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INTENSIVE SURVEY
OF
THE PECOS RIVER
NEAR SANTA ROSA AND PUERTO DE LUNA
GUADALUPE COUNTY, NEW MEXICO

JUNE 9-11, 1986

Steven T. Pierce

Surveillance and Standards Section
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
P.O. Box 968, Harold Runnels Building
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Santa Fe, New Mexico 87504-0968

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November 1986

SUMMARY AND CONCLUSIONS

During the week of June 9, 1986, the Surveillance and Standards Section conducted a three-day water quality survey of a ten-mile reach of the Pecos River, with additional stations on El Rito Creek. The Pecos River is included in water quality standards segment 2-211; El Rito Creek is currently unclassified. The objectives of the survey were: (1) to assess the water quality of the Pecos River and El Rito Creek, (2) to determine any effects of effluent from the Santa Rosa wastewater treatment facility on El Rito Creek or on the Pecos River, (3) to determine any effects from the raw sewage discharge at Rio Pecos Villa subdivision or from individual septic tanks in Puerto de Luna, and (4) to determine

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whether water quality standards are attained in segment 2-211. Chemical, physical and biological data collected during this intensive survey are presented and discussed in this report. Conclusions reached were as follows:

1. Water quality along stream segment 2-211 was relatively uniform although the concentration of a number of chemical constituents (i.e., chloride, sulfate and TDS) did increase downstream.

2. With the exception of one elevated total filterable residue (TDS) concentration, no exceedances of the numeric water quality standards occurred and this one did not constitute a violation because of low-flow conditions.

3. Water quality data collected at the Santa Rosa WWTF indicate that this facility discharged an effluent of poor quality into El Rito Creek, although the facility was being operated near peak performance. An apparent violation of an NPDES permit limitation was observed in a sample collected from the discharge.

4. Raw sewage being discharged from the failed package treatment plant at Rio Pecos Villa subdivision poses no immediate threat to the water quality of the Pecos River since the flow did not reach the river but rather percolated into the sandy soil. The package plant does pose an immediate hazard to health and safety of individuals, particularly children, by not being fenced to prevent access and by allowing the opportunity for insect-spread disease.

ACKNOWLEDGEMENTS

Deborah U. Potter and Joneen Cockman assisted in conducting the three-day field sampling effort. Ernestine Gutierrez offered invaluable information concerning the Santa Rosa WWTF, Rio Pecos Villa and sampling access to the Pecos River. Teddy Brown transported fecal coliform samples to the SLD Clovis branch laboratory for analysis. Deborah U. Potter and David F. Tague provided suggestions and useful criticisms that strengthened the manuscript. The Scientific Laboratory Division performed the analyses for water chemistry and bacteria. Maria Lourdes Torres performed the word processing necessary to prepare the manuscript. 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 Pecos River and El Rito Creek. The subsections of this introduction give the segment boundaries and water quality standards of segment 2-211, and describe physical and hydrologic characteristics of the Pecos River and El Rito Creek.

Water Quality Standards

The designated uses and numeric and narrative standards of segment 2-211 are as follows (NMWQCC 1985):

2-211. The main stem of the Pecos River from the headwaters of Sumner Lake upstream to Anton Chico, including any flow from below the perennial reaches of the Gallinas River that enters the main stem of the Pecos River.

A. Designated Uses: fish culture, 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 be less than 32.2 C (90 F).

2. The monthly logarithmic mean of fecal coliform bacteria shall be less than 1,000/100 ml, and no more than 10% of the samples shall exceed 2,000/100 ml.

3. At all flows above 50 cfs: TDS shall be less than 3,000 mg/l, sulfate shall be less than 2,000 mg/l, and chloride shall be less than 400 mg/l.

The general standards (Section 1-102) are also applicable to segment 2-211; relevant paragraphs are as follows:

1-102. GENERAL STANDARDS.

The following general standards apply at all times (unless otherwise specified in Part 2) to all surface waters of the State which are suitable for recreation and support of desirable aquatic life presently common in New Mexico waters:

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.

D. Odor and Taste of Fish: Water contaminants from other than natural causes shall be limited to concentrations that will not impart unpalatable flavor to fish, or result in offensive odor arising from the stream or otherwise interfere with the reasonable use of the water.

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 a dominance of nuisance species in receiving waters.

Description of Watercourse

The Pecos River arises high in the Pecos Wilderness in the Sangre de Cristo Mountains and flows south-southeast to the Texas border near Carlsbad (see Fig. 1). The river is second in size in New Mexico only to

