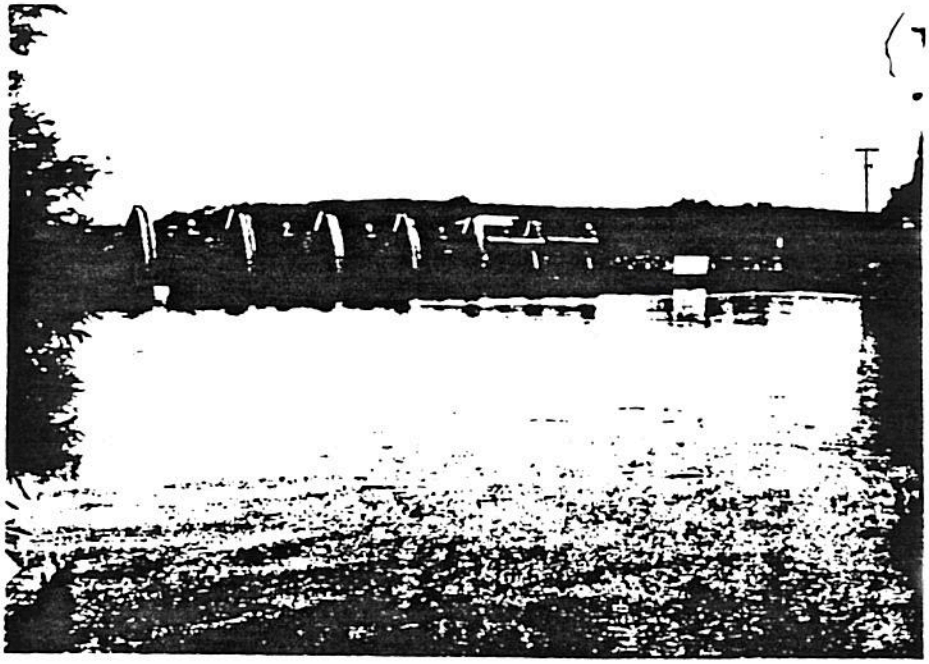


Station 2. Rio Grande at Picacho Avenue bridge in Las Cruces.

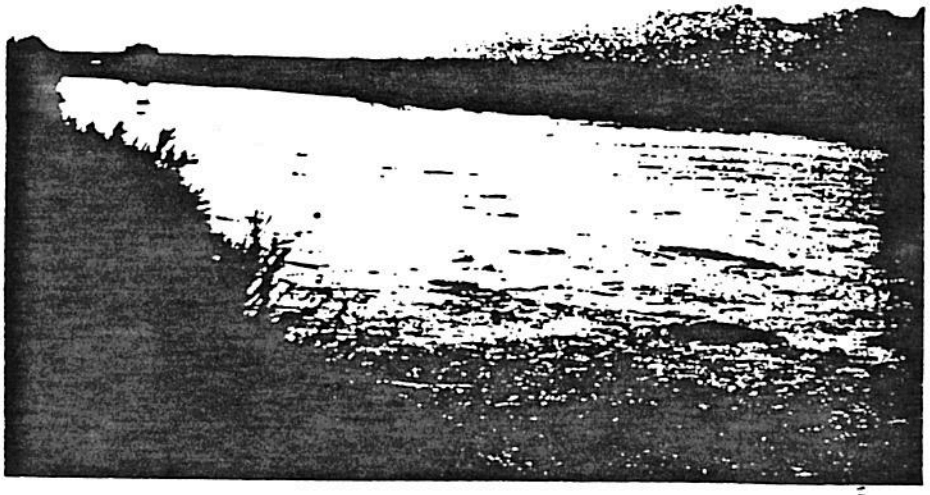
Station 3. Effluent discharge from the Las Cruces WWTF.



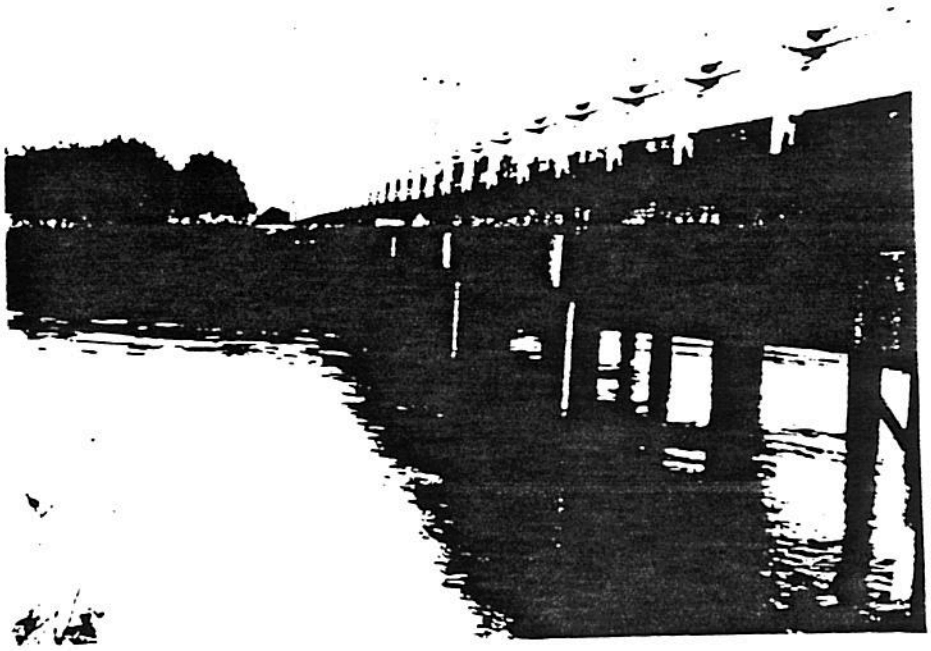
Station 4. Rio Grande at bridge near La Mesilla.



