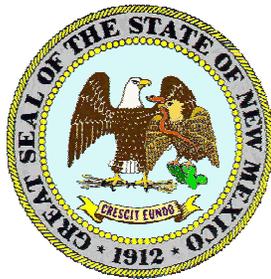


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**WATER QUALITY SURVEY SUMMARY**  
FOR THE  
**UPPER PECOS RIVER WATERSHED, PART I**  
(BETWEEN HEADWATERS AND VILLANUEVA STATE PARK)  
**2001**



Prepared by

Surface Water Quality Bureau  
New Mexico Environment Department

**August 2004**

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## 1.0 EXECUTIVE SUMMARY

Water quality surveys and assessments are completed in fulfillment of Section 106 of the Clean Water Act (CWA), *Work Program for Water Quality Management*. The purpose of the water quality survey is to collect water quality data to identify and prioritize water quality problems within a watershed and to evaluate the effectiveness of water quality based controls. The data collected as part of the survey are compared to current United State Environmental Protection Agency (USEPA) approved water quality standards to determine if waterbodies throughout the watershed are supporting their designated uses, such as the fishable and swimmable goals set forth in the CWA §102(a).

Water Quality Survey Summary Reports focus on information and data collected by the New Mexico Environment Department's (NMED) Surface Water Quality Bureau (SWQB) pertaining to stream reaches that were identified as NOT meeting water quality standards. All data collected as part of a survey are available upon request to the SWQB and can be downloaded from USEPA's computerized environmental data system known as STORET (<http://www.epa.gov/storet/>). The data collected as part of this study are later combined with all other readily available or submitted data that meet state quality assurance/quality control requirements to form the basis of designated use attainment determinations summarized in the *Integrated CWA §303(d)/305(b) Water Quality Monitoring and Assessment Report*.

The portions of the upper Pecos watershed surveyed in this study found numerous exceedences of state water quality standards. Impairments due to stream bottom deposits exist along the mainstem of the Pecos River from Santa Rosa Reservoir to Canon de Manzanita. Water quality standards exceedences were observed for this stretch of the Pecos River for ammonia, aluminum, copper, mercury, total dissolved solids, conductivity, fecal coliform, temperature and turbidity, but none were significant enough to conclude impairments for these parameters. As you move up the mainstem, more exceedences were detected for various parameters, but the only actual impairments identified in the middle portion of the study area along the mainstem were due to temperature and turbidity. No impairments were identified for the mainstem of the Pecos River above Willow Creek, although again, some water quality standards exceedences were observed. No impairments were observed for Holy Ghost Creek, Indian Creek, Winsor Creek, Rio Mora, Panchuela Creek and Jack's Creek tributaries, although some water quality standards exceedences were observed for turbidity, aluminum, and/or conductivity in these tributaries. Bull Creek was impaired due to temperature. Cow Creek was impaired due to temperature, turbidity, and possibly stream bottom deposits (additional data is necessary to assess the stream bottom deposit impairment), and had insignificant exceedences of conductivity and mercury. The two most impaired reaches of this study were Glorieta Creek and Willow Creek. Glorieta Creek is effluent dominated and impaired due to ammonia, nitrate/nitrite, dissolved oxygen, conductivity, temperature, and turbidity. Willow Creek, highly impacted from mining activities, is impaired due to stream bottom deposits, conductivity, zinc, cadmium, and toxic sediment and water bioassay results.

## 2.0 INTRODUCTION

From 28 March to 1 November 2001, the Surface Water Quality Bureau (SWQB) of the New Mexico Environment Department (NMED) conducted a series of multiple-day intensive water quality surveys of the upper Pecos River watershed. The survey included the main stem of the Pecos River from the headwaters to the inflow of Sumner Reservoir, and most perennial tributaries that enter the Pecos River in that reach. Because of the extent of this large watershed, the study was divided into three parts. This report addresses the uppermost portion of the study, from the headwaters to Villanueva State Park, and will be referred to as Part I of the upper Pecos River watershed study. The area of the portion of the watershed that was surveyed is 1611 km<sup>2</sup>, of which 1267 km<sup>2</sup> (78.6%) is in San Miguel County, 173 km<sup>2</sup> (10.7%) is in Santa Fe County, and 171 km<sup>2</sup> (10.6%) is in Mora County. Historic and current land uses in the upper Pecos River watershed include agriculture (range, pasture, and croplands), silviculture, recreation, and mining. Land ownership in the surveyed portion of the watershed includes the Santa Fe National Forest, Pecos National Historical Park, Villanueva State Park, Bureau of Land Management, State Land Office, and various private parcels.

## 3.0 NM WATER QUALITY STANDARDS

General standards and standards applicable to attainable or designated uses for portions of the upper Pecos River watershed, Part I that were surveyed in this study are set forth in sections 20.6.4.12 and 20.6.4.900, of *Standards for Interstate and Intrastate Surface Waters* (20.6.4 NMAC, October 11, 2002). Segment specific standards for the upper Pecos River watershed are set forth in Sections 20.6.4.216 and 20.6.4.217 and read as follows:

### **20.6.4.216 PECOS RIVER BASIN - The main stem of the Pecos river from Anton Chico upstream to the southern boundary of the Pecos national historical park, and perennial reaches of the Gallinas river from its mouth upstream to the diversion for the Las Vegas municipal reservoir.**

A. Designated Uses: irrigation, livestock watering, wildlife habitat, marginal coldwater fishery, and secondary contact.

B. Standards:

(1) In any single sample: pH shall be within the range of 6.6 to 9.0 and temperature shall not exceed 30°C (86°F). The use-specific numeric standards set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of fecal coliform bacteria shall not exceed 1,000/100 mL; no single sample shall exceed 2,000/100 mL (see Subsection B of 20.6.4.13 NMAC).

(3) At all flows above 10 cfs: TDS shall not exceed 250 mg/L, sulfate shall not exceed 25 mg/L, and chloride shall not exceed 5 mg/L.

[20.6.4.216 NMAC – Rp 20 NMAC 6.1.2213, 10-12-00]

**20.6.4.217 PECOS RIVER BASIN - Cow creek and all its tributaries and the main stem of the Pecos river from the southern boundary of the Pecos national historical park upstream to its headwaters, including all tributaries thereto.**

A. Designated Uses: domestic water supply, fish culture, high quality coldwater fishery, irrigation, livestock watering, wildlife habitat, and secondary contact.

