Department of Energy

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MAR 15 2006

PPPO-02-293-06

Mr. R. Bruce Scott, Director
Division of Waste Management
Kentucky Department for Environmental Protection
14 Reilly Road
Frankfort Office Park
Frankfort, Kentucky 40601

Mr. David Williams
United States Environmental Protection Agency
Region 4
DOE Remedial Section
Federal Facilities Branch
Waste Management Division
61 Forsythe Street
Atlanta, Georgia 30303

Dear Mr. Scott and Mr. Williams:

TRANSMITTAL – OPERATIONS AND MAINTENANCE PLAN FOR THE NORTHWEST STORMWATER CONTROL FACILITY AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/OR/07-2044&D1/R3)

Enclosed for your approval is the Operations and Maintenance Plan for the Northwest Stormwater Control Facility at the Paducah Gaseous Diffusion Plant. The document, along with the Comment Response Summary, incorporates and responds to comments from the Commonwealth of Kentucky that clarify the operations and maintenance activities associated with the C-613 Stormwater Control Facility at Paducah.

If you have any questions or require additional information, please call Greg Bazzell at (270) 441-6808.

I-01716-0191

Sincerely,

for Gregory A. Bazzell
William E. Murphie
Manager
Portsmouth/Paducah Project Office

Enclosures

REVIEWED FOR CLASSIFICATION
JUL 17 06
Initials Date
UNCLASSIFIED

PAD-RAAS/KD-06-027
CR—16199.20060317.002

March 17, 2006

Ms. April Ladd
Subcontract Technical Representative
Bechtel Jacobs Company LLC
761 Veterans Avenue
Kevil, KY 42053

Subject: Subcontract LOE Submittal—*Operation and Maintenance Plan for the Northwest Storm Water Control Facility at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/OR/07-2044&D1/R3, Secondary Document

Contract: Remedial Action Assessment Subcontract, Paducah, KY, WR-144, Line 1A
Bechtel Jacobs Company LLC Subcontract No. 23900-BA-RM086F

Dear Ms. Ladd:

Please find enclosed your project copy of the subject document. Per direction from Chris Marshall, SAIC has made a full D1 document distribution. The document received the appropriate ADC/TIO reviews.

If you have any questions regarding this submittal, please contact me at 462-4552 or Ken Davis at 462-4553.

Sincerely,
SCIENCE APPLICATIONS INTERNATION CORPORATION

Bruce M. Ford
SAIC RAAS Team
Program Manager

BMF:KD:jj

Enclosure

c:

Bechtel Jacobs Company
Chris Marshall

SAIC
CRF, w/enc
Kenneth R. Davis
Bruce M. Ford
Brenda Young
Project File, w/enc (DO 147)

BECHTEL JACOBS
Bechtel Jacobs Company LLC

DOE Contract No. DE-AC05-03OR22980
Job No. 23900
LTR-PAD/EP-AC-06-0010
March 7, 2006

Mr. William E. Murphie, Manager
Portsmouth/Paducah Project Office
U.S. Department of Energy
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513

Dear Mr. Murphie:

DE-AC05-03OR22980: Transmittal – ***Operations and Maintenance Plan for the Northwest Stormwater Control Facility at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*** **(DOE/OR/07-2044&D1/R3)**

Enclosed are the subject document and a suggested-text letter for transmitting the document to the Commonwealth of Kentucky (Commonwealth) and the United States Environmental Protection Agency (EPA) for review. This secondary document, along with the Comment Response Summary (CRS), incorporates and responds to comments from the Commonwealth that clarify the operations and maintenance activities associated with the C-613 Stormwater Control Facility at Paducah.

Distribution of this document will be performed by Science Applications International Corporation, in accordance with the *Bechtel Jacobs Company LLC Standard Distribution List* (8/15/2005). As a secondary document, it will not require certification. Please contact Chris Marshall of my staff at (270) 441-5083 once the transmittal letter has been processed and signed, or if you require additional information.

Sincerely,

James R. Kannard
Paducah Manager of Projects

JRK:CJM:amc

Enclosures: 1. Subject document
2. Suggested-text letter
3. CSR

c/enc: D. W. Dollins
File-EMEF DMC PAD-RC

c: R. A. Ausbrooks
G. A. Bazzell, PPPO/PAD
W. D. Biloski
R. H. Blumenfeld, PPPO/LEX
M. S. Dunham, PRS
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L. W. Hurst
C. S. Jones
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C. J. Marshall
J. W. Morgan
R. D. Nalley
M. E. Redfield
P. W. Willison

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Comment Response Summary

for the

Operation and Maintenance Plan
for the Northwest Storm Water Control Facility
at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky
(DOE/OR/2044&D1/R2)

Prepared for
U.S. Department of Energy
Office of Environmental Management

Comment Response Summary
For the
Operation and Maintenance Plan
for the Northwest Storm Water Control Facility
at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky
(DOE/OR/2004& D1/R2 issued December 2005)

Comment Number	Sect. Page/Para.	Reviewer and Comment	Response
1.	General Comment #1	Environmental and Public Protection Cabinet-KDEP: "Please replace BJC contractor references with the current contractor."	Agree. In the lone reference, Section 7, the text has been revised as follows (strikethrough indicates deleted text, underline indicates added text): "All work, under normal and alternate operating conditions (see Sects. 3 and 6), is governed by the ~~BJC~~ DOE contractor-approved health and safety plans…."
2.	General Comment #2	KDEP: "Please insure that all equipment manuals, maintenance and inspection procedures, analytical data, calibration logs, appropriate employee training certificates, Health and Safety Plans/Permits and relevant work instructions are present and kept in the Chemical Process Room."	Agree. The following text has been added as the third sentence of Section 9: "In addition, copies of all equipment manuals, maintenance and inspection procedures, analytical data, calibration logs, appropriate employee training certificates, Health and Safety Plans/Permits, and relevant work instructions will be kept in the C-613 Basin Chemical Process Room."

Comment Response Summary For the *Operation and Maintenance Plan* *for the Northwest Storm Water Control Facility* *at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/OR/2004& D1/R2 issued December 2005)			
Comment Number	**Sect. Page/Para.**	**Reviewer and Comment**	**Response**
3.	Specific Comment # 1, Section 2.1 – **Technical Specifications**, Page 1	KDEP: "Please add the approximate gallons per minute capacity of the discharge pump(s) and the approximate total volume of the basin (gallons) into the technical specifications section."	Agree. The seventh bullet of Section 2.1 now reads: "The discharge pump operation (one pump in operation) has the capacity to remove the 10-year, 24-hr runoff volume (14 acre-ft or 4,560,000 gal) from the Facility within four days after completion of treatment. (Each of the two facility pumps is rated to discharge up to 1,000 gallons per minute.) Treatment for pH or TSS of the basin water requires a minimum of one day. In the event of inclement weather conditions, removal time could be cut by approximately 50% with the use of both pumps. The following text was added to the end of the first bullet of Section 2.1: "The volume of the basin at the design maximum water level (360 ft above mean sea level) is approximately 3,750,000 gallons. At the elevation of the facility spillway (365 ft above mean sea level), the basin capacity is approximately 4,500,000 gallons."