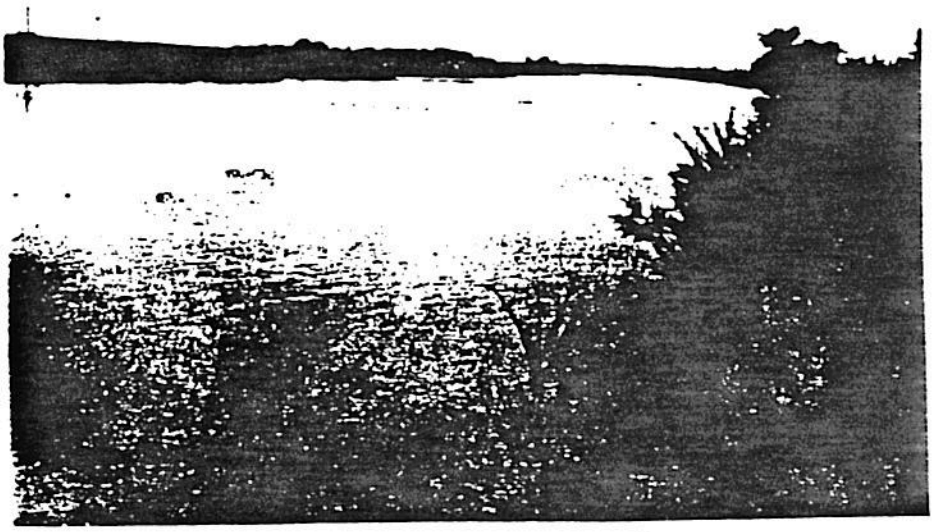
Station 5. Rio Grande at Mesilla diversion dam.



Station 6. Rio Grande at NM Hwy 228 near Mesquite.



Station 7. Rio Grande at NM hwy 226 near Berino.



Station 8. Rio Grande at bridge near Anthony

Larry

New Mexico Health and Environment Department

CARLA L. MUTH
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

February 15, 1989

Mr. Russell Bowen, Chief
State Program Section (6W-QS)
Environmental Protection Agency
1445 Ross Avenue
Dallas, TX 87503

Dear Mr. Bowen:

I have been asked to respond to the December 23, 1988 letter from Mr. Champagne of your staff to Kathleen Sisneros, Chief of the Surface Water Quality Bureau, concerning the State's preliminary 304(l) lists. I apologize for the delay in responding to Mr. Champagne's letter, but I concluded that completing the 304(l) lists by the statutory February 4, 1989 deadline to be of a higher priority. As you know, the Division submitted the final version of these lists on February 1, 1989. Many of EPA's concerns were specifically addressed and discussed in the final document.

I have addressed EPA's concerns below on an item-by-item basis.

Item 1: No action was taken on this item as there were no waterbodies remaining on the final short list.

Item 2: Where ambient data show significant exceedances of State water quality standards or of EPA freshwater criteria the waterbody was kept on the appropriate list (mini, long, or both).

Item 3: We have reviewed all reaches in the preliminary submittal including a re-evaluation of the listed data sources. Following this review, the Division reaffirms its position on these reaches; there are no available data to indicate these discharges are receiving or discharging 307(a) pollutants. We have included greater detail on data used in the final lists.

Item 4: I have no scientific basis for producing a list of waterbodies "suspected" of water quality impairments due to toxics or any other pollutants; moreover, there are no statutory or regulatory reason for performing this exercise. I suggest that the waterbodies listed in Mr. David Tague's February 3, 1989 transmittal of the intensive surveys to be conducted under both the section 106 and 314 program for the upcoming year adequately document's our commitment to the toxics control program.

RECEIVED
FEB 22 1989
WATER QUALITY MGMT.

— ENVIRONMENTAL IMPROVEMENT DIVISION —
Harold Runnels Building
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

Item 5: Results from the May through November 1988 studies conducted for Arizona Public Service (NPDES permit NM0000019) found no statistically significant difference in survival, reproductive success or growth of the fathead minnow in the tested effluent concentrations.

Item 6: No comment necessary.

Item 7: I find this comment somewhat puzzling in light of the "request" by the Permits Branch of the Water Management Division for EID review of potential exceedances of Gold Book criteria for parameters not covered in the State Regulations Governing Water Supplies (see item 9 below) and for reaches where these regulations do not apply. ThIS Division has repeatedly stated that we will propose adoption of appropriate criteria required by the statutory mandate of section 303(c)(2)(B) to the New Mexico Water Quality Control Commission.

Item 8: Every water identified by EPA had already been identified by the Division and appears in the proper 304(1) list.

Item 9: These dilution analyses had already been screened for potential inclusion in the 304(1) lists.

Item 10: I note that EPA apparently feels its eleventh hour "request" is sufficient reason for the Division to add additional point sources and/or stream reaches to a process which has, to date, required over one and one-half person years. If EPA had approached the Division earlier in the 304(1) process with this request, the additional review could have been systematically incorporated into ongoing programs. Moreover, the statement "The following RCRA facilities have NPDES permits and, therefore, discharge to surface waters..." is based on faulty assumptions. While a facility may have a NPDES permit the presence of that permit does not mean either that it is routinely allowed to discharge or even that it is active. For active facilities, the NPDES permit may not regulate or even recognize that toxics are discharged to receiving waters. I would suggest that your staff investigate the current status of the reported facilities and correctly identify your concerns. At least one of these permits is a "No Discharge" permit, one is a dairy farm and several are listed by our Hazardous Waste Bureau as exempt from RCRA. Where appropriate these facilities were reviewed for the final 304(1) lists.

