JEFFERSON COUNTY, ALABAMA

LEEDS COMPLETE WASTE TREATMENT SYSTEM

CONSENT DECREE TERMINATION PLAN

JEFFERSON COUNTY COMMISSION
ENVIRONMENTAL SERVICES DEPARTMENT

April 12, 2012

LEEDS COMPLETE WASTE TREATMENT SYSTEM

CONSENT DECREE TERMINATION PLAN

Request for Termination

The Jefferson County Commission, Jefferson County, Alabama, submits this report and seeks termination of Civil Actions No. 93-G-2492-S and No. 93-G-2947-S, Consolidated (hereinafter the Consent Decree) for the Leeds Complete Waste Treatment System. This request is made in accordance with Section XXIV, Termination, paragraph A.1. of the decree.

This report contains documentation which demonstrates the County has achieved and maintained compliance with all applicable provisions of Section VII of the Consent Decree for the Leeds system.

With respect to compliance with NPDES permit effluent limits, this report contains documentation that demonstrates the County has achieved and maintained substantial compliance in accordance with Section XXIV A.1.a.

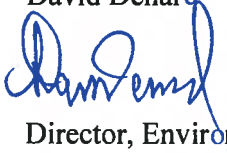
With respect to compliance with the objective of elimination of sewer system overflows (SSOs), this report contains documentation that demonstrates the County has achieved and maintained substantial compliance in accordance with Section XXIV A.1.b.

Jefferson County has paid all demands for stipulated penalties. No monetary obligations are due except for the balance of stipulated penalties that may have accrued but have not yet been assessed.

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, I certify that the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

David Denard



Director, Environmental Services Department

BACKGROUND

On November 29, 1993 Kipp and Angwins, as citizen plaintiffs, filed a complaint against Jefferson County, Alabama, alleging that the County violated the Clean Water Act by discharging pollutants to surface waters without the required National Pollutant Discharge Elimination System (NPDES) permits and had violated the terms and conditions of its NPDES permits during periods of wet weather. The Cahaba River Society (CRS) moved to intervene in that case on March 4, 1994 and the court granted that motion April 15, 1994. Thereafter, on December 6, 1994 the United States Environmental Protection Agency (EPA) filed a similar complaint and by order dated January 20, 1995, the court consolidated the EPA case with the cases filed by the citizens. All suits sought injunctive relief and the assessment of civil penalties. The collective allegations focused on permit violations that occurred as the result of automatic bypasses and overflows of untreated wastewater from the County's wastewater collection systems, or sewers, and bypasses at the County's wastewater treatment plants of wastewater that had not received full treatment.

On December 9, 1996, all parties entered into a Consent Decree that outlined actions to be taken by the County in order to comply with the Clean Water Act. Among other requirements, the Consent Decree required the County to comply with the Clean Water Act and NPDES permits. In addition, the County paid an initial civil penalty of $750,000 to the United States Treasury on January 7, 1997.

The County began preliminary sewer system analyses of its Complete Waste Treatment Systems in 1995 prior to the filing of the Consent Decree as a good faith effort to show intent to comply with the Clean Water Act during periods of wet weather. Results from these analyses facilitated the planning process to design and implement specific programs that would bring the County into compliance with the Consent Decree and the Clean Water Act. Program activities included repairs and improvements to the County's wastewater collection systems that eliminated all automatic bypasses and reduced infiltration/inflow (I/I) to these systems. Improvements at the County's wastewater treatment plants eliminated bypasses and enabled the full treatment of all wastewater flows received at these plants.

LEEDS COMPLETE WASTE TREATMENT SYSTEM
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I. COMPLIANCE WITH SECTION X OF THE CONSENT DECREE

In accordance with Section X of the Consent Decree, the County submitted payment for civil penalty in the amount of $750,000 on January 7, 1997 via wire transfer directly to the US Treasury.

II. COMPLIANCE WITH SECTION XI OF THE CONSENT DECREE

The County certifies that it has paid all penalties and monetary obligations assessed under the Consent Decree at the time of this submission.

Table II-1

EPA Demand Date	SSO Date Range From	SSO Date Range Through	Amount	Result
10/27/97	11/01/95	08/31/97	$61,000	Demand Rescinded By EPA
09/26/06	09/01/97	03/31/06	$339,000	Paid In Full
01/16/08	04/01/06	10/31/07	$238,000	Paid In Full

Documentation of each payment is in included in Appendix I. Jefferson County has not received any other demand notices as of the date of submission of this report.

III. COMPLIANCE WITH SECTION VII

The County certifies that all requirements of Section VII, Remedial Actions, are complete for the Leeds Complete Waste Treatment System. This report addresses the requirements of Section VII with respect to the Leeds Complete Waste Treatment System (Leeds System) and documents the County's performance by categorizing remedial actions into the following items.

