Indiana Department of Environmental Management

Pleasant Run and Bean Creek TMDL Study

September 2003

This study was prepared for the City of Indianapolis for IDEM pursuant to a contract with the State of Indiana.

Final Report

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List of Acronyms

AAC – Acute Aquatic Criterion
AWT- Advanced Wastewater Treatment
CAC – Chronic Aquatic Criterion
CWA – Clean Water Act
CSO – Combined Sewer Overflow
IDEM – Indiana Department of Environmental Management
IMAGIS – Indianapolis Mapping and Geographic Infrastructure System
LTCP – Long Term Control Plan
MCHD – Marion County Health Department
MOS – Margin of Safety
NPDES- National Pollutant Discharge Elimination System
OES – Office of Environmental Services
TMDL- Total Maximum Daily Load
TSS- Total Suspended Solids

Executive Summary

Water quality data has been collected from Pleasant Run in Marion County since 1991. In 1998, the Indiana Department of Environmental Management (IDEM) determined that Pleasant Run does not consistently comply with the state's water quality standards for *E. coli* bacteria. As a result, Pleasant Run was listed on the 1998 303(d) list and required to have a Total Maximum Daily Load (TMDL) evaluation for *E. coli* bacteria. This study was prepared for the City of Indianapolis for IDEM pursuant to a contract with the State of Indiana.

A model of Pleasant Run was developed and calibrated to the existing instream data for *E. coli* bacteria. A ten-year period of time was simulated to predict resultant instream *E. coli* bacteria counts for each day of the simulation period. Data collected by several agencies was obtained for the water quality model development.

Pleasant Run was divided into two segments for analysis purposes as follows:

- Pleasant Run upstream of the Combined Sewer Overflow (CSO) Area
- Pleasant Run within the CSO Area

Sources of *E. coli* bacteria in the watershed include CSOs, urban stormwater, failing septic systems, illicit storm drain connections, and pollutants from wildlife and domestic animals. Point sources and nonpoint sources were characterized and represented in the model for evaluation of loadings to determine the required action necessary to attain water quality standards.

The existing daily *E. coli* bacteria loads are presented in **Table E.1** for point and non-point sources. As can be seen from the table, CSO discharges and stormwater runoff contribute the largest *E. coli* bacteria loads into Pleasant Run.

Based on the modeled *E. coli* bacteria concentrations, stream flow and data analyzed, the allowable *E. coli* TMDLs for Pleasant Run were determined. The TMDL is calculated as 125 cfu *E. coli* bacteria/100 ml multiplied by the average daily flow for the stream segment during the recreational season (April to October). TMDLs are based on meeting water quality standards. The allowable *E. coli* bacteria TMDLs and required reductions are as follows:

Pleasant Run upstream of the CSO area:

Existing Waste Load = 3.00×10^{11} cfu

Existing Load = 6.37×10^{9} cfu

Existing Total Load = 3.06×10^{11} cfu

TMDL = 2.57×10^{10} cfu

Required Reduction = 92%

Pleasant Run within the CSO area:

Existing Waste Load = 5.23×10^{13} cfu
Existing Load = 1.15×10^{10} cfu
Existing Total Load = 5.23×10^{13} cfu

TMDL = 4.61×10^{10} cfu
Required Reduction = 99.9%

Table E.1 presents the loads from the individual *E. coli* bacteria sources.

TABLE E.1: SUMMARY OF EXISTING *E. COLI* BACTERIA LOAD FOR THE APRIL TO OCTOBER RECREATIONAL SEASON
PLEASANT RUN & BEAN CREEK

Scenario	Point Source -- CSO Discharges (cfu)*	Point Source -- Permitted Stormwater Discharges (cfu)*	Point Source -- Illicit Sanitary Connections (cfu)*	**Total Point Source Load (cfu)**	Nonpoint Source - Unpermitted Stormwater Discharges (cfu)*	Nonpoint Source -- Wildlife (cfu)*	Nonpoint Source -- Failing Septic Systems (cfu)*	**Total Nonpoint Source Load (cfu)**	**Total Load (cfu)**	TMDL (cfu)	**Required Load Reduction to meet TMDL (%)**
Pleasant Run-Upstream Existing	0.00E+00	3.00E+11	5.30E+07	**3.00E+11**	0	9.79E+08	5.39E+09	**6.37E+09**	**3.06E+11**	2.57E+10	**92%**
Pleasant Run-CSO Existing	5.20E+13	3.34E+11	1.14E+08	**5.23E+13**	0	1.96E+09	9.57E+09	**1.15E+10**	**5.23E+13**	4.61E+10	**99.91%**

*Note: All loads presented in are the average daily loads for the recreational season. These loads may be different from the loads presented in Section 5, which are for the entire year.

Section 1
Introduction

The State of Indiana assesses its water bodies for compliance with water quality standards established for their designated uses as required by the Federal Clean Water Act (CWA). Assessed water bodies are placed into five categories depending on water quality assessment results: supporting, partially supporting, water bodies with insufficient or no data, impaired but not requiring TMDLs, and finally, water bodies not supporting their designated uses and requiring TMDLs. These water bodies are found on Indiana's 303(d) list, which is published every two years, as required by section 303 (d) of the CWA.

Some of the 305(b) partially and not supporting water bodies are also assigned to Indiana's 303(d) list, also named after a section of the CWA. Water bodies on the 303(d) list are required to have a Total Maximum Daily Load (TMDL) evaluation for the water quality constituent(s) in violation of the water quality standard. The TMDL process establishes the allowable loading of pollutants or other quantifiable parameters for a water body based on the relationship between pollution sources and in-stream water quality conditions. This allows water quality-based controls to be developed to reduce pollution and restore and maintain water quality. TMDLs must meet the requirements set forth in federal regulation at 40 CFR 130.2 and 130.7

E. coli bacteria data has been collected from Pleasant Run in Marion County since 1991 by the City of Indianapolis. In 1998, the Indiana Department of Environmental Management (IDEM) determined that the *E. coli* bacteria standard is exceeded along the entire length of Pleasant Run. As a result, Pleasant Run was added to the state's 1998 303(d) list and scheduled for a TMDL evaluation.

Section 2
Background Information

The study segment relevant for this TMDL report consists of Pleasant Run from the most upstream extent to the confluence with the West Fork of the White River. This area does not consistently meet the Indiana bacteria (*E. coli*) water quality standard both during dry and wet weather.

2.1 Parameters of Concern

The State of Indiana's 1998 section 303(d) list shows one parameter of concern for Pleasant Run within the study area described above: *E. coli* bacteria.

Section 303(d) of the Clean Water Act requires states to list waters for which technology-based limits alone do not ensure attainment of water quality standards. States are to list and set priority rankings for their listed impaired waters. To address water body segments on the 303(d) list, states are required to develop TMDLs that allow these segments to attain water quality standards. This report presents instream data as well as modeling results and load allocations to achieve the standard for *E. coli* bacteria.

2.2 Water Quality Standards

IDEM has promulgated water quality standards to protect designated uses of waterways. These standards include numeric recreational use standards for *E. coli* bacteria, which can be used as target values for the TMDL.

The applicable bacteria standard is for *E. coli* bacteria and is as follows:

> *… for full body contact recreational uses E. coli bacteria, using membrane filter (MF) count, shall not exceed one hundred twenty-five (125) per one hundred (100) milliliters as a geometric mean based on not less than five (5) samples equally spaced over a thirty (30) day period nor exceed two hundred thirty-five (235) per one hundred (100) milliliters in any one (1) sample in a thirty (30) day period.*

E. coli bacteria is used as the water quality indicator and the target values are:

- Monthly geometric mean not to exceed 125 cfu/100 ml
- Monthly maximum count sampled not to exceed 235 cfu/100 ml.

Section 3
Data Sources and Initial Assessment

Data characterizing the amount of *E. coli* bacteria entering Pleasant Run from various sources were collected. These pollutants cause exceedances of the Indiana water quality standards for *E. coli* bacteria. This section of the report describes the sources of the data collected for review and gives an initial assessment of compliance for *E. coli* bacteria.

3.1 Data Sources

Instream *E. coli* bacteria sampling data was obtained from the following sources:

- City of Indianapolis Department of Public Works Office of Environmental Services (OES) and
- Marion County Health Department (MCHD).

3.2 Sampling Locations

Data for *E. coli* bacteria were collected at various intervals and locations by the two agencies. The sampling locations for each agency are shown on **Figure 3.1**.

The City of Indianapolis OES has collected samples and performed *E. coli* bacteria analysis at two locations on Pleasant Run and two locations on Bean Creek, a tributary to Pleasant Run. These samples were analyzed and continue to be analyzed on a monthly basis from May 1991 to present. Sampling locations are:

- 16th Street and Pleasant Run
- Meridian Street and Pleasant Run
- Southern Avenue and Bean Creek
- Garfield Park and Bean Creek

The MCHD has also collected samples five times per month at six sites on Pleasant Run and three sites on Bean Creek. The locations of the sampling stations along with their corresponding sampling dates are shown below.

<u>Pleasant Run</u>

- 21st Street - August 1997 to March 2002
- Arlington Avenue – August 1997 to March 2002
- Southeastern Avenue – December 1997 to March 2002
- Barth Avenue – February 2000 to March 2002
- Garfield Park – December 1997 to March 2002
- Bluff Road – December 1997 to March 2002

Bean Creek

- Emerton Place – December 1997 to March 2002
- Keystone Avenue – December 1997 to March 2002
- Garfield Park – December 1997 to March 2002

Additionally, in 2002 OES and MCHD performed sampling at several locations along the streams of interest to supplement the existing *E. coli* bacteria data for the TMDL project. Data was collected from these additional stations five times per month from April 2002 to October 2002. The following is a list of sites for Pleasant Run and Bean Creek where supplemental *E. coli* bacteria samples were collected:

Pleasant Run

- 30th Street
- 21st Street
- 16th Street
- 10th Street
- Pleasant Run Golf Course and South Creek
- Pleasant Run Golf Course
- Bolton Avenue/Arlington Avenue
- Emerson Avenue
- Keystone Avenue
- Barth Avenue
- Sherman Drive
- Southeastern Avenue
- State Street
- Garfield Park
- Meridian Street
- Bluff Road

Bean Creek

- Orange Street
- Emerton Place
- Southern Avenue
- Keystone Avenue
- Bethel Avenue

- Garfield Park

3.3 Data Review and Initial Findings

MCHD uses the Quanitray 2000 tray-counting method. Samples are prepared with the Colilert reagent and incubated for 24 to 48 hours prior to application on the trays.

The city's OES has used **Standard Methods for the Examination of Water and Wastewater** (prepared and published by the American Public Health Association/American Water Works Association/Water Environment Federation-latest edition) as a reference to determine the method(s) used to enumerate fecal Coliform and *E. coli* bacteria concentrations in surface water samples.

In order to produce as accurate of a value as possible, OES has been using Membrane Filtration (MF) as opposed to Most Probable Number (MPN) methods. The specific method for determining fecal Coliform concentrations is referenced as 9222 D, using mFC broth with Rosolic acid, incubating the samples at 44.5 Deg C (+/- 0.2 Deg C), for a 24 hour period, +/- 2 hours.

OES has been using a slightly modified Membrane Filter method 9222 G as an extension of 9222 D to obtain an *E. coli* bacteria value. This method uses the same filter pad from the fecal Coliform method and reincubates the filter pad on a nutrient agar plate containing the organic salt 4-methyl-umbelliferyl-Beta-D glucuronide (MUG). Reincubation is conducted for 4 hours at 35.0 degrees Celsius (+/- 0.5 deg C). When added to the agar plate, MUG causes *E. coli* bacteria colonies to fluoresce under an ultraviolet light source (366 nm). Extensive comparison testing was performed using the mTEC *E. coli* bacteria method to analyze WWTP and surface water samples. In addition, freeze dried *E. coli* bacteria cultures were obtained and rehydrated to evaluate both methods. The comparison evaluation resulted in a good correlation between the two test methods, and the "pure" *E. coli* bacteria culture sample was determined to be accurately reported. The rehydrated cultures did not have a reference concentration.

CDM has reviewed the available data for Pleasant Run. All data collected by OES, and MCHD is considered to have received quality assurance checks by the respective collecting entity (OES or MCHD). In addition, IDEM has approved the use of OES and MCHD data for this analysis. Additional data checking was not performed for this analysis. Data flagged by the collecting entity as questionable is presented in the attached graphs and noted as being questionable, but not used for determination of compliance.

All accepted data are considered comparable. OES and TMDL sampling (April 2002-October 2002) used the same method for comparison purposes. That is, where data is collected by more than one entity at a particular monitoring location, the data sets are combined for the assessment of compliance with the applicable standard.

Data plots of all stations and compliance plots for Pleasant Run and Bean Creek are found in **Figures 3.2 through 3.9**. The following paragraphs summarize the findings

from each source and the overall percent compliance with Indiana water quality standards for data from January 2000 to December 2001.

A comparison of the available data was made to both the maximum monthly *E. coli* bacteria standard of 235 cfu/100 ml and the monthly geometric mean standard of 125 cfu/100 ml for the recreational season of April to October.

Overall, the major findings are:

- More than 90 percent of the sampling stations exceed the daily maximum *E. coli* bacteria standard (235 cfu/100ml) more than 50 percent of the time.
- All of the sampling stations with sufficient data (5 samples in 30 days) exceed the geometric mean *E. coli* bacteria standard (125 cfu/100 ml) 100 percent of the time.

Along Pleasant Run from 21st Street to the confluence with the White River, *E. coli* bacteria problems are apparent. There is a low percent compliance with the bacteria standard. In addition, the number of exceedances of the standard occurring upstream of the CSO segment is similar to the number of exceedances occurring within the CSO stream segment.

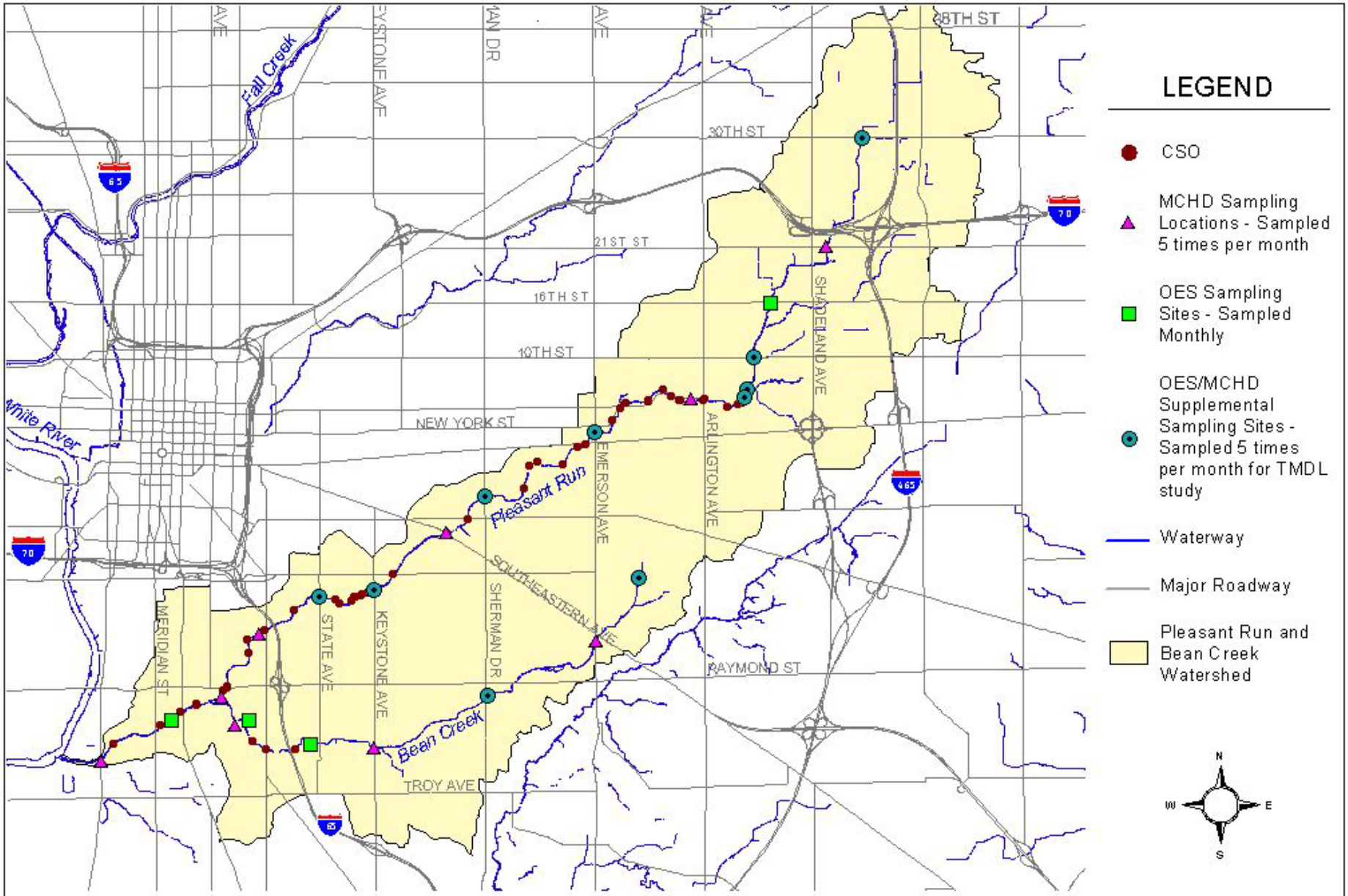
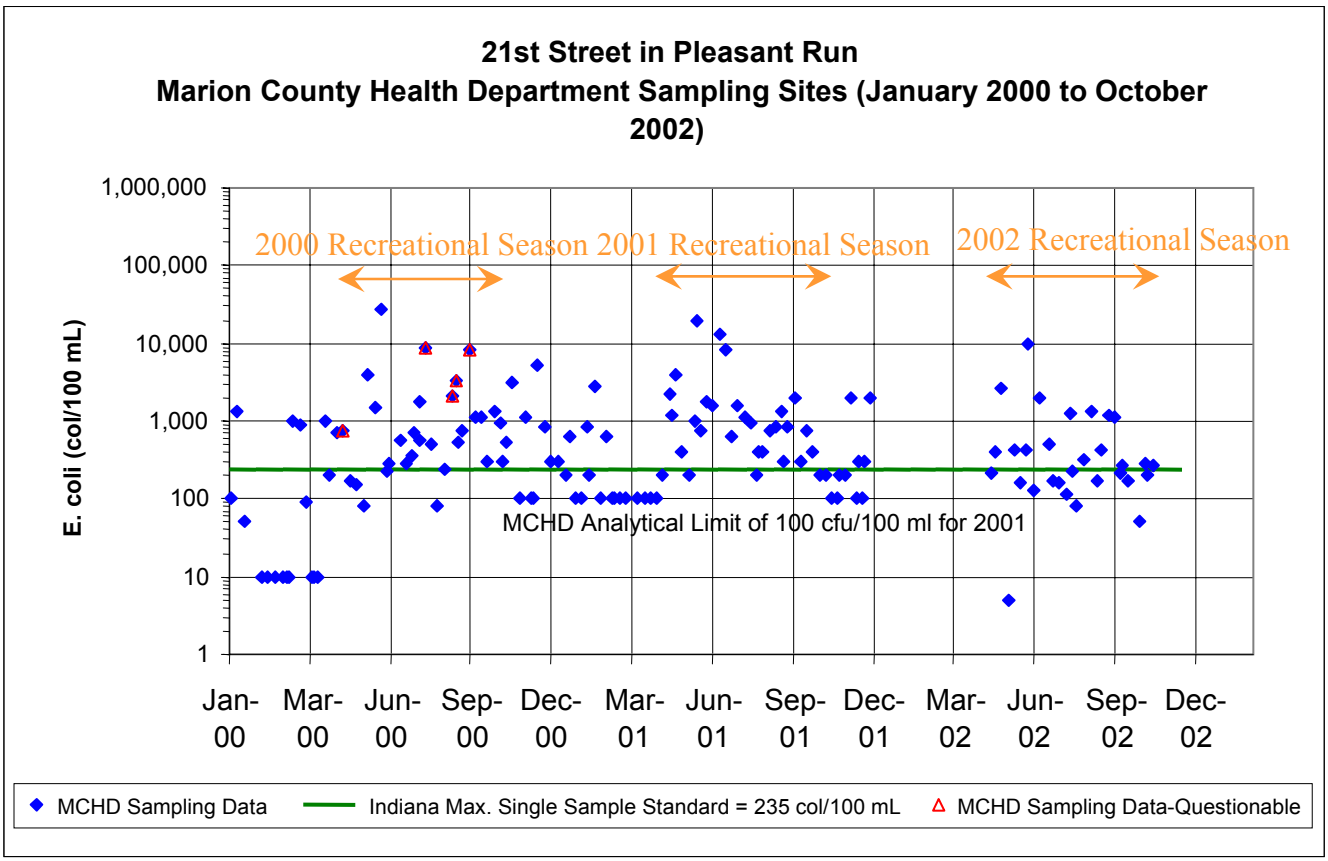


Figure 3.1: Water Quality Sampling Sites on Pleasant Run and Bean Creek
City of Indianapolis
As of Spring 2002