Item 11: There is nothing contained in a "proposed rule" or in EPA "guidance" which binds the Division or the State of New Mexico to any course of action. Moreover, we will not accept judgment of the sufficiency of our efforts on such after-the-fact proposals and/or nonstatutory requirements. In the case of the two referenced "waterbodies" Santa Fe Lake does not receive point source discharges and in fact may not meet the criteria as a Water of the United States while Little Walnut Creek is an ephemeral stream for which no data are available within STORET and for which our Superfund staff have only limited water quality data.

Item 12: All available toxicity tests were reviewed. With the exception of the Las Vegas studies, which indicated significant toxicity due to total chlorine residual, all other tests yielded no significant results.

Item 13: This review had already been done.

Item 14: While the Division had been aware of the negative results of the Dioxin study in New Mexico, we are concerned about EPA's apparent insistence that this reach be added to a completed report at some time in the indefinite future ("...we will expect this waterbody to be added to the State's 304(1) lists.") The Clean Water Act required the Division to submit the final 304(1) lists by February 4, 1989. We will not be held responsible for information which was not available in time for suitable evaluation.

Item 15: All reaches crossing the various borders were reviewed for consistency although there is no statutory requirement for this review. All reaches which were identified by the various States had already been identified by the Division.

If you have additional questions feel free to call me at (505) 827-2828.

Sincerely,

Jim Piatt

Jim Piatt
Program Manager
Planning Section
Surface Water Quality Bureau

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DEC 23 1988

Ms. Kathleen Sisneros, Chief
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
Harold Runnels Bldg.
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

Dear Ms. Sisneros:

As you know, Section 304(l) of the Clean Water Act, as amended, requires EPA to review and approve or disapprove the State-prepared lists of impaired waters, dischargers and amounts of priority pollutants, and individual control strategies (ICS). In the preparation of their lists and ICSs, States should use all existing and readily available sources of information. The list of categories described in Section III.C. of the March, 1988 final guidance for §304(l) may serve the Region as a principal basis for reviewing and approving or disapproving the State submittals. However, the Region will be relying most heavily on the Technical Agreements (TA) negotiated with each State. Some of these TAs have not been formally signed, but it is understood that the States have prepared their lists and ICSs according to the contents of the TA.

To help in the decision-making process, the Region has established a §304(l) Technical Review Committee (TRC) comprised of Region 6 personnel from Water Quality, Permits, Environmental Services, Enforcement, RCRA, and Superfund. The purpose of the TRC is to review the preliminary State submittals under §304(l) and provide comments to the States with recommendations for improvement to the lists and ICSs so that by the statutory due date of February 4, 1989, the final submittals will be as complete as possible. Comments from the TRC pertaining to your particular submittal are enclosed.

Please do not hesitate to contact me if you or your staff have any questions regarding these comments or other issues concerning §304(l).

Sincerely,

LC

Larry Champagne
304(l) Coordinator (6W-QS)

Enclosure

cc: Jim Piatt, NMEID
David Tague, NMEID

LC 12/20

CONCURRENCES

SYMBOL	6W-QS:LChampagne:5-7140:ch:11-21-88			LC-8600		
SURNAME	6W-QS Bowen	6W-QS Malott				
DATE	12/20	12/21				

EPA Form 1320-1 (12-70)

OFFICIAL FILE COPY

★U.S.GPO:1988-0-206-471

bcc: Bowen (6W-QS)
Vickery (6W-QT)
Ferguson (6W-P)
Stenger (6W-PM)
Pendergast (6W-PT)
Hartung (6W-E)
Holman (6E-SA)
State Coordinator (6W-QS)

DEC 2 3 1988

Ms. Kathleen Sisneros, Chief
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
Harold Runnels Bldg.
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

Dear Ms. Sisneros:

As you know, Section 304(l) of the Clean Water Act, as amended, requires EPA to review and approve or disapprove the State-prepared lists of impaired waters, dischargers and amounts of priority pollutants, and individual control strategies (ICS). In the preparation of their lists and ICSs, States should use all existing and readily available sources of information. The list of categories described in Section III.C. of the March, 1988 final guidance for §304(l) may serve the Region as a principal basis for reviewing and approving or disapproving the State submittals. However, the Region will be relying most heavily on the Technical Agreements (TA) negotiated with each State. Some of these TAs have not been formally signed, but it is understood that the States have prepared their lists and ICSs according to the contents of the TA.

To help in the decision-making process, the Region has established a §304(l) Technical Review Committee (TRC) comprised of Region 6 personnel from Water Quality, Permits, Environmental Services, Enforcement, RCRA, and Superfund. The purpose of the TRC is to review the preliminary State submittals under §304(l) and provide comments to the States with recommendations for improvement to the lists and ICSs so that by the statutory due date of February 4, 1989, the final submittals will be as complete as possible. Comments from the TRC pertaining to your particular submittal are enclosed.

Please do not hesitate to contact me if you or your staff have any questions regarding these comments or other issues concerning §304(l).

