Storm Water Flow Study Report

Prepared for:

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1.0 Introduction

The following sections provide a description of the methodology to be used to characterize and document the storm water runoff generated by the drainage basins for unnamed tributaries to Flat Creek upstream of the El Dorado Chemical Company facility (EDCC). A vicinity map outlining the upstream drainage basins and showing the location of the National Pollutant Discharge Elimination System (NPDES) permitted outfalls on the EDCC property is included as Figure 1.

Water level and flow data will be collected during storm events to develop a rating curve to represent the background stream flow. GBM^c & Associates, Bryant, Arkansas (GBM^c) will provide the functional team that will conduct the fieldwork, sampling, and data analysis for the Flat Creek tributary drainage basin characterization.

The final project report, including all calculations, data evaluation and discussion of findings will be delivered to EDCC for review, then will be submitted to the Arkansas Department of Environmental Quality (ADEQ) Water Division.

The proposed study is scheduled to occur over a twelve-month period during 2004-2005. The minimum number of runoff events necessary to provide an adequate data set is twelve. If twelve runoff events do not occur during the twelve-month duration of the proposed study, then the study may be extended to capture the necessary events. However, if more than twelve events occur over the duration of the proposed study, flow measurements will be collected from as many runoff events as practicable.

1.0 Introduction

The following sections provide a description of the methodology used to characterize and document the storm water runoff generated by the drainage basin for the unnamed tributaries to Flat Creek upstream of El Dorado Chemical Company (EDCC) and the results of the characterization. A vicinity map outlining the upstream drainage basins and showing the location of the National Pollutant Discharge Elimination System (NPDES) permitted outfalls on the EDCC property is included as Figure 1.

The July 15, 2004 Storm Water Flow Study Plan (the Plan) identified the characterization objectives and tasks to complete the study. This characterization report deviates from the Plan, due to the permanent abandonment of EDCC Outfalls 004 and 005 which discharged to the south unnamed tributary. Because there will be no future discharges from these two locations, the data collected for the south tributary and associated outfalls was not analyzed and the findings presented in this report are only for the north unnamed tributary and Outfalls 006 and 007.

Water level and flow data were collected during storm events to develop a rating curve to represent the north tributary background stream flow. Recorded water levels used in this study are included as Appendix A.

2.0 Project Organization

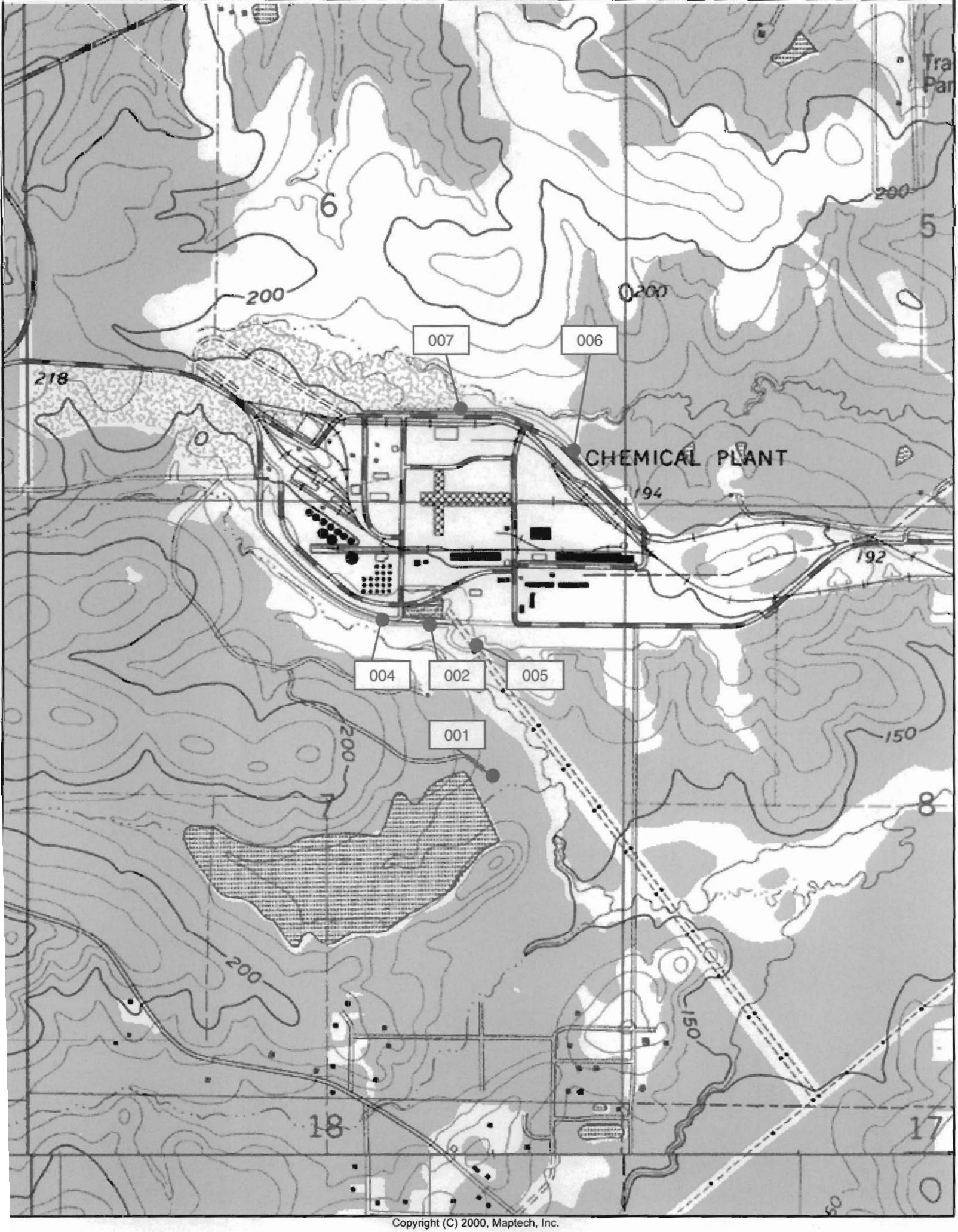
GBM^c & Associates, Bryant, Arkansas (GBM^c) provided the functional team that conducted the fieldwork and data analysis for the north tributary drainage basin characterization and the EDCC outfalls.

The study was performed over approximately a fifteen-month period, beginning March 2, 2005 and concluding June 17, 2006. Storm water discharges and instream flow measurements were collected during this timeframe to perform the analyses outlined in the Storm Water Flow Study Plan submitted to the ADEQ July 15, 2004.

4.0 Addendum

Site reconnaissance has determined that the background flow area for Outfalls 006 and 007 is not confined to a defined channel upstream of the facility discharges. Thus, the previously proposed background flow monitoring location is not suitable to obtain the desired information.

An alternate flow monitoring location for Outfalls 006 and 007 has been identified and is shown on the revised Figure 2. The methodology proposed for measurement of background flows at the alternate location will be to determine the total flow of the two small channels and subtract the measured flows from Outfall 006 and 007 from the totals measured at the downstream points. Evaluation of the data collected will be as proposed in the July 15, 2004 Storm Water Study Work Plan.

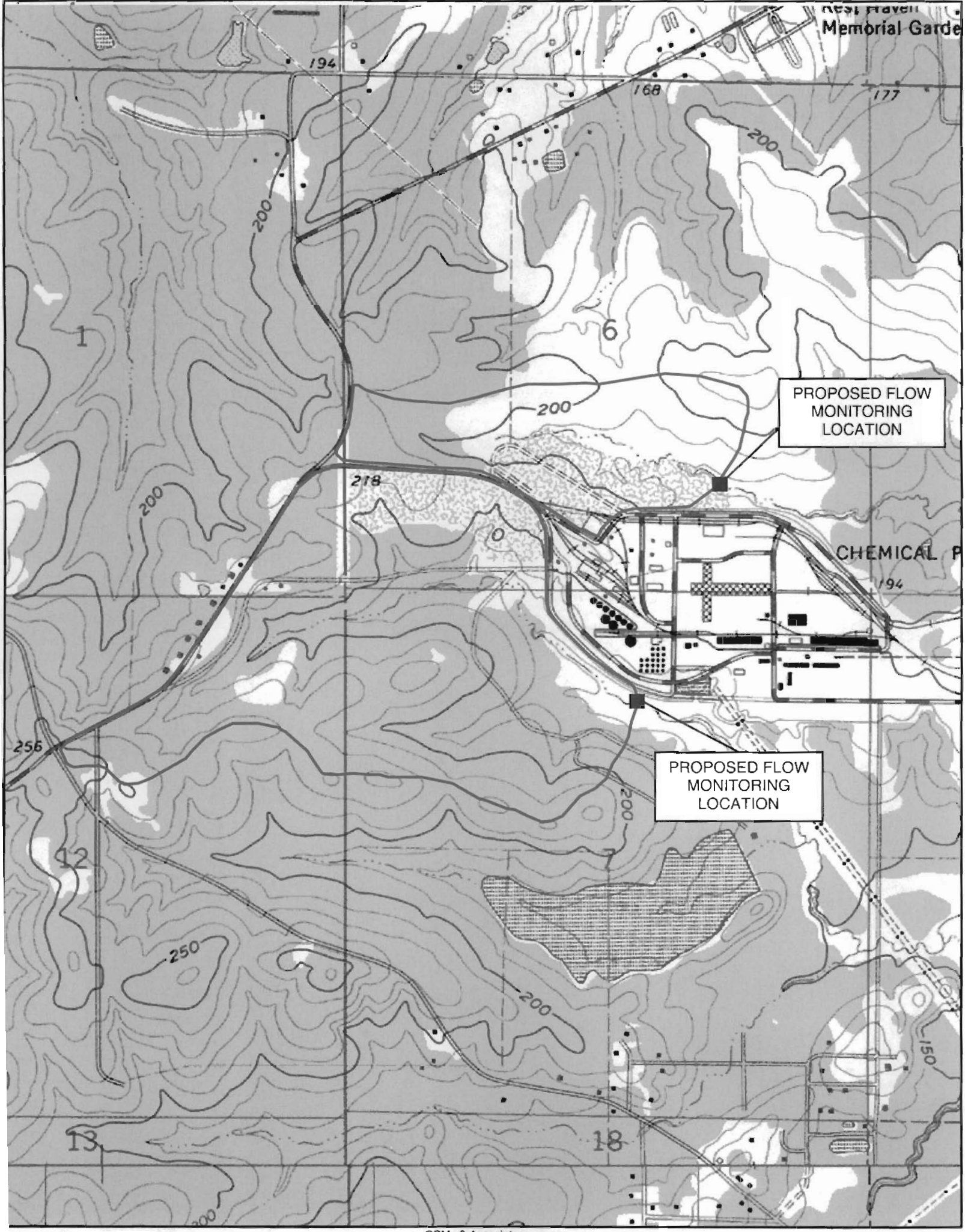


2.0 Hydrology Methodology

A reconnaissance survey of the site will be conducted and potential gauging stations identified in the tributary to Flat Creek north of the EDCC facility (Outfalls 006 and 007) and in the tributary south of the facility (Outfalls 002, 004, and 005) on EDCC property (Figure 2).

Instruments will be installed at these locations to automatically record stream level at specific time intervals. The instruments will be configured to collect and log level data on a relatively short time interval in order to maximize the number of level measurements obtained during a runoff event. Periodic site visits will be made to perform maintenance, check operation, and retrieve the data from the instruments.

In-stream flow measurements will be manually collected at each gauging station by a field crew during rainfall events as part of an effort to develop a relationship between stream level and rate of flow. In-stream velocity will be measured using a Marsh-M^{c}Birney model 201 water current meter. Measurements will be taken following protocols outlined in the GBM^{c} & Associates Quality Assurance Plan (GBM^{c} QAP, 2001). Flow calculations will be done using the velocity-area method. The cross-sectional area multiplied by the velocity yields the instantaneous volumetric flow for stream. This instantaneous flow rate in conjunction with the level recorded by the instruments at the time that the flow was measured will be used to develop the relationship between level and flow rate. A minimum of twelve coincident level and flow readings will be used from each gauging station to develop an independent relationship for each receiving stream upgradient of the EDCC discharges. Multiple flow measurements may be collected during a single rainfall event.



GBMc & Associates

The stream level versus flow rate relationship will allow GBM[c] to convert the level data collected by the instruments into flow rates. The flow rates will be used to develop flow versus time hydrographs for each tributary of Flat Creek to graphically represent the rate and timing of the surface runoff from the upstream watersheds generated by the rainfall events that occurred.

The discharge from NPDES Storm Water Outfalls 004, 005, 006, and 007 will be recorded continuously during storm events and used to generate flow versus time hydrographs for each NPDES outfall over the duration of the study. An existing rainfall gauge will measure and record the time and amount of precipitation to correlate with flow measurements in the NPDES storm water outfalls and receiving streams.

3.0 Results/Data Analysis

The flow versus time hydrographs for each Flat Creek tributary will be plotted together with the hydrographs for the NPDES storm water outfalls that discharge into each respective stream for each rainfall event that occurs over the duration of the study. These plots will indicate the flow rate of surface runoff contributed by the upstream watershed and the NPDES outfall at any given time during a specific rainfall event as well as the total volume contributed by either source over the entire event. This information will be used to evaluate the percent effluent composition of various stream flow events.

4.0 Addendum

Site reconnaissance has determined that the background flow area for Outfalls 006 and 007 is not confined to a defined channel upstream of the facility discharges. Thus, the previously proposed background flow monitoring location is not suitable to obtain the desired information.

An alternate flow monitoring location for Outfalls 006 and 007 has been identified and is shown on the revised Figure 2. The methodology proposed for measurement of background flows at the alternate location will be to determine the total flow of the two small channels and subtract the measured flows from Outfall 006 and 007 from the totals measured at the downstream points. Evaluation of the data collected will be as proposed in the July 15, 2004 Storm Water Study Work Plan.

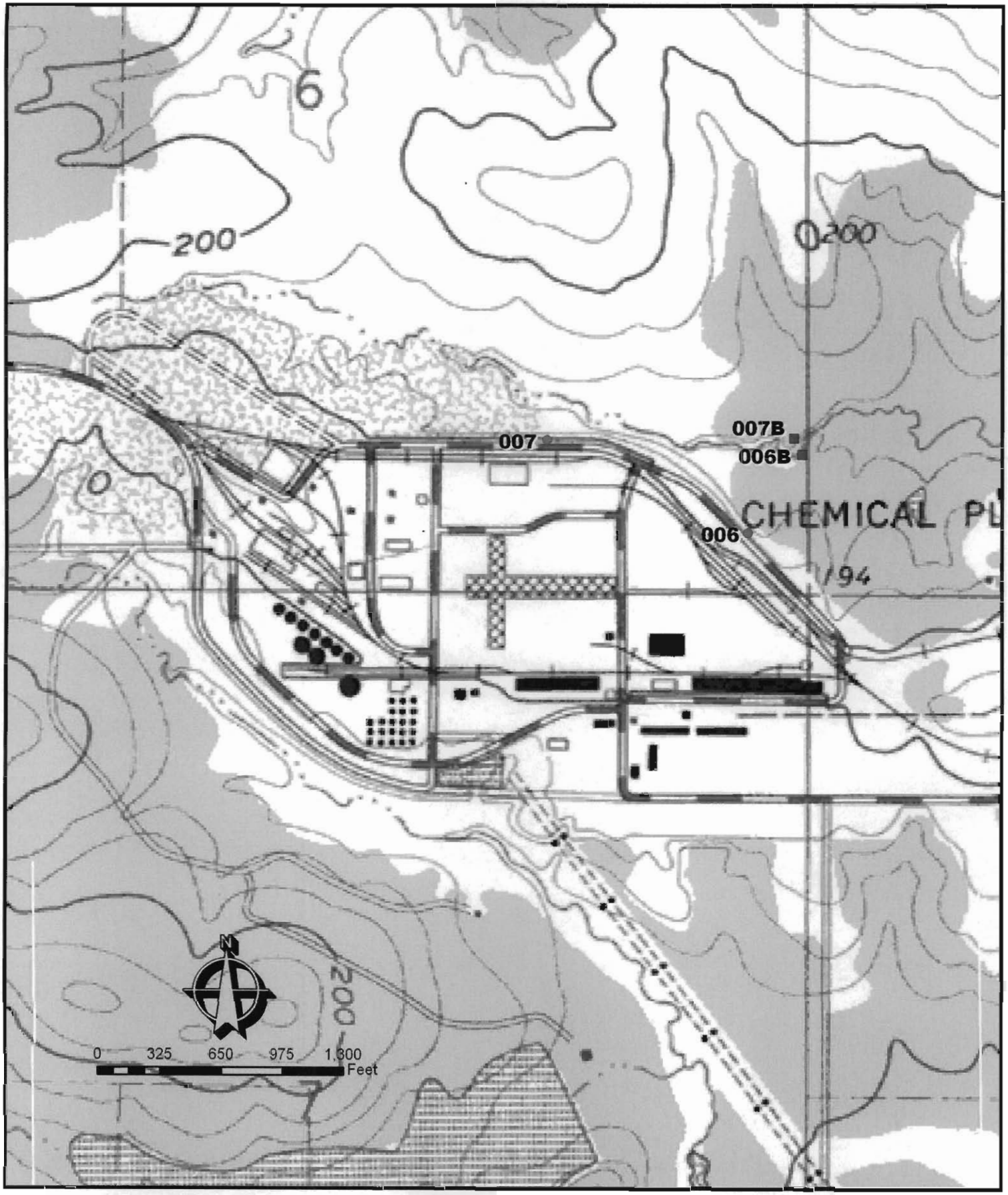


Figure 2. Map showing guaging staions 006B & 007B.

August 29, 2006

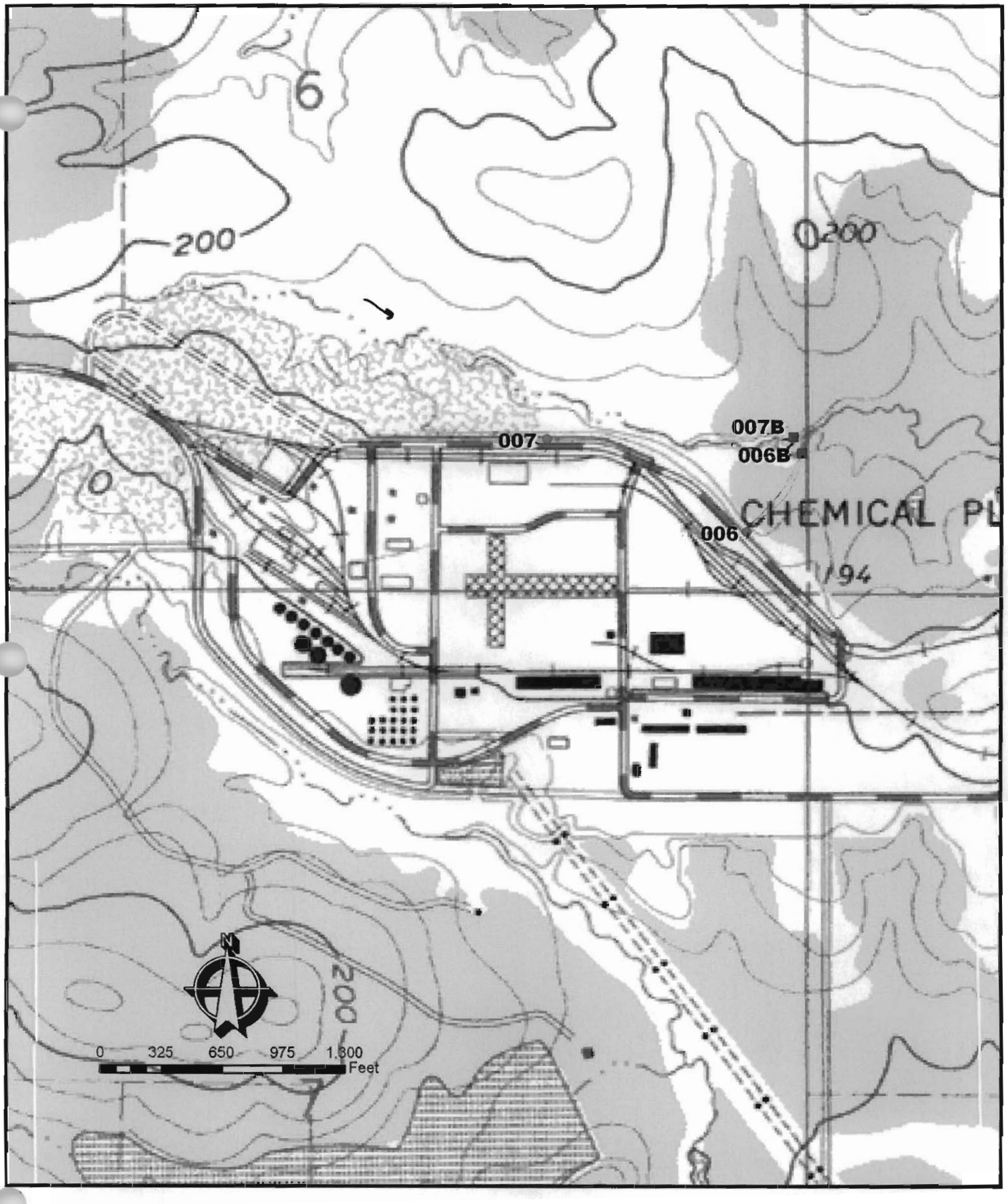


Figure 1. Map showing gauging stations.