Comment Response Summary For the *Operation and Maintenance Plan* *for the Northwest Storm Water Control Facility* *at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/OR/2004& D1/R2 issued December 2005)			
Comment Number	**Sect. Page/Para.**	**Reviewer and Comment**	**Response**
4.	Specific Comment #2, Section 5.3 – **Required Quality Assurance/ Quality Control**, Page 5	KDEP: "*The model will be updated four times annually with the results of the quarterly laboratory sample discussed in Section 5.2.* Please include this information/graph in the O&M Basin Facility section of the Semiannual FFA Progress Report."	Agree. The last sentence of Section 5.3 now reads: "This information will be included in the O&M Basin Facility section of the Semiannual FFA Progress Report."
5.	Specific Comment #3, Figure A.4 – **Relationship of NTU to TSS in samples collected form the C-613 Basin,** Page A-5	KDEP: "In the legend, please define the terms TSS and NTU and include the quarterly TSS sample collection date."	Agree. The terms are defined on the figure. The figure title now reads: "Relationship of NTU to TSS in samples collected from the C-613 Basin (March through May 2003)."

DOE/OR/07-2044&D1/R3
Secondary Document

Operation and Maintenance Plan for the Northwest Storm Water Control Facility at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

March 2006

CLEARED FOR PUBLIC RELEASE

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SCIENCE APPLICATIONS INTERNATIONAL CORPORATION

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

DOE/OR/07-2044&D1/R3
Secondary Document

Operation and Maintenance Plan for the Northwest Storm Water Control Facility at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

March 2006

Prepared for the
U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

by Bechtel Jacobs Company LLC
managing the

Environmental Management Activities at the
Paducah Gaseous Diffusion Plant
Paducah, Kentucky 42001

for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-98OR22700

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CONTENTS

ACRONYMS

DOE	U.S. Department of Energy
EMEF-DMC	Environmental Management and Enrichment Facility Document Management Center
FFA	*Federal Facility Agreement*
gpm	gallons per minute
HDPE	high-density polyethylene
HVAC	heating, ventilation, and air conditioning
KPDES	Kentucky Pollutant Discharge Elimination System
kWh	kilowatt-hour
NTU	nephelometric turbidity unit
O&M	operation and maintenance
PDCC	Project Document Control Center
PGDP	Paducah Gaseous Diffusion Plant
pH	negative logarithm of the hydrogen-ion concentration
PPE	personal protective equipment
SU	standard unit
TSS	total suspended solids

EXECUTIVE SUMMARY

The U.S. Department of Energy (DOE) is conducting a removal action at the Paducah Gaseous Diffusion Plant (PGDP) to safely remove and dispose of 39,000 tons of contaminated scrap metal and miscellaneous material contained in scrapyards located in the northwestern portion of the fenced area of the PGDP. The infrastructure of this project includes a Storm Water Control Facility to limit the migration of sediments from the work site. DOE is submitting this Operation and Maintenance (O&M) Plan for the O&M of the Northwest Storm Water Control Facility. This plan follows the outline for O&M Plans found in Appendix D of the *Federal Facility Agreement*.

Operation of the Northwest Storm Water Control Facility will consist of passive collection of runoff from a 61-acre watershed in which the work site is located. The level of total suspended solids (TSS) will be reduced through passive gravity-settling in the basin constructed as part of the facility. The impounded water then will be tested to ensure that discharges to Ditch 001 will not cause the effluent at Kentucky Pollutant Discharge Elimination System 001 to exceed 30 mg/L (monthly average or 60 mg/L peak) TSS or cause the pH to fall below 6 or to rise above 9 standard units. If the water is not within the targeted discharge range, the water will be treated through the application of polymers to induce flocculation and the introduction of acids and bases to adjust pH and TSS.

Maintenance of the Northwest Storm Water Control Facility will consist of routine inspections of the equipment and materials that make up the system. Faulty or worn materials and equipment will be replaced or repaired to avoid or minimize disruption of normal operations.

The focus of both operation and maintenance is to achieve the discharge objectives discussed above in a safe and efficient manner.

1. INTRODUCTION

Between 1974 and 1983, contaminated equipment was removed from the process buildings at the Paducah Gaseous Diffusion Plant (PGDP) as a part of numerous uranium enrichment process upgrade programs. Much of the scrap material from this program is contained in the Scrap Metal Yards located in the northwestern corner of the fenced area of the PGDP. The U.S. Department of Energy (DOE) is conducting a Comprehensive Environmental Response, Compensation, and Liability Act removal action to safely remove and dispose of the scrap material. The infrastructure of this project includes a Storm Water Control Facility (Facility) to limit the migration of sediments from the work site (see Fig. A.1). DOE is submitting this Operation and Maintenance (O&M) Plan for the O&M of the Facility. This plan follows the outline for O&M Plans found in Appendix D of the *Federal Facility Agreement* (FFA). This document presents the plan for operating and maintaining the Facility. This document is not intended to be utilized as a procedure, operator's manual, or work instruction.

2. EQUIPMENT START-UP AND OPERATOR TRAINING

2.1 TECHNICAL SPECIFICATIONS

The Facility design consists of three components: storm water collection and conveyance, gravity-settling basin, and enhanced settling by chemical treatment. A sketch of the Facility is shown in Fig A.2. According to specifications presented in the engineering evaluation/cost analysis (DOE 2001), the Facility is designed with the following criteria.

1. The Facility is designed to detain the estimated runoff volume from the Scrap Metal Yards for a 10-year, 24-hour (hr) precipitation event of 5 inches. Extra volume is included to enhance Facility operation and efficiency. The volume of the basin at the design maximum water level (360 ft above mean sea level) is approximately 3,750,000 gallons. At the elevation of the facility spillway (365 ft above mean sea level), the basin capacity is approximately 4,500,000 gallons.
2. The Facility is lined to minimize seepage. A double liner system consists of a 60-mil high-density polyethylene (HDPE) primary liner and a 3-ft thick secondary liner of compacted earthen soil.
3. Major components are designed for a 30-year life.
4. Hydraulic components (i.e., ditches, culverts, and emergency spillway) are designed to route the peak flow from a 25-year, 24-hr precipitation event. Ditch 001 receives emergency discharge, and the lower end has been upgraded and protected with riprap.
5. The Facility is designed to enhance solids settling. Collected storm water is routed to the rear of the Facility for energy dissipation and entry to the pond. A perforated baffle is placed within the Facility near the entrance to create even horizontal flow and further dissipate energy. Facility discharge will take place by pumping from the top of the water surface opposite the entrance.
6. Components for total suspended solids (TSS) treatment and pH adjustment are included in the design. TSS target levels are 60-mg/L maximum and a 30-day average of 30 mg/L, and pH discharge target levels are 6 to 9 standard units (SUs).
7. The discharge pump operation (one pump in operation) has the capacity to remove the 10-year, 24-hr runoff volume (14 acre-ft or 4,560,000 gal) from the Facility within four days after completion of treatment. (Each of the two facility pumps is rated to discharge up to 1,000 gallons per minute.) Treatment for pH or TSS of the basin water requires a minimum of one day. In the event of

inclement weather conditions, removal time could be cut by approximately 50% with the use of both pumps.

