Caguas Regional Wastewater Treatment Plant

Water Quality Modeling of Receiving Streams

Río Bairoa and Río Grande de Loíza at Caguas, Puerto Rico

APPENDIX A to the July 2004 Environmental Assessment

for
Puerto Rico Aqueduct and Sewer Authority

by
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July 2004

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Introduction

This report details the water quality modeling study performed for the Río Bairoa and Río Grande de Loíza at Caguas, Puerto Rico, to assess the impact of the proposed increase in effluent discharge from the Puerto Rico Aqueduct and Sewerage Authority (PRASA) Caguas Regional Wastewater Treatment Plant (CRWWTP). The current results appear to be consistent with the original results reported in our March 1991 report entitled "Caguas Gurabo Regional WWTP Water Quality Modeling of Proposed Effluent Limitations". These results indicated that the proposed CRWWTP effluent limitations would result in a receiving water quality that meets the Puerto Rico Environmental Quality Board (EQB) water quality standards (WQS) of a minimum dissolved oxygen (DO) level of 5.0 mg/L at critical low flow stream conditions. The original assessment (March 1991) was completed for 6 million gallons per day (MGD) and 12 MGD effluent discharges into the Río Bairoa which flows into the Río Grande de Loíza. A projected flow of 18 MGD CRWWTP discharge during critical low flow conditions into the Río Bairoa, was evaluated with updated stream data in July 1991. This study expands on the two previous assessments by examining the impacts of increasing the plant capacity to an effluent discharge of 24 MGD maximum month flow, and 40 MGD maximum daily flow.

Background

The PRASA CRWWTP is an advanced secondary treatment facility designed to meet stringent effluent quality standards including significant nutrient removal. The effluent is discharged into Río Bairoa, a tributary of Río Grande de Loíza which feeds Lago Loíza, a major drinking water source for the metropolitan San Juan area. The wet stream unit processes of the facility consist of primary clarification, biological selector activated sludge, final clarification, dual media effluent filters, disinfection with chlorine, and effluent reaeration. Expected effluent values for the facility are presented in Table 1. Of significant importance for this study are the projected effluent maximum monthly average $CBOD_5$ and NH_3-N levels of 10 mg/L and 1 mg/L, respectively. These values are based on extensive process evaluations completed for the proposed facility.

Table 1.
Caguas Regional Wastewater Treatment Plant
Proposed Effluent Limitations

Parameter	**Limitation**	
	Maximum Monthly Average	Maximum Daily
Plant Effluent Flow, MGD	24	40
$CBOD_5$, mg/L	10	10
NH_3-N, mg/L	1	2
Dissolved Oxygen, mg/L	6.8	6.8

The existing biological treatment system was designed with three parallel treatment trains. The total maximum monthly average capacity for this configuration was 12 MGD. Subsequently the addition of one more treatment train increased the total capacity of the plant to 18 MGD. The facility seeks to improve their onsite treatment processes thereby allowing an increased effluent discharge of 24 MGD on a maximum monthly average basis and 40 MGD on a maximum daily flow basis. This analysis evaluates the water quality impact of the CRWWTP on the Río Bairoa and Río Grande de Loíza at these flows. For this study $CBOD_5$, NH_3-N and DO were modeled.

Stream Characteristics

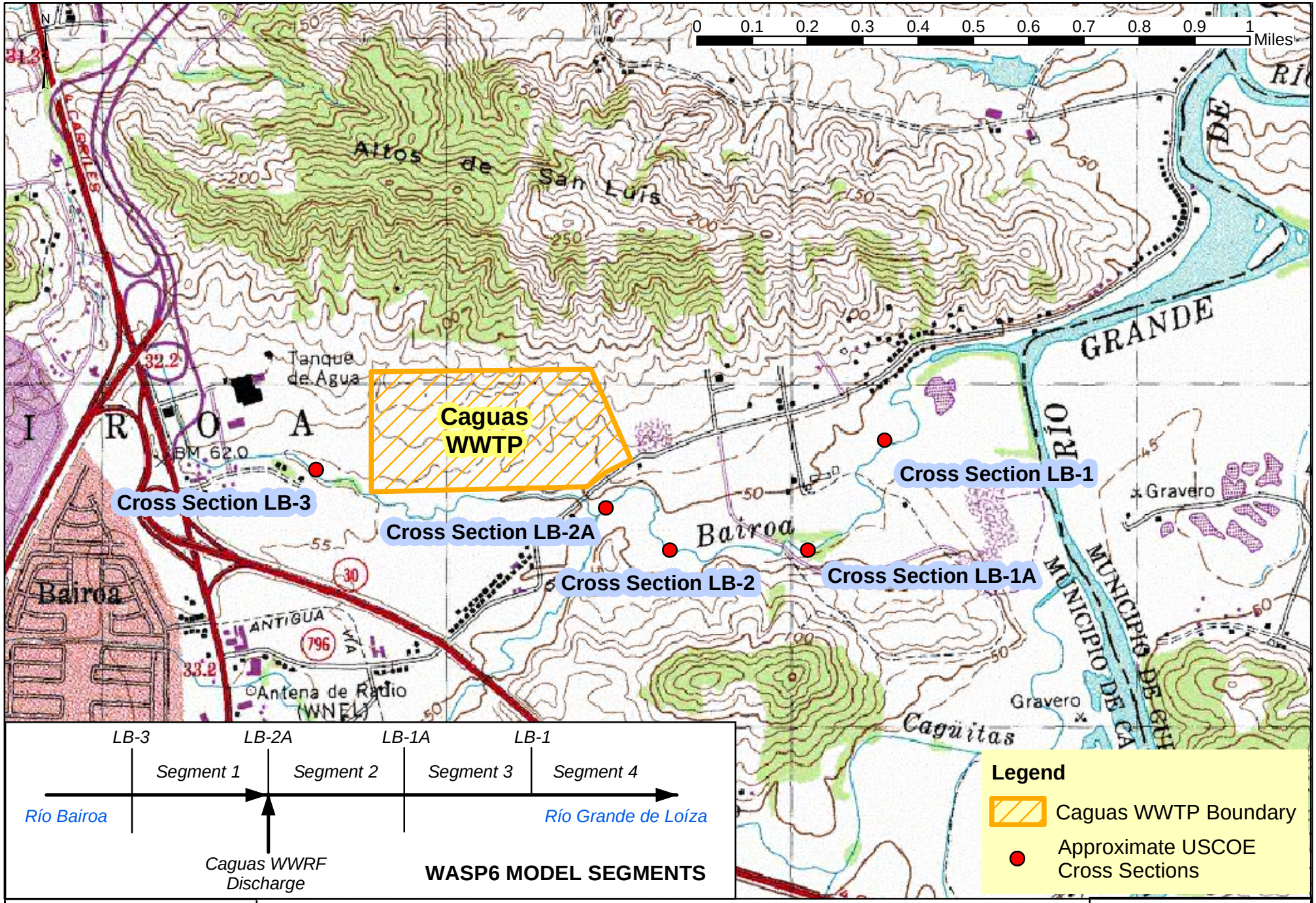
Malcolm Pirnie (MPI) requested assistance from the U.S. Army Corps of Engineers (USCOE) in 1991 to determine the geometry and hydraulic characteristics of the Río Bairoa. The USCOE determined the stream geometry at several locations and performed detailed mathematical modeling to estimate the hydraulic characteristics at several flow conditions. In addition, the Puerto Rico office for the U.S. Geological Survey (USGS) provided stream characteristics for the Río Grande de Loíza at low flow conditions which allowed the physical and hydraulic characteristics of this river to be estimated at different flows.

The critical physical and hydrologic information required to accurately model the rivers includes low flow rates, stream depths, cross-sectional areas, velocities and spatial reference to these parameters. As previously mentioned, critical hydraulic and geometric characteristics were developed by the USCOE for the Río Bairoa using field surveys and the HEC-2 modeling program. For the present study, the HEC-2 analysis was repeated by MPI using the same cross-sections provided by the USCOE in the 1991 report and present flow conditions. Depth and velocity calculations for the Río Grande de Loíza were also developed based on the information previously provided by the USGS. All information and calculations used to determine stream characteristics, including the HEC-2 output files, are found in Appendix A and are described below.

Río Bairoa

The location of the CRWWTP and the upstream and downstream lengths of the Río Bairoa are identified in Figure 1. This map also shows the location of five USCOE cross-sections where data was collected to complete hydraulic modeling of the stream. Three sections are located upstream of the CRWWTP effluent and two are located downstream. As shown on Figure 1, the CRWWTP effluent discharges into the Río Bairoa approximately one mile upstream of the confluence of the Río Bairoa with the Río Grande de Loíza.

The USCOE field data indicate that the stream changes from a relatively steep and shallow stream near the effluent discharge location to a wider and slower moving stream near the confluence with the Río Grande de Loíza. Cross sectional areas, velocities, slopes and water surface elevations for the stream were calculated for the 7Q2 flow (seven-consecutive-day minimum flow with a two-year recurrence interval) with the 24 MGD maximum monthly average flow and the 40 MGD daily maximum flow. Due to several droughts that occurred during the 1990's, the 7Q2 flow for this stream was



USCOE Approximate Locations of Cross-Sections and Schematic of WASP6 Model Segments

Figure 1

recalculated as 2.6 cfs using recent data from USGS monitoring station 50055390. This analysis can be found in Appendix A.

Each cross-section was input into the HEC-2 model to determine the depth of flow, velocity, and flow area for each river reach. The hydraulic depth was used to approximate the river depth for these sections. The output from the HEC-2 analysis is provided for reference as part of Appendix A.

Río Grande de Loíza

The PR USGS provided the average depth and width of the Río Grande de Loíza in 1991 for the 7Q2 flow at USGS monitoring station 50055000 located approximately 1.5 miles upstream of the CRWWTP discharge. Due to the droughts during the 1990's the 7Q2 flow for this stream was recalculated as 32.0 cfs based on current data from the USGS website (Appendix A). This information was used with the Manning open channel equation to estimate the river slope, depths and velocities for the Río Grande de Loíza at critical low flow conditions with the Río Bairoa tributary discharges for the two modeled CRWWTP effluent flows. The width of the river bed was increased since the USGS topographic map of the area showed that the river widens downstream of the confluence with the Río Bairoa. These calculations are provided in Appendix A and the depth and area results are used as inputs for the water quality modeling.

Dissolved Oxygen Modeling

In the previous studies, a mathematical model (DOSAG) was used to determine the impact of the proposed CRWWTP effluent discharge on the DO concentration profile in the Río Bairoa and Río Grande de Loíza. The model simulates the DO, $CBOD_5$ and NBOD profiles in a one-dimensional, advective stream under steady state conditions. Documentation and results for 6 MGD, 12 MGD and 18 MGD CRWWTP flows of the model were provided in the March 1991 and July 1991 studies.

For this study the EPA model, Water Quality Analysis Simulation Program Version 6 (WASP6), was used. This model allows for an analysis of water quality responses from point and non-point source pollution. The water-quality program uses conservation of mass principles to track the flow and pollutants through the system over time. The program allows a time varying input of pollutant and flow parameters. Inputs to the model include water body characteristics such as flow, depth, volume, velocity, length, and background loading such as treatment plant influent sources.

WASP6 is a one-dimensional model that uses representative cells to define the river geometry. Each of these cells are aligned to define the channel characteristics, flow patterns, and pollutant loading. The WASP6 model uses the physical characteristics, reaction rates, upstream water quality, and CRWWTP effluent quality to model the DO depletion and pollutant concentrations along the length of the river. The model inputs are described in detail in the following sections.

Physical Data

The WASP6 model was divided into four major segments with uniform characteristics. These segments are composed of multiple sub-segments to refine the calculation grid and improve the accuracy of the model. The Río Bairoa was divided into three major segments to represent the varying hydraulic conditions in the River. The USCOE data indicated that the stream near the effluent discharge location was characterized as shallow and fast moving, while the downstream segment near the confluence was characterized as slow moving and deeper. The first segment in the WASP6 model represents a short length of the Río Bairoa upstream of the CRWWTP effluent which was used to input the upstream boundary conditions. The second segment represents a 0.57 mile length of the Río Bairoa just downstream of the CRWWTP. For the WASP6 analysis, the river characteristics for this segment were taken as the average of the river characteristics of the HEC-2 cross-sections just upstream and just downstream of the plant. The third segment in the WASP6 model corresponds to the furthest downstream section in the HEC-2 model just upstream of the confluence with the Río Grande de Loíza. The Río Grande de Loíza makes up the fourth segment. This segmentation of the rivers for the WASP6 modeling is consistent with the segmentation used in the 1991 studies. Figure 1 provides a schematic of the segmentation of the model.

As per EQB regulations, the upstream 7Q2 flows, summarized in Table 2, were used for both streams. The average depth, velocity and cross sectional areas for these flows in the Río Bairoa were projected for the 24 and 40 MGD design effluent flows and the 7Q2 flows using the HEC-2 modeling. Similarly, characteristics for the Río Grande de Loíza were also projected for the combined 7Q2 flows in Río Bairoa and Río Grande de Loíza using USGS data.

Table 2.
Caguas Regional Wastewater Treatment Plant
Summary of Low Flow Statistics for
Río Bairoa and Río Grande de Loíza

Stream	7Q2 (cfs)
Río Bairoa	2.60
Río Grande de Loíza	32.0

The USGS maintains temperature records for Río Bairoa and Río Grande de Loíza at monitoring stations 50055400 and 50055000, respectively. The average stream temperature for Río Bairoa is 25.5°C while the average temperature for Río Grande de Loíza is 26.9°C. Both streams have periods of record that span a minimum of 10 years. Stream temperatures were assumed to be 30°C for the water quality modeling. This value is approximately two standard deviations above the average for each stream meaning that 95% of the temperature readings are below 30°C. The use of 30°C for temperature provides a conservative approximation since $CBOD_5$ and NBOD deoxygenation rates increase with temperature and further depress the DO profile in the stream.

Reaction Rates

The reaction rates used in this study were the same rates as presented in the July 1991 study which were previously accepted by the EQB:

- The NBOD deoxygenation rate, K_n, was assumed to be 0.1 $days^{-1}$ at 20ºC. Our experience has shown that this nitrification rate is a conservative estimate. A temperature correction coefficient of 1.04 was incorporated into the model to convert the 20ºC K_n to the 30ºC value.

- The K_r and K_d rates were assumed to be 0.13 $days^{-1}$ at 20ºC. A temperature correction coefficient of 1.04 was incorporated into the model to convert the 20ºC K_r and K_d to the 30ºC values.

The reaeration rate (K_a) for all four segments differed since each segment had different stream characteristics of depth and velocity. The WASP6 model was used to calculate the K_a for each stream segment based on the velocity and depth inputs to the model. The model output listing this result is included in Appendix B.

Upstream Water Quality

Assumptions of upstream water quality inputs were based on information presented in other studies. Data was collected as part of the existing National Pollutant Discharge Elimination System (NPDES) Permit at six locations near the plant discharge. These data were provided for model verification and calibration purposes. These data were used in conjunction with data presented in the July 1991 study which were accepted by the EQB:

- The upstream $CBOD_5$ concentration of 2.6 mg/L was used for Río Bairoa as reported in the permit model calibration data.

- The upstream $CBOD_5$ concentration of 1 mg/L was used for the Río Grande de Loíza which is consistent with the July 1991 study.

- The $CBOD_u/CBOD_5$ ratio of 1.29 previously presented in the July 1991 study was utilized in this evaluation. The WASP6 model input requires the $CBOD_u$ values.

- The upstream NH_3-N concentration of 0.7 mg/L was used for Río Bairoa as reported in the permit model calibration data.

- The upstream NH_3-N concentration of 0.2 mg/L was used for the Río Grande de Loíza which is consistent with the July 1991 study. (Note: Where NBOD data are provided, the values must be divided by 4.57 to convert the NBOD to NH_3-N values for input to the WASP6 model. The WASP6 model input requires the NH_3-N values.)

- Based on the July 1991 study, the upstream DO deficit for both streams was estimated to be 0.0 mg/L.

CRWWTP Effluent

The effluent discharge was modeled for two flows with each having the same $CBOD_5$, DO, and temperature levels but different NH_3-N levels to reflect the varying effluent quality under different flow conditions. The modeling was based on the following effluent information which is also detailed in Table 1:

- The projected maximum monthly average flow is 24 MGD; the maximum daily flow is 40 MGD.
- $CBOD_5$ levels of 10 mg/L are anticipated.
- NH_3-N levels of 1.0 mg/L are anticipated. Under certain high flow conditions, the NH_3-N levels may be increased and therefore a concentration 2.0 mg/L was used for the 40 MGD plant flow condition.
- As a conservative contingency analysis, 20 percent additional plant effluent $CBOD_5$ and NH_3-N loads were used in the analysis.
- DO levels of 6.8 mg/L at the end of step aeration were used to be consistent with the concentrations reported in the CRWWTP permit records.
- Temperature of 30°C which is the same as stream temperatures.

A summary of the WASP6 input parameters is provided as Table 3, below.

Table 3.
Caguas Regional Wastewater Treatment Plant
Summary of WASP6 Input Parameters

	Segment Characteristics				Reaction Rates (day^{-1} @ 20°C)			Inflow Characteristics				
	Flow (cfs)	Depth (ft)	Area (ft^2)	Length (mile)	K_d	K_r	K_n	Flow (cfs)	$CBOD_5$ (mg/L)	NH_3-N (mg/L)	DO (mg/L)	Temp (°C)
24 MGD Caguas Effluent Flow												
Segment 1	2.6	0.2	1	0	0.13	0.13	0.1	2.6	2.6	0.7	7.365	30
Segment 2	39.7	1.2	21.5	0.57	0.13	0.13	0.1	37.1	10+20%	1+20%	6.8	30
Segment 3	39.7	4.9	425.9	0.48	0.13	0.13	0.1	-	-	-	-	-
Segment 4	71.7	5.3	397.5	3.95	0.13	0.13	0.1	32	1	0.2	7.365	30
40 MGD Caguas Effluent Flow												
Segment 1	2.6	0.2	1	0	0.13	0.13	0.1	2.6	2.6	0.7	7.365	30
Segment 2	64.5	1.5	28.1	0.57	0.13	0.13	0.1	61.9	10+20%	2+20%	6.8	30
Segment 3	64.5	4.9	425.9	0.48	0.13	0.13	0.1	-	-	-	-	-
Segment 4	96.5	6.4	479.8	3.95	0.13	0.13	0.1	32	1	0.2	7.365	30

Modeling Results

The results of the 24 MGD and 40 MGD plant effluent WASP6 modeling can be found in Appendix B and are presented graphically in Figures 2 and 3, respectively. The results indicate that the DO concentrations in Río Bairoa and Río Grande de Loíza would meet the EQB minimum standard of 5 mg/L under the proposed increased effluent rates. The study also indicated that an additional 20 percent assimilative capacity of the Río Bairoa and Río Grande de Loíza is reserved. The modeling results for each flow condition show similar trends in the DO profile of Río Bairoa. DO levels increase in Segment 2 where the reaeration rate exceeds the DO uptake just downstream of the CRWWTP effluent. DO levels start to decrease in Segment 3 where the deeper and slower moving water results in a lower reaeration rate. In Segment 4 the DO levels increase when the Río Bairoa and Río Grande de Loíza mix at the confluence of these waterbodies. Downstream of the confluence the DO gradually decreases until it reaches Lago Loíza at the downstream end of the model.