B. Standards:

(1) In any single sample: conductivity shall not exceed 300  $\mu$ mhos, pH shall be within the range of 6.6 to 8.8, temperature shall not exceed 20°C (68°F), and turbidity shall not exceed 10 NTU. The use-specific numeric standards set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of fecal coliform bacteria shall not exceed 100/100 mL; no single sample shall exceed 200/100 mL (see Subsection B of 20.6.4.13 NMAC).

[20.6.4.217 NMAC – Rp 20 NMAC 6.1.2214, 10-12-00]

## 4.0 METHODS

Water quality sampling methods were in accordance with the approved Quality Assurance Project Plan for Water Pollution Control Programs (QAPP) (NMED 2001). Benthic macroinvertebrate and fish sampling methods conformed to protocols in United States Environmental Protection Agency’s (EPA) *Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers* (Barbour et al., 1999) and the SWQB QAPP (NMED 2001). Fluvial geomorphologic measurements were in accordance with protocols for the SWQB QAPP (NMED 2001).

Water chemistry samples were collected primarily on three consecutive days in spring (15-17 May) and fall (9-11 October), and two consecutive days in summer (31 July-1 August).

Fecal coliform and *E. coli* samples were collected on 7 June, 13 June, and 1 November 2001.

## 5.0 SAMPLING SUMMARY

The station numbers, STORET identification codes (where available), and location descriptions of sampling stations selected for this survey are provided in Table 1.

**Table 1. Sampling Stations**

| Station | Legacy STORET Code | New STORET Code | Sampling Station Location Description          |
|---------|--------------------|-----------------|--|
| 1       |                    | 50PecosR812.2   | Pecos River @ wilderness boundary              |
| 2       |                    | 50JacksC000.1   | Jack’s Creek above confluence with Pecos River |
| 3       | UPR214.008040      | 50Panchu001.5   | Panchuela Creek 100 m above campground         |
| 4       | UPR214.007505      | 50RioMor000.3   | Rio Mora at USGS gage 08377900                 |
| 5       |                    | 50PecosR811.8   | Pecos River below Jack’s Creek                 |

| Station | Legacy STORET Code | New STORET Code | Sampling Station Location Description                       |
|---------|--------------------|-----------------|---|
| 6       | PECOSCON08         | 50PecosR803.7   | Pecos River 400 m above confluence with Willow Creek        |
| 7       | UPR214.007010      | 50Willow000.1   | Willow Creek below white drain                              |
| 8       |                    | 50PecosR801.7   | Pecos River below Terrero mine                              |
| 9       | PECOSCON06         | 50HolyGh000.1   | Holy Ghost Cr 300m Upstream Hwy 63 Br Over Pecos R          |
| 10      | PECOSCON04         | 50Indian000.1   | Indian Creek 3m West Of Hwy 63 Bridge                       |
| 11      | PECOSCON03         | 50MachoC000.2   | Macho Canyon Creek 10m West Of Hwy 63 Bridge                |
| 12      | HP11               | 50Winsor000.1   | Winsor Creek above confluence with Pecos River              |
| 13      |                    | 50PecosR784.1   | Pecos River above Lisboa Springs Fish Hatchery              |
| 14      |                    | 50PecosR784.0   | Lisboa Springs Fish Hatchery effluent discharge             |
| 15      |                    | 50PecosR783.7   | Pecos River below Lisboa Springs Fish Hatchery              |
| 16      |                    | 50PecosR777.3   | Pecos River above Village of Pecos WWTP discharge           |
| 17      | NM0029041          | 50PecosR777.2   | Village Of Pecos WWTP                                       |
| 18      | UPR214.006005      | 50PecosR777.1   | Pecos River Blw Village Of Pecos WWTP                       |
| 19      | NM0028088          | 50Glorie0013.9  | Glorieta Baptist Conf Center WWTP                           |
| 20      |                    | 50Glorie001.8   | Glorieta Creek above confluence with Pecos River            |
| 21      |                    | 50 PecosR772.8  | Pecos River @ Pecos NHP                                     |
| 22      |                    | 50CowCre023.7   | Cow Creek below confluence with Bull Creek @ Forest Road 83 |
| 23      |                    | 50BullCr000.1   | Bull Creek above confluence with Cow Creek                  |
| 24      |                    | 50CowCre023.8   | Cow Creek above confluence with Bull Creek                  |
| 25      |                    | 50PecosR743.8   | Pecos River @ South San Ysidro                              |
| 26      | UPR213.004545      | 50PecosR726.5   | Pecos River at San Jose                                     |
| 27      | UPR213.004515      | 50PecosR700.9   | Pecos River at Villanueva State Park                        |
| 28      |                    | 50PecosR670.2   | Pecos River below confluence with Tecolote Creek            |

Table 2 summarizes data collected in each assessment unit and at each station. The number of times each parameter (or suite of parameters) was sampled for is indicated (in the case of stream discharge, some of the data are estimated or calculated). Thermograph data, benthic macroinvertebrate, fish, and fluvial geomorphology sampling are indicated by an X. Field data include temperature, specific conductance, pH, dissolved oxygen, and turbidity.

**Table 2. Sampling Summary**

| Assessment Unit                        | Station | Field Data | Ions (full suite) | TDS/TSS (only) | Nutrients | Total Metals (full suite) | Total Hg/Se (only) | Dissolved Metals (full suite) | Fecal Coliform | Cyanide | Radionuclides | Organics | Antibiotics | Thermograph | Benthic Macroinvertebrates | Fish | Geomorphology | Stream Discharge |
|--|---------|------------|-------------------|----------------|-----------|---------------------------|--------------------|-------------------------------|----------------|---------|---------------|----------|-------------|-------------|----------------------------|------|---------------|------------------|
| Pecos River (Jack's Cr. to headwaters) | 1       | 8          | 3                 | 5              | 8         | 3                         | 5                  | 8                             | 0              | 1       | 1             | 0        | 0           | X           |                            |      | X             | 3                |

