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Operations and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

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January 21, 1998

Mr. Robert H. Daniell, Director
Division of Waste Management
Kentucky Department for Environmental Protection
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

Mr. Carl R. Froede Jr., P. G.
United States Environmental Protection Agency
Region IV
DOE Remedial Section
Federal Facilities Branch
Waste Management Division
61 Forsyth Street
Atlanta, Georgia 30303

Dear Mr. Daniell and Mr. Froede:

OPERATIONS AND MAINTENANCE PLAN FOR THE NORTHEAST PLUME INTERIM REMEDIAL ACTION AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/OR/07-1535&D3)

Enclosed for your review and approval is the subject document. This document has been revised in order to update information in the sampling and analysis plan (section 4) based on an internal Data Quality Objective review that was held in late 1997. The same outline that was previously approved by your agencies was used in developing this revision.

Because operating conditions change as efficiencies and improvements are identified, this Operations and Maintenance (O&M) Plan will be issued as a controlled document. This will allow the Department of Energy to keep the Environmental Protection Agency and the Kentucky Department for Environmental Protection informed of operational changes as they occur in a timely manner. As in the past, all changes will be submitted to you for approval prior to implementation or inclusion to the O&M Plan.

If you have any questions or require additional information, please call David W. Dollins at (502) 441-6819.

Sincerely,

Jimmie C. Hodges, Site Manager
Paducah Site Office

Enclosure

cc w/enclosure:
J. Stickney, UKFFOU/Frankfort
T. Taylor, UKFFOU/Frankfort
R. Thomas, UKFFOU/Frankfort

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Revision 0

Operations and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—January 1998

Prepared for the
DOE Funding Office EM40
Budget Activity Code EU20
for
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

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ASSIGNMENT PAGE

Operations and Maintenance Plan
for the
Northeast Plume Containment System
Interim Remedial Action at the
Paducah Gaseous Diffusion Plant
Paducah, Kentucky
(DOE/OR/07-1535&D3)

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ACRONYMS

ACO	Administrative Consent Order
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	Department of Energy
DQO	data quality objective
EMEF	Environmental Management and Enrichment Facilities
EPA	Environmental Protection Agency
EQ	equalization
EW	extraction well
gpm	gallons per minute
HDPE	high-density polyethylene
HSP	Health and Safety Plan
IRA	Interim Remedial Action
ITP	Integrated Test Plan
KDWM	Kentucky Division of Waste Management
KPDES	Kentucky Pollutant Discharge Elimination System
LMES	Lockheed Martin Energy Systems, Inc.
LMUS	Lockheed Martin Utility Services, Inc.
MW	monitoring well
MSDS	Material Safety Data Sheet
NE	Northeast
NEPCS	Northeast Plume Containment System
NWPGS	Northwest Plume Groundwater System
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PGDP	Paducah Gaseous Diffusion Plant
PLC	programmable logic controller
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCW	recirculating cooling water
RGA	regional gravel aquifer
ROD	Record of Decision
SSHO	Site Safety and Health Officer
TCE	trichloroethylene
TDS	total dissolved solids
^{99}Tc	technetium-99
TSS	total suspended solids
VOC	volatile organic compound

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EXECUTIVE SUMMARY

This Operations and Maintenance (O&M) Plan has been prepared to serve as a guide and reference for operation of the Northeast Plume Containment System (NEPCS) constructed as a first-phase interim remedial action (IRA) at the Northeast (NE) Plume at the Paducah Gaseous Diffusion Plant (PGDP). The first-phase IRA is consistent with the Department of Energy's (DOE) *Record of Decision for Interim Remedial Action at the Northeast Plume, Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, which was signed in June 1995.

The objective of this IRA is to retard the migration of the highest concentration volume of trichloroethylene (TCE) in the NE Plume and to meet the objectives stated in the Record of Decision (ROD).

In August 1988, volatile organic compounds (VOCs) and radionuclides were detected in private wells north of PGDP. In response, DOE and the Environmental Protection Agency (EPA) entered into an Administrative Consent Order (ACO) under Sections 104 and 106 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). DOE then implemented a PGDP Water Policy to reduce the current risk to potential human exposure (i.e., potentially effected residences and businesses). The CERCLA site investigations discovered TCE-contaminated groundwater within the regional gravel aquifer (RGA) northeast of the plant. This plume is referred to as the NE Plume. To conduct an investigation leading to a remedial action for the contaminated groundwater, DOE submitted, as required for a hazardous waste permit, an interim corrective measures work plan to EPA and the Commonwealth of Kentucky. Additional information detailing the activities that led to the construction of the NEPCS is outlined in the NE Plume ROD.