2.2 SERVICE REQUIREMENTS

To assure proper operation, inspection, and maintenance of the Facility will be required. At start-up, a general inspection will be conducted of all pumps, buildings and structures, and related equipment. An example inspection and maintenance checklist is included in Appendix A (Fig. A.3). The exact form to be used and the frequency of the inspection will be included in a work instruction for the Facility. An inspection form similar to the one shown in Appendix A will be completed and filed in the Paducah Project Document Control Center (PDCC) and the Environmental Management Enrichment Facility Document Management Center (EMEF-DMC).

2.3 TRAINING SCHEDULE

The technicians in charge of conducting the inspections and maintaining the Facility will read the applicable work instruction in its entirety, receive training on the work instruction by the Facility owner or designee, and accompany the Facility owner or designee on a facility walkdown of the work instruction. A training matrix will be developed and maintained for Facility technicians.

3. DESCRIPTION OF NORMAL O&M

3.1 TASKS REQUIRED FOR SYSTEM OPERATION

In general, the Facility will operate in one of two modes: direct discharge or discharge after treatment.

3.1.1 Direct Discharge

Normal operation of the Facility consists of removing water from the Facility using one or both of the water-transfer pumps. The transfer pumps will extract the water from the Facility via skimmers to ensure bottom sediments are not disturbed by the suction of the pumps. The water initially will be recirculated to the Facility inlet, while turbidity (used as an indicator of TSS, see Sect. 5.3) and pH values are measured. These measurements are made using meters mounted on and within the transfer pump flowline (in-line meters). Once it has been determined that TSS and pH values are acceptable for discharge, water from the transfer pumps will be diverted to the manhole at the southeast corner of the Facility enclosure, which leads to Ditch 001. Under normal operating conditions, water discharge into the Ditch 001 shall not be initiated without first verifying that the discharge will not cause TSS values at Kentucky Pollutant Discharge Elimination System (KPDES) 001 to rise above of 30 mg/L (monthly average) or 60mg/L (peak), or pH values to fall below 6 or rise above 9. Once discharge is initiated, pH levels and turbidity shall be monitored to ensure that pH and turbidity levels remain stable. If a sustained significant increase in turbidity levels or pH fluctuations is observed in discharge stream, direct discharge operations shall cease.

3.1.2 Discharge after Treatment

3.1.2.1 Polymer Treatment System Operation

If it is determined that TSS values of the basin's water are elevated above a level that will cause TSS values at KPDES 001 to rise above of 30 mg/L (monthly average) or 60mg/L (peak), then the TSS level must be reduced using the Polymer Treatment System. The Polymer Treatment System withdraws water from the basin through one of two Water Treatment Pumps. The Water Treatment Pumps will extract the water from the basin via a flexible tube whose inlet will be located at a position deep enough to establish circulation in the basin, yet shallow enough to avoid sucking sediment into the treatment loop. A polymer flocculent will be withdrawn from an injection system into the treatment loop. The entrained flocculent then will be introduced into the basin via spray nozzles mounted at the basin's edge. A preliminary test may be conducted to determine the most effective treatment for the water by using a jar testing system and various cationic polymers and doses. In order for coagulation and flocculation to occur, it may be necessary to correct the pH of the basin water before treatment with the appropriate polymer system.

3.1.2.2 pH Treatment System Operation

If it is determined that pH values of the basin discharge can cause the pH at KPDES 001 to rise above 9 or fall below 6, then the pH must be adjusted using the pH Treatment System. The pH Treatment System is a side-stream of the transfer pump flowlines. The water flowing through the transfer pump flowlines can be diverted into a piping loop routed through the process compartment of the building. Within this loop, there is an eductor. If the pH of the water is out of the targeted discharge range, carbon dioxide can be introduced via the eductor and the treated water can be recirculated until the desired pH parameters are met. Circulating water reenters the basin through an 8-inch polyvinyl chloride pipe at the basin inlet. In addition to adjusting pH to meet discharge parameters, pH adjustment may be necessary to optimize polymer performance.

3.2 TASKS REQUIRED FOR SYSTEM MAINTENANCE

A general inspection of all equipment, pumps, buildings, and structures will be performed prior to initial and subsequent system operation and on a routine basis during nonoperating periods per the inspection checklist included as Fig. A.3. Any material or equipment that jeopardizes system performance or worker safety will be replaced, modified, or repaired as needed. Debris that impairs system operation will be removed from culvert screens, baffle wall, and skimmers. All removed debris will be characterized for disposal in the C-746-U Landfill.

3.3 PRESCRIBED TREATMENT AND OPERATING CONDITIONS

Basin water discharged to Ditch 001 shall not cause the effluent at KPDES 001 to have a pH below 6 or above 9. Nor shall the discharge cause the effluent at KPDES 001 to have a TSS load greater than 30 mg/L (monthly average) or 60mg/L (peak). While these conditions are met, operation of the Facility occurs in the normal operational mode described in Sect. 3.1.1. Should these conditions not be met, chemical treatment of the water is conducted prior to discharge as described in Sect. 3.1.2.

3.4 FREQUENCY OF O&M TASKS

The Facility operates continually receiving runoff from the watershed and allowing for gravity-settling. Frequency of discharge operations will vary depending on water elevation, sediment elevation, and meteorological conditions. The following questions will be considered prior to commencing discharge.

- Is the water elevation sufficiently greater than sediment elevation to prevent sediment disturbance if pumping is initiated?
- Is the emergency spillway elevation sufficiently greater than water elevation to prevent emergency discharge as a result of heavy rainfall?
- Has sufficient time lapsed since the last runoff event to take full advantage of gravity-settling?
- Are the TSS and pH values of the basin water at or near the target discharge levels?
- What is the weather forecast?

Inspection and maintenance activities will be performed on a routine schedule. An example inspection and maintenance checklist is included in Appendix A (Fig. A.3). The exact form to be used and the specific frequency of the inspection will be included in a work instruction for the Facility and will be filed in the PDCC and the EMEF-DMC.

4. DESCRIPTION OF POTENTIAL OPERATING PROBLEMS

Stagnant water conditions during warm weather will be conducive to algae growth. Algae convert the carbon dioxide in basin waters to oxygen that then is released to the atmosphere. This natural process can raise the pH of the host water to levels as high as 11. Robust algae blooms may create pH problems that are correctable using the pre-discharge chemical treatment regimes described in Sects. 3.1.2 and 3.1.3. Information on controlling algae blooms is readily available in industry literature. A likely corrective action will be to reduce the pH by adding carbon dioxide via the acid/base eductor.