A brief discussion of the modeling efforts follows:

- **24 MGD CRWWTP Flow –** At the 24 MGD effluent discharge flow with an effluent DO level of 6.8 mg/L, we predict that the DO of both streams would remain above the EQB minimum standard of 5 mg/L. The in-stream DO concentration rises in Segment 2 and decreases rapidly in Segment 3 to a minimum DO concentration of 6.4 mg/L which occurs just before the confluence with Río Grande de Loíza. After the initial mixing of the Bairoa and Loíza flows, DO levels gradually decrease for the next several miles to a minimum value of 6.0 mg/L at the entrance to Lago Loíza.

- **40 MGD CRWWTP Flow –** At the 40 MGD effluent discharge flow with an effluent DO level of 6.8 mg/L, we predict that the DO of both streams would remain above the EQB minimum standard of 5 mg/L. Changes in DO are similar to the 24 MGD results, however, the higher flows result in lower reaeration rates in Segments 2 and 4 and higher rates in Segment 3. The minimum DO level before the confluence of the Río Grande de Loíza is projected to be 6.5 mg/L. DO levels continue to slowly decrease in the Río Grande de Loíza to a minimum value of 5.3 mg/L at the entrance to Lago Loíza.

The WASP6 model results appear to be consistent with the calibration data that was collected as part of the NPDES Permit for the CRWWTP and provided for model verification. A plot of this data is presented in Figure 4. The DO concentrations predicted by the model are within the range of the collected data in the 1000 ft sampling reach of the river. The range of DO values collected during the monitoring period between April 2000 and March 2003 range from 6.2 to 7.8 mg/L with one outlier. There is no recognizable trend of the DO concentrations in the first 1000 ft and the variation in the data appears to be within the precision of the measurement device.

Discussion

Based on the present modeling with updated stream data, the DO concentrations of Río Bairoa and Río Grande de Loíza resulting from the CRWWTP effluent discharges of 24

Figure 2.
WASP6 Output - DO Concentration
24 mgd

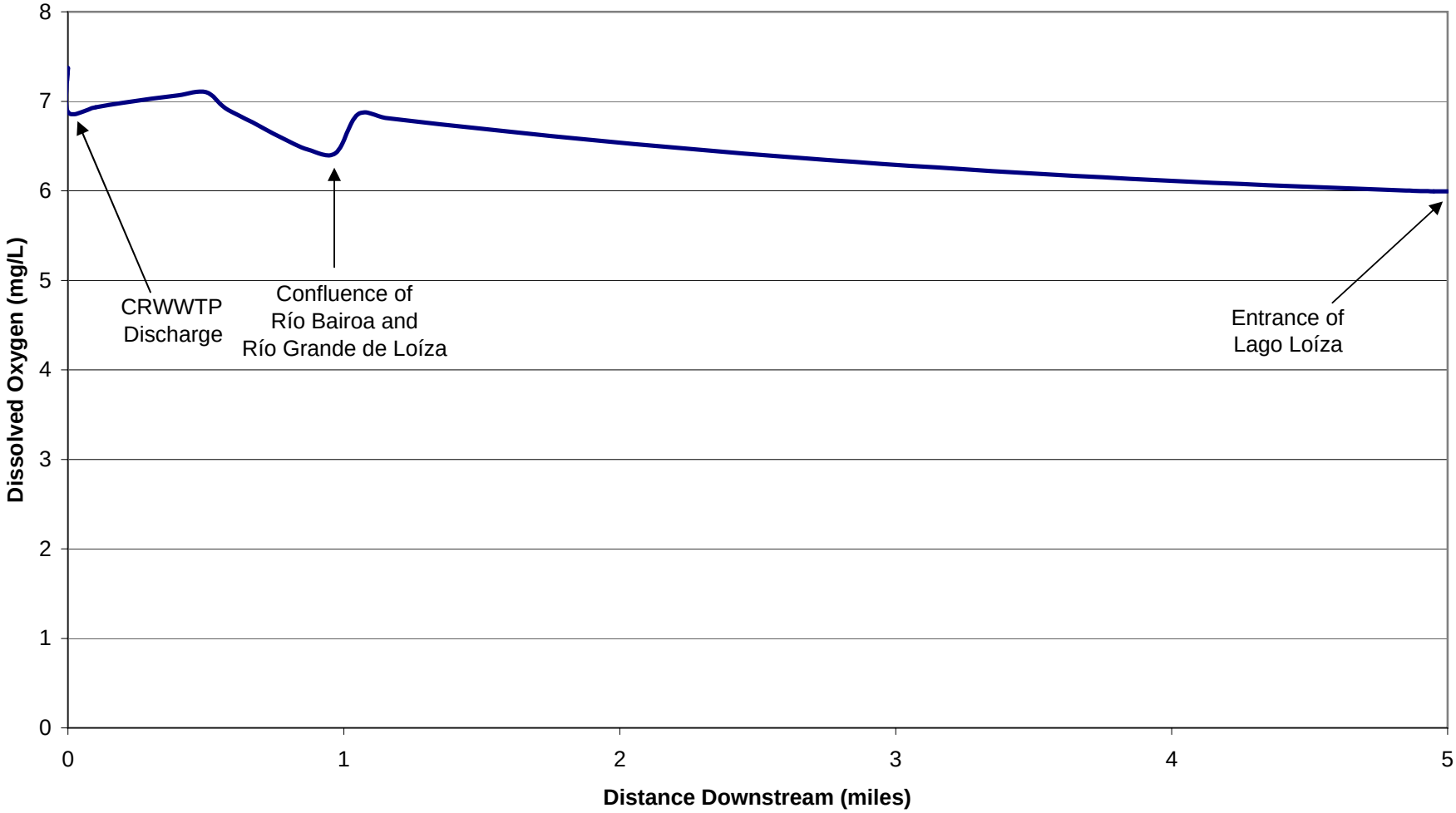


Figure 3.
WASP6 Output - DO Concentration
40 mgd

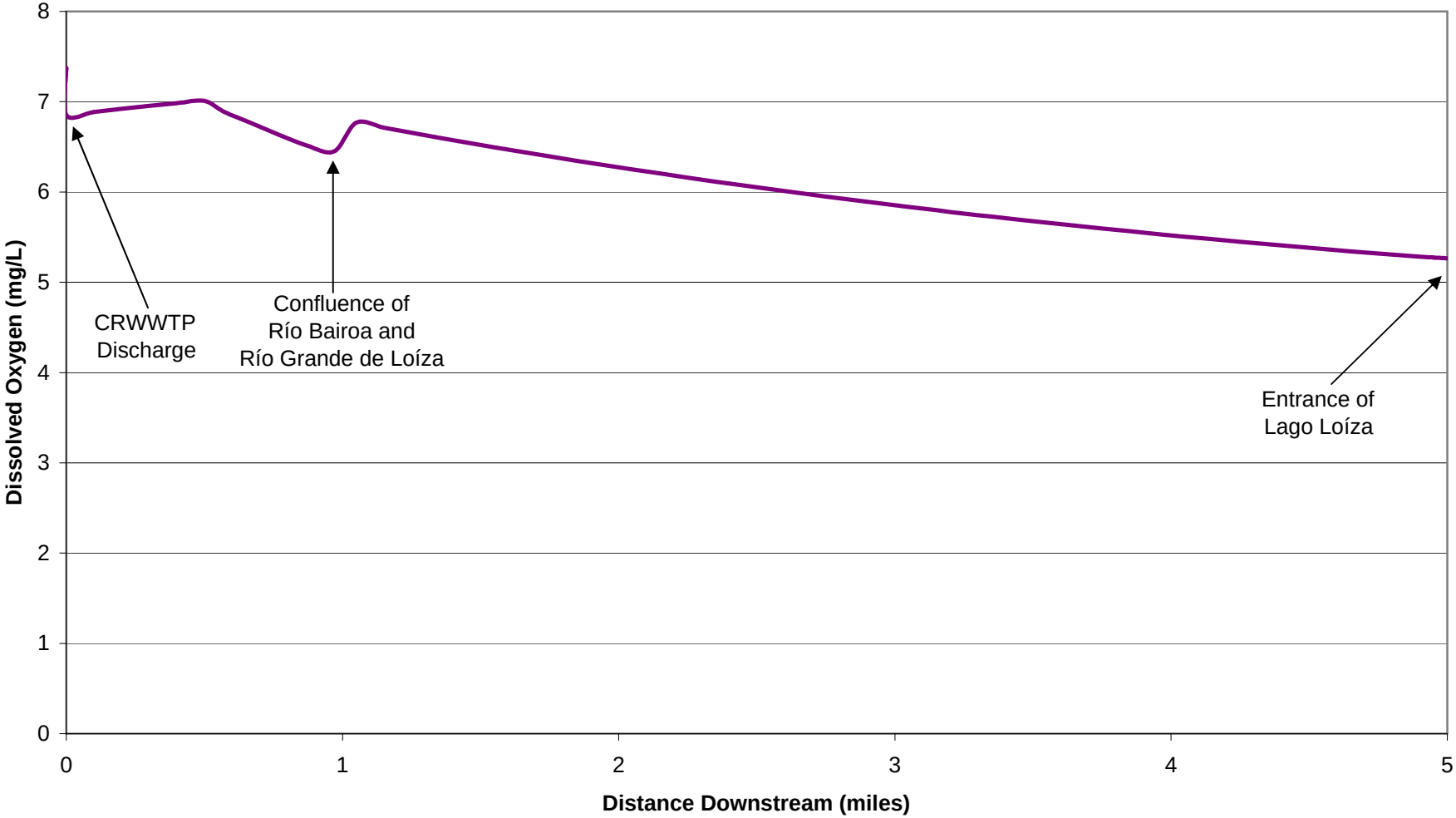
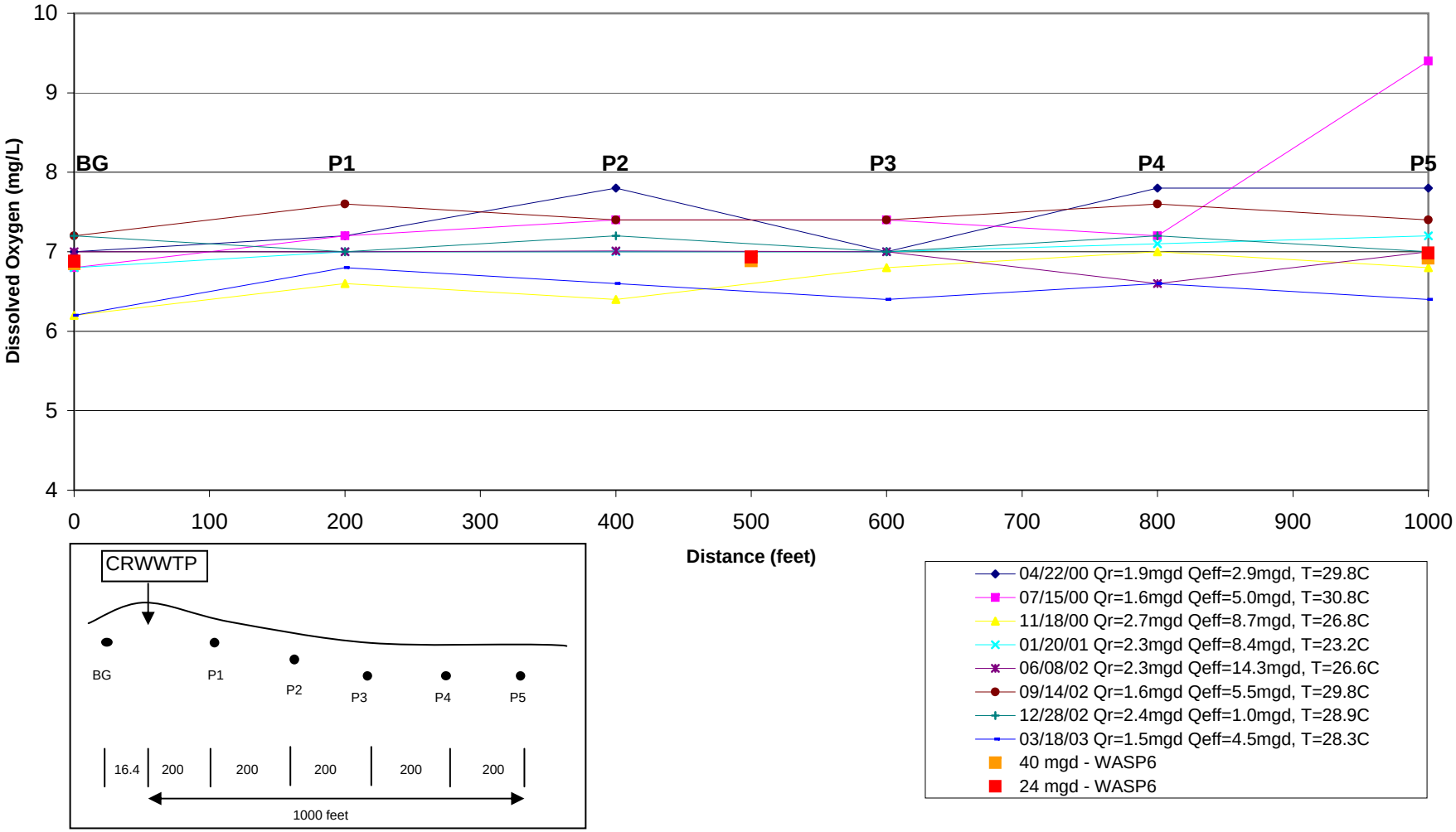


Figure 4.
NPDES Permit Water Quality Data
Measured DO Concentrations vs. WASP6 Model Results



MGD and 40 MGD are projected to remain above the 5 mg/L minimum standard establish by EQB. The results consider the critical low flow stream conditions (7Q2 as per EQB regulations), elevated temperature (30°C), and a 20 percent increase over expected loads. The model indicates that the proposed effluent discharge limits of 10 mg/L $CBOD_5$ and 1 mg/L NH_3-N (2 mg/L NH_3-N for daily maximum flows) for the CRWWTP would comply with the EQB WQS for DO in the Río Bairoa and Río Grande de Loíza. Accordingly, we believe that this is adequate protection for the DO concentrations of both streams.

Appendix A – Stream Data

- 7Q2 Calculations
- HEC-2 Output Files
- Stream Characteristics

7Q2 Calculations

```
#
# U.S. Geological Survey
# National Water Information System
# Retrieved: 2004-07-13 11:53:08 EDT
#
# This file contains published daily mean streamflow data.
#
# Further Descriptions of the dv_cd column can be found at:
# http://waterdata.usgs.gov/nwis/help?codes_help#dv_cd
#
#
# This information includes the following fields:
#
# agency_cd   Agency Code
# site_no     USGS station number
# dv_dt       date of daily mean streamflow
# dv_va       daily mean streamflow value, in cubic-feet per-second
# dv_cd       daily mean streamflow value qualification code
#
# Sites in this file include:
#  USGS 50055390 RIO BAIROA AT BAIROA, PR
#
```

LOW FLOW CALCULATIONS WY 1990 - 1999

Rank	7-Day Min	p	T
1	1.56	0.09	11.00
2	2.20	0.18	5.50
3	2.20	0.27	3.67
4	2.27	0.36	2.75
5	2.40	0.45	2.20
6	2.66	0.55	1.83
7	2.77	0.64	1.57
8	2.86	0.73	1.38
9	3.36	0.82	1.22
10	4.49	0.91	1.10

Interpolate to get 7Q10
7Q10 = 1.67 cfs

Interpolate to get 7Q2
7Q2 = 2.54 cfs

p = (rank)/(N+1) = cumulative prob
T = 1/p = recurrance interval

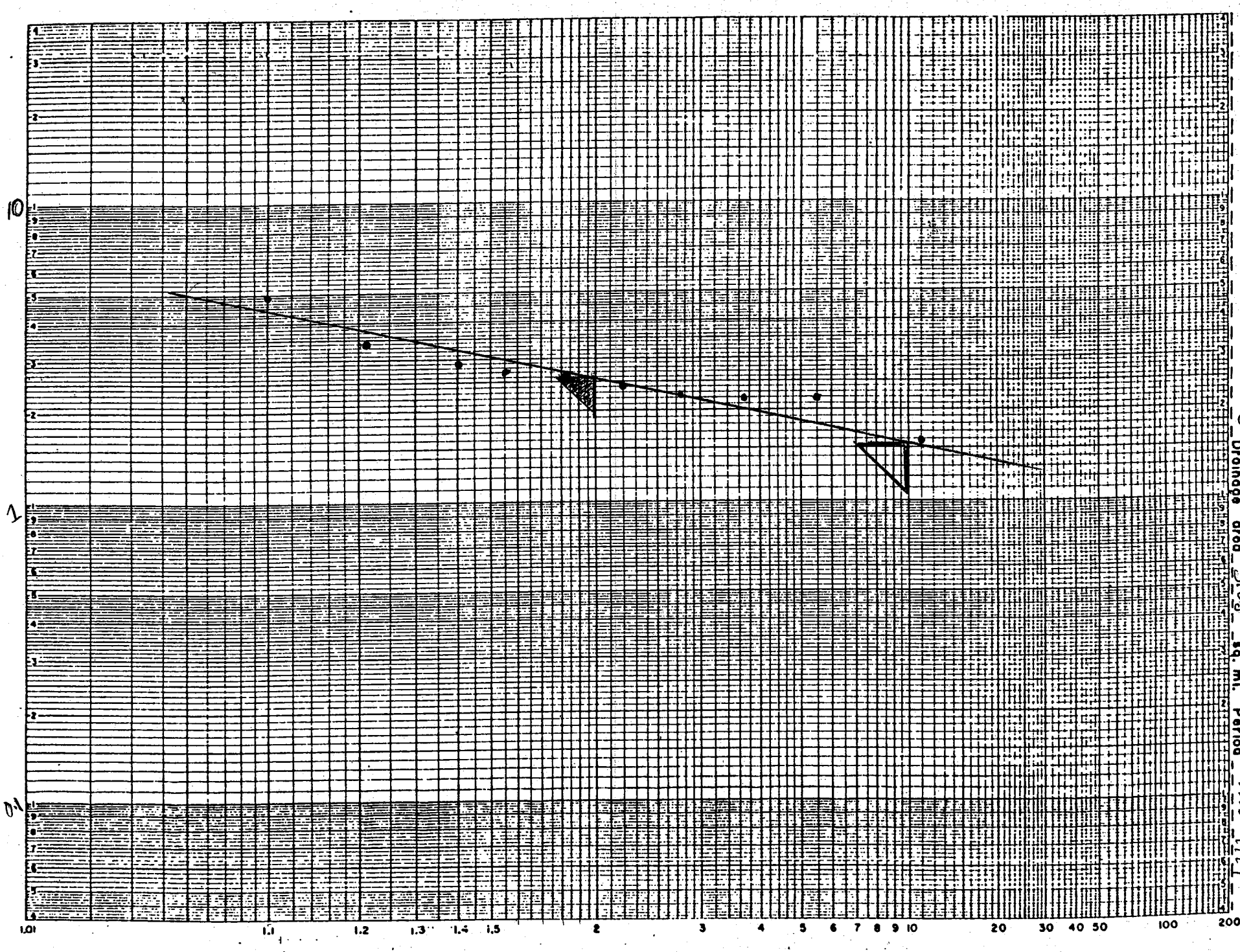
Reference: Thomann, RV and Mueller, JA. "Principles of Surface Water Quality Modeling and Control." Harper & Row, Publishers, New York. 1987

These values are linear interpolations between points. But because of data scatter, a graphical method was used to provide a better number.
Using this method, the **7Q2 = 2.6 cfs**
7Q10 = 1.55 cfs
The plotted values are attached.