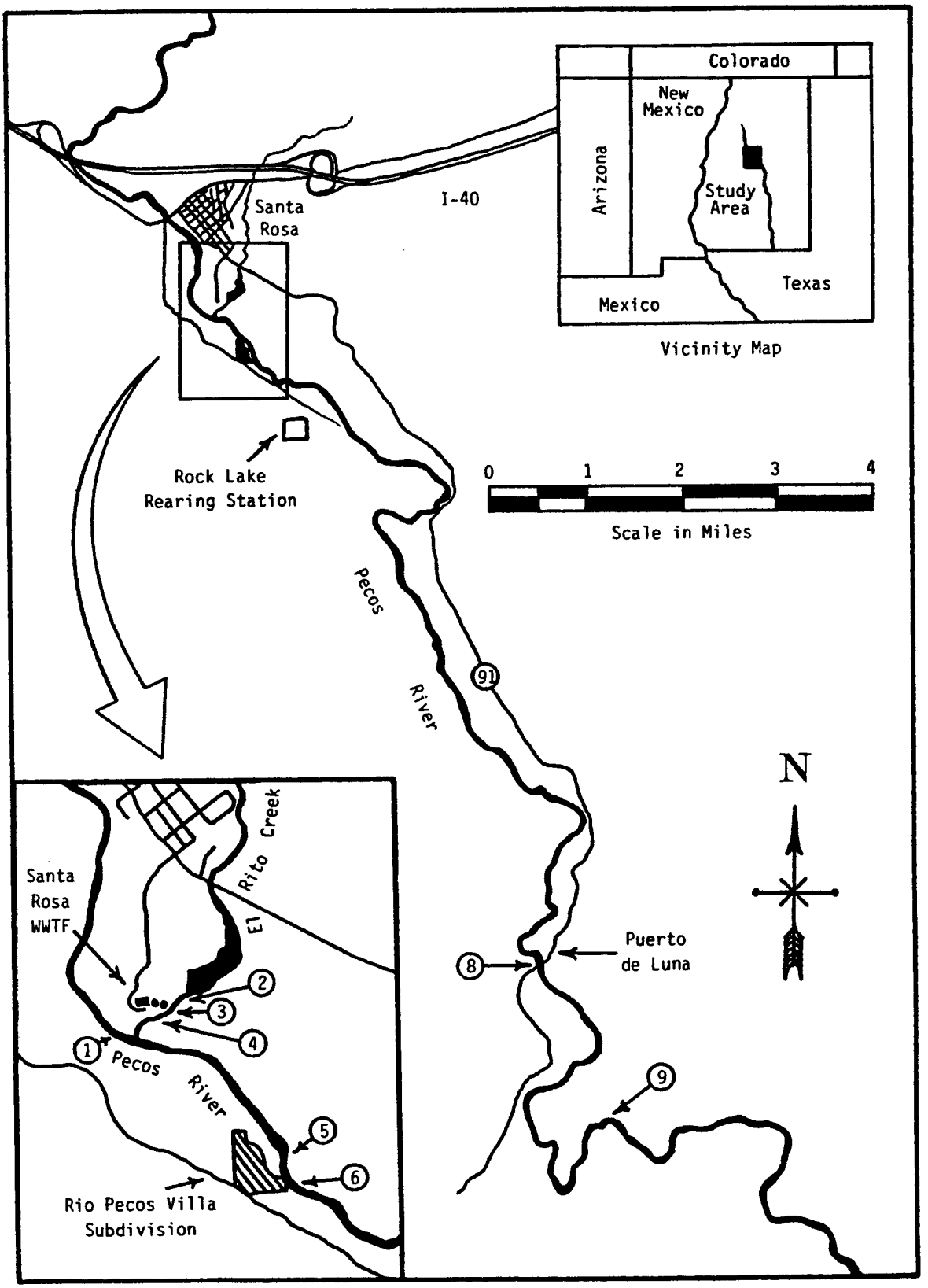

Figure 1. Pecos River sampling sites, 1986.

the Rio Grande 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. Seven miles upstream from Santa Rosa the Pecos River has been impounded at Santa Rosa Lake since 1980 and the flow downstream has been regulated since then. Prior to 1980 flow records for 63 years indicate an average flow at Santa Rosa of 135 ft^3/sec, while records covering five years since the lake was created indicate a flow of 86.6 ft^3/sec. This represents a drop in average flow of 36 percent. From Santa Rosa to Puerto de Luna the Pecos River drops in elevation an average of less than ten feet per mile.

Upstream from Santa Rosa water is diverted from the Pecos River for irrigating approximately 12,000 acres; water is diverted for irrigating 500 acres between Santa Rosa and Puerto de Luna. All irrigation flow is returned to the main river channel approximately two miles downstream from the bridge at Puerto de Luna. The drainage area of the Pecos River at Puerto de Luna is 3,970 square miles.

El Rito Creek arises from Tres Lagunas approximately 1.5 miles northeast of Santa Rosa. The creek flows southwest to the city limits and then flows almost due south along the eastern edge of the city until it joins the Pecos River. Numerous springs emerge along the creek's three-mile length, adding greatly to its flow. Flow from Blue Hole also enters El Rito Creek. South of Santa Rosa the creek has been impounded to form Power Dam Lake, a 15-acre lake in the Janes-Wallace Memorial Park, which is stocked with rainbow trout from nearby Rock Lake Rearing Station. Below Power Dam dense clumps of Elodea spp. exist all along El Rito Creek. The

Santa Rosa wastewater treatment facility (WWTF) is located in the "Y" formed by El Rito Creek and the Pecos River. This facility has been in operation since 1959 and serves approximately 4,000 people. It is operating at or beyond design capacity with an average discharge of 0.322 MGD and is nearing the end of its useful life. For the last ten years the plant has been seriously non-compliant with NPDES permit limitations; violations of effluent limits routinely occur for more than one parameter. Treated effluent is discharged to El Rito Creek approximately 150 yards upstream from the confluence with the Pecos River.

Development of Rio Pecos Villa subdivision, 1.4 miles south of the Santa Rosa city limits, was approved by the Guadalupe County Commission and the Santa Rosa Planning and Zoning Commission in 1974. A Sanilogical package treatment plant was installed in 1976 and replaced after failure in 1977. Heavy rains later in 1977 again destroyed the plant which was repaired and worked as designed for three months in 1979. Early in 1980 the plant again failed and has been inoperative since. The unit currently mimics a septic tank with primary settling occurring. The NPDES permit expired in 1981, but the unit still receives sewage from nine residential connections.

The Santa Rosa area receives an average of 13.8 inches of precipitation annually, mostly as rainfall during the warmer months, and an average of 13.4 inches of snow annually. Although the mild climate provides a long growing season (April - October), the Santa Rosa area is characterized as semi-arid with a water deficit for agriculture of 18 inches per year (Gabin and Lesperance 1977).

MATERIALS AND METHODS

Eight stations were sampled during the three-day survey of the Pecos River from Santa Rosa to Puerto de Luna.

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	(Secondary) STORET Code	Location
1	UPR211001040	Pecos River upstream of El Rito Creek.
2	UPR211001037	El Rito Creek upstream of Santa Rosa WWTF discharge.
3	UPR211001035	Santa Rosa WWTF discharge.
4	UPR211001030	El Rito Creek downstream of Santa Rosa WWTF discharge.
5	UPR211001025	Pecos River upstream of Rio Pecos Villa subdivision.
6	UPR211001020	Rio Pecos Villa subdivision sewage effluent.
8	UPR211000515	Pecos River at Puerto de Luna bridge.
9	UPR211000510	Pecos River approximately two miles downstream from Puerto de Luna.

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

Data Acquistion

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 field color comparator kit (Hellige). Water samples for turbidity measurements were collected in clean 250 ml glass 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). The samples were preserved as indicated below, cooled on ice to 4°C and transported in ice chests to the Scientific Laboratory Division 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 determinations 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 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 enviromental measurements performed during this water quality survey are summarized in Table A1.

RESULTS AND DISCUSSION

The water quality data collected during this survey are tabulated in Table A2 and graphically presented in Figs. 2-4. These data are available on STORET and can be retrieved using the selector A=21NMEX and the restrictor IS=863506. During the three-day survey, average flows in the Pecos River were 5.4 ft^3/sec at Santa Rosa and 107.3 ft^3/sec at Puerto de Luna, an increase of 2,000 percent (Linda Beal USGS). The greatly increased flow was contributed by El Rito Creek, the Rio Agua Negra and numerous springs located along this stretch of the watercourse. Surface drainage from approximately 1,300 square miles enters the Pecos River between Santa Rosa and Puerto de Luna. Photographs of all sampling stations are appended.