Upper Pecos Watershed, Part I Summary  
March – November 2001

| Assessment Unit                                | Station | Field Data | Ions (full suite) | TDS/TSS (only) | Nutrients | Total Metals (full suite) | Total Hg/Se (only) | Dissolved Metals (full suite) | Fecal Coliform | Cyanide | Radionuclides | Organics | Antibiotics | Thermograph | Benthic Macroinvertebrates | Fish | Geomorphology | Stream Discharge |
|--|---------|------------|-------------------|----------------|-----------|---------------------------|--------------------|-------------------------------|----------------|---------|---------------|----------|-------------|-------------|----------------------------|------|---------------|------------------|
| Jack's Creek (Pecos R. to headwaters)          | 2       | 8          | 3                 | 5              | 8         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 5                |
| Panchuela Creek (Pecos R. to headwaters)       | 3       | 8          | 3                 | 5              | 8         | 3                         | 5                  | 8                             | 0              | 0       | 0             | 0        | 0           | X           | X                          | X    | X             | 5                |
| Rio Mora (Pecos R. to headwaters)              | 4       | 8          | 3                 | 5              | 8         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 0        | 0           |             | X                          | X    | X             | 5                |
| Pecos River (Willow Cr. to Jack's Cr.)         | 5       | 1          | 1                 | 0              | 1         | 1                         | 0                  | 1                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 0                |
|  | 6       | 8          | 3                 | 5              | 8         | 3                         | 5                  | 8                             | 0              | 0       | 0             | 0        | 0           |             |                            | X    |               | 2                |
| Willow Creek (Pecos R. to headwaters)          | 7       | 8          | 3                 | 5              | 8         | 3                         | 5                  | 8                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 0                |
| Pecos River (Alamitos Canyon to Willow Cr.)    | 8       | 9          | 4                 | 5              | 9         | 4                         | 5                  | 9                             | 0              | 0       | 0             | 0        | 0           |             |                            | X    |               | 0                |
|  | 13      | 8          | 3                 | 5              | 8         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 0        | 0           |             |                            |      | X             | 0                |
|  | 14      | 6          | 2                 | 4              | 6         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 0                |
|  | 15      | 6          | 2                 | 4              | 6         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 2                |
| Holy Ghost Creek (Pecos R. to headwaters)      | 9       | 8          | 3                 | 5              | 8         | 3                         | 5                  | 8                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 5                |
| Indian Creek (Pecos R. to headwaters)          | 10      | 3          | 3                 | 0              | 3         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 3                |
| Macho Canyon Creek (Pecos R. to headwaters)    | 11      | 1          | 1                 | 0              | 1         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 1                |
| Winsor Creek (Pecos R. to headwaters)          | 12      | 3          | 2                 | 1              | 3         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 5                |
| Pecos R (S. Bnd Pecos NHP to Alamitos Canyon)* | 16      | 7          | 4                 | 3              | 7         | 0                         | 0                  | 0                             | 1              | 0       | 0             | 0        | 0           |             |                            | X    |               | 0                |
|  | 17      | 7          | 3                 | 4              | 7         | 3                         | 4                  | 7                             | 2              | 0       | 0             | 0        | 1           | N/A         | N/A                        | N/A  | N/A           | N/A              |
|  | 18      | 7          | 3                 | 3              | 7         | 0                         | 0                  | 0                             | 2              | 0       | 0             | 0        | 0           |             |                            | X    |               | 0                |
|  | 21      | 0          | 0                 | 0              | 0         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 0        | 0           | X           |                            |      | X             | 3                |
| Glorieta Creek (Pecos R. to headwaters)        | 19      | 8          | 3                 | 5              | 8         | 3                         | 5                  | 8                             | 2              | 0       | 0             | 0        | 1           | N/A         | N/A                        | N/A  | N/A           | N/A              |
|  | 20      | 8          | 4                 | 4              | 8         | 0                         | 0                  | 0                             | 2              | 0       | 0             | 0        | 0           | X           |                            | X    |               | 6                |
| Cow Creek (Pecos R. to Bull Cr.)               | 22      | 8          | 3                 | 5              | 8         | 3                         | 5                  | 8                             | 0              | 3       | 0             | 0        | 0           |             |                            |      | X             | 4                |
| Bull Creek (Cow Cr. to headwaters)             | 23      | 8          | 3                 | 5              | 8         | 3                         | 5                  | 8                             | 0              | 4       | 1             | 0        | 0           | X           |                            | X    | X             | 4                |
| Cow Creek (Bull Cr. to headwaters)             | 24      | 9          | 4                 | 5              | 9         | 4                         | 5                  | 9                             | 0              | 5       | 1             | 0        | 0           | X           |                            | X    |               | 4                |
| Pecos R (Cañon del Oso to S. Bnd Pecos NHP)**  | 25      | 8          | 5                 | 4              | 9         | 1                         | 1                  | 2                             | 0              | 0       | 0             | 0        | 0           |             |                            |      |               | 2                |
|  | 26      | 9          | 6                 | 4              | 10        | 5                         | 5                  | 10                            | 0              | 5       | 1             | 0        | 0           |             |                            |      |               | 2                |
|  | 27      | 8          | 4                 | 4              | 8         | 0                         | 0                  | 0                             | 0              | 0       | 0             | 1        | 0           |             |                            | X    | X             | 3                |
|  | 28      | 9          | 5                 | 4              | 9         | 4                         | 5                  | 9                             | 0              | 1       | 1             | 1        | 0           |             |                            |      |               | 0                |

- \* This Assessment Unit has since been reclassified into the following assessment units:  
Pecos River (Tecolote Creek to Canon de Manzanita)  
Pecos River (Canon de Manzanita to Alamitos Canyon)
- \*\* This Assessment Unit has since been reclassified into the following assessment unit:  
Pecos River (Santa Rosa Reservoir to Tecolote Creek)

## 6.0 WATER QUALITY ASSESSMENT (RESULTS AND DISCUSSION)

### 6.1 Water Quality Standards Exceedences

For many water quality parameters, the State of New Mexico maintains numeric water quality standards. However, for several parameters (e.g., plant nutrients, stream bottom deposits), only narrative standards exist. Data are assessed for designated use attainment status for both numeric and narrative water quality standards by application of the *Assessment Protocol* and associated appendices (NMED/SWQB, 2004a).