Equipment or material failure could prevent normal discharge and/or pre-treatment operations from occurring. Owner/user manuals for the equipment and materials, if provided by the manufacturer, will be kept on file in the Facility office. These manuals may contain information pertinent to correcting problems. If material or equipment failure cannot be corrected, equipment will be repaired or replaced. Both the discharge system and the treatment system are equipped with redundant pumps; if a pump fails, the system will operate on one pump until the broken pump is replaced or repaired. Other materials and equipment that make up the Facility are readily available from local suppliers, thus minimizing the potential for significant downtime as a result of waiting on replacement parts.

Turbidity (used as a measure of TSS, see Sect. 5.3) and pH meter failure could prevent in-line monitoring of these parameters. If the in-line pH or turbidity meters should fail, measurements will be taken on grab samples until the broken meter is replaced or repaired.

The polymer loop Facility inlet, if not properly positioned, could render the treatment system ineffective. If the inlet is positioned too close to the sediments, it may entrain the sediments into the treatment piping. These sediments would prematurely clog the basket strainer and/or the spray heads. Conversely, if the inlet is positioned too close to the upper surface of the water, the system may fail to set up an effective circulation of polymer within the basin. The system operator will adjust the elevation of the inlet, based on sediment and water elevations, before starting the treatment pumps; additional adjustments may be necessary during the treatment period.

An electrical outage during freezing weather would render the installed heat tracing ineffective, thus leaving the pumps and associated piping vulnerable to freeze damage. Under these circumstances, all standing water in pumps and exposed piping should be drained. Additionally, if the surface water of the basin freezes, the skimmers associated with the discharge pumps will be rendered inoperable. Under these circumstances, discharge and treatment operations will cease until the ice in the basin thaws.

Dramatic rainfall events after long dry periods may result in the resuspension of sediment from the bottom of the basin. Retreatment of the water may be necessary in these situations.

5. DESCRIPTION OF ROUTINE MONITORING AND LABORATORY TESTING

5.1 MONITORING TASKS

TSS and pH associated with water retained in the basin will be monitored to optimize the timing of discharge and treatment system operations. Water elevation and volume in the basin will be tracked to protect against basin overflow and to optimize treatment regimen. The pH and TSS levels of the system's effluent will be monitored to prevent discharge of water with unacceptable pH or TSS levels to Outfall 001.

5.2 REQUIRED LABORATORY TESTS AND THEIR INTERPRETATION

The objectives of this Facility are to discharge water within specified pH and TSS parameters. Both parameters will be monitored using field instrumentation prior to releasing water to Ditch 001. Field instrumentation will be calibrated against laboratory results. Once per quarter, a sample will be collected to confirm that field observation of pH and turbidity (used as a measure of TSS) values are appropriate indicators that discharge parameters are being met.

5.3 REQUIRED QUALITY ASSURANCE/QUALITY CONTROL

The C-613 Basin was designed and constructed to reduce the level of suspended solids in the storm water runoff from the scrapyards and to control the pH of discharge from the basin; therefore, the instrumentation used to monitor these parameters is subject to quality control activities. Because the measure of suspended solids typically is a laboratory analysis, turbidity (which can be readily measured by a field probe) is used as a measure of suspended solids. The reliability of turbidity as an indicator of suspended solids is well documented.

The pH and turbidity meters were calibrated to standard solutions after they were installed. The turbidity meter was calibrated using 40, 200, 800 nephelometric turbidity unit (NTU) standards and the manufacturer's operating manual. The pH meter was calibrated using standard buffer solutions of pH 4 and pH 7. Continuing quality assurance activities will consist of calibrating the turbidity and pH meters with factory standards (pH 4 and pH 7 buffer solutions for the pH meter and 40, 200, 800 NTU standards for the turbidity meter) on a quarterly basis.

The relationship of turbidity to total suspended solids in the runoff from the scrapyards was determined from laboratory analysis of TSS and suspended solids obtained from seven samples collected at the basin. All but one of the five samples collected on March 19, 2003, (from various locations within the basin and recirculation system) and 1 sample each collected on May 7 and May 12, 2003, (from within the recirculation system) represented normal basin conditions under stable weather. The 5th sample collected on March 19, 2003, is a fabricated turbidity sample, generated by mixing bottom sediment with the water sample, to aid in correlation of TSS and NTU values. The TSS and NTU values of each sample were plotted on a graph (see Fig. A.4). The graph shows a linear regression line through seven data points where $R^2 = 0.9362$ and the regression equation $TSS = 1.282605 + 0.862264 \times NTU$. The high R^2 means the linear model accounts for 93.62% of the variation in TSS. The model predicts the 30 mg/L of TSS will occur at 33.3 NTU. The model will be updated four times annually with the results of the quarterly laboratory sample discussed in Sect. 5.2. This information will be included in the O&M Basin Facility section of the Semiannual FFA Progress Report.

5.4 MONITORING FREQUENCY

Water retained in the basin will be monitored for TSS (as turbidity) and pH to optimize discharge and treatment system operations. The pH and turbidity levels of system effluent shall be determined prior to discharge to Ditch 001.

6. DESCRIPTION OF ALTERNATE O&M

6.1 ALTERNATE PROCEDURES

In order to prevent undue hazards if the basin's normal discharge system undergoes a long-term failure, the basin is designed with an emergency spillway designed to pass the peak flow from a 25-year, 24-hr precipitation event.

6.2 ANALYSIS OF VUNERABILITY

Should the basin's normal discharge system undergo long-term failure, the additional runoff retention time caused by the basin would continue to reduce TSS.

7. SAFETY PLAN

Safety and Health Work Permits or Activity Hazard Assessments will be issued to personnel who operate and perform maintenance for the basin. These permits describe the requirements to wear appropriate personal protective equipment (PPE) such as steel-toed boots, eye and hearing protection, and company-issued clothing. Equipment is inspected prior to use, and sites are walked-down prior to work to assess for any potential hazards that might impact the operation and maintenance. All O&M activities are conducted under the Integrated Safety Management System. All work, under normal and alternate operating conditions (see Sects. 3 and 6), is governed by the DOE contractor-approved health and safety plans, procedures, and activity hazard assessments. Although this O&M plan addresses equipment and operations associated with the introduction of chemicals to adjust TSS or pH of basin water, the actual introduction and use of these chemicals will be authorized only after associated facility Safety Basis documents are updated to account for their presence and usage.

8. DESCRIPTION OF EQUIPMENT

8.1 EQUIPMENT IDENTIFICATION

The Facility consists of three major components: storm-water collection and conveyance, gravity-settling basin, and enhanced settling by chemical treatment.