Figure 3.2: Pleasant Run *E. coli* Data Plots



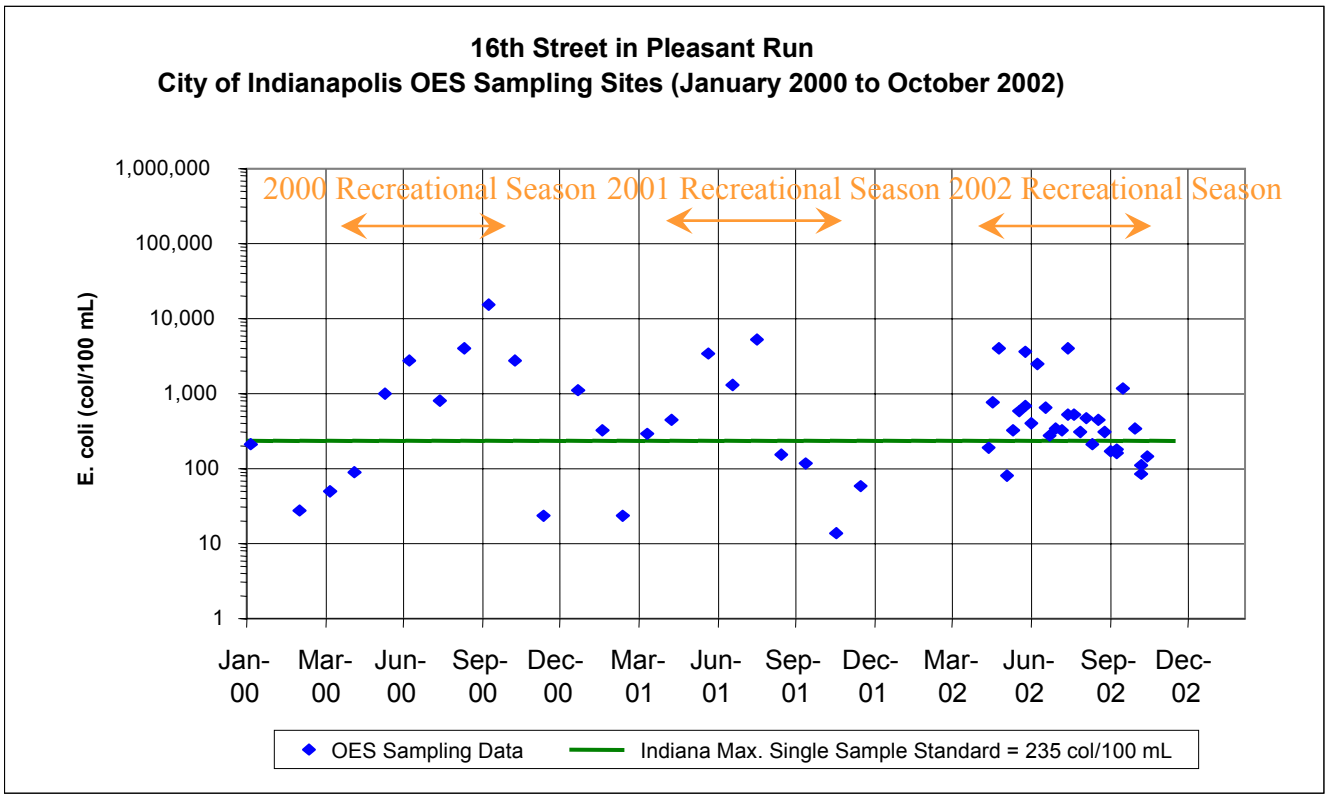
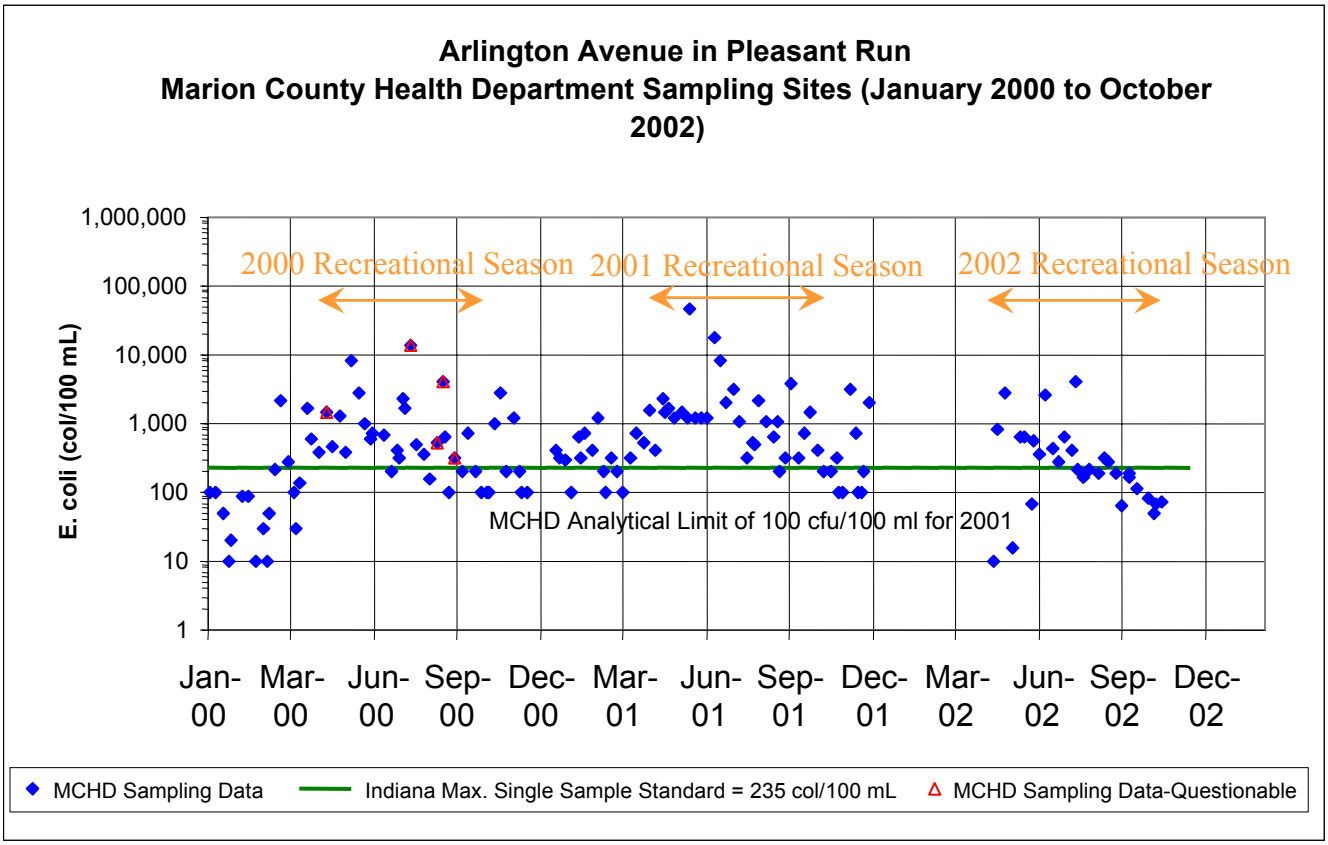


Figure 3.3: Pleasant Run *E. coli* Data Plots



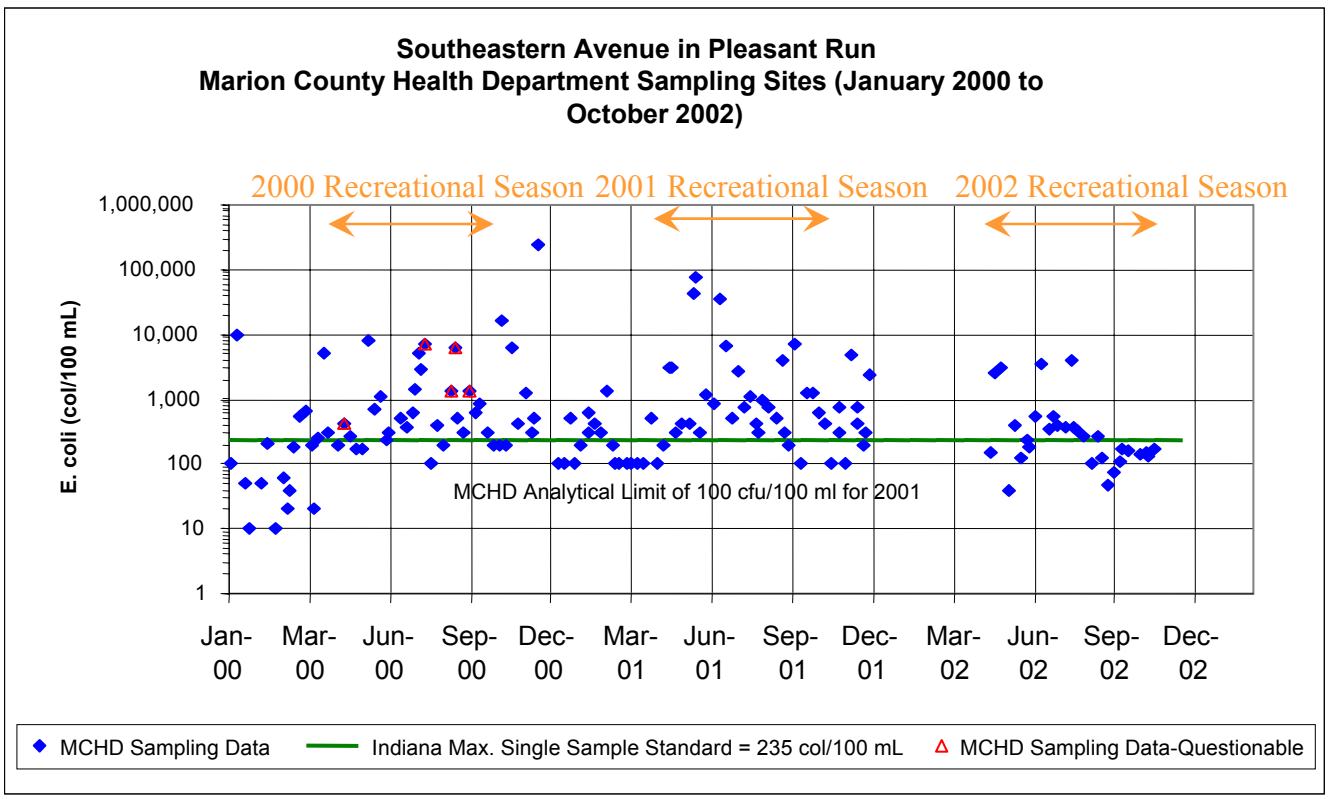
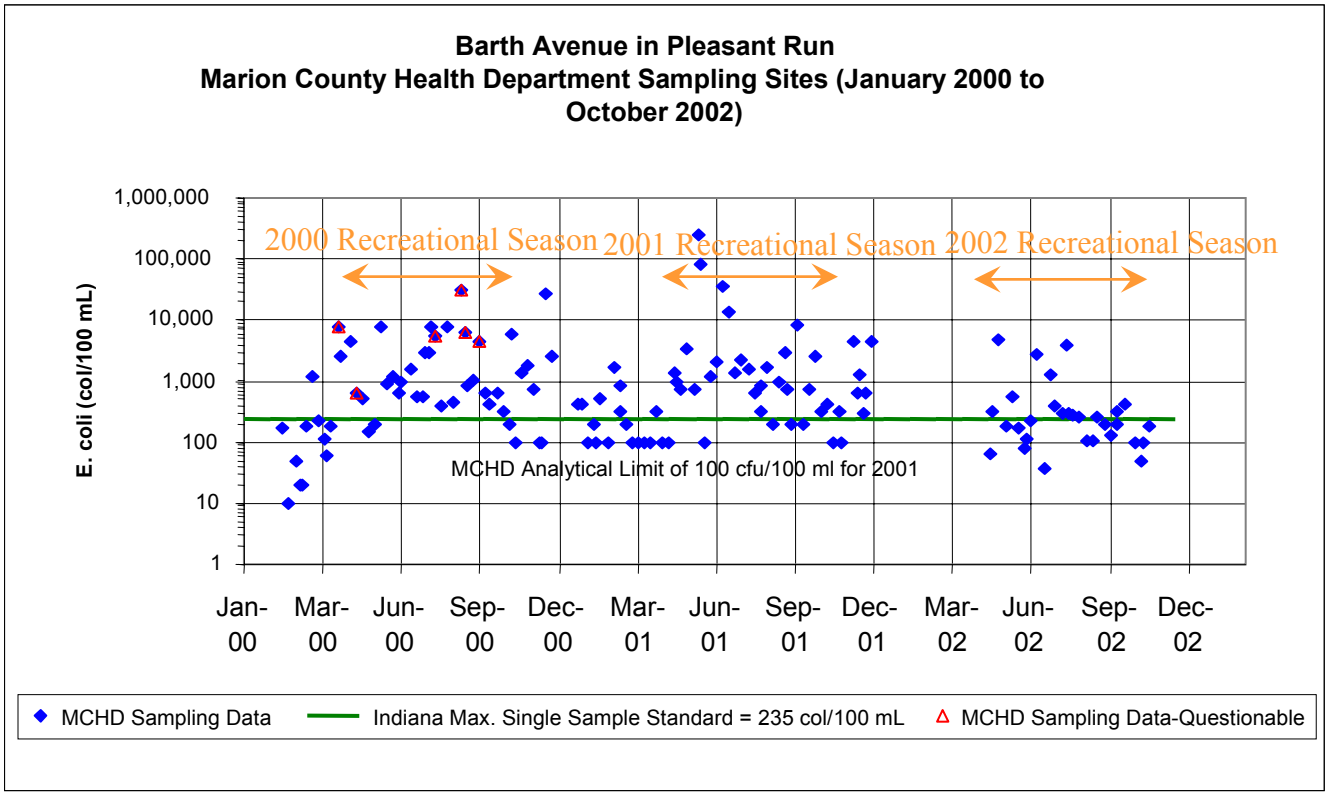


Figure 3.4: Pleasant Run *E. coli* Data Plots



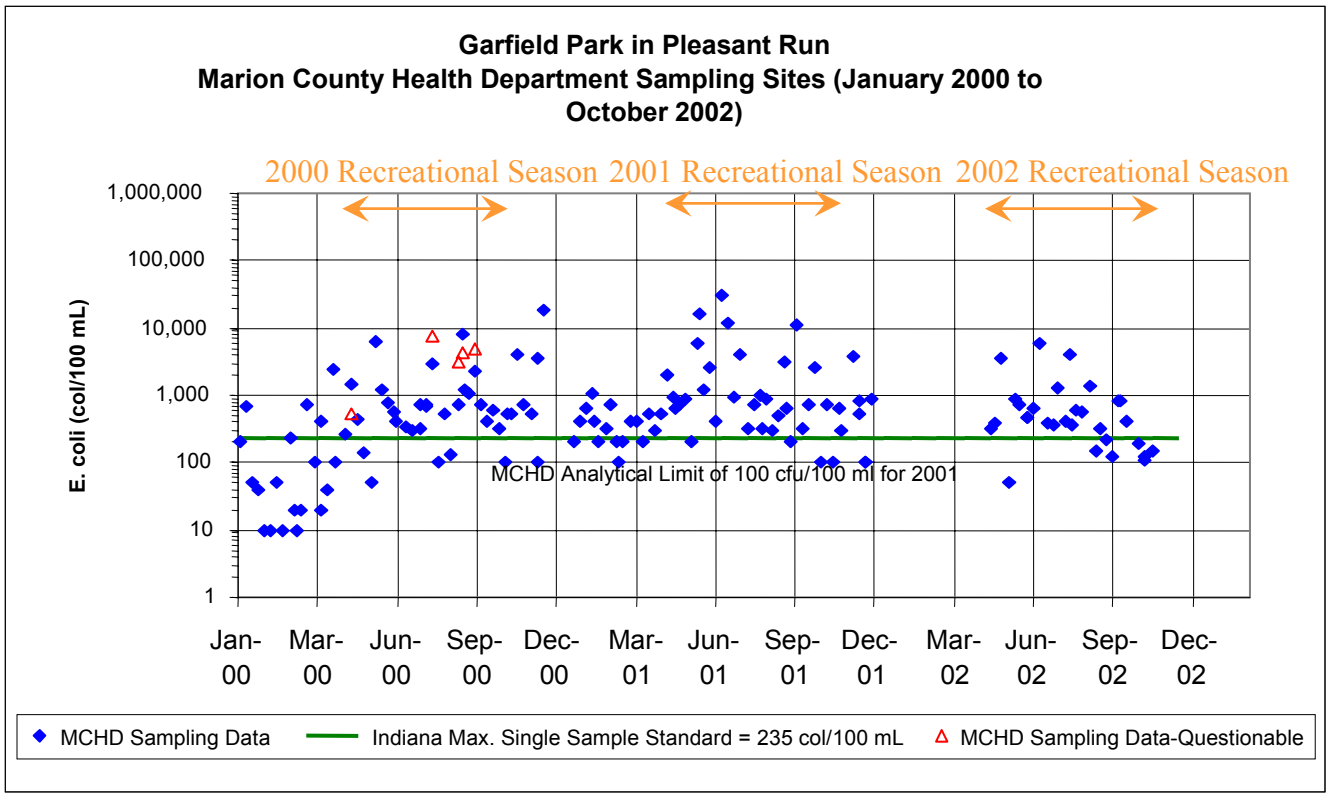
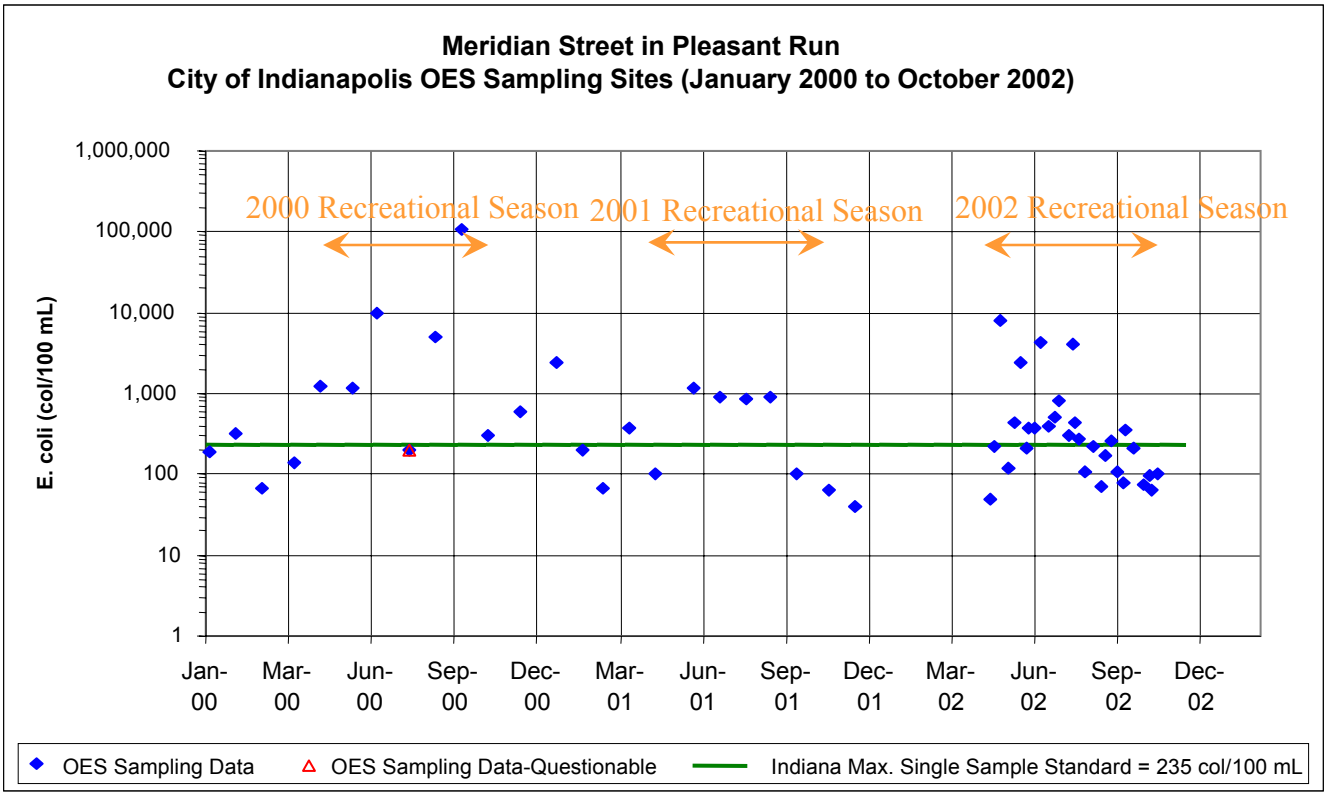