A. Phase I Planning Documents

Phase I planning documents required as a part of Section VII, paragraphs B, C, E, G, I, K, L, and N are shown in the Table III-1 with the submittal date to EPA and EPA approval date listed. The Phase I documents were not unique to the Leeds System and were inclusive of each complete waste treatment system operated by the County.

Table III-1		
Phase I Document	**Submittal Date**	**EPA Approval Date**
Preliminary Sewer System Analysis (PSSA)	10/30/1995	12/18/1995
Infiltration & Inflow (I/I) Plan	11/20/1995	12/15/1995
Sewer System Evaluation Survey (SSES) Plan	01/02/1996	02/02/1996
Capacity Analysis Plan	11/13/1995	01/18/1996
Comprehensive Performance Evaluation (CPE) Plan	12/15/1995	02/01/1996
Water Quality Monitoring Plan (WQM)	02/26/1996	08/30/1996
Initial Waste Treatment System Capital Improvement Plan (WTSCIP)	01/19/1996	02/15/1996
Unpermitted Discharge Event Program	10/30/1995	1

1 – No approval required

B. Phase II Reports

Phase II reports, plans, and schedules specific to the Leeds System required as a part of Section VII, paragraphs D, F, J, and M are shown in Table III-2 with the submittal date to EPA and EPA approval date listed.

Table III-2		
Phase II Document	**Submittal Date**	**EPA Approval Date**
Infiltration & Inflow Report	06/03/1996	07/09/1996
Sewer System Evaluation Survey Report	05/31/1996	07/09/1996
Capacity Analysis Report	09/03/1996	1
Capacity Improvement Schedule	03/03/1997	04/18/1997
Comprehensive Performance Evaluation Report	03/20/1997	03/28/1997
Performance Improvement Plan	2	2
WTSCIP Amendment No. 3	09/02/1997	01/14/1998
WTSCIP Amendment No. 3A	10/01/1998	11/09/1998

1 - No approval required
2 - A PIP was not required to be performed for this system.

C. Phase III Implementation

Phase III encompasses the implementation of repairs and improvements (Section VII., paragraphs H, O, and P) identified in Waste Treatment System Capital Improvement Plan (WTSCIP) Amendment No. 3 submitted September 2, 1997 and Amendment No. 3A submitted October 1, 1998. Both WTSCIP Amendment No. 3 and Amendment No. 3A proposed that the itemized sewer rehabilitation recommendations from the approved SSES report be addressed. The required work was incorporated into one (1) rehabilitation contract that was complete as of January 1, 2000 prior to the Section VII, Paragraph H.3 deadline of September 1, 2001. Table III-3 summarizes the Phase III work.

Construction of the Leeds Wastewater Treatment Plant (WWTP) began in 1993 and the plant was in operation prior to the January 19, 1996 submission of the Initial Waste Treatment System Capital Improvement Plan, therefore, it is not addressed in WTSCIP Amendment No. 3 or Amendment No. 3A.

Table III-3			
Phase III Contract	**Final Contract Value**	**Construction Completion**	**Consent Decree Deadline**
Leeds Collection System Rehabilitation	$8,810,831.50	12/10/1999	09/01/2001

Phase III also includes submission of the Collection System Operation and Maintenance Plan and implementation of the Water Quality Monitoring Program. Table III-4 summarizes these Phase III remedial actions.

Table III-4		
Phase III Remedial Action	**Submittal Date**	**Implementation Date**
Collection System O&M Plan	1/18/2001	7/12/2001
Water Quality Monitoring Program	2/26/1996	12/02/1996

D. Reporting Requirements

In accordance with Section VII, Paragraph Q., Reporting Requirements, and subparagraphs Q.1, K.4, and N.4, the County has complied with the requirements to submit Quarterly Reports, monthly summaries of Unpermitted Discharge Events, and has performed all requirements set forth in the Water Quality Monitoring program and submitted all associated data.

E. Sewer Collection System Unification

In accordance with Section VII, Paragraph R., Municipalities, the County has complied with the requirements to create a unified system which includes all Collection Systems served by any of the County's Wastewater Treatment Plants. Table III-5 below lists the municipal systems served by County WWTPs and the date of transfer of those systems to the County.