Mean total phosphorus concentrations were extremely low in the Pecos River upstream of El Rito Creek and also in El Rito Creek upstream of the Santa Rosa WWTF effluent. These concentrations increased slightly in El

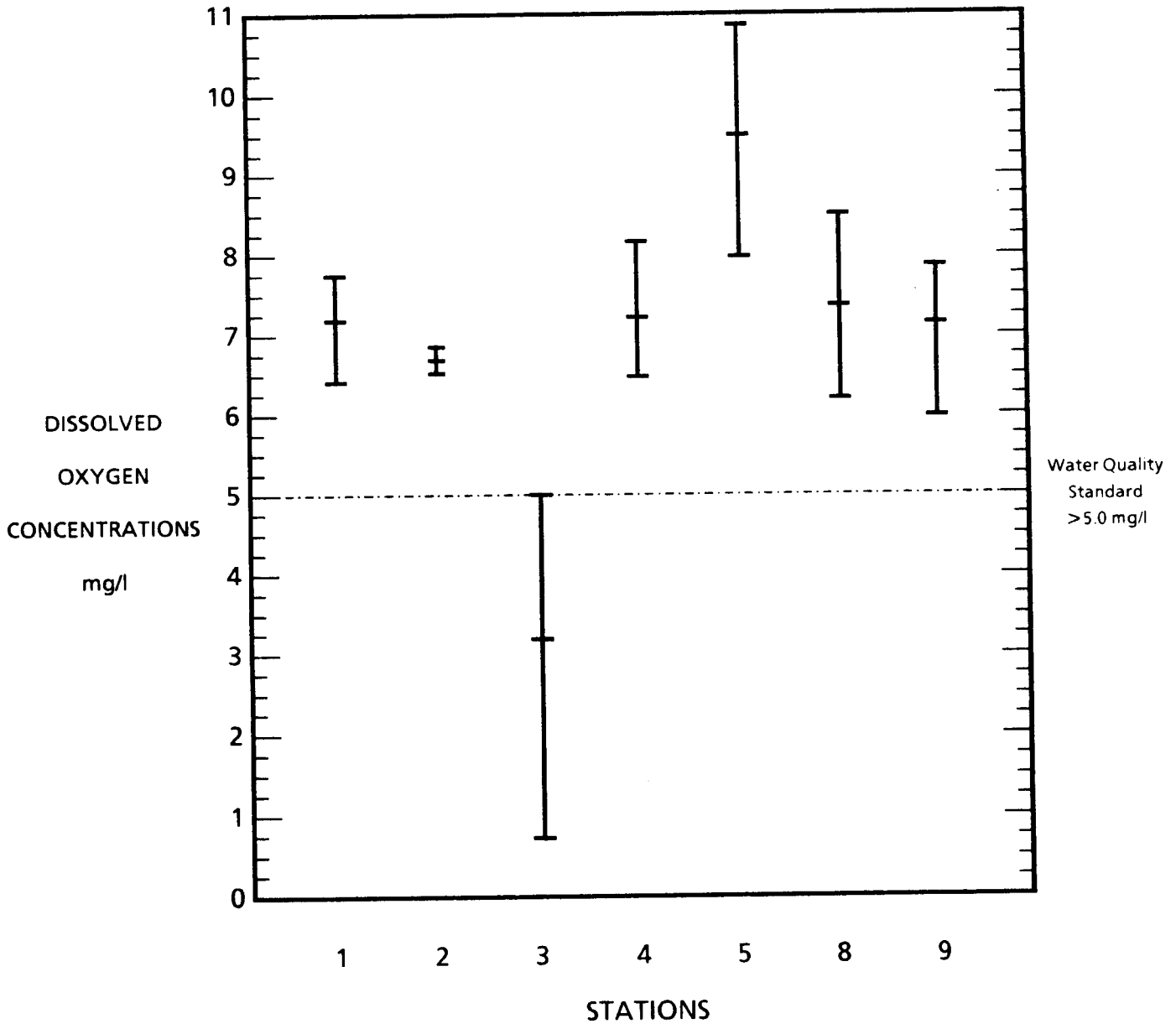

Figure 2. Total dissolved oxygen concentrations (means and ranges) at stations on the Pecos River, El Rito Creek and at the effluent outfall from the Santa Rosa WWTF, June 9-11, 1986.