Figure 3.5: Pleasant Run *E. coli* Data Plots



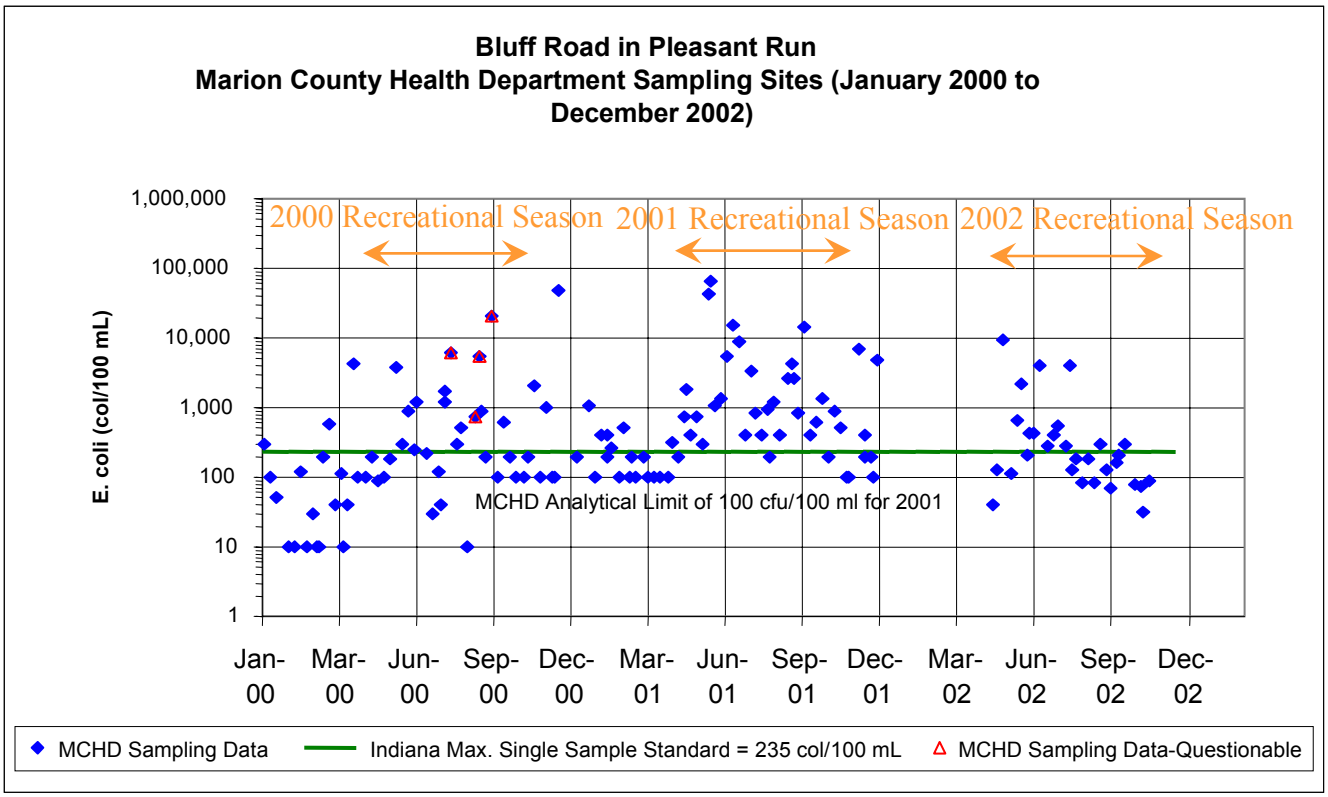
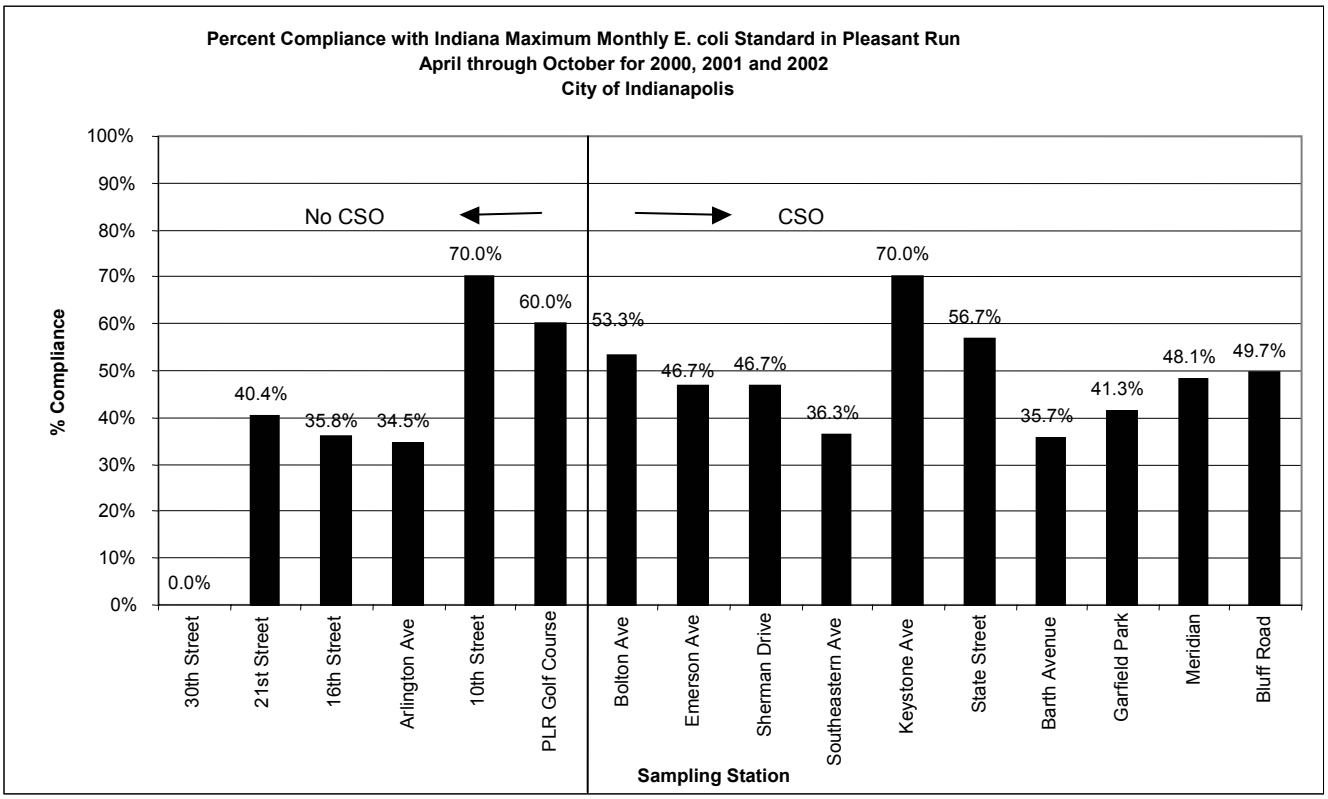


Figure 3.6: Pleasant Run *E. coli* Data Plots



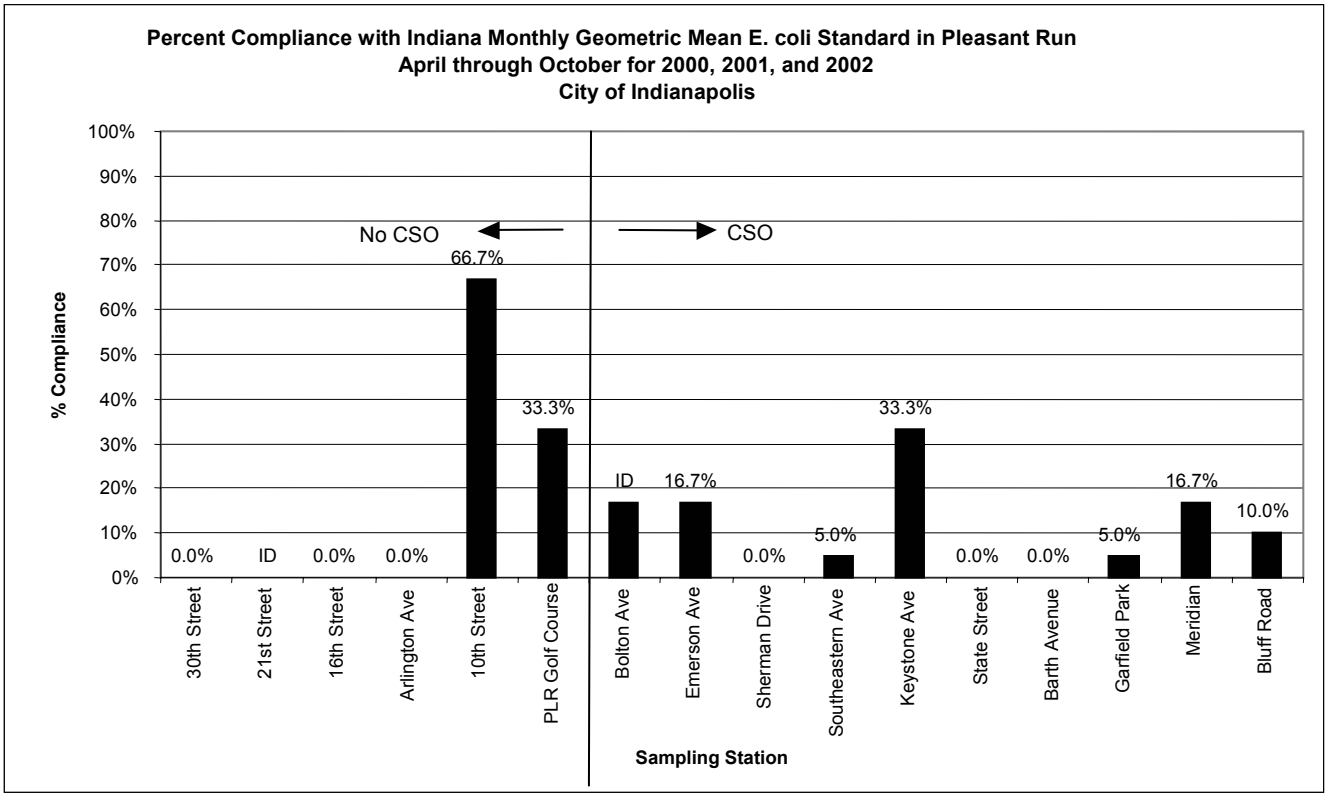
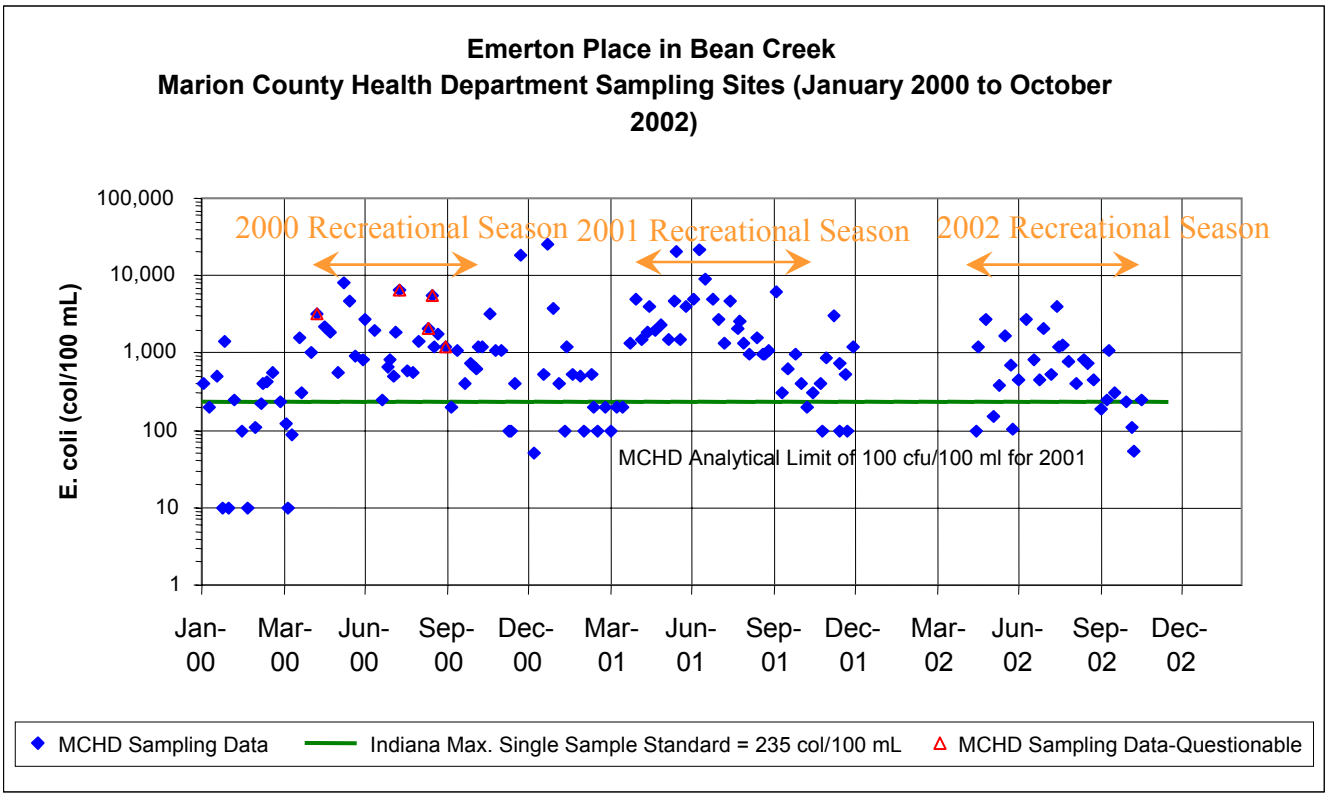


Figure 3.7: Bean Creek *E. coli* Data Plots



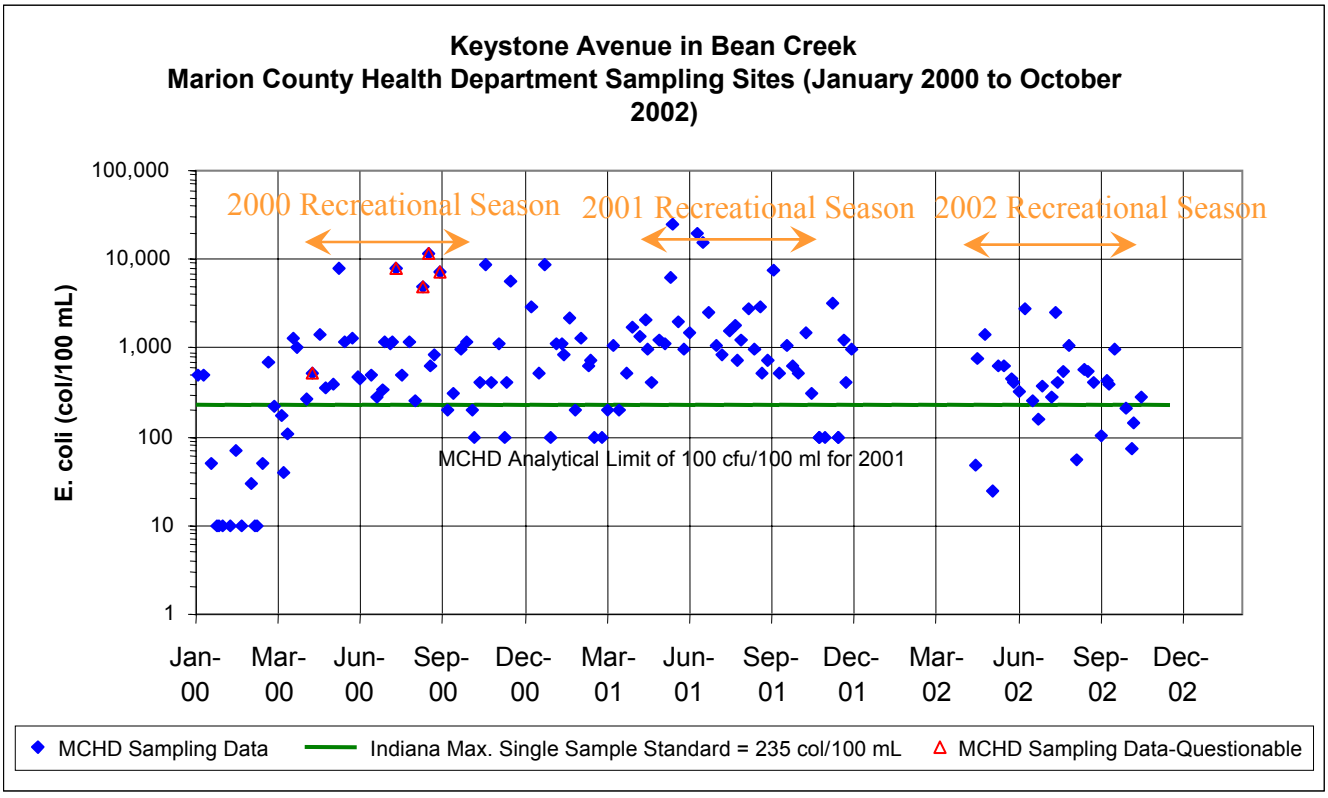
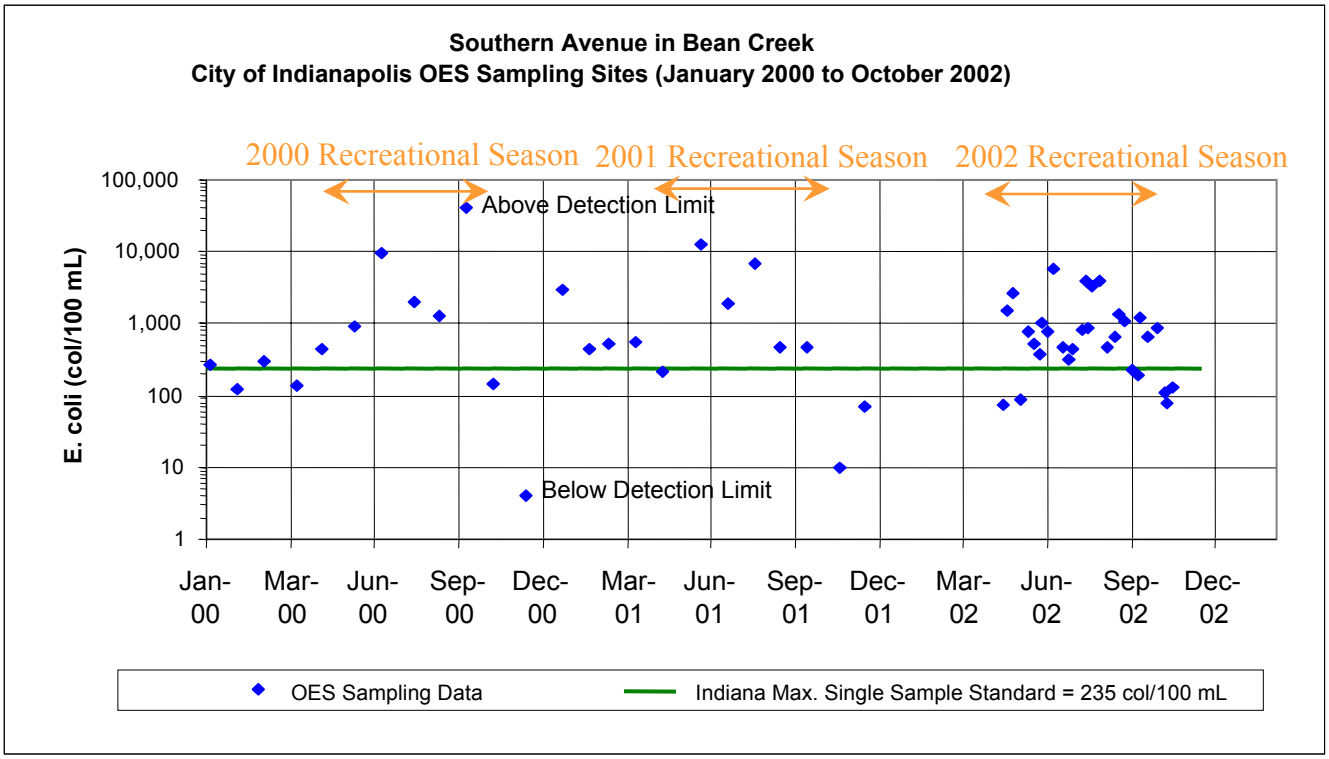