Table III-5	
Municipality	**Effective Date**
Brighton	March 1, 1998
Fultondale	March 1, 1998
Gardendale	March 1, 1998
Graysville	March 1, 1998
Homewood	March 1, 1998
Hoover	March 1, 1998
Hueytown	March 1, 1998
Lipscomb	March 1, 1998
Mountain Brook	March 1, 1998
Pleasant Groove	March 1, 1998
Tarrant	March 1, 1998
Trussville	March 1, 1998
Vestavia Hills	March 1, 1998
Birmingham	May 1, 1998
Adamsville	August 1, 1998
Bessemer	August 1, 1998
Fairfield	August 1, 1998
Irondale	August 1, 1998
Leeds	August 1, 1998
Midfield	August 1, 1998
Warrior	August 1, 1998

IV. COMPLIANCE WITH SECTION VIII OF THE CONSENT DECREE

In accordance with Section VIII of the Consent Decree, the County has performed all obligations and has observed or fulfilled all conditions with respect to the Supplemental Environmental Project (SEP) Greenways Project. The County submitted the SEP Master Plan Final Report on July 19, 1999, and began its implementation including the establishment of the Black Warrior /Cahaba Land Trust (hereinafter the Land Trust) to direct and oversee purchases of prioritized parcels along Jefferson County stream corridors. The SEP Final Report was submitted on December 9, 2006, outlining SEP activities and expenditures completed in accordance with the Master Plan. A 12-month extension was granted to the County and the Land Trust to complete remaining activities including the transfer of SEP parcels and funds between the County and the Land Trust, completing all pending property transactions and parcel site inventories, and performing initial property maintenance and site security measures. These activities were formalized in a Memorandum of Agreement (MOA) between the County and the Land Trust and documented in two amendments to the Final Report (See Table IV-1).

All SEP expenditures and activities are complete, including the Five Mile Creek Constructed Wetlands Project, of which the Land Trust oversaw the design, construction

and completion of this project. The final report on the Five Mile Creek Constructed Wetlands Project was submitted to EPA on December 23, 2008. The County has also completed the Five-Year Annual Benthic Macroinvertebrate Assessment of the SEP. The final report on the Benthic Macroinvertebrate Assessment was received by EPA Region IV on December 29, 2011.

Table IV – 1	
SEP Document	**Submittal Date**
Final Master Plan	July 19, 1999
Final Report	December 9, 2006
Amendment No. 1	June 9, 2007
Amendment No. 2	December 9, 2007[1]
Five Mile Creek Constructed Wetlands Final Report	December 23, 2008
Benthic Macroinvertebrate Assessment Final Report	December 27, 2011

1- EPA accepted amendment 1/18/08

V. VERIFICATION

Although not required in the Consent Decree, EPA has requested that the County verify that the repairs recommended by the Sewer System Evaluation Survey (SSES) were completed. This section describes the County's verification methodology and summarizes the results. Detail is provided in Appendix II.

This certification is in addition to the oversight and certifications provided during construction by Jefferson County and contracted consulting engineers at the project level. The work performed under these projects is documented by the production of as-constructed drawings, which are the primary document for evaluating the work to be verified. The following describes the process for an item of work to be included for payment and to ultimately be shown as work completed on as as-constructed drawing:

> A repair is completed by a Contractor. The repair details are then recorded by the Consultant and/or Jefferson County Inspector in a field diary. The field diary entries are used to compile the Consultant Engineer's project work summary. A work order is generated by the Consultant in the County's Sewer Infrastructure Management System (SIMS). At the end of the month the Consultant Engineer and Inspector(s) meet to discuss quantities for that month. Following this meeting the Inspector(s) meet with the Contractor to discuss monthly quantities. An invoice is then generated by the Contractor. The invoice is then reviewed and certified by the Consultant Engineer and subsequently reviewed by the County Engineer. The invoice is then signed by the ESD Director for authorization for payment. At the end of the Contract, as-constructed drawings are created as further described in the definitions below.

A. Methodology

The following definitions apply to the verification procedure herein described.

1. Definitions

As-Constructed Drawings: The Engineer's record drawing of all work performed in a specific contract. These documents are typically created by a Consultant CAD Technician from Consultant and/or County Inspector field diaries and notes and maps from the Consultant Engineer of Record.

Document Control Log (DCL): A summary of verified repairs for each complete waste treatment system.

Document Verification Form: A form used by a Jefferson County Engineer to verify SSES recommended repairs (from existing documentation) for the purposes of this termination request.

Engineer's Project Work Summary: A binder of record, separated by type of repair, organized by mini-system and manhole number showing all pertinent information for each SSES recommended repair. This document is composed by the Consultant Engineer and Inspector of Record (Consultant or County) and is generated from the inspector's field diaries.

Field Check: A site visit by a Jefferson County Inspector used to verify work completed. This may be done by direct visual inspection or remote television inspection.

Field Diary: A bound document, composed daily during a contract, filled out by the on-site inspector, showing work completed. This document is used by the Consultant Engineer and County and/or Consultant Inspector of Record to generate monthly invoice quantities.

Inspector Field Verification Form: A form used by a Jefferson County Inspector to verify SSES recommended repairs (from field inspection) for the purposes of this termination request.

Other Construction Records: For flow chart simplicity, this item may include but not be limited to: field diaries, SIMS manhole photographs and other uncategorized records.