3.0 Stream Level Monitoring

Two gauging stations were established in the north tributary on EDCC property (Figure 1) at a point where the flow in the tributary splits into two channels. One gauge was installed on each channel, tributary 006B and tributary 007B. Each gauging station was equipped with a Global Water WL-15 water level logger which was configured to record stream level at five-minute intervals. The loggers were installed at each of the gauging stations on March 2, 2005 and were removed from the EDCC facility June 17, 2006. Site visits were performed approximately every four to six weeks throughout the course of the study to retrieve the stored data from the loggers, perform necessary maintenance, minimize potential data loss due to equipment malfunction, and to ensure the loggers were operating properly. During a scheduled site visit, it was determined that the Global Water WL-15 logger installed at the background flow site designated as 006B had malfunctioned. The WL-15 logger was replaced with a HOBO® U20 level logger on February 24, 2006. The two gauging stations for the north tributary (006B and 007B) were located west of two separate road culverts which create a split stream channel but later combine a few yards downstream to convey all of the north tributary and storm water flows off of the EDCC site. Both loggers were installed in protective conduits placed on the bottom center of the main stem of the drainage channel. Precipitation data was provided by a rain gauge installed and maintained at EDCC. The rainfall data is included as Appendix B.

Instream flow measurements were manually collected at each gauging station by a field crew over a range of flow conditions (12 measurement events) to develop a relationship between stream level and rate of flow. Instream velocity was measured using a Marsh-M^{c}Birney model 201 water current meter following protocols outlined in the GBM^{c} & Associates Quality Assurance Plan (GBM^{c} QAP, 2001). Flow calculations were performed using the velocity-area method. The cross-sectional area multiplied by the velocity yields the instantaneous volumetric flow for the stream. The field data from the flow measurements and calculations are included as Appendix C. The instantaneous flow rate was used in conjunction with the level recorded by the loggers at the time of the flow measurement to develop a relationship between water level and flow rate. Table 1 shows the date, instantaneous flow rate, and water level for each flow measurement collected at the north tributary gauges.

Table 1. North Tributary Flow Measurement Summary.

	006B				007B		
Date	Time	Flow (CFS)	Logger depth (ft)	Date	Time	Flow (CFS)	Logger depth (ft)
3/2/2005	3:40 PM	0.67	0.78	3/2/2005	4:00 PM	0.02	0.86
3/29/2005	1:00 PM	0.93	0.86	3/29/2005	1:15 PM	0.05	0.86
1/23/2006	5:35 PM	0.35	0.73	1/23/2006	5:45 PM	0.4	1.3
2/24/2006	1:05 PM	0.11	0.62	2/24/2006	12:55 PM	0	0.66
3/20/2006	12:26 PM	4.4	1.465	3/20/2006	12:15 PM	10.32	2
4/25/2006	1:20 PM	0.88	0.97	4/25/2006	1:25 PM	0	0.69
4/29/2006	10:40 AM	1.72	1.162	4/29/2006	10:50 AM	0	0.83
4/29/2006	12:20 PM	2.69	1.326	4/29/2006	12:30 PM	0	0.85
5/4/2006	6:10 PM	3.59	1.359	5/4/2006	6:25 PM	0	1.3
5/4/2006	7:40 PM	2.74	1.32	5/4/2006	7:50 PM	4.21	1.7
6/17/2006	5:50 PM	1.395	1.151	6/17/2006	6:00 PM	0	0.82
6/17/2006	6:50 PM	0.63	1.006	6/17/2006	6:55 PM	0	0.72

To convert the water level measurements collected from the level loggers into a flow estimate, a rating curve was developed for each branch of north tributary based on the data in Table 1. The level versus flow data was plotted to determine the best fit curve through the data for each stream using various regression techniques. Charts showing the data and the best fit curves are included as Appendix D. It was determined that a trinomial function ($y=a_3x^3+a_2x^2+a_xx+a_0$) yielded the best representation of the data set for the 006B tributary. The equation used to calculate flow rate for the 006B tributary:

$$y = 11.286x^3 - 28.13x^2 + 25.05x - 7.2465$$

where: y = flow rate, CFS

x = water level, ft.

To represent the level to flow relationship for the 007B tributary, several regression (curve fitting) methods were assessed. A power function was found to provide the best curve fit. Therefore, the equation used to calculate flow in the 007B tributary is:

$$y = 0.0856x^{6.9528}$$

where y = flow rate, CFS

x = water level, ft.

4.0 Outfall 006/007 Monitoring

Storm water Outfalls 006 and 007 at EDCC are equipped with prefabricated flumes for measurement of instantaneous flow rate. A 3 ft "H" flume is installed at Outfall 006, and a 4 ft "HL" flume is installed at Outfall 007. One water level recording gauge was installed on each flume. Each gauging station was equipped with a Global Water WL-15 water level logger which was configured to record water level at five-minute intervals. The loggers were installed at each of the gauging stations on March 2, 2005 and were removed from the EDCC facility June 17, 2006. Site visits were performed approximately every four to six weeks throughout the course of the study to retrieve the stored data from the loggers, perform necessary maintenance, minimize potential data loss due to equipment malfunction, and to ensure the loggers were operating properly.

Water level data recorded by the instruments was used to determine instantaneous flow rate using the flow vs. depth relationships developed by the U. S. Department of Agriculture as published in their Handbook No. 224. Flume flow tables are provided in Appendix E.

5.0 Findings

5.1 Background Flow vs. Outfall Flow

Flow rates were measured and logged at storm water outfalls 006 and 007 at the EDCC facility throughout the study. The storm outfalls are situated in the headwaters of the north tributary; as discussed in the Plan (Section 4.0 addendum, 9/17/04), the background flow would be determined by simultaneously measuring total discharge of the north tributary and subtracting measured discharges from the facility. The purpose of the study was to establish the percentage volumetric contribution of plant storm water discharges to the total watershed discharge exiting EDCC property. Therefore, storm water discharge flow was totalized on an event basis and compared to the total background storm event flow in the tributary, as estimated from the rating curves, to determine a total storm event flow ratio for each event where a discharge occurred and reached the gauging stations at the property boundary.

A total of seventy-one storm discharge events were measured during the study. Flow ratios were calculated by dividing the receiving stream flow (background flow) by the discharge

flow for storm water outfalls 006 and 007. A summary of the data used in the development of the flow ratios is provided in Appendix F. Table 2 summarizes the flow rate ratios calculated from the data. Ratios are calculated and presented seasonally (summer period and seasonal period). The summer period is depicted July through October and the seasonal period as November through June.

Several statistics were calculated from the flow ratios for each season and scenario. These statistics included the mean, the median, the 25th percentile and confidence intervals about the mean at the 80%, 90% and 95% level. The 25th percentile value is the point at which 75 percent of the data set is greater than it. That is, 75% of the ratios in the data set are greater than the 25th percentile value for a given season and scenario. The median is equivalent to the 50th percentile value, such that half the data is greater than it and half the data is less than it. A confidence interval provides a statistical probability that a new set of data (ratios in this case) will result in a mean value in the range of the interval. The lower confidence interval for each probability basis is presented in Table 2 as it is the low side of the statistical range of predicted means and thus the more conservative value. Table 2 does not provide an exhaustive list of potential statistics that could be developed for regulatory use. However, the table does provide those that would be most commonly used for permitting purposes.

Table 2. Storm event flow rate ratio summary, background flow: storm effluent discharge.

Statistic	006 Seasonal	007 Seasonal	006 Summer[1]	007 Summer[1]
Lower 95% CI	53.6	15.0	0.00	0.00
Lower 90% CI	61.0	17.4	0.14	0.00
Lower 80% CI	69.5	20.1	0.53	0.00
Mean	98.7	29.4	1.7	3.5
Median	20.1	8.0	0.58	0.40
25%tile	9.2	4.0	0.42	0.31

[1] Zeros (0.00) appear or all statistical results less than 0.01.

5.2 Acute/Chronic Aquatic Toxicity

The current NPDES storm water discharge limits for Outfalls 006 and 007 at EDCC include numeric values for cadmium, lead, and zinc that are based on the presumption that 7Q10 for the receiving stream (north tributary of Flat Creek) is zero; that is, the stream is comprised of 100% storm effluent from EDCC. However, site-specific data has shown that using the lower 95% confidence interval (53.6:1 Outfall 006, 15:1 Outfall 007) during the seasonal (November – June) period, the tributary contains only 8.53% storm effluent associated with industrial activity at EDCC. Cadmium, lead and zinc analytical data collected for the

NPDES Permit application was used in a reasonable potential screen to determine the minimum background to source flow ratio required to prevent instream acute and chronic aquatic toxicity in the north tributary to Flat Creek. The screen results are shown in Table 3.

Table 3. Acute/Chronic Aquatic Toxicity Screen Results, EDCC Outfalls 006/007.

Background to Source ratio (B:S)			
Outfall (95% CI)	**Cadmium**	**Lead**	**Zinc**
006 (53.6)	7.13	201.77	215.2
007 (15.0)	0.26	13.03	9.92

5.3 Total Dissolved Solids

The current NPDES Permit includes effluent limits for Total Dissolved Solids (TDS) for Outfalls 006 and 007 based on limited instantaneous flow data for the storm water outfalls available at the time the application was prepared. As a result of this study, seasonal period storm water effluent flows as a ratio of background flow were determined and may be used instead of the assumed 4 CFS background flow used in the water quality standard implementation process in the following formula:

$$C_eQ_e + C_bQ_b \leq C_{wqs}(Q_e+Q_b)$$

where: C_e = effluent concentration, mg/l

Q_e = effluent flow, CFS

C_b = background concentration, 67 mg/l

Q_b = background flow, CFS

C_{wqs} = Water Quality Standard concentration, 123 mg/l.

Substituting the seasonal period 95% CI background to source flow ratio for Outfalls 006 and 007 results in the appropriate TDS limit derivations shown in Table 4.

Table 4. TDS Limit Derivation, EDCC Outfalls 006/007.

Outfall (95% CI)	Seasonal TDS Monthly Ave Limit (mg/l)
006 (53.6)	3124.6
007 (15.0)	963.0

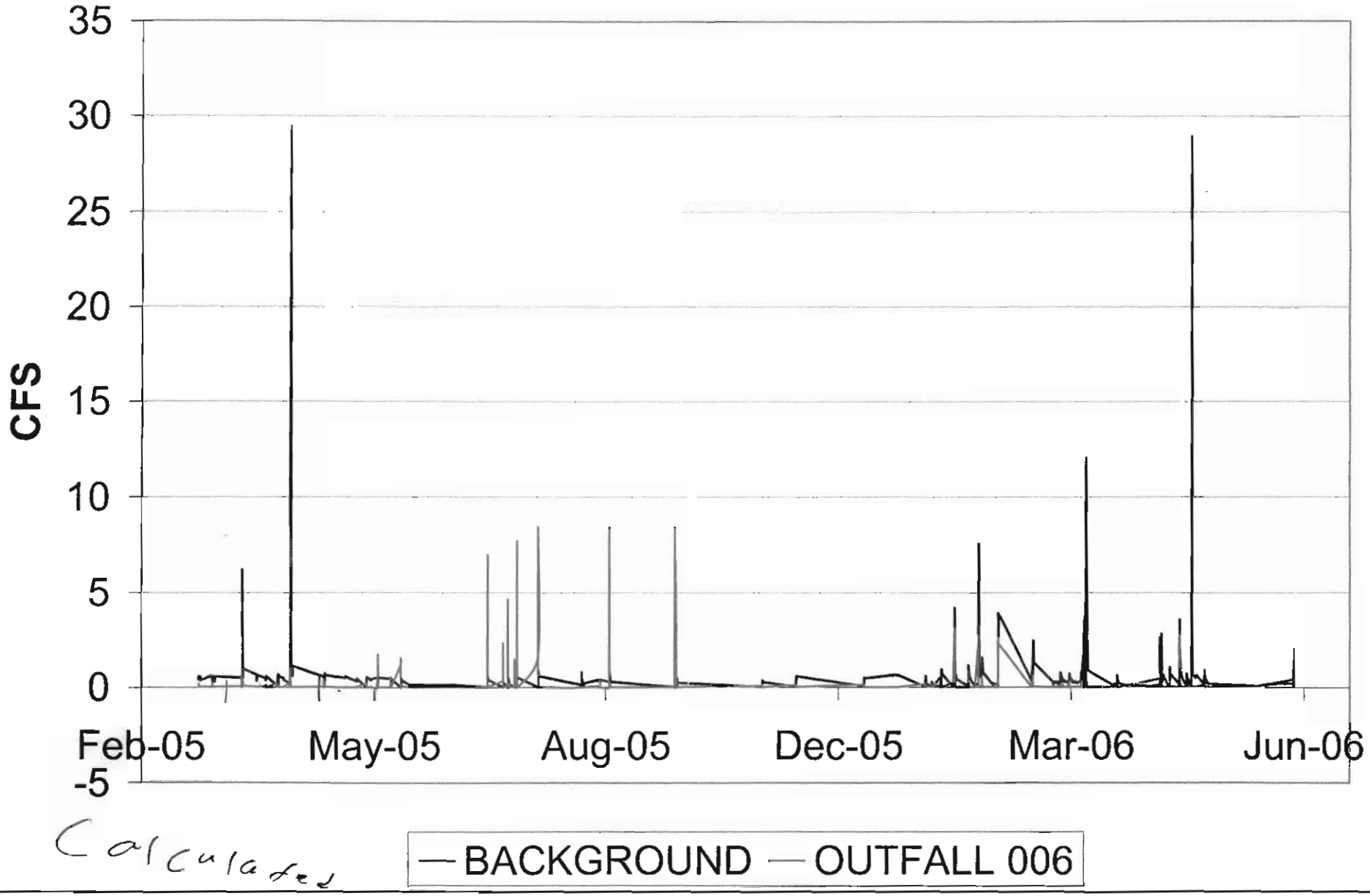
6.0 Recommendations

The EDCC Storm Water Flow Study has successfully demonstrated that background flow occurs in the north tributary to Flat Creek during storm water discharge events seasonally, and that statistically conservative analysis of the ratio of background to source flows indicates that the current NPDES Permit limits for certain parameters are not appropriate during the November through June period. Thus, our recommendations are:

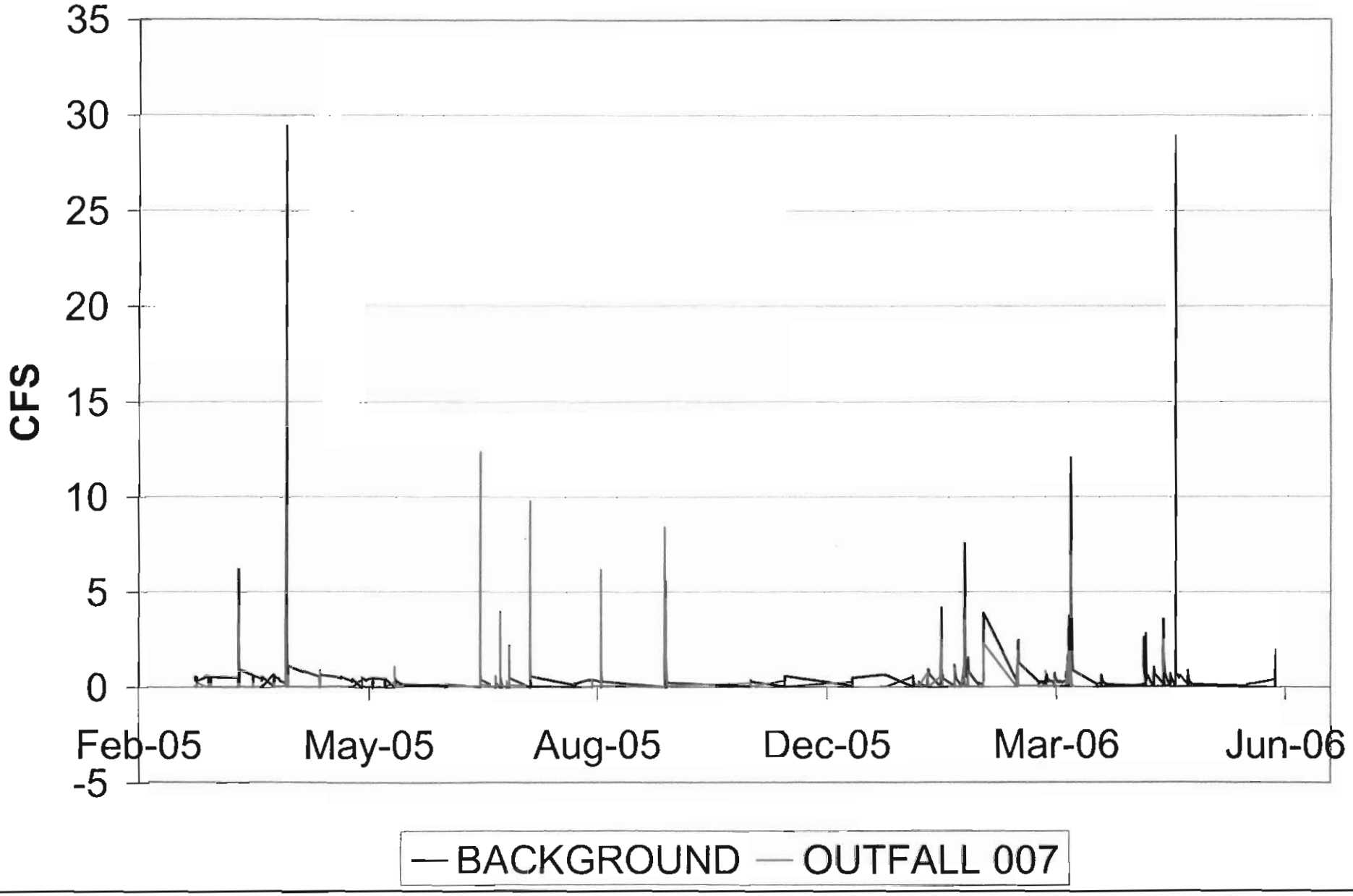
1. *Eliminate all effluent limits for cadmium at Outfall 006 using the 95% CI ratio of background-to-source for the period November through June. Current limits to remain for July – October.*
2. *Revise the monthly average/daily maximum effluent limits for lead at Outfall 006 to 139.1/279.0 ug/l using the 95% CI ratio of background-to-source for the period November through June. Current limits to remain for July – October.*
3. *Revise the monthly average/daily maximum effluent limits for zinc at Outfall 006 to 2,198.1/4,409.9 ug/l using the 95% CI ratio of background-to-source for the period November through June. Current limits to remain for July – October.*
4. *Revise the monthly average/daily maximum effluent limits for TDS at Outfall 006 to 3,124/4,686 mg/l using the 95% CI ratio of background-to-source for the period November through June. Current limits to remain for July – October.*
5. *Eliminate all effluent limits for cadmium, lead and zinc at Outfall 007 using the 95% CI ratio of background-to-source for the period November through June. Current limits to remain for July – October.*
6. *Revise the monthly average/daily maximum effluent limits for TDS at Outfall 007 to 963/1,444 mg/l using the 95% CI ratio of background-to-source for the period November through June. Current limits to remain for July – October.*
7. *Revise the critical dilution and dilution series for Acute Biomonitoring at Outfall 006 using the 95% CI ratio of background-to-source for the period November through June. Current dilutions to remain for July – October.*
8. *Revise the critical dilution and dilution series for Acute Biomonitoring at Outfall 006 using the 95% CI ratio of background-to-source for the period November through June. Current dilutions to remain for July – October.*