There were no USGS studies to confirm these estimates. However based on the Loiza analysis (Station 50055000), these values are assumed to be accurate.

Magnitude and frequency of Minimum 7-Day Averages 1990-1999 on USGS 05390 R.D. Baird C. Baird

Drainage area 5.08 sq. mi. Period 1990-1999



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LogPearson (III)

```
#
# U.S. Geological Survey
# National Water Information System
# Retrieved: 2004-07-13 11:51:56 EDT
#
# This file contains published daily mean streamflow data.
#
# Further Descriptions of the dv_cd column can be found at:
# http://waterdata.usgs.gov/nwis/help?codes_help#dv_cd
#
#
# This information includes the following fields:
#
# agency_cd   Agency Code
# site_no     USGS station number
# dv_dt       date of daily mean streamflow
# dv_va       daily mean streamflow value, in cubic-feet per-second
# dv_cd       daily mean streamflow value qualification code
#
# Sites in this file include:
# USGS 50055000 RIO GRANDE DE LOIZA AT CAGUAS, PR
#
#
```

LOW FLOW CALCULATIONS WY 1960 - 2001

p = (rank)/(N+1) = cumulative prob
T = 1/p = recurrance interval

Rank	7-Day Min	p	T
1	11.0	2.33%	43.0
2	13.5	4.65%	21.5
3	17.8	6.98%	14.3
4	19.2	9.30%	10.8
5	19.3	11.63%	8.6
6	19.3	13.95%	7.2
7	20.5	16.28%	6.1
8	21.0	18.60%	5.4
9	21.2	20.93%	4.8
10	22.0	23.26%	4.3
11	22.2	25.58%	3.9
12	22.2	27.91%	3.6
13	25.3	30.23%	3.3
14	26.2	32.56%	3.1
15	26.8	34.88%	2.9
16	28.5	37.21%	2.7
17	29.5	39.53%	2.5
18	30.5	41.86%	2.4
19	30.5	44.19%	2.3
20	30.8	46.51%	2.2
21	32.7	48.84%	2.05
22	32.7	51.16%	1.95
23	33.0	53.49%	1.87
24	33.5	55.81%	1.79
25	34.0	58.14%	1.72
26	35.0	60.47%	1.65
27	36.2	62.79%	1.59
28	36.3	65.12%	1.54
29	36.7	67.44%	1.48
30	39.2	69.77%	1.43
31	40.2	72.09%	1.39
32	42.0	74.42%	1.34
33	42.7	76.74%	1.30
34	43.2	79.07%	1.26
35	46.3	81.40%	1.23
36	48.8	83.72%	1.19
37	52.2	86.05%	1.16
38	54.7	88.37%	1.13
39	56.0	90.70%	1.10
40	62.0	93.02%	1.08
41	74.5	95.35%	1.05
42	96.0	97.67%	1.02

Interpolate to get 7Q10
7Q10 = 19.23 cfs

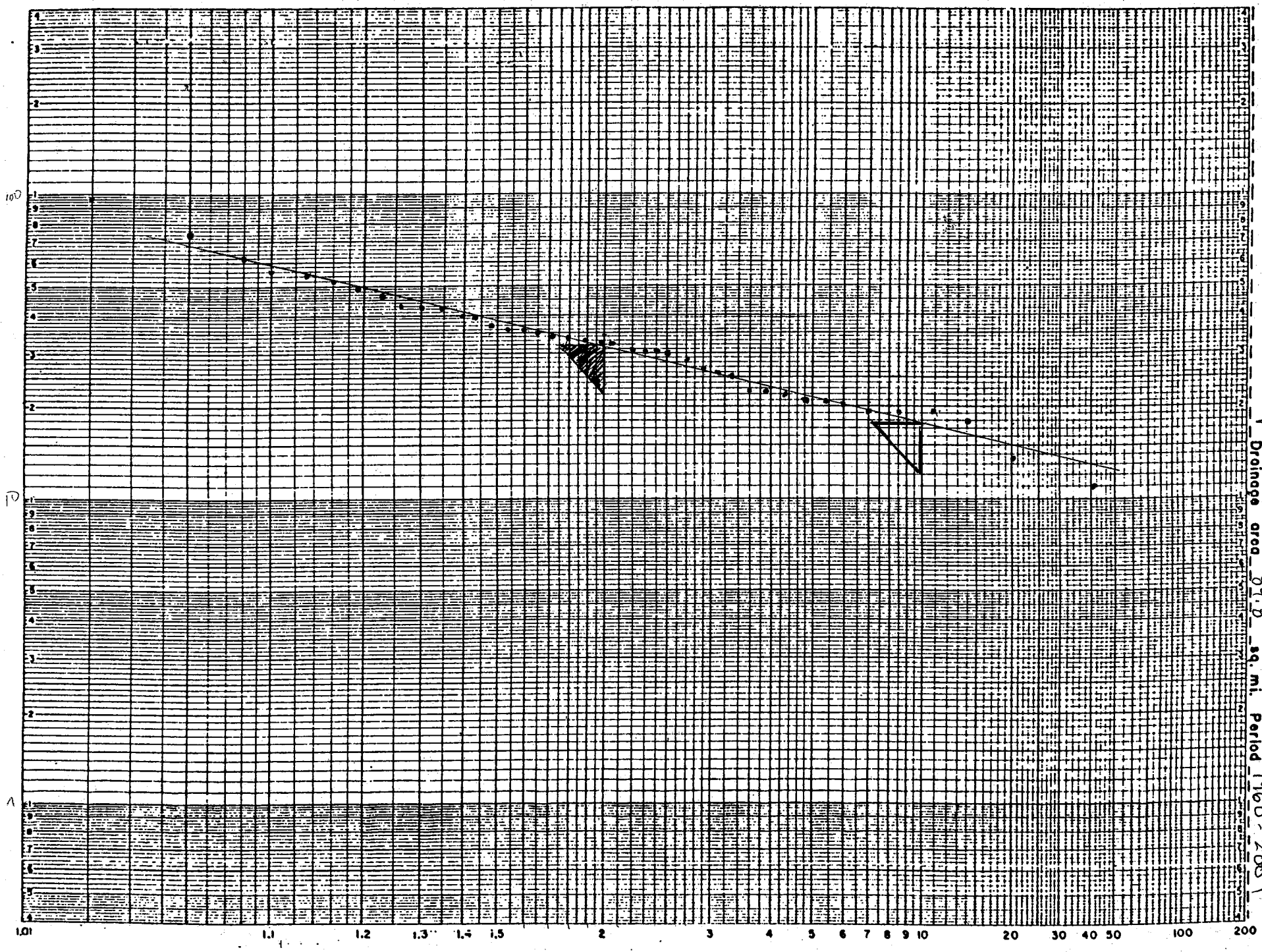
7Q2 = 32.67 cfs

These values are linear interpolations between points. But because of data scatter, a graphical method was used to provide a better number.
Using this method, the **7Q2 = 32.0 cfs**
7Q10 = 18.0 cfs
The plotted values are attached.
These values are confirmed from a USGS report: Santiago-Rivera, Luis. "Low-Flow Characteristics at Selected Sites on Streams in Northern and Central Puerto Rico." USGS Water-Resources Investigations Report 98-4200. pg. 17. 1998.

Reference: Thomann, RV and Mueller, JA. "Principles of Surface Water Quality Modeling and Control." Harper & Row, Publishers, New York. 1987

Magnitude and frequency of Minimum 7-Day Averages on USGS 5500 Rio Grande de Lopez

Drainage area 89.8 sq. mi. Period 1960-2001



Recurrence interval in years

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Log Pearson (III)

HEC-2 Output Files

```
 *  Version   4.6.2;  May 1991              *
 *                                          *
 *  RUN DATE    27JUL04    TIME   12:13:55  *
 ********************************************
```

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 *  609 SECOND STREET, SUITE D
 *  DAVIS, CALIFORNIA 95616-4687
 *          (916) 756-1104
 ********************************
```

```
1*******************************************
 *  HEC-2 WATER SURFACE PROFILES           *
 *                                         *
 *  Version   4.6.2;  May 1991             *
 *                                         *
 *  RUN DATE    27JUL04    TIME   12:13:55 *
 *******************************************
```

```
 ****************************************
 *  U.S. ARMY CORPS OF ENGINEERS        *
 *  HYDROLOGIC ENGINEERING CENTER       *
 *  609 SECOND STREET, SUITE D          *
 *  DAVIS, CALIFORNIA 95616-4687        *
 *          (916) 756-1104              *
 ****************************************
```

```
X     X  XXXXXXX   XXXXX            XXXXX
X     X  X        X     X          X     X
X     X  X        X                      X
XXXXXXX  XXXX     X          XXXXX   XXXXX
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX            XXXXXXX
```

1

27JUL04 12:13:55

PAGE 1

THIS RUN EXECUTED 27JUL04 12:13:55

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************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
************************************
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```
T1     RIO GRANDE DE LOIZA BASIN **BAIROA RIVER**
T2     cODED L-R LOOKING DOWNSTREAM FROM REVISED 1977 X-SECTIONS
T3     BAIROA RIVER PROFILES

J1  ICHECK    INQ       NINV      IDIR      STRT      METRIC    HVINS     Q         WSEL      FQ

                2                                                                   139

J2  NPROF     IPLOT     PRFVS     XSECV     XSECH     FN        ALLDC     IBW       CHNIM     ITRACE

      1                 -1                                      -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38        39        42        43         1         2        13        14        15        55
     26        56        25
```

```
* Version   4.6.2;  May 1991          *
*                                     *
* RUN DATE    27JUL04    TIME   12:13:55  *
*****************************************
```


```
* 609 SECOND STREET, SUITE D
* DAVIS, CALIFORNIA 95616-4687
*          (916) 756-1104
*********************************
```


```
NC      .09       .09       .07       .1        .3

QT        2     39.73     64.48

X1      .74        24      1930      1956
GR    178.3      1328     179.4      1332     163.6      1613     161.5      1684     157.4      1725
GR    146.7      1760     140.8      1832     138.7      1877     134.0      1884     133.7      1930
GR    131.6      1948     133.2      1956     140.4      1957     141.6      2080     142.2      2232
GR    148.0      2308     153.0      2398     154.1      2420     158.9      2445     160.9      2497
GR    160.3      2572     153.2      2684     154.7      2726     161.4      2800

X1     1.21        23      2730      2752      1200      1200      1200
GR    191.2      1650     191.9      1652     186.4      1722     177.1      1957     165.0      2206
GR    165.0      2290     161.6      2368     163.8      2445     147.5      2530     143.7      2610
GR    149.0      2694     141.6      2700     140.9      2730     137.4      2734     138.7      2748
GR    141.2      2752     142.5      2828     146.3      2830     147.5      2912     157.7      2980
GR    178.3      3044     190.3      3122     195.8      3206

X1     1.69        23      2730      2752      1200      1200      1200
GR    191.2      1650     191.9      1652     186.4      1722     177.1      1957     165.0      2206
GR    165.0      2290     161.6      2368     163.8      2445     153.4      2530     149.6      2610
GR    150.0      2694     147.5      2700     146.8      2730     143.3      2734     144.6      2748
GR    147.1      2752     148.4      2828     152.2      2830     153.4      2912     157.7      2980
GR    178.3      3044     190.3      3122     195.8      3206
1
   27JUL04      12:13:55                                                                    PAGE    2

QT        2       2.6       2.6

X1     2.11        18      2730      2752       950       950       950
GR    196.8      1944     180.4      2094     171.4      2294     171.4      2494     164.0      2594
GR    156.6      2694     154.1      2700     153.4      2730     149.9      2734     151.2      2748
GR    153.7      2752     155.0      2828     158.8      2830     160.0      2912     164.3      2980
GR    184.9      3044     169.9      3122     202.4      3206

X1     2.29        17      2340      2353       600       600       600
GR    180.0      2050     179.7      2055     178.6      2100     170.2      2185     160.7      2236
GR    158.8      2280     159.2      2326     154.9      2340     154.1      2347     156.6      2353
GR    158.1      2368     160.4      2378     159.5      2424     164.8      2470     161.7      2500
GR    164.9      2530     179.4      2800
1
   27JUL04      12:13:55                                                                    PAGE    3

    SECNO     DEPTH     CWSEL     CRIWS     WSELK     EG        HV        HL        OLOSS     L-BANK ELEV
```

```
*  Version   4.6.2;  May 1991            *                          *  609 SECOND STREET, SUITE D
*                                        *                          *  DAVIS, CALIFORNIA 95616-4687
*  RUN DATE    27JUL04    TIME   12:13:55  *                        *          (916) 756-1104
*****************************************                            ********************************
```

```
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST

 *PROF 1

 CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS
0

 CCHV=     .100 CEHV=     .300
 *SECNO  .740
      .740       7.40     139.00     132.76     139.00     139.00        .00        .00        .00     133.70
      39.7       19.9       19.8         .0      256.4      167.1        2.3         .0         .0     133.20
       .00        .08        .12        .01       .090       .070       .090       .000     131.60    1870.57
   .000003         0.         0.         0.          0         19          0        .00      86.23    1956.81

 *SECNO 1.210

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =   .01

     1.210       1.52     138.92     138.62        .00     139.05        .13        .01        .04     140.90
      39.7         .0       39.7         .0         .0       13.5         .0        6.1        1.4     141.20
       .11        .00       2.93        .00       .000       .070       .000       .000     137.40    2732.26
   .025414      1200.      1200.      1200.          2         20          0        .00      16.09    2748.35

 *SECNO 1.690

 3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  3.27

     1.690       2.44     145.74     144.52        .00     145.77        .03       6.70        .01     146.80
      39.7         .0       39.7         .0         .0       29.5         .0        6.6        1.9     147.10
       .36        .00       1.35        .00       .000       .070       .000       .000     143.30    2731.21
   .002382      1200.      1200.      1200.          7         15          0        .00      18.61    2749.82

 *SECNO 2.110

 3235 SLOPE TOO STEEP, EXCEEDS        .10

 7185 MINIMUM SPECIFIC ENERGY
 3720 CRITICAL DEPTH ASSUMED
     2.110        .41     150.31     150.31        .00     150.41        .11       2.52        .02     153.40
       2.6         .0        2.6         .0         .0        1.0         .0        7.0        2.1     153.70
       .46        .00       2.61        .00       .000       .070       .000       .000     149.90    2733.53
   .131196       950.       950.       950.          0         25          0        .00       4.87    2738.40

1
   27JUL04      12:13:55                                                                          PAGE    4
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```
*  Version   4.6.2;  May 1991            *                                  *  609 SECOND STREET, SUITE D
*                                        *                                  *  DAVIS, CALIFORNIA 95616-4687
*  RUN DATE    27JUL04    TIME   12:13:55  *                                *          (916) 756-1104
*****************************************                                  ********************************
```

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 2.290

3302 WARNING: CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE, KRATIO = 7.31

2.290	.87	154.97	154.52	.00	154.98	.01	4.56	.01	154.90
2.6	.0	2.6	.0	.0	4.2	.0	7.0	2.2	156.60
.73	.01	.62	.00	.000	.070	.000	.000	154.10	2339.77
.002453	600.	600.	600.	10	8	0	.00	9.32	2349.09

1

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T1 RIO GRANDE DE LOIZA BASIN **BAIROA RIVER**
T2 cODED L-R LOOKING DOWNSTREAM FROM REVISED 1977 X-SECTIONS
T3 BAIROA RIVER PROFILES

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		3							139	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	2		-1				-1			

1

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SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 2