SIMS Manhole Photograph: Photograph of a manhole showing at least one permanent feature in the background, the compass direction in which the picture was taken and the manhole number.

SIMS Work Order: A database created within SIMS to catalog completed repair information, searchable through line and manhole selection. Work orders are created by the Consultant from Inspector's field diary information or by County employees after a repair has been completed.

2. Verification Procedure

This verification procedure serves to demonstrate that the SSES recommended sewer rehabilitation work was performed in accordance with the Consent Decree for the Leeds Complete Waste Treatment System.

a) Statistical Analysis

The SSES recommended repairs were placed into separate Excel spreadsheets according to their complete waste treatment system. Within each complete waste treatment system spreadsheet, every SSES recommended repair for that system was assigned a number corresponding to the row in which it was located. The specific repairs to be confirmed were randomly selected via an Excel random number generator from the spreadsheet containing a list of all SSES recommended repairs, in this case, for the Leeds Complete Waste Treatment System.

A statistical analysis was used to determine an appropriate number of random samples to be examined in order to verify that the SSES recommended repairs were addressed in the Leeds Complete Waste Treatment System.

The number of samples selected to represent the collection system were based on a formula put forth by Krejcie and Morgan (1970) for determining sample sizes for research activities. Calculations were based on the following formula for a known population size:

$$\text{Sample Size} = \frac{X^2NP(1-P)}{d^2(N-1) + X^2P(1-P)}$$

$$\text{Sample Size} = \frac{(3.841)*(369)*(0.95)*(1-0.95)}{(0.05)^2*(369-1) + (3.841)*(0.95)*(1-0.95)} = 61.07 \approx 62$$

Where:

X^2 is the table value of Chi-Square at 1 degree of freedom for a 95 percent confidence level (3.841). *N* is the population size (total number of recommended repairs for a collection system). *P* is the population proportion, which is the minimum percentage of SSES recommended repairs assumed to be performed in each individual complete waste treatment system basin. And *d* is the degree of accuracy expressed as a proportion (0.05 was used to represent 95% accuracy).

Consequently, the number of randomly-selected repairs checked demonstrates that at least 95% of the total numbers of repairs were performed at a confidence level of 95%.

In addition to the sample size generated by the above referenced process, an additional sample pool consisting of twenty-five (25) random repairs is generated to form a secondary sample pool. The purpose of this pool is described in the following section *Records and Field Review*.

b) Records and Field Review

The following records were used in the verification process:

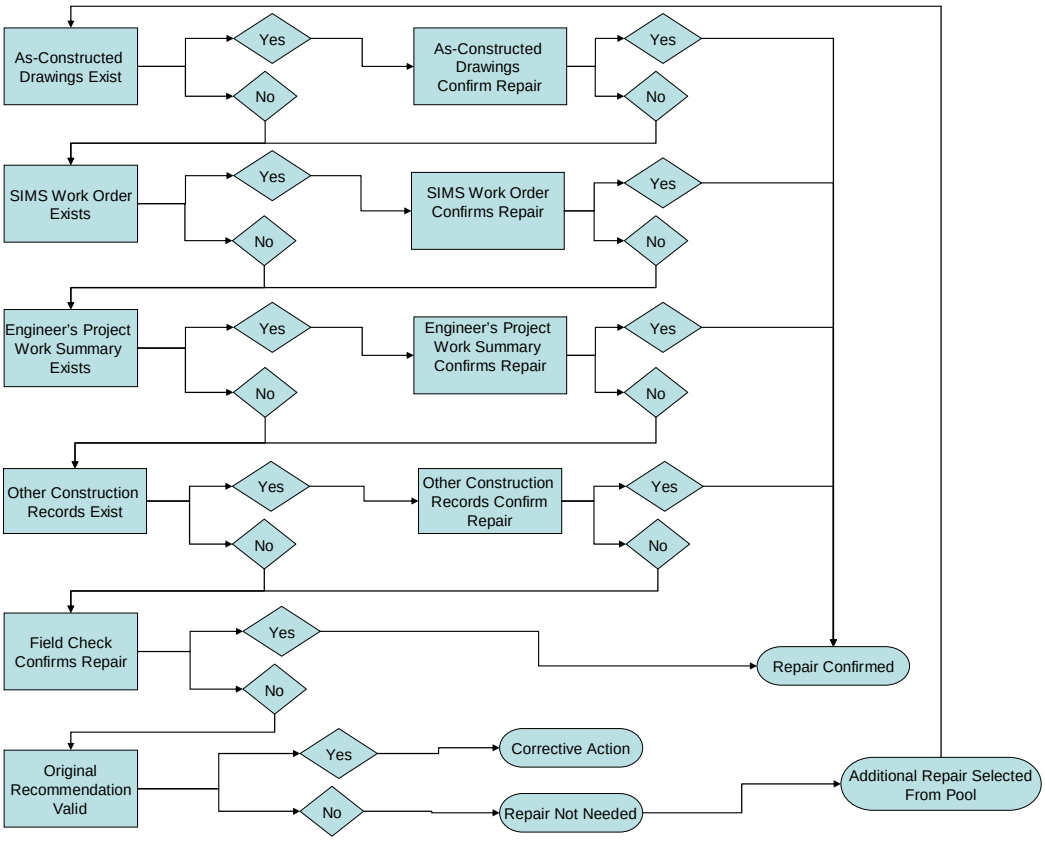
1. As-Constructed Drawings – Document Verification Form
2. SIMS Work Orders – Document Verification Form
3. SIMS Manhole Photograph – Document Verification Form
4. Field Diary – Document Verification Form
5. Field Checks – Inspector Field Verification Form