Sincerely,

Larry Champagne

Larry Champagne
304(l) Coordinator (6W-QS)

Enclosure

cc: Jim Piatt, NMEID
David Tague, NMEID

6W-QS:LChampagne:5-7140:ch:11-21-88 LC-8600
6W-QS
Bowen

bcc: Bowen (6W-QS)
Vickery (6W-QT)
Ferguson (6W-P)
Stenger (6W-PM)
Pendergast (6W-PT)
Hartung (6W-E)
Holman (6E-SA)
State Coordinator (6W-QS)

Region 6 Technical Review Committee Comments on
New Mexico's § 304(l) Submittal

304(l) Lists

The Technical Review Committee found EID's approach to list development to be very logical and well organized. EID utilized the RTI report containing the 16 categories of waters described in the 304(l) Guidance (March, 1988) and the proposed rule to prepare their "short" list. We approve of this methodology and would like to encourage EID to continue using RTI's report as a preliminary screening tool when preparing final "mini" and "long" lists. However, if EID does not evaluate data for any of these categories, then a specific rationale for doing so must be provided. We recommend that EID address the following comments during the development of final lists:

1) EID needs to submit a list of dischargers and the types and amounts of priority pollutants they are discharging for every facility associated with the waterbodies on the short list. To assist you in this endeavor, EPA contractors have developed a "sources and amounts" list which is enclosed for your review. This information should be used to help finalize your short list.

2) If a waterbody is deleted from the short list because no discharger is present or because the discharger identified has an expired permit, then EID should ensure that the waterbody is retained on the long list.

3) Several times on the State's preliminary short list submittal the assumption is made that municipal dischargers are not expected to discharge 307(a) toxics. For example, the City of Gallup on page 17 of the short list. We strongly recommend that EID review any effluent, DMR or in-stream data available on these municipal dischargers before making this assumption. EID should also provide a reference to the data used to delete the waterbody from the short list.

4) As stated in the Technical Agreement (TA) and to help demonstrate its commitment to an on-going toxics control program, the State should also submit a list of waterbodies "suspected" of having toxics problems. The methodology which will be used to confirm or deny this suspected toxicity (i.e., the Water Quality Assessment Plan) should accompany this submittal or may be included as an activity in EID's § 106 or 205(j)(1) workplans.

5) We expect EID to follow-up on evaluating biomonitoring data transmitted to the State by EPA and, if appropriate, add waterbodies to the short list. Stream segment 2-401 of the Chaco River on page 12-13 of the short list was removed before results from biomonitoring tests conducted in May 1988 were reviewed. This waterbody should be retained, at a minimum, on the suspect list until test results are reviewed.

6) We would like to remind EID that should they suspect a minor facility is discharging toxics, the Permits Branch of EPA will include, upon request from the State, biomonitoring requirements in the facility's permit.

7) Since the State is required to identify on the "mini list" waterbodies in which state-adopted numeric standards for 307(a) toxics are exceeded, only those waterbodies in which you have an exceedance of the numeric standards in New Mexico's "Regulations Governing Water Supplies" must be included on the "mini list". If the State chooses to include waterbodies on the "mini list" for exceedance of gold book criteria, we will expect the State to adopt numeric standards for those pollutants.

8) In order to help the Region identify waterbodies impacted by toxic pollutants our Environmental Services Division was asked to run a retreival of STORET data indicating exceedances of water quality criteria for priority pollutants. EPA's Gold Book criteria were used for assessments unless appropriate State standards were available. This data and the methodology used in the evaluation are enclosed. We strongly recommend that you consider this information in preparing final lists.

9) You should have previously received three (3) potential human health/ water quality criteria exceedances (listed below) as identified by dilution calculations performed by EPA. These waterbodies should be evaluated for inclusion on the "short" or "suspect" list.

Stream name and segment	Facility	NPDES #	Pollutants
a) Rio Grande 2-101	City of Las Cruces	NM0023311	Chlorine Cyanide Copper Lead
b) San Juan 2-401	Bloomfield Refinery	NM0029751	Arsenic
c) Red River 2-119	Molycorp, Inc.	NM0022306	Cadmium Copper Lead

10) The following RCRA facilities have NPDES permits and therefore discharge to surface waters of the State:

Facility	NPDES #
a) Arizona Public Services Co.	NM0000019
b) Chino Mines Co. - Hurley	NM0020435
c) El Paso Electric	NM0000108
d) General Electric Co. - Albuquerque	NM0000159
e) Gold Fields Operating Co.	NM0028711
f) Homestake Mining Co.	NM0020389
g) Kaiser Steel Corp.	NM0000205
h) Molycorp Inc. - Questa	NM0022306
i) New Mexico State University	NM0025437
j) Public Service Co. - San Juan	NM0028606
k) Public Service of New Mexico	NM0000124
l) San Jaun Coal Co. - San Juan	NM0028746
m) U.S. Dept. of Energy - Los Alamos	NM0028576

Since all these facilities are generators/handlers of hazardous waste you should confer with your State RCRA staff to evaluate possible impacts on surface water. For information on hazardous waste codes for these facilities, see the enclosed RCRA information package.

11) The latest version of the proposed rule on § 304(l) was sent to EID by letter dated December 2, 1988. The definition of an ICS has been expanded to include decision statements under CERCLA. This means that any surface waters or sediments impacted by Superfund sites must be identified on the short list. The ICS for these waters would be the Record of Decision rendered under CERCLA. We would, therefore, expect to see the following waterbodies on the short list based on their association with Superfund sites:

a) Santa Fe lake, a playa lake, located south of the AT + SF Railway switching yard in Clovis, New Mexico is the focus for the Atchison, Topeka and Santa Fe (AT + SF) Superfund site. Remedial Investigation sampling at the site found lake water to contain elevated amounts of arsenic, boron, chloride, fluoride, total phenolics, sulfate, total dissolved solids (TDS) and total organic carbon (TOC). Lake sediments show levels of boron, lead, chromium, hydrocarbons, total phenolics and TOC above expected levels.

b) EPA's quarterly report for Superfund sites indicates Little Walnut Creek five miles downstream from the Cleveland Mill near Silver City, Grant County, New Mexico is highly acidic and possibly contaminated with lead, silver, zinc, copper, and arsenic.