Figure 3.8: Bean Creek *E. coli* Data Plots



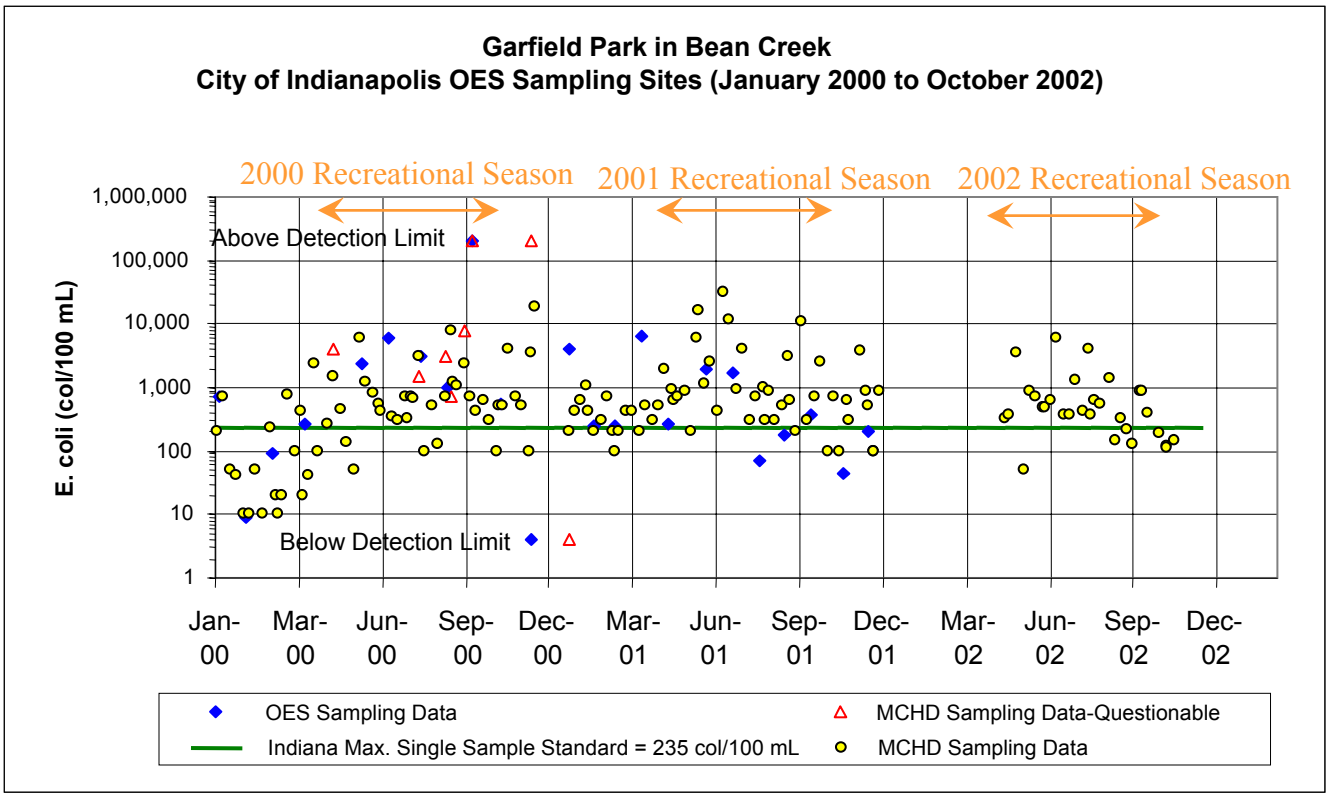
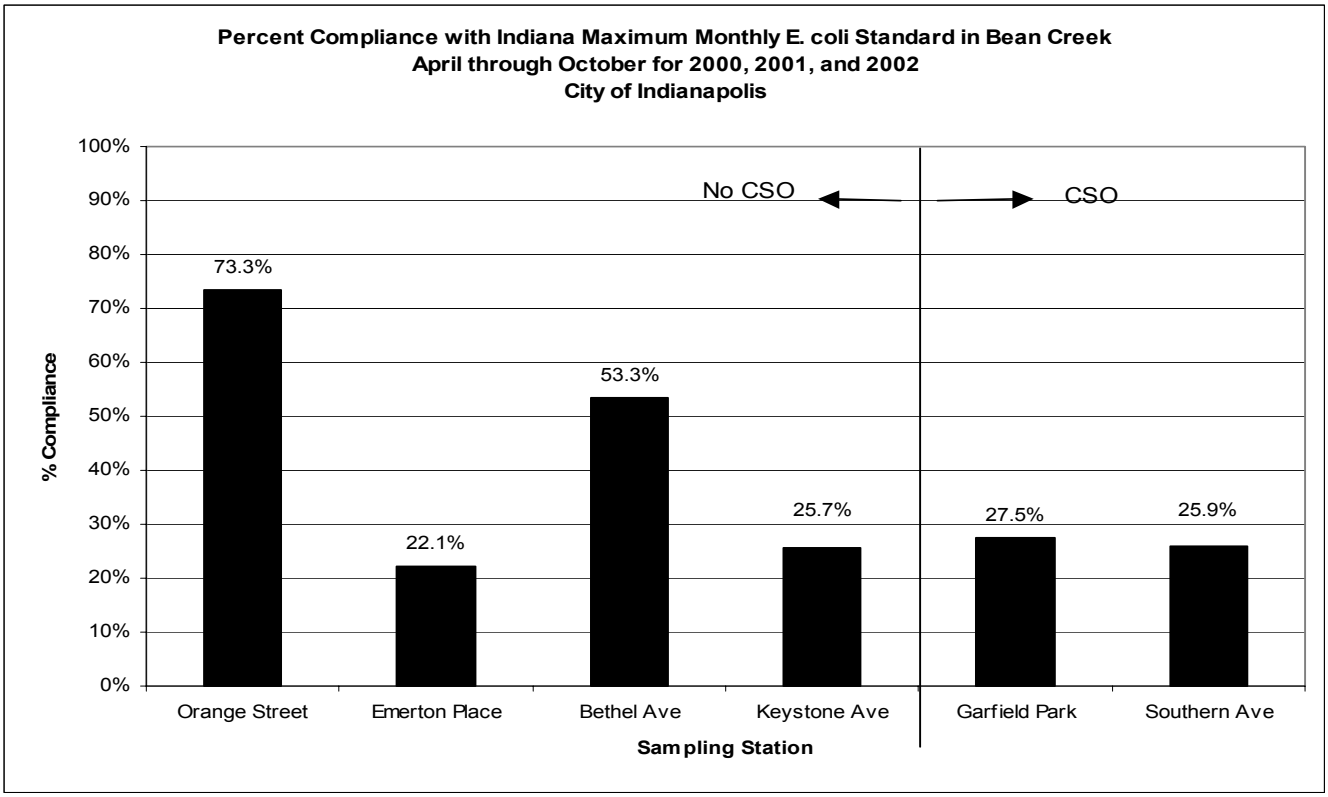
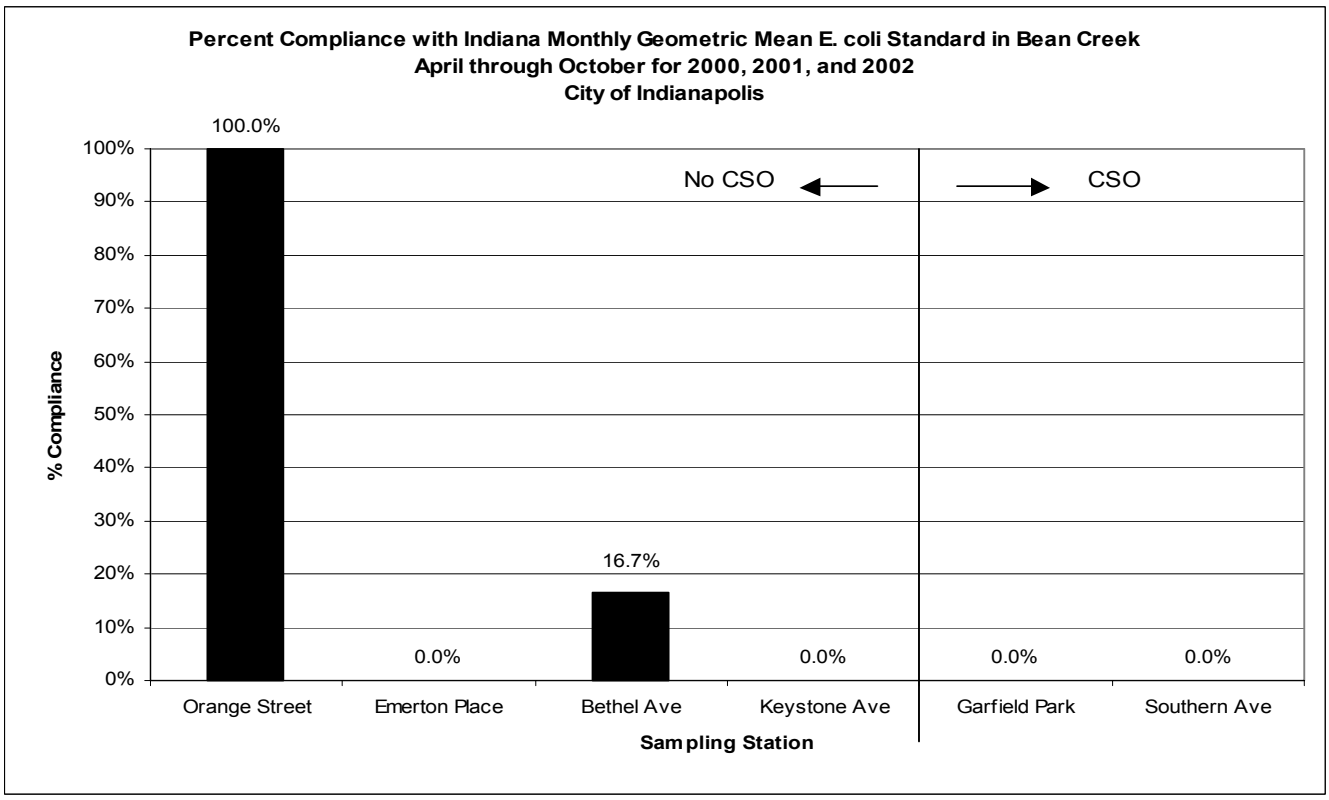


Figure 3.9: Bean Creek *E. coli* Data Plots





Section 4
Water Quality Characterization

The previous section documents the existing water quality for Pleasant Run. The findings indicate that the *E. coli* bacteria standard of 125 cfu/100 ml (geometric mean of five samples collected over 30 days) and 235 cfu/100 ml (maximum day value) are often exceeded in the stream.

4.1 Compliance Evaluation

E. coli bacteria data for 2000, 2001, and 2002 were analyzed for compliance with three reference criteria as follows:

- IDEM's geometric mean water quality standard for *E. coli* bacteria which is 125 cfu/100 ml or less,
- IDEM's 303(d) Listing Methodology (2002) guidance of no more than 10 percent of samples be above 235 cfu/100 ml, and
- IDEM's 303(d) Listing Methodology (2002) guidance of no sample having an *E. coli* level greater than 10,000 cfu/100 ml.

For this analysis, the *E. coli* bacteria data was separated into two categories, wet weather and dry weather. Wet weather is defined as any days with precipitation (greater than trace amounts) and the three days following that day. The three day period was determined by an analysis of *E. coli* bacteria in stormwater and CSOs as part of the April 2001 LTCP (CDM, 2003.) Dry weather is any time other than wet weather.

Pleasant Run and Bean Creek were divided into segments for analysis purposes as follows:

- Pleasant Run Upstream of the CSO Area
- Pleasant Run Within the CSO Area
- Bean Creek Upstream of the CSO Area
- Bean Creek Within the CSO Area

Instream *E. coli* bacteria sampling data for stations upstream of the CSO areas were grouped for each stream. Monitoring stations in the CSO areas were a second group for each stream. For informational purposes, data from Bean Creek were also analyzed. **Table 4.1 and Figure 4.1** show the extent of each stream segment analyzed.

Table 4.2 provides a summary of the *E. coli* bacteria sampling program for the stream segments compared to the three reference *E. coli* bacteria compliance criteria and presents the findings of the compliance analysis for the segments analyzed. **Figures 4.2 through 4.6** present the findings graphically.

4.1.1 All Weather Analysis

All four stream segments are not in compliance with the *E. coli* bacteria monthly geometric mean standard of 125 cfu/100 ml or the reference criteria of less than 10% of samples below 235 cfu/100 ml and no samples in excess of 10,000 cfu/100 ml. The analysis suggests that all stream segments are not able to accept the *E. coli* bacteria load from septic, stormwater, and CSO sources. The 29 samples in excess of 10,000 cfu/100 ml in the Pleasant Run CSO area imply that CSOs are a significant source of *E. coli* bacteria to the stream. The high number of samples in excess of 10,000 cfu/100 ml in Bean Creek upstream of the CSO area suggests that septic and stormwater sources are significant to the stream segment.

4.1.2 Dry Weather

All four stream segments are not in compliance with the Indiana geometric mean standard of 125 cfu/100 ml or the reference criteria of less than 10% of samples above 235 cfu/100 ml during dry weather. The analysis suggests that the septic, wildlife, and illicit connection loads are excessive for the stream. The presence of samples in excess of 10,000 cfu/100 ml in Bean Creek and the Pleasant Run CSO area segment illustrates the significance of these dry weather sources.

4.1.3 Wet Weather

All four stream segments are not in compliance with all three criteria during wet weather. The analysis suggests that the stormwater and CSO loads are excessive for the stream. However, the relatively small difference between dry and wet weather periods for the reference criteria of less than 10% of samples above 235 cfu/100 ml suggests that *E. coli* bacteria concentrations in slight excess of 235 cfu/100 ml is primarily due to dry weather loads, and the wet weather loads to the stream segments are producing *E. coli* bacteria concentrations in far excess of 235 cfu/100 ml.

Figure 4.1: Stream Segments on Pleasant Run and Bean Creek

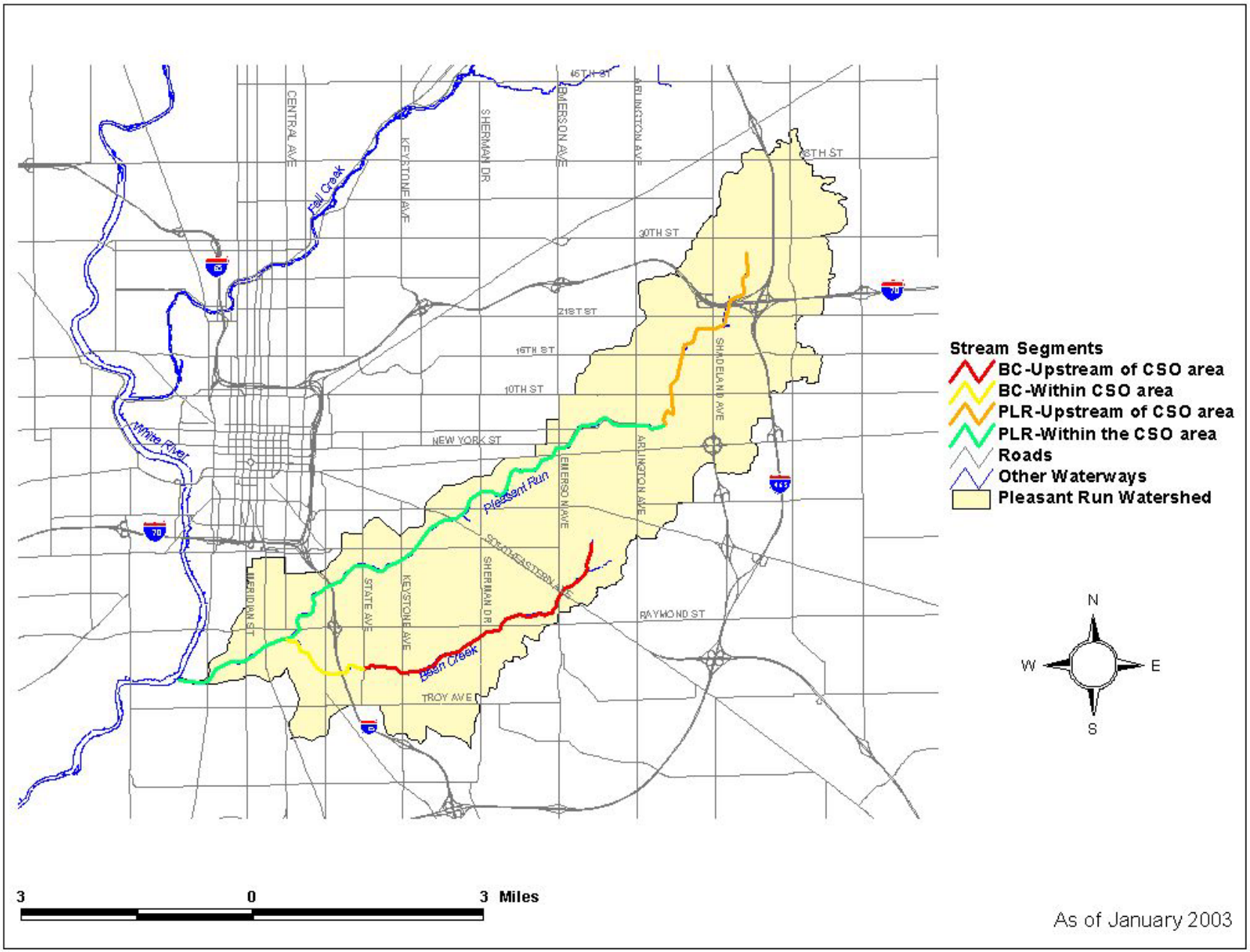


Figure 4.2: E. *coli* Bacteria Compliance
Pleasant Run Upstream of CSO Area
(Based on 2000 to 2002 Data)
City of Indianapolis
Stream Miles 8.1 to 11.2

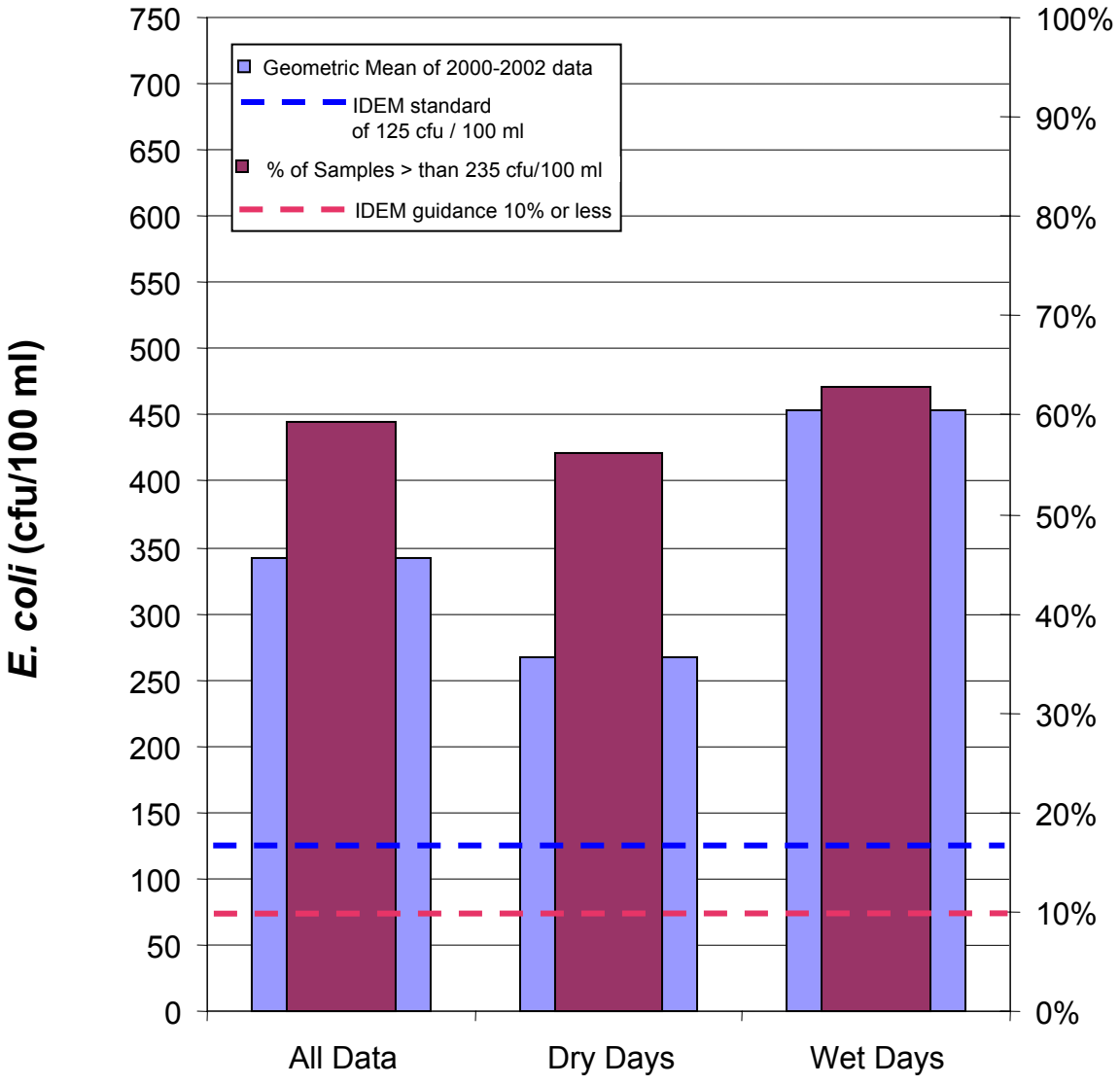


Figure 4.3: E. *coli* Bacteria Compliance
Pleasant Run Within CSO Area
(Based on 2000 to 2002 Data)
City of Indianapolis
Stream Miles 0 to 8.1

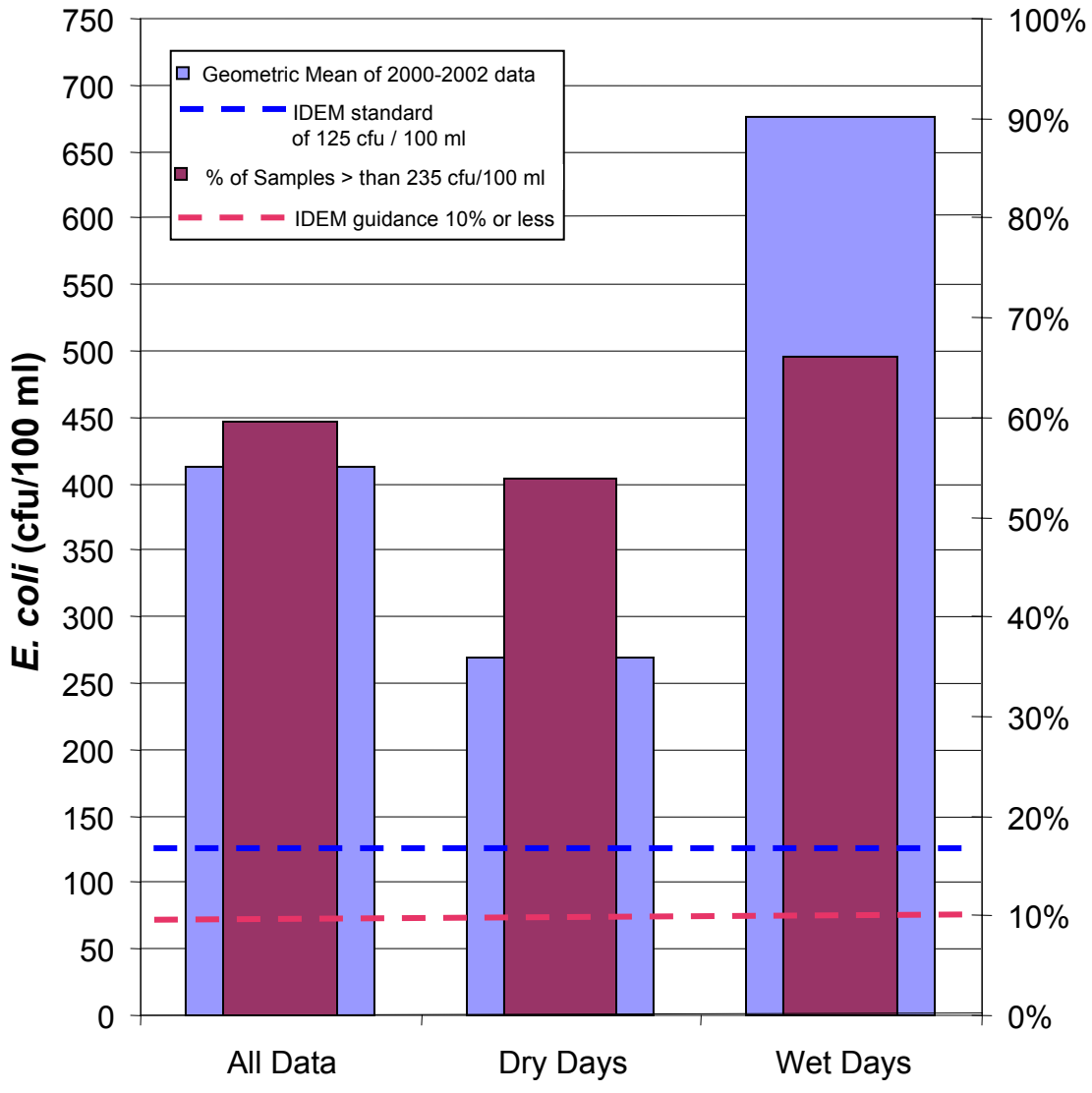


Figure 4.4: E. *coli* Bacteria Compliance
Bean Creek Upstream of CSO Area
(Based on 2000 to 2002 Data)
City of Indianapolis
Stream Miles 1.3 to 5.2