The following discussion includes information pertaining to all exceedences of water quality standards found during the intensive watershed survey. The purpose of this section of the report is to provide the reader with information on where current water quality standards are being exceeded within the watershed. These exceedences are used to determine designated use impairment status. Final assessment determinations as to whether or not a stream reach is considered to be meeting its designated uses depend on the overall amount and type of data available during the assessment process (Refer to NMED/SWQB’s *Assessment Protocol* for additional information on the assessment process, NMED/SWQB 2004a). When available, outside sources of data that meet quality assurance requirements are combined with data collected by SWQB during intensive watershed survey to determine final impairment status. Final designated use impairment status is housed in the Assessment Database (ADB) and is reported in *Appendix B* of the *Integrated Clean Water Act §303(d)/ §305(b) Report* (NMED/SWQB, 2004b).

#### 6.1.1 Physicochemical Data

Physicochemical water quality criteria exceedences are provided in Table 3, which is the “exceedences only” report generated from the SWQB’s in-house water quality database. This report does not include data from continuous monitoring devices, such as sondes and thermographs. These data are organized by assessment unit, designated use, analyte, and station, in that order. Those persons requiring a complete data set should contact the SWQB.

**Table 3. Physicochemical Water Quality Standards Exceedences**

#### **Bull Creek (Cow Creek to headwaters)**

segment specific criteria

Temperature

Bull Creek above confluence with Cow Creek

|          |             |           |         |            |        |                |
|----------|-------------|-----------|---------|------------|--------|----------------|
| Exceeds: | Analyte:    | LessThan: | Result: | Criterion: | Units: | Sampling date: |
| Yes      | Temperature | No        | 22.65   | 20         | C      | 08/01/2001     |

#### **Cow Creek (Bull Creek to headwaters)**

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segment specific criteria

Conductivity

Cow Creek above confluence with Bull Creek

| Exceeds: | Analyte:             | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------------------|-----------|---------|------------|--------|----------------|
| Yes      | Specific conductance | No        | 302     | 300        | umhos  | 10/10/2001     |

Temperature

Cow Creek above confluence with Bull Creek

| Exceeds: | Analyte:    | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-------------|-----------|---------|------------|--------|----------------|
| Yes      | Temperature | No        | 22.8    | 20         | C      | 08/01/2001     |

Turbidity

Cow Creek above confluence with Bull Creek

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 301     | 10         | ntu    | 03/28/2001     |
| Yes      | Turbidity | No        | 105.3   | 10         | ntu    | 05/15/2001     |
| Yes      | Turbidity | No        | 119.3   | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 77.5    | 10         | ntu    | 05/17/2001     |
| Yes      | Turbidity | No        | 1483.5  | 10         | ntu    | 07/31/2001     |
| Yes      | Turbidity | No        | 650     | 10         | ntu    | 08/01/2001     |
| Yes      | Turbidity | No        | 24.6    | 10         | ntu    | 10/09/2001     |
| Yes      | Turbidity | No        | 22.6    | 10         | ntu    | 10/10/2001     |
| Yes      | Turbidity | No        | 27.7    | 10         | ntu    | 10/11/2001     |

**Cow Creek (Pecos River to Bull Creek)**

fishery (chronic)

Total mercury

Cow Creek below confluence with Bull Creek @ Forest Road 83

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | mercury  | No        | 0.0003  | 0.000012   | mg/L   | 07/31/2001     |

segment specific criteria

Temperature

Cow Creek below confluence with Bull Creek @ Forest Road 83

| Exceeds: | Analyte:    | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-------------|-----------|---------|------------|--------|----------------|
| Yes      | Temperature | No        | 20.68   | 20         | C      | 07/31/2001     |
| Yes      | Temperature | No        | 22.9    | 20         | C      | 08/01/2001     |

Turbidity

Cow Creek below confluence with Bull Creek @ Forest Road 83

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 133.7   | 10         | ntu    | 05/15/2001     |
| Yes      | Turbidity | No        | 82.2    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 62.7    | 10         | ntu    | 05/17/2001     |
| Yes      | Turbidity | No        | 1490.7  | 10         | ntu    | 07/31/2001     |
| Yes      | Turbidity | No        | 550     | 10         | ntu    | 08/01/2001     |
| Yes      | Turbidity | No        | 18.7    | 10         | ntu    | 10/09/2001     |
| Yes      | Turbidity | No        | 17.1    | 10         | ntu    | 10/10/2001     |
| Yes      | Turbidity | No        | 22.9    | 10         | ntu    | 10/11/2001     |

**Glorieta Creek (Pecos River to headwaters)**

cold fishery (acute)

Ammonia

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GLORIETA BAPTIST CONF CENTER WWTP

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | Ammonia  | No        | 14.4    | 6.927922   | mg/L as | 07/31/2001     |
| Yes      | Ammonia  | No        | 15.8    | 6.793088   | mg/L as | 08/01/2001     |

cold fishery (chronic)

Ammonia

GLORIETA BAPTIST CONF CENTER WWTP

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | Ammonia  | No        | 14.4    | 1.119126   | mg/L as | 07/31/2001     |
| Yes      | Ammonia  | No        | 15.8    | 1.097345   | mg/L as | 08/01/2001     |

domestic water supply

Dissolved nitrate/nitrite

GLORIETA BAPTIST CONF CENTER WWTP

| Exceeds: | Analyte:             | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------------------|-----------|---------|------------|--------|----------------|
| Yes      | Nitrate+ Nitrite (N) | No        | 17      | 10         | mg/L   | 05/15/2001     |
| Yes      | Nitrate+ Nitrite (N) | No        | 17      | 10         | mg/L   | 05/16/2001     |
| Yes      | Nitrate+ Nitrite (N) | No        | 15      | 10         | mg/L   | 05/17/2001     |

high quality coldwater fishery

Dissolved oxygen

GLORIETA BAPTIST CONF CENTER WWTP

| Exceeds: | Analyte:         | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|------------------|-----------|---------|------------|--------|----------------|
| Yes      | Dissolved oxygen | No        | 5.17    | 6          | mg/L   | 10/09/2001     |
| Yes      | Dissolved oxygen | No        | 5.51    | 6          | mg/L   | 10/10/2001     |