12) You should have previously received toxicity tests results on five facilities which EPA evaluated since the toxicity screening program began in 1984. The facilities which have been screened are as follows:

NPDES #	Facility Name	Sample Collection Date
NM0000159	General Electric	5-21-87
NM0020737	Grants	11-26-85
NM0028100	Gulf Oil	4-10-84
NM0028355	USDE-LANL	3-10-86
NM0028827	Las Vegas	9-16-86
NM0028827	Las Vegas	12-29-87

EID should review this data and be sure that their 304(l) lists submittal is reflective of any impacts discovered. If you do not have toxicity tests data for any of these facilities, contact Phil Crocker at (214) 655-7145.

13) EID should review their preliminary 304(l) lists submittal for consistency with their NPS Assessment Report, Lake Water Quality Assessment Report, and their Section 305(b) Report.

14) There were apparently no contaminated waters identified in New Mexico by the National Dioxin Study. Two sites have been sampled in New Mexico under the National Bioaccumulation Study, a follow-up to the

National Dioxin study. Rio Mora near Terrero was sampled as a control site and no contamination was found here. EPA has not received results yet on the Pecos River site at Red Bluff, New Mexico. When we receive results we will transmit them to the State. If a problem is indicated here, we will expect this waterbody to be added to the State's 304(l) lists.

15) Enclosed are preliminary 304(l) submittals for Colorado, Utah, Arizona and Texas. EID should review this data for consistency on waterbodies which cross New Mexico's border. As we receive updated submittals from these States and a preliminary submittal from Oklahoma, we will transmit this information to you for evaluation.

MARIAH ASSOCIATES, INC.
2825-C Broadbent Pky., NE • Albuquerque, New Mexico 87107 • 505-345-2466
ENVIRONMENTAL SCIENTISTS

Mike - add to 304 mailing list.

June 20, 1989

Ms. Ellen Caldwell
Permits Branch (6W-PS)
U.S. EPA, Region 6
1445 Ross Avenue
Dallas, Texas 75202-2733

Dear Ms. Caldwell:

Please send a copy of the U.S. EPA Region 6's decisions with regard to approving and disapproving the lists of waters, point sources, and pollutants and the individual control strategies.

Thank you for your assistance.

Sincerely,
MARIAH ASSOCIATES, INC.

Louella M. Chavez

Louella M. Chavez
Administrative Assistant

RECEIVED
JUN 23 1989
6W-PS

I hope this resolves your concerns. If you have any questions in this matter, please call Assistant Regional Counsel Pat Rankin at (214) 655-2129.

Sincerely yours,

Myron O. Knudson, P.E.
Director
Water Management Division

cc: Mr. Dennis Boyd, Secretary
New Mexico Health and Environment Department

bcc: J. Pendergast, 6W-PT
E. Boss, 6W-QS
B. Goetz, 6AX
P. Rankin, 6C

MAY 15 1990

John D. Robb, Esquire
Rodey, Dickason, Sloan, Akin & Robb, P.A.
P. O. Box 1888
Albuquerque, New Mexico 87103

Dear Mr. Robb:

On April 14, 1990, EPA published a supplemental public notice proposing to add Quivira Mining to a list of dischargers for which it will issue individual control strategies (ICSs) under Section 304(l) of the Clean Water Act. In a May 7, 1990, meeting between representatives of Quivira and EPA, you contended 40 CFR 130.10 (d)(10)(vi) requires a 120 day comment period on such supplemental notices instead of the 30 day notice provided Quivira. You also argued 30 days is insufficient time for Quivira to prepare its comments, particularly in view of the somewhat unusual natures of the discharge and receiving stream at issue. This letter responds to your contention.

EPA established the 120 day period in 40 CFR 130.10(d)(10)(vi) primarily for the benefit of parties desiring to petition EPA for addition of dischargers to a proposed list, not to allow sufficient comment time for dischargers listed in the notice. Although EPA regulations do not address the issue, we therefore doubt the 120 day comment provision applies to a supplemental notice. The Agency sympathizes with your client's desire for additional time for comment preparation, but it cannot extend the comment period in this matter if it is to consider comments and make a decision on the proposed listing by June 4, 1990, as required by law.

We can, however, avoid any prejudice the relatively short comment period might otherwise cause your client. If EPA decides to issue an ICS for Quivira, that decision will not constitute judicially reviewable final agency action until Quivira's NPDES permit is amended to incorporate the ICS. Although copies of "draft permits" incorporating ICSs are issued in connection with listing decisions, the Agency provides a comment period on those draft permits in connection with the subsequent permit modification proceedings. See 40 CFR 124.10. Quivira may submit comments on the propriety of the ICS during that 30 day comment period and EPA will not challenge its right to raise issues which should have been raised in the current comment period on proposed listings. Our current projections indicate the comment period on a draft permit for Quivira would commence in November 1990. This should provide Quivira with more than enough time to prepare comments.

6C-W:PRankin:xt2129:5-14-90

CONCUR:

Collins	Alexander	Boss ✓	Ferguson
6C-W	6C	6W-QS	6W-P

FEB 8 1989

Mr. Jim Piatt
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
Harold Runnels Bldg.
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

Dear Mr. Piatt:

Enclosed you will find STORET maps which correspond to the list of impacted waters as identified by our Environmental Services Division. This impacted waters list should have been transmitted to you previously in a comment letter on the State's preliminary 304(l) lists or informally. Our Environmental Services Division prepared this list by running a retrieval of STORET data indicating exceedances of water quality criteria for priority pollutants. EPA's Gold Book criteria were used for assessments unless appropriate State standards were available. This list along with the methodology for development of the maps are enclosed. We hope that you find this information useful.