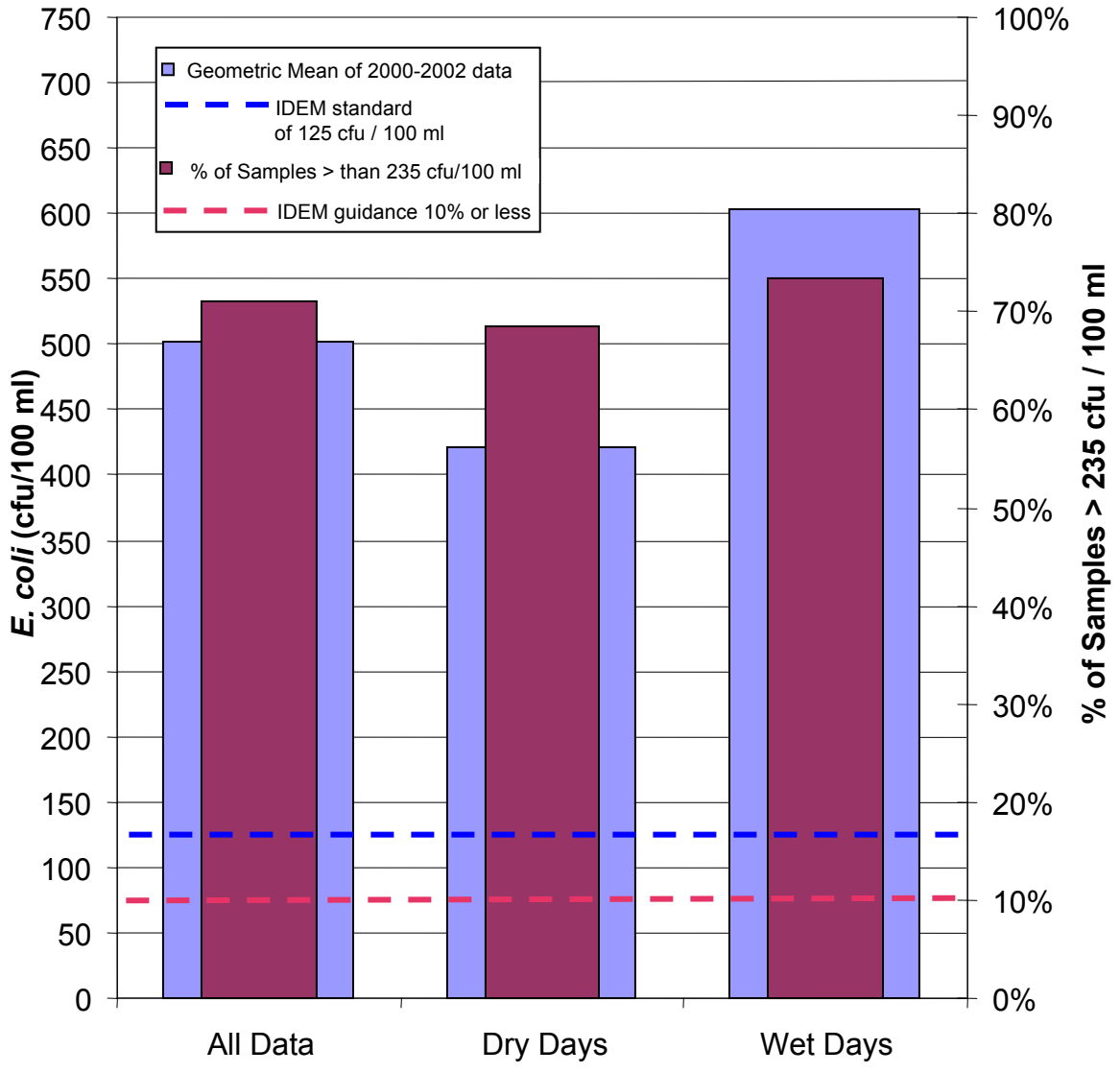


Figure 4.5: E. *coli* Bacteria Compliance
Bean Creek Within CSO Area
(Based on 2000 to 2002 Data)
City of Indianapolis
Stream Miles 0 to 1.3

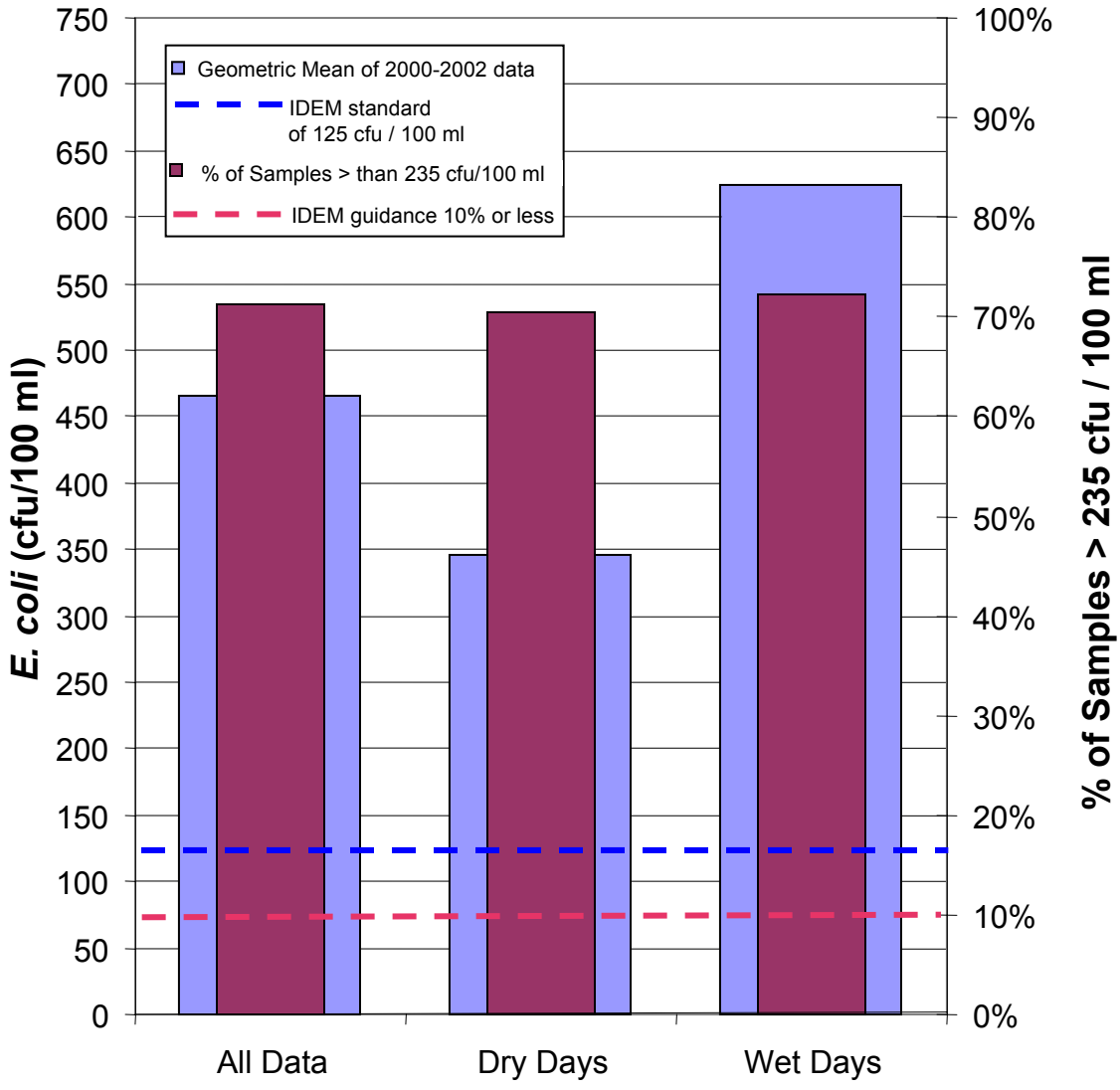


Table 4.1: Segment River Mile – Pleasant Run

Stream Segment	Stream Mile Start	Stream Mile End
Pleasant Run - Upstream of CSO Area	8.1	11.2
Pleasant Run - Within CSO Area	0	8.1
Bean Creek - Upstream of CSO Area	1.3	5.2
Bean Creek - Within CSO Area	0	1.3

Table 4.2: *E. coli* Bacteria Compliance – Pleasant Run

All Data				
River Segment	**Geometric Mean of 2000-2002 data**	**% of Samples > 235 cfu/100 ml**	**Total Number of Samples > 10,000 cfu/100 ml**	**Total Number of Samples**
Pleasant Run - Upstream of CSO Area	342	59.3%	4	258
Pleasant Run - Within CSO Area	413	59.5%	29	862
Bean Creek - Upstream of CSO Area	502	71.1%	8	340
Bean Creek - Within CSO Area	466	71.3%	5	178
Dry Weather				
River Segment	**Geometric Mean of 2000-2002 data**	**% of Samples > 235 cfu/100 ml**	**Total Number of Samples > 10,000 cfu/100 ml**	**Total Number of Samples**
Pleasant Run - Upstream of CSO Area	267	56.2%	0	137
Pleasant Run - Within CSO Area	269	53.8%	3	461
Bean Creek - Upstream of CSO Area	421	68.6%	1	175
Bean Creek - Within CSO Area	346	70.5%	0	88
Wet Weather				
River Segment	**Geometric Mean of 2000-2002 data**	**% of Samples > 235 cfu/100 ml**	**Total Number of Samples > 10,000 cfu/100 ml**	**Total Number of Samples**
Pleasant Run - Upstream of CSO Area	454	62.8%	4	121
Pleasant Run - Within CSO Area	676	66.1%	26	401
Bean Creek - Upstream of CSO Area	603	73.3%	7	165
Bean Creek - Within CSO Area	625	72.2%	5	90
State Guidance [1]	**(IDEM standard of 125 cfu/100 ml)**	**(IDEM Guidance 10% or less)**	**(IDEM Guidance None > 10,000 cfu/100 ml)**	

[1] Indiana's 303(d) Listing Methodology for Impaired Waterbodies and Total Maximum Daily Load - September 2002

Section 5
Source Characterization

A model was developed to simulate the impact of both dry and wet weather *E. coli* bacteria sources. The model simulates wet-weather bacteria sources including CSOs and urban/residential nonpoint sources to Pleasant Run. Additionally, work was performed to define the sources of dry weather bacteria and the components of urban/residential nonpoint source wet-weather contaminants.

A source assessment is used to characterize the known and suspected sources of *E. coli* bacteria in the watershed for the development of the TMDL. *E. coli* bacteria was characterized for the following sources:

- Septic systems
- Illicit connections to storm drains
- Wildlife/Natural
- Stormwater runoff
- Combined sewer overflows

There is one NPDES wastewater treatment facility on Pleasant Run, which is for cooling water and does not discharge *E. coli* bacteria. All sources of *E. coli* bacteria identified in the watershed were assigned a loading rate based on data from the City of Indianapolis programs, literature values, and population in the watershed. Because of varying decay or die-off rates for *E. coli* bacteria, and varying transport assumptions, the *E. coli* bacteria loading from these sources were computed separately as described below.

5.1 Septic Systems

Failing septic systems have been linked to increased *E. coli* bacteria levels in streams throughout the world. In accordance with the City of Indianapolis' Septic Tank Elimination Program, a list of neighborhoods with failing septic systems is kept and updated based on new information. Scheduling of sewer projects in each neighborhood is partially based on the degree of system failure that is observed. Priority levels 1 through 3 are assigned, with Priority 1 typically corresponding to neighborhoods with the highest degree of failure. The failure information was obtained for the period of 2000 through 2002 and was compared to sampling data for that same period. As of early 2000, there were five Priority 1 septic neighborhoods within the Pleasant Run watershed boundary, as well as one Priority 2 and one Priority 3 septic neighborhood. The number of septic systems in each watershed was estimated based on the city's GIS data for septic neighborhoods, buildings, and watersheds. *E. coli* bacteria loads were estimated based on an estimated failure rate, flow rate, and *E. coli* bacteria counts for the septic neighborhoods. For purposes of the

TMDL analysis, the failure rate for septic systems was related to the priority level of the neighborhood as follows:

- Priority 1: 25% failure rate
- Priority 2: 15% failure rate
- Priority 3: 10% failure rate
- All others: 5% failure rate

The city's reported failure rate is often much higher than the values used in this TMDL, as septic system "failure" may not result in *E. coli* bacteria reaching the stream. Septic system failure rates were validated using the instream *E. coli* bacteria data during development of the model. A flow of 100 gallons/person-day and a concentration of 10,000 cfu/100 ml (Horsley and Whitten, 1996) for each failing septic system were assigned. Leaking septic systems are characterized as a point source having constant flow and concentration. The loading rate attributed to leaking septic systems is estimated to be 9.57×10^9 cfu per day. **Table 5.1** summarizes the estimated failed septic system *E. coli* bacteria loadings into Pleasant Run. The average daily load is calculated as the average daily septic flow multiplied by the average daily septic *E. coli* bacteria concentration. The average monthly load is the daily load multiplied by 30 days.

5.2 Illicit Connections

Stormwater outfalls often carry *E. coli* bacteria during dry weather because of loadings from illicit sanitary connections to the stormwater collection system. The City of Indianapolis Fifth Annual Report (2002) for the NPDES stormwater permit (AMEC, 2003) reported that approximately 7.7% of the stormwater outfalls sampled contained dry weather flows. This flow is assumed to contain *E. coli* bacteria. For each illicit discharge, a flow of 20 gpd with 10,000 cfu/100 ml for *E. coli* bacteria was assigned. This flow rate and concentration were validated using the instream *E. coli* bacteria data during development of the model. **Table 5.2** summarizes the estimated illicit storm drain *E. coli* bacteria loadings into Pleasant Run. The average daily load is calculated as the average daily illicit connection flow multiplied by the average daily illicit connection *E. coli* bacteria concentration. The average monthly load is the daily load multiplied by 30 days.

5.3 Wildlife and Natural Background

Not all *E. coli* bacteria in waterways is the result of man-made sources. Wildlife, both instream and on-bank, can be a source of *E. coli* bacteria to the streams. To estimate the potential load from wildlife, the instream monitoring station at 71st Street on Fall Creek was utilized. The land use above 71st Street indicates natural conditions with the least anthropogenic sources in the study area. The *E. coli* bacteria monitoring data

from this station was used as a basis for representing the wildlife or natural *E. coli* bacteria load into the streams. **Table 5.3** summarizes the estimated *E. coli* bacteria concentrations and loadings into Pleasant Run that are a result of natural biota in the watersheds. All *E. coli* concentrations shown in the table received adjustment during model calibration (Section 6.2). This load represents wildlife or natural *E. coli* bacteria during dry weather conditions only. *E. coli* bacteria from wildlife or natural sources that is conveyed to the river by surface runoff is discussed in Section 5.4. The average daily load is calculated as the average daily natural background flow multiplied by the average daily natural background *E. coli* bacteria concentration. The average monthly load is the daily load multiplied by 30 days.

5.4 Stormwater Runoff

Stormwater often carries *E. coli* because of loadings from domestic animals, wildlife, and agricultural land. Information from the City of Indianapolis' stormwater program and GIS coverages provided insight into the contribution of stormwater to the *E. coli* exceedance seen in Pleasant Run and showed what progress has been made thus far in alleviating that contribution. Due to variations in solid deposits and *E. coli* bacteria loadings in residential, commercial, and other property types, a range of *E. coli* bacteria concentrations was assumed for each land use. Average stormwater *E. coli* counts were estimated from literature values and based on Indianapolis Mapping and Geographic Infrastructure System (IMAGIS) land use and watershed coverages. These bacteria counts were applied to surface runoff flows from October 1991 to October 2001 predicted using the city's watershed model. **Table 5.4** contains a summary of the average daily surface runoff flows and *E. coli* loadings into Pleasant Run based on land use. This load contains all sources of *E. coli* bacteria carried in from stormwater runoff, including wildlife. The average daily load is calculated as the average daily stormwater runoff flow multiplied by the average daily stormwater runoff *E. coli* bacteria concentration. The average monthly load is the daily load multiplied by 30 days. **Table 5.5** shows the percentages of stormwater loads into Pleasant Run that come from permitted (storm drain outfall), non-permitted (surface runoff), and out-of-county sources. This information is pertinent to the TMDL analysis as the city's stormwater programs only address the control of stormwater *E. coli* bacteria from sources within the county.

5.5 Combined Sewer Overflows

Combined Sewer Overflows (CSOs) can be a large source of *E. coli* in urban streams. The CSO flows and *E. coli* bacteria loadings were determined using a methodology similar to that being used for the CSO Long Term Control Plan (LTCP). CSO discharges were predicted by the city's collection system model for a ten-year period of time (October 1991 to October 2001). *E. coli* sampling of CSO discharges were performed by the city in 2001 to characterize CSO discharges. Concentrations ranged from 500,000 cfu/100 ml up to 900,000 cfu/100 ml. The CSO flows and *E. coli* loads were predicted using the city's models and sampling data. **Table 5.6** contains a summary of the estimated *E. coli* loadings from CSOs on Pleasant Run. The average

annual CSO loads and the average CSO *E. coli* bacteria concentrations were determined from hydraulic model simulations. The average daily load is the annual load divided by 365. The average monthly load is the daily load multiplied by 30 days.

TABLE 5.1: FAILING SEPTIC SYSTEMS
PLEASANT RUN

Watershed	Approximate Count of Septic Systems				Total Septic Systems	Estimated Failing Septic Systems	Approximate Population	Estimated Failing Septic Flow (MGD)	Estimated Failing Septic Daily Load (cfu)	Estimated Failing Septic Monthly Load (cfu)
	Barrett Law Priority 1	Barrett Law Priority 2	Barrett Law Priority 3	Non-Barrett Law						
Assumed Failure Rate	**25%**	**15%**	**10%**	**5%**						
Pleasant Run Upstream	163	204	56	89	512	81	285	0.03	5.39E+09	3.24E+11
Pleasant Run CSO	30	129	0	94	253	32	110	0.01	4.18E+09	1.25E+11
Pleasant Run Totals	**193**	**333**	**56**	**183**	**765**	**113**	**395**	**0**	**9.57E+09**	**4.49E+11**

*Assumptions include 3.5 persons per septic system, 100 gpcd septic flow, and 10,000 cfu/100 ml E. coli in the septic flow
**Persons per system and per capita flows taken from May 1989 DPW Design Standards
***Assume 5,000 cfu/100 ml for Pleasant Run Upstream

TABLE 5.2: ILLICIT CONNECTIONS TO STORM DRAINS
PLEASANT RUN

Watershed	# of Storm Outfalls	Miles of Storm Sewer and Drains	Approximate number of Illicit Connections	Illicit Flow (MGD)	Estimated Illicit Connection Daily Load (cfu)	Estimated Illicit Connection Monthly Load (cfu)
Pleasant Run Upstream	85	127	7	1.40E-04	5.30E+07	1.59E+09
Pleasant Run CSO	110	155	8	1.60E-04	6.06E+07	1.82E+09

*Illicit Connections for all stream segments assumed at 7.7% of outfalls (based on 2002 NPDES Stormwater report sampling data)
20 gpd sanitary flow, and 10,000 cfu/100 ml E. coli in the illict flow

TABLE 5.3: INSTREAM WILDLIFE
PLEASANT RUN

Watershed	Average Dry-Weather *E. coli* (cfu/100 ml)	Average Dry-Weather stream flow (cfs)	Approximate Instream Wildlife Daily Load (cfu)	Estimated Instream Wildlife Monthly Load (cfu)
Pleasant Run Upstream*	20	2.0	9.79E+08	2.94E+10
Pleasant Run CSO*	20	2.0	9.79E+08	2.94E+10

*The 71st Street Sampling Station along Fall Creek is not in close proximity to any septic systems.
Its dry-weather observed *E. coli* bacteria concentrations are assumed to be the result of wildlife.
This concentration is applied to all other streams
*These concentrations received adjustment during model calibration. Calibrated concentrations are shown.

TABLE 5.4: STORMWATER RUNOFF FROM SEPARATE SEWER AREAS
PLEASANT RUN

	Approximate Percentage of Specified Land use								Approximate Average E. Coli Concentration (cfu/100 ml)	Daily Average Stormwater Flow (cfs)	Daily Average Stormwater Load (cfu)
Land use Type	Commercial	Residential	Historic & Hospital	Industrial	Parks	Highway ROW	Spec. Uses	University			
Zoning Class	All C's	All D's	All H's	All I's	All PK's	ROW, RC	All SU's	All U's			
Assumed E. coli concentration	2500	2000	2500	5000	2000	5000	3000	3000			
Pleasant Run Upstream	11%	53%	0%	22%	7%	4%	3%	0%	2200	5	2.56E+11
Pleasant Run CSO	12%	68%	1%	12%	2%	1%	2%	1%	2200	1	4.35E+10

TABLE 5.5: UNPERMITTED AND PERMITTED STORMWATER RUNOFF SOURCES PLEASANT RUN							
Watershed	**Permitted Storm Sewer Area (Acres)**	**Area without Storm Sewers (Acres)**	**Area outside County (Acres)**	**Total Area (Acres)**	**% Permitted**	**% Unpermitted**	**% Out of County**
Pleasant Run & Bean Creek Upstream	14,000	-	-	14,000	100%	0%	0%

TABLE 5.6: COMBINED SEWER OVERFLOWS PLEASANT RUN							
Watershed	# Of CSO Regulators	# of CSO Outfalls	Annual Average CSO Volume (MG)	Average CSO E. Coli Concentration (cfu/100 ml)	Annual Average CSO E. Coli Load (cfu)	Daily Average CSO E. Coli Load (cfu)	Monthly Average CSO E. Coli Load (cfu)
Pleasant Run CSO	51	51	334	1.21E+06	1.51E+16	4.13E+13	1.24E+15

*Flows and bacteria loadings are from the 50-year rainfall record. Flows and loads are model results.