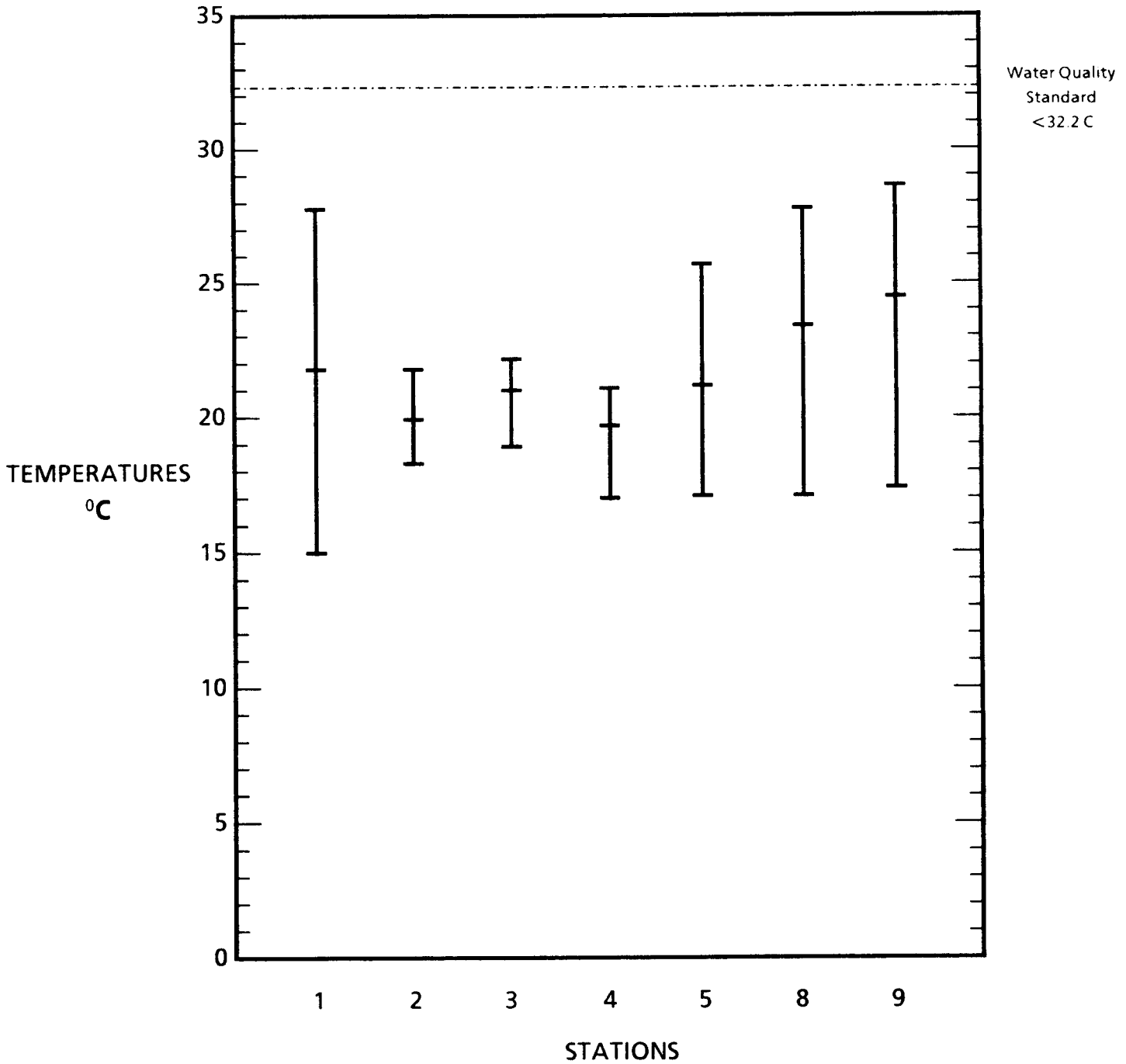

Figure 3. Temperatures (means and ranges) at stations on the Pecos River, El Rito Creek and at the effluent outfall from the Santa Rosa WWTF, June 9-11, 1986.

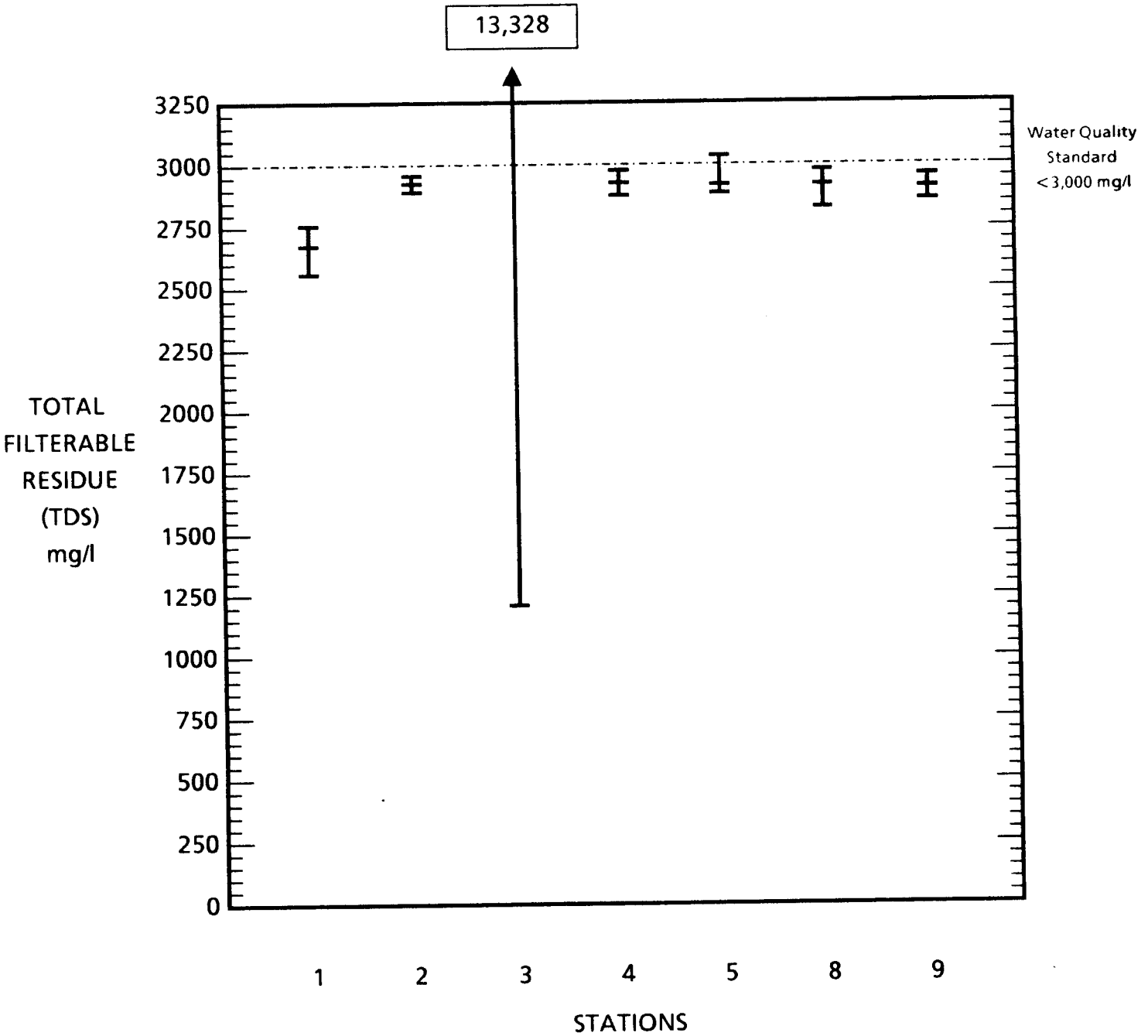

Figure 4. Total filterable residue (TDS) concentrations (means and ranges) at stations on the Pecos River, El Rito Creek and at the effluent outfall from the Santa Rosa WWTF, June 9-11, 1986.

Rito Creek downstream of the effluent and in the Pecos River downstream of El Rito Creek. Total phosphorus concentrations in the Rio Pecos Villa effluent were very high, but the discharge was not reaching the Pecos River at the time of the survey. This pattern was repeated by total nitrogen concentrations.

Concentrations of dissolved oxygen ranged from 6.2 to 10.8 mg/l in the Pecos River and from 6.5 to 8.1 mg/l in El Rito Creek (Fig. 2). No dissolved oxygen sag was observed in either watercourse during this study. Levels of pH ranged from 7.5 to 8.2 in the Pecos River with a slight increase downstream and pH levels ranged from 7.3 to 8.0 in El Rito Creek. Temperatures in the Pecos River varied from 15.0 C to 28.8 C and those in El Rito Creek ranged from 17.0 C to 21.8 C (Fig. 3). Sulfate levels ranged from 1,518 to 1,729 mg/l in the Pecos River and from 1,722 to 1,734 mg/l in El Rito Creek. Chloride concentrations ranged from 87 to 149 mg/l in the Pecos River and from 73 to 76 mg/l in El Rito Creek.

Total filterable residue (TDS) was high at all watercourse stations (> 2,575 mg/l) with high concentrations and extreme variability being observed in the effluent from the Santa Rosa WWTF (Fig. 4). Total non-filterable residue (TSS) was low at every station except at the Santa Rosa WWTF effluent and at the station two miles below Puerto de Luna. Metals were generally near or below the detection limits at all stations.