CRITICAL DEPTH TO BE CALCULATED AT ALL CROSS SECTIONS
0

CCHV= .100 CEHV= .300
*SECNO .740

.740	7.40	139.00	133.00	139.00	139.00	.00	.00	.00	133.70
64.5	32.2	32.2	.1	256.4	167.1	2.3	.0	.0	133.20

```
*  Version   4.6.2;  May 1991            *                                    *  609 SECOND STREET, SUITE D
*                                        *                                    *  DAVIS, CALIFORNIA 95616-4687
*  RUN DATE    27JUL04    TIME   12:13:55 *                                    *          (916) 756-1104
*****************************************                                    ********************************
```

```
      .00       .13       .19       .02      .090      .070      .090      .000    131.60   1870.57
  .000007        0.        0.        0.         0        24         0       .00     86.23   1956.81


*SECNO 1.210
7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
    1.210      1.46    138.86    138.86       .00    139.27       .41       .03       .12    140.90
     64.5        .0      64.5        .0        .0      12.6        .0       6.0       1.4    141.20
      .06       .00      5.13       .00      .000      .070      .000      .000    137.40   2732.33
  .084551     1200.     1200.     1200.         0        21         0       .00     15.92   2748.25


*SECNO 1.690

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  6.51

    1.690      3.16    146.46    144.76       .00    146.49       .03      7.19       .04    146.80
     64.5        .0      64.5        .0        .0      43.6        .0       6.8       1.9    147.10
      .29       .00      1.48       .00      .000      .070      .000      .000    143.30   2730.39
  .001992     1200.     1200.     1200.         9         5         0       .00     20.59   2750.98


*SECNO 2.110

3235 SLOPE TOO STEEP, EXCEEDS        .10

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED
    2.110       .41    150.31    150.31       .00    150.41       .11      2.03       .02    153.40
      2.6        .0       2.6        .0        .0       1.0        .0       7.3       2.2    153.70
      .39       .00      2.61       .00      .000      .070      .000      .000    149.90   2733.53
 .131300      950.      950.      950.         0        17         0       .00      4.87   2738.40


1
   27JUL04      12:13:55                                                                          PAGE     7

    SECNO      DEPTH      CWSEL      CRIWS      WSELK      EG         HV         HL         OLOSS      L-BANK ELEV
    Q          QLOB       QCH        QROB       ALOB       ACH        AROB       VOL        TWA        R-BANK ELEV
    TIME       VLOB       VCH        VROB       XNL        XNCH       XNR        WTN        ELMIN      SSTA
    SLOPE      XLOBL      XLCH       XLOBR      ITRIAL     IDC        ICONT      CORAR      TOPWID     ENDST


*SECNO 2.290

3302 WARNING:  CONVEYANCE CHANGE OUTSIDE OF ACCEPTABLE RANGE,  KRATIO =  7.32

    2.290       .87    154.97    154.52       .00    154.98       .01      4.56       .01    154.90
      2.6        .0       2.6        .0        .0       4.2        .0       7.3       2.3    156.60
      .66       .01       .62       .00      .000      .070      .000      .000    154.10   2339.77
 .002453      600.      600.      600.        10         8         0       .00      9.32   2349.09
```

```
* Version   4.6.2;  May 1991              *                    * 609 SECOND STREET, SUITE D
*                                         *                    * DAVIS, CALIFORNIA 95616-4687
* RUN DATE    27JUL04    TIME   12:13:55  *                    *         (916) 756-1104
*******************************************                    ********************************
```

1

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THIS RUN EXECUTED 27JUL04 12:13:55

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*************************************
 HEC-2 WATER SURFACE PROFILES

 Version   4.6.2;  May 1991
*************************************
```

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

AIROA RIVER PROFILES

SUMMARY PRINTOUT

	SECNO	XLCH	ELMIN	Q	CWSEL	CRIWS	QLOB	QCH	QROB	VLOB	VCH	VROB	AREA
	.740	.00	131.60	39.73	139.00	132.76	19.86	19.84	.03	.08	.12	.01	425.85
	.740	.00	131.60	64.48	139.00	133.00	32.23	32.20	.06	.13	.19	.02	425.85
*	1.210	1200.00	137.40	39.73	138.92	138.62	.00	39.73	.00	.00	2.93	.00	13.54
*	1.210	1200.00	137.40	64.48	138.86	138.86	.00	64.48	.00	.00	5.13	.00	12.56
*	1.690	1200.00	143.30	39.73	145.74	144.52	.00	39.73	.00	.00	1.35	.00	29.51
*	1.690	1200.00	143.30	64.48	146.46	144.76	.00	64.48	.00	.00	1.48	.00	43.60
*	2.110	950.00	149.90	2.60	150.31	150.31	.00	2.60	.00	.00	2.61	.00	1.00
*	2.110	950.00	149.90	2.60	150.31	150.31	.00	2.60	.00	.00	2.61	.00	1.00
*	2.290	600.00	154.10	2.60	154.97	154.52	.00	2.60	.00	.01	.62	.00	4.21
*	2.290	600.00	154.10	2.60	154.97	154.52	.00	2.60	.00	.01	.62	.00	4.21

1

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SUMMARY OF ERRORS AND SPECIAL NOTES

```
WARNING SECNO=      1.210  PROFILE=  1  CONVEYANCE CHANGE OUTSIDE ACCEPTABLE RANGE
CAUTION SECNO=      1.210  PROFILE=  2  CRITICAL DEPTH ASSUMED
CAUTION SECNO=      1.210  PROFILE=  2  MINIMUM SPECIFIC ENERGY
```

Stream Characteristics

Stream Characteristics for Rio Grand De Loiza (2004)

Data From USGS Staion 50055000 Upstream of Confluence with RioBairoa - 1991

Q =	34.1	cfs	
H =	4.72	ft	
W =	45	ft	
Area =	H*W	212.4	sq ft
Velocity =	Q/A	0.16	fps

Use Mannings Equation to Find Slope

U = Q/a = (1.49/n)*[(rh)^2/3* S(^1/2)]

rh = area/perimeter = H*W/(2*H+W)

n =	0.1	for natural channel w/weeds
		with Engineering Applications p 327
		Daugherty and Franzini
S=	1.89022E-05	

Slope =	0.000019
C	0.010775
rw	3.901542983
rh^2/3	2.47832123
c/rh^2/3	0.004347664
S =	1.89022E-05

Solve for U and H for 24 MGD using Mannings equation and a trial and error solution

	Rio Bairoa	Plant flow	Rio Loiza	
	7Q2			
		24		
Q tot = cfs	2.6	37.1	32	71.728

Assume width of 75 ft below confluence (USGS Map)

Manning n =	0.1
slope =	0.000019
H =	5.30 Trial and error #
Area	397.47
Constant =	4.86
Mannings Q	71.7 71.7 Q
Therefore U =	0.180

Solve for U and H for 40 MGD using Mannings equation and a trial and error solution

	Rio Bairoa	Plant flow	Rio Loiza	
	7Q2			
		40		
Q tot = cfs	2.6	61.9	32	96.5

Assume width of 75 ft below confluence (USGS Map)

Manning n =	0.1
slope =	0.000019
H =	6.40 Trial and error #
Area	479.84
Constant =	4.86
Mannings Q	96.5 96.5 Q
Therefore U =	0.201

Calculation of Required WASP Input Parameters

HEC Section Designation	WASP Segment Designation	Area[a] (sf)	Top Width[b] (ft)	Hydraulic Depth[c] (ft)
Flow 24 MGD				
SECNO 2.110	1	1.00	4.87	0.21
SECNO 1.690	-	29.51	18.61	1.59
SECNO 1.210	-	13.54	16.09	0.84
-	2[d]	21.53	17.35	1.21
SECNO .740	3	425.85	86.23	4.94
-	4[e]	397.47	-	5.30
Flow 40 MGD				
SECNO 2.110	1	1.00	4.87	0.21
SECNO 1.690		43.60	20.59	2.12
SECNO 1.210	-	12.56	15.92	0.79
-	2[d]	28.08	18.26	1.45
SECNO .740	3	425.85	86.23	4.94
-	4[e]	479.84	-	6.40

a: taken from HEC-2 Output File
b: taken from HEC-2 Output File
c: calculated as Area/Top Width
d: WASP Segment 2 = Average of HEC Sections 1.210 and 1.690
e: taken from Stream Characteristics for Rio Grand De Loiza Calculations

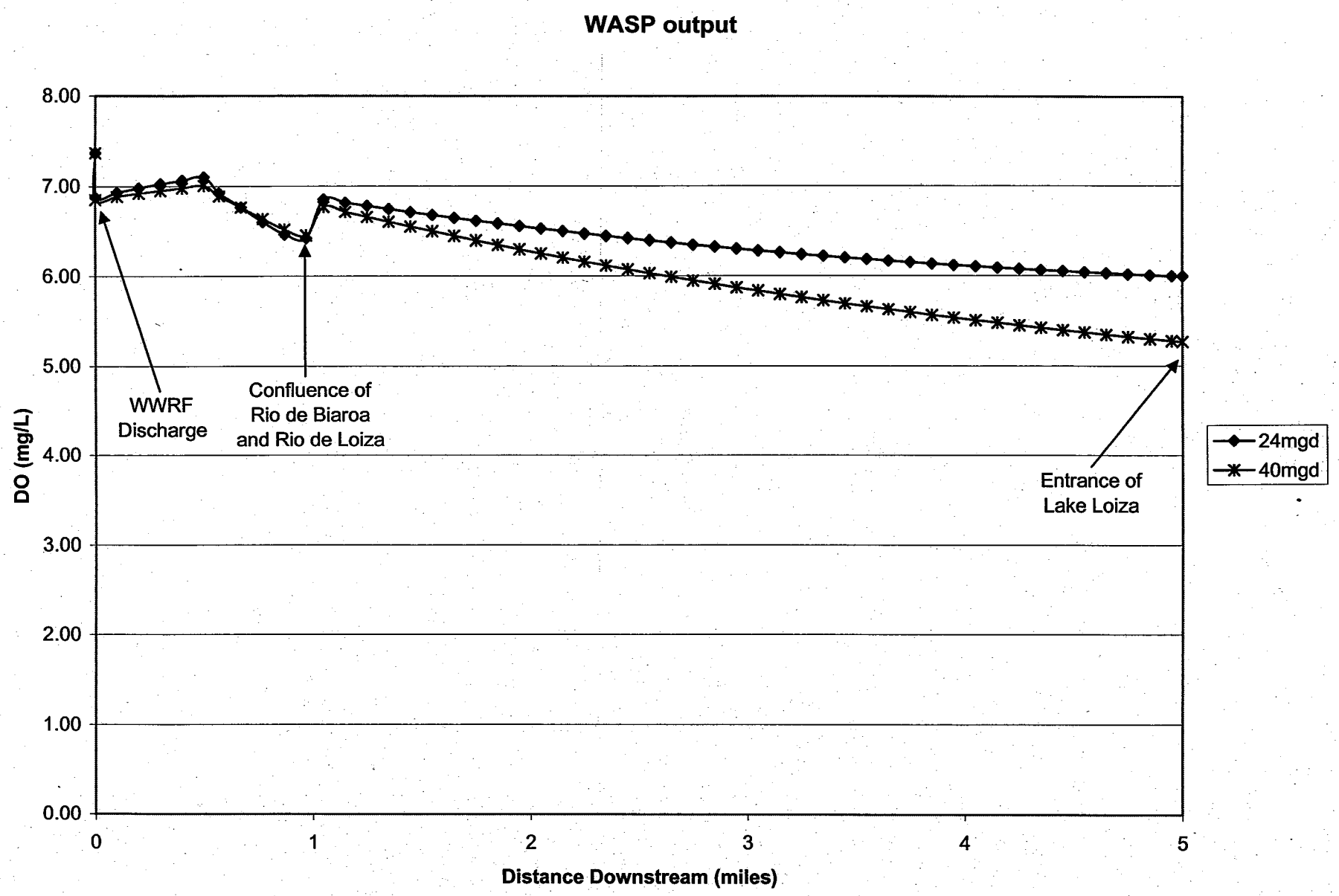
National Pollutant Discharge Elimination System Permit
Model Calibration Monitoring Requirement Clause Data

Station	Distance (ft)	04/22/00 Qr=1.9mgd Qeff=2.9mgd, T=29.8C	07/15/00 Qr=1.6mgd Qeff=5.0mgd, T=30.8C	11/18/00 Qr=2.7mgd Qeff=8.7mgd, T=26.8C	01/20/01 Qr=2.3mgd Qeff=8.4mgd, T=23.2C	06/08/02 Qr=2.3mgd Qeff=14.3mgd, T=26.6C	09/14/02 Qr=1.6mgd Qeff=5.5mgd, T=29.8C	12/28/02 Qr=2.4mgd Qeff=1.0mgd, T=28.9C	03/18/03 Qr=1.5mgd Qeff=4.5mgd, T=28.3C
	DO								
BG	0	7	6.8	6.2	6.8	7	7.2	7.2	6.2
P1	200	7.2	7.2	6.6	7	7	7.6	7	6.8
P2	400	7.8	7.4	6.4	7	7.01	7.4	7.2	6.6
P3	600	7	7.4	6.8	7	7	7.4	7	6.4
P4	800	7.8	7.2	7	7.1	6.6	7.6	7.2	6.6
P5	1000	7.8	9.4	6.8	7.2	7	7.4	7	6.4
	Ammonia								
BG	0	0.291	0.359	0.348	0.385	0.09	0.191	0.246	0.182
P1	200	0.478	0.59	0.36	0.385	0.301	0.328	0.331	0.835
P2	400	**0.666**	0.528	0.387	0.506	0.78	0.292		0.702
P3	600	0.638	0.585	0.474	0.441	0.397	0.273	0.427	0.479
P4	800	0.534	0.622	0.371	0.534	0.379	0.26	0.203	0.597
P5	1000	0.432	0.769	0.332	0.441	0.737	0.219	0.214	0.119
	BOD5								
BG	0	<2.0	<2.0	4.1	<2.0	2.1	<2.0	4.6	2.2
P1	200	2.5	<2.0	2.3	<2.0	4.7	<2.0	<2.0	2.1
P2	400	<2.0	<2.0	6.6	<2.0	3	<2.0	<2.0	<2.0
P3	600	2.3	<2.0	2.9	<2.0	4.2	<2.0	<2.0	<2.0
P4	800	**2.6**	<2.0	2.8	<2.0	4.4	<2.0	<2.0	3.1
P5	1000	2.3	<2.0	2.6	<2.0	4	<2.0	<2.0	3.4

Appendix B – WASP6 Modeling

- WASP6 Summary Figure
  - 24 MGD Output Files
  - 40 MGD Output Files

WASP6 Summary Figure


WASP output
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
DO (mg/L)
0
1
2
3
4
5
Distance Downstream (miles)
WWRF Discharge
Confluence of Rio de Biaroa and Rio de Loiza
Entrance of Lake Loiza
24mgd
40mgd

24 MGD Output Files

WASP Summary Table - 24 mgd

	Flow	DO	NH3	BOD5	Ult. BOD
Biaroa	2.6	7.365	0.7	2.6	3.35
Plant	61.9	6.8	2.4	12	15.48
Loiza	32	7.365	0.2	1	1.29
Total	96.5				

WASP Output

Length (miles)	DO (mg/L)	CBODu (mg/L)	NBOD (mg/L)	Ammonia (mg/L)	Effective Ka	BOD5 (mg/L)
0.00	7.37	3.35	3.20	0.70	31.63	2.86
0.00	7.37	3.47	3.22	0.70	31.63	2.93
0.00	6.88	14.61	5.32	1.16	30.15	9.07
0.10	6.93	14.60	5.32	1.16	30.15	9.07
0.20	6.98	14.59	5.31	1.16	30.15	9.07
0.30	7.03	14.58	5.31	1.16	30.15	9.06
0.40	7.07	14.58	5.31	1.16	30.15	9.06
0.50	7.10	14.57	5.31	1.16	30.15	9.05
0.57	6.92	14.41	5.26	1.15	0.47	8.96
0.67	6.76	14.26	5.22	1.14	0.47	8.87
0.77	6.60	14.07	5.17	1.13	0.47	8.76
0.87	6.46	13.75	5.06	1.11	0.47	8.56
0.97	6.42	12.63	4.70	1.03	0.47	7.89
1.05	6.85	7.10	2.85	0.62	0.59	4.52
1.15	6.82	7.06	2.84	0.62	0.59	4.49
1.25	6.78	7.02	2.83	0.62	0.59	4.47
1.35	6.74	6.98	2.82	0.62	0.59	4.45
1.45	6.71	6.95	2.81	0.61	0.59	4.42
1.55	6.68	6.91	2.79	0.61	0.59	4.40
1.65	6.64	6.87	2.78	0.61	0.59	4.38
1.75	6.61	6.83	2.77	0.61	0.59	4.35
1.85	6.58	6.79	2.76	0.60	0.59	4.33
1.95	6.55	6.75	2.75	0.60	0.59	4.31
2.05	6.52	6.71	2.73	0.60	0.59	4.28
2.15	6.50	6.68	2.72	0.60	0.59	4.26
2.25	6.47	6.64	2.71	0.59	0.59	4.24
2.35	6.44	6.60	2.70	0.59	0.59	4.22
2.45	6.42	6.56	2.69	0.59	0.59	4.19
2.55	6.39	6.53	2.67	0.59	0.59	4.17
2.65	6.37	6.49	2.66	0.58	0.59	4.15
2.75	6.35	6.46	2.65	0.58	0.59	4.13
2.85	6.32	6.42	2.64	0.58	0.59	4.11
2.95	6.30	6.38	2.63	0.58	0.59	4.09
3.05	6.28	6.35	2.62	0.57	0.59	4.06
3.15	6.26	6.31	2.61	0.57	0.59	4.04
3.25	6.24	6.28	2.60	0.57	0.59	4.02
3.35	6.22	6.24	2.58	0.57	0.59	4.00
3.45	6.20	6.21	2.57	0.56	0.59	3.98
3.55	6.19	6.17	2.56	0.56	0.59	3.96
3.65	6.17	6.14	2.55	0.56	0.59	3.94
3.75	6.15	6.10	2.54	0.56	0.59	3.92
3.85	6.14	6.07	2.53	0.55	0.59	3.90
3.95	6.12	6.04	2.52	0.55	0.59	3.88
4.05	6.10	6.00	2.51	0.55	0.59	3.86
4.15	6.09	5.97	2.50	0.55	0.59	3.84
4.25	6.08	5.94	2.49	0.54	0.59	3.82
4.35	6.06	5.90	2.48	0.54	0.59	3.80
4.45	6.05	5.87	2.46	0.54	0.59	3.78
4.55	6.04	5.84	2.45	0.54	0.59	3.76
4.65	6.03	5.80	2.44	0.53	0.59	3.74
4.75	6.01	5.77	2.43	0.53	0.59	3.72
4.85	6.00	5.73	2.42	0.53	0.59	3.69
4.95	5.99	5.60	2.37	0.52	0.59	3.61
5.00	5.99	4.65	1.97	0.43	0.59	3.00

```
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*********************************************************************

                 Water Quality Analysis Simulation Program (WASP6)