8.1.1 Collection Basin

The Collection Basin consists of entrance structures, and settling zone. Entrance structures include a basin entrance channel; three ripples or bumps; an inlet trough; 12, 18-inch corrugated metal pipes; and a perforated baffle. In combination, these structures serve to dissipate energy and distribute flow uniformly over the entire cross-section of the settling zone. The settling zone is constructed with a primary liner of textured, 60-mil, HDPE underlain with a 3-ft thick low-permeable earthen secondary liner. A heavy nonwoven, geotextile fabric is installed between the secondary liner and primary liner. The slopes in the southern area of the basin are double lined in areas near the intake components of the transfer pumps.

8.1.2 Recirculation/Discharge System

The recirculation/discharge system provides the option of recirculating the water from the discharge end of the basin to the inlet or discharging to Ditch 001. The major components of the system are two pumps (approximately 1000 gallons per minute [gpm] each, housed in weather resistant buildings); two floating intake point (skimmers); skimmer anchors and tethers; piping to two separate discharge points (basin inlet and Ditch 001); in-line flow, TSS, and pH meters; discharge manhole leading to Ditch 001.

8.1.3 Supplemental Treatment System

There are two supplementary treatment systems (loops) to enhance settling (the polymer loop and the pH adjustment loop). Schematic descriptions of the treatment processes are presented in the process flow diagram (Fig A.5).

The polymer loop consists of two pumps (approximately 150 gpm each), flexible intake tubing, a polymer injection port; in-line flow meter and pressure gauge; basket strainer; piping to two sprinkler heads, two sprinkler heads, and piping to basin inlet.

The pH adjustment loop consists of acid/base liquid eductor mounted in the recirculation/discharge system.

8.1.4 Building

The prefabricated building is divided into three compartments: (1) office compartment, (2) storage compartment, and (3) process compartment. The building is approximately 50 ft L x 12 ft W x 8 ft 8 inches H. The process, storage, and office compartments are approximately 25 x 12 ft, 10 x 12 ft, and 15 x 12 ft, respectively. The process compartment houses the polymer loop pumps and associated components, the acid/base eductor, and the TSS and pH meters on the recirculation/discharge system.

8.1.5 Security Fence

A security fence encircles the basin.

8.1.6 Electrical System

The electrical system consists of components for supplying electrical power to the discharge pumps; the treatment system pumps; heat tracing elements; lighting; and heating, ventilation, and air conditioning (HVAC) for the building and exterior lighting for select work areas.

8.2 INSTALLATION OF MONITORING COMPONENTS

In-line pH and turbidity (as a measure of TSS) probes, flow indicators, and pressure gauges are installed on the treatment loops of the recirculation/discharge system.

8.3 MAINTENANCE OF SITE EQUIPMENT

The building and structures, skimmers, sprinklers, and pumps will undergo documented inspections. Buildings and air conditioner filters will be cleaned to maintain a safe and productive work environment. Performance, impeller clearance, vibration and alignment of the pumps will be measured and documented. Lubricants will be replaced or replenished, as needed. Valves, bearings, and housings will be inspected. An inspection and maintenance form similar to the one shown in Appendix A (Fig. A.3) will be completed and placed on file in the PDCC and the EMEF-DMC. The exact form to be used and the frequency of maintenance activities will be included in the Facility work instructions.

8.4 REPLACEMENT SCHEDULE

Lubricants are scheduled for replacement annually. Additional suggested replacement schedule is found in Appendix A (Fig. A.3).

9. RECORDS AND REPORTING

Records for the Northwest Storm Water Control Facility include discharge and treatment operation logs and maintenance charts. Field and laboratory records for turbidity, pH, and TSS will be completed and filed with the PDCC and the EMEF-DMC for each O&M event. In addition, copies of all equipment manuals, maintenance and inspection procedures, analytical data, calibration logs, appropriate employee training certificates, Health and Safety Plans/Permits, and relevant work instructions will be kept in the C-613 Basin Chemical Process Room. Maintenance cost will be tracked and documented by a DOE contractor project controls specialist. Financial records are retained in the PDCC and the EMEF-DMC. All personnel who perform inspections, mowing, and routine monitoring activities are required to maintain a means of communication with the Plant Shift Superintendent, who has the capability to respond to emergency requests. Maintenance records will be on file in the PDCC and the EMEF-DMC; in addition, a copy of records will be kept in the trailer at the facility. All files produced digitally also will be kept in electronic format. Reporting on the O&M Basin Facility will occur in the Semiannual FFA Progress Report.

10. PROJECTED O&M COSTS

The normal annual O&M cost for the Facility is estimated at $65,653 (2002 dollars, unescalated). The major contributors and the cost and their associated value are listed below. Assumptions used in the estimate are found in Appendix B.

Labor	$60,750
Electricity	$ 1,960
Chemical Additives	$ 2,543
Laboratory	$ 400
Total Cost	$65,653

11. REFERENCES

DOE (U.S. Department of Energy) 2001. *Engineering Evaluation/Cost Analysis for Scrap Metal Disposition at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1880&D2/R1, U.S. Department of Energy, Paducah, KY, March.

DOE 2002. *Removal Action Work Plan for Paducah Scrap Metal Removal and Disposal at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-2013&D2, U.S. Department of Energy, Paducah, KY, April.

EPA (U.S. Environmental Protection Agency) 1998. *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant,* U.S. Environmental Protection Agency, Region 4, Atlanta, GA, February 13.