Sincerely,

Gloria Malott for

Larry F. Champagne
304(l) Coordinator (6W-QS)

6W-QS:LC/GM:tlc:1/21/89

GM-8697

6W-QS
Bowen

[ADR]

Dear [NAME]:

Enclosed you will find STORET maps which correspond to the list of impacted waters as identified by our Environmental Services Division. This impacted waters list should have been transmitted to you previously in a comment letter on the State's preliminary 304(l) lists or informally. Our Environmental Services Division prepared this list by running a retrieval of STORET data indicating exceedances of water quality criteria for priority pollutants. EPA's Gold Book criteria were used for assessments unless appropriate State standards were available. This list along with the methodology for development of the maps are enclosed. We hope that you find this information useful.

Sincerely,

Glenda Malott for

Larry F. Champagne
304(l) Coordinator (6W-QS)

6W-QS:LC/GM:tlc:1/21/89

GM-8697

6W-QS
Bowen

[a]
Mr. Jim Piatt "Mr. Piatt"
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
Harold Runnels Bldg.
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

[a]
Mr. Vince Blubaugh, Chief "Mr. Blubaugh"
Water Division
Arkansas Department of Pollution Control and Ecology
8001 National Drive
Little Rock, Arkansas 72209

[a]
Mr. Jim Davenport "Mr. Davenport"
Water Quality Standards Unit
Texas Water Commission
P.O. Box 13087 - Capitol Station
Austin, Texas 78711-3087

[a]
Mr. Dugan Sabins "Mr. Sabins"
Water Quality Standards Coordinator
Water Pollution Control Division
Department of Environmental Quality
P.O. Box 44091
Baton Rouge, Louisiana 70804-4091

[a]
Mr. David Jennings "Mr. Jennings"
Environmental Specialist
Oklahoma Department of Pollution Control
P.O. Box 53504
Oklahoma City, Oklahoma 73152

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

ENVIRONMENTAL IMPROVEMENT DIVISION

GARREY CARRUTHERS
Governor
CARLA L. MUTH
Secretary
MICHAEL J. BURKHART
Deputy Secretary

September 29, 1988

Ms. Glenda Malott
New Mexico State Coordinator (6W-QS)
U.S. Environmental Protection Agency
1445 Ross Avenue, 12th Floor
Dallas, Texas 75202-2733

Dear Mr. Malott:

I transmit herewith three copies of the program output entitled "State of New Mexico Action Plan for Strengthening the Toxic Substances Control Program," dated September 30, 1988. The Surveillance and Standards Section completed this document in fulfillment of program commitment 2.2.H of the state's FY 88 Section 106 work program for water quality management.

I would be pleased to receive your comments and approval letter at your convenience.

Sincerely,

David F. Tague

David F. Tague
Program Manager
Surveillance and Standards Section

mlt

Enclosures

STATE OF NEW MEXICO
ACTION PLAN FOR STRENGTHENING
THE TOXIC SUBSTANCES CONTROL PROGRAM

September 30, 1988

Surface Water Quality Bureau
Environmental Improvement Division
New Mexico Health and Environment Department
P.O. Box 968, Harold Runnels Building
1190 St. Francis Drive
Santa Fe, New Mexico 87503

This "Action Plan" is submitted in
fulfillment of program commitment
2.2.H of the "FY 88 Section 106
Work Program for Water Quality Management."

STATE OF NEW MEXICO
ACTION PLAN FOR STRENGTHENING
THE TOXIC SUBSTANCES CONTROL PROGRAM

September 30, 1988

1.0. INTRODUCTION

This "Action Plan" is submitted in fulfillment of program commitment 2.2.H of the "FY 88 Section 106 Work Program for Water Quality Management." Program commitment 2.2.H is as follows:

"H. Submit an "Action Plan" according to Section 304(a)(7) guidance within 90 days following receipt of reports entitled "List of Action Items" and "Summary of Findings" based on the review of the state's water quality-based, toxic pollutants control program conducted by EPA November 19, 1987."

The U.S. Environmental Protection Agency transmitted a "Draft New Mexico Toxics Control Program Assessment" April 21, 1988. The Surface Water Quality Bureau responded May 12, 1988, concluding that the USEPA's review had failed to identify any serious deficiencies in the state's toxic pollutants assessment and control programs. The USEPA transmitted the final "New Mexico State Toxics Control Program Assessment" August 15, 1988. The "Action Items" therein were essentially unchanged from the April 21 draft. In accordance with program commitment 2.2.H, the due date for submittal of the state's "Action Plan" is November 15, 1988, 90 days from the date of the USEPA's final state toxics control program assessment of August 15, 1988.

This document is organized as follows: (1) the major headings of the USEPA's state toxic pollutant control assessment are retained, (2) the wording of each of the USEPA's "Action Items" is reproduced in sections 2.2, 3.1, 4.1, etc., to facilitate review, and (3) the corresponding elements of the state's "Action Plan" is given in sections 2.2, 3.2, 4.2, etc., after the "Action Items."

2.0. STATE AUTHORITY AND LEGAL MECHANISMS FOR TOXICS CONTROL

2.1. Action Items

a. For purpose of clarification, the "Guidelines for Developing Controls for Point Sources of Toxic Substances" should be cross-referenced as additional information in the surface water quality standards.

b. Also for purposes of clarification, the EID should provide a flow chart or outline of each section's duties in reviewing NPDES permit applications for state certification. At a minimum, the EID could reference in the CPP, the steps of the "Implementation Plan" which are followed when certifying an NPDES permit.