*********************************************************************

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                           Version 6.10
               Compiled on:  Date: May 2002

                   Maximum Parameters for this Model

        Systems:    9          Segments: 3000     Break Points: 4000
     Parameters:   21         Constants:  104    Boundary Cond:  200
    Waste Loads:  200     Print Interval:   50    Time Function:   23

*********************************************************************


  Number of Segments --->    54        Number of Systems --->     9

        System Bypass Options for System  1 TO  9 are 0 1 1 1 0 0 1 1 1
*********************************************************************


                         Simulation Time Steps
                          Option 0 Selected

    DT          T          DT          T          DT          T
  ~~~~~~      ~~~~~~~    ~~~~~~      ~~~~~~~    ~~~~~~      ~~~~~~~

  0.00100     0.00000   0.00100   365.00000
                          Print Intervals

  PRINT      ELAPSED      PRINT      ELAPSED      PRINT      ELAPSED
 INTERVAL     TIME      INTERVAL     TIME      INTERVAL     TIME
~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~

   0.100       0.00       0.100      365.00



                         Exchange Coefficients
                         ~~~~~~~~~~~~~~~~~~~~~~


                     Number of Exchange Fields =   1


                     FIELD  1 has  1  Time Functions

                    SCALR = 0.100E+01  CONVR = 0.100E+01
```

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Time Function 1 has 57 Exchanges

X-Area	Length	From	To
0.900E-01	0.100E+03	0	1
0.900E-01	0.100E+03	1	2
0.900E-01	0.100E+03	2	3
0.200E+01	0.100E+03	0	3
0.200E+01	0.100E+03	3	4
0.200E+01	0.161E+03	4	5
0.200E+01	0.161E+03	5	6
0.200E+01	0.161E+03	6	7
0.200E+01	0.161E+03	7	8
0.200E+01	0.161E+03	8	9
0.396E+02	0.113E+03	9	10
0.396E+02	0.161E+03	10	11
0.396E+02	0.161E+03	11	12
0.396E+02	0.161E+03	12	13
0.396E+02	0.161E+03	13	14
0.369E+02	0.100E+03	0	14
0.369E+02	0.129E+03	14	15
0.369E+02	0.161E+03	15	16
0.369E+02	0.161E+03	16	17
0.369E+02	0.161E+03	17	18
0.369E+02	0.161E+03	18	19
0.369E+02	0.161E+03	19	20
0.369E+02	0.161E+03	20	21
0.369E+02	0.161E+03	21	22
0.369E+02	0.161E+03	22	23
0.369E+02	0.161E+03	23	24
0.369E+02	0.161E+03	24	25
0.369E+02	0.161E+03	25	26
0.369E+02	0.161E+03	26	27
0.369E+02	0.161E+03	27	28
0.369E+02	0.161E+03	28	29
0.369E+02	0.161E+03	29	30
0.369E+02	0.161E+03	30	31
0.369E+02	0.161E+03	31	32
0.369E+02	0.161E+03	32	33
0.369E+02	0.161E+03	33	34
0.369E+02	0.161E+03	34	35
0.369E+02	0.161E+03	35	36
0.369E+02	0.161E+03	36	37
0.369E+02	0.161E+03	37	38
0.369E+02	0.161E+03	38	39
0.369E+02	0.161E+03	39	40
0.369E+02	0.161E+03	40	41
0.369E+02	0.161E+03	41	42
0.369E+02	0.161E+03	42	43
0.369E+02	0.161E+03	43	44
0.369E+02	0.161E+03	44	45
0.369E+02	0.161E+03	45	46
0.369E+02	0.161E+03	46	47
0.369E+02	0.161E+03	47	48
0.369E+02	0.161E+03	48	49
0.369E+02	0.161E+03	49	50
0.369E+02	0.161E+03	50	51
0.369E+02	0.161E+03	51	52
0.369E+02	0.161E+03	52	53
0.369E+02	0.161E+03	53	54
0.369E+02	0.805E+02	54	0

Number of Breaks in Time Function = 2

Dispersion	Time	Dispersion	Time	Dispersion	Time

****

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0.100E+01 0.000E+00 0.100E+01 0.365E+03

R Bypass Options for Systems 1 to 9 are 0 1 1 1 0 0 1 1 1

1

VOLUMES
~~~~~~~

Bed Volume Option = 0 Bed Time Step = 0.000E+00

Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Seg #	BOTSG	Type	Volume	V mult	V exp	D mult	D exp
1	0	1	9.290	0.792	0.000	0.060	0.000
2	0	1	9.290	0.792	0.000	0.060	0.000
3	0	1	200.020	0.562	0.000	0.370	0.000
4	0	1	321.901	0.562	0.000	0.370	0.000
5	0	1	321.901	0.562	0.000	0.370	0.000
6	0	1	321.901	0.562	0.000	0.370	0.000
7	0	1	321.901	0.562	0.000	0.370	0.000
8	0	1	321.901	0.562	0.000	0.370	0.000
9	0	1	4457.430	0.028	0.000	1.510	0.000
10	0	1	6367.756	0.028	0.000	1.510	0.000
11	0	1	6367.756	0.028	0.000	1.510	0.000
12	0	1	6367.756	0.028	0.000	1.510	0.000
13	0	1	6367.756	0.028	0.000	1.510	0.000
14	0	1	4754.512	0.055	0.000	1.620	0.000
15	0	1	5943.140	0.055	0.000	1.620	0.000
16	0	1	5943.140	0.055	0.000	1.620	0.000
17	0	1	5943.140	0.055	0.000	1.620	0.000
18	0	1	5943.140	0.055	0.000	1.620	0.000
19	0	1	5943.140	0.055	0.000	1.620	0.000
20	0	1	5943.140	0.055	0.000	1.620	0.000
21	0	1	5943.140	0.055	0.000	1.620	0.000
22	0	1	5943.140	0.055	0.000	1.620	0.000
23	0	1	5943.140	0.055	0.000	1.620	0.000
24	0	1	5943.140	0.055	0.000	1.620	0.000
25	0	1	5943.140	0.055	0.000	1.620	0.000
26	0	1	5943.140	0.055	0.000	1.620	0.000
27	0	1	5943.140	0.055	0.000	1.620	0.000
28	0	1	5943.140	0.055	0.000	1.620	0.000
29	0	1	5943.140	0.055	0.000	1.620	0.000
30	0	1	5943.140	0.055	0.000	1.620	0.000
31	0	1	5943.140	0.055	0.000	1.620	0.000
32	0	1	5943.140	0.055	0.000	1.620	0.000
33	0	1	5943.140	0.055	0.000	1.620	0.000
34	0	1	5943.140	0.055	0.000	1.620	0.000
35	0	1	5943.140	0.055	0.000	1.620	0.000
36	0	1	5943.140	0.055	0.000	1.620	0.000
37	0	1	5943.140	0.055	0.000	1.620	0.000
38	0	1	5943.140	0.055	0.000	1.620	0.000
39	0	1	5943.140	0.055	0.000	1.620	0.000
40	0	1	5943.140	0.055	0.000	1.620	0.000
41	0	1	5943.140	0.055	0.000	1.620	0.000
42	0	1	5943.140	0.055	0.000	1.620	0.000
43	0	1	5943.140	0.055	0.000	1.620	0.000
44	0	1	5943.140	0.055	0.000	1.620	0.000
45	0	1	5943.140	0.055	0.000	1.620	0.000
46	0	1	5943.140	0.055	0.000	1.620	0.000
47	0	1	5943.140	0.055	0.000	1.620	0.000
48	0	1	5943.140	0.055	0.000	1.620	0.000
49	0	1	5943.140	0.055	0.000	1.620	0.000
50	0	1	5943.140	0.055	0.000	1.620	0.000
51	0	1	5943.140	0.055	0.000	1.620	0.000
52	0	1	5943.140	0.055	0.000	1.620	0.000
~~~~~~~

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   53       0       1        5943.140    0.055    0.000    1.620    0.000
   54       0       1        2971.570    0.055    0.000    1.620    0.000
1
```

FLOWS

Flow Option 1 Used
Number of Flow Fields = 6

Field 1 has 1 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Inflow Number 1

Continuity Array:

Flow	From	To	Flow	From	To	Flow	From	To
0.400E-01	0	1	0.400E-01	1	2	0.400E-01	2	3
0.510E+00	0	3	0.550E+00	3	4	0.550E+00	4	5
0.550E+00	5	6	0.550E+00	6	7	0.550E+00	7	8
0.550E+00	8	9	0.550E+00	9	10	0.550E+00	10	11
0.550E+00	11	12	0.550E+00	12	13	0.550E+00	13	14
0.450E+00	0	14	0.100E+01	14	15	0.100E+01	15	16
0.100E+01	16	17	0.100E+01	17	18	0.100E+01	18	19
0.100E+01	19	20	0.100E+01	20	21	0.100E+01	21	22
0.100E+01	22	23	0.100E+01	23	24	0.100E+01	24	25
0.100E+01	25	26	0.100E+01	26	27	0.100E+01	27	28
0.100E+01	28	29	0.100E+01	29	30	0.100E+01	30	31
0.100E+01	31	32	0.100E+01	32	33	0.100E+01	33	34
0.100E+01	34	35	0.100E+01	35	36	0.100E+01	36	37
0.100E+01	37	38	0.100E+01	38	39	0.100E+01	39	40
0.100E+01	40	41	0.100E+01	41	42	0.100E+01	42	43
0.100E+01	43	44	0.100E+01	44	45	0.100E+01	45	46
0.100E+01	46	47	0.100E+01	47	48	0.100E+01	48	49
0.100E+01	49	50	0.100E+01	50	51	0.100E+01	51	52
0.100E+01	52	53	0.100E+01	53	54	0.100E+01	54	0

Number of Breaks in Time Function = 2

Flow	Time	Flow	Time	Flow	Time
0.203E+01	0.000E+00	0.203E+01	0.365E+03		

Field 2 has 0 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Field 3 has 0 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Field 4 has 0 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Field 5 has 0 Inflows

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SCALQ = 0.100E+01 CONVQ = 0.100E+01

Field 6 has 0 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Q Bypass Options for Systems 1 to 9 are 0 1 1 1 0 0 1 1 1

1

Boundary Conditions

Boundary Concentrations for System 1
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.7000000E+00	0.00	0.7000000E+00	365.00
3	2	0.1200000E+01	0.00	0.1200000E+01	365.00
14	2	0.2000000E+00	0.00	0.2000000E+00	365.00
54	2	0.0000000E+00	0.00	0.0000000E+00	365.00

Boundary Concentrations for System 2
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	0.00	0.0000000E+00	365.00

Boundary Concentrations for System 3
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	0.00	0.0000000E+00	365.00

Boundary Concentrations for System 4
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	0.00	0.0000000E+00	365.00

Boundary Concentrations for System 5
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.3350000E+01	0.00	0.3350000E+01	365.00

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3	2	0.1548000E+02	0.00	0.1548000E+02	365.00
14	2	0.1290000E+01	0.00	0.1290000E+01	365.00
54	2	0.0000000E+00	0.00	0.0000000E+00	365.00

Boundary Concentrations for System 6
BC Option 0 Used   No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.7365000E+01	0.00	0.7365000E+01	365.00
3	2	0.6800000E+01	0.00	0.6800000E+01	365.00
14	2	0.7365000E+01	0.00	0.7365000E+01	365.00
54	2	0.5990000E+01	0.00	0.5990000E+01	365.00

Boundary Concentrations for System 7
BC Option 0 Used   No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	0.00	0.0000000E+00	365.00

Boundary Concentrations for System 8
BC Option 0 Used   No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	0.00	0.0000000E+00	365.00

Boundary Concentrations for System 9
BC Option 0 Used   No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	0.00	0.0000000E+00	365.00

Waste Loads
~~~~~~~~~~~

Forcing Functions For System 1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Wk Option 3 Used   No.of WK'S Read 0

No Forcing Function for System 1
Forcing Functions For System 2
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Wk Option 3 Used   No.of WK'S Read 0

No Forcing Function for System 2
Forcing Functions For System 3
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

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                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  3
                           Forcing Functions For System  4
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  4
                           Forcing Functions For System  5
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  5
                           Forcing Functions For System  6
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  6
                           Forcing Functions For System  7
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  7
                           Forcing Functions For System  8
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  8
                           Forcing Functions For System  9
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  9
                                  Segment Parameters
                                  ~~~~~~~~~~~~~~~~~~

 PARM      SCALE        PARM      SCALE        PARM      SCALE        PARM      SCALE
 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
         1
0.1000E+01
    1
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    2
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    3
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    4
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    5
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    6
```

```
*********************************************************************

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                    Atlanta, GA  30303
                    For Technical Support:
                    Email: wool.tim@epa.gov
                    Voice: 404/562-9260 / Fax: 404/562-9224
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  7
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  8
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  9
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  10
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  11
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  12
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  13
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  14
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  15
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  16
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  17
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  18
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  19
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  20
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  21
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  22
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  23
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  24
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  25
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  26
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  27
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  28
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  29
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  30
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  31
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  32
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  33
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  34
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  35
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  36
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  37
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  38
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  39
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  40
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  41
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  42
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
```

```
*****************************************************************

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                    Voice: 404/562-9260 / Fax: 404/562-9224
  43
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  44
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  45
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  46
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  47
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  48
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  49
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  50
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  51
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  52
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  53
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  54
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
1
                     Environmental and Chemical Constants
                     ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
        7
    Const        11  0.1000E+00     Const        12  0.1040E+01
    Const        13  0.1000E+01     Const        71  0.1300E+00
    Const        72  0.1040E+01     Const        75  0.1000E+01
    Const        81  0.2670E+01
1
```

No Time Functions have been Entered for this Simulation

1

Initial Conditions
~~~~~~~~~~~~~~~~~~

Initial Conditions for System 1
==========

Particulate Form Transported by Solids Field 3
Density of System = 1.0000

Segment	Concentration	Fraction Dissolved
1:	0.2000E+01	1.00
2:	0.2000E+01	1.00
3:	0.2000E+01	1.00
4:	0.2000E+01	1.00
5:	0.2000E+01	1.00
6:	0.2000E+01	1.00
7:	0.2000E+01	1.00
8:	0.2000E+01	1.00
9:	0.2000E+01	1.00
10:	0.2000E+01	1.00
11:	0.2000E+01	1.00
12:	0.2000E+01	1.00
13:	0.2000E+01	1.00
14:	0.2000E+01	1.00
15:	0.2000E+01	1.00
16:	0.2000E+01	1.00
17:	0.2000E+01	1.00
~~~~~~~~~~~~~~~~~~

```
*********************************************************************

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 18:          0.2000E+01              1.00
 19:          0.2000E+01              1.00
 20:          0.2000E+01              1.00
 21:          0.2000E+01              1.00
 22:          0.2000E+01              1.00
 23:          0.2000E+01              1.00
 24:          0.2000E+01              1.00
 25:          0.2000E+01              1.00
 26:          0.2000E+01              1.00
 27:          0.2000E+01              1.00
 28:          0.2000E+01              1.00
 29:          0.2000E+01              1.00
 30:          0.2000E+01              1.00
 31:          0.2000E+01              1.00
 32:          0.2000E+01              1.00
 33:          0.2000E+01              1.00
 34:          0.2000E+01              1.00
 35:          0.2000E+01              1.00
 36:          0.2000E+01              1.00
 37:          0.2000E+01              1.00
 38:          0.2000E+01              1.00
 39:          0.2000E+01              1.00
 40:          0.2000E+01              1.00
 41:          0.2000E+01              1.00
 42:          0.2000E+01              1.00
 43:          0.2000E+01              1.00
 44:          0.2000E+01              1.00
 45:          0.2000E+01              1.00
 46:          0.2000E+01              1.00
 47:          0.2000E+01              1.00
 48:          0.2000E+01              1.00
 49:          0.2000E+01              1.00
 50:          0.2000E+01              1.00
 51:          0.2000E+01              1.00
 52:          0.2000E+01              1.00
 53:          0.2000E+01              1.00
 54:          0.2000E+01              1.00

       Initial Conditions for System  2
       ==================================
  Particulate Form Transported by Solids Field    3
  Density of System =      1.0000

 Segment      Concentration      Fraction Dissolved
 =======      =============      ==================
   1:          0.1000E-23              1.00
   2:          0.1000E-23              1.00
   3:          0.1000E-23              1.00
   4:          0.1000E-23              1.00
   5:          0.1000E-23              1.00
   6:          0.1000E-23              1.00
   7:          0.1000E-23              1.00
   8:          0.1000E-23              1.00
   9:          0.1000E-23              1.00
  10:          0.1000E-23              1.00
  11:          0.1000E-23              1.00
  12:          0.1000E-23              1.00
  13:          0.1000E-23              1.00
  14:          0.1000E-23              1.00
  15:          0.1000E-23              1.00
  16:          0.1000E-23              1.00
  17:          0.1000E-23              1.00
  18:          0.1000E-23              1.00
  19:          0.1000E-23              1.00
  20:          0.1000E-23              1.00
  21:          0.1000E-23              1.00
  22:          0.1000E-23              1.00
  23:          0.1000E-23              1.00
  24:          0.1000E-23              1.00
  25:          0.1000E-23              1.00
  26:          0.1000E-23              1.00
```

```
*********************************************************************

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 27:          0.1000E-23              1.00
 28:          0.1000E-23              1.00
 29:          0.1000E-23              1.00
 30:          0.1000E-23              1.00
 31:          0.1000E-23              1.00
 32:          0.1000E-23              1.00
 33:          0.1000E-23              1.00
 34:          0.1000E-23              1.00
 35:          0.1000E-23              1.00
 36:          0.1000E-23              1.00
 37:          0.1000E-23              1.00
 38:          0.1000E-23              1.00
 39:          0.1000E-23              1.00
 40:          0.1000E-23              1.00
 41:          0.1000E-23              1.00
 42:          0.1000E-23              1.00
 43:          0.1000E-23              1.00
 44:          0.1000E-23              1.00
 45:          0.1000E-23              1.00
 46:          0.1000E-23              1.00
 47:          0.1000E-23              1.00
 48:          0.1000E-23              1.00
 49:          0.1000E-23              1.00
 50:          0.1000E-23              1.00
 51:          0.1000E-23              1.00
 52:          0.1000E-23              1.00
 53:          0.1000E-23              1.00
 54:          0.1000E-23              1.00

        Initial Conditions for System  3
        ================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000