Appendix A
Recorded Water Levels and Flow Data

EDCC-INSTANTANEOUS FLOW



EDCC-INSTANTANEOUS FLOW



Appendix B
Rainfall Data

EDCC Rainfall Data

2005	Rainfall Inches
Date	
1-Jan	
2-Jan	
3-Jan	0.2
4-Jan	0
5-Jan	0
6-Jan	0.33
7-Jan	1
8-Jan	
9-Jan	
10-Jan	0.5
11-Jan	0
12-Jan	0
13-Jan	1.05
14-Jan	0
15-Jan	
16-Jan	
17-Jan	0
18-Jan	0
19-Jan	0
20-Jan	0
21-Jan	0
22-Jan	
23-Jan	
24-Jan	0
25-Jan	0
26-Jan	0
27-Jan	0
28-Jan	0.23
29-Jan	
30-Jan	
31-Jan	1.18
1-Feb	0.07
2-Feb	0.53
3-Feb	0
4-Feb	0
5-Feb	
6-Feb	
7-Feb	0.51
8-Feb	0.3
9-Feb	0
10-Feb	0
11-Feb	0
12-Feb	
13-Feb	
14-Feb	0.03
15-Feb	0
16-Feb	0
17-Feb	0
18-Feb	0
19-Feb	
20-Feb	
21-Feb	0.3
22-Feb	0
23-Feb	0
24-Feb	0.58
25-Feb	0.03
26-Feb	
27-Feb	
28-Feb	0.07
1-Mar	0
2-Mar	0
3-Mar	0.2
4-Mar	0
5-Mar	
6-Mar	
7-Mar	0
8-Mar	0.13
9-Mar	0.07
10-Mar	0.1
11-Mar	0
12-Mar	
13-Mar	
14-Mar	0
15-Mar	0
16-Mar	0
17-Mar	0
18-Mar	0
19-Mar	
20-Mar	
21-Mar	0.05
22-Mar	0.72
23-Mar	0
24-Mar	0
25-Mar	
26-Mar	
27-Mar	
28-Mar	0.36
29-Mar	0
30-Mar	0
31-Mar	0
1-Apr	0.13
2-Apr	
3-Apr	
4-Apr	0
5-Apr	0
6-Apr	0.36
7-Apr	0.07

2005	Rainfall Inches
8-Apr	0.1
9-Apr	
10-Apr	
11-Apr	2
12-Apr	2.07
13-Apr	0
14-Apr	0
15-Apr	0
16-Apr	
17-Apr	
18-Apr	0
19-Apr	0
20-Apr	0
21-Apr	0
22-Apr	0
23-Apr	
24-Apr	
25-Apr	0
26-Apr	0.54
27-Apr	0
28-Apr	0
29-Apr	0
30-Apr	
1-May	
2-May	0.07
3-May	0
4-May	0
5-May	0
6-May	0
7-May	
8-May	
9-May	0.13
10-May	0
11-May	0
12-May	0
13-May	0
14-May	
15-May	
16-May	0.3
17-May	0
18-May	0
19-May	0
20-May	0
21-May	
22-May	
23-May	0
24-May	0
25-May	0.26
26-May	0
27-May	0
28-May	
29-May	
30-May	
31-May	0.56
1-Jun	0
2-Jun	0.03
3-Jun	0
4-Jun	
5-Jun	
6-Jun	0
7-Jun	0
8-Jun	0.1
9-Jun	0
10-Jun	0
11-Jun	
12-Jun	
13-Jun	0
14-Jun	0
15-Jun	0
16-Jun	0
17-Jun	0
18-Jun	
19-Jun	
20-Jun	0.28
21-Jun	0
22-Jun	0
23-Jun	0
24-Jun	0
25-Jun	
26-Jun	
27-Jun	0
28-Jun	0
29-Jun	0
30-Jun	0
1-Jul	0
2-Jul	
3-Jul	
4-Jul	
5-Jul	0
6-Jul	1.04
7-Jul	0
8-Jul	0
9-Jul	
10-Jul	
11-Jul	0
12-Jul	0
13-Jul	0.23
14-Jul	

2005	Rainfall Inches
15-Jul	1.2
16-Jul	
17-Jul	
18-Jul	0.15
19-Jul	0.41
20-Jul	0
21-Jul	0
22-Jul	0
23-Jul	
24-Jul	
25-Jul	0
26-Jul	0
27-Jul	0
28-Jul	1.12
29-Jul	0
30-Jul	
31-Jul	
1-Aug	0
2-Aug	0
3-Aug	0
4-Aug	0
5-Aug	0
6-Aug	
7-Aug	
8-Aug	0
9-Aug	0
10-Aug	0
11-Aug	0
12-Aug	0
13-Aug	
14-Aug	
15-Aug	0.13
16-Aug	0.2
17-Aug	0
18-Aug	0
19-Aug	0
20-Aug	
21-Aug	
22-Aug	0.22
23-Aug	0
24-Aug	0.38
25-Aug	0
26-Aug	0
27-Aug	
28-Aug	
29-Aug	1.04
30-Aug	0
31-Aug	0
1-Sep	0
2-Sep	0
3-Sep	
4-Sep	
5-Sep	
6-Sep	0
7-Sep	0
8-Sep	0
9-Sep	0
10-Sep	
11-Sep	
12-Sep	0
13-Sep	0
14-Sep	0
15-Sep	0
16-Sep	0.16
17-Sep	
18-Sep	
19-Sep	0
20-Sep	0
21-Sep	0
22-Sep	0
23-Sep	0
24-Sep	
25-Sep	
26-Sep	2
27-Sep	0
28-Sep	0
29-Sep	0.03
30-Sep	0
1-Oct	
2-Oct	
3-Oct	0
4-Oct	0
5-Oct	0
6-Oct	0
7-Oct	0
8-Oct	
9-Oct	
10-Oct	
11-Oct	0
12-Oct	0
13-Oct	0
14-Oct	0
15-Oct	
16-Oct	
17-Oct	0
18-Oct	0
19-Oct	0
20-Oct	0

discharge from outfall on DMF

EDCC Rainfall Data

2005	Rainfall Inches
21-Oct	0
22-Oct	
23-Oct	
24-Oct	0
25-Oct	0
26-Oct	0
27-Oct	0
28-Oct	0
29-Oct	
30-Oct	
31-Oct	0
1-Nov	0.66
2-Nov	0
3-Nov	0
4-Nov	0
5-Nov	
6-Nov	
7-Nov	0
8-Nov	0
9-Nov	0
10-Nov	0
11-Nov	0
12-Nov	
13-Nov	
14-Nov	0.26
15-Nov	0.13
16-Nov	0.33
17-Nov	0
18-Nov	0
19-Nov	
20-Nov	
21-Nov	0.07
22-Nov	0
23-Nov	0
24-Nov	
25-Nov	
26-Nov	
27-Nov	
28-Nov	0.49
29-Nov	0
30-Nov	0
1-Dec	0
2-Dec	0
3-Dec	
4-Dec	0.5
5-Dec	0
6-Dec	0
7-Dec	0
8-Dec	1.25
9-Dec	0
10-Dec	
11-Dec	
12-Dec	0
13-Dec	0
14-Dec	0.02
15-Dec	0.5
16-Dec	0
17-Dec	
18-Dec	
19-Dec	0
20-Dec	0
21-Dec	0
22-Dec	0
23-Dec	
24-Dec	
25-Dec	
26-Dec	
27-Dec	0
28-Dec	0
29-Dec	0
30-Dec	0
31-Dec	
2006	
1-Jan	
2-Jan	
3-Jan	0
4-Jan	0
5-Jan	0
6-Jan	0
7-Jan	
8-Jan	
9-Jan	0
10-Jan	0.6
11-Jan	0.07
12-Jan	0
13-Jan	0.18
14-Jan	
15-Jan	
16-Jan	0
17-Jan	0.72
18-Jan	0
19-Jan	0
20-Jan	0
21-Jan	
22-Jan	
23-Jan	2
24-Jan	0
25-Jan	0

2006	Rainfall Inches
26-Jan	0
27-Jan	0
28-Jan	
29-Jan	
30-Jan	0.35
31-Jan	0
1-Feb	0
2-Feb	0.8
3-Feb	0
4-Feb	
5-Feb	
6-Feb	0.25
7-Feb	0
8-Feb	0
9-Feb	0
10-Feb	0
11-Feb	
12-Feb	
13-Feb	
14-Feb	
15-Feb	
16-Feb	
17-Feb	
18-Feb	
19-Feb	
20-Feb	
21-Feb	
22-Feb	
23-Feb	
24-Feb	
25-Feb	
26-Feb	
27-Feb	1.25
28-Feb	0
1-Mar	0
2-Mar	0
3-Mar	0
4-Mar	
5-Mar	
6-Mar	0.1
7-Mar	0
8-Mar	0
9-Mar	0
10-Mar	0.4
11-Mar	
12-Mar	
13-Mar	0
14-Mar	0.23
15-Mar	0
16-Mar	0
17-Mar	0
18-Mar	
19-Mar	
20-Mar	2
21-Mar	0.37
22-Mar	0
23-Mar	0
24-Mar	0
25-Mar	0
26-Mar	
27-Mar	0
28-Mar	0
29-Mar	0
30-Mar	0
31-Mar	0
1-Apr	
2-Apr	
3-Apr	0.3
4-Apr	0
5-Apr	0
6-Apr	0
7-Apr	0
8-Apr	
9-Apr	
10-Apr	0
11-Apr	0
12-Apr	0
13-Apr	0
14-Apr	0
15-Apr	
16-Apr	
17-Apr	0
18-Apr	0
19-Apr	0
20-Apr	0
21-Apr	0.8
22-Apr	
23-Apr	
24-Apr	0.65
25-Apr	0
26-Apr	0.45
27-Apr	0
28-Apr	0
29-Apr	
30-Apr	
1-May	1
2-May	0
3-May	0.3

2006	Rainfall Inches
4-May	0
5-May	1
6-May	
7-May	
8-May	0.2
9-May	0.1
10-May	0.3
11-May	0
12-May	0
13-May	
14-May	
15-May	0
16-May	0
17-May	0
18-May	0
19-May	0
20-May	
6-Jun	0
7-Jun	1.1
8-Jun	0
9-Jun	0
10-Jun	
11-Jun	
12-Jun	0
13-Jun	0
14-Jun	0
15-Jun	0
16-Jun	0
17-Jun	

Appendix C

Flow Measurement Data Collected in the Field

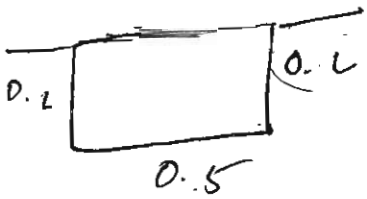
form ?

El Dorado Chemical date 3/2/2005 Start 1550 Stop 1600

3:45

Station:	096b EDCC				
Waterbody	Trib			Level	0.78 logger
Crew:	BJP / JJF				
Width (ft):	3	Area:	0.65	Max Vel:	1.24
Flow (cfs):	0.67	Velocity:	0.90	Min Vel:	0

Distance from initial point (ft)	1 Width (ft)	2 Depth (ft)	3 Avg. velocity at point (ft/sec)	4 Area (sq. ft.)	5 Discharge (cfs)	6 Method Depth	7 Average Discharge (cfs)
0.5	0.5	0.2	1.24	0.1	0.124	0.6	0.12
1	0.5	0.2	1.22	0.1	0.122	0.6	0.12
1.5	0.5	0.4	1.24	0.2	0.248	0.6	0.25
2	0.5	0.2	0.98	0.1	0.098	0.6	0.10
2.5	0.5	0.2	0.73	0.1	0.073	0.6	0.07
3	0.5	0.1	0	0.05	0	0.6	0.00
				0	0	0.6	0.00
				0	0	0.6	0.00
				0	0	0.6	0.00
				0	0	0.6	0.00
total	3	1.3	5.41	0.65			0.665
average	0.5	0.216667	0.901667	0.065			0.073889



$V = \frac{Q}{A}$

$\frac{0.67}{0.65} = 1.02$

0.65 * 0.9 = 0.585 ?

El Dorado Chemical date 3/29/2005 Start 1300
Stop 1315

Station:	006b EDCC				
Waterbody	Trib				
Crew:	AAS / JJF				
Width (ft):	3.5	Area:	1.0395	Max Vel:	1.7
/Flow (cfs):	0.93	Velocity:	0.70	Min Vel:	0

Level

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.35	0.35	0.2	0.17	0.07	0.0119	0.6	0.01
0.7	0.35	0.3	1.2	0.105	0.126	0.6	0.13
1.05	0.35	0.32	1.3	0.112	0.1456	0.6	0.15
1.4	0.35	0.35	1.7	0.1225	0.20825	0.6	0.21
1.75	0.35	0.45	1.5	0.1575	0.23625	0.6	0.24
2.1	0.35	0.5	0.8	0.175	0.14	0.6	0.14
2.45	0.35	0.5	0.35	0.175	0.06125	0.6	0.06
2.8	0.35	0.25	0	0.0875	0	0.6	0.00
3.15	0.35	0.1	0	0.035	0	0.6	0.00
3.5	0.35	0	0	0	0	0.6	0.00
total	3.15	2.97	7.02	1.0395			0.929
average	0.35	0.297	0.702	0.10395			0.10325

El Dorado Chemical date 3/29/2005 Start 1315
Stop 1320

Station: 007b EDCC			
Waterbody Trib			Level 0.86
Crew: AAS / JJF			
Width (ft):	Area: 1.57	Max Vel:	
Flow (cfs): 0.05	Velocity: 0.03	Min Vel:	

$A = ((\theta - \sin\theta)D^2)/8$
for $y<D/2$ $\theta = \pi - 2\sin^{-1}[1-(2y/D)]$
for $y>D/2$ $\theta = \pi + 2\sin^{-1}[(2y/D) - 1]$

Station 007b EDCC flows through a 24" diameter pipe at low velocity
The following calculations are partially full round cross sections (Page 363, Mott).

$A = ((\theta - \sin\theta)D^2)/8$
for $y<D/2$ $\theta = \pi - 2\sin^{-1}[1-(2y/D)]$
for $y>D/2$ $\theta = \pi + 2\sin^{-1}[(2y/D) - 1]$

D=	2	ft
y=	1	ft
v=	0.03	ft/s
θ=	3.14	radians
A=	1.57	ft^2
Q=	0.047	CFS

El Dorado Chemical date 1/23/2006 Start 1735
Stop 1742

Station:	006b EDCC				
Waterbody	Trib				Level
Crew:	SKH / JJF				
Width (ft):	4.5	Area:	1.6	Max Vel:	0.35
/Flow (cfs):	0.35	Velocity:	0.16	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.2	0.05	0.1	0.005	0.6	0.01
1	0.5	0.3	0.3	0.15	0.045	0.6	0.05
1.5	0.5	0.5	0.33	0.25	0.0825	0.6	0.08
2	0.5	0.6	0.14	0.3	0.042	0.6	0.04
2.5	0.5	0.6	0.35	0.3	0.105	0.6	0.11
3	0.5	0.5	0.26	0.25	0.065	0.6	0.07
3.5	0.5	0.4	0.04	0.2	0.008	0.6	0.01
4	0.5	0.1	0	0.05	0	0.6	0.00
4.5	0.5	0	0	0	0	0.6	0.00
total	4.5	3.2	1.47	1.6			0.353
average	0.5	0.355556	0.163333	0.177778			0.039167

El Dorado Chemical date 1/23/2006 Start 1745
Stop 1750

Station:	007b EDCC				
Waterbody	Trib				Level
Crew:	SKH / JJF				
Width (ft):	3	Area:	0.6	Max Vel:	0.95
Flow (cfs):	0.40	Velocity:	0.66	Min Vel:	0.51

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.1	0.63	0.05	0.0315	0.6	0.03
1	0.5	0.2	0.51	0.1	0.051	0.6	0.05
1.5	0.5	0.2	0.65	0.1	0.065	0.6	0.07
2	0.5	0.3	0.69	0.15	0.1035	0.6	0.10
2.5	0.5	0.2	0.95	0.1	0.095	0.6	0.10
3	0.5	0.2	0.55	0.1	0.055	0.6	0.06
total	3	1.2	3.98	0.6			0.401
average	0.5	0.2	0.663333	0.1			0.066833

El Dorado Chemical date 2/24/2006 Start 1305
Stop 1310

Station:	006b EDCC				
Waterbody	Trib				Level
Crew:	SKH / JJF				
Width (ft):	2.8	Area:	0.25	Max Vel:	0.15
Flow (cfs):	0.11	Velocity:	0.38	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.1	0.7	0.05	0.035	0.6	0.04
1	0.5	0.1	0.15	0.05	0.0075	0.6	0.01
1.5	0.5	0.1	0.7	0.05	0.035	0.6	0.04
2	0.5	0.1	0.7	0.05	0.035	0.6	0.04
2.5	0.5	0.1	0	0.05	0	0.6	0.00
2.8	0.3	0	0	0	0	0.6	0.00
total	2.8	0.5	2.25	0.25			0.113
average	0.466667	0.083333	0.375	0.041667			0.01875

El Dorado Chemical date 2/24/2006 Start 1255
Stop 1300

Station:	007b EDCC				
Waterbody	Trib				Level
Crew:	SKH / JJF				
Width (ft):	3.8	Area:	0.55	Max Vel:	0.1
Flow (cfs):	-0.09	Velocity:	0.03	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.1	0	0.05	0	0.6	0.00
1	0.5	0.2	0.01	0.1	0.001	0.6	0.00
1.5	0.5	0.2	0.01	0.1	0.001	0.6	0.00
2	0.5	0.2	0.05	0.1	0.005	0.6	0.01
2.5	0.5	0.2	0.1	0.1	0.01	0.6	0.01
3	0.5	0.2	0.02	0.1	0.002	0.6	0.00
3.8	0.8	0	0	0	0	0.6	0.00
total	3.8	1.1	0.19	0.55			-0.094
average	0.542857	0.157143	0.027143	0.078571			0.002714

note: measured flow with 006b flow. Subtracted 006b(0.113) from 007b total cfs(0.019)

El Dorado Chemical date 3/2/2005 Start 1600
Stop 1610

Station:	007b EDCC				
Waterbody	Trib			Level	0.86
Crew:	BJP / JJF				
Width (ft):	2	Area:	0.45	Max Vel:	0.05
Flow (cfs):	0.02	Velocity:	0.03	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.2	0.02	0.1	0.002	0.6	0.00
1	0.5	0.4	0.05	0.2	0.01	0.6	0.01
1.5	0.5	0.2	0.05	0.1	0.005	0.6	0.01
2	0.5	0.1	0	0.05	0	0.6	0.00
total	2	0.9	0.12	0.45			0.017
average	0.5	0.225	0.03	0.1125			0.00425

El Dorado Chemical date 3/20/2006 Start 1215
Stop 1220

Station:	007b EDCC				
Waterbody	Trib				Level
Crew:	SKH / JJF				
Width (ft):	9	Area:	6.4	Max Vel:	3.37
Flow (cfs):	10.32	Velocity:	2.07	Min Vel:	0.25

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
1	1	0.2	0.59	0.2	0.118	0.6	0.12
2	1	0.4	2.19	0.4	0.876	0.6	0.88
3	1	0.6	2.75	0.6	1.65	0.6	1.65
4	1	0.9	3.37	0.9	3.033	0.6	3.03
5	1	0.9	3.29	0.9	2.961	0.6	2.96
6	1	1	2.7	1	2.7	0.6	2.70
7	1	1	2.55	1	2.55	0.6	2.55
8	1	0.7	0.94	0.7	0.658	0.6	0.66
9	1	0.7	0.25	0.7	0.175	0.6	0.18
total	9	6.4	18.63	6.4			10.323
average	1	0.711111	2.07	0.711111			1.635667

14.72

note: measured flow with 006b flow. Subtracted 006b(4.398) from 007b total cfs(14.721)

El Dorado Chemical date 3/20/2006 Start 1226
Stop 1231

Station:	006b EDCC				
Waterbody	Trib				Level
Crew:	SKH / JJF				
Width (ft):	5.3	Area:	2.6	Max Vel:	2.86
/Flow (cfs):	4.40	Velocity:	1.18	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.2	0	0.1	0	0.6	0.00
1	0.5	0.3	0.33	0.15	0.0495	0.6	0.05
1.5	0.5	0.5	1.31	0.25	0.3275	0.6	0.33
2	0.5	0.7	2.08	0.35	0.728	0.6	0.73
2.5	0.5	0.8	2.86	0.4	1.144	0.6	1.14
3	0.5	0.7	2.16	0.35	0.756	0.6	0.76
3.5	0.5	0.7	1.73	0.35	0.6055	0.6	0.61
4	0.5	0.7	1.5	0.35	0.525	0.6	0.53
4.5	0.5	0.5	1.05	0.25	0.2625	0.6	0.26
5	0.5	0.1	0	0.05	0	0.6	0.00
5.3	0.3	0	0	0	0	0.6	0.00
total	4.5	5.2	13.02	2.6			4.398
average	0.5	0.472727	1.183636	0.236364			0.488667