The verification process was performed based on the decision flow chart in Figure V-1. This process was documented via a document control log and associated forms where applicable. The aforementioned forms identified the randomly selected repair, with an attached photocopy of the documentation of the repair from records 1, 2, 3 and 4. If no documentation of the repair was found in these records, a field check was performed to confirm that the repair was addressed. The field checks were made by County staff at the site of the recommended repair as visual verification of the current status of the recommended repair. A form

signed by the field inspector confirming the status of the repair is included for documentation.

If an SSES recommended repair has been investigated and determined to be "not warranted", an additional SSES recommended repair is selected from the next sequential random repair from the secondary sample pool. The substituted random repair is then investigated in the same manner as that of the original sample set.

Figure V-1.



B. Summary of Verification Results

The verification procedure was successful in confirming the 95% confidence level for SSES repair work performed in the Leeds collection system in that sixty-one (61) repairs within the sixty-two (62) repair sample have been addressed. Of the sixty-two (62) random repairs within the sample pool, fifty-two (52) were confirmed by record documents and ten (10) were confirmed through field inspections. Five (5) of the SSES recommended repairs were determined through field inspections to be insignificant and not in need of repair (therefore addressing the original SSES recommendation), and one (1) SSES recommended repair had not been performed at the time of the inspection. The repair in question was

recommended for manhole maintenance because it was holding debris. The manhole was holding debris because it did not have an invert. An invert was constructed on December 22, 2008.

Because six (6) recommended repairs in the original sample set were found to be "not warranted" or incomplete (in one instance), six (6) additional recommended repairs were selected from the secondary sample pool. Four (4) were confirmed through record documents and one (1) was confirmed through field inspection. One (1) of the SSES recommended repairs was determined through field inspection to be insignificant and not in need of repair.

Because one (1) recommended repair in the secondary sample set was found to be "not warranted", one (1) additional recommended repair was selected from the secondary sample pool. The additional recommended repair was confirmed by record document.

In summary, a total of seventy-one (71) SSES recommended repairs were investigated as a part of the verification procedure. Sixty-four (64) recommended repairs were documented as performed, six (6) recommended repairs were determined to be not warranted and one (1) repair was found to be incomplete. The verification procedure was successful in confirming the 95% confidence level for SSES repair work performed in the Leeds collection system.

Detailed documentation relevant to this summary is included in Appendix II.

VI. SUBSTANTIAL COMPLIANCE WITH SECTION XXIV OF THE CONSENT DECREE

The County has complied with the requirements to achieve and maintain substantial compliance with respect to NPDES permit limitations and with the objective of elimination of Sewer System Overflows. The period of substantial compliance is identified and the support documentation is described below.

A. Substantial Compliance Period

Section XXIV A.1 of the Consent Decree establishes that the County is to achieve and maintain

> …compliance with all applicable provisions of Section VII … (for each complete waste treatment system for a period of)… twelve (12) consecutive months, provided that during that 12-month period the County can establish that precipitation has been average or greater. In the absence of evidence of average or greater than average precipitation during a 12-month period, the

County shall be permitted to demonstrate compliance at such Complete Waste Treatment System during a 24-month period.

The County submits the period from April 1, 2011 through March 31, 2012 as the 12 consecutive months that exhibits substantial compliance in accordance with Section XXIV.A.1. of the Consent Decree. This 12-month consecutive period had above average rainfall of 55.43 inches for the Birmingham/Leeds area as indicated by National Weather Service records.

The County used rainfall data compiled by the National Weather Service Observation Station at the Birmingham, Alabama International Airport to establish average rainfall for the Leeds system. The 30-year average rainfall at this weather observation station (1971-2000) was 53.99 inches. This rainfall amount was used as the basis for establishing the substantial compliance period of consecutive 12-months of average precipitation. The 12-month substantial compliance period for the Leeds Complete Waste Treatment System was determined to be for a period of average to above-average precipitation for the Birmingham/Leeds area after the recommended work in the Consent Decree was completed. All recommended sewer rehabilitation work for the Leeds Complete Waste Treatment System was completed on January 1, 2000.