Fecal coliform counts ranged from 24 to 84 organisms per 100 ml on the Pecos River and from 8-12 per 100 ml on El Rito Creek. The Santa Rosa WWTF effluent contained two fecal coliform organisms per 100 ml and the Rio Pecos Villa effluent contained 25,000 organisms per 100 ml.

During the fifth and final sampling run a large quantity of irrigation return flow was observed entering the Pecos River immediately upstream of station 9. The return flow was heavily silt-laden and did not completely mix with the main flow until a point approximately one-quarter mile downstream of station 9. Samples collected at that point were elevated in total non-filterable residue (TSS). The level detected during the irrigation water return flow showed an eight-fold increase over the average of the first four measurements obtained at that station. These samples also showed an increase in total phosphorus content.

Water Quality Standards Attainment

During the three-day survey there was only one potential violation of the numeric standards at the stations sampled within segment 2-211. This apparent exceedance of the numeric standard for total filterable residue (TDS) occurred at station 5 on the Pecos River between El Rito Creek and Rio Pecos Villa subdivision. The level detected was 3,025 mg/l compared to the standard for this segment of 3,000 mg/l which applies only when flows are greater than 50 ft^3/sec. Although instantaneous flow at station 5 was not measured during this survey, a reasonable determination was made that flow could not have exceeded 50 ft^3/sec. Flow at the Santa Rosa gage two miles upstream averaged approximately 5 ft^3/sec for the three days of the survey. Although there was an increase in flow between the gage and station 5, it was determined that the flow did not increase to 50 ft^3/sec until many miles downstream where diverted irrigation flow is returned to the river. Therefore, this did not constitute a violation of the standards. In addition, there was one apparent violation of NPDES permit

limitations in effluent from the Santa Rosa WWTF. The effluent limitation for total non-filterable residue (TSS) under NPDES permit number NM0024988 is 30 mg/l as a 30-day average based on two or more samples collected per month. A concentration of 51 mg/l of TSS was determined in a sample collected from the discharge during the survey. All levels of dissolved oxygen, pH, temperature, sulfate and chloride were within limits set forth in the water quality standards.

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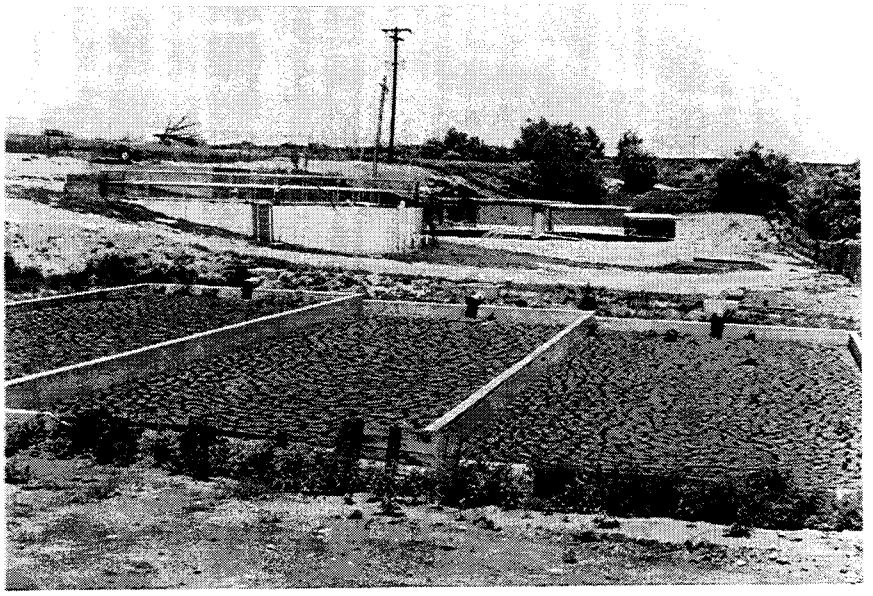
Table A1. Summary of sample types, parameter names and STORET codes of environmental measurements performed during the water quality survey of the Pecos River and El Rito Creek, June 9-11, 1986.

Type	Parameter	STORET Code
Physical	Temperature	00010
	Conductivity	00095
	Total filterable residue (TDS)	70300
	Total non-filterable residue (TSS)	00530
	Turbidity	00070
Chemical	pH	00400
	Dissolved oxygen	00300
	Total Kjeldahl nitrogen	00625
	Total ammonia nitrogen	00610
	Total nitrite + nitrate nitrogen	00630
	Total phosphorus	00665
	Total alkalinity	00410
	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
Biological	Fecal coliform bacteria	31616