 Segment      Concentration      Fraction Dissolved
 =======      =============      ==================
   1:          0.1000E-23              1.00
   2:          0.1000E-23              1.00
   3:          0.1000E-23              1.00
   4:          0.1000E-23              1.00
   5:          0.1000E-23              1.00
   6:          0.1000E-23              1.00
   7:          0.1000E-23              1.00
   8:          0.1000E-23              1.00
   9:          0.1000E-23              1.00
  10:          0.1000E-23              1.00
  11:          0.1000E-23              1.00
  12:          0.1000E-23              1.00
  13:          0.1000E-23              1.00
  14:          0.1000E-23              1.00
  15:          0.1000E-23              1.00
  16:          0.1000E-23              1.00
  17:          0.1000E-23              1.00
  18:          0.1000E-23              1.00
  19:          0.1000E-23              1.00
  20:          0.1000E-23              1.00
  21:          0.1000E-23              1.00
  22:          0.1000E-23              1.00
  23:          0.1000E-23              1.00
  24:          0.1000E-23              1.00
  25:          0.1000E-23              1.00
  26:          0.1000E-23              1.00
  27:          0.1000E-23              1.00
  28:          0.1000E-23              1.00
  29:          0.1000E-23              1.00
  30:          0.1000E-23              1.00
  31:          0.1000E-23              1.00
  32:          0.1000E-23              1.00
  33:          0.1000E-23              1.00
  34:          0.1000E-23              1.00
  35:          0.1000E-23              1.00
```

```
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                    Email: wool.tim@epa.gov
                    Voice: 404/562-9260 / Fax: 404/562-9224
 36:        0.1000E-23              1.00
 37:        0.1000E-23              1.00
 38:        0.1000E-23              1.00
 39:        0.1000E-23              1.00
 40:        0.1000E-23              1.00
 41:        0.1000E-23              1.00
 42:        0.1000E-23              1.00
 43:        0.1000E-23              1.00
 44:        0.1000E-23              1.00
 45:        0.1000E-23              1.00
 46:        0.1000E-23              1.00
 47:        0.1000E-23              1.00
 48:        0.1000E-23              1.00
 49:        0.1000E-23              1.00
 50:        0.1000E-23              1.00
 51:        0.1000E-23              1.00
 52:        0.1000E-23              1.00
 53:        0.1000E-23              1.00
 54:        0.1000E-23              1.00

       Initial Conditions for System  4
       ==================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000

Segment     Concentration     Fraction Dissolved
~~~~~~~     ~~~~~~~~~~~~~     ~~~~~~~~~~~~~~~~~~
  1:        0.1000E-23              1.00
  2:        0.1000E-23              1.00
  3:        0.1000E-23              1.00
  4:        0.1000E-23              1.00
  5:        0.1000E-23              1.00
  6:        0.1000E-23              1.00
  7:        0.1000E-23              1.00
  8:        0.1000E-23              1.00
  9:        0.1000E-23              1.00
 10:        0.1000E-23              1.00
 11:        0.1000E-23              1.00
 12:        0.1000E-23              1.00
 13:        0.1000E-23              1.00
 14:        0.1000E-23              1.00
 15:        0.1000E-23              1.00
 16:        0.1000E-23              1.00
 17:        0.1000E-23              1.00
 18:        0.1000E-23              1.00
 19:        0.1000E-23              1.00
 20:        0.1000E-23              1.00
 21:        0.1000E-23              1.00
 22:        0.1000E-23              1.00
 23:        0.1000E-23              1.00
 24:        0.1000E-23              1.00
 25:        0.1000E-23              1.00
 26:        0.1000E-23              1.00
 27:        0.1000E-23              1.00
 28:        0.1000E-23              1.00
 29:        0.1000E-23              1.00
 30:        0.1000E-23              1.00
 31:        0.1000E-23              1.00
 32:        0.1000E-23              1.00
 33:        0.1000E-23              1.00
 34:        0.1000E-23              1.00
 35:        0.1000E-23              1.00
 36:        0.1000E-23              1.00
 37:        0.1000E-23              1.00
 38:        0.1000E-23              1.00
 39:        0.1000E-23              1.00
 40:        0.1000E-23              1.00
 41:        0.1000E-23              1.00
 42:        0.1000E-23              1.00
 43:        0.1000E-23              1.00
 44:        0.1000E-23              1.00
```

```
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                    For Technical Support:
                    Email: wool.tim@epa.gov
                    Voice: 404/562-9260 / Fax: 404/562-9224
 45:          0.1000E-23              1.00
 46:          0.1000E-23              1.00
 47:          0.1000E-23              1.00
 48:          0.1000E-23              1.00
 49:          0.1000E-23              1.00
 50:          0.1000E-23              1.00
 51:          0.1000E-23              1.00
 52:          0.1000E-23              1.00
 53:          0.1000E-23              1.00
 54:          0.1000E-23              1.00

        Initial Conditions for System  5
        ==================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000

 Segment      Concentration      Fraction Dissolved
 ~~~~~~~      ~~~~~~~~~~~~~      ~~~~~~~~~~~~~~~~~~
   1:          0.4000E+01              1.00
   2:          0.4000E+01              1.00
   3:          0.4000E+01              1.00
   4:          0.4000E+01              1.00
   5:          0.4000E+01              1.00
   6:          0.4000E+01              1.00
   7:          0.4000E+01              1.00
   8:          0.4000E+01              1.00
   9:          0.4000E+01              1.00
  10:          0.4000E+01              1.00
  11:          0.4000E+01              1.00
  12:          0.4000E+01              1.00
  13:          0.4000E+01              1.00
  14:          0.4000E+01              1.00
  15:          0.4000E+01              1.00
  16:          0.4000E+01              1.00
  17:          0.4000E+01              1.00
  18:          0.4000E+01              1.00
  19:          0.4000E+01              1.00
  20:          0.4000E+01              1.00
  21:          0.4000E+01              1.00
  22:          0.4000E+01              1.00
  23:          0.4000E+01              1.00
  24:          0.4000E+01              1.00
  25:          0.4000E+01              1.00
  26:          0.4000E+01              1.00
  27:          0.4000E+01              1.00
  28:          0.4000E+01              1.00
  29:          0.4000E+01              1.00
  30:          0.4000E+01              1.00
  31:          0.4000E+01              1.00
  32:          0.4000E+01              1.00
  33:          0.4000E+01              1.00
  34:          0.4000E+01              1.00
  35:          0.4000E+01              1.00
  36:          0.4000E+01              1.00
  37:          0.4000E+01              1.00
  38:          0.4000E+01              1.00
  39:          0.4000E+01              1.00
  40:          0.4000E+01              1.00
  41:          0.4000E+01              1.00
  42:          0.4000E+01              1.00
  43:          0.4000E+01              1.00
  44:          0.4000E+01              1.00
  45:          0.4000E+01              1.00
  46:          0.4000E+01              1.00
  47:          0.4000E+01              1.00
  48:          0.4000E+01              1.00
  49:          0.4000E+01              1.00
  50:          0.4000E+01              1.00
  51:          0.4000E+01              1.00
  52:          0.4000E+01              1.00
  53:          0.4000E+01              1.00
```

```
*********************************************************************

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                    31 Forsyth St
                    Atlanta, GA  30303
                    For Technical Support:
                    Email: wool.tim@epa.gov
                    Voice: 404/562-9260 / Fax: 404/562-9224
 54:          0.4000E+01              1.00
```

Initial Conditions for System 6

Particulate Form Transported by Solids Field 3
Density of System = 1.0000

Segment	Concentration	Fraction Dissolved
1:	0.5500E+01	1.00
2:	0.5500E+01	1.00
3:	0.5500E+01	1.00
4:	0.5500E+01	1.00
5:	0.5500E+01	1.00
6:	0.5500E+01	1.00
7:	0.5500E+01	1.00
8:	0.5500E+01	1.00
9:	0.5500E+01	1.00
10:	0.5500E+01	1.00
11:	0.5500E+01	1.00
12:	0.5500E+01	1.00
13:	0.5500E+01	1.00
14:	0.5500E+01	1.00
15:	0.5500E+01	1.00
16:	0.5500E+01	1.00
17:	0.5500E+01	1.00
18:	0.5500E+01	1.00
19:	0.5500E+01	1.00
20:	0.5500E+01	1.00
21:	0.5500E+01	1.00
22:	0.5500E+01	1.00
23:	0.5500E+01	1.00
24:	0.5500E+01	1.00
25:	0.5500E+01	1.00
26:	0.5500E+01	1.00
27:	0.5500E+01	1.00
28:	0.5500E+01	1.00
29:	0.5500E+01	1.00
30:	0.5500E+01	1.00
31:	0.5500E+01	1.00
32:	0.5500E+01	1.00
33:	0.5500E+01	1.00
34:	0.5500E+01	1.00
35:	0.5500E+01	1.00
36:	0.5500E+01	1.00
37:	0.5500E+01	1.00
38:	0.5500E+01	1.00
39:	0.5500E+01	1.00
40:	0.5500E+01	1.00
41:	0.5500E+01	1.00
42:	0.5500E+01	1.00
43:	0.5500E+01	1.00
44:	0.5500E+01	1.00
45:	0.5500E+01	1.00
46:	0.5500E+01	1.00
47:	0.5500E+01	1.00
48:	0.5500E+01	1.00
49:	0.5500E+01	1.00
50:	0.5500E+01	1.00
51:	0.5500E+01	1.00
52:	0.5500E+01	1.00
53:	0.5500E+01	1.00
54:	0.5500E+01	1.00

Initial Conditions for System 7

Particulate Form Transported by Solids Field 3
Density of System = 1.0000

****

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Voice: 404/562-9260 / Fax: 404/562-9224

Segment	Concentration	Fraction Dissolved
1:	0.1000E-23	1.00
2:	0.1000E-23	1.00
3:	0.1000E-23	1.00
4:	0.1000E-23	1.00
5:	0.1000E-23	1.00
6:	0.1000E-23	1.00
7:	0.1000E-23	1.00
8:	0.1000E-23	1.00
9:	0.1000E-23	1.00
10:	0.1000E-23	1.00
11:	0.1000E-23	1.00
12:	0.1000E-23	1.00
13:	0.1000E-23	1.00
14:	0.1000E-23	1.00
15:	0.1000E-23	1.00
16:	0.1000E-23	1.00
17:	0.1000E-23	1.00
18:	0.1000E-23	1.00
19:	0.1000E-23	1.00
20:	0.1000E-23	1.00
21:	0.1000E-23	1.00
22:	0.1000E-23	1.00
23:	0.1000E-23	1.00
24:	0.1000E-23	1.00
25:	0.1000E-23	1.00
26:	0.1000E-23	1.00
27:	0.1000E-23	1.00
28:	0.1000E-23	1.00
29:	0.1000E-23	1.00
30:	0.1000E-23	1.00
31:	0.1000E-23	1.00
32:	0.1000E-23	1.00
33:	0.1000E-23	1.00
34:	0.1000E-23	1.00
35:	0.1000E-23	1.00
36:	0.1000E-23	1.00
37:	0.1000E-23	1.00
38:	0.1000E-23	1.00
39:	0.1000E-23	1.00
40:	0.1000E-23	1.00
41:	0.1000E-23	1.00
42:	0.1000E-23	1.00
43:	0.1000E-23	1.00
44:	0.1000E-23	1.00
45:	0.1000E-23	1.00
46:	0.1000E-23	1.00
47:	0.1000E-23	1.00
48:	0.1000E-23	1.00
49:	0.1000E-23	1.00
50:	0.1000E-23	1.00
51:	0.1000E-23	1.00
52:	0.1000E-23	1.00
53:	0.1000E-23	1.00
54:	0.1000E-23	1.00

Initial Conditions for System 8
==========

Particulate Form Transported by Solids Field 3
Density of System = 1.0000

Segment	Concentration	Fraction Dissolved
1:	0.1000E-23	1.00
2:	0.1000E-23	1.00
3:	0.1000E-23	1.00
4:	0.1000E-23	1.00
5:	0.1000E-23	1.00
6:	0.1000E-23	1.00
7:	0.1000E-23	1.00

```
*********************************************************************

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   8:        0.1000E-23              1.00
   9:        0.1000E-23              1.00
  10:        0.1000E-23              1.00
  11:        0.1000E-23              1.00
  12:        0.1000E-23              1.00
  13:        0.1000E-23              1.00
  14:        0.1000E-23              1.00
  15:        0.1000E-23              1.00
  16:        0.1000E-23              1.00
  17:        0.1000E-23              1.00
  18:        0.1000E-23              1.00
  19:        0.1000E-23              1.00
  20:        0.1000E-23              1.00
  21:        0.1000E-23              1.00
  22:        0.1000E-23              1.00
  23:        0.1000E-23              1.00
  24:        0.1000E-23              1.00
  25:        0.1000E-23              1.00
  26:        0.1000E-23              1.00
  27:        0.1000E-23              1.00
  28:        0.1000E-23              1.00
  29:        0.1000E-23              1.00
  30:        0.1000E-23              1.00
  31:        0.1000E-23              1.00
  32:        0.1000E-23              1.00
  33:        0.1000E-23              1.00
  34:        0.1000E-23              1.00
  35:        0.1000E-23              1.00
  36:        0.1000E-23              1.00
  37:        0.1000E-23              1.00
  38:        0.1000E-23              1.00
  39:        0.1000E-23              1.00
  40:        0.1000E-23              1.00
  41:        0.1000E-23              1.00
  42:        0.1000E-23              1.00
  43:        0.1000E-23              1.00
  44:        0.1000E-23              1.00
  45:        0.1000E-23              1.00
  46:        0.1000E-23              1.00
  47:        0.1000E-23              1.00
  48:        0.1000E-23              1.00
  49:        0.1000E-23              1.00
  50:        0.1000E-23              1.00
  51:        0.1000E-23              1.00
  52:        0.1000E-23              1.00
  53:        0.1000E-23              1.00
  54:        0.1000E-23              1.00

      Initial Conditions for System  9
      ==================================
 Particulate Form Transported by Solids Field    3
 Density of System =     1.0000

Segment      Concentration      Fraction Dissolved
~~~~~~~      ~~~~~~~~~~~~~      ~~~~~~~~~~~~~~~~~~
  1:         0.1000E-23              1.00
  2:         0.1000E-23              1.00
  3:         0.1000E-23              1.00
  4:         0.1000E-23              1.00
  5:         0.1000E-23              1.00
  6:         0.1000E-23              1.00
  7:         0.1000E-23              1.00
  8:         0.1000E-23              1.00
  9:         0.1000E-23              1.00
 10:         0.1000E-23              1.00
 11:         0.1000E-23              1.00
 12:         0.1000E-23              1.00
 13:         0.1000E-23              1.00
 14:         0.1000E-23              1.00
 15:         0.1000E-23              1.00
 16:         0.1000E-23              1.00
```

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17:	0.1000E-23	1.00
18:	0.1000E-23	1.00
19:	0.1000E-23	1.00
20:	0.1000E-23	1.00
21:	0.1000E-23	1.00
22:	0.1000E-23	1.00
23:	0.1000E-23	1.00
24:	0.1000E-23	1.00
25:	0.1000E-23	1.00
26:	0.1000E-23	1.00
27:	0.1000E-23	1.00
28:	0.1000E-23	1.00
29:	0.1000E-23	1.00
30:	0.1000E-23	1.00
31:	0.1000E-23	1.00
32:	0.1000E-23	1.00
33:	0.1000E-23	1.00
34:	0.1000E-23	1.00
35:	0.1000E-23	1.00
36:	0.1000E-23	1.00
37:	0.1000E-23	1.00
38:	0.1000E-23	1.00
39:	0.1000E-23	1.00
40:	0.1000E-23	1.00
41:	0.1000E-23	1.00
42:	0.1000E-23	1.00
43:	0.1000E-23	1.00
44:	0.1000E-23	1.00
45:	0.1000E-23	1.00
46:	0.1000E-23	1.00
47:	0.1000E-23	1.00
48:	0.1000E-23	1.00
49:	0.1000E-23	1.00
50:	0.1000E-23	1.00
51:	0.1000E-23	1.00
52:	0.1000E-23	1.00
53:	0.1000E-23	1.00
54:	0.1000E-23	1.00

Stability Criteria for Numerical Integration

System	Maximum Concentration
1	100.00
2	100.00
3	100.00
4	100.00
5	100.00
6	100.00
7	100.00
8	100.00
9	100.00

40 MGD Output Files

WASP Summary Table - 40 mgd

	Flow	DO	NH3	BOD5	Ult. BOD
Biaroa	2.6	7.365	0.7	2.6	3.35
Plant	61.9	6.8	2.4	12	15.48
Loiza	32	7.365	0.2	1	1.29
Total	96.5				