2.2. Action Plan Elements

a. Adopting a reference to "Guidelines" in the water quality standards will not satisfy requirements in "Guidance for State Implementation of Water Quality Standards for Clean Water Act Section 303(c)(2)(B)," published by the USEPA September 2, 1988. Further, adopting such a reference would not enhance the existing authority or legality of "Guidelines" as a state procedure for deriving and setting numeric water quality standards for toxic substances. The bureau will consider whether to reference "Guidelines" as additional information in the "Water Quality Standards for Interstate and Intrastate Streams in New Mexico."

b. The bureau reviews applications for state certification of NPDES permits, pursuant to Section 401(a)(1) of the Clean Water Act, in accordance with procedural steps set out in Section 1-101.B, para. 1-6 and 9 of "Water Quality Standards for Interstate and Intrastate Streams in New Mexico," WQCC 88-1, April 25, 1988. Additional certification procedural language in the water quality standards is not warranted. The bureau has developed a procedural flow chart which clarifies the responsibilities of each section of the bureau in the state certification process (appended).

3.0. WATER QUALITY STANDARDS

3.1. Action Items

a. Once the 304(1) process is complete adopt numeric criteria for appropriate toxics, in accordance with the Clean Water Act requirements.

b. Begin using the acid-extractable method for analyzing metals as soon as the method is available.

c. Formalize a mixing zone policy which provides specific guidance for size of the zone and how toxic provisions will be implemented in the mixing zone.

d. Develop a clear procedure to address human health including the definition of a risk level.

e. Develop a procedure to address whole effluent toxicity.

TA

3.2. Action Plan Elements

a. Section 303(c)(2)(B) requires the state to adopt numeric water quality standards for toxic pollutants if the discharge or presence of these pollutants in the affected waters can reasonably be expected to interfere with the attainment of designated uses. In accordance with Section 303(c)(2)(B), the Surface Water Quality Bureau will develop and propose at public hearing numeric standards for specific toxic substances (i.e., Section 307(a) "priority pollutants") where these substances have been shown to interfere with the attainment of designated uses in impacted water bodies. The bureau will identify and document impacted water bodies through the Section 304(1) process.

b. When the USEPA publishes (40 CFR Part 136) approved acid-extractable analytical methods for the determination of concentrations of metals, the SWQ bureau will recommend and request the use of these methods.

c. The cross-sectional area of the mixing zone is specified in Section 1-102.M. The length of the mixing zone will depend on site-specific flow volumes and channel characteristics. The mixing zone concept is a necessary device which allows application of a dilution factor in the calculation of an effluent limitation. The mixing zone concept itself embodies toxicity in the zone of mixing. Without this provision the numeric standards of the receiving watercourse would have to be met in the outfall, i.e., no mixing zone toxicity - no dilution factor. Numeric water quality standards would then become the effluent limitations in all cases.

d. Human health is currently addressed in various sections of "Water Quality Standards for Interstate and Intrastate Streams in New Mexico" including, but not limited to, sections 1-102, 1-102.F, 1-102.G, and 1-102.H. Statutory authority to require the state to define a specific human health risk level is lacking.

e. Whole effluent toxicity will be controlled through existing state procedures set forth in "State of New Mexico Continuing Planning Process," January 1987.

4.0. IDENTIFICATION OF WATERS NEEDING TOXIC SUBSTANCES CONTROLS

4.1. Action Items

a. It is recommended that the state continue to implement the five monitoring priorities for toxic pollutants that the EID identified in 1986; these priorities are as follows:

- determine trace-metal levels in waters used for domestic water supply,

- characterize trace metals in point source discharges to the Rio Grande and Pecos River,

- strengthen pesticide monitoring in general with particular attention to sediment and tissue analysis in agricultural areas,

- determine ambient trace-metal concentrations in the San Juan River, and

- resurvey for mercury levels in the fish of the Middle Rio Grande.

b. Develop methods to evaluate toxic impacts on aquatic life for stream reaches where benthic surveys are impractical or ineffective, such as cases where impacts from habitat impairment or conventional pollutants will be difficult to separate from those of toxicants. It is recommended that ambient water and sediment chronic toxicity tests be used in these situations.

4.2. Action Plan Elements

a. Trace-metal analyses are routinely done in all water quality surveys at all stations including effluent pipes. Trace-metal sampling of effluents during compliance sampling inspections has been performed at three facilities each on the Rio Grande and Pecos River. The bureau will continue to monitor for pesticides which are currently used in New Mexico. Tissue analyses for pesticides and metals are performed by the U.S. Fish and Wildlife Service. The bureau receives the results of this effort. Trace-metal data for the San Juan River are currently available from a recent water quality survey conducted by the bureau, regular ambient monitoring by the U.S. Geological Survey, biocontaminate monitoring by the U.S. Fish and Wildlife Service, and monitoring of blowdown at Morgan Lake by the Arizona Public Service Company.

The most recent study of mercury in fish of the Middle Rio Grande was a joint effort by the Surface Water Quality Bureau, the New Mexico Game and Fish Department, the U.S. Fish and Wildlife Service, the New Mexico Institute of Mining and Technology, and the Scientific Laboratory Division. The survey report, "Mercury Levels in Middle Rio Grande Fish and Associated Public Health Risks: Status Report, 1983," concluded that body burdens of mercury in carp and white bass of the Middle Rio Grande did not present a risk to the health of people eating these fish. Further, the survey report concluded that "mercury levels in the Middle Rio Grande represent a natural background condition rather than pollution caused by man."

b. The Scientific Laboratory Division does not currently have the resources, i.e., funding, equipment, and staffing, to enable it to

perform acute and chronic toxicity testing. Ambient water and sediment chronic toxicity tests were performed by the USEPA in FY 88 on the Rio Grande in the vicinity of Las Cruces and on the Red River in the vicinity of the Molycorp mine and mill. The SWQ bureau is grateful for this assistance and would welcome similar studies in the future.