Station 1 - Pecos River upstream of El Rito Creek

Station 2 - El Rito Creek upstream of Santa Rosa WWTF

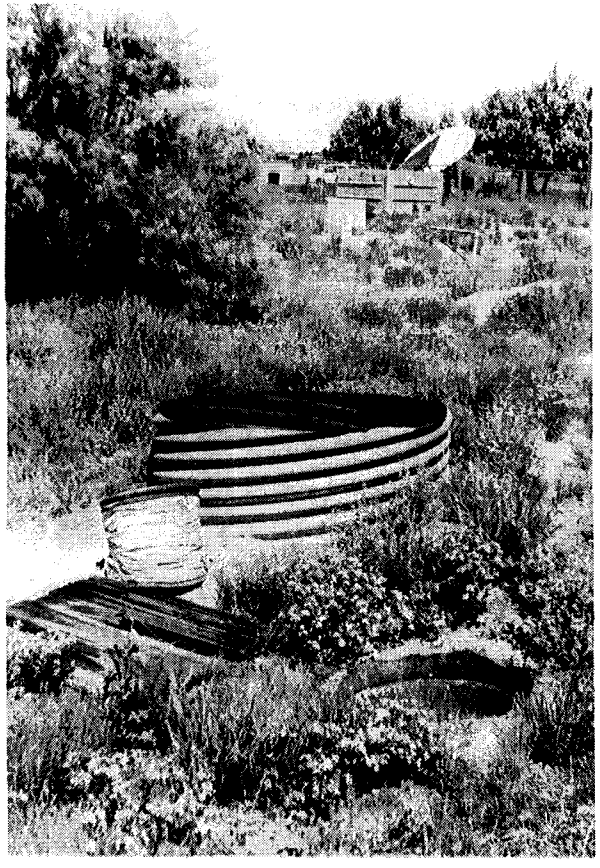


Santa Rosa wastewater treatment facility

Station 3 - Santa Rosa WWTF discharge

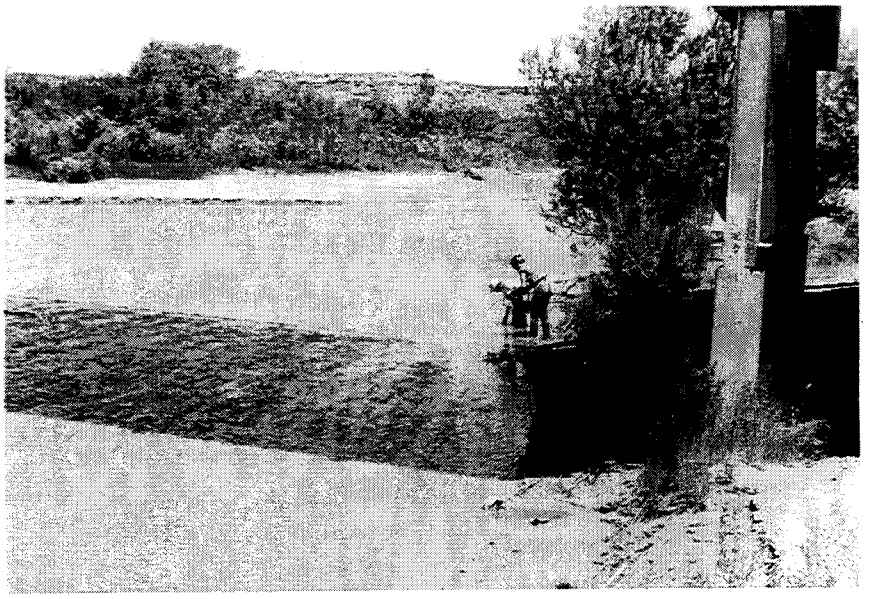
Station 4 - El Rito Creek (foreground) downstream from WWTF discharge above confluence with Pecos River

Station 5 - Pecos River downstream from El Rito Creek



Rio Pecos Villa failed package treatment plant

Station 6 - Effluent from failed Rio Pecos Villa package treatment plant



Station 8 - Pecos River at the Puerto de Luna bridge

Station 9 - Pecos River two miles downstream from Puerto de Luna

Table A2. Water quality data collected on the Pecos River and El Rito Creek, June 9-11, 1986.

PGM=RET PAGE: 1

UPR211.001040 UPR211001040 SR1
34 55 31.0 104 41 03.0 4
PECOS RIVER UPSTREAM OF EL RITO CREEK
35019 NEW MEXICO GUADALUPE
WESTERN GULF 120800
PECOS RIVER PECOS RIVER UPSTREAM OF EL RITO CREEK
21NMEX 860712 13060001
SURFACE SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00070 TURB JKSN JTU	00095 CNDUCTVY AT 25C MICROMHO	00300 DO MG/L	00400 PH SU	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00640 T INORG. NITROGEN MG/L N
86/06/09	1300	WATER		25.0	.9	2450	7.2	7.8	.100	.10K	.81	.020	.200C
86/06/10	0915	WATER		18.1		2299	7.2	7.7	.100	.10K	.12	.020	.200C
86/06/10	1405	WATER		27.8		1907	7.3	7.9	.060	.20	.37	.020	.260C
86/06/11	0625	WATER		15.0		2424	6.4	7.5	.120	.12	.49	.020	.240C
86/06/11	1120	WATER		23.8		2355	7.7	7.9	.080	.14	.54	.020	.220C

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00530 RESIDUE TOT NFLT MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	00925 MGNSIUM MG,DISS MG/L	00940 CHLORIDE TOTAL MG/L	00410 T ALK CACO3 MG/L	00440 HCO3 ION HCO3 MG/L
86/06/09	1300	WATER		3K	.71C	.910C							
86/06/10	0915	WATER		3K	.02C	.220C	73.6	2.34	520.0	109.0	87.0	128	157.0
86/06/10	1405	WATER		3	.17C	.430C	78.2	3.12	580.0	19.5	99.0	127	155.0
86/06/11	0625	WATER		3K	.37C	.610C							
86/06/11	1120	WATER		3K	.40C	.620C							

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00946 SULFATE SO4-DISS MG/L	70300 RESIDUE DISS-180 C 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	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L
86/06/09	1300	WATER			2575								
86/06/10	0915	WATER		1518.0	2660	8	150	1K	5K	10K	.5K	5K	1K
86/06/10	1405	WATER		1593.0	2758								
86/06/11	0625	WATER			2695								
86/06/11	1120	WATER			2700								

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	31616 FEC COLI MFM-FCBR /100ML
86/06/11	0625	WATER		80

UPR211.001037 UPR211001037 SR2
34 55 34.0 104 40 52.0 4
EL RITO CREEK UPSTREAM OF SANTA ROSA WWTF
35019 NEW MEXICO GUADALUPE
WESTERN GULF 120800
PECOS RIVER
21NMEX 860712 13060001
SURFACE SAMPLES

EL RITO CREEK UPSTREAM OF SANTA ROSA WWTF

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00070 TURB JKSN JTU	00095 CNDUCTVY AT 25C MICROMHO	00300 DO MG/L	00400 PH SU	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00640 T INORG. NITROGEN MG/L N
86/06/09	1200	WATER		21.8	4.8	2447	6.8	8.0	.040K	.25	.25	.020	.290C
86/06/11	0715	WATER		18.2		3158	6.6	7.8	.040K	.31	.33	.010	.350C

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00530 RESIDUE TOT NFLT MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	00925 MGNSIUM MG,DISS MG/L	00940 CHLORIDE TOTAL MG/L	00410 T ALK CACO3 MG/L	00440 HCO3 ION HCO3 MG/L
86/06/09	1200	WATER		4	.00	.290C							
86/06/11	0715	WATER		7	.02C	.370C							

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00946 SULFATE SO4-DISS MG/L	70300 RESIDUE DISS-180 C 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	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L
86/06/09	1200	WATER			2918								
86/06/11	0715	WATER			2950	8	110	1K	7	10K	.5K	5K	1K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	31616 FEC COLI MFM-FCBR /100ML
86/06/11	0715	WATER		8

NM0024988 UPR211001035 SR3
34 54 19.0 104 41 00.0 4
SANTA ROSA WASTEWATER PLANT
35019 NEW MEXICO GUADALUPE SANTA ROSA WASTEWATER TREATMENT PLANT EFFLUENT
WESTERN GULF 120800
PECOS /TYPA/MUN/TREATD/OUTFL/NONAMB/PIPE
21NMEX 830820 13060001013 0004.370 ON
0001 FEET DEPTH INDEX MILES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00070 TURB JKSN JTU	00095 CNDUCTVY AT 25C MICROMHO	00300 DO MG/L	00400 PH SU	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00640 T INORG. NITROGEN MG/L N
86/06/09	1220	WATER		22.2	28.0	1478	.7	7.3	.040K	25.65	35.20	6.990	25.610C
86/06/10	0845	WATER		20.0		1628	2.0	7.3	.220	18.50	26.50	8.390	18.720C
86/06/10	1330	WATER		22.0		1505	3.1	7.4	.350	20.30	29.10	7.060	20.650C
86/06/11	0710	WATER		19.0		1568	2.7	7.1	.220	23.60	25.00	7.760	23.820C
86/06/11	1055	WATER		22.0		1569	3.2	7.3	.330	29.40	38.80	9.660	29.730C