APPENDIX A

FIGURES

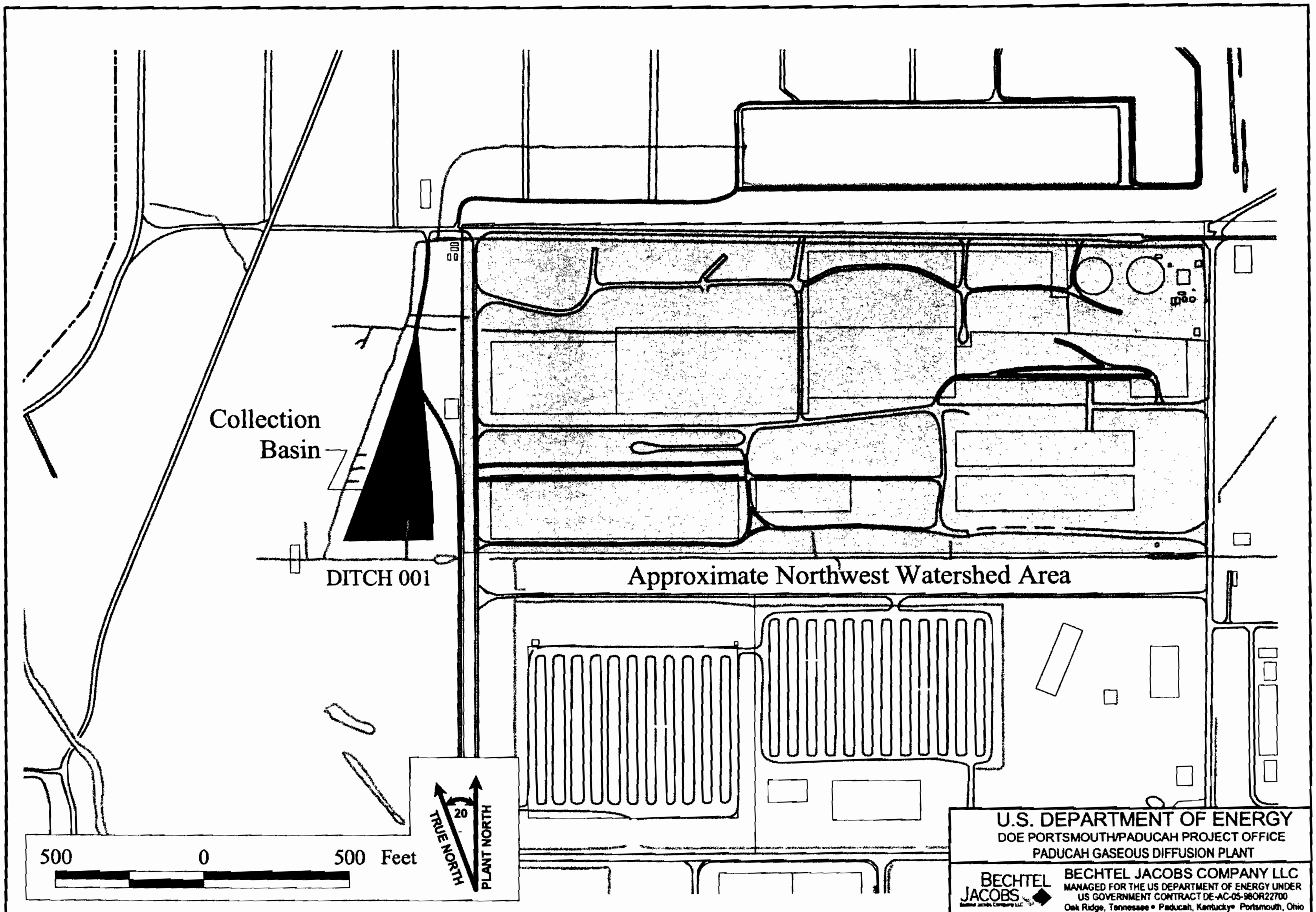

Fig. A.1. Location of the Northwest Storm Water Control Facility.

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Oak Ridge, Tennessee 37831

FIGURE No. c5ac90001sk557r1.apr
DATE 09-06-02

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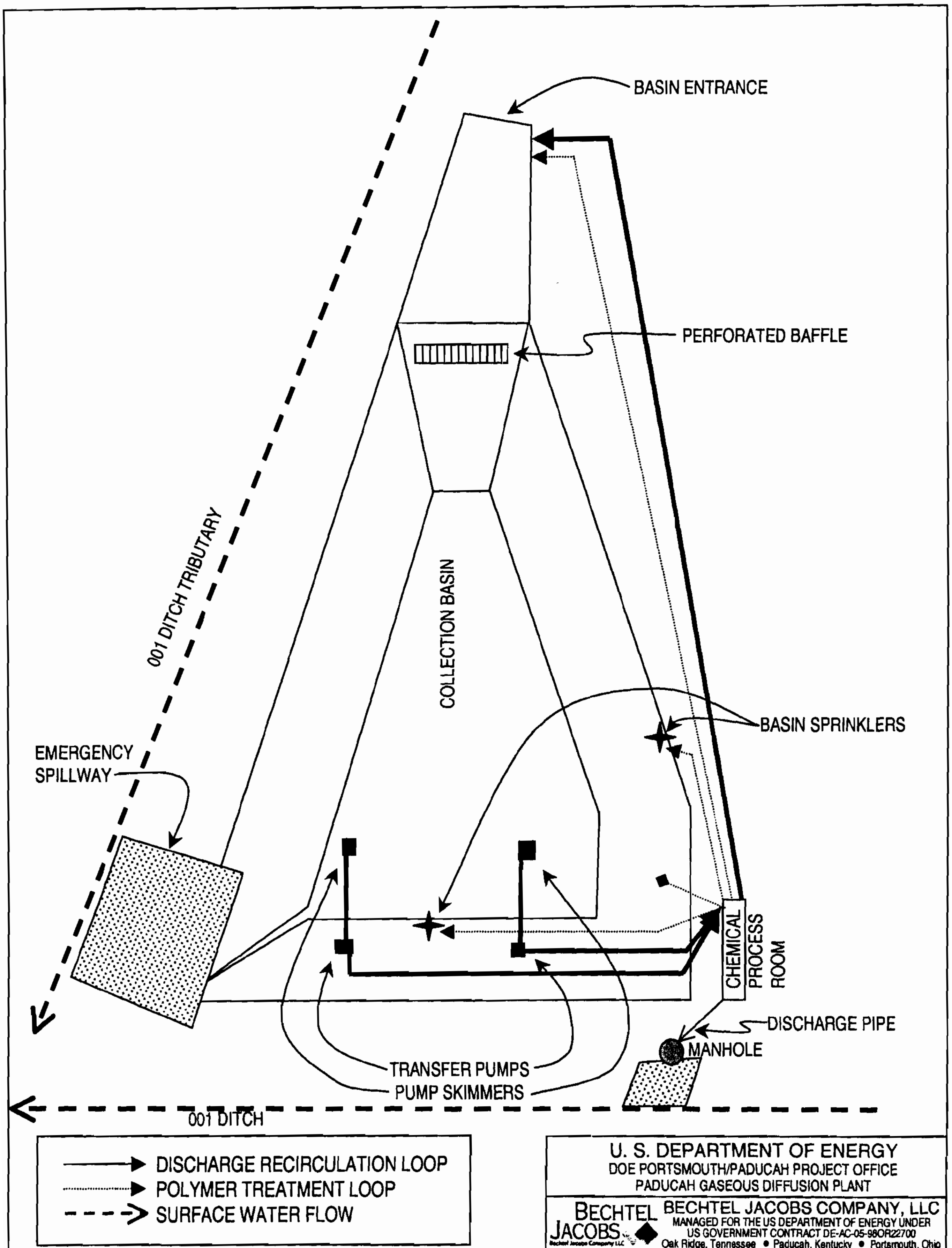

Fig. A.2. Northwest Storm Water Collection Basin and support facilities.