Section 6
Total Maximum Daily Load Analysis

A TMDL is a tool for meeting water quality standards. It is based on the relationship between sources of pollutants and instream water quality conditions. The TMDL establishes the allowable loadings for point nonpoint sources of specific pollutants that a water body can receive without exceeding water quality standards, thereby providing the basis for establishing water quality based pollutant controls.

6.1 Goals

Using the U.S. EPA *Protocol for Developing Pathogen TMDLs* (January 2001), the following steps were followed and utilized to develop a TMDL for *E. coli* bacteria:

- **Problem identification**: Identify key factors and background information for waterbody that describe the nature of the impairment.
- **Water quality indicators and targets**: Identify numeric indicators and target values that can be used to evaluate attainment of water quality standards.
- **Source assessment**: Identify and characterize sources of pollutant to water body.
- **Linkage between water quality targets and sources**: Linkage establishes the cause and effect relationship between the pollutant sources and the instream water quality response. The linkage is further used to estimate the load assimilation capacity of the water body, which is the maximum amount of pollutant loading a water body can assimilate and still attain water quality standards.
- **Load allocation**: Based on the established target/sources linkage, pollutant loadings that will not exceed the load assimilation capacity and will lead to attainment of the water quality standard can be determined.
- **Assembling the TMDL**: The elements of a TMDL submittal are compiled to facilitate TMDL review.
- **Follow-up monitoring and evaluation**: After implementation of the TMDL, follow-up monitoring is used to assess if the TMDL results in attaining water quality standards for the water body.

6.2 Methods

An *E. coli* bacteria model of Pleasant Run was developed and calibrated to the existing instream *E. coli* bacteria data. The model simulated the daily instream bacteria counts for each stream segment based on loads from the sources described in Section 5. For the dry weather sources, a constant load was applied. The dry weather sources are failing septics, wildlife and natural background, and illicit storm drain connections. For stormwater runoff and CSO discharges, the *E. coli* bacteria load was based on the

city's separate sewer area water quality model for stormwater and the collection system interceptor model for CSO discharges during wet weather. A ten-year period of time (October 1991 through September 2001) was simulated. Data on stream flow was used to predict the resultant instream *E. coli* bacteria counts for each day for the ten-year period.

Daily flow data for the Pleasant Run – Arlington Avenue station was obtained from the USGS for the period of October 1, 1991 through September 30, 2001. This flow data was used for the daily *E. coli* bacteria model.

Table 6.1 presents a sample page from the daily *E. coli* bacteria model for the Pleasant Run – CSO area. **Figure 6.1** presents the predicted instream bacteria counts for April 1, 1997 to October 31, 1997, the most representative sampling period.

Model calibration consisted of comparisons of the *E. coli* bacteria geometric mean, percent of samples greater than 235 cfu/100 ml and the number of samples over 10,000 cfu/100 ml per year of sampling. These comparisons were performed for both dry weather and wet weather data. The calibration of the model for *E. coli* bacteria included quality control checks of the USGS daily flow data, adjustment for *E. coli* bacteria contributions from wildlife for all segments, adjustment for the septic flow *E. coli* bacteria contributions, and for *E. coli* bacteria contributions from stormwater. **Table 6.2** contains a summary of the observed and modeled *E. coli* bacteria loading parameters from October 1991 through September 2001. The percentage of observed and predicted days in excess of 235 cfu/100 ml for dry, wet, and all weather conditions is reported in the table. **Table 6.3** summarizes the failed septic systems, illicit connections, wildlife, stormwater, and CSO *E. coli* bacteria loadings into Pleasant Run.

6.3 Seasonality

The TMDL for all segments of Pleasant Run has been calculated for the recreational season, which is April through October. Calculating a TMDL for this period will be more conservative than a calculation over an entire year.

6.4 Critical Condition

The TMDL for all segments of Pleasant Run has been calculated for the recreational season, which is April through October. The recreational season is considered to be the critical condition evaluated for Pleasant Run.

6.5 Margin of Safety

The Margin of Safety (MOS) is a required component of TMDL development. There are two basic methods for incorporating the MOS: 1) Implicitly incorporate the MOS using conservative model assumptions to develop allocations; or 2) Explicitly specify a portion of the TMDL as the MOS and use the remainder for allocations. For this

TMDL the MOS was implicitly incorporated into the modeling process by using conservative assumptions.

The assumptions used to represent the various loads from CSOs, stormwater, failed septic systems and other sources are generally conservative. Greater reductions in *E. coli* bacteria will likely occur than those predicted based on the model and analysis.

Additional conservative assumptions in the modeling process include:

- The model has the die-off rate of *E. coli* bacteria set to 0.0 for each model stream segment. In general, the stream segments have short travel times, typically a day or less.
- Inclusion of natural/background contributions in the analysis, which recognizes the presence of *E. coli* bacteria that cannot be removed from the stream.
- The model simulation is over a 10-year time period to represent the stream flow variations that occur.
- TMDLs are set on the April through October recreational period, which is the lowest flow period of the year.

6.6 Existing and Allowable *E. coli* Bacteria Load

The existing *E. coli* bacteria loads, both point and nonpoint sources, for Pleasant Run are presented in **Table 6.4.** The components of the point source loads include CSOs, permitted stormwater discharges, and illicit storm drain connections. The components of the nonpoint source loads are unpermitted stormwater discharges, wildlife and natural background, and failing septic systems. All *E. coli* bacteria loads presented are calculated for the recreational season.

Based on the modeled *E. coli* bacteria concentrations and stream flow, the allowable *E. coli* TMDLs for Pleasant Run were determined. The TMDL is calculated as 125 cfu *E. coli* bacteria/100 ml multiplied by the average daily flow for the stream segment during the recreational season. TMDLs are based on meeting water quality standards.

The allowable *E. coli* bacteria TMDLs and required reductions for Pleasant Run are as follows.

Pleasant Run upstream of the CSO area:

Existing Waste Load = 3.00×10^{11} cfu
Existing Load = 6.37×10^{9} cfu
Existing Total Load = 3.06×10^{11} cfu

TMDL = 2.57×10^{10} cfu
Required Reduction = 92%

Pleasant Run within the CSO area:

Existing Waste Load = 5.23×10^{13} cfu
Existing Load = 1.15×10^{10} cfu
Existing Total Load = 5.23×10^{13} cfu

TMDL = 4.61×10^{10} cfu
Required Reduction = 99.9%

Figure 6.1: Predicted Pleasant Run CSO Area Daily *E. coli* Bacteria Counts

April 1, 1997 through October 31, 1997

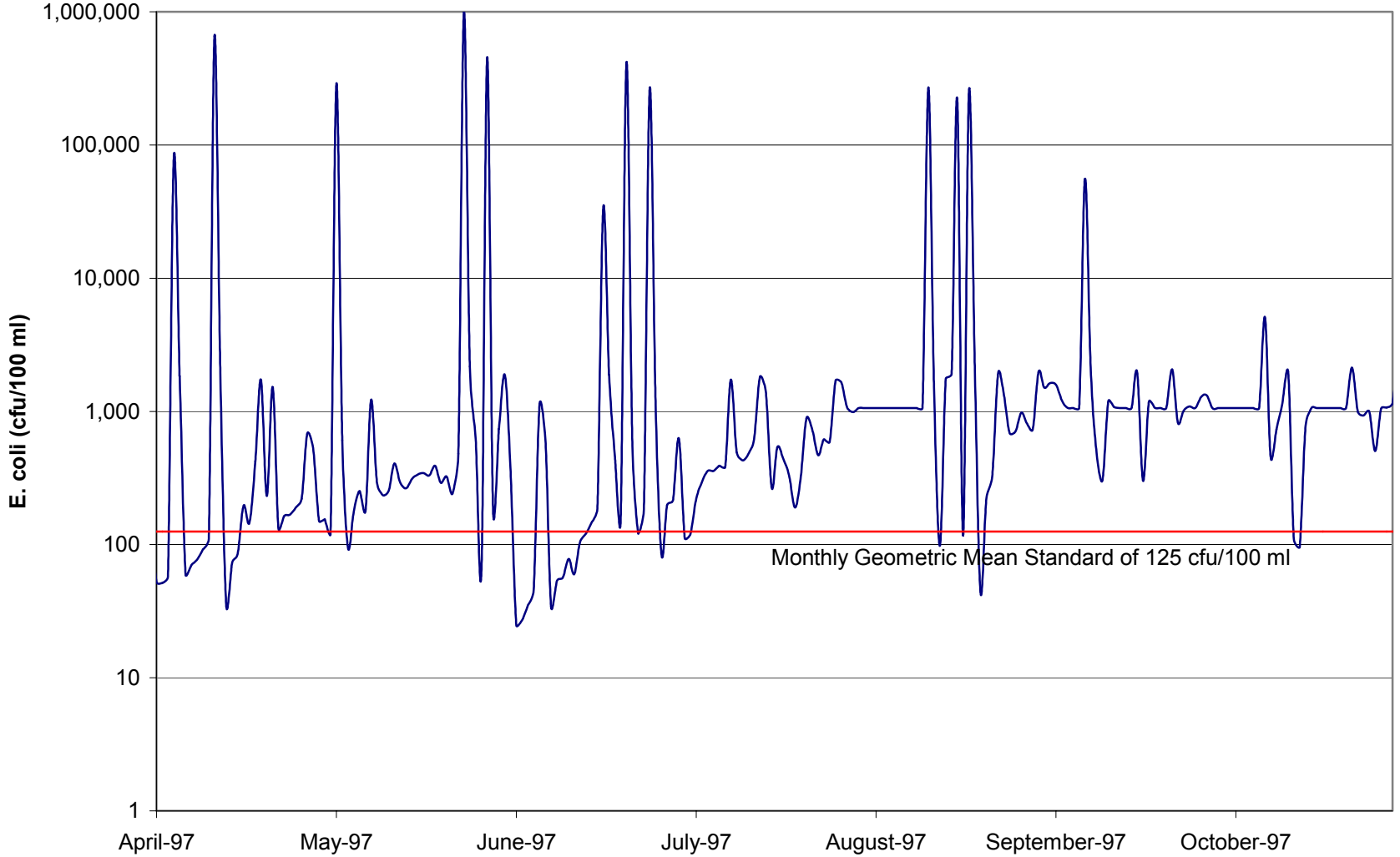


TABLE 6.1: SAMPLE OF PLEASANT RUN CSO AREA DAILY *E. coli* COUNTS

Date	Average Daily Flow (cfs)	Stormwater Runoff (cfs)	CSO Flow (cfs)	Total Daily Flow (cfs)	Septic Load (cfu/day)	Illicit Load (cfu/day)	Wildlife Load (cfu/day)	Stormwater Load (cfu/day)	CSO Load (cfu/day)	Total Load (cfu/day)	Resulting Concentration (cfu/100 ml)
1/1/1992	1.74	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	274
1/2/1992	1.97	0	0	2	9.57E+09	1.14E+08	1.96E+09	2.55E+09	0.00E+00	1.42E+10	288
1/3/1992	5.03	0	0	5	9.57E+09	1.14E+08	1.96E+09	1.16E+10	0.00E+00	2.32E+10	181
1/4/1992	2.15	0	0	2	9.57E+09	1.14E+08	1.96E+09	2.43E+09	0.00E+00	1.41E+10	262
1/5/1992	1.74	0	0	2	9.57E+09	1.14E+08	1.96E+09	2.18E+08	0.00E+00	1.19E+10	278
1/6/1992	1.74	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	274
1/7/1992	1.71	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	278
1/8/1992	1.69	0	0	2	9.57E+09	1.14E+08	1.96E+09	7.68E+09	0.00E+00	1.93E+10	431
1/9/1992	2.33	0	0	2	9.57E+09	1.14E+08	1.96E+09	7.42E+09	0.00E+00	1.91E+10	316
1/10/1992	1.78	0	0	2	9.57E+09	1.14E+08	1.96E+09	1.54E+09	0.00E+00	1.32E+10	298
1/11/1992	1.58	0	0	2	9.57E+09	1.14E+08	1.96E+09	1.15E+08	0.00E+00	1.18E+10	304
1/12/1992	2.15	0	0	2	9.57E+09	1.14E+08	1.96E+09	6.25E+09	2.75E+11	2.93E+11	5263
1/13/1992	7.72	2	0	10	9.57E+09	1.14E+08	1.96E+09	1.00E+11	0.00E+00	1.12E+11	477
1/14/1992	46.68	33	0	79	9.57E+09	1.14E+08	1.96E+09	1.75E+12	0.00E+00	1.76E+12	910
1/15/1992	8.98	1	0	10	9.57E+09	1.14E+08	1.96E+09	7.03E+10	0.00E+00	8.19E+10	326
1/16/1992	5.39	0	0	6	9.57E+09	1.14E+08	1.96E+09	2.44E+10	0.00E+00	3.61E+10	252
1/17/1992	3.59	0	0	4	9.57E+09	1.14E+08	1.96E+09	4.60E+09	0.00E+00	1.62E+10	181
1/18/1992	2.69	0	0	3	9.57E+09	1.14E+08	1.96E+09	7.20E+08	0.00E+00	1.24E+10	187
1/19/1992	2.15	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	221
1/20/1992	1.8	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	264
1/21/1992	4.49	0	0	4	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	106
1/22/1992	12.21	0	0	12	9.57E+09	1.14E+08	1.96E+09	3.25E+08	0.00E+00	1.20E+10	40
1/23/1992	23.34	0	0	24	9.57E+09	1.14E+08	1.96E+09	1.04E+10	0.00E+00	2.20E+10	38
1/24/1992	9.87	1	0	11	9.57E+09	1.14E+08	1.96E+09	3.75E+10	0.00E+00	4.91E+10	190
1/25/1992	7	0	0	7	9.57E+09	1.14E+08	1.96E+09	1.18E+10	0.00E+00	2.34E+10	133
1/26/1992	7.36	0	0	7	9.57E+09	1.14E+08	1.96E+09	3.34E+09	0.00E+00	1.50E+10	83
1/27/1992	8.26	0	0	8	9.57E+09	1.14E+08	1.96E+09	3.58E+08	0.00E+00	1.20E+10	59
1/28/1992	7	0	0	7	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	68
1/29/1992	5.39	0	0	5	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	88
1/30/1992	4.49	0	0	4	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	106
1/31/1992	3.95	0	0	4	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	120
2/1/1992	2.87	0	0	3	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	166
2/2/1992	2.51	0	0	3	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	190
2/3/1992	2.51	0	0	3	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	190
2/4/1992	2.33	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	204
2/5/1992	1.97	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	242
2/6/1992	1.97	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	242
2/7/1992	1.8	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	264
2/8/1992	1.71	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	278
2/9/1992	1.53	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	311
2/10/1992	1.53	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	311
2/11/1992	1.53	0	0	2	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	311
2/12/1992	1.35	0	0	1	9.57E+09	1.14E+08	1.96E+09	0.00E+00	0.00E+00	1.16E+10	353
2/13/1992	1.97	0	0	2	9.57E+09	1.14E+08	1.96E+09	1.67E+10	0.00E+00	2.83E+10	507
2/14/1992	2.69	1	0	3	9.57E+09	1.14E+08	1.96E+09	3.24E+10	7.79E+11	8.23E+11	10143
2/15/1992	57.45	29	0	86	9.57E+09	1.14E+08	1.96E+09	1.55E+12	0.00E+00	1.56E+12	740

TABLE 6.2: COMPARISON OF OBSERVED AND MODELED E. COLI COUNTS
PLEASANT RUN

	Geometric Mean of *E. coli* bacteria			% of Days *E. coli* bacteria > 235 cfu/100 ml			# of Days per year *E. coli* bacteria > 10,000 cfu/100 ml		
Watershed	All	Dry**	Wet***	All	Dry**	Wet***	All	Dry**	Wet***
Pleasant Run-Upstream Measured*	342	267	454	59%	56%	63%	3	0	3
Pleasant Run-Upstream Modeled	368	257	443	63%	62%	64%	0	0	0
Pleasant Run-CSO Measured*	413	269	676	60%	54%	66%	19	2	17
Pleasant Run-CSO Modeled	448	259	597	60%	62%	58%	24	0	24

*Measured *E. coli* counts are reported in Table 4.2

**The Dry weather geometric mean, % of days over 235 cfu/100 ml, and # of days per year over 10,000 cfu/100 ml are calculated for dry weather days only

***The Wet weather geometric mean, % of days over 235 cfu/100 ml, and # of days per year over 10,000 cfu/100 ml are calculated for wet weather days only

TABLE 6.3: TOTAL AVERAGE E. COLI DAILY LOAD
PLEASANT RUN

Watershed	Average Daily Septic Load (cfu)	Average Daily Illicit Connection Load (cfu)	Average Daily Wildlife Load (cfu)	Average Daily Stormwater Load (cfu)	Average Daily CSO Load (cfu)	Total Average Daily Load (cfu)	Total Cumulative Daily Load (cfu)
Pleasant Run Upstream	5.39E+09	5.30E+07	9.79E+08	2.56E+11	0.00E+00	2.62E+11	
Pleasant Run CSO	4.18E+09	6.06E+07	9.79E+08	4.35E+10	4.13E+13	4.14E+13	**4.17E+13**

TABLE 6.4: SUMMARY OF EXISTING *E. COLI* BACTERIA LOAD FOR APRIL TO OCTOBER THE RECREATIONAL SEASON PLEASANT RUN & BEAN CREEK

Scenario	Point Source -- CSO Discharges (cfu)*	Point Source -- Permitted Stormwater Discharges (cfu)*	Point Source -- Illicit Sanitary Connections (cfu)*	**Total Point Source Load (cfu)**	Nonpoint Source - Unpermitted Stormwater Discharges (cfu)*	Nonpoint Source -- Wildlife (cfu)*	Nonpoint Source -- Failing Septic Systems (cfu)*	**Total Nonpoint Source Load (cfu)**	**Total Load (cfu)**	TMDL (cfu)	**Required Load Reduction to meet TMDL (%)**
Pleasant Run-Upstream Existing	0.00E+00	3.00E+11	5.30E+07	**3.00E+11**	0	9.79E+08	5.39E+09	**6.37E+09**	**3.06E+11**	2.57E+10	**92%**
Pleasant Run-CSO Existing	5.20E+13	3.34E+11	1.14E+08	**5.23E+13**	0	1.96E+09	9.57E+09	**1.15E+10**	**5.23E+13**	4.61E+10	**99.91%**

*Note: All loads presented in are the average daily loads for the recreational season. These loads may be different from the loads presented in Section 5, which are for the entire year.

Section 7
Public Participation

7.1 Public Meetings

To date, the IDEM has held three public stakeholder meetings to present the progress of the TMDL program for Pleasant Run. Information such as a summary of findings, characterization of the stream, weather conditions and how results are affected, model introduction, and an overview of the TMDL process were presented. The public participation meetings were held on September 17, 2002; December 17, 2002; and April 1, 2003. The draft findings of this report were presented to community stakeholders on July 8, 2003.

IDEM invited all registered neighborhood organizations in Indianapolis, as well as many major environmental groups. Groups in attendance at the public stakeholder meetings include the Wet Weather Technical Advisory Committee and the Friends of the White River.

In addition to the TMDL process, water quality-related public outreach is a key component of the city's CSO LTCP, Septic Tank Elimination Program, and stormwater program.

Section 8
Implementation Activities and Schedule

The ultimate goal of the TMDL program is to improve water quality in our streams by determining the allowable pollutant load and reducing loads accordingly. While there are no specific activities planned as a result of this TMDL study, results of this TMDL study have been incorporated into the existing programs for control of stormwater, failed septic systems, and CSOs of the City of Indianapolis. Each of these programs is briefly described below.

8.1 Stormwater Program

The city utilizes new construction or redevelopment permitting as an opportunity to control stormwater flows that discharge into receiving streams or the CSO system through the recently revised Chapter 700 to Section 581 of the City of Indianapolis Code (Stormwater Management and Sediment Control). Chapter 700 requires best management practices (BMPs) to improve the quality of the stormwater runoff whenever new construction or redevelopment that disturbs more than 1/2 - acre is proposed anywhere in Marion County. The city is implementing this proactive approach in the CSO area to improve water quality even though it is not required by the NPDES stormwater permit. The city requires that prior to new construction, reconstruction, or remodeling, contractors and developers must submit a stormwater control plan and obtain drainage permits to address stormwater runoff originating from the sites. In the CSO area, controlling stormwater runoff has the added benefit of potentially reducing CSO discharges to the receiving streams. In addition, at locations where the stormwater runoff is controlled and then treated by BMPs before being discharged directly to the receiving streams, the city stormwater programs require developers to improve the urban stormwater quality.

Control of stormwater runoff quality is based on the management of total suspended solids (TSS). The target TSS removal rate is 80%. The requirements apply to all areas of the county except the city limits of Beech Grove, Lawrence, Southport and Speedway. Control of sediment is required for construction site runoff citywide.

The city's current stormwater NPDES Permit program is estimated to reduce the stormwater *E. coli* bacteria load by approximately 10 percent. This reduction is considered to be an estimate of the program's effectiveness, not an objective.

8.2 Septic Tank Elimination Program

Of the 320,000 homes in Marion County, approximately 18,000 are served by septic systems that were targeted for replacement in the Septic Tank Elimination Program. The Septic Tank Elimination Program prioritized 161 unsewered areas for conversion to sewers. The master plan ranks each area based on the following criteria: septic failure rate, stream bacteriological impairment, wellfield protection, presence of residential wells, proximity to greenways, petitions from residents or Marion County Health & Hospital Corp., number of residents in favor of the project, cost, and downstream capacity. These areas are then placed into one of four categories: Priority

1, Priority 2, Priority 3, and other septic areas not immediately projected for conversion to sewers.