B. NPDES Permit Effluent Limits

In accordance with Section XXIV.A.1.a., the County has complied with the requirements to achieve and maintain substantial compliance with respect to NPDES permit limitations at the Leeds WWTP for the consecutive twelve (12) month period of April 1, 2011 through March 31, 2012. There were **no** permit violations during the evaluation period. Copies of the Leeds NPDES Permit Discharge Monitoring Reports (DMRs) for the compliance period are provided in Appendix IV.

The construction of the Leeds WWTP at its current location began in November 1993. The facility began discharging April 20, 1995. The plant's permitted average daily treatment capacity was increased to 2.0 MGD and the peak daily design flow increased to 10 MGD. The WWTP has been maintained exceptionally well, and significant investments in equipment replacements and new process improvements have been made during the life of the facility. The Leeds WWTP has won numerous awards over the many years since its completion including Alabama Water and Pollution Control Association Awards (1998, 1999, 2001, 2002, 2006, 2007, 2008, 2009, and 2010), Peak Performance awards from the National Association of Clean Water Agencies (1999, 2000, 2002, 2003, 2004, 2005, 2006, 2007, 2008, and 2009), and the 2010 Alabama Water Environment Association Award of Excellence. See Appendix III for the flow schematic and process flow narrative for the WWTP.

In the 43 month period from January 1992 through completion of start-up of the new plant in July 1995, there were 105 reported NPDES violations, an average of 2.4 violations per month. Since August 1995, there have been only four NPDES violations over the 200 month, 16.7 year, period through March 2012. The Leeds WWTP has been proven itself as an effective and reliable treatment facility that has contributed to the improvement of water quality and the protection of human health in the Little Cahaba watershed and downstream.

C. Bypasses

In accordance with Section VII.B.4. of the Consent Decree, the County has complied with the elimination of all collection system automatic bypasses including Hurricane Branch, Horsefarm, Barton Branch, Tarrant Branch, and Watkins Branch. Additionally, the County has complied with the elimination of bypasses at all wastewater treatment plants.

There have been zero (0) occurrences of bypasses, as defined by the Consent Decree, within the Leeds Complete Waste Treatment System during the evaluation period or since the start-up of the Leeds WWTP in 1995 up to the present.

D. Sanitary Sewer Overflows

In accordance with Section XXIV.A.1.b, the County has substantially complied with the objectives of the Consent Decree for the consecutive twelve (12) month period of April 1, 2011 through March 31, 2012 for the Leeds Complete Waste Treatment System.

There were three (3) overflows in the Leeds Complete Waste Treatment System during the compliance period. Appendix VIII provides the details regarding the overflows that occurred during the compliance period. It is also worth noting that there have been twelve (12) other consecutive twelve (12) month periods over the last nine years with only two (2) or three (3) overflows.

One overflow (event no. C00949) occurred during the compliance period as a result of causes not attributable to the condition or operations of the system. This overflow was caused by a bypass pump failure from a contractor who performed work on a sewer line. The failure resulted in an estimated 6,950 gallon SSO. Considering these mitigating circumstances, only two other overflows occurred in the system for the compliance period.

The remaining two SSOs (M04034 and M04148) occurring within the compliance period were two dry weather SSOs attributable to grease-related or unknown causes. For the prior three years of 2008, 2009 and 2010, six, four and five (respectively) grease-related overflows occurred in the system. This fifty to eighty percent reduction of potentially grease-related overflows over the three years prior

to the compliance period clearly demonstrates a trend toward the reduction and elimination of SSOs and substantial compliance with the Consent Decree.

Although not occurring during the compliance period, there have been three (3) overflows in the recent past that occurred during a period of heavy rain and flooding. On Friday, March 4, 2011 Insituform Technologies, working under contract for Jefferson County, installed 370' of 24" diameter cured-in-place (CIP) liner in the Leeds collection system as a part of a system-wide rehabilitation contract. CIP liners were installed on line segments 8002-044 to 8002-041 and 8002-041 to 8002-002. Because of the long cure time required for the large diameter liners, the work was not completed until late in the evening. Due to these time constraints, the lines were not television-inspected that night. On Monday, March 7, 2011, the Jefferson County Inspector assigned to the project identified evidence of an SSO at MH 8002-041 (the overflow was not active at the time). The inspector questioned the job superintendent and was told the liner had lifted and created a constriction in pipe capacity. It was later learned that the pipe constriction was significantly worse than originally reported by the contractor.