5.0. EXPOSURE ASSESSMENT AND WASTELOAD ALLOCATION

5.1. Action Items

a. Need wasteload allocation procedure for assessing toxicity within the mixing zone.

5.2. Action Plan Elements

a. The concept and application of the mixing zone has been discussed. A numeric water quality standard must be attained at the final isopleth of concentration, i.e., at the edge of the mixing zone for the controlled pollutant. As stated in paragraph 3.2.c, the mixing zone concept provides for toxicity within the mixing zone. There is no regulatory requirement to "assess toxicity within the mixing zone," nor is there any need for such a requirement.

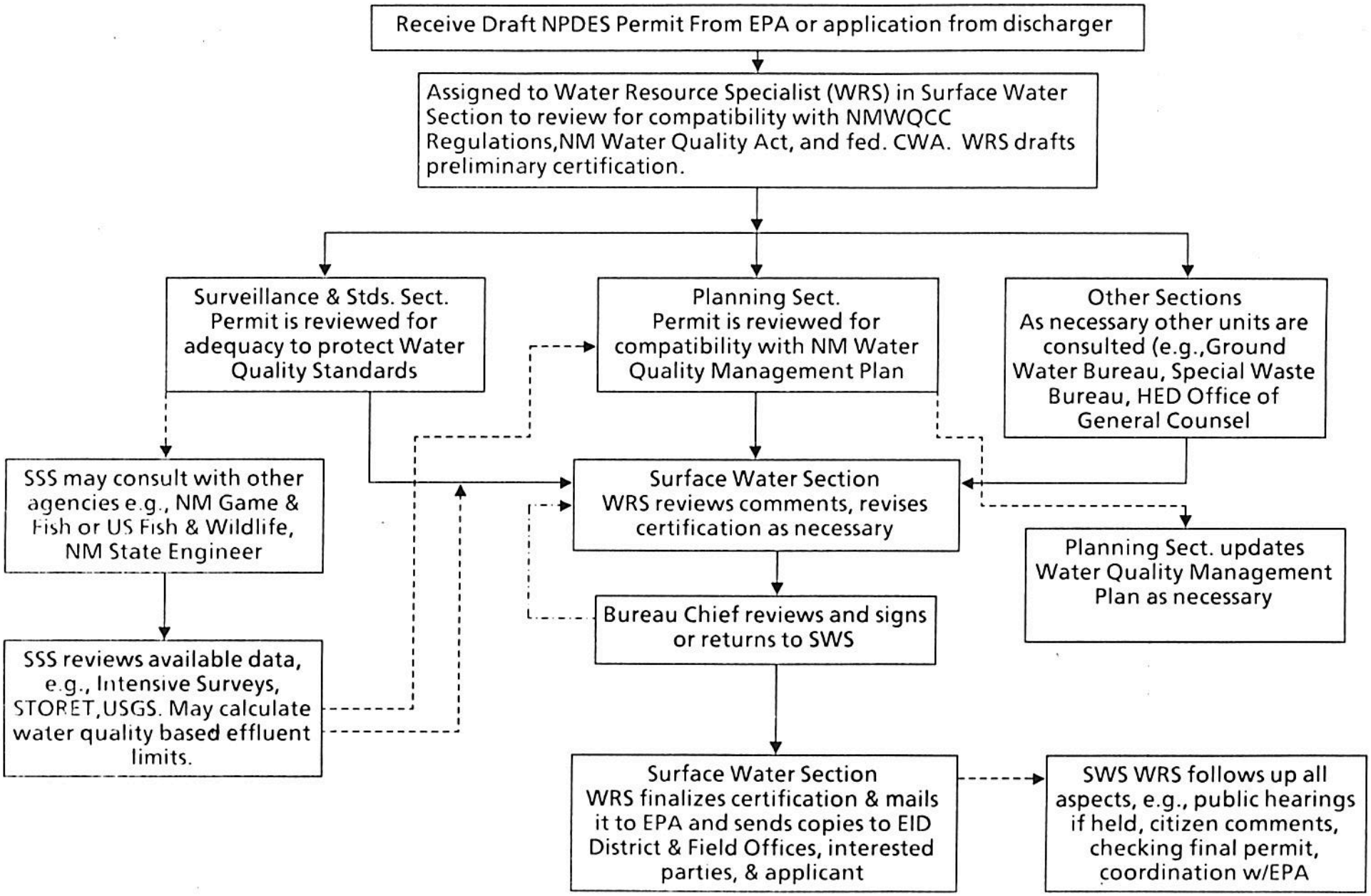
6.0. EFFLUENT CHARACTERIZATION AND PERMITTING PROCEDURES

6.1. Action Items

a. Establish a procedure to receive and process data obtained from the permittees or permit writer. Specifically, the state needs to develop a system to handle the following:

- data from toxicity testing which show instream toxicity upstream from an NPDES permittee,
- calculated concentrations of parameters which exceed EPA's "Quality Criteria for Water" concentrations for food and water consumption downstream from an NPDES permittee, and
- calculated instream concentrations of parameters which exceed maximum contaminant levels.

6.2. Action Plan Elements

a. The Surface Water Quality Bureau does not consider calculations using unspecified variables to be "data." The bureau utilizes the national, computed-based data storage and retrieval system (STORET). Data which is not amenable to STORET goes into NPDES permit-process files or water quality survey files. This system of data management serves the bureau quite well.

NMEID NPDES PERMIT CERTIFICATION PROCEDURE