8.3 CSO Long Term Control Plan

In 2001, the City of Indianapolis submitted a CSO Long Term Control Plan (LTCP) for review to IDEM and the U.S. EPA. This plan proposed an 85% level of capture to achieve water quality standards within the streams of Indianapolis given financial constraints. The plan consisted of AWT enhancements, various system control alternatives, streambank restoration and sediment removal, and accelerated septic system removal.

Negotiations with IDEM and Region V EPA are ongoing and may affect the final level of capture and pollutant removal rates achieved through the LTCP. A final CSO LTCP is expected in spring 2004. The TMDL reductions from CSOs will reflect the final LTCP.

Section 9
Monitoring Plan

An integral part of managing the progress of a TMDL program is monitoring. The current monitoring programs performed by the City of Indianapolis Office of Environmental Services and the Marion County Health Department will continue throughout the implementation of load allocations. These monitoring programs consist of sampling at the locations and intervals described in Section 3 of this report.

As the city's watershed improvement programs are implemented, this continued monitoring will allow the city and IDEM the opportunity to review progress towards meeting water quality standards. As this monitoring indicates and in accordance with EPA's guidance, IDEM and the city reserve the right to adopt these projected programs if necessary.

References

AMEC. 2003. *City of Indianapolis Fifth Annual Report (2002)*

Camp Dresser & McKee (CDM). 2003. *CSO Control Technologies Evaluation.*

Camp Dresser & McKee (CDM). 2003. *Fall Creek TMDL Report.*

IDEM. 2002. Indiana's 303(d) Listing Methodology for Impaired Waterbodies and Total Maximum Daily Load.

IDEM. 2002. Indiana Water Quality 305(b) Report.

U.S. Environmental Protection Agency (EPA). 2001. *Protocol for Developing Pathogen TMDLs.*

PLEASANT RUN TMDL REPORT

APPENDICES

Date	OES Sampling Locations				
	Wet or Dry?	Meridian Street		16th Street	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
1/6/2000	Dry	190	1	210	1
2/3/2000	Wet	327	1		
3/2/2000	Wet	66	1	28	1
4/6/2000	Dry	136	1	50	1
5/4/2000	Wet	1200	1	90	1
6/8/2000	Dry	1162	1	1000	0
7/6/2000	Wet	10000	0	2800	0
8/10/2000	Wet	**196**	0	800	0
9/7/2000	Dry	5000	0	4000	0
10/5/2000	Wet	108000	0	15000	0
11/3/2000	Dry	310	0	2750	0
12/7/2000	Dry	580	0	24	1
1/16/2001	Dry	2450	1	1120	0
2/13/2001	Dry	200	0	330	0
3/7/2001	Dry	67	0	24	1
4/5/2001	Dry	380	1	293	0
5/3/2001	Dry	104	0	450	0
6/14/2001	Dry	1150	0	3400	0
7/12/2001	Dry	900	0	1300	0
8/9/2001	Dry	864	0	5200	0
9/6/2001	Dry	900	0	150	1
10/4/2001	Dry	104	1	120	1
11/8/2001	Dry	64	1	14	1
12/5/2001	Dry	40	1	60	1
5/2/2002	Wet	48	1	190	1
5/6/2002	Wet	220	1	760	0
05/13/02	Wet	8000	0	4000	0
5/22/2002	Wet	116	1	80	1
05/29/02	Wet	440	0	333	0
6/4/2002	Dry	2400	0	580	0
06/11/02	Dry	213	1	700	0
6/13/2002	Wet	380	0	3600	0
06/19/02	Dry	380	0	393	0
6/26/2002	Wet	4200	0	2500	0
07/05/02	Dry	400	0	640	0
7/11/2002	Wet	507	0	270	0
07/16/02	Dry	820	0	340	0
7/25/2002	Wet	307	0	333	0
07/30/02	Wet	**4000**	0	**4000**	0
8/1/2002	Dry	440	0	520	0
08/06/02	Dry	270	0	520	0
8/13/2002	Dry	106	1	307	0
08/22/02	Dry	220	1	480	0
8/29/2002	Dry	70	1	210	1
09/03/02	Dry	167	1	440	0
9/10/2002	Dry	260	0	313	0
09/17/02	Wet	107	1	173	1
9/24/2002	Wet	80	1	180	1
09/26/02	Dry	360	0	160	1
10/3/2002	Dry	210	1	1150	0
10/15/02	Wet	75	1	350	0
10/22/2002	Dry	95	1	110	1
10/24/02	Dry	65	1	85	1
10/31/2002	Wet	100	1	147	1

Date	MCHD Sampling Locations						
	Wet or Dry?	Bluff Road		Garfield Park		Barth Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
01/03/00	Wet	300	0	600	0		
01/10/00	Wet	100	1	42000	0		
01/18/00	Dry	50	1	50	1		
01/24/00	Wet			10	1		
01/26/00	Dry						
01/31/00	Wet	10	1				
02/07/00	Dry	10	1	10	1		
02/14/00	Wet	120	1	190	1	170	1
02/21/00	Dry	10	1	10	1	10	1
03/01/00	Wet	30	1	30	1	50	1
03/06/00	Dry	10	1	10	1	20	1
03/08/00	Dry	10	1	20	1	20	1
03/13/00	Wet	190	1	110	1	180	1
03/20/00	Wet	570	0	650	0	1200	0
03/27/00	Wet	40	1	70	1	220	1
04/03/00	Wet	110	1	30	1	110	1
04/05/00	Wet	10	1	10	1	60	1
04/10/00	Dry	40	1	50	1	180	1
04/17/00	Wet	4300	0	5400	0	8000	0
04/21/00	Wet	100	1	600	0	2600	0
05/01/00	Wet	100	1	200	1	4500	0
05/08/00	Wet	200	1	520	0	630	0
05/15/00	Dry	90	1	200	1	510	0
05/22/00	Wet	100	1	150	1	150	1
05/30/00	Dry	180	1	120	1	190	1
06/05/00	Wet	3700	0	8000	0	8000	0
06/12/00	Wet	300	0	300	0	900	0
06/19/00	Wet	900	0	900	0	1200	0
06/26/00	Wet	250	0	210	1	630	0
06/28/00	Wet	1200	0	230	1	1000	0
07/10/00	Dry	220	1	340	0	1600	0
07/17/00	Dry	30	1	100	1	550	0
07/24/00	Dry	120	1	120	1	550	0
07/26/00	Dry	40	1	200	1	2900	0
07/31/00	Wet	1700	0	900	0	2900	0
08/02/00	Wet	1200	0	4500	0	8000	0
08/07/00	Wet	6300	0	7600	0	5500	0
08/14/00	Dry	300	0	100	1	400	0
08/21/00	Dry	500	0	110	1	7800	0
08/28/00	Dry	10	1	170	1	450	0
09/06/00	Dry	740	0	3130	0	30440	0
09/11/00	Wet	5560	0	4410	0	6090	0
09/13/00	Wet	860	0	630	0	860	0
09/18/00	Dry	200	1	200	1	1040	0
09/25/00	Wet	20750	0	4880	0	4570	0
10/02/00	Dry	100	1	630	0	630	0
10/08/00	Dry	630	0	200	1	410	0
10/16/00	Wet	200	1	740	0	630	0
10/23/00	Dry	100	1	310	0	310	0
10/30/00	Dry			200	1	200	1
11/01/00	Dry	100	1	100	1	5830	0
11/06/00	Wet	200	1	100	1	100	1
11/13/00	Wet	2130	0	1600	0	1340	0
11/20/00	Dry	100	1	100	1	1810	0
11/27/00	Wet	980	0	630	0	740	0
12/04/00	Dry	100	1	100	1	100	1
12/06/00	Dry	100	1	100	1	100	1
12/11/00	Wet	49520	0	198628	0	27550	0

Date	Wet or Dry?	MCHD Sampling Locations					
		Bluff Road		Garfield Park		Barth Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
12/18/00	Wet					2590	0
12/26/00	Dry						
01/02/01	Dry	200	1				
01/11/01	Dry						
01/16/01	Dry	1070	0	7330	0	410	0
01/22/01	Dry	100	1	100	1	410	0
01/29/01	Wet	410	0	520	0	100	1
02/05/01	Wet	410	0	740	0	200	1
02/07/01	Wet	200	1	200	1	100	1
02/12/01	Dry	260	0	300	0	520	0
02/20/01	Dry	100	1	520	0	100	1
02/26/01	Wet	520	0	1430	0	1690	0
03/05/01	Dry	100	1	630	0	310	0
03/07/01	Dry	200	1	100	1	860	0
03/12/01	Dry	100	1	100	1	200	1
03/20/01	Dry	200	1	310	0	100	1
03/26/01	Dry	100	1	100	1	100	1
04/02/01	Wet	100	1	100	1	100	1
04/09/01	Dry	100	1	100	1	100	1
04/17/01	Wet	100	1	740	0	310	0
04/23/01	Dry	310	0	520	0	100	1
04/30/01	Dry	200	1	520	0	100	1
05/07/01	Wet	730	0	1080	0	1350	0
05/09/01	Wet	1830	0	2180	0	970	0
05/14/01	Dry	410	0	1050	0	740	0
05/21/01	Dry	740	0	1610	0	3450	0
05/29/01	Wet	300	0	310	0	740	0
06/04/01	Wet	43520	0	241920	0	241920	0
06/06/01	Wet	64880	0	92080	0	81640	0
06/11/01	Dry	1090	0	11190	0	100	1
06/18/01	Dry	1340	0	520	0	1220	0
06/25/01	Dry	5450	0	1220	0	2010	0
07/02/01	Wet	15290	0	17230	0	36540	0
07/09/01	Wet	8880	0	9330	0	13540	0
07/16/01	Dry	410	0	1210	0	1350	0
07/23/01	Wet	3350	0	4190	0	2160	0
07/30/01	Wet	850	0	1600	0	1610	0
08/06/01	Dry	410	0	740	0	630	0
08/13/01	Dry	950	0	520	0	840	0
08/15/01	Dry	200	1	310	0	310	0
08/20/01	Wet	1210	0	630	0	1710	0
08/27/01	Wet	410	0	740	0	200	1
09/04/01	Dry	2590	0	2430	0	970	0
09/10/01	Wet	4410	0	4040	0	2980	0
09/12/01	Dry	2620	0	520	0	740	0
09/17/01	Dry	840	0	200	1	200	1
09/24/01	Wet	14550	0	10220	0	8600	0
10/01/01	Dry	410	0	100	1	200	1
10/08/01	Dry	630	0	1600	0	740	0
10/15/01	Wet	1350	0	1850	0	2620	0
10/22/01	Dry	200	1	310	0	310	0
10/29/01	Dry	860	0	980	0	410	0
11/05/01	Dry	520	0	1300	0	100	1
11/12/01	Dry	100	1	300	0	310	0
11/14/01	Dry	100	1	100	1	100	1
11/19/01	Wet						1
11/27/01	Wet	6970	0	6500	0	4570	0
12/03/01	Dry	200	1	300	0	630	0
12/04/01	Dry	410	0	1550	0	1310	0

Date	Wet or Dry?	MCHD Sampling Locations					
		Bluff Road		Garfield Park		Barth Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
12/10/01	Dry	200	1	200	1	300	0
12/12/01	Wet	100	1	100	1	630	0
12/18/01	Wet	4820	0	2430	0	4500	0
05/02/02	Wet	40	1	**10**	1	64	1
05/06/02	Wet	128	1	216	1	310	0
05/13/02	Wet	9200	0	4800	0	4800	0
05/22/02	Wet	112	1	112	1	183	1
05/29/02	Wet	640	0	800	0	557	0
06/04/02	Dry	2200	0	440	0	173	1
06/11/02	Dry	213	1	213	1	80	1
06/13/02	Wet	440	0	347	0	112	1
06/19/02	Dry	420	0	300	0	230	1
06/26/02	Wet	4000	0	3700	0	2700	0
07/05/02	Dry	287	0	200	1	38	1
07/11/02	Wet	400	0	840	0	1300	0
07/16/02	Dry	560	0	300	0	400	0
07/25/02	Wet	273	0	300	0	287	0
07/30/02	Wet	**4000**	0	**4000**	0	**4000**	0
08/01/02	Dry	127	1	700	0	300	0
08/06/02	Dry	180	1	460	0	280	0
08/13/02	Dry	84	1	220	1	267	0
08/22/02	Dry	180	1	210	1	104	1
08/29/02	Dry	85	1	150	1	105	1
09/03/02	Dry	300	0	660	0	253	0
09/10/02	Dry	130	1	273	0	190	1
09/17/02	Wet	70	1	65	1	125	1
09/24/02	Wet	160	1	144	1	200	1
09/26/02	Dry	210	1	380	0	320	0
10/03/02	Dry	290	0	150	1	425	0
10/15/02	Wet	80	1	60	1	100	1
10/22/02	Dry	75	1	60	1	50	1
10/24/02	Dry	31	1	34	1	95	1
10/31/02	Wet	90	1	240	0	177	1

Date	MCHD Sampling Locations						
	Wet or Dry?	State Street		Keystone Ave		Southeastern Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
01/03/00	Wet					100	1
01/10/00	Wet					10000	0
01/18/00	Dry					50	1
01/24/00	Wet					10	1
01/26/00	Dry						
01/31/00	Wet						
02/07/00	Dry					50	1
02/14/00	Wet					210	1
02/21/00	Dry					10	1
03/01/00	Wet					60	1
03/06/00	Dry					20	1
03/08/00	Dry					40	1
03/13/00	Wet					180	1
03/20/00	Wet					560	0
03/27/00	Wet					680	0
04/03/00	Wet					200	1
04/05/00	Wet					20	1
04/10/00	Dry					250	0
04/17/00	Wet					5000	0
04/21/00	Wet					300	0
05/01/00	Wet					200	1
05/08/00	Wet					410	0
05/15/00	Dry					260	0
05/22/00	Wet					170	1
05/30/00	Dry					170	1
06/05/00	Wet					8000	0
06/12/00	Wet					700	0
06/19/00	Wet					1100	0
06/26/00	Wet					240	0
06/28/00	Wet					300	0
07/10/00	Dry					510	0
07/17/00	Dry					370	0
07/24/00	Dry					620	0
07/26/00	Dry					1400	0
07/31/00	Wet					5200	0
08/02/00	Wet					2800	0
08/07/00	Wet					7000	0
08/14/00	Dry					100	1
08/21/00	Dry					390	0
08/28/00	Dry					190	1
09/06/00	Dry					1300	0
09/11/00	Wet					6090	0
09/13/00	Wet					520	0
09/18/00	Dry					310	0
09/25/00	Wet					1300	0
10/02/00	Dry					630	0
10/08/00	Dry					840	0
10/16/00	Wet					310	0
10/23/00	Dry					200	1
10/30/00	Dry					200	1
11/01/00	Dry					16690	0
11/06/00	Wet					200	1
11/13/00	Wet					6090	0
11/20/00	Dry					410	0
11/27/00	Wet					1220	0
12/04/00	Dry					300	0
12/06/00	Dry					520	0
12/11/00	Wet					241917	0

Date	MCHD Sampling Locations							
	Wet or Dry?	State Street		Keystone Ave		Southeastern Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
12/18/00	Wet						
12/26/00	Dry						
01/02/01	Dry					100	1
01/11/01	Dry					100	1
01/16/01	Dry					520	0
01/22/01	Dry					100	1
01/29/01	Wet					200	1
02/05/01	Wet					630	0
02/07/01	Wet					310	0
02/12/01	Dry					410	0
02/20/01	Dry					310	0
02/26/01	Wet					1320	0
03/05/01	Dry					200	1
03/07/01	Dry					100	1
03/12/01	Dry					100	1
03/20/01	Dry					100	1
03/26/01	Dry					100	1
04/02/01	Wet					100	1
04/09/01	Dry					100	1
04/17/01	Wet					510	0
04/23/01	Dry					100	1
04/30/01	Dry					200	1
05/07/01	Wet					3090	0
05/09/01	Wet					3130	0
05/14/01	Dry					300	0
05/21/01	Dry					410	0
05/29/01	Wet					410	0
06/04/01	Wet					43520	0
06/06/01	Wet					77010	0
06/11/01	Dry					310	0
06/18/01	Dry					1210	0
06/25/01	Dry					850	0
07/02/01	Wet					36090	0
07/09/01	Wet					6760	0
07/16/01	Dry					520	0
07/23/01	Wet					2780	0
07/30/01	Wet					740	0
08/06/01	Dry					1090	0
08/13/01	Dry					410	0
08/15/01	Dry					300	0
08/20/01	Wet					970	0
08/27/01	Wet					740	0
09/04/01	Dry					520	0
09/10/01	Wet					3930	0
09/12/01	Dry					310	0
09/17/01	Dry					200	1
09/24/01	Wet					7270	0
10/01/01	Dry					100	1
10/08/01	Dry					1220	0
10/15/01	Wet					1220	0
10/22/01	Dry					630	0
10/29/01	Dry					410	0
11/05/01	Dry					100	1
11/12/01	Dry					740	0
11/14/01	Dry					310	0
11/19/01	Wet					100	1
11/27/01	Wet					4960	0
12/03/01	Dry					740	0
12/04/01	Dry					410	0

Date	MCHD Sampling Locations						
	Wet or Dry?	State Street		Keystone Ave		Southeastern Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
12/10/01	Dry					200	1
12/12/01	Wet					310	0
12/18/01	Wet					2310	0
05/02/02	Wet	96	1	120	1	152	1
05/06/02	Wet	510	0	880	0	2520	0
05/13/02	Wet	2800	0	8200	0	3160	0
05/22/02	Wet	100	1	59	1	38	1
05/29/02	Wet	560	0	700	0	400	0
06/04/02	Dry	240	0	300	0	120	1
06/11/02	Dry	6800	0	133	1	240	0
06/13/02	Wet	119	1	112	1	180	1
06/19/02	Dry	200	1	300	0	560	0
06/26/02	Wet	3100	0	2900	0	3400	0
07/05/02	Dry	**10**	1	210	1	340	0
07/11/02	Wet	230	1	320	0	560	0
07/16/02	Dry	**10**	1	230	1	393	0
07/25/02	Wet	367	0	313	0	367	0
07/30/02	Wet	**4000**	0	**4000**	0	**4000**	0
08/01/02	Dry	400	0	220	1	360	0
08/06/02	Dry	260	0	111	1	333	0
08/13/02	Dry	150	1	103	1	273	0
08/22/02	Dry	136	1	230	1	104	1
08/29/02	Dry	260	0	100	1	270	0
09/03/02	Dry	193	1	55	1	123	1
09/10/02	Dry	800	0	49	1	46	1
09/17/02	Wet	87	1	70	1	75	1
09/24/02	Wet	200	1	180	1	112	1
09/26/02	Dry	350	0	157	1	170	1
10/03/02	Dry	140	1	200	1	160	1
10/15/02	Wet	130	1	100	1	137	1
10/22/02	Dry	115	1	65	1	150	1
10/24/02	Dry	200	1	80	1	130	1
10/31/02	Wet	200	1	130	1	167	1

Date	Wet or Dry?	MCHD Sampling Locations					
		Sherman Drive		Emerson Avenue		Arlington Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
01/03/00	Wet					100	1
01/10/00	Wet					100	1
01/18/00	Dry					50	1
01/24/00	Wet					10	1
01/26/00	Dry					20	1
01/31/00	Wet						
02/07/00	Dry					90	1
02/14/00	Wet					90	1
02/21/00	Dry					10	1
03/01/00	Wet					30	1
03/06/00	Dry					10	1
03/08/00	Dry					50	1
03/13/00	Wet					220	1
03/20/00	Wet					2100	0
03/27/00	Wet					270	0
04/03/00	Wet					100	1
04/05/00	Wet					30	1
04/10/00	Dry					140	1
04/17/00	Wet					1700	0
04/21/00	Wet					600	0
05/01/00	Wet					380	0
05/08/00	Wet					1480	0
05/15/00	Dry					450	0
05/22/00	Wet					1300	0
05/30/00	Dry					380	0
06/05/00	Wet					8000	0
06/12/00	Wet					2800	0
06/19/00	Wet					1000	0
06/26/00	Wet					610	0
06/28/00	Wet					710	0
07/10/00	Dry					680	0
07/17/00	Dry					200	1
07/24/00	Dry					410	0
07/26/00	Dry					320	0
07/31/00	Wet					2300	0
08/02/00	Wet					1700	0
08/07/00	Wet					14000	0
08/14/00	Dry					500	0
08/21/00	Dry					360	0
08/28/00	Dry					160	1
09/06/00	Dry					520	0
09/11/00	Wet					4190	0
09/13/00	Wet					620	0
09/18/00	Dry					100	1
09/25/00	Wet					310	0
10/02/00	Dry					200	1
10/08/00	Dry					740	0
10/16/00	Wet					200	1
10/23/00	Dry					100	1
10/30/00	Dry					100	1
11/01/00	Dry					100	1
11/06/00	Wet					970	0
11/13/00	Wet					2750	0
11/20/00	Dry					200	1
11/27/00	Wet					1190	0
12/04/00	Dry					200	1
12/06/00	Dry					100	1
12/11/00	Wet					100	1

Date	MCHD Sampling Locations						
	Wet or Dry?	Sherman Drive		Emerson Avenue		Arlington Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
12/18/00	Wet						
12/26/00	Dry						
01/02/01	Dry						
01/11/01	Dry					410	0
01/16/01	Dry					310	0
01/22/01	Dry					300	0
01/29/01	Wet					100	1
02/05/01	Wet					630	0
02/07/01	Wet					310	0
02/12/01	Dry					740	0
02/20/01	Dry					410	0
02/26/01	Wet					1210	0
03/05/01	Dry					200	1
03/07/01	Dry					100	1
03/12/01	Dry					310	0
03/20/01	Dry					200	1
03/26/01	Dry					100	1
04/02/01	Wet					310	0
04/09/01	Dry					740	0
04/17/01	Wet					520	0
04/23/01	Dry					1580	0
04/30/01	Dry					410	0
05/07/01	Wet					2230	0
05/09/01	Wet					1450	0
05/14/01	Dry					1690	0
05/21/01	Dry					1220	0
05/29/01	Wet					1460	0
06/04/01	Wet					1200	0
06/06/01	Wet					46110	0
06/11/01	Dry					1210	0
06/18/01	Dry					1200	0
06/25/01	Dry					1220	0
07/02/01	Wet					17250	0
07/09/01	Wet					8390	0
07/16/01	Dry					2010	0
07/23/01	Wet					3240	0
07/30/01	Wet					1080	0
08/06/01	Dry					310	0
08/13/01	Dry					520	0
08/15/01	Dry					500	0
08/20/01	Wet					2110	0
08/27/01	Wet					1090	0
09/04/01	Dry					630	0
09/10/01	Wet					1090	0
09/12/01	Dry					200	1
09/17/01	Dry					310	0
09/24/01	Wet					3740	0
10/01/01	Dry					310	0
10/08/01	Dry					730	0
10/15/01	Wet					1460	0
10/22/01	Dry					410	0
10/29/01	Dry					200	1
11/05/01	Dry					200	1
11/12/01	Dry					310	0
11/14/01	Dry					100	1
11/19/01	Wet					100	1
11/27/01	Wet					3130	0
12/03/01	Dry					740	0
12/04/01	Dry					100	1