Glorieta Creek above confluence with Pecos River

| Exceeds: | Analyte:         | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|------------------|-----------|---------|------------|--------|----------------|
| Yes      | Dissolved oxygen | No        | 4.8     | 6          | mg/L   | 10/11/2001     |

segment specific criteria

Conductivity

GLORIETA BAPTIST CONF CENTER WWTP

| Exceeds: | Analyte:             | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------------------|-----------|---------|------------|--------|----------------|
| Yes      | Specific conductance | No        | 979     | 300        | umhos  | 05/15/2001     |
| Yes      | Specific conductance | No        | 878     | 300        | umhos  | 05/16/2001     |
| Yes      | Specific conductance | No        | 868     | 300        | umhos  | 05/17/2001     |
| Yes      | Specific conductance | No        | 861     | 300        | umhos  | 07/31/2001     |
| Yes      | Specific conductance | No        | 912     | 300        | umhos  | 08/01/2001     |
| Yes      | Specific conductance | No        | 726     | 300        | umhos  | 10/09/2001     |
| Yes      | Specific conductance | No        | 919     | 300        | umhos  | 10/10/2001     |
| Yes      | Specific conductance | No        | 898     | 300        | umhos  | 10/11/2001     |

Glorieta Creek above confluence with Pecos River

| Exceeds: | Analyte:             | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------------------|-----------|---------|------------|--------|----------------|
| Yes      | Specific conductance | No        | 813     | 300        | umhos  | 05/15/2001     |
| Yes      | Specific conductance | No        | 790     | 300        | umhos  | 05/16/2001     |
| Yes      | Specific conductance | No        | 835     | 300        | umhos  | 05/17/2001     |
| Yes      | Specific conductance | No        | 806     | 300        | umhos  | 07/31/2001     |
| Yes      | Specific conductance | No        | 797     | 300        | umhos  | 08/01/2001     |
| Yes      | Specific conductance | No        | 814     | 300        | umhos  | 10/09/2001     |
| Yes      | Specific conductance | No        | 810     | 300        | umhos  | 10/10/2001     |
| Yes      | Specific conductance | No        | 826     | 300        | umhos  | 10/11/2001     |

Temperature

GLORIETA BAPTIST CONF CENTER WWTP

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| Exceeds: | Analyte:    | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-------------|-----------|---------|------------|--------|----------------|
| Yes      | Temperature | No        | 21.71   | 20         | C      | 07/31/2001     |
| Yes      | Temperature | No        | 21.99   | 20         | C      | 08/01/2001     |

Glorieta Creek above confluence with Pecos River

| Exceeds: | Analyte:    | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-------------|-----------|---------|------------|--------|----------------|
| Yes      | Temperature | No        | 20.32   | 20         | C      | 05/15/2001     |
| Yes      | Temperature | No        | 22.43   | 20         | C      | 07/31/2001     |

**Turbidity**

GLORIETA BAPTIST CONF CENTER WWTP

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 16.4    | 10         | ntu    | 07/31/2001     |
| Yes      | Turbidity | No        | 17.7    | 10         | ntu    | 10/09/2001     |
| Yes      | Turbidity | No        | 20.7    | 10         | ntu    | 10/10/2001     |

warm fishery (acute)

**Ammonia**

GLORIETA BAPTIST CONF CENTER WWTP

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | Ammonia  | No        | 14.4    | 7.796559   | mg/L as | 07/31/2001     |
| Yes      | Ammonia  | No        | 15.8    | 7.794123   | mg/L as | 08/01/2001     |

warm fishery (chronic)

**Ammonia**

GLORIETA BAPTIST CONF CENTER WWTP

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | Ammonia  | No        | 14.4    | 1.579033   | mg/L as | 07/31/2001     |
| Yes      | Ammonia  | No        | 15.8    | 1.548302   | mg/L as | 08/01/2001     |

**Holy Ghost Creek (Pecos River to headwaters)**

segment specific criteria

**Turbidity**

HOLY GHOST CR 300M UPSTRM HWY63 BR OVER PECOS R

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 13.8    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 17.8    | 10         | ntu    | 05/17/2001     |

**Indian Creek (Pecos River to headwaters)**

segment specific criteria

**Conductivity**

INDIAN CREEK 3M WEST OF HWY 63 BRDG

| Exceeds: | Analyte:             | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------------------|-----------|---------|------------|--------|----------------|
| Yes      | Specific conductance | No        | 358     | 300        | umhos  | 10/09/2001     |

**Jack's Creek (Pecos River to headwaters)**

segment specific criteria

**Turbidity**

Jack's Creek above confluence with Pecos River

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 20.8    | 10         | ntu    | 05/15/2001     |
| Yes      | Turbidity | No        | 25.4    | 10         | ntu    | 05/16/2001     |

### Panchuela Creek (Pecos River to headwaters)

fishery (chronic)

Dissolved aluminum

PANCHUELA CR. 100 M ABV CAMPGROUND

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | aluminum | No        | 0.15    | 0.087      | mg/L   | 05/15/2001     |
| Yes      | aluminum | No        | 0.18    | 0.087      | mg/L   | 05/16/2001     |
| Yes      | aluminum | No        | 0.2     | 0.087      | mg/L   | 05/17/2001     |

segment specific criteria

Turbidity

PANCHUELA CR. 100 M ABV CAMPGROUND

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 10.7    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 14      | 10         | ntu    | 05/17/2001     |

### Pecos River (Alamitos Canyon to Willow Creek)

cold fishery (chronic)

Ammonia

Pecos River above Lisboa Springs fish hatchery

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | Ammonia  | No        | 1.57    | 0.3225124  | mg/L as | 07/31/2001     |

fishery (chronic)

Dissolved aluminum

Pecos River below Terrero mine

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | aluminum | No        | 0.18    | 0.087      | mg/L   | 03/28/2001     |
| Yes      | aluminum | No        | 0.09    | 0.087      | mg/L   | 05/15/2001     |
| Yes      | aluminum | No        | 0.14    | 0.087      | mg/L   | 05/16/2001     |
| Yes      | aluminum | No        | 0.13    | 0.087      | mg/L   | 05/16/2001     |
| Yes      | aluminum | No        | 0.18    | 0.087      | mg/L   | 05/17/2001     |
| Yes      | aluminum | No        | 0.15    | 0.087      | mg/L   | 05/17/2001     |

segment specific criteria

Conductivity

Pecos River @ Lisboa Springs fish hatchery effluent discharge

| Exceeds: | Analyte:             | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------------------|-----------|---------|------------|--------|----------------|
| Yes      | Specific conductance | No        | 308     | 300        | umhos  | 10/09/2001     |
| Yes      | Specific conductance | No        | 309     | 300        | umhos  | 10/10/2001     |
| Yes      | Specific conductance | No        | 313     | 300        | umhos  | 10/11/2001     |