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00530 RESIDUE TOT NFLT MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	00925 MGNSIUM MG,DISS MG/L	00940 CHLORIDE TOTAL MG/L	00410 T ALK CACO3 MG/L	00440 HCO3 ION HCO3 MG/L
86/06/09	1220	WATER		22	9.55C	35.160C							
86/06/10	0845	WATER		27	8.00C	26.720C	75.9	8.19	188.0	19.5	73.0	267	326.0
86/06/10	1330	WATER		24	8.80C	29.450C	71.3	7.80	170.0	47.6	72.0	258	315.0
86/06/11	0710	WATER		51	1.40C	25.220C							
86/06/11	1055	WATER		25	9.40C	39.130C							

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00946 SULFATE S04-DISS MG/L	70300 RESIDUE DISS-180 C 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	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L
86/06/09	1220	WATER			1212								
86/06/10	0845	WATER		451.0	1235	5K	100K	1K	5K	10K	.5K	5K	1K
86/06/10	1330	WATER		530.0	1230								
86/06/11	0710	WATER			1262								
86/06/11	1055	WATER			13328								

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	31616 FEC COLI MFM-FCBR /100ML
86/06/11	0710	WATER		2

UPR211.001030 UPR211001030 SR4
34 55 32.0 104 40 59.0 4
EL RITO CREEK DOWNSTREAM OF THE SANTA ROSA WWTF
35019 NEW MEXICO GUADALUPE
WESTERN GULF 120800
PECOS RIVER EL RITO CREEK DOWNSTREAM OF THE SANTA ROSA WWTF
21NMEX 860712 13060001
SURFACE SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00070 TURB JKSN JTU	00095 CNDUCTVY AT 25C MICROMHO	00300 DO MG/L	00400 PH SU	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00640 T INORG. NITROGEN MG/L N
86/06/09	1245	WATER		21.0	3.7	2376	6.5	7.3	.040K	1.05	2.67	.080	1.090C
86/06/10	0900	WATER		19.0		2598	7.5	7.8	.040	.58	.98	.170	.620C
86/06/10	1345	WATER		21.0		2538	8.1	7.7	.070	.36	.61	.130	.430C
86/06/11	0640	WATER		17.0		2714	6.7	7.6	.040K	.20	.76	.100	.240C
86/06/11	1110	WATER		21.0		2592	7.0	7.8	.050	.53	1.11	.180	.580C

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00530 RESIDUE TOT NFLT MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	00925 MGNSIUM MG,DISS MG/L	00940 CHLORIDE TOTAL MG/L	00410 T ALK CACO3 MG/L	00440 HCO3 ION HCO3 MG/L
86/06/09	1245	WATER		4	1.62C	2.710C							
86/06/10	0900	WATER		11	.40C	1.020C	62.1	1.95	580.0	17.1	73.0	144	176.0
86/06/10	1345	WATER		6	.25C	.680C	2.0	64.40	600.0	65.8	76.0	144	175.0
86/06/11	0640	WATER		8	.56C	.800C							
86/06/11	1110	WATER		17	.58C	1.160C							

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00946 SULFATE S04-DISS MG/L	70300 RESIDUE DISS-180 C 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	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L
86/06/09	1245	WATER			2920								
86/06/10	0900	WATER		1722.0	2925	8	100K	1K	5K	10K	.5K	5K	1K
86/06/10	1345	WATER		1734.0	2945								
86/06/11	0640	WATER			2968								
86/06/11	1110	WATER			2965								

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	31616 FEC COLI MFM-FCBR /100ML
86/06/11	0640	WATER		12

UPR211.001025 UPR211001025 SR5
34 55 09.0 104 40 30.0 4
PECOS RIVER UPSTREAM OF RIO PECOS VILLA SUBDIV.
35019 NEW MEXICO GUADALUPE
WESTERN GULF 120800
PECOS RIVER PECOS RIVER UPSTREAM OF THE RIO PECOS VILLA SUBDIVISION
21NMEX 860712 13060001
SURFACE SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00070 TURB JKSN JTU	00095 CNDUCTVY AT 25C MICROMHO	00300 DO MG/L	00400 PH SU	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00640 T INORG. NITROGEN MG/L N
86/06/09	1340	WATER		25.8	4.4	3542	9.6	8.0	.040K	.10K	.27	.120	.140C
86/06/10	1000	WATER		20.0		2585	10.8	7.9	.040	.18	.62	1.050	.220C
86/06/10	1455	WATER		24.2		2743	9.7	8.0	.040K	.13	2.31	.150	.170C
86/06/11	0755	WATER		17.3		2747	8.0	7.7	.040K	.30	.30	.100	.340C
86/06/11	1145	WATER		18.2		2942	9.3	8.0	.040K	.16	.53	.060	.200C

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00530 RESIDUE TOT NFLT MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	00925 MGNSIUM MG,DISS MG/L	00940 CHLORIDE TOTAL MG/L	00410 T ALK CACO3 MG/L	00440 HCO3 ION HCO3 MG/L
86/06/09	1340	WATER		3	.17C	.310C							
86/06/10	1000	WATER		3K	.44C	.660C	80.5	2.34	584.0	8.8	103.0	139	170.0
86/06/10	1455	WATER		3K	2.18C	2.350C	78.2	2.73	536.0	87.4	103.0	133	163.0
86/06/11	0755	WATER		3K	.00	.340C							
86/06/11	1145	WATER		7	.37C	.570C							

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00946 SULFATE SO4-DISS MG/L	70300 RESIDUE DISS-180 C 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	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L
86/06/09	1340	WATER			2905								
86/06/10	1000	WATER		1705.0	2918	6	120	1K	5K	10K	.5K	5K	1K
86/06/10	1455	WATER		1568.0	2900								
86/06/11	0755	WATER			2963								
86/06/11	1145	WATER			3025								

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	31616 FEC COLI MFM-FCBR /100ML
86/06/11	0745	WATER		24