Date	Wet or Dry?	MCHD Sampling Locations					
		Sherman Drive		Emerson Avenue		Arlington Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
12/10/01	Dry					100	1
12/12/01	Wet					200	1
12/18/01	Wet					1990	0
05/02/02	Wet	**10**	1	**10**	1	**10**	1
05/06/02	Wet	1600	0	23600	0	840	0
05/13/02	Wet	4600	0	6200	0	2750	0
05/22/02	Wet	35	1	16	1	16	1
05/29/02	Wet	340	0	320	0	657	0
06/04/02	Dry	133	1	400	0	643	0
06/11/02	Dry	173	1	**20**	1	67	1
06/13/02	Wet	260	0	270	0	560	0
06/19/02	Dry	580	0	333	0	360	0
06/26/02	Wet	2200	0	3500	0	2600	0
07/05/02	Dry	320	0	340	0	440	0
07/11/02	Wet	270	0	320	0	280	0
07/16/02	Dry	130	1	180	1	620	0
07/25/02	Wet	162	1	190	1	400	0
07/30/02	Wet	**4000**	0	**4000**	0	**4000**	0
08/01/02	Dry	280	0	293	0	220	1
08/06/02	Dry	180	1	92	1	170	1
08/13/02	Dry	460	0	500	0	210	1
08/22/02	Dry	510	0	350	0	190	1
08/29/02	Dry	560	0	153	1	310	0
09/03/02	Dry	560	0	400	0	270	0
09/10/02	Dry	940	0	320	0	193	1
09/17/02	Wet	154	1	280	0	65	1
09/24/02	Wet	260	0	100	1	190	1
09/26/02	Dry	100	1	200	1	170	1
10/03/02	Dry	220	1	130	1	115	1
10/15/02	Wet	137	1	150	1	85	1
10/22/02	Dry	127	1	105	1	50	1
10/24/02	Dry	200	1	65	1	66	1
10/31/02	Wet	147	1	153	1	73	1

Date	Wet or Dry?	MCHD Sampling Locations							
		PLR Golf Course		10th Street		21st Street		30th Street	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
01/03/00	Wet					100	1		
01/10/00	Wet					1300	0		
01/18/00	Dry					50	1		
01/24/00	Wet								
01/26/00	Dry								
01/31/00	Wet								
02/07/00	Dry					10	1		
02/14/00	Wet					10	1		
02/21/00	Dry					10	1		
03/01/00	Wet					10	1		
03/06/00	Dry					10	1		
03/08/00	Dry					10	1		
03/13/00	Wet					1000	0		
03/20/00	Wet					900	0		
03/27/00	Wet					90	1		
04/03/00	Wet					10	1		
04/05/00	Wet					10	1		
04/10/00	Dry					10	1		
04/17/00	Wet					1000	0		
04/21/00	Wet					200	1		
05/01/00	Wet					720	0		
05/08/00	Wet					740	0		
05/15/00	Dry					170	1		
05/22/00	Wet					150	1		
05/30/00	Dry					80	1		
06/05/00	Wet					4000	0		
06/12/00	Wet					1500	0		
06/19/00	Wet					27000	0		
06/26/00	Wet					230	1		
06/28/00	Wet					290	0		
07/10/00	Dry					580	0		
07/17/00	Dry					280	0		
07/24/00	Dry					360	0		
07/26/00	Dry					730	0		
07/31/00	Wet					1800	0		
08/02/00	Wet					560	0		
08/07/00	Wet					9000	0		
08/14/00	Dry					500	0		
08/21/00	Dry					80	1		
08/28/00	Dry					240	0		
09/06/00	Dry					2160	0		
09/11/00	Wet					3360	0		
09/13/00	Wet					520	0		
09/18/00	Dry					740	0		
09/25/00	Wet					8160	0		
10/02/00	Dry					1090	0		
10/08/00	Dry					1100	0		
10/16/00	Wet					310	0		
10/23/00	Dry					1340	0		
10/30/00	Dry					960	0		
11/01/00	Dry					310	0		
11/06/00	Wet					520	0		
11/13/00	Wet					3140	0		
11/20/00	Dry					100	1		
11/27/00	Wet					1100	0		
12/04/00	Dry					100	1		
12/06/00	Dry					100	1		
12/11/00	Wet					5290	0		

Date	Wet or Dry?	MCHD Sampling Locations							
		PLR Golf Course		10th Street		21st Street		30th Street	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
12/18/00	Wet					860	0		
12/26/00	Dry					310	0		
01/02/01	Dry					310	0		
01/11/01	Dry					200	1		
01/16/01	Dry					630	0		
01/22/01	Dry					100	1		
01/29/01	Wet					100	1		
02/05/01	Wet					860	0		
02/07/01	Wet					200	1		
02/12/01	Dry					2850	0		
02/20/01	Dry					100	1		
02/26/01	Wet					630	0		
03/05/01	Dry					100	1		
03/07/01	Dry					100	1		
03/12/01	Dry					100	1		
03/20/01	Dry					100	1		
03/26/01	Dry								
04/02/01	Wet					100	1		
04/09/01	Dry					100	1		
04/17/01	Wet					100	1		
04/23/01	Dry					100	1		
04/30/01	Dry					200	1		
05/07/01	Wet					2260	0		
05/09/01	Wet					1200	0		
05/14/01	Dry					3840	0		
05/21/01	Dry					410	0		
05/29/01	Wet					200	1		
06/04/01	Wet					980	0		
06/06/01	Wet					19180	0		
06/11/01	Dry					740	0		
06/18/01	Dry					1750	0		
06/25/01	Dry					1580	0		
07/02/01	Wet					13010	0		
07/09/01	Wet					8420	0		
07/16/01	Dry					630	0		
07/23/01	Wet					1580	0		
07/30/01	Wet					1100	0		
08/06/01	Dry					960	0		
08/13/01	Dry					200	1		
08/15/01	Dry					410	0		
08/20/01	Wet					410	0		
08/27/01	Wet					740	0		
09/04/01	Dry					860	0		
09/10/01	Wet					1350	0		
09/12/01	Dry					300	0		
09/17/01	Dry					850	0		
09/24/01	Wet					1990	0		
10/01/01	Dry					300	0		
10/08/01	Dry					740	0		
10/15/01	Wet					410	0		
10/22/01	Dry					200	1		
10/29/01	Dry					200	1		
11/05/01	Dry					100	1		
11/12/01	Dry					100	1		
11/14/01	Dry					200	1		
11/19/01	Wet					200	1		
11/27/01	Wet					2030	0		
12/03/01	Dry					100	1		
12/04/01	Dry					310	0		

Date	Wet or Dry?	MCHD Sampling Locations							
		PLR Golf Course		10th Street		21st Street		30th Street	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
12/10/01	Dry					100	1		
12/12/01	Wet					310	0		
12/18/01	Wet					1930	0		
05/02/02	Wet	**10**	1	24	1	220	1	104	1
05/06/02	Wet	640	0	460	0	390	0	752	0
05/13/02	Wet	2900	0	4600	0	2680	0	4800	0
05/22/02	Wet	8	1	**4**	1	5	1	27	1
05/29/02	Wet	120	1	67	1	420	0	400	0
06/04/02	Dry	320	0	67	1	160	1		1
06/11/02	Dry	27	1	**20**	1	420	0	**20**	1
06/13/02	Wet	3600	0	370	0	**9700**	0	**20000**	0
06/19/02	Dry	112	1	**10**	1	131	1	840	0
06/26/02	Wet	2100	0	2800	0	2000	0	2200	0
07/05/02	Dry	310	0	200	1	500	0	840	0
07/11/02	Wet	180	1	253	0	170	1	740	0
07/16/02	Dry	112	1	160	1	160	1	769	0
07/25/02	Wet	96	1	116	1	112	1	2540	0
07/30/02	Wet	1060	0	1000	0	**1240**	0	1760	0
08/01/02	Dry	300	0	287	0	227	1	2400	0
08/06/02	Dry	131	1	200	1	80	1	640	0
08/13/02	Dry	126	1	96	1	313	0		1
08/22/02	Dry	300	0	160	1	1350	0	500	0
08/29/02	Dry	373	0	113	1	173	1	860	0
09/03/02	Dry	580	0	460	0	420	0	**2400**	0
09/10/02	Dry	293	0	387	0	1200	0		1
09/17/02	Wet	97	1	160	1	**1120**	0	**2300**	0
09/24/02	Wet	120	1	40	1	210	1	350	0
09/26/02	Dry	120	1	12	1	270	0	1800	0
10/03/02	Dry	80	1	55	1	170	1	240	0
10/15/02	Wet	85	1	**5**	1	50	1	470	0
10/22/02	Dry	28	1	6	1	290	0	310	0
10/24/02	Dry	38	1	19	1	197	1	310	0
10/31/02	Wet	65	1	45	1	270	0	143	1

Date	OES Sampling Locations				
	Wet or Dry?	Garfield Park		Southern Avenue	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
1/6/2000	Dry	727	0	270	0
2/3/2000	Wet	9	0	120	1
3/2/2000	Wet	90	1	300	0
4/6/2000	Dry	270	0	140	1
5/4/2000	Wet			454	0
6/8/2000	Dry	2300	0	900	0
7/6/2000	Wet	6000	0	9400	0
8/10/2000	Wet	3000	0	2000	0
9/7/2000	Dry	984	0	1312	0
10/5/2000	Wet	**200000**	0	**40000**	0
11/3/2000	Dry	540	0	147	1
12/7/2000	Dry	**4**	1	**4**	1
1/16/2001	Dry	**4000**	1	3040	0
2/13/2001	Dry	250	0	450	0
3/7/2001	Dry	240	0	510	0
4/5/2001	Dry	6400	0	560	0
5/3/2001	Dry	270	0	210	1
6/14/2001	Dry	2000	1	12800	0
7/12/2001	Dry	1750	0	1900	0
8/9/2001	Dry	72	0	6800	0
9/6/2001	Dry	180	0	470	0
10/4/2001	Dry	380	0	464	0
11/8/2001	Dry	43	0	**10**	1
12/5/2001	Dry	204	1	70	1
05/02/02	Wet	320	0	72	1
05/06/02	Wet	380	0	1480	0
05/13/02	Wet	3600	0	2700	0
05/22/02	Wet	51	1	88	1
05/29/02	Wet	886	0	786	0
06/04/02	Dry	720	0	520	0
06/11/02	Dry	480	0	373	0
06/13/02	Wet	473	0	1000	0
06/19/02	Dry	640	0	760	0
06/26/02	Wet	5900	0	5700	0
07/05/02	Dry	380	0	470	0
07/11/02	Wet	370	0	320	0
07/16/02	Dry	1262	0	440	0
07/25/02	Wet	420	0	800	0
07/30/02	Wet	**4000**	0	**4000**	0
08/01/02	Dry	360	0	850	0
08/06/02	Dry	620	0	**3380**	0
08/13/02	Dry	560	0	**4000**	0
08/22/02	Dry	1350	0	460	0
08/29/02	Dry	150	1	660	0
09/03/02	Dry	313	0	1360	0
09/10/02	Dry	220	1	1067	0
09/17/02	Wet	125	1	220	1
09/24/02	Wet	850	0	190	1
09/26/02	Dry	850	0	1200	0
10/03/02	Dry	400	0	650	0
10/15/02	Wet	187	1	850	0
10/22/02	Dry	123	1	107	1
10/24/02	Dry	110	1	80	1
10/31/02	Wet	150	1	130	1

Date	MCHD Sampling Locations										
	Wet or Dry?	Garfield Park		Keystone Avenue		Bethel Avenue		Emerton Place		Orange Street	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
01/03/00	Wet	200	1	500	0			400	0		
01/10/00	Wet	700	0	500	0			200	1		
01/18/00	Dry	50	1	50	1			500	0		
01/24/00	Wet	40	1	10	1			10	1		
01/26/00	Dry			10	1			1400	0		
01/31/00	Wet	10	1	10	1			10	1		
02/07/00	Dry	10	1	10	1			250	0		
02/14/00	Wet	50	1	70	1			100	1		
02/21/00	Dry	10	1	10	1			10	1		
03/01/00	Wet	230	1	30	1			110	1		
03/06/00	Dry	20	1	10	1			220	1		
03/08/00	Dry	10	1	10	1			410	0		
03/13/00	Wet	20	1	50	1			420	0		
03/20/00	Wet	750	0	690	0			550	0		
03/27/00	Wet	100	1	220	1			230	1		
04/03/00	Wet	420	0	170	1			120	1		
04/05/00	Wet	20	1	40	1			10	1		
04/10/00	Dry	40	1	110	1			90	1		
04/17/00	Wet	2400	0	1300	0			1600	0		
04/21/00	Wet	100	1	1000	0			300	0		
05/01/00	Wet	260	0	270	0			1000	0		
05/08/00	Wet	1460	0	520	0			3140	0		
05/15/00	Dry	440	0	1400	0			2200	0		
05/22/00	Wet	140	1	350	0			1900	0		
05/30/00	Dry	50	1	390	0			550	0		
06/05/00	Wet	6200	0	8000	0			8000	0		
06/12/00	Wet	1200	0	1200	0			4800	0		
06/19/00	Wet	800	0	1300	0			900	0		
06/26/00	Wet	550	0	470	0			800	0		
06/28/00	Wet	410	0	450	0			2800	0		
07/10/00	Dry	340	0	500	0			2000	0		
07/17/00	Dry	300	0	280	0			250	0		
07/24/00	Dry	720	0	340	0			670	0		
07/26/00	Dry	320	0	1200	0			800	0		
07/31/00	Wet	710	0	1100	0			500	0		
08/02/00	Wet	680	0	1200	0			1900	0		
08/07/00	Wet	3000	0	8000	0			6600	0		
08/14/00	Dry	100	1	500	0			600	0		
08/21/00	Dry	530	0	1200	0			560	0		
08/28/00	Dry	130	1	250	0			1400	0		
09/06/00	Dry	740	0	4960	0			2130	0		
09/11/00	Wet	7940	0	11780	0			5630	0		
09/13/00	Wet	1200	0	630	0			1210	0		
09/18/00	Dry	1090	0	840	0			1730	0		
09/25/00	Wet	2330	0	7170	0			1180	0		
10/02/00	Dry	730	0	200	1			200	1		
10/08/00	Dry	410	0	310	0			1080	0		
10/16/00	Wet	620	0	970	0			410	0		
10/23/00	Dry	310	0	1200	0			740	0		
10/30/00	Dry	100	1	200	1			610	0		
11/01/00	Dry	520	0	100	1			1220	0		
11/06/00	Wet	520	0	410	0			1210	0		
11/13/00	Wet	4130	0	8800	0			3270	0		
11/20/00	Dry	740	0	410	0			1080	0		
11/27/00	Wet	520	0	1100	0			1080	0		
12/04/00	Dry	100	1	100	1			100	1		
12/06/00	Dry	3640	0	410	0			100	1		
12/11/00	Wet	18350	0	5680	0			410	0		
12/18/00	Wet							18600	0		
12/26/00	Dry										
01/02/01	Dry			2880	0			50	1		
01/11/01	Dry			520	0			520	0		
01/16/01	Dry	200	1	8600	0			24950	0		
01/22/01	Dry	410	0	100	1			3840	0		
01/29/01	Wet	630	0	1100	0			400	0		
02/05/01	Wet	1090	0	1100	0			100	1		
02/07/01	Wet	410	0	850	0			1200	0		
02/12/01	Dry	200	1	2180	0			520	0		
02/20/01	Dry	310	0	200	1			510	0		
02/26/01	Wet	740	0	1320	0			100	1		
03/05/01	Dry	200	1	630	0			520	0		
03/07/01	Dry	100	1	740	0			200	1		
03/12/01	Dry	200	1	100	1			100	1		
03/20/01	Dry	410	0	100	1			200	1		
03/26/01	Dry	410	0	200	1			100	1		
04/02/01	Wet	200	1	1090	0			200	1		
04/09/01	Dry	520	0	200	1			200	1		

Date	MCHD Sampling Locations										
	Wet or Dry?	Garfield Park		Keystone Avenue		Bethel Avenue		Emerton Place		Orange Street	
		E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance	E. Coli (col/100 mL)	% Compliance
04/17/01	Wet	300	0	520	0			1340	0		
04/23/01	Dry	520	0	1730	0			4880	0		
04/30/01	Dry	1970	0	1340	0			1460	0		
05/07/01	Wet	960	0	2130	0			1870	0		
05/09/01	Wet	630	0	980	0			3990	0		
05/14/01	Dry	740	0	410	0			2010	0		
05/21/01	Dry	860	0	1220	0			2310	0		
05/29/01	Wet	200	1	1100	0			1480	0		
06/04/01	Wet	6010	0	6130	0			4720	0		
06/06/01	Wet	16640	0	24890	0			20980	0		
06/11/01	Dry	1180	0	1990	0			1460	0		
06/18/01	Dry	2560	0	980	0			4080	0		
06/25/01	Dry	410	0	1460	0			4890	0		
07/02/01	Wet	31300	0	19350	0			21420	0		
07/09/01	Wet	11690	0	15530	0			8840	0		
07/16/01	Dry	940	0	2560	0			4870	0		
07/23/01	Wet	3930	0	1090	0			2720	0		
07/30/01	Wet	310	0	860	0			1350	0		
08/06/01	Dry	740	0	1560	0			4800	0		
08/13/01	Dry	980	0	1830	0			2060	0		
08/15/01	Dry	310	0	740	0			2620	0		
08/20/01	Wet	860	0	1210	0			1320	0		
08/27/01	Wet	300	0	2730	0			980	0		
09/04/01	Dry	510	0	950	0			1550	0		
09/10/01	Wet	3090	0	2950	0			980	0		
09/12/01	Dry	630	0	520	0			970	0		
09/17/01	Dry	200	1	720	0			1090	0		
09/24/01	Wet	11000	0	7680	0			6050	0		
10/01/01	Dry	310	0	520	0			310	0		
10/08/01	Dry	740	0	1080	0			630	0		
10/15/01	Wet	2590	0	630	0			980	0		
10/22/01	Dry	100	1	520	0			410	0		
10/29/01	Dry	740	0	1480	0			200	1		
11/05/01	Dry	100	1	310	0			310	0		
11/12/01	Dry	630	0	100	1			410	0		
11/14/01	Dry	300	0	100	1			100	1		
11/19/01	Wet			100	1			850	0		
11/27/01	Wet	3680	0	3270	0			2990	0		
12/03/01	Dry	850	0	100	1			730	0		
12/04/01	Dry	520	0	100	1			100	1		
12/10/01	Dry	100	1	1220	0			530	0		
12/12/01	Wet	100	1	420	0			100	1		
12/18/01	Wet	860	0	980	0			1220	0		
05/02/02	Wet	320	0	48	1	64	1	96	1	**10**	1
05/06/02	Wet	380	0	768	0	3050	0	1200	0	380	0
05/13/02	Wet	3600	0	1400	0	2000	0	2680	0	980	0
05/22/02	Wet	51	1	24	1	49	1	152	1	5	1
05/29/02	Wet	886	0	620	0	253	0	380	0	93	1
06/04/02	Dry	720	0	620	0	227	1	1700	0	80	1
06/11/02	Dry	480	0	460	0	93	1	714	0	**20**	1
06/13/02	Wet	473	0	407	0	220	1	106	1	44	1
06/19/02	Dry	640	0	330	0	220	1	460	0	19	1
06/26/02	Wet	5900	0	2800	0	4700	0	2700	0	290	0
07/05/02	Dry	380	0	260	0	540	0	800	0	**10**	1
07/11/02	Wet	370	0	160	1	480	0	460	0	62	1
07/16/02	Dry	1262	0	367	0	273	0	2100	0	125	1
07/25/02	Wet	420	0	280	0	240	0	533	0	32	1
07/30/02	Wet	**4000**	0	**2540**	0	**4000**	0	**4000**	0	1420	0
08/01/02	Dry	360	0	420	0	520	0	**1200**	0	62	1
08/06/02	Dry	620	0	560	0	220	1	1300	0	353	0
08/13/02	Dry	560	0	1060	0	110	1	773	0	12	1
08/22/02	Dry	1350	0	56	1	1400	0	410	0	480	0
08/29/02	Dry	150	1	580	0	100	1	820	0	17	1
09/03/02	Dry	313	0	540	0	213	1	720	0	54	1
09/10/02	Dry	220	1	420	0	140	1	460	0	130	1
09/17/02	Wet	125	1	103	1	293	0	193	1	130	1
09/24/02	Wet	850	0	425	0	140	1	250	0	24	1
09/26/02	Dry	850	0	400	0	1050	0	1100	0	40	1
10/03/02	Dry	400	0	950	0	120	1	310	0	45	1
10/15/02	Wet	187	1	210	1	85	1	240	0	130	1
10/22/02	Dry	123	1	75	1	6	1	110	1	53	1
10/24/02	Dry	110	1	145	1	270	0	55	1	330	0
10/31/02	Wet	150	1	280	0	230	1	250	0	290	0