Turbidity

Pecos River @ Lisboa Springs fish hatchery effluent discharge

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 11      | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 17.9    | 10         | ntu    | 05/17/2001     |

Pecos River above Lisboa Springs fish hatchery

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 11.1    | 10         | ntu    | 05/15/2001     |
| Yes      | Turbidity | No        | 27.4    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 34.2    | 10         | ntu    | 05/17/2001     |

Upper Pecos Watershed, Part I Summary  
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Pecos River below Lisboa Springs fish hatchery

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 21.5    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 30      | 10         | ntu    | 05/17/2001     |

Pecos River below Terrero mine

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 19.2    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 25      | 10         | ntu    | 05/17/2001     |

warm fishery (chronic)

Ammonia

Pecos River above Lisboa Springs fish hatchery

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | Ammonia  | No        | 1.57    | 0.4550496  | mg/L as | 07/31/2001     |

### Pecos River (Canon del Oso to Pecos NHP)

cold fishery (chronic)

Ammonia

Pecos River @ South San Ysidro

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | Ammonia  | No        | 0.582   | 0.2258348  | mg/L as | 08/01/2001     |

fishery (chronic)

Dissolved aluminum

PECOS RIVER AT SAN JOSE

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | aluminum | No        | 0.21    | 0.087      | mg/L   | 03/28/2001     |
| Yes      | aluminum | No        | 0.14    | 0.087      | mg/L   | 08/01/2001     |
| Yes      | aluminum | No        | 0.15    | 0.087      | mg/L   | 08/01/2001     |

Dissolved copper

Pecos River @ South San Ysidro

| Exceeds: | Analyte: | LessThan: | Result: | Criterion:   | Units: | Sampling date: |
|----------|----------|-----------|---------|--------------|--------|----------------|
| Yes      | copper   | No        | 0.01    | 7.724133E-03 | mg/L   | 06/08/2001     |

PECOS RIVER AT SAN JOSE

| Exceeds: | Analyte: | LessThan: | Result: | Criterion:   | Units: | Sampling date: |
|----------|----------|-----------|---------|--------------|--------|----------------|
| Yes      | copper   | No        | 0.01    | 8.595012E-03 | mg/L   | 06/08/2001     |

Total mercury

Pecos River @ South San Ysidro

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | mercury  | No        | 0.0002  | 0.000012   | mg/L   | 06/08/2001     |

PECOS RIVER AT SAN JOSE

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | mercury  | No        | 0.0002  | 0.000012   | mg/L   | 06/08/2001     |

segment specific criteria

TDS, Q > 10 cfs

PECOS RIVER AT VILLANUEVA STATE PARK

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
|          |          |           |         |            |        |                |

Upper Pecos Watershed, Part I Summary  
March – November 2001

|     |                        |    |     |     |      |            |
|-----|------------------------|----|-----|-----|------|------------|
| Yes | Total Dissolved Solids | No | 272 | 250 | mg/L | 10/10/2001 |
|-----|------------------------|----|-----|-----|------|------------|

PECOS RIVER BELOW CONFLUENCE WITH TECOLOTE CREEK

| Exceeds: | Analyte:               | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|------------------------|-----------|---------|------------|--------|----------------|
| Yes      | Total Dissolved Solids | No        | 266     | 250        | mg/L   | 10/17/2001     |
| Yes      | Total Dissolved Solids | No        | 252     | 250        | mg/L   | 10/18/2001     |

warm fishery (chronic)

Ammonia

Pecos River @ South San Ysidro

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | Ammonia  | No        | 0.582   | 0.3186421  | mg/L as | 08/01/2001     |

**Pecos River (Jack's Creek to headwaters)**

fishery (chronic)

Dissolved aluminum

Pecos River @ wilderness boundary

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | aluminum | No        | 0.13    | 0.087      | mg/L   | 05/15/2001     |
| Yes      | aluminum | No        | 0.12    | 0.087      | mg/L   | 05/16/2001     |
| Yes      | aluminum | No        | 0.17    | 0.087      | mg/L   | 05/17/2001     |

segment specific criteria

Turbidity

Pecos River @ wilderness boundary

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 14.5    | 10         | ntu    | 05/15/2001     |
| Yes      | Turbidity | No        | 28.3    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 37.6    | 10         | ntu    | 05/17/2001     |

**Pecos River (Southern Pecos NHP bnd to Alamitos Canyon)**

segment specific criteria

Conductivity

VILLAGE OF PECOS WWTP

| Exceeds: | Analyte:             | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------------------|-----------|---------|------------|--------|----------------|
| Yes      | Specific conductance | No        | 870     | 300        | umhos  | 05/15/2001     |
| Yes      | Specific conductance | No        | 841     | 300        | umhos  | 05/16/2001     |
| Yes      | Specific conductance | No        | 895     | 300        | umhos  | 05/17/2001     |
| Yes      | Specific conductance | No        | 964     | 300        | umhos  | 07/31/2001     |
| Yes      | Specific conductance | No        | 977     | 300        | umhos  | 08/01/2001     |
| Yes      | Specific conductance | No        | 860     | 300        | umhos  | 10/09/2001     |
| Yes      | Specific conductance | No        | 865     | 300        | umhos  | 10/10/2001     |

Fecal coliform, m. geom. mean

VILLAGE OF PECOS WWTP

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | fecals   | No        | 270     | 100        | /100 mL | 06/07/2001     |
| Yes      | fecals   | No        | 140     | 100        | /100 mL | 11/01/2001     |

Fecal coliform, single sample

VILLAGE OF PECOS WWTP

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units:  | Sampling date: |
|----------|----------|-----------|---------|------------|---------|----------------|
| Yes      | fecals   | No        | 270     | 200        | /100 mL | 06/07/2001     |

Upper Pecos Watershed, Part I Summary  
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Temperature