El Dorado Chemical date 4/25/2006 Start 1320
Stop 1330

Station:	006b EDCC				
Waterbody	Trib				Level
Crew:	SKH / JJF				
Width (ft):	3.7	Area:	0.85	Max Vel:	1.45
/Flow (cfs):	0.88	Velocity:	1.00	Min Vel:	0.51

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0	0	0.2	0.47	0	0	0.6	0.00
0.5	0.5	0.2	0.72	0.1	0.072	0.6	0.07
1	0.5	0.3	0.93	0.15	0.1395	0.6	0.14
1.5	0.5	0.3	1.21	0.15	0.1815	0.6	0.18
2	0.5	0.3	1.45	0.15	0.2175	0.6	0.22
2.5	0.5	0.2	1.05	0.1	0.105	0.6	0.11
3	0.5	0.2	1.15	0.1	0.115	0.6	0.12
3.5	0.5	0.2	0.51	0.1	0.051	0.6	0.05
total	3.5	1.7	7.02	0.85			0.882
average	0.5	0.242857	1.002857	0.121429			0.125929

El Dorado Chemical date 4/29/2006 Start 1220
Stop 1225

Station:	006b EDCC				
Waterbody	Trib			Level	1.2 staff
Crew:	BJP / JB				
Width (ft):	4.5	Area:	1.75	Max Vel:	2.2
/Flow (cfs):	2.69	Velocity:	1.31	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.4	1	0.2	0.2	0.6	0.20
1	0.5	0.5	1.73	0.25	0.4325	0.6	0.43
1.5	0.5	0.5	2.2	0.25	0.55	0.6	0.55
2	0.5	0.5	2.1	0.25	0.525	0.6	0.53
2.5	0.5	0.5	1.6	0.25	0.4	0.6	0.40
3	0.5	0.5	1.46	0.25	0.365	0.6	0.37
3.5	0.5	0.3	1.05	0.15	0.1575	0.6	0.16
4	0.5	0.2	0.61	0.1	0.061	0.6	0.06
4.5	0.5	0.1	0	0.05	0	0.6	0.00
total	4.5	3.5	11.75	1.75			2.691
average	0.5	0.388889	1.305556	0.194444			0.299

El Dorado Chemical date 4/29/2006 Start 1040
Stop 1045

Station:	006b EDCC				
Waterbody	Trib			Level	1.05 staff gage
Crew:	BJP / JB				
Width (ft):	4	Area:	1.3	Max Vel:	1.87
/Flow (cfs):	1.72	Velocity:	1.17	Min Vel:	0.4

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.3	0.4	0.15	0.06	0.6	0.06
1	0.5	0.4	1.55	0.2	0.31	0.6	0.31
1.5	0.5	0.4	1.87	0.2	0.374	0.6	0.37
2	0.5	0.5	1.77	0.25	0.4425	0.6	0.44
2.5	0.5	0.4	1.32	0.2	0.264	0.6	0.26
3	0.5	0.3	1.05	0.15	0.1575	0.6	0.16
3.5	0.5	0.2	0.73	0.1	0.073	0.6	0.07
4	0.5	0.1	0.7	0.05	0.035	0.6	0.04
total	4	2.6	9.39	1.3			1.716
average	0.5	0.325	1.17375	0.1625			0.2145

El Dorado Chemical date 4/29/2006 Start 1050
Stop 1055

Station:	007b EDCC				
Waterbody	Trib			Level	0.65
Crew:	BJP / JB				
Width (ft):	4.5	Area:	1.3	Max Vel:	1.47
Flow (cfs):	1.70	Velocity:	1.16	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.3	1.23	0.15	0.1845	0.6	0.18
1	0.5	0.3	1.39	0.15	0.2085	0.6	0.21
1.5	0.5	0.4	1.46	0.2	0.292	0.6	0.29
2	0.5	0.4	1.35	0.2	0.27	0.6	0.27
2.5	0.5	0.4	1.47	0.2	0.294	0.6	0.29
3	0.5	0.3	1.35	0.15	0.2025	0.6	0.20
3.5	0.5	0.3	1.34	0.15	0.201	0.6	0.20
4	0.5	0.1	0.86	0.05	0.043	0.6	0.04
4.5	0.5	0.1	0	0.05	0	0.6	0.00
total	4.5	2.6	10.45	1.3			1.696
average	0.5	0.288889	1.161111	0.144444			0.188389

flow is a combination of 006b and 007b

007b= (007b+006b)-006b
007b= -0.020
007b= 0

El Dorado Chemical date 4/29/2006 Start 1230
Stop 1235

Station:	007b EDCC				
Waterbody	Trib			Level	0.65
Crew:	BJP / JB				
Width (ft):	5	Area:	1.85	Max Vel:	1.74
/Flow (cfs):	2.52	Velocity:	1.13	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.1	0	0.05	0	0.6	0.00
1	0.5	0.3	1.05	0.15	0.1575	0.6	0.16
1.5	0.5	0.4	1.51	0.2	0.302	0.6	0.30
2	0.5	0.5	1.74	0.25	0.435	0.6	0.44
2.5	0.5	0.5	1.6	0.25	0.4	0.6	0.40
3	0.5	0.5	1.58	0.25	0.395	0.6	0.40
3.5	0.5	0.5	1.44	0.25	0.36	0.6	0.36
4	0.5	0.4	1.35	0.2	0.27	0.6	0.27
4.5	0.5	0.4	1.01	0.2	0.202	0.6	0.20
5	0.5	0.1	0	0.05	0	0.6	0.00
total	4.5	3.7	11.28	1.85			2.522
average	0.5	0.37	1.128	0.185			0.280167

flow is a combination of 006b and 007b

007b= (007b+006b)-006b
007b= -0.170
007b= 0

El Dorado Chemical date 5/4/2006 Start 1950
Stop 2000

Station:	007b EDCC				
Waterbody	Trib			Level	1.7 at logger
Crew:	JBB/JJF				
Width (ft):	6	Area:	3.55	Max Vel:	2.4
Flow (cfs):	4.21	Velocity:	1.66	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)	
0.5	0.5	0.6	0.95	0.3	0.285	0.6	0.29	
1	0.5	0.5	1.85	0.25	0.4625	0.6	0.46	
1.5	0.5	0.8	2.24	0.4	0.896	0.6	0.90	
2	0.5	0.9	2.4	0.45	1.08	0.6	1.08	
2.5	0.5	1	2.31	0.5	1.155	0.6	1.16	
3	0.5	1	2.09	0.5	1.045	0.6	1.05	
3.5	0.5	0.9	2.13	0.45	0.9585	0.6	0.96	
4	0.5	0.6	1.65	0.3	0.495	0.6	0.50	
4.5	0.5	0.4	1.48	0.2	0.296	0.6	0.30	
5	0.5	0.2	1.58	0.1	0.158	0.6	0.16	
5.5	0.5	0.2	1.19	0.1	0.119	0.6	0.12	
6	0.5	0.1	0	0.05	0	0.6	0.00	
total	4.5	7.2	19.87	3.55			4.213	6.95
average	0.5	0.6	1.655833	0.322727			0.741444	

note: measured flow with 006b flow. Subtracted 006b(2.737) from 007b total cfs(6.95)

El Dorado Chemical date 5/4/2006 Start 1940
Stop 1950

Station:	006b EDCC				
Waterbody	Trib			Level	1.3 at logger
Crew:	JBB/JJF				
Width (ft):	4.5	Area:	1.8	Max Vel:	2.43
Flow (cfs):	2.74	Velocity:	1.22	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.4	1.18	0.2	0.236	0.6	0.24
1	0.5	0.6	1.73	0.3	0.519	0.6	0.52
1.5	0.5	0.6	2.43	0.3	0.729	0.6	0.73
2	0.5	0.5	1.82	0.25	0.455	0.6	0.46
2.5	0.5	0.5	1.34	0.25	0.335	0.6	0.34
3	0.5	0.5	1.23	0.25	0.3075	0.6	0.31
3.5	0.5	0.3	0.68	0.15	0.102	0.6	0.10
4	0.5	0.2	0.53	0.1	0.053	0.6	0.05
4.5	0.5	0	0	0	0	0.6	0.00
total	4.5	3.6	10.94	1.8			2.737
average	0.5	0.4	1.215556	0.2			0.304056

El Dorado Chemical date 5/4/2006 Start 1825
Stop 1830

Station:	007b EDCC				
Waterbody	Trib			Level	1.3 at logger
Crew:	JBB/JJF				
Width (ft):	5.5	Area:	1.95	Max Vel:	2.14
Flow (cfs):	-0.09	Velocity:	1.49	Min Vel:	1.03

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)	
0.5	0.5	0.4	1.08	0.2	0.216	0.6	0.22	
1	0.5	0.4	1.69	0.2	0.338	0.6	0.34	
1.5	0.5	0.4	2.02	0.2	0.404	0.6	0.40	
2	0.5	0.5	2.14	0.25	0.535	0.6	0.54	
2.5	0.5	0.6	2.08	0.3	0.624	0.6	0.62	
3	0.5	0.5	2.11	0.25	0.5275	0.6	0.53	
3.5	0.5	0.5	1.89	0.25	0.4725	0.6	0.47	
4	0.5	0.3	1.66	0.15	0.249	0.6	0.25	
4.5	0.5	0.2	1.03	0.1	0.103	0.6	0.10	
5	0.5	0.1	0.67	0.05	0.0335	0.6	0.03	
5.5	0.5	0	0	0	0	0.6	0.00	
total	4.5	3.9	16.37	1.95			-0.094	3.50
average	0.5	0.354545	1.488182	0.177273			0.385444	

note: measured flow with 006b flow. Subtracted 006b(3.597) from 007b total cfs(3.5)

El Dorado Chemical date 5/4/2006 Start 1810
Stop 1820

Station:	006b EDCC				
Waterbody	Trib			Level	1.4 at logger
Crew:	JBB/JJF				
Width (ft):	5	Area:	2.15	Max Vel:	2.4
Flow (cfs):	3.60	Velocity:	1.26	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.5	0.92	0.25	0.23	0.6	0.23
1	0.5	0.5	1.48	0.25	0.37	0.6	0.37
1.5	0.5	0.6	2.12	0.3	0.636	0.6	0.64
2	0.5	0.7	2.4	0.35	0.84	0.6	0.84
2.5	0.5	0.7	1.8	0.35	0.63	0.6	0.63
3	0.5	0.6	1.87	0.3	0.561	0.6	0.56
3.5	0.5	0.4	1.35	0.2	0.27	0.6	0.27
4	0.5	0.2	0.49	0.1	0.049	0.6	0.05
4.5	0.5	0.1	0.21	0.05	0.0105	0.6	0.01
5	0.5	0	0	0	0	0.6	0.00
total	4.5	4.3	12.64	2.15			3.597
average	0.5	0.43	1.264	0.215			0.399611

El Dorado Chemical date 6/17/2006 Start 1800
Stop 1805

Station:	007b EDCC				
Waterbody	Trib			Level	0.82 at logger
Crew:	SKH/BJP				
Width (ft):	3.5	Area:	2	Max Vel:	0.65
Flow (cfs):	-0.25	Velocity:	0.49	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)	
0.5	0.5	0.7	0.61	0.35	0.2135	0.6	0.21	
1	0.5	0.8	0.58	0.4	0.232	0.6	0.23	
1.5	0.5	0.8	0.63	0.4	0.252	0.6	0.25	
2	0.5	0.6	0.6	0.3	0.18	0.6	0.18	
2.5	0.5	0.6	0.65	0.3	0.195	0.6	0.20	
3	0.5	0.4	0.36	0.2	0.072	0.6	0.07	
3.5	0.5	0.1	0	0.05	0	0.6	0.00	
total	3.5	4	3.43	2			-0.251	1.14
average	0.5	0.571429	0.49	0.285714			0.1635	

note: measured flow with 006b flow. Subtracted 006b(1.395) from 007b total cfs(1.14)

El Dorado Chemical date 6/17/2006 Start 1855
Stop 1900

Station:	007b EDCC				
Waterbody	Trib			Level	0.72 at logger
Crew:	SKH/BJP				
Width (ft):	3.5	Area:	1.54	Max Vel:	0.36
Flow (cfs):	-0.16	Velocity:	0.25	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)	
0.5	0.5	0.6	0.28	0.3	0.084	0.6	0.08	
1	0.5	0.7	0.34	0.35	0.119	0.6	0.12	
1.5	0.5	0.7	0.35	0.35	0.1225	0.6	0.12	
2	0.5	0.4	0.36	0.2	0.072	0.6	0.07	
2.5	0.5	0.4	0.32	0.2	0.064	0.6	0.06	
3	0.5	0.2	0.13	0.1	0.013	0.6	0.01	
3.4	0.4	0.1	0	0.04	0	0.6	0.00	
total	3.4	3.1	1.78	1.54			-0.156	0.47
average	0.485714	0.442857	0.254286	0.22			0.067786	

note: measured flow with 006b flow. Subtracted 006b(0.63) from 007b total cfs(0.47)

El Dorado Chemical date 6/17/2006 Start 1750
Stop 1755

Station:	006b EDCC				
Waterbody	Trib			Level	1.1 at logger
Crew:	SKH/BJP				
Width (ft):	4	Area:	1.25	Max Vel:	1.77
Flow (cfs):	1.40	Velocity:	0.92	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.1	0	0.05	0	0.6	0.00
1	0.5	0.3	0.63	0.15	0.0945	0.6	0.09
1.5	0.5	0.4	1.27	0.2	0.254	0.6	0.25
2	0.5	0.4	1.14	0.2	0.228	0.6	0.23
2.5	0.5	0.5	1.08	0.25	0.27	0.6	0.27
3	0.5	0.4	1.77	0.2	0.354	0.6	0.35
3.5	0.5	0.3	1.2	0.15	0.18	0.6	0.18
4	0.5	0.1	0.29	0.05	0.0145	0.6	0.01
total	4	2.5	7.38	1.25			1.395
average	0.5	0.3125	0.9225	0.15625			0.174375

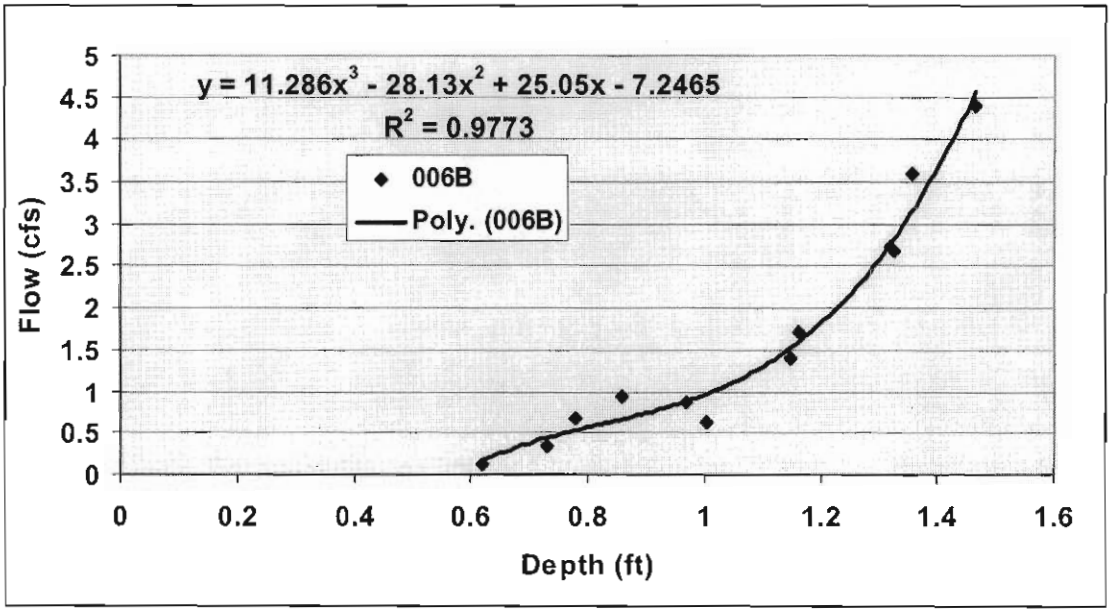
El Dorado Chemical date 6/17/2006 Start 1850
Stop 1855

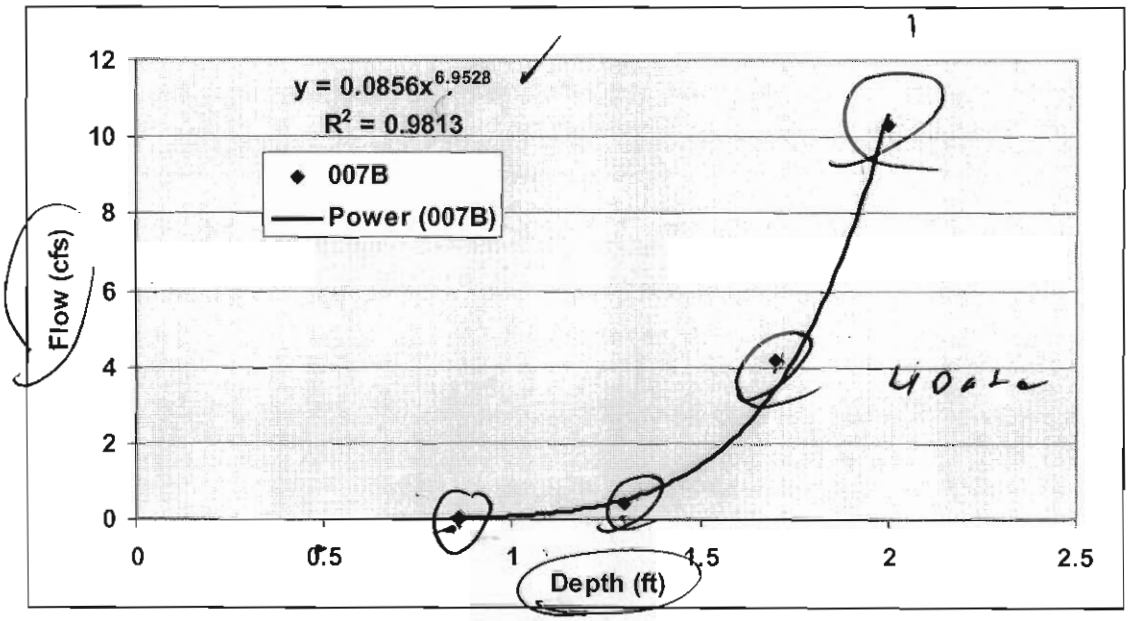
Station:	006b EDCC				
Waterbody	Trib			Level	1.00 at logger
Crew:	SKH/BJP				
Width (ft):	3.5	Area:	0.8	Max Vel:	1.54
Flow (cfs):	0.63	Velocity:	0.70	Min Vel:	0

Distance from initial point (ft)	Width (ft)	Depth (ft)	Avg. velocity at point (ft/sec)	Area (sq. ft.)	Discharge (cfs)	Method Depth	Average Discharge (cfs)
0.5	0.5	0.1	0.6	0.05	0.03	0.6	0.03
1	0.5	0.3	1.11	0.15	0.1665	0.6	0.17
1.5	0.5	0.3	0.71	0.15	0.1065	0.6	0.11
2	0.5	0.3	0	0.15	0	0.6	0.00
2.5	0.5	0.3	1.54	0.15	0.231	0.6	0.23
3	0.5	0.2	0.96	0.1	0.096	0.6	0.10
3.5	0.5	0.1	0	0.05	0	0.6	0.00
total	3.5	1.6	4.92	0.8			0.630
average	0.5	0.228571	0.702857	0.114286			0.09

Appendix D
Rating Curves

Rating curves developed from field data.