Jefferson County immediately directed the contractor to put into use the bypass pumps that were used to divert flow in dry weather conditions during installation of the liners to mitigate the possibility for another SSO. A 156 gallon overflow was calculated from ponding calculations based on the observed conditions on March 7, 2011. The bypass system and available sewer pipe capacity were sufficient for flows received on March 7th and 8th; however, these pumps coupled with the constricted pipe capacity (resulting from the defective liner) were inadequate to completely carry the peak flow that resulted from the heavy rain that began March 8, 2011 and continued through March 9, 2011. The below photographs in Figure VI-1 show the overflow, bypass piping, and flooded river conditions. Note that the overflow is significantly less turbid than the receiving stream.

Figure VI-1

The overflow was reported as restarting March 9, 2011 at 1:29 p.m. and continued until 10:10 a.m. on March 10th. While this overflow was reported as a 6,018,850 gallon overflow (based on an observed overflow rate of 4,850 gallon per minute for duration of 1,241 minutes), an engineering review of the upstream sewer capacity reveals that a 6 million gallon (MG) overflow was improbable based on the flows delivered and passed through manhole 8002-041 by the upstream sewers. The Manning's equation full pipe capacity for the immediately upstream pipe is 4.621 million gallons per day (MGD) and a connector line from the east has a theoretical maximum output of 1.30 MGD. A pipe under pressure could deliver slightly more flow, but the system would not be able to produce a 6 MGD overflow in addition to the flow pumped and carried by the sewer.

A more accurate estimate of the overflow volume can be calculated based on an active flow monitor located three pipe segments downstream of the overflow as shown below in Figure VI-2. This flow monitor, Leeds L2, recorded a maximum flow of 3.197 MGD and a total flow of 2.704 MG during the overflow period. A very conservative but likely more accurate approach assumes the upstream pipes and connected downstream pipes prior to the flow monitor were at peak capacity at the time of the overflow. Subtracting out the recorded total flow in the downstream flow monitor from the theoretical peak flows of all contributing sewers produces a maximum probable overflow volume of roughly 3.4 MG. While this amount is still substantial, it is a 43% reduction from the original estimation.

Figure VI-2

After flows subsided, an attempt was made by the contractor to repair the liner by reheating and reforming the malformed liner; this attempt failed. The malformed liner was ultimately repaired by cutting and removing the lifted material from both tangents and installing a new liner. The new liner installation was completed on April 8, 2011. At all times during the failed liner event, the County promptly responded and instructed the contractor to perform whatever actions could reasonably be performed to mitigate the SSO and promptly correct the defect which caused the SSO.

It should also be noted that two of the seven most recent SSOs in the Leeds system were the result of simple but unusual errors committed by reputable contractors retained by the County as part of its ongoing commitment to repair

and maintain the system. These SSOs are the unfortunate and unintended byproduct of the County's continued attention, not neglect, of the system. These actions demonstrate the County's commitment to maintain the system in compliance with the goals of the Consent Decree.

A third overflow during the March 2011 storms occurred at the Coosa Avenue Pump Station. At some time during the storm event, the breaker to one of the two pumps in the pump station tripped, causing a pump to shut off. The County was immediately alerted by an alarm signal sent from the cellular based real-time SCADA system, maintenance crews responded, and the crews were able to correct the problem. The overflow was limited to only an estimated 10,193 gallons because of the alert system, one pump remaining in service, and the crew's quick response. This alert system has been installed at the Coosa Avenue pump station and most other pump stations in the County. This alert system demonstrates substantial compliance with the Consent Decree and the County's commitment to eliminate and, where not possible, mitigate SSOs.

Although the March 2011 flooding event was significant as observed by the Little Cahaba flooding out of its banks and the event's impact on other parts of the County's collection system, MH 8002-041 was the only potential capacity-related overflow identified in the Leeds system but was actually the result of the malformed liner and not the capacity of the host pipe. A subsequent event in excess of a 25-year, 2-day return period which occurred on September 5-6, 2011 did not produce any SSOs in the Leeds system.

Also not occurring within the compliance period, two overflows from 2008-2011 were originally attributed to I/I causes. The first (C00819) occurred during a rain event; however, it was subsequently determined that the cause of the overflow was the result of a partially blocked siphon downstream. The siphon was cleaned and is part of the County's routine cleaning schedule. The second (M03620) was the result of I/I, but significant upstream defects were subsequently identified through temporary flow monitoring, CCTV, and smoke testing. Smoke testing completed in 2010 revealed two manholes located along a drainage ditch/creek with damaged covers. The manholes were repaired eliminating a large source of inflow.

In addition to the forgoing, the following describe the programs and systems put in place by the County to achieve the objective of the elimination of SSOs.

1. Management, Operation, and Maintenance Program

The County's Management, Operation, and Maintenance (MOM) Program ensures the appropriate operation of the sanitary sewer collection system by implementing effective management and maintenance practices. The MOM Program document outlines these management and maintenance practices and

is used by County staff to direct operations to meet the objective of substantial compliance in all applicable areas.