UPR211.001020 UPR211001020 SR6
34 55 03.0 104 40 30.0 4
RIO PECOS VILLA SUBDIVISION SEWAGE EFFLUENT
35019 NEW MEXICO GUADALUPE RIO PECOS VILLA SUBDIVISION SEWAGE EFFLUENT
WESTERN GULF 208000
PECOS RIVER /TYPA/MUN/PTRTMT/OUTFL/NONAMB/PIPE
21NMEX 860712 13060001
SURFACE SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00070 TURB JKSN JTU	00095 CNDUCTVY AT 25C MICROMHO	00300 DO MG/L	00400 PH SU	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00640 T INORG. NITROGEN MG/L N
86/06/09	1405	WATER		23.0	75.0	957	.0	7.0	.040K	42.50	56.30	18.000	42.540C
86/06/10	1045	WATER							.060	34.40	70.00	.350	34.460C

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00530 RESIDUE TOT NFLT MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	00925 MGNSIUM MG,DISS MG/L	00940 CHLORIDE TOTAL MG/L	00410 T ALK CACO3 MG/L	00440 HCO3 ION HCO3 MG/L
86/06/09	1405	WATER		18	13.80C	56.340C							
86/06/10	1045	WATER		20	35.60C	70.060C	73.6	10.10	56.8	16.5	37.5	355	433.0

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00946 SULFATE SO4-DISS MG/L	70300 RESIDUE DISS-180 C 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	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L
86/06/09	1405	WATER			524								
86/06/10	1045	WATER		58.0	500	5K	100K	1K	5K	10K	.5K	5K	1K

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	31616 FEC COLI MFM-FCBR /100ML
86/06/11	0755	WATER		25000

UPR211.000515 UPR211000515 SR8
34 49 36.0 104 37 30.0 4
PECOS RIVER AT PUERTO DE LUNA HIGHWAY BRIDGE
35019 NEW MEXICO GUADALUPE
WESTERN GULF 120800
PECOS RIVER PECOS RIVER AT PUERTO DE LUNA HIGHWAY BRIDGE
21NMEX 860712 13060001
SURFACE SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00070 TURB JKSN JTU	00095 CNDUCTVY AT 25C MICROMHO	00300 DO MG/L	00400 PH SU	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00640 T INORG. NITROGEN MG/L N
86/06/09	1520	WATER		27.9	1.7	2543	6.2	8.2	.050	.10K	1.02	.050	.150C
86/06/10	1130	WATER		21.2		2798	8.5	8.0	.060	.10K	.10K	.090	.160C
86/06/10	1550	WATER		27.5		2803	7.2	8.2	.040	.10K	.47	.140	.140C
86/06/11	0830	WATER		17.2		2497	7.6	7.9	.070	.18	2.14	.160	.250C
86/06/11	1225	WATER		23.2		2466	7.2	8.1	.040	.10K	.55	.110	.140C

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00530 RESIDUE TOT NFLT MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	00925 MGNSIUM MG,DISS MG/L	00940 CHLORIDE TOTAL MG/L	00410 T ALK CACO3 MG/L	00440 HCO3 ION HCO3 MG/L
86/06/09	1520	WATER		12	.92C	1.070C							
86/06/10	1130	WATER		6	.00C	.160C	98.9	1.95	512.0	85.4	132.0	140	171.0
86/06/10	1550	WATER		9	.37C	.510C	98.9	2.34	520.0	85.4	132.0	120	147.0
86/06/11	0830	WATER		6	1.96C	2.210C							
86/06/11	1225	WATER		5	.45C	.590C							

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00946 SULFATE S04-DISS MG/L	70300 RESIDUE DISS-180 C 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	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L
86/06/09	1520	WATER			2845								
86/06/10	1130	WATER		1729.0	2988	5K	120	1K	5K	10K	.5K	5K	1K
86/06/10	1550	WATER		1720.0	2988								
86/06/11	0830	WATER			2870								
86/06/11	1225	WATER			2990								

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	31616 FEC COLI MFM-FCBR /100ML
86/06/11	0830	WATER		84

UPR211.000510 UPR211000510 SR9
34 48 10.0 104 36 55.0 4
PECOS RIVER APPROX. 2 MILES BELOW PUERTO DE LUNA
35019 NEW MEXICO GUADALUPE
WESTERN GULF 120800
PECOS RIVER PECOS RIVER APPROXIMATELY TWO MILES DOWNSTREAM FROM PUERTO DE LUNA
21NMEX 860712 13060001
SURFACE SAMPLES

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00010 WATER TEMP CENT	00070 TURB JKSN JTU	00095 CNDUCTVY AT 25C MICROMHO	00300 DO MG/L	00400 PH SU	00630 NO2&NO3 N-TOTAL MG/L	00610 NH3+NH4- N TOTAL MG/L	00625 TOT KJEL N MG/L	00665 PHOS-TOT MG/L P	00640 T INORG. NITROGEN MG/L N
86/06/09	1550	WATER		28.8	15.0	2633	5.9	8.1	.060	.10K	.44	.130	.160C
86/06/10	1210	WATER		24.8		2691	7.9	8.0	.060	.13	.24	.150	.190C
86/06/10	1605	WATER		27.2		2792	7.2	8.2	.060	1.25	2.10	.310	1.310C
86/06/11	0850	WATER		17.5		3680	7.7	8.1	.060	.10K	.50	.090	.160C
86/06/11	1300	WATER		24.5		2879	6.6	8.0	.060	.10K	.54	.840	.160C

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00530 RESIDUE TOT NFLT MG/L	00605 ORG N N MG/L	00600 TOTAL N N MG/L	00930 SODIUM NA,DISS MG/L	00935 PTSSIUM K,DISS MG/L	00915 CALCIUM CA,DISS MG/L	00925 MGNSIUM MG,DISS MG/L	00940 CHLORIDE TOTAL MG/L	00410 T ALK CACO3 MG/L	00440 HCO3 ION HCO3 MG/L
86/06/09	1550	WATER		44	.34C	.500C							
86/06/10	1210	WATER		40	.11C	.300C	39.1	1.95	580.0	63.0	149.0	128	156.0
86/06/10	1605	WATER		43	.85C	2.160C	101.0	1.95	620.0	7.2	148.0	125	153.0
86/06/11	0850	WATER		23	.40C	.560C							
86/06/11	1300	WATER		299	.44C	.600C							

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	00946 SULFATE SO4-DISS MG/L	70300 RESIDUE DISS-180 C 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	71900 MERCURY HG,TOTAL UG/L	01147 SELENIUM SE,TOT UG/L	01077 SILVER AG,TOT UG/L
86/06/09	1550	WATER			2860								
86/06/10	1210	WATER		1648.0	2890	8	160	1K	5K	10K	.5K	5K	1K
86/06/10	1605	WATER		1718.0	2948								
86/06/11	0850	WATER			2900								
86/06/11	1300	WATER			2879								

DATE FROM TO	TIME OF DAY	MEDIUM	SMK OR DEPTH (FT)	31616 FEC COLI MFM-FCBR /100ML
86/06/11	0850	WATER		52