Appendix E
USDA Flume Tables

	006 3ft H flume	
H, ft	FLOW MGD	FLOW CFS
0.01	0.0006	0.0009
0.02	0.0014	0.0022
0.03	0.0029	0.0045
0.04	0.0047	0.0073
0.05	0.0068	0.0105
0.06	0.0092	0.0142
0.07	0.012	0.0186
0.08	0.0151	0.0234
0.09	0.0186	0.0288
0.1	0.0224	0.0347
0.11	0.0263	0.0407
0.12	0.0304	0.0470
0.13	0.0348	0.0538
0.14	0.0394	0.0610
0.15	0.0443	0.0685
0.16	0.0495	0.0766
0.17	0.055	0.0851
0.18	0.0607	0.0939
0.19	0.0667	0.1032
0.2	0.073	0.1129
0.21	0.0795	0.1230
0.22	0.0866	0.1340
0.23	0.0937	0.1450
0.24	0.1008	0.1559
0.25	0.1086	0.1680
0.26	0.1163	0.1799
0.27	0.1247	0.1929
0.28	0.1338	0.2070
0.29	0.1442	0.2231
0.3	0.1512	0.2339
0.31	0.1609	0.2489
0.32	0.1706	0.2639
0.33	0.181	0.2800
0.34	0.1913	0.2960
0.35	0.2016	0.3119
0.36	0.2126	0.3289
0.37	0.2243	0.3470
0.38	0.2359	0.3650
0.39	0.2475	0.3829
0.4	0.2598	0.4019
0.41	0.2721	0.4210
0.42	0.285	0.4409
0.43	0.2986	0.4620
0.44	0.3122	0.4830

	007 4ft HL flume	
H, ft	FLOW MGD	FLOW CFS
0.01	0.001	0.0015
0.02	0.003	0.0046
0.03	0.0078	0.0121
0.04	0.0129	0.0200
0.05	0.0187	0.0289
0.06	0.0252	0.0390
0.07	0.0323	0.0500
0.08	0.0401	0.0620
0.09	0.0485	0.0750
0.1	0.0575	0.0890
0.11	0.0666	0.1030
0.12	0.0769	0.1190
0.13	0.0873	0.1351
0.14	0.0982	0.1519
0.15	0.1099	0.1700
0.16	0.1228	0.1900
0.17	0.1364	0.2110
0.18	0.1499	0.2319
0.19	0.1648	0.2550
0.2	0.1797	0.2780
0.21	0.1952	0.3020
0.22	0.2113	0.3269
0.23	0.2275	0.3520
0.24	0.2443	0.3780
0.25	0.2618	0.4050
0.26	0.2805	0.4340
0.27	0.3005	0.4649
0.28	0.3212	0.4969
0.29	0.3425	0.5299
0.3	0.3652	0.5650
0.31	0.3878	0.6000
0.32	0.4104	0.6349
0.33	0.433	0.6699
0.34	0.4556	0.7049
0.35	0.4783	0.7400
0.36	0.5041	0.7799
0.37	0.53	0.8200
0.38	0.5558	0.8599
0.39	0.5817	0.8999
0.4	0.6075	0.9399
0.41	0.6347	0.9819
0.42	0.6657	1.0299
0.43	0.698	1.0799
0.44	0.7239	1.1199

H, ft	006 3ft H flume FLOW MGD	FLOW CFS
0.45	0.3257	0.5039
0.46	0.34	0.5260
0.47	0.3548	0.5489
0.48	0.3697	0.5720
0.49	0.3852	0.5959
0.5	0.4007	0.6199
0.51	0.4162	0.6439
0.52	0.4324	0.6690
0.53	0.4492	0.6950
0.54	0.466	0.7209
0.55	0.4834	0.7479
0.56	0.5009	0.7749
0.57	0.519	0.8029
0.58	0.5377	0.8319
0.59	0.5565	0.8610
0.6	0.5752	0.8899
0.61	0.5946	0.9199
0.62	0.6146	0.9508
0.63	0.6347	0.9819
0.64	0.6553	1.0138
0.65	0.6767	1.0469
0.66	0.698	1.0799
0.67	0.7193	1.1128
0.68	0.7413	1.1469
0.69	0.7639	1.1818
0.7	0.7885	1.2199
0.71	0.8079	1.2499
0.72	0.8337	1.2898
0.73	0.8596	1.3299
0.74	0.879	1.3599
0.75	0.9048	1.3998
0.76	0.9307	1.4399
0.77	0.9565	1.4798
0.78	0.9824	1.5199
0.79	1.008	1.5595
0.8	1.034	1.5997
0.81	1.066	1.6492
0.82	1.092	1.6894
0.83	1.118	1.7297
0.84	1.15	1.7792
0.85	1.176	1.8194
0.86	1.202	1.8596
0.87	1.234	1.9091
0.88	1.267	1.9602

H, ft	007 4ft HL flume FLOW MGD	FLOW CFS
0.45	0.7562	1.1699
0.46	0.7885	1.2199
0.47	0.8208	1.2699
0.48	0.8531	1.3198
0.49	0.8854	1.3698
0.5	0.9177	1.4198
0.51	0.9565	1.4798
0.52	0.9888	1.5298
0.53	1.028	1.5904
0.54	1.06	1.6399
0.55	1.099	1.7003
0.56	1.137	1.7591
0.57	1.176	1.8194
0.58	1.215	1.8797
0.59	1.254	1.9401
0.6	1.299	2.0097
0.61	1.338	2.0700
0.62	1.383	2.1396
0.63	1.428	2.2093
0.64	1.474	2.2804
0.65	1.519	2.3500
0.66	1.564	2.4197
0.67	1.609	2.4893
0.68	1.655	2.5605
0.69	1.706	2.6394
0.7	1.751	2.7090
0.71	1.803	2.7894
0.72	1.855	2.8699
0.73	1.907	2.9503
0.74	1.958	3.0292
0.75	2.01	3.1097
0.76	2.062	3.1901
0.77	2.12	3.2799
0.78	2.172	3.3603
0.79	2.223	3.4392
0.8	2.281	3.5289
0.81	2.333	3.6094
0.82	2.391	3.6991
0.83	2.449	3.7888
0.84	2.508	3.8801
0.85	2.572	3.9791
0.86	2.637	4.0797
0.87	2.702	4.1803
0.88	2.766	4.2793

H, ft	006 3ft H flume FLOW MGD	FLOW CFS
0.89	1.293	2.0004
0.9	1.325	2.0499
0.91	1.357	2.0994
0.92	1.39	2.1505
0.93	1.422	2.2000
0.94	1.454	2.2495
0.95	1.486	2.2990
0.96	1.519	2.3500
0.97	1.558	2.4104
0.98	1.59	2.4599
0.99	1.622	2.5094
1	1.661	2.5697
1.01	1.693	2.6192
1.02	1.732	2.6796
1.03	1.764	2.7291
1.04	1.803	2.7894
1.05	1.842	2.8498
1.06	1.881	2.9101
1.07	1.92	2.9704
1.08	1.958	3.0292
1.09	1.997	3.0896
1.1	2.036	3.1499
1.11	2.075	3.2102
1.12	2.113	3.2690
1.13	2.159	3.3402
1.14	2.197	3.3990
1.15	2.236	3.4593
1.16	2.281	3.5289
1.17	2.327	3.6001
1.18	2.365	3.6589
1.19	2.411	3.7301
1.2	2.456	3.7997
1.21	2.501	3.8693
1.22	2.546	3.9389
1.23	2.592	4.0101
1.24	2.637	4.0797
1.25	2.682	4.1493
1.26	2.734	4.2298
1.27	2.779	4.2994
1.28	2.824	4.3690
1.29	2.876	4.4495
1.3	2.928	4.5299
1.31	2.973	4.5995
1.32	3.025	4.6800

H, ft	007 4ft HL flume FLOW MGD	FLOW CFS
0.89	2.831	4.3798
0.9	2.895	4.4789
0.91	2.96	4.5794
0.92	3.025	4.6800
0.93	3.096	4.7898
0.94	3.167	4.8997
0.95	3.238	5.0095
0.96	3.309	5.1194
0.97	3.38	5.2292
0.98	3.451	5.3390
0.99	3.522	5.4489
1	3.593	5.5587
1.01	3.671	5.6794
1.02	3.749	5.8001
1.03	3.826	5.9192
1.04	3.904	6.0399
1.05	3.981	6.1590
1.06	4.059	6.2797
1.07	4.136	6.3988
1.08	4.214	6.5195
1.09	4.291	6.6386
1.1	4.369	6.7593
1.11	4.453	6.8892
1.12	4.537	7.0192
1.13	4.621	7.1491
1.14	4.705	7.2791
1.15	4.789	7.4091
1.16	4.873	7.5390
1.17	4.957	7.6690
1.18	5.041	7.7989
1.19	5.125	7.9289
1.2	5.209	8.0588
1.21	5.3	8.1996
1.22	5.397	8.3497
1.23	5.494	8.4998
1.24	5.59	8.6483
1.25	5.687	8.7984
1.26	5.748	8.8927
1.27	5.881	9.0985
1.28	5.987	9.2625
1.29	6.075	9.3986
1.3	6.172	9.5487
1.31	6.269	9.6988
1.32	6.398	9.8983

H, ft	006 3ft H flume FLOW MGD	FLOW CFS
1.33	3.076	4.7589
1.34	3.128	4.8393
1.35	3.18	4.9198
1.36	3.232	5.0002
1.37	3.283	5.0791
1.38	3.335	5.1596
1.39	3.387	5.2400
1.4	3.445	5.3298
1.41	3.496	5.4087
1.42	3.555	5.4999
1.43	3.606	5.5788
1.44	3.665	5.6701
1.45	3.723	5.7599
1.46	3.774	5.8388
1.47	3.833	5.9300
1.48	3.891	6.0198
1.49	3.949	6.1095
1.5	4.007	6.1992
1.51	4.072	6.2998
1.52	4.13	6.3895
1.53	4.188	6.4793
1.54	4.253	6.5798
1.55	4.311	6.6695
1.56	4.375	6.7686
1.57	4.44	6.8691
1.58	4.498	6.9589
1.59	4.563	7.0594
1.6	4.628	7.1600
1.61	4.692	7.2590
1.62	4.757	7.3596
1.63	4.828	7.4694
1.64	4.892	7.5684
1.65	4.957	7.6690
1.66	5.028	7.7788
1.67	5.093	7.8794
1.68	5.164	7.9892
1.69	5.235	8.0991
1.7	5.3	8.1996
1.71	5.371	8.3095
1.72	5.442	8.4193

H, ft	007 4ft HL flume FLOW MGD	FLOW CFS
1.33	6.528	10.0995
1.34	6.592	10.1985
1.35	6.722	10.3996
1.36	6.786	10.4986
1.37	6.915	10.6982
1.38	6.98	10.7988
1.39	7.109	10.9983
1.4	7.239	11.1995
1.41	7.368	11.3990
1.42	7.497	11.5986
1.43	7.562	11.6992
1.44	7.691	11.8987
1.45	7.82	12.0983
1.46	7.949	12.2979
1.47	8.014	12.3985
1.48	8.143	12.5980
1.49	8.273	12.7992
1.5	8.402	12.9987
1.51	8.531	13.1983
1.52	8.596	13.2989
1.53	8.725	13.4984
1.54	8.854	13.6980
1.55	8.984	13.8991
1.56	9.113	14.0987
1.57	9.242	14.2983
1.58	9.371	14.4979
1.59	9.501	14.6990
1.6	9.63	14.8986
1.61	9.759	15.0981
1.62	9.888	15.2977
1.63	10.02	15.5019
1.64	10.15	15.7031
1.65	10.28	15.9042
1.66	10.47	16.1981
1.67	10.6	16.3993
1.68	10.73	16.6004
1.69	10.86	16.8015
1.7	10.99	17.0026
1.71	11.12	17.2038
1.72	11.25	17.4049

Appendix F
Flow Event Summary Data

ATTACHMENT 1

Priority Pollutant Scan Calculation

Permittee	El Dorado Chemical - Outfall 007			
Receiving Stream	unnamed tributary of Flat Creek			
Permit number	AR0000752		Qe for:	
Flow (Qe)	0.65	MGD	Municipalities = Design Flow	
Flow (Qe)	1.00	CFS	Industrial Discharges = Highest monthly average flow of the last two years	
7Q10 =	15.00	CFS		
Long Term Average =	0.00	CFS	TSS for:	
Using Diffusers	no	Yes/No	Gulf Coastal 5.5 mg/l	Ouach Mount = 2 mg/l
pH =	7.26	S.U.	Ark River Valley = 3 mg/l	Ozark Highands = 2.5 mg/l
Total Hardness	31.00	mg/l	Boston Mount = 1.3 mg/l	Delta = 8 mg/l
TSS	5.5	mg/l		
(% of 7Q10 for Chronic)	0.67		Total Hardness for:	
(% of 7Q10 for Acute)	0.33		Arkansas River = 125 mg/l	Red River = 211 mg/l
			Ouachita River = 28 mg/l	St. Francis River = 103 mg/l

For the following receiving enter 0.06 in cell "C17 White River = 116 mg/l

Mississippi, Arkansas, Red River.	Gulf Coastal = 31 mg/l	Ouachita Mount = 31 mg/l
White (Below confluence with Black River)	Ozark Highlands = 148 mg/l	Ark River Valley = 25 mg/l
Ouachita (below Confluence with Little Miss. Rive	Boston Mount = 25 mg/l	Delta = 81 mg/l

4.37

Upstream Flow (Qb) = 10.05 (Chronic) 4.95 (Acute)
Pollutant Concentration Upstream (Cb) = 0 ug/l
Water Effect Ratio(WER) 1.00
Cancer Risk Level: 1.00E-05 (STATE); 1.00e-6 (EPA)

IWC = instream concentration of pollutant after mixing with the receiving stream
IWC = (Ce*Qe + Cb*Qb)/(Qb +Qe)
Ce = Pollutant concentration in the effluent (ug/l) : Reported value as Total Recov

	Reported Value (Ce) (ug/l)	Ce*2.13 (ug/l)	EPA Acute (ug/l)	STATE Acute (ug/l)	IWC Acute (ug/l)	EPA Chronic (ug/l)	STATE Chronic (ug/l)	IWC Chronic (ug/l)	EPA Bioacc. (ug/l)	STATE Bioacc. (ug/l)	IWC Bioacc. (ug/l)	Violation of Acute	Chr	Bio
METALS and CYANIDE														
1. Antimony Total	0.00	0.00	9000	**********	0.00	1600	**********	0.00	4300	**********	0.00	NO	NO	NO
2. Arsenic Total	0.00	0.00	633.81	**********	0.00	334.51	**********	0.00	1.40	**********	0.00	NO	NO	NO
3. Beryllium Total	0.00	0.00	130.00	**********	0.00	5.30	**********	0.00	**********	0.076	0.00	NO	NO	NO
4. Cadmium Total*	0.00	0.00	**********	4.37	0.00	**********	1.82	0.00	**********	**********	0.00	NO	NO	NO
6. Chromium (Tri)*	0.00	0.00	**********	1006.35	0.00	**********	326.45	0.00	**********	**********	0.00	NO	NO	NO
7. Chromium (hex)	0.00	0.00	**********	15.71	0.00	**********	10.58	0.00	**********	**********	0.00	NO	NO	NO
8. Copper Total*	0.00	0.00	**********	14.79	0.00	**********	10.93	0.00	**********	**********	0.00	NO	NO	NO
9. Lead Total*	68.90	68.90	**********	87.29	11.58	**********	3.40	6.24	**********	**********	68.90	NO	Yes	NO
10. Mercury Total*	0.00	0.00	**********	6.70	0.00	**********	0.0120	0.00	0.15	**********	0.00	NO	NO	NO
12. Nickel Total*	0.00	0.00	**********	1061.45	0.00	**********	117.88	0.00	4600	**********	0.00	NO	NO	NO
13. Selenium Total	0.00	0.00	**********	20.00	0.00	**********	5.00	0.00	**********	**********	0.00	NO	NO	NO
14. Silver Total*	0.00	0.00	**********	1.5097	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
15. Thallium Total	0.00	0.00	1400	**********	0.00	40.00	**********	0.00	6.30	**********	0.00	NO	NO	NO
16. Zinc Total*	471.00	471.00	**********	130.87	79.16	**********	119.50	42.62	**********	**********	471.00	NO	NO	NO
129. Phenols, Total	0.00	0.00	**********	**********	**********	**********	**********	**********	**********	**********	0.00			NO
17. Cyanide Total	0.00	0.00	**********	22.36	0.00	**********	5.20	0.00	220000	**********	0.00	NO	NO	NO

* See linear partition coefficient (Page 6)

	Reported	Ce*2.13	EPA	STATE	IWC	EPA	STATE	IWC	EPA	STATE	IWC	Violation of

	Value (Ce) (ug/l)	(ug/l)	Acute (ug/l)	Acute (ug/l)	Acute (ug/l)	Chronic (ug/l)	Chronic (ug/l)	Chronic (ug/l)	Bioacc. (ug/l)	Bioacc. (ug/l)	Bioacc. (ug/l)	Acute	Chr	Bio
DIOXIN														
18. 2-3-7-8-TCDD	0.00	0.00	0.01	**********	0.00	**********	**********	0.00	1.40E-07	1.00E-09	0.00	NO	NO	NO
VOLATILE COMPOUNDS														
19. Acrolein	0.00	0.00	68.00	**********	0.00	21.00	**********	0.00	780.00	**********	0.00	NO	NO	NO
20. Acrylonitrile	0.00	0.00	7550	**********	0.00	2600	**********	0.00	6.60	**********	0.00	NO	NO	NO
21. Benzene	0.00	0.00	5300	**********	0.00	**********	**********	0.00	710.00	**********	0.00	NO	NO	NO
22. Bromoform	0.00	0.00	**********	**********	0.00	**********	**********	0.00	3600.00	**********	0.00	NO	NO	NO
23. Carbon Tet	0.00	0.00	35200	**********	0.00	**********	**********	0.00	44.00	**********	0.00	NO	NO	NO
24. Chlorobenzene	0.00	0.00	250.00	**********	0.00	50.00	**********	0.00	2.10E+04	**********	0.00	NO	NO	NO
25. Chlorodibromomethane	0.00	0.00	**********	**********	0.00	**********	**********	0.00	340.00	**********	0.00	NO	NO	NO
26. Chloroethane	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
27. 2-Chloroethylvinyl ether	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
28. Chloroform	0.00	0.00	28900	**********	0.00	1240	**********	0.00	4700.00	**********	0.00	NO	NO	NO
29. Dichlorobromomethane	0.00	0.00	**********	**********	0.00	**********	**********	0.00	220.00	**********	0.00	NO	NO	NO
30. 1-1-Dichlorethane	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
31. 1-2-Dichloroethane	0.00	0.00	118000	**********	0.00	20000	**********	0.00	990.00	**********	0.00	NO	NO	NO
32. 1-1-Dichlorethylene	0.00	0.00	11600	**********	0.00	**********	**********	0.00	32.00	**********	0.00	NO	NO	NO
33. 1,2 Dichloropropane	0.00	0.00	23000	**********	0.00	5700	**********	0.00	**********	**********	0.00	NO	NO	NO
34. 1,3 Dichloropropylene	0.00	0.00	6060	**********	0.00	244.00	**********	0.00	1700.00	**********	0.00	NO	NO	NO
35. Ethylbenzene	0.00	0.00	32000	**********	0.00	**********	**********	0.00	29000.00	**********	0.00	NO	NO	NO
37. Methyl Chloride	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
36. Methyl bromide	0.00	0.00	**********	**********	0.00	**********	**********	0.00	4000.00	**********	0.00	NO	NO	NO
38. Methylene chloride	0.00	0.00	**********	**********	0.00	**********	**********	0.00	16000.00	**********	0.00	NO	NO	NO
39. 1-1-2-2-Tetrachloroethane	0.00	0.00	9320	**********	0.00	2400	**********	0.00	110.00	**********	0.00	NO	NO	NO
40. Tetrachloroethylene	0.00	0.00	5280	**********	0.00	840	**********	0.00	88.50	**********	0.00	NO	NO	NO
41. Toluene	0.00	0.00	17500	**********	0.00	**********	**********	0.00	2.0E+05	**********	0.00	NO	NO	NO
42. 1,2-trans-dichloroethylene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
44. 1-1-2-Trichloroethane	0.00	0.00	18000	**********	0.00	9400	**********	0.00	420.00	**********	0.00	NO	NO	NO
43. 1-1-1-Trichloroethane	0.00	0.00	18000	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
45. Trichloroethylene	0.00	0.00	45000	**********	0.00	21900	**********	0.00	810.00	**********	0.00	NO	NO	NO
46. Vinyl Chloride	0.00	0.00	**********	**********	0.00	**********	**********	0.00	5250.00	**********	0.00	NO	NO	NO