WASP Output

Length (miles)	DO (mg/L)	CBODu (mg/L)	NBOD (mg/L)	Ammonia (mg/L)	Effective Ka	BOD5 (mg/L)
0.00	7.37	3.35	3.20	0.70	31.63	2.86
0.00	7.37	3.47	3.28	0.72	31.63	2.95
0.00	6.85	14.94	10.62	2.32	25.35	11.32
0.10	6.89	14.93	10.62	2.32	25.35	11.32
0.20	6.92	14.93	10.62	2.32	25.35	11.31
0.30	6.95	14.92	10.61	2.32	25.35	11.31
0.40	6.98	14.91	10.61	2.32	25.35	11.30
0.50	7.01	14.91	10.60	2.32	25.35	11.30
0.57	6.89	14.82	10.56	2.31	0.60	11.24
0.67	6.76	14.72	10.50	2.30	0.60	11.17
0.77	6.63	14.62	10.44	2.29	0.60	11.10
0.87	6.52	14.45	10.34	2.26	0.60	10.98
0.97	6.45	13.78	9.88	2.16	0.60	10.47
1.05	6.77	8.83	6.33	1.39	0.47	6.71
1.15	6.71	8.79	6.31	1.38	0.47	6.68
1.25	6.66	8.75	6.28	1.37	0.47	6.65
1.35	6.60	8.70	6.26	1.37	0.47	6.62
1.45	6.55	8.66	6.23	1.36	0.47	6.59
1.55	6.50	8.61	6.21	1.36	0.47	6.56
1.65	6.44	8.57	6.18	1.35	0.47	6.53
1.75	6.39	8.53	6.16	1.35	0.47	6.50
1.85	6.35	8.48	6.14	1.34	0.47	6.47
1.95	6.30	8.44	6.11	1.34	0.47	6.44
2.05	6.25	8.40	6.09	1.33	0.47	6.41
2.15	6.20	8.36	6.07	1.33	0.47	6.38
2.25	6.16	8.32	6.04	1.32	0.47	6.35
2.35	6.12	8.27	6.02	1.32	0.47	6.32
2.45	6.07	8.23	6.00	1.31	0.47	6.29
2.55	6.03	8.19	5.97	1.31	0.47	6.27
2.65	5.99	8.15	5.95	1.30	0.47	6.24
2.75	5.95	8.11	5.93	1.30	0.47	6.21
2.85	5.91	8.07	5.90	1.29	0.47	6.18
2.95	5.87	8.03	5.88	1.29	0.47	6.15
3.05	5.83	7.99	5.86	1.28	0.47	6.12
3.15	5.80	7.95	5.84	1.28	0.47	6.10
3.25	5.76	7.91	5.81	1.27	0.47	6.07
3.35	5.73	7.87	5.79	1.27	0.47	6.04
3.45	5.69	7.83	5.77	1.26	0.47	6.01
3.55	5.66	7.79	5.75	1.26	0.47	5.99
3.65	5.63	7.75	5.73	1.25	0.47	5.96
3.75	5.60	7.72	5.70	1.25	0.47	5.93
3.85	5.56	7.68	5.68	1.24	0.47	5.91
3.95	5.53	7.64	5.66	1.24	0.47	5.88
4.05	5.51	7.60	5.64	1.23	0.47	5.85
4.15	5.48	7.57	5.62	1.23	0.47	5.83
4.25	5.45	7.53	5.60	1.22	0.47	5.80
4.35	5.42	7.49	5.58	1.22	0.47	5.77
4.45	5.39	7.45	5.56	1.22	0.47	5.75
4.55	5.37	7.42	5.53	1.21	0.47	5.72
4.65	5.34	7.38	5.51	1.21	0.47	5.70
4.75	5.32	7.34	5.49	1.20	0.47	5.67
4.85	5.29	7.30	5.47	1.20	0.47	5.64
4.95	5.27	7.21	5.41	1.18	0.47	5.58
5.00	5.27	6.59	4.94	1.08	0.47	5.10

```
*********************************************************************

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*********************************************************************

                 Water Quality Analysis Simulation Program (WASP6)

*********************************************************************

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                           Version 6.10
               Compiled on:  Date: May 2002

                   Maximum Parameters for this Model

        Systems:    9          Segments: 3000     Break Points: 4000
     Parameters:   21          Constants:  104    Boundary Cond:  200
    Waste Loads:  200     Print Interval:   50    Time Function:   23

*********************************************************************


  Number of Segments --->    54        Number of Systems --->     9

        System Bypass Options for System  1 TO  9 are 0 1 1 1 0 0 1 1 1
*********************************************************************


                         Simulation Time Steps
                          Option 0 Selected

     DT         T          DT         T          DT         T
   ~~~~~~     ~~~~~~~    ~~~~~~     ~~~~~~~    ~~~~~~     ~~~~~~~

   0.00100    0.00000   0.00100   365.00000
                          Print Intervals

   PRINT      ELAPSED      PRINT      ELAPSED      PRINT      ELAPSED
 INTERVAL      TIME      INTERVAL     TIME      INTERVAL      TIME
~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~  ~~~~~~~~~~

    0.100       0.00       0.100      365.00



                        Exchange Coefficients
                        ~~~~~~~~~~~~~~~~~~~~~~


                   Number of Exchange Fields =   1


                   FIELD  1 has  1  Time Functions

                  SCALR = 0.100E+01  CONVR = 0.100E+01
```

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Time Function 1 has 57 Exchanges

X-Area	Length	From	To
0.900E-01	0.100E+03	0	1
0.900E-01	0.100E+03	1	2
0.900E-01	0.100E+03	2	3
0.261E+01	0.100E+03	0	3
0.261E+01	0.100E+03	3	4
0.261E+01	0.161E+03	4	5
0.261E+01	0.161E+03	5	6
0.261E+01	0.161E+03	6	7
0.261E+01	0.161E+03	7	8
0.261E+01	0.161E+03	8	9
0.396E+02	0.113E+03	9	10
0.396E+02	0.161E+03	10	11
0.396E+02	0.161E+03	11	12
0.396E+02	0.161E+03	12	13
0.396E+02	0.161E+03	13	14
0.446E+02	0.100E+03	0	14
0.446E+02	0.129E+03	14	15
0.446E+02	0.161E+03	15	16
0.446E+02	0.161E+03	16	17
0.446E+02	0.161E+03	17	18
0.446E+02	0.161E+03	18	19
0.446E+02	0.161E+03	19	20
0.446E+02	0.161E+03	20	21
0.446E+02	0.161E+03	21	22
0.446E+02	0.161E+03	22	23
0.446E+02	0.161E+03	23	24
0.446E+02	0.161E+03	24	25
0.446E+02	0.161E+03	25	26
0.446E+02	0.161E+03	26	27
0.446E+02	0.161E+03	27	28
0.446E+02	0.161E+03	28	29
0.446E+02	0.161E+03	29	30
0.446E+02	0.161E+03	30	31
0.446E+02	0.161E+03	31	32
0.446E+02	0.161E+03	32	33
0.446E+02	0.161E+03	33	34
0.446E+02	0.161E+03	34	35
0.446E+02	0.161E+03	35	36
0.446E+02	0.161E+03	36	37
0.446E+02	0.161E+03	37	38
0.446E+02	0.161E+03	38	39
0.446E+02	0.161E+03	39	40
0.446E+02	0.161E+03	40	41
0.446E+02	0.161E+03	41	42
0.446E+02	0.161E+03	42	43
0.446E+02	0.161E+03	43	44
0.446E+02	0.161E+03	44	45
0.446E+02	0.161E+03	45	46
0.446E+02	0.161E+03	46	47
0.446E+02	0.161E+03	47	48
0.446E+02	0.161E+03	48	49
0.446E+02	0.161E+03	49	50
0.446E+02	0.161E+03	50	51
0.446E+02	0.161E+03	51	52
0.446E+02	0.161E+03	52	53
0.446E+02	0.161E+03	53	54
0.446E+02	0.161E+03	54	0

Number of Breaks in Time Function = 2

Dispersion	Time	Dispersion	Time	Dispersion	Time

****

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0.100E+01 0.000E+00 0.100E+01 0.365E+03

R Bypass Options for Systems 1 to 9 are 0 1 1 1 0 0 1 1 1

1

VOLUMES
~~~~~~~

Bed Volume Option = 0 Bed Time Step = 0.000E+00

Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Seg #	BOTSG	Type	Volume	V mult	V exp	D mult	D exp
1	0	1	9.290	0.792	0.000	0.060	0.000
2	0	1	9.290	0.792	0.000	0.060	0.000
3	0	1	261.058	0.700	0.000	0.440	0.000
4	0	1	420.131	0.700	0.000	0.440	0.000
5	0	1	420.131	0.700	0.000	0.440	0.000
6	0	1	420.131	0.700	0.000	0.440	0.000
7	0	1	420.131	0.700	0.000	0.440	0.000
8	0	1	420.131	0.700	0.000	0.440	0.000
9	0	1	4457.430	0.046	0.000	1.510	0.000
10	0	1	6367.756	0.046	0.000	1.510	0.000
11	0	1	6367.756	0.046	0.000	1.510	0.000
12	0	1	6367.756	0.046	0.000	1.510	0.000
13	0	1	6367.756	0.046	0.000	1.510	0.000
14	0	1	5738.905	0.061	0.000	1.950	0.000
15	0	1	7173.631	0.061	0.000	1.950	0.000
16	0	1	7173.631	0.061	0.000	1.950	0.000
17	0	1	7173.631	0.061	0.000	1.950	0.000
18	0	1	7173.631	0.061	0.000	1.950	0.000
19	0	1	7173.631	0.061	0.000	1.950	0.000
20	0	1	7173.631	0.061	0.000	1.950	0.000
21	0	1	7173.631	0.061	0.000	1.950	0.000
22	0	1	7173.631	0.061	0.000	1.950	0.000
23	0	1	7173.631	0.061	0.000	1.950	0.000
24	0	1	7173.631	0.061	0.000	1.950	0.000
25	0	1	7173.631	0.061	0.000	1.950	0.000
26	0	1	7173.631	0.061	0.000	1.950	0.000
27	0	1	7173.631	0.061	0.000	1.950	0.000
28	0	1	7173.631	0.061	0.000	1.950	0.000
29	0	1	7173.631	0.061	0.000	1.950	0.000
30	0	1	7173.631	0.061	0.000	1.950	0.000
31	0	1	7173.631	0.061	0.000	1.950	0.000
32	0	1	7173.631	0.061	0.000	1.950	0.000
33	0	1	7173.631	0.061	0.000	1.950	0.000
34	0	1	7173.631	0.061	0.000	1.950	0.000
35	0	1	7173.631	0.061	0.000	1.950	0.000
36	0	1	7173.631	0.061	0.000	1.950	0.000
37	0	1	7173.631	0.061	0.000	1.950	0.000
38	0	1	7173.631	0.061	0.000	1.950	0.000
39	0	1	7173.631	0.061	0.000	1.950	0.000
40	0	1	7173.631	0.061	0.000	1.950	0.000
41	0	1	7173.631	0.061	0.000	1.950	0.000
42	0	1	7173.631	0.061	0.000	1.950	0.000
43	0	1	7173.631	0.061	0.000	1.950	0.000
44	0	1	7173.631	0.061	0.000	1.950	0.000
45	0	1	7173.631	0.061	0.000	1.950	0.000
46	0	1	7173.631	0.061	0.000	1.950	0.000
47	0	1	7173.631	0.061	0.000	1.950	0.000
48	0	1	7173.631	0.061	0.000	1.950	0.000
49	0	1	7173.631	0.061	0.000	1.950	0.000
50	0	1	7173.631	0.061	0.000	1.950	0.000
51	0	1	7173.631	0.061	0.000	1.950	0.000
52	0	1	7173.631	0.061	0.000	1.950	0.000
~~~~~~~

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   53       0       1        7173.631    0.061    0.000    1.950    0.000
   54       0       1        3586.816    0.061    0.000    1.950    0.000
1
```

FLOWS

Flow Option 1 Used
Number of Flow Fields = 6

Field 1 has 1 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Inflow Number 1

Continuity Array:

Flow	From	To	Flow	From	To	Flow	From	To
0.300E-01	0	1	0.300E-01	1	2	0.300E-01	2	3
0.640E+00	0	3	0.670E+00	3	4	0.670E+00	4	5
0.670E+00	5	6	0.670E+00	6	7	0.670E+00	7	8
0.670E+00	8	9	0.670E+00	9	10	0.670E+00	10	11
0.670E+00	11	12	0.670E+00	12	13	0.670E+00	13	14
0.330E+00	0	14	0.100E+01	14	15	0.100E+01	15	16
0.100E+01	16	17	0.100E+01	17	18	0.100E+01	18	19
0.100E+01	19	20	0.100E+01	20	21	0.100E+01	21	22
0.100E+01	22	23	0.100E+01	23	24	0.100E+01	24	25
0.100E+01	25	26	0.100E+01	26	27	0.100E+01	27	28
0.100E+01	28	29	0.100E+01	29	30	0.100E+01	30	31
0.100E+01	31	32	0.100E+01	32	33	0.100E+01	33	34
0.100E+01	34	35	0.100E+01	35	36	0.100E+01	36	37
0.100E+01	37	38	0.100E+01	38	39	0.100E+01	39	40
0.100E+01	40	41	0.100E+01	41	42	0.100E+01	42	43
0.100E+01	43	44	0.100E+01	44	45	0.100E+01	45	46
0.100E+01	46	47	0.100E+01	47	48	0.100E+01	48	49
0.100E+01	49	50	0.100E+01	50	51	0.100E+01	51	52
0.100E+01	52	53	0.100E+01	53	54	0.100E+01	54	0

Number of Breaks in Time Function = 2

Flow	Time	Flow	Time	Flow	Time
0.273E+01	0.000E+00	0.273E+01	0.365E+03		

Field 2 has 0 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Field 3 has 0 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Field 4 has 0 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Field 5 has 0 Inflows

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SCALQ = 0.100E+01 CONVQ = 0.100E+01

Field 6 has 0 Inflows
SCALQ = 0.100E+01 CONVQ = 0.100E+01

Q Bypass Options for Systems 1 to 9 are 0 1 1 1 0 0 1 1 1

1

Boundary Conditions

Boundary Concentrations for System 1
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.7000000E+00	0.00	0.7000000E+00	365.00
3	2	0.2400000E+01	0.00	0.2400000E+01	365.00
14	2	0.2000000E+00	0.00	0.2000000E+00	365.00
54	2	0.0000000E+00	4.98	0.0000000E+00	365.00

Boundary Concentrations for System 2
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	4.98	0.0000000E+00	365.00

Boundary Concentrations for System 3
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	4.98	0.0000000E+00	365.00

Boundary Concentrations for System 4
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	4.98	0.0000000E+00	365.00

Boundary Concentrations for System 5
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.3350000E+01	0.00	0.3350000E+01	365.00

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3	2	0.1548000E+02	0.00	0.1548000E+02	365.00
14	2	0.1290000E+01	0.00	0.1290000E+01	365.00
54	2	0.0000000E+00	4.98	0.0000000E+00	365.00

Boundary Concentrations for System 6
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.7365000E+01	0.00	0.7365000E+01	365.00
3	2	0.6800000E+01	0.00	0.6800000E+01	365.00
14	2	0.7365000E+01	0.00	0.7365000E+01	365.00
54	2	0.5270000E+01	4.98	0.5270000E+01	365.00

Boundary Concentrations for System 7
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	4.98	0.0000000E+00	365.00

Boundary Concentrations for System 8
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	4.98	0.0000000E+00	365.00

Boundary Concentrations for System 9
BC Option 0 Used No.Of BC'S Read 4
Scale Factor = 0.1000E+01 Conversion Factor = 0.1000E+01

Segment	No.Brk.	BC(T)	T	BC(T)	T
1	2	0.0000000E+00	0.00	0.0000000E+00	365.00
3	2	0.0000000E+00	0.00	0.0000000E+00	365.00
14	2	0.0000000E+00	0.00	0.0000000E+00	365.00
54	2	0.0000000E+00	4.98	0.0000000E+00	365.00

Waste Loads
~~~~~~~~~~~

Forcing Functions For System 1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Wk Option 3 Used No.of WK'S Read 0

No Forcing Function for System 1
Forcing Functions For System 2
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Wk Option 3 Used No.of WK'S Read 0

No Forcing Function for System 2
Forcing Functions For System 3
~~~~~~~~~~~~~~~~~~~~~~~~~~~~

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                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  3
                           Forcing Functions For System  4
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  4
                           Forcing Functions For System  5
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  5
                           Forcing Functions For System  6
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  6
                           Forcing Functions For System  7
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  7
                           Forcing Functions For System  8
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  8
                           Forcing Functions For System  9
                           ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                     Wk Option  3 Used     No.of WK'S Read    0


                        No Forcing Function for System  9
                                  Segment Parameters
                                  ~~~~~~~~~~~~~~~~~~

 PARM      SCALE        PARM      SCALE        PARM      SCALE        PARM      SCALE
 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
         1
0.1000E+01
    1
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    2
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    3
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    4
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    5
  ISC:   3  Scale:     1.0000  Value: 0.3000E+02
    6
```

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 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  7
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  8
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  9
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  10
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  11
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  12
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  13
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  14
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  15
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  16
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  17
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  18
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  19
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  20
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  21
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  22
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  23
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  24
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  25
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  26
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  27
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  28
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  29
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  30
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  31
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  32
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  33
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  34
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  35
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  36
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  37
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  38
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  39
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  40
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  41
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  42
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
```

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  43
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  44
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  45
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  46
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  47
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  48
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  49
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  50
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  51
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  52
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  53
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
  54
 ISC:   3  Scale:     1.0000  Value: 0.3000E+02
1
                     Environmental and Chemical Constants
                     ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
        7
    Const        11  0.1000E+00     Const        12  0.1040E+01
    Const        13  0.1000E+01     Const        71  0.1300E+00
    Const        72  0.1040E+01     Const        75  0.1000E+01
    Const        81  0.2670E+01
1


                     No Time Functions have been Entered                    for this Simulation
1


                         Initial Conditions
                         ~~~~~~~~~~~~~~~~~~


        Initial Conditions for System  1
        ================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000

 Segment     Concentration     Fraction Dissolved
 ~~~~~~~     ~~~~~~~~~~~~~     ~~~~~~~~~~~~~~~~~~
   1:         0.2000E+01              1.00
   2:         0.2000E+01              1.00
   3:         0.2000E+01              1.00
   4:         0.2000E+01              1.00
   5:         0.2000E+01              1.00
   6:         0.2000E+01              1.00
   7:         0.2000E+01              1.00
   8:         0.2000E+01              1.00
   9:         0.2000E+01              1.00
  10:         0.2000E+01              1.00
  11:         0.2000E+01              1.00
  12:         0.2000E+01              1.00
  13:         0.2000E+01              1.00
  14:         0.2000E+01              1.00
  15:         0.2000E+01              1.00
  16:         0.2000E+01              1.00
  17:         0.2000E+01              1.00
```

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 18:          0.2000E+01              1.00
 19:          0.2000E+01              1.00
 20:          0.2000E+01              1.00
 21:          0.2000E+01              1.00
 22:          0.2000E+01              1.00
 23:          0.2000E+01              1.00
 24:          0.2000E+01              1.00
 25:          0.2000E+01              1.00
 26:          0.2000E+01              1.00
 27:          0.2000E+01              1.00
 28:          0.2000E+01              1.00
 29:          0.2000E+01              1.00
 30:          0.2000E+01              1.00
 31:          0.2000E+01              1.00
 32:          0.2000E+01              1.00
 33:          0.2000E+01              1.00
 34:          0.2000E+01              1.00
 35:          0.2000E+01              1.00
 36:          0.2000E+01              1.00
 37:          0.2000E+01              1.00
 38:          0.2000E+01              1.00
 39:          0.2000E+01              1.00
 40:          0.2000E+01              1.00
 41:          0.2000E+01              1.00
 42:          0.2000E+01              1.00
 43:          0.2000E+01              1.00
 44:          0.2000E+01              1.00
 45:          0.2000E+01              1.00
 46:          0.2000E+01              1.00
 47:          0.2000E+01              1.00
 48:          0.2000E+01              1.00
 49:          0.2000E+01              1.00
 50:          0.2000E+01              1.00
 51:          0.2000E+01              1.00
 52:          0.2000E+01              1.00
 53:          0.2000E+01              1.00
 54:          0.2000E+01              1.00