VILLAGE OF PECOS WWTP

| Exceeds: | Analyte:    | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-------------|-----------|---------|------------|--------|----------------|
| Yes      | Temperature | No        | 20.24   | 20         | C      | 05/15/2001     |
| Yes      | Temperature | No        | 23.83   | 20         | C      | 05/17/2001     |
| Yes      | Temperature | No        | 23.51   | 20         | C      | 07/31/2001     |
| Yes      | Temperature | No        | 23.28   | 20         | C      | 08/01/2001     |

Turbidity

Pecos River above Village of Pecos WWTP effluent discharge

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 51      | 10         | ntu    | 05/15/2001     |
| Yes      | Turbidity | No        | 65.2    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 32.1    | 10         | ntu    | 05/17/2001     |
| Yes      | Turbidity | No        | 13.7    | 10         | ntu    | 08/01/2001     |

PECOS RIVER BLW VILLAGE OF PECOS WWTP

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 37.2    | 10         | ntu    | 05/15/2001     |
| Yes      | Turbidity | No        | 62.8    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 26      | 10         | ntu    | 05/17/2001     |

VILLAGE OF PECOS WWTP

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 60.7    | 10         | ntu    | 05/15/2001     |
| Yes      | Turbidity | No        | 114.9   | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 58.2    | 10         | ntu    | 05/17/2001     |
| Yes      | Turbidity | No        | 45.5    | 10         | ntu    | 07/31/2001     |
| Yes      | Turbidity | No        | 60.6    | 10         | ntu    | 08/01/2001     |
| Yes      | Turbidity | No        | 50.4    | 10         | ntu    | 10/09/2001     |
| Yes      | Turbidity | No        | 51.6    | 10         | ntu    | 10/10/2001     |

**Pecos River (Willow Creek to Jack's Creek)**

fishery (chronic)

Dissolved aluminum

PECOS RIVER 400M ABOVE CONFLUENCE W WILLOW CK

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | aluminum | No        | 0.16    | 0.087      | mg/L   | 05/15/2001     |
| Yes      | aluminum | No        | 0.15    | 0.087      | mg/L   | 05/15/2001     |
| Yes      | aluminum | No        | 0.15    | 0.087      | mg/L   | 05/16/2001     |
| Yes      | aluminum | No        | 0.12    | 0.087      | mg/L   | 05/17/2001     |

Pecos River below Jack's Creek

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | aluminum | No        | 0.23    | 0.087      | mg/L   | 03/28/2001     |

segment specific criteria

Turbidity

PECOS RIVER 400M ABOVE CONFLUENCE W WILLOW CK

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 19.1    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 27.8    | 10         | ntu    | 05/17/2001     |

## Rio Mora (Pecos River to headwaters)

segment specific criteria

Turbidity

RIO MORA AT USGS GAGE 08377900

| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Yes      | Turbidity | No        | 21.2    | 10         | ntu    | 05/16/2001     |
| Yes      | Turbidity | No        | 12.7    | 10         | ntu    | 05/17/2001     |

## Willow Creek (Pecos River to headwaters)

domestic water supply

Dissolved cadmium

WILLOW CR BLW WHITE DRAIN

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | cadmium  | No        | 0.007   | 0.005      | mg/L   | 05/16/2001     |
| Yes      | cadmium  | No        | 0.008   | 0.005      | mg/L   | 07/31/2001     |
| Yes      | cadmium  | No        | 0.006   | 0.005      | mg/L   | 08/01/2001     |
| Yes      | cadmium  | No        | 0.038   | 0.005      | mg/L   | 10/11/2001     |

fishery (acute)

Dissolved cadmium

WILLOW CR BLW WHITE DRAIN

| Exceeds: | Analyte: | LessThan: | Result: | Criterion:   | Units: | Sampling date: |
|----------|----------|-----------|---------|--------------|--------|----------------|
| Yes      | cadmium  | No        | 0.038   | 2.580599E-02 | mg/L   | 10/11/2001     |

Dissolved zinc

WILLOW CR BLW WHITE DRAIN

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | zinc     | No        | 0.26    | 0.1818777  | mg/L   | 05/15/2001     |
| Yes      | zinc     | No        | 3.3     | 0.2268032  | mg/L   | 05/16/2001     |
| Yes      | zinc     | No        | 0.26    | 0.1772807  | mg/L   | 05/17/2001     |
| Yes      | zinc     | No        | 2.8     | 0.2072543  | mg/L   | 07/31/2001     |
| Yes      | zinc     | No        | 2       | 0.1973557  | mg/L   | 08/01/2001     |
| Yes      | zinc     | No        | 0.9     | 0.2373378  | mg/L   | 10/09/2001     |
| Yes      | zinc     | No        | 0.7     | 0.2276844  | mg/L   | 10/10/2001     |
| Yes      | zinc     | No        | 27      | 0.4799132  | mg/L   | 10/11/2001     |

fishery (chronic)

Dissolved cadmium

WILLOW CR BLW WHITE DRAIN

| Exceeds: | Analyte: | LessThan: | Result: | Criterion:   | Units: | Sampling date: |
|----------|----------|-----------|---------|--------------|--------|----------------|
| Yes      | cadmium  | No        | 0.007   | 3.97875E-03  | mg/L   | 05/16/2001     |
| Yes      | cadmium  | No        | 0.008   | 3.678494E-03 | mg/L   | 07/31/2001     |
| Yes      | cadmium  | No        | 0.006   | 3.525037E-03 | mg/L   | 08/01/2001     |
| Yes      | cadmium  | No        | 0.038   | 7.632453E-03 | mg/L   | 10/11/2001     |

Dissolved zinc

WILLOW CR BLW WHITE DRAIN

| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|
| Yes      | zinc     | No        | 0.26    | 0.1833569  | mg/L   | 05/15/2001     |
| Yes      | zinc     | No        | 3.3     | 0.2286478  | mg/L   | 05/16/2001     |
| Yes      | zinc     | No        | 0.26    | 0.1787225  | mg/L   | 05/17/2001     |
| Yes      | zinc     | No        | 2.8     | 0.2089399  | mg/L   | 07/31/2001     |