	Reported Value (Ce) (ug/l)	Ce*2.13 (ug/l)	EPA Acute (ug/l)	STATE Acute (ug/l)	IWC Acute (ug/l)	EPA Chronic (ug/l)	STATE Chronic (ug/l)	IWC Chronic (ug/l)	EPA Bioacc. (ug/l)	STATE Bioacc. (ug/l)	IWC Bioacc. (ug/l)	Violation of Acute	Chr	Bio
ACID COMPOUNDS														
47. 2-Chlorophenol	0.00	0.00	4380	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
48. 2-4-Dichlorphenol	0.00	0.00	2020	**********	0.00	365	**********	0.00	**********	**********	0.00	NO	NO	NO
49. 2-4 Dimethylphenol	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
50. 4,6-Dinitro-o-Cresol	0.00	0.00	**********	**********	0.00	**********	**********	0.00	765.00	**********	0.00	NO	NO	NO
51. 2,4-Dinitrophenol	0.00	0.00	**********	**********	0.00	**********	**********	0.00	14000	**********	0.00	NO	NO	NO
52.-53. Nitrophenols	0.00	0.00	230	**********	0.00	150	**********	0.00	**********	**********	0.00	NO	NO	NO
54. 4 Chloro-3-methylphenol	0.00	0.00	30.00	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
55. Pentachlorophenol	0.00	0.00	11.78	11.78	0.00	7.44	7.44	0.00	82.00	**********	0.00	NO	NO	NO
56. Phenol	0.00	0.00	10200	**********	0.00	2560	**********	0.00	4600000	**********	0.00	NO	NO	NO
57. 2-4-6-Trichlorophenol	0.00	0.00	**********	**********	0.00	**********	**********	0.00	65.00	**********	0.00	NO	NO	NO
BASE/NEUTRAL COMPOUNDS														
58. Acenaphthene	0.00	0.00	1700	**********	0.00	520	**********	0.00	**********	**********	0.00	NO	NO	NO
59. Acenapthylene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
60. Anthracene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	110000.00	**********	0.00	NO	NO	NO
61. Benzidine	0.00	0.00	2500	**********	0.00	**********	**********	0.00	5.4E-03	**********	0.00	NO	NO	NO
62. Benzo(a) anthracene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	0.310	**********	0.00	NO	NO	NO
63. Benzo(a) pyrene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	0.310	**********	0.00	NO	NO	NO
64. 3,4-benzoflouranthene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	0.310	**********	0.00	NO	NO	NO
65. Benzo(g,h,i)perylene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
66. Benzo(k) fluoranthene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	0.310	**********	0.00	NO	NO	NO
67. Bis(2-chloroethoxy)methane	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
68. Bis(2-cloroethly) Ether	0.00	0.00	**********	**********	0.00	**********	**********	0.00	14.00	**********	0.00	NO	NO	NO
69. Bis(2-Chloroisopropyl) eth	0.00	0.00	**********	**********	0.00	**********	**********	0.00	1.7E+05	**********	0.00	NO	NO	NO
70. Bis(2-ethylhexyl)phthalate	0.00	0.00	**********	**********	0.00	**********	**********	0.00	59.00	**********	0.00	NO	NO	NO
71. 4-Bromophenyl phenyl ether	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
72. Butylbenzy phthalate	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
73. 2-chloronapthalene	0.00	0.00	1600	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
74. 4-chlorophenyl phenyl ether	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
75. Chrysene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	0.310	**********	0.00	NO	NO	NO
76. Dibenzo(a,h)anthracene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	0.310	**********	0.00	NO	NO	NO
77-79. Dichlorobenzene(1,2-1,3-1,4)	0.00	0.00	1120	**********	0.00	763	**********	0.00	2600.0	**********	0.00	NO	NO	NO
80. 3,3' Dichlorobenzidine	0.00	0.00	**********	**********	0.00	**********	**********	0.00	0.770	**********	0.00	NO	NO	NO
81. Diethyl Phthalate	0.00	0.00	**********	**********	0.00	**********	**********	0.00	1.2E+05	**********	0.00	NO	NO	NO
82. Dimethyl phthalate	0.00	0.00	**********	**********	0.00	**********	**********	0.00	2.9E+06	**********	0.00	NO	NO	NO
83. Di-n-Butyl phthalate	0.00	0.00	**********	**********	0.00	**********	**********	0.00	1.2E+04	**********	0.00	NO	NO	NO
84. 2-4-Dinitrotoluene	0.00	0.00	330	**********	0.00	230	**********	0.00	91.00	**********	0.00	NO	NO	NO
85. 2-6-Dinitrotoluene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
86. Di-n-octyl phthalate	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
87. 1,2-diphenylhydrazine	0.00	0.00	270	**********	0.00	**********	**********	0.00	5.400	**********	0.00	NO	NO	NO
88. Fluoranthene	0.00	0.00	3980	**********	0.00	**********	**********	0.00	370.00	**********	0.00	NO	NO	NO
89. Fluorene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	14000.000	**********	0.00	NO	NO	NO
90. Hexachlorobenzene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	0.00770	**********	0.00	NO	NO	NO
91. Hexachlorobutadiene	0.00	0.00	90.00	**********	0.00	9.30	**********	0.00	500.000	**********	0.00	NO	NO	NO
92. Hexachlorocyclopentadiene	0.00	0.00	7.00	**********	0.00	5.20	**********	0.00	1.70E+04	**********	0.00	NO	NO	NO
93. Hexachloroethane	0.00	0.00	980	**********	0.00	540	**********	0.00	89.00	**********	0.00	NO	NO	NO
Hexachlorocyclohexane	0.00	0.00	2.00	2.00	0.00	0.08	0.08	0.00	**********	**********	0.00	NO	NO	NO
94. Indeno(1,2,3-cd)pyrene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	0.31000	**********	0.00	NO	NO	NO
95. Isophorone	0.00	0.00	117000	**********	0.00	**********	**********	0.00	6000	**********	0.00	NO	NO	NO
96. Naphthalene	0.00	0.00	2300	**********	0.00	620	**********	0.00	**********	**********	0.00	NO	NO	NO
97. Nitrobenzene	0.00	0.00	27000	**********	0.00	**********	**********	0.00	1900.00	**********	0.00	NO	NO	NO
98. N-nitrosodimethylamine	0.00	0.00	**********	**********	0.00	**********	**********	0.00	81.00	**********	0.00	NO	NO	NO
99. N-nitrosodi-n-propylamine	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
100. N-nitrosodiphenylamine	0.00	0.00	**********	**********	0.00	**********	**********	0.00	160.00	**********	0.00	NO	NO	NO
101. Phenanthrene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO
103. 1,2,4-trichlorobenzene	0.00	0.00	**********	**********	0.00	**********	**********	0.00	**********	**********	0.00	NO	NO	NO

	Reported Value (Ce) (ug/l)	Ce*2.13 (ug/l)	EPA Acute (ug/l)	STATE Acute (ug/l)	IWC Acute (ug/l)	EPA Chronic (ug/l)	STATE Chronic (ug/l)	IWC Chronic (ug/l)	EPA Bioacc. (ug/l)	STATE Bioacc. (ug/l)	IWC Bioacc. (ug/l)	Violation of Acute	Chr	Bio
PESTICIDES														
104. Aldrin	0.00	0.00	3.00	3.00	0.00	**********	**********	0.00	0.00140	**********	0.00	NO	NO	NO
105. Alpha-BHC	0.00	0.00	**********	2.00	0.00	**********	0.08	0.00	1.300E-01	0.0373	0.00	NO	NO	NO
106. Beta-BHC	0.00	0.00	**********	2.00	0.00	**********	0.08	0.00	0.4600	**********	0.00	NO	NO	NO
107. Gamma-BHC	0.00	0.00	2.00	2.00	0.00	0.08	0.08	0.00	0.6300	**********	0.00	NO	NO	NO
108. Delta-BHC	0.00	0.00	**********	2.00	0.00	**********	0.08	0.00	**********	**********	0.00	NO	NO	NO
109. Chlordane	0.00	0.00	2.40	2.40	0.00	0.0043	0.0043	0.00	5.900E-03	0.0050	0.00	NO	NO	NO
110. 4,4'-DDT	0.00	0.00	1.10	1.10	0.00	0.0010	0.0010	0.00	0.0059	**********	0.00	NO	NO	NO
111. 4,4'-DDE	0.00	0.00	**********	1.10	0.00	**********	0.0010	0.00	0.0059	**********	0.00	NO	NO	NO
112. 4,4'-DDD	0.00	0.00	**********	1.10	0.00	**********	0.0010	0.00	0.0084	**********	0.00	NO	NO	NO
113. Dieldrin	0.00	0.00	2.50	2.50	0.00	0.0019	0.0019	0.00	1.400E-03	0.0012	0.00	NO	NO	NO
114. Alpha-endosulfan	0.00	0.00	0.22	0.22	0.00	0.0560	0.0560	0.00	2.00	**********	0.00	NO	NO	NO
115. Beta-endosulfan	0.00	0.00	0.22	0.22	0.00	0.0560	0.0560	0.00	2.00	**********	0.00	NO	NO	NO
116. Endosulfan sulfate	0.00	0.00	**********	0.22	0.00	**********	0.0560	0.00	2.00	**********	0.00	NO	NO	NO
117. Endrin	0.00	0.00	0.18	0.18	0.00	0.0023	0.0023	0.00	8.100E-01	**********	0.00	NO	NO	NO
118. Endrin aldehyde	0.00	0.00	**********	0.18	0.00	**********	0.0023	0.00	8.1000E-01	**********	0.00	NO	NO	NO
119. Heptachlor	0.00	0.00	0.52	0.52	0.00	0.0038	0.0038	0.00	0.0021	**********	0.00	NO	NO	NO
120. Heptachlor epoxide	0.00	0.00	0.52	0.52	0.00	0.0038	0.0038	0.00	0.0011	**********	0.00	NO	NO	NO
121. PCB-1242	0.00	0.00	**********	**********	0.00	0.0140	0.0140	0.00	4.500E-04	4.00E-04	0.00	NO	NO	NO
122. PCB-1254	0.00	0.00	**********	**********	0.00	0.0140	0.0140	0.00	4.500E-04	4.00E-04	0.00	NO	NO	NO
123. PCB-1221	0.00	0.00	**********	**********	0.00	0.0140	0.0140	0.00	4.500E-04	4.00E-04	0.00	NO	NO	NO
124. PCB-1232	0.00	0.00	**********	**********	0.00	0.0140	0.0140	0.00	4.500E-04	4.00E-04	0.00	NO	NO	NO
125. PCB-1248	0.00	0.00	**********	**********	0.00	0.0140	0.0140	0.00	4.500E-04	4.00E-04	0.00	NO	NO	NO
126. PCB-1260	0.00	0.00	**********	**********	0.00	0.0140	0.0140	0.00	4.500E-04	4.00E-04	0.00	NO	NO	NO
127. PCB-1016	0.00	0.00	**********	**********	0.00	0.0140	0.0140	0.00	4.500E-04	4.00E-04	0.00	NO	NO	NO
128. Toxaphene	0.00	0.00	0.73	0.73	0.00	0.00020	0.0002	0.00	4.500E-04	0.0063	0.00	NO	NO	NO
130. Chlorpyrifos	0.00	0.00	0.083	0.083	0.00	0.041	0.041	0.00	**********	**********	0.00	NO	NO	NO

	Reported Value (Ce) (ug/l)	Ce*2.13 (ug/l)	STATE Acute (ug/l)	IWC Acute (ug/l)	STATE Chronic (ug/l)	IWC Chronic (ug/l)	STATE Bioacc. (ug/l)	IWC Bioacc. (ug/l)	Violation of Acute	Chr	Bio
AWQ, Reg. No. 2											
Alpha-BHC	0.00	0.00	2.00	0.00	0.08	0.00	0.0373	0.00	NO	NO	NO
Beta-BHC	0.00	0.00	2.00	0.00	0.08	0.00			NO	NO	
Gamma-BHC	0.00	0.00	2.00	0.00	0.08	0.00			NO	NO	
Delta-BHC	0.00	0.00	2.00	0.00	0.08	0.00			NO	NO	
Pentachlorophenol	0.00	0.00	11.78	0.00	7.44	0.00			NO	NO	
Aldrin	0.00	0.00	3.00	0.00					NO		
Chlordane	0.00	0.00	2.40	0.00	0.0043	0.00	0.005	0.00	NO	NO	NO
4,4'-DDT	0.00	0.00	1.10	0.00	0.0010	0.00			NO	NO	
4,4'-DDE	0.00	0.00	1.10	0.00	0.0010	0.00			NO	NO	
4,4'-DDD	0.00	0.00	1.10	0.00	0.0010	0.00			NO	NO	
Dieldrin	0.00	0.00	2.50	0.00	0.0019	0.00	0.0012	0.00	NO	NO	NO
Alpha-endosulfan	0.00	0.00	0.22	0.00	0.0560	0.00			NO	NO	
Beta-endosulfan	0.00	0.00	0.22	0.00	0.0560	0.00			NO	NO	
Endosulfan sulfate	0.00	0.00	0.22	0.00	0.0560	0.00			NO	NO	
Endrin	0.00	0.00	0.18	0.00	0.0023	0.00			NO	NO	
Endrin aldehyde	0.00	0.00	0.18	0.00	0.0023	0.00			NO	NO	
Heptachlor	0.00	0.00	0.52	0.00	0.0038	0.00			NO	NO	
Heptachlor epoxide	0.00	0.00	0.52	0.00	0.0038	0.00			NO	NO	
Toxaphene	0.00	0.00	0.73	0.00	0.0002	0.00	0.0063	0.00	NO	NO	NO
Chlorpyrifos	0.00	0.00	0.083	0.00	0.0410	0.00			NO	NO	
Cadmium Total*	0.00	0.00	4.37	0.00	1.82	0.00			NO	NO	
Chromium (hex)	0.00	0.00	15.71	0.00	10.58	0.00			NO	NO	
Copper Total*	0.00	0.00	14.79	0.00	10.93	0.00			NO	NO	
Lead Total*	68.90	146.76	87.29	24.67	3.40	13.28			NO	Yes	
Mercury Total*	0.00	0.00	6.70	0.00	0.0120	0.00			NO	NO	
Nickel Total*	0.00	0.00	1061.45	0.00	117.88	0.00			NO	NO	
Selenium Total	0.00	0.00	20.00	0.00	5.00	0.00			NO	NO	
Silver Total*	0.00	0.00	1.5097	0.00					NO		
Zinc Total*	471.00	1003.23	130.87	168.61	119.50	90.79			Yes	NO	
Chromium (Tri)*	0.00	0.00	1006.35	0.00	326.45	0.00			NO	NO	
Cyanide Total	0.00	0.00	22.36	0.00	5.20	0.00			NO	NO	
Beryllium Total	0.00	0.00					0.076	0.00			NO
PCB-1242	0.00	0.00			0.0140	0.00	4.00E-04	0.00		NO	NO
PCB-1254	0.00	0.00			0.0140	0.00	4.00E-04	0.00		NO	NO
PCB-1221	0.00	0.00			0.0140	0.00	4.00E-04	0.00		NO	NO
PCB-1232	0.00	0.00			0.0140	0.00	4.00E-04	0.00		NO	NO
PCB-1248	0.00	0.00			0.0140	0.00	4.00E-04	0.00		NO	NO
PCB-1260	0.00	0.00			0.0140	0.00	4.00E-04	0.00		NO	NO
PCB-1016	0.00	0.00			0.0140	0.00	4.00E-04	0.00		NO	NO
2-3-7-8-TCDD	0.00	0.00					1E-06	0.00			NO

* See Linear Partition Coefficient (Page 6)

Linear Partition Coefficients

Metals	Streams Kpo	a
Arsenic	**********	-0.73
Cadmium	**********	-1.13
Chromium(3)	**********	-0.93
Copper	**********	-0.74
Lead	**********	-0.80
Mercury	**********	-1.14
Nickel	**********	-0.57
Zinc	**********	-0.70
Silver	**********	-1.03

Kp = Kpo X TSS^a

Kp = Linear Partition Coefficient
TSS = Total Suspended Solids (mg/l)
Kpo = found from above table
a = found from above table

C/Ct = 1 /(1 + Kp X TSS X10^-6)

C / Ct = Fraction of Metal Dissolved

Metals	Streams Kp	C / Ct
Arsenic	138285	0.5680
Cadmium	582707	0.2378
Chromium (3)	688338	0.2089
Copper	294554	0.3817
Lead	715926	0.2025
Mercury	415322	0.3045
Nickel	185434	0.4951
Zinc	379015	0.3242
Silver	414608	0.3048

Total Metal = Dissolved Metal / (C/Ct)

AQUATIC LIFE CRITERIA (DISSOLVED ACUTE VALUES)

Pollutant	Dissolved(ug/l)	Formula
Cadmium	1.04	WER X Conversion Factor* X e[1.128ln(hardness)]-3.828
Chromium(III	210.28	WER X 0.316 X e[0.819ln(hardness)]+3.688
Chromium(V	15.71	WER X 0.982 X 16
Copper	5.64	WER X 0.96 X e[0.9422ln(hardness)]-1.464
Lead	17.68	WER X Conversion Factor** X e[1.273ln(hardness)]-1.460
Mercury	2.04	WER X 0.85 X 2.4
Nickel	525.50	WER X 0.998 X e[0.8460ln(hardness)]+3.3612
Silver	0.4602	WER X 0.85 X e[1.72ln(hardness)]-6.52
Zinc	42.43	WER X 0.978 X e[0.8473ln(hardness)]+0.8604

* 1.136672 - [(ln hardness)(0.041838)]
** 1.46203 - [(ln hardness)(0.145712)]

AQUATIC LIFE CRITERIA (DISSOLVED CHRONIC VALUES)

Pollutant	Dissolved(ug/l)	Formula
Cadmium	0.43	WER X Conversion Factor* X e[0.7852ln(hardness)]-3.490
Chromium(III	68.21	WER X 0.86 X e[0.819ln(hardness)]+1.561
Chromium(V	10.58	WER X 10
Copper	4.17	WER X 0.96 X e[0.8545ln(hardness)]-1.465
Lead	0.69	WER X Conversion Factor** X e[1.273ln(hardness)]-4.705
Nickel	58.42	WER X 0.997 X e[0.8460ln(hardness)]+1.1645
Zinc	38.74	WER X 0.986 X e[0.8473ln(hardness)]+0.7614

* 1.101672 - [(ln hardness)(0.041838)]
** 1.46203 - [(ln hardness)(0.145712)]

EL DORADO CHEMICAL - AR0000752
DMR DATA FROM 03/01/05 THROUGH PRESENT
(LORETTA REIBER/PCS==>LORETTA)

****

* GENERAL FACILITY INFORMATION *

PERMIT NUMBER: AR0000752
FACILITY NAME: EL DORADO CHEMICAL CO, INC
(SEGMENT 2):
(SEGMENT 3):
(SEGMENT 4):

CITY : 28080 EL DORADO
COUNTY: 139 UNION
STATE : AR REGION: 06 SUB-REGION:
USGS HYD BAS CD: 08040202 STREAM SEGMENT: 0070
USGS DESC: LOWER OUACHITA-BAYOU DE LOUTRE
RECEIVING STREAM CLASS CD: MILEAGE INDICATOR: 0.000
RECEIVING WATERS: TRIB,FLAT CK,HAYNES CK,OUACHITA RV
LATITUDE : +3315250 LONGITUDE: -09241200
LAT/LON CODE OF ACCURACY:

MAJOR/MINOR : MAJOR
MAJORS RATING : 085
PREVIOUS RATING: MINOR
ACTIVITY STATUS: ACTIVE
ACTIVITY DATE :
EPA HQ PRIORITY:
REGION PRIORITY: S

TYPE OF OWNERSHIP: PRI PRIVATE
SIC CODE/DESCRIP : 2873 NITROGEN FERTILIZERS
INDUSTRIAL CLASS : R ON ELG
CODE OF FED. REG.: 418B AMMONIA
FED FACILITY ID :
CONSOLIDATED ID :
STATE PERMIT NO : 70-00040

AVERAGE DESIGN FLOW : 2.431
FEDERAL GRANT INDICATOR :
FINAL LIMIT INDICATOR :
WATER QUALITY LIMIT IND :
PRETREAT PGM REQUIRED :
ATTORNEY: ENGINEER : LR

CONTROL AUTHORITY ID :
RECEIVING POTW ID :
RDF1: RDF4: 085 RDF7: STATE
RDF2: T RDF5: 2D RDF8: GREG
RDF3: RDF6: RDF9:
RDF0 :700040

LAT/LON METHOD: U UNKNOWN
LAT/LON SCALE : U UNKNOWN
SLUDGE INDICATOR:
SLUDGE CLASS FAC IND:
SLUDGE USER DEFINED ELEMENT 1:

LAT/LON DATUM : U UNKNOWN
LAT/LON DESCRIPTION: 01099 CENTROID OF PROCESSING AREA

SLUDGE RELATED PERMIT # :
SLUDGE USER DEFINED ELEMENT 2:

ANNUAL DRY SLUDGE PROD: 0000000 DMT/YR

ARCHIVAL DESCRIPTOR: LAST ARCHIVAL DATE: 12/31/00 PERMIT DATE ISSUED: 05/31/02 PERMIT DATE EXPIRED: 06/30/07
NEW SOURCE CODE: ORIGINAL PERMIT ISSUE DATE: 10/22/74 REISSUED NUMBER:

****

* MAILING INFORMATION *

****

FACILITY LOCATION:

EL DORADO CHEMICAL CO., INC.
4500 NORTHWEST AV
(SEC-7 TWP-17S RNG-15W)
EL DORADO
ARKANSAS 71730

OWNER'S ADDRESS:

PRIMARY DMR MAILING ADDRESS:

EL DORADO CHEMICAL CO.
P.O. BOX 231
EL DORADO
ARKANSAS 717310231

OPERATOR'S ADDRESS:

ALTERNATE DMR MAILING ADDRESS:

SLUDGE COMMERCIAL HANDLER ADDRESS:

OWNER'S PHONE:

OPERATORS'S PHONE:

COGNIZANT OFFICIAL: WES MORGAN, MGR ENVIRON COMPL
OFFICIAL'S PHONE: (870) 863-1484

EL DORADO CHEMICAL - AR0000752
DMR DATA FROM 03/01/05 THROUGH PRESENT
(LORETTA REIBER/PCS==>LORETTA)

FACILITY: EL DORADO CHEMICAL CO, INC * PERMIT TRACKING DATA * PERMIT NUMBER: AR0000752
PERMIT TYPE: STANDARD ********** PAGE: 2

TYPE OF APPLICATION: SC SHORT C ORIGINAL ISSUE DATE: 10/22/74 NEW SOURCE CODE:
PERMIT ISSUED BY : S STATE NUMBER OF REISSUES : NEW SOURCE DATE:

PERMIT TRACKING EVENT CODE / DESCRIPTION	ACTUAL DATE	SCHEDULED DATE	PERMIT TRACKING EVENT COMMENTS	RDE1	RDE2
P10-99 APPLICATION RECEIVED	12/21/06				
P20-99 APPLICATION COMPLETE	01/02/07				
P30-99 DRAFT PERMIT/PUBLIC NOTICE	03/22/06				
P40-99 PERMIT ISSUED	05/31/02				
P50-99 PERMIT EXPIRED	06/30/07				
P60-99 PERMIT EFFECTIVE	07/01/02				
P70-99 STAYS	06/27/02		ENTIRE PERMIT APPEALED		02-004
033-06 APPLICATION TO STATE	08/12/80				
034-06 DRAFT PERMIT RECD FROM STATE	03/05/90				
200-99 (REIS) PERMIT REISSUED	05/31/02				
300-99 PERMIT MODIFIED	04/30/04				
310-99 MODIFICATION REQUEST	01/12/05				
350-99 MODIFICATION PUBLIC NOTICE	01/15/04				
360-99 MODIFICATION EFFECTIVE	06/01/04				
600-99 APPLICATION SOLICITATION	02/21/85				
907-99 STATE CERTIFICATION REQUEST	12/04/82				

EL DORADO CHEMICAL - AR0000752
DMR DATA FROM 03/01/05 THROUGH PRESENT
(LORETTA REIBER/PCS==>LORETTA)

QL														QL
	006A	03/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		1.7	1.7				E00	
	006A	04/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		2.6	2.6				E00	
	006A	05/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	05/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	
	006A	06/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	06/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	
	006A	07/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		1.8	1.8				E00	
	006A	08/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	08/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	
	006A	09/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.851	0.851				E00	
	006A	10/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.054	0.054				E00	
	006A	11/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	11/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	
	006A	12/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	12/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	
	006A	01/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.70	0.85				E00	
	006A	02/28/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		1.25	1.25				E00	
	006A	03/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		1.0	1.0				E00	
	006A	04/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	04/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	
	006A	05/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	05/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	
	006A	06/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	06/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	
	006A	07/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.25	0.25				E00	
	006A	08/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.020	0.025				E00	
	006A	09/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	09/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	
	006A	10/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		2.8	3.2				E00	
	006A	11/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P						C	E00	
	006A	11/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1						C	E00	

SUB-TOTAL QUICK LOOK PRINT LINES: 31

10/05 - study shows no rainfall or discharge
others marked SW study shows discharge

EL DORADO CHEMICAL - AR0000752
DMR DATA FROM 03/01/05 THROUGH PRESENT
(LORETTA REIBER/PCS==>LORETTA)

QL													QL
	007A	03/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		2.2	2.2			E00		
	007A	04/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		2.9	2.9			E00		
	007A	05/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	05/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		
	007A	06/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	06/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		
	007A	07/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		1.6	1.6			E00		
	007A	08/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	08/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		
	007A	09/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.05	0.05			E00		
	007A	10/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.105	0.105			E00		
	007A	11/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	11/30/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		
	007A	12/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	12/31/05	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		
	007A	01/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.6	0.7			E00		
	007A	02/28/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		1.25	1.25			E00		
	007A	03/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		1.0	1.0			E00		
	007A	04/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	04/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		
	007A	05/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	05/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		
	007A	06/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	06/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		
	007A	07/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.25	0.25			E00		
	007A	08/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		0.020	0.025			E00		
	007A	09/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	09/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		
	007A	10/31/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1		2	2.1			E00		
	007A	11/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	P					C	E00		
	007A	11/30/06	FLOW, IN CONDUIT OR THRU TREATMENT PLANT	50050	1					C	E00		

SUB-TOTAL QUICK LOOK PRINT LINES: 31

see 006

1 2 3 4 5 6 7 8

EDCC Date / Time	CALC BG CFS	TOT EVENT CF	006 FLOW CFS	006 EVENT CF	007 FLOW CFS	007 EVENT CF		EVENT RATIO BG/006	EVENT RATIO BG/007
3/3/05 14:49	0.57	26.82	0.0105	3.62	0.0015	1.62	1.00	7.42	16.51
3/4/05 7:59	0.34	5.42	0.0073	0.08	0.2110	0.62	2.00	67.76	8.76
3/8/05 14:49	0.58	59.73	0.0045	0.66	0.0000	0.37	3.00	91.00	162.48
3/9/05 17:14	0.54	77.08	0.0073	7.06	0.0046	6.24	4.00	10.92	12.35
3/10/05 9:39	0.55	26.39	0.0073	0.24	0.0015	4.60	5.00	111.39	5.73
3/22/05 10:56	0.92	311.90	0.0347	22.93	0.0046	34.84	6.00	13.60	8.95
3/28/05 10:31	0.63	32.21	0.0105	0.58	0.0015	5.05	7.00	55.91	6.38
4/1/05 5:55	0.57	31.94	0.0009	1.36	0.0200	3.48	8.00	23.42	9.18
4/6/05 14:55	0.56	80.49	0.0009	2.43	0.0015	26.74	9.00	33.06	3.01
4/8/05 16:50	0.37	21.20	0.0009	0.13	0.0200	1.13	10.00	160.86	18.72
4/12/05 12:45	1.11	2501.81	0.0022	323.35	0.0289	563.91	11.00	7.74	4.44
4/26/05 16:40	0.63	58.49	0.0045	9.49	0.0121	21.90	12.00	6.16	2.67
5/5/05 17:20	0.54	30.95	0.0009	0.96	0.0121	1.09	13.00	32.36	28.38
5/10/05 17:30	0.43	26.65	0.0009	0.97	0.0200	1.92	14.00	27.49	13.87
5/14/05 20:21	0.53	20.09	0.0009	2.57	0.0620	8.12	15.00	7.82	2.47
5/16/05 17:31	0.40	40.56	0.0022	1.15	0.0289	3.23	16.00	35.40	12.54
5/19/05 17:51	0.49	25.59	0.0009	6.86	0.0200	3.17	17.00	3.73	8.07
5/25/05 4:16	0.46	21.97	0.0009	12.44	0.0500	6.01	18.00	1.77	3.66
5/29/05 20:31	0.37	57.54	0.0288	14.23	0.1190	31.10	19.00	4.04	1.85
6/20/05 19:06	0.12	12.28	0.0009	1.53	0.0200	5.60	21.00	8.04	2.19
7/6/05 6:51	0.37	34.18	0.0022	51.37	0.1030	130.25	22.00	0.67	0.26
7/12/05 20:12	0.24	4.73	0.0009	11.18	0.0750	18.41	23.00	0.42	0.26
7/14/05 23:50	0.45	28.13	0.0022	56.01	0.1351	88.94	24.00	0.50	0.32
7/15/05 14:55	0.12	2.79	0.0105	1.22	0.0750	2.23	25.00	2.29	1.25
7/17/05 18:25	0.17	3.06	0.0022	9.69	0.0890	9.92	26.00	0.32	0.31
7/18/05 23:25	0.48	38.12	0.0022	51.97	0.1030	63.27	27.00	0.73	0.60
7/28/05 2:00	0.57	42.61	0.0022	95.42	0.0620	132.28	28.00	0.45	0.32
8/15/05 17:30	0.22	2.27	0.0009	5.90	0.0390	2.57	29.00	0.38	0.88
8/16/05 17:15	0.19	8.64	0.0022	0.77	0.0046	0.24	30.00	11.18	36.08
8/23/05 17:39	0.38	6.99	0.0009	2.47	0.0500	4.86	32.00	2.83	1.44
8/27/05 23:09	0.28	50.37	0.0009	125.88	0.0620	142.76	33.00	0.40	0.35
9/25/05 17:39	0.22	233.60	0.0009	331.07	0.0620	525.05	34.00	0.71	0.44
11/1/2005 8:03	0.26	29.79	0.0009	6.20	0.0200	11.48	35.00	4.81	2.60
11/15/2005 20:08	0.57	17.84	0.0105	1.85	0.0121	4.30	36.00	9.65	4.15
12/15/2005 5:36	0.46	35.67	0.0009	2.40		4.85	37.00	14.88	7.36
12/27/2005 16:31	0.64	38.70	0.0009	0.06	0.0046	0.68	38.00	616.08	57.26
12/29/2005 14:16	0.63	14.43	0.0009	0.02	0.0015	0.06	39.00	863.70	229.75
1/10/2006 18:10	0.19	38.91	0.0009	4.38	0.0015	7.02	40.00	8.89	5.54
1/13/2006 9:49	0.15	12.60	0.0009	0.65	0.0121	2.11	41.00	19.36	5.98
1/17/2006 14:39	0.68	130.68	0.0009	20.33	0.0046	48.00	42.00	6.43	2.72
1/23/2006 18:37	0.42	243.76	0.0009	73.91	0.0000	135.35	43.00	3.30	1.80
1/29/2006 15:43	0.41	146.43	0.0009	18.81	0.0121	38.70	44.00	7.78	3.78
1/31/2006 15:48	0.14	1.29	0.0009	0.06	0.0015	0.05	45.00	22.72	27.00
2/25/2006 20:12	1.28	280.33	0.0098	37.66	0.0500	137.85	50.00	7.44	2.03
3/6/2006 16:32	0.25	16.44	0.0004	1.55	0.0200	2.42	51.00	10.63	6.78
3/7/2006 17:17	0.25	10.67	0.0004	0.04	0.0046	0.63	52.00	304.66	17.05
3/8/2006 16:32	0.25	10.34	0.0004	1.03	0.0200	1.65	53.00	10.03	6.27
3/9/2006 16:47	0.66	47.10	0.0004	3.98	0.0500	19.65	54.00	11.83	2.40
3/10/2006 15:37	0.37	9.32	0.0004	0.59	0.0121	0.45	55.00	15.93	20.62
3/11/2006 16:27	0.28	8.98	0.0004	0.03	0.0289	1.10	56.00	328.61	8.18
3/12/2006 15:07	0.29	3.03	0.0004	0.01	0.0289	0.40	57.00	571.75	7.60
3/13/2006 13:47	0.52	36.61	0.0004	1.92	0.0500	11.13	58.00	19.05	3.29
3/14/2006 16:22	0.24	6.81	0.0004	0.02	0.0046	0.17	59.00	393.32	39.46
3/15/2006 15:32	0.29	4.87	0.0004	0.02	0.0121	0.19	60.00	284.54	25.36
3/16/2006 16:37	0.21	1.47	0.0004	0.00	0.0289	0.25	61.00	453.52	5.80
3/21/2006 10:38	0.84	2093.97	0.0004	154.14	0.0390	590.53	62.00	13.58	3.55
3/31/2006 15:03	0.14	2.42	0.0009	0.01	0.0019	0.01	63.00	165.34	196.67
4/2/2006 17:47	0.54	17.20	0.0004	1.30	0.0209	0.68	64.00	13.27	25.46
4/3/2006 16:32	0.19	7.87	0.0004	0.03	0.0083	0.44	65.00	240.67	17.87
4/4/2006 14:12	0.12	1.46	0.0004	0.01	0.0050	0.06	66.00	155.93	24.87
4/22/2006 5:32	0.74	307.81	0.0004	21.81	0.0121	1.35	67.00	14.11	228.11
4/24/2006 16:52	0.07	3.92	0.0009	0.07	0.0083	0.50	68.00	56.04	7.82
4/25/2006 16:48	0.69	54.60	0.0004	2.72	0.0006	0.41	69.00	20.05	134.44
4/30/2006 15:23	0.51	341.85	0.0022	71.56	0.0390	118.78	70.00	4.78	2.88
5/1/2006 16:43	0.24	17.05	0.0004	0.10	0.0500	4.11	71.00	169.39	4.15
5/2/2006 16:08	0.59	17.44	0.0004	0.76	0.0050	0.96	72.00	22.86	18.23
5/7/2006 1:29	0.58	504.11	0.0004	5.38	0.0083	3.18	73.00	93.70	158.28
5/10/2006 16:13	0.40	92.05	0.0004	2.37	0.0313	11.57	74.00	38.86	7.96
5/11/2006 16:33	0.16	2.63	0.0004	0.06	0.0209	0.35	75.00	43.89	7.52
5/31/2006 3:08	0.02	1.22	0.0004	0.02	0.0019	0.10	76.00	62.63	12.87
6/17/2006 19:19	0.94	82.85	0.0170	8.82	0.0050	1.39	77.00	9.40	59.52

10 no discharge

Winter/Spring

EDCC Date / Tim	CALC BG CFS	TOT EVENT CF	006 FLOW CFS	006 EVENT CF	007 FLOW CFS	007 EVENT CF		EVENT RATIO BG/006	EVENT RATIO BG/007
Mar-05	0.574632	26.82155	0.01052	3.616879	0.001547	1.624331	1	7.415662	16.51237
Mar-05	0.339136	5.419849	0.007272	0.079987	0.211028	0.618697	2	67.75948	8.760103
Mar-05	0.579524	59.72549	0.004487	0.656292	0	0.367598	3	91.00442	162.4751
Mar-05	0.543629	77.0788	0.007272	7.058932	0.004641	6.239727	4	10.91933	12.35291
Mar-05	0.550652	26.38511	0.007272	0.236865	0.001547	4.602555	5	111.3928	5.732709
Mar-05	0.923446	311.8953	0.034656	22.93109	0.004641	34.63702	6	13.60142	8.952985
Mar-05	0.62863	32.21429	0.01052	0.576151	0.001547	5.045962	7	55.91294	6.384172
Apr-05	0.569385	31.93932	0.000928	1.363485	0.019958	3.480267	8	23.42476	9.177259
Apr-05	0.559179	80.49297	0.000928	2.434563	0.001547	26.74058	9	33.0626	3.010143
Apr-05	0.367711	21.20358	0.000928	0.131815	0.019958	1.132808	10	160.8581	18.71772
Apr-05	1.105249	2501.806	0.002166	323.3508	0.028931	563.9127	11	7.737127	4.436513
Apr-05	0.632872	58.48811	0.004487	9.493804	0.012068	21.90395	12	6.160661	2.670209
May-05	0.536219	30.94816	0.000928	0.956435	0.012068	1.090417	13	32.35782	28.38196
May-05	0.434296	26.65408	0.000928	0.969741	0.019958	1.922308	14	27.48578	13.86566
May-05	0.525542	20.08885	0.000928	2.569472	0.06204	8.117787	15	7.818278	2.47467
May-05	0.400987	40.55626	0.002166	1.145649	0.028931	3.234893	16	35.40024	12.53713
May-05	0.490917	25.59426	0.000928	6.861673	0.019958	3.169604	17	3.730032	8.074907
May-05	0.462208	21.97418	0.000928	12.43552	0.049972	6.010443	18	1.76705	3.656
May-05	0.369923	57.5419	0.028777	14.22864	0.118974	31.10488	19	4.04409	1.849931
Nov-05	0.264035	29.79009	0.000928	6.198731	0.019958	11.47831	35	4.805837	2.595337
Nov-05	0.570331	17.84177	0.01052	1.849284	0.012068	4.297618	36	9.647934	4.15155
Dec-05	0.461695	35.66648	0.000928	2.396814		4.848087	37	14.88079	7.356815
Dec-05	0.64149	38.69827	0.000928	0.062813	0.004641	0.675786	38	616.0822	57.26405
Dec-05	0.627707	14.43155	0.000928	0.016709	0.001547	0.062813	39	863.6987	229.7524
Jan-06	0.192512	38.9139	0.000928	4.375438	0.001547	7.020257	40	8.893714	5.543087
Jan-06	0.150856	12.59977	0.000928	0.650878	0.012068	2.105644	41	19.35812	5.983806
Jan-06	0.684452	130.6753	0.000928	20.32867	0.004641	48.00002	42	6.428128	2.722401
Jan-06	0.422302	243.7591	0.000928	73.91166	0	135.3474	43	3.297979	1.800988
Jan-06	0.411676	146.4344	0.000928	18.81248	0.012068	38.70316	44	7.783897	3.783526
Jan-06	0.13661	1.286573	0.000928	0.056625	0.001547	0.047652	45	22.72095	26.99957
Feb-06	1.279837	280.3271	0.00976	37.66061	0.049972	137.8453	50	7.443509	2.033635
Mar-06	0.251095	16.43706	0.000388	1.545701	0.019958	2.423735	51	10.63405	6.781707
Mar-06	0.249841	10.67306	0.000388	0.035033	0.004641	0.626124	52	304.6607	17.04625
Mar-06	0.250412	10.34387	0.000388	1.031717	0.019958	1.650943	53	10.02588	6.265433
Mar-06	0.661984	47.09638	0.000388	3.98034	0.049972	19.65073	54	11.83225	2.396674
Mar-06	0.373802	9.321641	0.000388	0.585342	0.012068	0.452072	55	15.92511	20.61983
Mar-06	0.280396	8.98457	0.000388	0.027341	0.028931	1.097999	56	328.6121	8.182679
Mar-06	0.285483	3.030355	0.000388	0.0053	0.028931	0.398696	57	571.7501	7.600674
Mar-06	0.516797	36.61492	0.000388	1.921882	0.049972	11.12511	58	19.05159	3.291197
Mar-06	0.242337	6.81318	0.000388	0.017322	0.004641	0.17266	59	393.3161	39.46015
Mar-06	0.294126	4.873681	0.000388	0.017128	0.012068	0.192154	60	284.5364	25.36346
Mar-06	0.211851	1.46569	0.000388	0.003232	0.028931	0.252801	61	453.5225	5.797799
Mar-06	0.843068	2093.971	0.000388	154.1417	0.038988	590.5254	62	13.58472	3.545946
Mar-06	0.142338	2.415218	0.000905	0.014608	0.001939	0.012281	63	165.3387	196.666
Apr-06	0.53888	17.20346	0.000388	1.296143	0.020877	0.675703	64	13.27281	25.46008
Apr-06	0.193414	7.871155	0.000388	0.032706	0.008338	0.440364	65	240.6659	17.8742
Apr-06	0.116893	1.461452	0.000388	0.009372	0.005042	0.058754	66	155.9348	24.87409
Apr-06	0.74093	307.8064	0.000388	21.80807	0.012087	1.349402	67	14.11433	228.1057
Apr-06	0.067498	3.922887	0.000905	0.070001	0.008338	0.501445	68	56.04075	7.823168
Apr-06	0.694885	54.59655	0.000388	2.722526	0.000646	0.406107	69	20.05364	134.4388
Apr-06	0.507948	341.8465	0.002166	71.55588	0.038988	118.781	70	4.777336	2.877957
May-06	0.23968	17.048	0.000388	0.100642	0.049972	4.108715	71	169.3927	4.149229
May-06	0.588479	17.44468	0.000388	0.763091	0.005042	0.957025	72	22.86055	18.22803
May-06	0.581471	504.1053	0.000388	5.380158	0.008338	3.184996	73	93.69713	158.2751
May-06	0.403138	92.04834	0.000388	2.368839	0.031348	11.57007	74	38.858	7.955726
May-06	0.155181	2.627107	0.000388	0.059853	0.020877	0.349227	75	43.89281	7.522625
May-06	0.022029	1.22262	0.000388	0.01952	0.001939	0.095015	76	62.63416	12.8677
Jun-05	0.115561	12.2765	0.000928	1.526862	0.019958	5.596431	21	8.040347	2.19363
Jun-06	0.942746	82.84794	0.016999	8.81691	0.005042	1.391997	77	9.396482	59.51731
average								98.7	29.4
Median								20.1	8.0
Min								1.8	1.8
Max								863.7	229.8
Stdev								173.3	55.3
25%tile								9.1	4.0
count								59	59

Summer/Fall

EDCC Date / Tim	CALC BG CFS	TOT EVENT CF	006 FLOW CFS	006 EVENT CF	007 FLOW CFS	007 EVENT CF		EVENT RATIO BG/006	EVENT RATIO BG/007
Jul-05	0.372807	34.1775	0.002166	51.37459	0.103039	130.2477	22	0.665261	0.262404
Jul-05	0.235802	4.73	0.000928	11.18265	0.075036	18.41192	23	0.422879	0.256839
Jul-05	0.453041	28.13214	0.002166	56.00794	0.135064	88.94106	24	0.502288	0.316301
Jul-05	0.11826	2.790128	0.01052	1.218364	0.075036	2.231734	25	2.29006	1.250206
Jul-05	0.166536	3.060085	0.002166	9.689516	0.08896	9.920348	26	0.315814	0.308466
Jul-05	0.481669	38.12481	0.002166	51.97442	0.103039	63.2714	27	0.73353	0.60256
Jul-05	0.568417	42.60759	0.002166	95.41564	0.06204	132.2806	28	0.446547	0.3221
Aug-05	0.219297	2.271754	0.000928	5.904155	0.038988	2.573495	29	0.384772	0.882751
Aug-05	0.191287	8.640109	0.002166	0.772482	0.004641	0.239496	30	11.18487	36.07627
Aug-05	0.383698	6.987958	0.000928	2.472622	0.049972	4.863556	32	2.826133	1.4368
Aug-05	0.278957	50.36737	0.000928	125.8791	0.06204	142.7572	33	0.400125	0.352818
Sep-05	0.218964	233.5994	0.000928	331.0685	0.06204	525.0485	34	0.705592	0.44491

average	1.74	3.54
Median	0.58	0.40
Min	0.32	0.26
Max	11.18	36.08
Stdev	3.08	10.25
25%tile	0.42	0.31
count	12	12

219 Brown Lane Bryant, AR 72022 (501) 847-7077 (501) 847-7943 fax

GBM^c

September 21, 2006

MB ——
Have Staff review and make changes you feel are appropriate.
Meeting - 9-26-06
GRETA: (LOG)

Mr. Martin Maner, P.E., Chief
Water Division
Arkansas Department of Environmental Quality
P.O. Box 8913
Little Rock, AR 72219-8913

Re: Storm Water Flow Study Report - El Dorado Chemical Company
GBM^c No. 2042-99-010

Dear Mr. Maner:

As required by Item 12 in Part III of NPDES Permit No. AR0000752, please find enclosed the Storm Water Flow Study Report for El Dorado Chemical Company.