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FIGURE No. c5ac90001sk558r1.ppt
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NORTHWEST STORM WATER CONTROL FACILITY
INSPECTION AND MAINTENANCE CHECK-LIST

		START UP	MONTHLY	QUARTERLY	ANNUAL	OTHER
TRANSFER PUMPS	general condition (temp, noises, vibration, cracks, leaks, etc.)	GI				
	pump performance (gauges, speed, flow)			M/D		
	bearing lubricant			add	replace	
	seal lubricant			add	replace	
	air relief	GI			I/D	
	water level in housing	GI				
	vibration	GI			M/D	
	V-belts	GI			M/D	
	alignment				M/D	
	bearings				I/D	
	housing				I/D	
	check valve	GI			I/D	
	piping	GI			GI	
	motor lubricant					
	bearing temp	GI		M/D	M/D	
WATER TREATMENT PUMPS	general condition (temp, noises, vibration, cracks, leaks, etc.)	GI				
	pump performance (gauges, speed, flow)	GI		M/D		
	bearing lubricant			add	replace	
	seal lubricant			add	replace	
	air relief plunger rod	GI				
	check valve	GI			I/D	
	relief valve	GI			I/D	
	alignment				M/D	
	bearings				I/D	
	housing				I/D	
	piping	GI			GI	
	motor lubricant					
	bearing temp	GI		M/D	M/D	
	vibration	GI			M/D	
BUILDING AND STRUCTURE	general condition (dents, holes, damage, paint)	GI			I/D; clean	
	door locks	GI			I/D	
	leaks	GI			I/D	
	air conditioners				I/D; clean	
	thermostats	GI			I/D	
	chemical leaks	GI	I/D			
	lights	GI			I/D	
	heaters				I/D	
	fans	GI			I/D	
	strainers			clean out		
SKIM-MER	general condition	GI			I/D	
	anchor ropes	GI			I/D	
	flexible hose	GI			I/D	
	SPRINKLERS	GI			I/D	
BASIN	water elevation		M/D*			
	water pH and tubidity		M/D*			
	sediment elevation				M/D	

GI: general inspection
I/D: detailed and documented inspection
M/D: measure and document
(* indicates daily inspection during rainfall events)

U. S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

BECHTEL JACOBS
BECHTEL JACOBS COMPANY, LLC
MANAGED FOR THE US DEPARTMENT OF ENERGY UNDER US GOVERNMENT CONTRACT DE-AC-05-98OR22700
Oak Ridge, Tennessee • Paducah, Kentucky • Portsmouth, Ohio

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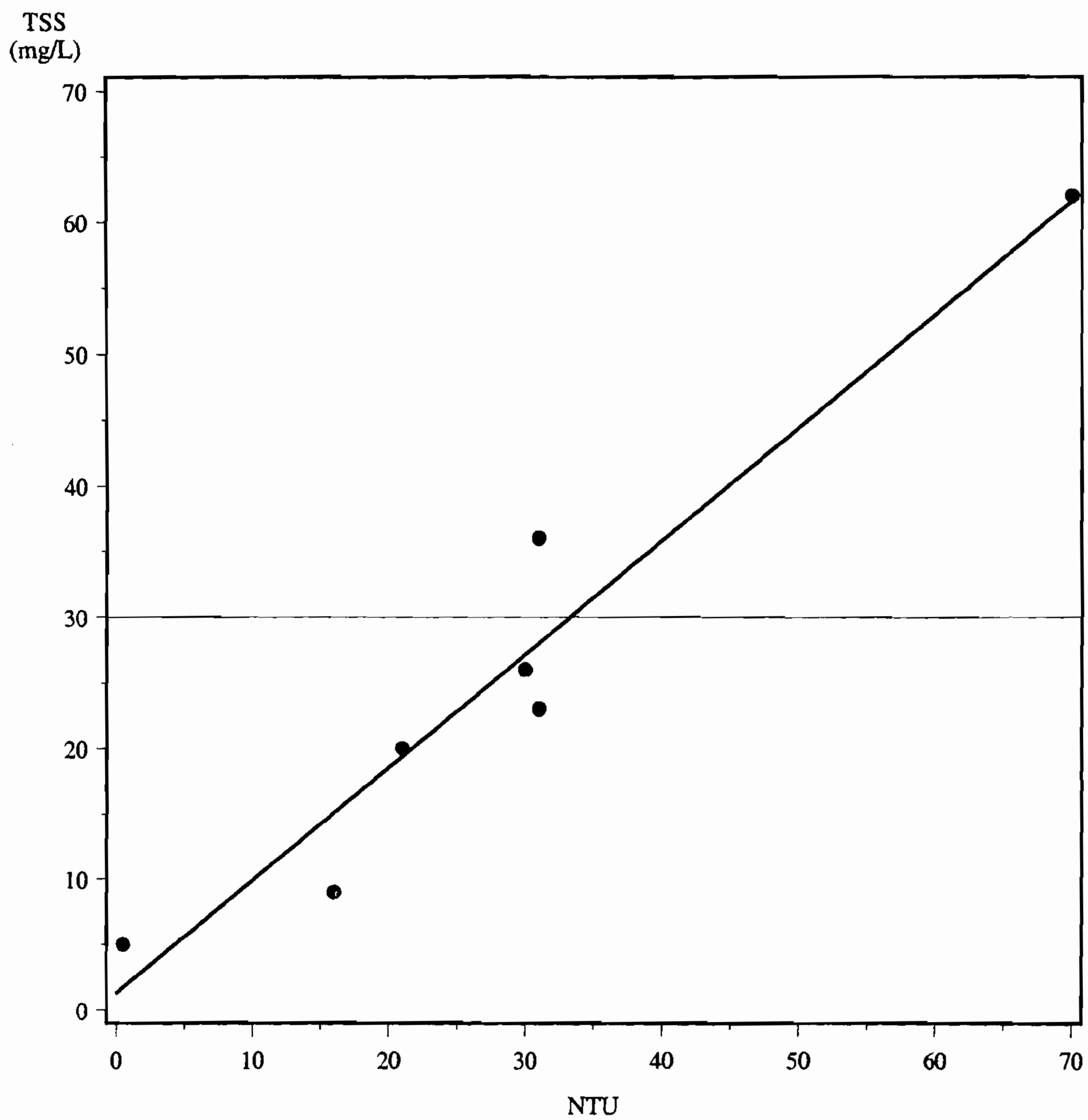
Fig. A.3. Inspection and maintenance schedule.

FIGURE No. c5ac90001sk565r1.doc
DATE 09-06-02



TSS = Total Suspended Solids
NTU = Nephelometric turbidity unit

Fig. A.4. Relationship of NTU to TSS in samples collected from the C-613 Basin (March through May 2003).