Upper Pecos Watershed, Part I Summary  
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|     |      |    |     |           |      |            |
|-----|------|----|-----|-----------|------|------------|
| Yes | zinc | No | 2   | 0.1989607 | mg/L | 08/01/2001 |
| Yes | zinc | No | 0.9 | 0.2392681 | mg/L | 10/09/2001 |
| Yes | zinc | No | 0.7 | 0.2295361 | mg/L | 10/10/2001 |
| Yes | zinc | No | 27  | 0.4838163 | mg/L | 10/11/2001 |

high quality coldwater fishery

Dissolved oxygen

WILLOW CR BLW WHITE DRAIN

|          |                  |           |         |            |        |                |
|----------|------------------|-----------|---------|------------|--------|----------------|
| Exceeds: | Analyte:         | LessThan: | Result: | Criterion: | Units: | Sampling date: |
| Yes      | Dissolved oxygen | No        | 5.51    | 6          | mg/L   | 10/11/2001     |

irrigation

Dissolved cadmium

WILLOW CR BLW WHITE DRAIN

|          |          |           |         |            |        |                |
|----------|----------|-----------|---------|------------|--------|----------------|
| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
| Yes      | cadmium  | No        | 0.038   | 0.01       | mg/L   | 10/11/2001     |

Dissolved zinc

WILLOW CR BLW WHITE DRAIN

|          |          |           |         |            |        |                |
|----------|----------|-----------|---------|------------|--------|----------------|
| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
| Yes      | zinc     | No        | 3.3     | 2          | mg/L   | 05/16/2001     |
| Yes      | zinc     | No        | 2.8     | 2          | mg/L   | 07/31/2001     |
| Yes      | zinc     | No        | 27      | 2          | mg/L   | 10/11/2001     |

livestock watering

Dissolved zinc

WILLOW CR BLW WHITE DRAIN

|          |          |           |         |            |        |                |
|----------|----------|-----------|---------|------------|--------|----------------|
| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
| Yes      | zinc     | No        | 27      | 25         | mg/L   | 10/11/2001     |

segment specific criteria

Conductivity

WILLOW CR BLW WHITE DRAIN

|          |                      |           |         |            |        |                |
|----------|----------------------|-----------|---------|------------|--------|----------------|
| Exceeds: | Analyte:             | LessThan: | Result: | Criterion: | Units: | Sampling date: |
| Yes      | Specific conductance | No        | 425     | 300        | umhos  | 05/16/2001     |
| Yes      | Specific conductance | No        | 332     | 300        | umhos  | 07/31/2001     |
| Yes      | Specific conductance | No        | 333     | 300        | umhos  | 08/01/2001     |
| Yes      | Specific conductance | No        | 394     | 300        | umhos  | 10/09/2001     |
| Yes      | Specific conductance | No        | 389     | 300        | umhos  | 10/10/2001     |
| Yes      | Specific conductance | No        | 1977    | 300        | umhos  | 10/11/2001     |

Turbidity

WILLOW CR BLW WHITE DRAIN

|          |           |           |         |            |        |                |
|----------|-----------|-----------|---------|------------|--------|----------------|
| Exceeds: | Analyte:  | LessThan: | Result: | Criterion: | Units: | Sampling date: |
| Yes      | Turbidity | No        | 145     | 10         | ntu    | 10/11/2001     |

**Winsor Creek (Pecos River to headwaters)**

segment specific criteria

Turbidity

Winsor Creek at Pecos River

|          |          |           |         |            |        |                |
|----------|----------|-----------|---------|------------|--------|----------------|
| Exceeds: | Analyte: | LessThan: | Result: | Criterion: | Units: | Sampling date: |
|----------|----------|-----------|---------|------------|--------|----------------|

Yes                      Turbidity                      No                      18                      10                      ntu                      05/16/2001

**6.1.2 Thermograph Data**

Temperature data loggers (thermographs) were deployed at Stations 1, 3, 20, 21, 22, 23, 24, 25, and 27. The devices were programmed to record temperature once per hour. Unfortunately, thermographs at Stations 22, 25, and 27 were lost before any data could be retrieved. However, the Santa Fe National Forest had deployed several of these devices, one of which was at Station 22. Table 3 summarizes temperature data from thermographs in degrees Celsius.

**Table 4. Summary of Thermograph Data**

| Station | Data Collection Interval | Maximum Temperature |
|---------|--------------------------|---------------------|
| 1       | 13 Jun - 18 Nov          | 19.03               |
| 3       | 13 Jun - 05 Nov          | 15.53               |
| 20      | 12 Jun - 05 Nov          | 29.38               |
| 21      | 12 Jun - 05 Nov          | 24.86               |
| 22      | 11 Jul - 10 Oct          | 27.15               |
| 23      | 12 Jun - 05 Nov          | 26.56               |
| 24      | 12 Jun - 05 Nov          | 26.31               |

**7.0 CONCLUSIONS**

The portions of the upper Pecos watershed surveyed in this study found numerous exceedences of state water quality standards. Impairments due to stream bottom deposits exist along the mainstem of the Pecos River from Santa Rosa Reservoir to Canon de Manzanita. Water quality standards exceedences were observed for this stretch of the Pecos River for ammonia, aluminum, copper, mercury, total dissolved solids, conductivity, fecal coliform, temperature and turbidity, but none were significant enough to conclude impairments for these parameters. As you move up the mainstem, more exceedences were detected for various parameters, but the only actual impairments identified in the middle portion of the study area along the mainstem were due to temperature and turbidity. No impairments were identified for the mainstem of the Pecos River above Willow Creek, although again, some water quality standards exceedences were observed. No impairments were observed for Holy Ghost Creek, Indian Creek, Winsor Creek, Rio Mora, Panchuela Creek and Jack’s Creek tributaries, although some water quality standards exceedences were observed for turbidity, aluminum, and/or conductivity in these tributaries. Bull Creek was impaired due to temperature. Cow Creek was impaired due to temperature, turbidity, and possibly stream bottom deposits (additional data is necessary to assess the stream bottom deposit impairment), and had insignificant exceedences of conductivity and mercury. The two most impaired reaches of this study were Glorieta Creek and Willow Creek. Glorieta Creek is effluent dominated and impaired due to ammonia, nitrate/nitrite, dissolved oxygen, conductivity, temperature, and turbidity. Willow Creek, highly impacted from mining activities, is impaired

due to stream bottom deposits, conductivity, zinc, cadmium, and toxic sediment and water bioassay results.

## 8.0 REFERENCES

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