If you have any questions, do not hesitate to contact me or Wes Morgan, El Dorado Chemical Company.

Sincerely,
GBM^c & ASSOCIATES

Chuck Campbell, PE, REM
Senior Engineer

Attachments

CC: Mo Shafii, ADEQ
John Carver, LSB Industries
Wes Morgan, EDCC

RECEIVED
SEP 25 2006
5493

Clem, Sarah

From: Clem, Sarah
Sent: Friday, December 08, 2006 11:52 AM
To: Reiber, Loretta; Shafii, Mo; Roberts, Christopher; Singleton, Bob
Subject: EDCC Storm flow study Outfalls 006/007 comments

007

When reviewing the reported Pb concentrations they are very high. In March 2006, 68.9 ug/L was reported from outfall 007. This was measured during a period EDCC recommended the limits be removed. EDCC is also reporting concentrations for Zn which exceed limitations during the period they recommend limits be removed.

006

Concentrations reported for both Pb and Zn are not as high as Outfall 007 however most are 3 times the limitation. The EDCC recommended limitations for Pb and Zn from November to June are similar to concentrations for a discharge into a large river.

I recommend the source of Pb, and Zn be removed or some treatment alternative be evaluated prior to a significant change in limits. This discharge would be toxic if EDCC recommendations are followed.

Sarah Clem
Program Support Manager
ADEQ
8001 National Dr.
P.O. Box 8913
Little Rock, AR 72219-8913
T: 501.682.0663
F: 501.682.0910

Reiber, Loretta

From: Shafii, Mo
Sent: Thursday, August 10, 2006 11:02 AM
To: Reiber, Loretta
Subject: FW: EDCC EQ Basin Temperature Study (follow up question)

Thanks

Mo Shafii
Permits Section Chief
NPDES, Water Division
Arkansas Department of Environmental Quality
Telephone: 501-682-0616
Fax: 501-682-0910
E-Mail: shafii@adeq.state.ar.us

-----Original Message-----
From: Shafii, Mo
Sent: Monday, February 27, 2006 2:04 PM
To: Singleton, Bob
Subject: RE: EDCC EQ Basin Temperature Study (follow up question)

What is the next step. Do you need to go to PN or what?

Thanks

Mo

> -----Original Message-----
> **From:** Singleton, Bob
> **Sent:** Monday, February 27, 2006 12:43 PM
> **To:** Shafii, Mo
> **Subject:** RE: EDCC EQ Basin Temperature Study (follow up question)
>
> That's ok.
>
> > -----Original Message-----
> > **From:** Shafii, Mo
> > **Sent:** Monday, February 27, 2006 11:35
> > **To:** Singleton, Bob
> > **Subject:** FW: EDCC EQ Basin Temperature Study (follow up question)
> >
> > Bob;
> >
> > What do you think about the response to your request.
> >
> > Thanks
> >
> > Mo
> > -----Original Message-----
> > **From:** Shon Simpson [mailto:ssimpson@gbmcassoc.com]

Sent: Monday, February 27, 2006 11:07 AM
To: Shafii, Mo
Cc: Vince Blubaugh
Subject: EDCC EQ Basin Temperature Study (follow up question)

Mo, I apologize for not getting back to you quicker regarding the selection of Captain Black Lake for comparison purposes with the EDCC EQ Basin. I understand from previous conversation that my email of February 7 (below) satisfied the questions that you posed in your letter of February 2, 2006 to Vince. The remaining question was why a Red River oxbow used instead of one along the Ouachita River. The reasons for use of Captain Black Lake were: (1) It was of generally similar morphology as the EDDC EQ Basin. The EQ Basin is approximately 2500 ft. long and 1000 ft. wide at its widest point, generally covers 50 acres and is 4 ft. deep in its shallow end and greater than 10 ft. deep toward the dam. Captain Black is slightly larger at 59 acres, is approximately 3000 ft. long and 1200 ft. wide at its widest point and was also 4 ft. deep in its shallow end and greater than 10 ft. deep. (2) The two waterbodies are near the same latitude, and probably most importantly, (3) Captain Black Lake is on private property with a locked gate. Without control of access to the lake we could not assure that the study equipment that collected the data for the project would have survived the study, or even a small portion of it. Because the temperature probes had to be suspended from the surface, (to maintain consistent measurement depth) the floats used to suspend the probes were highly visible and it would have not been possible to maintain the devices in an uncontrolled situation.

Although we did not conduct an exhaustive search, we were not able to match the attributes of Captain Black Lake as a control condition for the EDCC EQ Basin. Therefore, it was selected as the control lake and was included by name in the Workplan approved to conduct the study.

Please let me know if this satisfies the remaining question on the study. Thanks Shon

>>> "Shafii, Mo" <SHAFII@adeq.state.ar.us> 2/8/2006 4:11 PM >>>

Shon;

FYI

-----Original Message-----
From: Singleton, Bob
Sent: Wednesday, February 08, 2006 15:18
To: Harmon, Jennifer
Subject: RE: EDCC EQ Basin Temperature Study

Although we don't sample that lake as a part of our lakes assessment, it would have the same designated uses as the other lakes in the state, with the same water quality protection mechanism. Why did they do a study on a Red River oxbow, and not one along the Ouachita River, where EDCC is located?

-----Original Message-----
From: Shon Simpson [mailto:ssimpson@gbmcassoc.com]
Sent: Tuesday, February 07, 2006 4:41 PM

3191 LR

219 Brown Lane Bryant, AR 72022 (501) 847-7077 (501) 847-7943 fax

February 1, 2007 FEB - 2 2007 sw

NPDES PERMIT FILE
NPDES # AR00 00752
AFIN # 70-00040
Permit PN
✓ Correspondence
Technical Backup
2-2-07 sw Date Scanned

Mr. Mo Shafii
Permits Section Chief
NPDES Section, Water Division
Arkansas Department of Environmental Quality
8001 National Drive
PO Box 8913
Little Rock, AR 72219-8913

RE: El Dorado Chemical Company, NPDES AR0000752, AFIN 70-00040
GBM^c No. 2042-99-010

Dear Mr. Shafii:

El Dorado Chemical Company (EDCC) has received your letter dated January 5, 2007 regarding the Storm Water Flow Study Report prepared by GBM^c & Associates and has asked us to prepare a response. Please consider the following regarding your concerns listed in the January 5 letter.

1. **From Figure 1 on Page 2 of the Report, it appears that the background flow meters were placed downstream of Outfalls 006 and 007. If this is correct, please explain why this is appropriate. Also, please explain why monitors were not also placed at the property boundary upstream of the facility to determine the flow rate of the stream entering the property.**

Response: Monitoring stations were established according to the Storm Water Flow Study Plan dated July 15, 2004 and the Addendum dated September 17, 2004 which was approved by ADEQ. The September addendum (attached) explains the placement of monitoring stations for Outfalls 006 and 007.

2. **Section 5.1 of the Report:**
   a. **It is not clear whether the background flow to effluent flow ratios were assumed to be normally distributed in the confidence interval calculations. Please provide the assumptions made and a detailed copy of the calculations for the lower 95% confidence interval proposed (i.e., reference citations and equations used).**

   b. **Please explain why days without rainfall were not included in the calculations.**

   c. **Please explain why the lower 95% confidence interval will be protective of human health and the environment versus a more restrictive interval (e.g., lower 99.99% confidence interval). Is there any regulatory basis or precedent to the proposed confidence interval?**

Response a: The distribution of each data set were not normally distributed. However, the confidence intervals for each mean were calculated using a two-sided 100(1-α)% confidence interval that typically is associated with normal distributions. The equation for the lower confidence interval is presented below.

$$X - t_{1-\alpha/2,\ n-1\ df} * SE$$

This equation was chosen for use in this case as it generally provides a more conservative value than a distribution free statistical method and is the procedure commonly used in statistical software packages. In the case of these data sets this generality holds true. Lower 95% CI's calculated by a distribution free method results in more liberal values of 54.5 and 15.3, for the 006 Seasonal and 007 Seasonal values, respectively.

Response b: The objective of the study was to establish the ratio of facility storm effluent to the receiving stream flow. The study lasted 472 days, during which time data was logged at four locations in five-minute intervals, for an approximate total of 540,000 data points. To minimize the processing of useless information, data points that did not include coincident measurable flows from both outfalls 006/007 and the receiving stream were excluded from the statistical analysis.

Response c: The lower 95% CI provides a measure of conservatism beyond the mean, ensuring that atypical years with smaller rain events are still protective of in-stream water quality. The 95 percentile probability basis (α=0.05) is consistent with ADEQ permitting practice for calculation of average monthly limits for toxics.

3. **It is important to note that the final background flow to effluent flow ratio for each outfall will be included in the permit upon renewal. Please explain how compliance with these proposed limits will be met and monitored.**

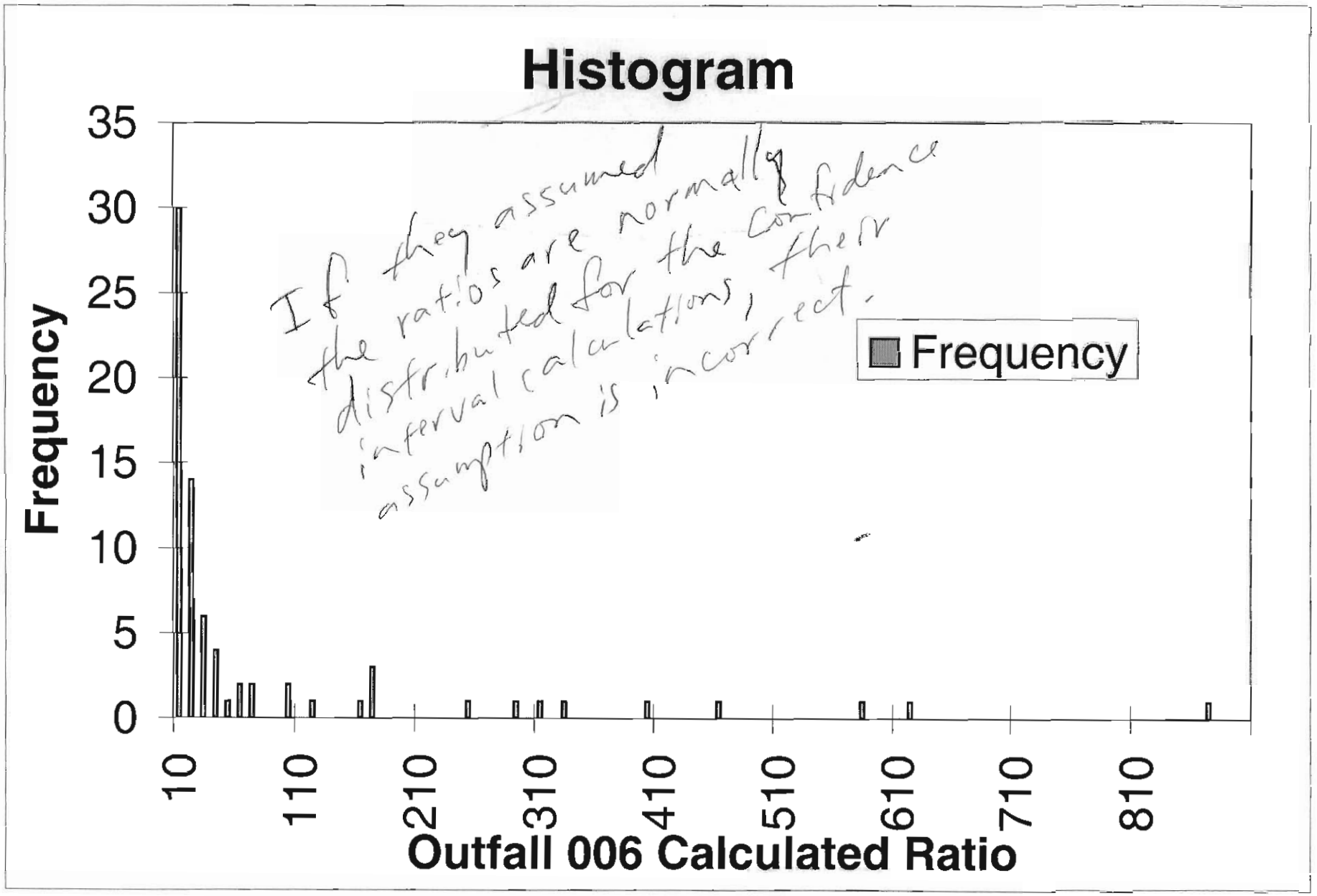
Response: The study was based on several events across a fifteen-month period and demonstrates a conservative relationship between the facility storm effluent and receiving stream flows. The recommendations used study findings and considered the range of flow ratios exhibited to request permit conditions that will be protective of water quality using the 95 percentile probability. To avoid burdensome and unnecessary monitoring and reporting, EDCC suggests that the seasonal (November – June) flow relationships be verified once prior to renewal of the current NPDES permit, and once during each subsequent renewed permit cycle. Verification of the ratios will be provided to ADEQ in a summary report describing the event conditions and flow ratios observed during the field verification. EDCC is opposed to institution of flow ratios as a permit limit on an uncontrolled, natural drainage system. Inclusion of ratios as a permit limit infers that EDCC has the ability to manipulate storm effluent through outfalls 006 and 007, which it does not. Again, the purpose of the Storm Water Flow Study was to determine what ratios were observed and provide that data to ADEQ for use in determining appropriate permit limits for storm water discharges.

We appreciate the opportunity to provide supporting information to you on this matter on behalf of EDCC. We propose to meet with you and your staff as soon as possible to discuss this response and any other issues you may have concerning the Storm Water Flow Study Report and recommendations. I will contact you to schedule a convenient meeting time, but if you have immediate questions please contact me at 501-847-7077.

Sincerely,
GBM^{c} & Associates

Chuck Campbell, PE, REM
Principal/Senior Engineer

cc:
attach Martin Maner – ADEQ
John Carver – LSB
Greg Withrow - EDCC
Brent Parker – EDCC


Histogram
Frequency
35
30
25
20
15
10
5
0
10
110
210
310
410
510
610
710
810
Outfall 006 Calculated Ratio
Frequency
If they assumed the ratios are normally distributed for the confidence interval calculations, their assumption is incorrect.

SECTION B. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

Outfalls 001, 002, 003, 004, 005, 006, and 007:

1. Compliance with interim limitations is required on the effective date of the permit.
2. The permittee shall achieve compliance with final limitations in accordance with the following:

	Activity	Compliance Date from Effective date of the modified permit
1.	Submit Progress Report	One Year
2.	Submit Progress Report	Two Years
3.	Achieve final limitations	Three Years

3. Consent Administrative Order No. 02-059 continues to remain in effect and provides the permittee three(3) years from the effective date of this permit to comply with technology-based limits contained herein.

Outfalls 010 or 011 (Combined flows of Outfalls 001, 002, and 004):

1. Compliance with final limitations is required on the effective date of the permit. Permittee must notify ADEQ in writing ten days after operation of outfall 010 or 011 in order to terminate outfalls 001, 002 and 004.

Outfalls 002, 004, 005, 006, and 007 - Item #12 in Part III

1. Within 90 days of permit issuance, the permittee shall submit a protocol for the evaluation of the background flow of the receiving streams for these outfalls and the dilution of the effluent in the receiving stream as a result of a storm event.
2. The evaluation shall be completed within 18 months of permit issuance.
3. Until such time as the permit is reopened and modified, the effluent limits and toxicity testing requirements in this permit remain in effect.

Outfall 001 - Item #1 in Part III

1. Within 90 days of permit issuance, the permittee shall submit a protocol for the evaluation of the temperature regime of the fifty (50) acre equalization basin for the purpose of determining if the elevation of the temperatures in the equalization basin are related to ambient sources of heat resulting from summertime conditions.
2. The evaluation shall be completed within 18 months of permit issuance.

13. The sampling frequency for dissolved minerals at all outfalls shall be reduced automatically to once per quarter after 24 consecutive months with no violations. If a violation occurs after the frequency has been reduced, the monitoring frequency will then automatically increase back to once per month. However, if a violation of the dissolved minerals effluent limitations occurs at Outfall 001 while the permittee is monitoring once per month, the frequency shall than be increased to three times per week.

14. The permittee shall perform an evaluation of the temperature regime of the fifty (50) acre equalization basin for the purpose of determining if the elevation of temperatures in the equalization basin are related to ambient sources of heat resulting from summertime conditions. This permit may be modified to remove the temperature limitation for Outfall 001 if the evaluation documents that the elevation of water temperatures in the fifty (50) acre equalization basin are related to ambient sources of heat under summertime conditions.

15. **WHOLE EFFLUENT TOXICITY TESTING (48-HOUR ACUTE NOEC FRESHWATER)**

1. SCOPE AND METHODOLOGY

a. The permittee shall test the effluent for toxicity in accordance with the provisions in this section.

APPLICABLE TO FINAL OUTFALLS: **002, 004, 005, 006, and 007**

CRITICAL DILUTION (%): **100%** (all outfalls in this condition)

EFFLUENT DILUTION SERIES (%): **32%, 42%, 56%, 75%, 100%**

COMPOSITE SAMPLE TYPE: Defined at PART I

TEST SPECIES/METHODS: 40 CFR Part 136

Daphnia pulex acute static renewal 48-hour definitive toxicity test using EPA/600/4-90/027F, or the latest update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

Pimephales promelas (fathead minnow) acute static renewal 48-hour definitive toxicity test using EPA/600/4-90/027F, or the latest update thereof. A minimum of five (5) replicates with eight (8) organisms per replicate must be used in the control and in each effluent dilution of this test.

b. The NOEC (No Observed Effect Concentration) is defined as the greatest effluent dilution above which lethality that is statistically different from the control (0%effluent) at the 95% confidence level does not occur.