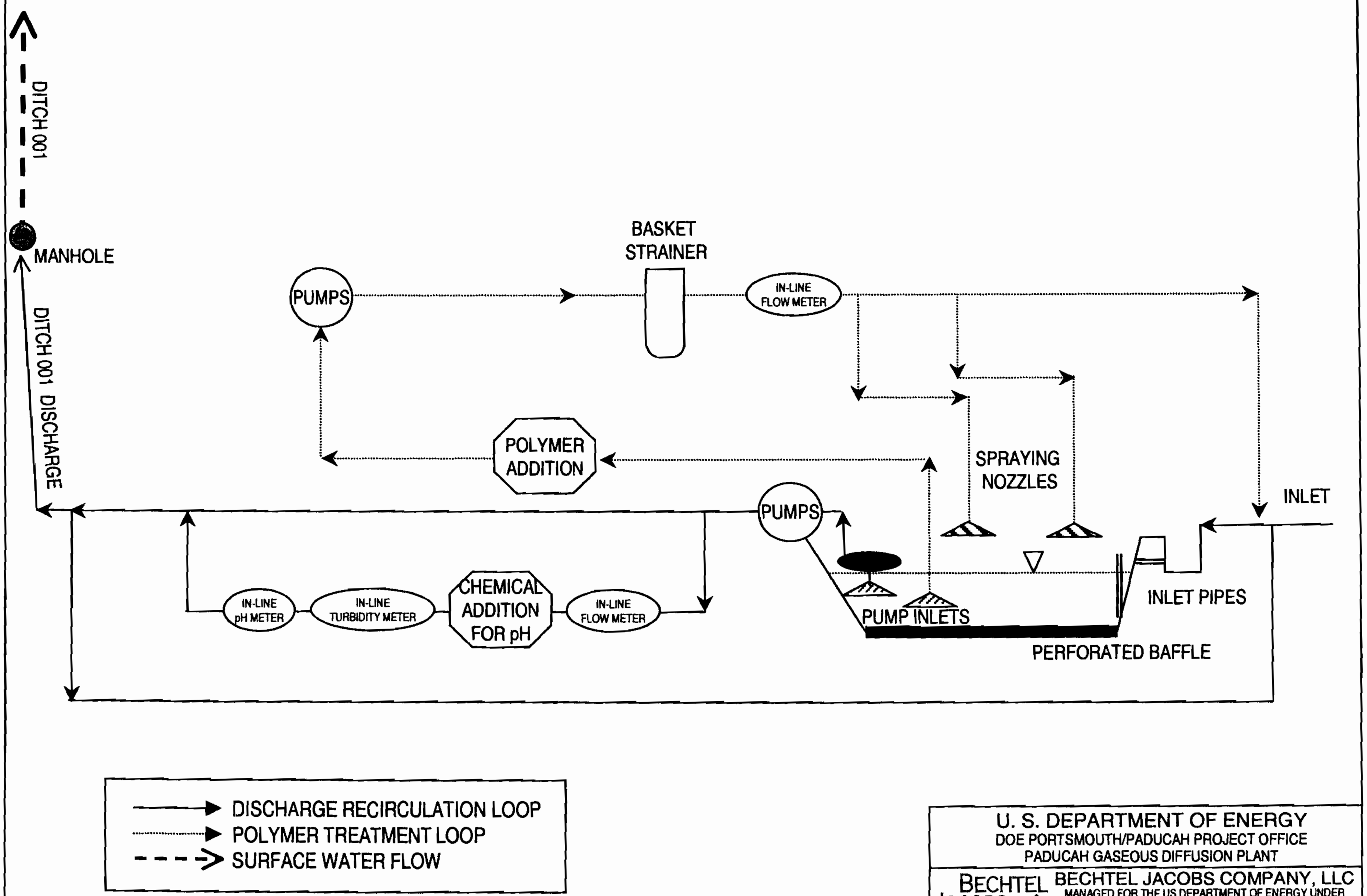


Fig. A.5. Northwest Storm Water Control Facility process diagram.

U. S. DEPARTMENT OF ENERGY
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PADUCAH GASEOUS DIFFUSION PLANT

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FIGURE No. c5ac90001sk558.ppt
DATE 08-29-02

APPENDIX B

COST ESTIMATE

Cost Estimate for Annual O&M on the Northwest Storm Water Control Facility

General assumptions:

- Total of 27,000,000 gal discharged per year.
- All cost unescalated (2002 dollars)

Discharge-only events:

- Twenty-four 1,000,000-gal discharge-only events
- Transfer pumps will operate 8 hrs each (16 hrs) during 24 discharge-only events (384 hrs)
  - 2 x 30 hp x .75 x 8 hrs = 360 kilowatt-hours (kWh) x $0.05/kWh = $18 x 24 = $432

Treatment-plus-discharge events:

- Two 3,000,000-gal treatment/discharge events per year
- Both treatment/discharge events will be require a 48-hr treatment period prior to discharge
- Transfer pumps will operate 48 hrs per event
  - 2 x 30 hp x .75 x 48 hrs = 2160 kWh x $0.05/kWh = $108 x 2 = $216
- Treatment pumps will operate 48 hrs per event
  - 2 x 15 hp x .75 x 48 hrs = 1080 kWh x $0.05/kWh = $54 x 2 = $108
- 3000 pounds of polymer ($11,500) for one event = $11,500 x 1 = $11,500.
- Polymer treatment will be required for one event
  - 3,000,000 treated with 34 mg/L of polymer =1160 pounds of polymer
  - polymer cost estimated at $1.45/pound
  - total polymer cost = $1,687.27
- CO_2 treatment will be required on one treatment/discharge event
  - 1501 lbs of CO_2 x .57/lb = $856
- Transfer pumps will operate 25 hrs each (25 hrs) during both discharging-after-treatment events
  - 2 x 30 hp x .75 x 25 hrs = 1125 kWh x $0.05/kWh = $56 x 2 = $112

Miscellaneous electric:

- 24,000 kWh per year at .05 kWh = $1,200

Labor:

- Operations time (pumping time) of 338 hrs plus 2 hrs of mob/prep per event (26)
  - 338 hrs + (2 x 26) = 390 total hrs of pump operations
  - Assume pumps will be staffed 25% of operating time
  - Assume staff includes 2 operators and 1 supervisor
  - 390 x .25 = 98; 98x3 = 294 total man hrs
- Nonoperating inspection and monitoring for technician
  - Includes monitoring water conditions, sampling and meter calibration, H&S and compliance inspections
  - Average 12 hrs per month = 144 hrs per year
- Maintenance
  - Includes routine (upkeep) and nonroutine maintenance (repair and replacement)
  - Assume 3 man crew for both routine and nonroutine
  - Assume for routine maintenance an average of 8 hrs per quarter for 3 calendar quarters and 24 hrs for the remaining quarter for a total of 48 hrs
  - Assume for nonroutine maintenance an average of 24 hrs annually
  - Total manhours = 216 (72 hrs x 3)
- Management, administrative, and support functions = 156 hrs.
- Total hrs = 810
- Professional charge-out rate = $75/hr
  - includes fringe and overhead
  - includes a mix of professional levels from operator to project manager
- Total labor cost = $60,750

Laboratory:

- Two pre-discharge grab samples per event = 14 samples
- One sample per quarter = 4 samples
- Total samples = 4
- TSS and pH run on all samples
- Expedited turn around
- Cost per sample = $100
- Total laboratory cost = $400

Cost Summary:

Electric:	$ 1,960
Additives:	$ 2,543 (Polymer - $1,687 and CO_2 - $856)
Labor:	$60,750
Laboratory:	$ 400
Total:	$65,653