       Initial Conditions for System  2
       ==================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000

Segment      Concentration      Fraction Dissolved
~~~~~~~      ~~~~~~~~~~~~~      ~~~~~~~~~~~~~~~~~~
  1:          0.1000E-23              1.00
  2:          0.1000E-23              1.00
  3:          0.1000E-23              1.00
  4:          0.1000E-23              1.00
  5:          0.1000E-23              1.00
  6:          0.1000E-23              1.00
  7:          0.1000E-23              1.00
  8:          0.1000E-23              1.00
  9:          0.1000E-23              1.00
 10:          0.1000E-23              1.00
 11:          0.1000E-23              1.00
 12:          0.1000E-23              1.00
 13:          0.1000E-23              1.00
 14:          0.1000E-23              1.00
 15:          0.1000E-23              1.00
 16:          0.1000E-23              1.00
 17:          0.1000E-23              1.00
 18:          0.1000E-23              1.00
 19:          0.1000E-23              1.00
 20:          0.1000E-23              1.00
 21:          0.1000E-23              1.00
 22:          0.1000E-23              1.00
 23:          0.1000E-23              1.00
 24:          0.1000E-23              1.00
 25:          0.1000E-23              1.00
 26:          0.1000E-23              1.00
```

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 27:          0.1000E-23              1.00
 28:          0.1000E-23              1.00
 29:          0.1000E-23              1.00
 30:          0.1000E-23              1.00
 31:          0.1000E-23              1.00
 32:          0.1000E-23              1.00
 33:          0.1000E-23              1.00
 34:          0.1000E-23              1.00
 35:          0.1000E-23              1.00
 36:          0.1000E-23              1.00
 37:          0.1000E-23              1.00
 38:          0.1000E-23              1.00
 39:          0.1000E-23              1.00
 40:          0.1000E-23              1.00
 41:          0.1000E-23              1.00
 42:          0.1000E-23              1.00
 43:          0.1000E-23              1.00
 44:          0.1000E-23              1.00
 45:          0.1000E-23              1.00
 46:          0.1000E-23              1.00
 47:          0.1000E-23              1.00
 48:          0.1000E-23              1.00
 49:          0.1000E-23              1.00
 50:          0.1000E-23              1.00
 51:          0.1000E-23              1.00
 52:          0.1000E-23              1.00
 53:          0.1000E-23              1.00
 54:          0.1000E-23              1.00

       Initial Conditions for System  3
       ==================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000

 Segment      Concentration      Fraction Dissolved
 ~~~~~~~      ~~~~~~~~~~~~~~     ~~~~~~~~~~~~~~~~~~
   1:          0.1000E-23              1.00
   2:          0.1000E-23              1.00
   3:          0.1000E-23              1.00
   4:          0.1000E-23              1.00
   5:          0.1000E-23              1.00
   6:          0.1000E-23              1.00
   7:          0.1000E-23              1.00
   8:          0.1000E-23              1.00
   9:          0.1000E-23              1.00
  10:          0.1000E-23              1.00
  11:          0.1000E-23              1.00
  12:          0.1000E-23              1.00
  13:          0.1000E-23              1.00
  14:          0.1000E-23              1.00
  15:          0.1000E-23              1.00
  16:          0.1000E-23              1.00
  17:          0.1000E-23              1.00
  18:          0.1000E-23              1.00
  19:          0.1000E-23              1.00
  20:          0.1000E-23              1.00
  21:          0.1000E-23              1.00
  22:          0.1000E-23              1.00
  23:          0.1000E-23              1.00
  24:          0.1000E-23              1.00
  25:          0.1000E-23              1.00
  26:          0.1000E-23              1.00
  27:          0.1000E-23              1.00
  28:          0.1000E-23              1.00
  29:          0.1000E-23              1.00
  30:          0.1000E-23              1.00
  31:          0.1000E-23              1.00
  32:          0.1000E-23              1.00
  33:          0.1000E-23              1.00
  34:          0.1000E-23              1.00
  35:          0.1000E-23              1.00
```

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                    Voice: 404/562-9260 / Fax: 404/562-9224
 36:          0.1000E-23              1.00
 37:          0.1000E-23              1.00
 38:          0.1000E-23              1.00
 39:          0.1000E-23              1.00
 40:          0.1000E-23              1.00
 41:          0.1000E-23              1.00
 42:          0.1000E-23              1.00
 43:          0.1000E-23              1.00
 44:          0.1000E-23              1.00
 45:          0.1000E-23              1.00
 46:          0.1000E-23              1.00
 47:          0.1000E-23              1.00
 48:          0.1000E-23              1.00
 49:          0.1000E-23              1.00
 50:          0.1000E-23              1.00
 51:          0.1000E-23              1.00
 52:          0.1000E-23              1.00
 53:          0.1000E-23              1.00
 54:          0.1000E-23              1.00

        Initial Conditions for System  4
        ==================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000

 Segment     Concentration     Fraction Dissolved
 =======     =============     ==================
   1:         0.1000E-23              1.00
   2:         0.1000E-23              1.00
   3:         0.1000E-23              1.00
   4:         0.1000E-23              1.00
   5:         0.1000E-23              1.00
   6:         0.1000E-23              1.00
   7:         0.1000E-23              1.00
   8:         0.1000E-23              1.00
   9:         0.1000E-23              1.00
  10:         0.1000E-23              1.00
  11:         0.1000E-23              1.00
  12:         0.1000E-23              1.00
  13:         0.1000E-23              1.00
  14:         0.1000E-23              1.00
  15:         0.1000E-23              1.00
  16:         0.1000E-23              1.00
  17:         0.1000E-23              1.00
  18:         0.1000E-23              1.00
  19:         0.1000E-23              1.00
  20:         0.1000E-23              1.00
  21:         0.1000E-23              1.00
  22:         0.1000E-23              1.00
  23:         0.1000E-23              1.00
  24:         0.1000E-23              1.00
  25:         0.1000E-23              1.00
  26:         0.1000E-23              1.00
  27:         0.1000E-23              1.00
  28:         0.1000E-23              1.00
  29:         0.1000E-23              1.00
  30:         0.1000E-23              1.00
  31:         0.1000E-23              1.00
  32:         0.1000E-23              1.00
  33:         0.1000E-23              1.00
  34:         0.1000E-23              1.00
  35:         0.1000E-23              1.00
  36:         0.1000E-23              1.00
  37:         0.1000E-23              1.00
  38:         0.1000E-23              1.00
  39:         0.1000E-23              1.00
  40:         0.1000E-23              1.00
  41:         0.1000E-23              1.00
  42:         0.1000E-23              1.00
  43:         0.1000E-23              1.00
  44:         0.1000E-23              1.00
```

```
*********************************************************************

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 45:          0.1000E-23              1.00
 46:          0.1000E-23              1.00
 47:          0.1000E-23              1.00
 48:          0.1000E-23              1.00
 49:          0.1000E-23              1.00
 50:          0.1000E-23              1.00
 51:          0.1000E-23              1.00
 52:          0.1000E-23              1.00
 53:          0.1000E-23              1.00
 54:          0.1000E-23              1.00

        Initial Conditions for System  5
        ================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000

 Segment      Concentration      Fraction Dissolved
 =======      =============      ==================
   1:          0.4000E+01              1.00
   2:          0.4000E+01              1.00
   3:          0.4000E+01              1.00
   4:          0.4000E+01              1.00
   5:          0.4000E+01              1.00
   6:          0.4000E+01              1.00
   7:          0.4000E+01              1.00
   8:          0.4000E+01              1.00
   9:          0.4000E+01              1.00
  10:          0.4000E+01              1.00
  11:          0.4000E+01              1.00
  12:          0.4000E+01              1.00
  13:          0.4000E+01              1.00
  14:          0.4000E+01              1.00
  15:          0.4000E+01              1.00
  16:          0.4000E+01              1.00
  17:          0.4000E+01              1.00
  18:          0.4000E+01              1.00
  19:          0.4000E+01              1.00
  20:          0.4000E+01              1.00
  21:          0.4000E+01              1.00
  22:          0.4000E+01              1.00
  23:          0.4000E+01              1.00
  24:          0.4000E+01              1.00
  25:          0.4000E+01              1.00
  26:          0.4000E+01              1.00
  27:          0.4000E+01              1.00
  28:          0.4000E+01              1.00
  29:          0.4000E+01              1.00
  30:          0.4000E+01              1.00
  31:          0.4000E+01              1.00
  32:          0.4000E+01              1.00
  33:          0.4000E+01              1.00
  34:          0.4000E+01              1.00
  35:          0.4000E+01              1.00
  36:          0.4000E+01              1.00
  37:          0.4000E+01              1.00
  38:          0.4000E+01              1.00
  39:          0.4000E+01              1.00
  40:          0.4000E+01              1.00
  41:          0.4000E+01              1.00
  42:          0.4000E+01              1.00
  43:          0.4000E+01              1.00
  44:          0.4000E+01              1.00
  45:          0.4000E+01              1.00
  46:          0.4000E+01              1.00
  47:          0.4000E+01              1.00
  48:          0.4000E+01              1.00
  49:          0.4000E+01              1.00
  50:          0.4000E+01              1.00
  51:          0.4000E+01              1.00
  52:          0.4000E+01              1.00
  53:          0.4000E+01              1.00
```

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*********************************************************************

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 54:          0.4000E+01              1.00

        Initial Conditions for System  6
        ==================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000

 Segment      Concentration      Fraction Dissolved
 ~~~~~~~      ~~~~~~~~~~~~~~     ~~~~~~~~~~~~~~~~~~
   1:          0.5500E+01              1.00
   2:          0.5500E+01              1.00
   3:          0.5500E+01              1.00
   4:          0.5500E+01              1.00
   5:          0.5500E+01              1.00
   6:          0.5500E+01              1.00
   7:          0.5500E+01              1.00
   8:          0.5500E+01              1.00
   9:          0.5500E+01              1.00
  10:          0.5500E+01              1.00
  11:          0.5500E+01              1.00
  12:          0.5500E+01              1.00
  13:          0.5500E+01              1.00
  14:          0.5500E+01              1.00
  15:          0.5500E+01              1.00
  16:          0.5500E+01              1.00
  17:          0.5500E+01              1.00
  18:          0.5500E+01              1.00
  19:          0.5500E+01              1.00
  20:          0.5500E+01              1.00
  21:          0.5500E+01              1.00
  22:          0.5500E+01              1.00
  23:          0.5500E+01              1.00
  24:          0.5500E+01              1.00
  25:          0.5500E+01              1.00
  26:          0.5500E+01              1.00
  27:          0.5500E+01              1.00
  28:          0.5500E+01              1.00
  29:          0.5500E+01              1.00
  30:          0.5500E+01              1.00
  31:          0.5500E+01              1.00
  32:          0.5500E+01              1.00
  33:          0.5500E+01              1.00
  34:          0.5500E+01              1.00
  35:          0.5500E+01              1.00
  36:          0.5500E+01              1.00
  37:          0.5500E+01              1.00
  38:          0.5500E+01              1.00
  39:          0.5500E+01              1.00
  40:          0.5500E+01              1.00
  41:          0.5500E+01              1.00
  42:          0.5500E+01              1.00
  43:          0.5500E+01              1.00
  44:          0.5500E+01              1.00
  45:          0.5500E+01              1.00
  46:          0.5500E+01              1.00
  47:          0.5500E+01              1.00
  48:          0.5500E+01              1.00
  49:          0.5500E+01              1.00
  50:          0.5500E+01              1.00
  51:          0.5500E+01              1.00
  52:          0.5500E+01              1.00
  53:          0.5500E+01              1.00
  54:          0.5500E+01              1.00

        Initial Conditions for System  7
        ==================================
  Particulate Form Transported by Solids Field    3
  Density of System =     1.0000
```

****

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Segment	Concentration	Fraction Dissolved
1:	0.1000E-23	1.00
2:	0.1000E-23	1.00
3:	0.1000E-23	1.00
4:	0.1000E-23	1.00
5:	0.1000E-23	1.00
6:	0.1000E-23	1.00
7:	0.1000E-23	1.00
8:	0.1000E-23	1.00
9:	0.1000E-23	1.00
10:	0.1000E-23	1.00
11:	0.1000E-23	1.00
12:	0.1000E-23	1.00
13:	0.1000E-23	1.00
14:	0.1000E-23	1.00
15:	0.1000E-23	1.00
16:	0.1000E-23	1.00
17:	0.1000E-23	1.00
18:	0.1000E-23	1.00
19:	0.1000E-23	1.00
20:	0.1000E-23	1.00
21:	0.1000E-23	1.00
22:	0.1000E-23	1.00
23:	0.1000E-23	1.00
24:	0.1000E-23	1.00
25:	0.1000E-23	1.00
26:	0.1000E-23	1.00
27:	0.1000E-23	1.00
28:	0.1000E-23	1.00
29:	0.1000E-23	1.00
30:	0.1000E-23	1.00
31:	0.1000E-23	1.00
32:	0.1000E-23	1.00
33:	0.1000E-23	1.00
34:	0.1000E-23	1.00
35:	0.1000E-23	1.00
36:	0.1000E-23	1.00
37:	0.1000E-23	1.00
38:	0.1000E-23	1.00
39:	0.1000E-23	1.00
40:	0.1000E-23	1.00
41:	0.1000E-23	1.00
42:	0.1000E-23	1.00
43:	0.1000E-23	1.00
44:	0.1000E-23	1.00
45:	0.1000E-23	1.00
46:	0.1000E-23	1.00
47:	0.1000E-23	1.00
48:	0.1000E-23	1.00
49:	0.1000E-23	1.00
50:	0.1000E-23	1.00
51:	0.1000E-23	1.00
52:	0.1000E-23	1.00
53:	0.1000E-23	1.00
54:	0.1000E-23	1.00

Initial Conditions for System 8
==========

Particulate Form Transported by Solids Field 3
Density of System = 1.0000

Segment	Concentration	Fraction Dissolved
1:	0.1000E-23	1.00
2:	0.1000E-23	1.00
3:	0.1000E-23	1.00
4:	0.1000E-23	1.00
5:	0.1000E-23	1.00
6:	0.1000E-23	1.00
7:	0.1000E-23	1.00

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8:	0.1000E-23	1.00
9:	0.1000E-23	1.00
10:	0.1000E-23	1.00
11:	0.1000E-23	1.00
12:	0.1000E-23	1.00
13:	0.1000E-23	1.00
14:	0.1000E-23	1.00
15:	0.1000E-23	1.00
16:	0.1000E-23	1.00
17:	0.1000E-23	1.00
18:	0.1000E-23	1.00
19:	0.1000E-23	1.00
20:	0.1000E-23	1.00
21:	0.1000E-23	1.00
22:	0.1000E-23	1.00
23:	0.1000E-23	1.00
24:	0.1000E-23	1.00
25:	0.1000E-23	1.00
26:	0.1000E-23	1.00
27:	0.1000E-23	1.00
28:	0.1000E-23	1.00
29:	0.1000E-23	1.00
30:	0.1000E-23	1.00
31:	0.1000E-23	1.00
32:	0.1000E-23	1.00
33:	0.1000E-23	1.00
34:	0.1000E-23	1.00
35:	0.1000E-23	1.00
36:	0.1000E-23	1.00
37:	0.1000E-23	1.00
38:	0.1000E-23	1.00
39:	0.1000E-23	1.00
40:	0.1000E-23	1.00
41:	0.1000E-23	1.00
42:	0.1000E-23	1.00
43:	0.1000E-23	1.00
44:	0.1000E-23	1.00
45:	0.1000E-23	1.00
46:	0.1000E-23	1.00
47:	0.1000E-23	1.00
48:	0.1000E-23	1.00
49:	0.1000E-23	1.00
50:	0.1000E-23	1.00
51:	0.1000E-23	1.00
52:	0.1000E-23	1.00
53:	0.1000E-23	1.00
54:	0.1000E-23	1.00

Initial Conditions for System 9
==========

Particulate Form Transported by Solids Field 3
Density of System = 1.0000

Segment	Concentration	Fraction Dissolved
1:	0.1000E-23	1.00
2:	0.1000E-23	1.00
3:	0.1000E-23	1.00
4:	0.1000E-23	1.00
5:	0.1000E-23	1.00
6:	0.1000E-23	1.00
7:	0.1000E-23	1.00
8:	0.1000E-23	1.00
9:	0.1000E-23	1.00
10:	0.1000E-23	1.00
11:	0.1000E-23	1.00
12:	0.1000E-23	1.00
13:	0.1000E-23	1.00
14:	0.1000E-23	1.00
15:	0.1000E-23	1.00
16:	0.1000E-23	1.00

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17:	0.1000E-23	1.00
18:	0.1000E-23	1.00
19:	0.1000E-23	1.00
20:	0.1000E-23	1.00
21:	0.1000E-23	1.00
22:	0.1000E-23	1.00
23:	0.1000E-23	1.00
24:	0.1000E-23	1.00
25:	0.1000E-23	1.00
26:	0.1000E-23	1.00
27:	0.1000E-23	1.00
28:	0.1000E-23	1.00
29:	0.1000E-23	1.00
30:	0.1000E-23	1.00
31:	0.1000E-23	1.00
32:	0.1000E-23	1.00
33:	0.1000E-23	1.00
34:	0.1000E-23	1.00
35:	0.1000E-23	1.00
36:	0.1000E-23	1.00
37:	0.1000E-23	1.00
38:	0.1000E-23	1.00
39:	0.1000E-23	1.00
40:	0.1000E-23	1.00
41:	0.1000E-23	1.00
42:	0.1000E-23	1.00
43:	0.1000E-23	1.00
44:	0.1000E-23	1.00
45:	0.1000E-23	1.00
46:	0.1000E-23	1.00
47:	0.1000E-23	1.00
48:	0.1000E-23	1.00
49:	0.1000E-23	1.00
50:	0.1000E-23	1.00
51:	0.1000E-23	1.00
52:	0.1000E-23	1.00
53:	0.1000E-23	1.00
54:	0.1000E-23	1.00

Stability Criteria for Numerical Integration

System	Maximum Concentration
1	100.00
2	100.00
3	100.00
4	100.00
5	100.00
6	100.00
7	100.00
8	100.00
9	100.00