The Leeds Complete Waste Treatment System has been operating under the County's Collection System Operation and Maintenance (O&M) Plan as approved by EPA in July 2001. By utilizing the programs outlined in the O&M Plan, the County has been able to achieve the objective of substantial compliance for the Leeds collection system. In order to continue to achieve and maintain substantial compliance, the County has updated its O&M Plan and created a Collection System Management, Operations, and Maintenance (MOM) Program. This is a strategic planning document that is updated as the MOM Program evolves. The current version of the County's MOM Plan is included in Appendix V for reference.

2. Grease Control Program

The Jefferson County Commission adopted a Grease Control Ordinance in October 2006 as part of a comprehensive plan to achieve the objective of the elimination of sewer system overflows due to grease blockages. The Grease Control Program (GCP) operates out of the County's Barton Laboratory Monitoring and Compliance Division and utilizes a permitting and inspection process to monitor Food Service Facility (FSF) discharges to the County's sanitary sewer collection systems. The GCP permits require FSFs to install and maintain grease handling devices in order to reduce grease discharges to the sewer. Residential introduction of grease into the system is controlled through a cooking oil recycling program and various public education initiatives.

The GCP operates in conjunction with the County's Line Maintenance Division in identifying chronic grease problems. The above-mentioned divisions work together to report, inspect, repair, and prevent grease blockages in the sewer. These objectives are achieved via a joint communication, reporting, and inspection system, utilizing SIMS and a Cityworks database. Detail may be found in the County's MOM. A copy of the Grease Control Program Ordinance is included as Appendix VI.

3. Sanitary Sewer Modeling

In December 2008, Jefferson County retained Black & Veatch to prepare a comprehensive sanitary sewer hydraulic model of the wastewater collection system for the Leeds Basin. The work was completed in May, 2011. The Leeds collection system contains approximately 48.3 miles of sanitary sewer pipes, 8 pump stations, and 8 siphons. Black & Veatch reviewed the system data and analyzed rainfall and ongoing flowmetering results. This analysis resulted in the development of site-specific rainfall series and diurnal flow profiles for the basin. Black & Veatch developed an all-pipes Innovyze

InfoWorks CS dynamic hydraulic model of the wastewater collection system. The model was calibrated to actual data from 2007 and 2008 from 6 permanent flow metering sites for both dry and wet weather conditions, and a year-long simulation was performed as a quality control on the model calibration. Using the calibrated model, the existing system was analyzed under both dry and wet weather conditions. The dry weather simulation indicated adequate system capacity, with surcharging in only one location upstream of the Parkway pump station. The wet weather simulation indicated some limited surcharging under the 50th percentile analysis (roughly equivalent to a 2-year return storm), mostly in the 8-inch and smaller pipes. The model predicted only four potential overflow locations all upstream of the Parkway pump station with volumes that were insignificant and below the precision of the model. All pump station capacities were adequate for peak flows predicted from the wet weather analysis.

4. Capacity Assurance Program

The County has developed a Capacity Assurance Program (CAP), initially submitted to EPA on June 25, 2008 and revised by letter on November 13, 2008. The CAP is in use in Leeds and is evolving with the completion of the sewer system model. After the completion of the modeling work in May 2011, the County began working to incorporate the model results into the CAP. The County is on-schedule to have the model incorporated into the CAP within two years following the model's completion as stated in the November 13, 2008 letter. When complete, the upgraded Leeds CAP will be able to verify capacity for each pipe segment downstream of a proposed development instead of only at the 6 flow meter sites and pump stations as currently implemented. In addition, the completed hydraulic model is available and has been used for the evaluation of larger and more complex additions to the Leeds system, well ahead of the County's proposed schedule. The current version of the County's CAP is included in Appendix VII for reference.

5. Collection System Asset Management

The County entered into an agreement with Hazen and Sawyer, P.C. on February 14, 2012 for the development of a comprehensive Collection System Asset Management Program (Program). The goal of the Program is to develop and provide tools, technologies, and procedures that will empower and enable the County to better manage the sanitary sewer collection system. The developed Program will establish a comprehensive asset management system with processes and procedures to identify and prioritize future collection system capital and operating replacement and maintenance requirements. The Program is an extension and improvement to the current MOM. The Program's objectives are focused on achieving the MOM goals of continual refinement and continuous performance improvement.

The prior termination of the Turkey Creek, Warrior, Trussville and Prudes Creek systems also demonstrate that the County's systems and programs are adequate to demonstrate substantial compliance. Since their termination, the County has controlled overflows in these systems through the same system in place for the Leeds system, demonstrating that they are adequate for smaller and similarly sized/aged systems such as Leeds.