The NE Plume ROD initiated an IRA that included installation of the NEPCS. The NEPCS is a treatment system that consists of two extraction wells (EWs), an equalization (EQ) tank, a transfer pump, approximately 6000 feet of total pipeline (including 5500 feet of transfer piping), and utilization of an existing cooling tower (for air stripping) at PGDP. To evaluate the effectiveness of the remedial action, seven monitoring wells and three piezometers have been installed at various locations to supplement existing monitoring wells. The monitoring wells and piezometers serve as an integral part of the NEPCS and are used to evaluate the effectiveness of the system in meeting the IRA objectives.

This O&M Plan provides the NEPCS operators with background information; program organization; reporting requirements; O&M requirements and guidelines; training requirements; and PGDP emergency response guidelines. It also includes references to plans and procedures required to maintain and operate the treatment system to meet DOE, EPA, and Commonwealth of Kentucky policies and statutes.

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1. EQUIPMENT START-UP AND OPERATOR TRAINING

1.1 GENERAL NORTHEAST (NE) PLUME CONTAINMENT SYSTEM DESCRIPTION

The Northeast Plume Containment System (NEPCS) is designed to recover groundwater contaminated by trichloroethylene (TCE) from the NE Plume and deliver it to the Paducah Gaseous Diffusion Plant (PGDP) C-637-2A Cooling Tower.

The system consists of two extraction wells (EWs) each of which is equipped with a submersible pump, drop pipe, data logger, electrical service, and pitless well adaptor. After extraction, water is pumped through the pitless adaptor and transfer line to an underground equalization (EQ) tank. A transfer pump moves the groundwater from the EQ tank through approximately 5500 linear feet of transfer piping leading to the C-637-2A Cooling Tower. The transfer line is connected to the existing cooling tower piping and water is discharged into the top of the cooling tower. The water then flows through the cooling tower where the TCE is stripped. A process flow diagram and more detailed system information are contained in Section 7.

1.2 INITIAL NEPCS START-UP GUIDELINES

This section includes a summary of the guidelines used for starting up the NEPCS and conducting system checks during the Integrated Test Plan (ITP) and system shakedown. Before initiation of the ITP, the construction contractor completed required testing as outlined in the *Northeast Plume Interim Remedial Action Project Plan*, EPIC-FY95-016/R0 (LMES 1995), and its amendments.

1.2.1 Objectives

The overall objective of the ITP (which occurred January to February 1997) was to initiate system operation and conduct testing of system components, interlocks, and controls. Testing included collection and analysis of an initial round of samples from all sample points. The data are used to establish a system baseline for determining impacts to system operation, including impacts to the water chemistry of the C-637-2A Cooling Tower.

The objective of system shakedown (which occurred in February 1997) was to ensure that equipment and systems were operating as designed. The shakedown period allowed NEPCS personnel to become familiar with system operations and make necessary adjustments before continuous long-term operations and maintenance (O&M).

1.2.2 Integrated Test Plan (January to February 1997)

During the ITP, the NEPCS was operated using work instructions developed for system operations. These work instructions were written using information provided by the construction contractor and the manufacturer's equipment manuals. System start-up was managed by the NEPCS Operations Manager. The

ITP included the following activities:

- Instrument calibration (before startup).
- Extraction well pumps minimum flow test.
- Extraction well pumps maximum flow test.
- Extraction well pumps nominal flow test.
- Extraction well pumps constant rate flow test.
- Interlocks test.
- Orderly system shutdown.
- Emergency system shutdown.

After the successful completion of ITP activities, it was determined that the system met the following required testing conditions:

- NEPCS components were tested and met their specified performance criteria.
- Required operator training was completed.
- Analytical data from the first sampling round were within expected ranges.

Accordingly, continuous operations were initiated, supplemented by maintenance and operational data collection conducted by NEPCS operators.

1.2.3 Shakedown (February 1997)

After completion of the ITP, the system was operated eight hours/day for the shakedown period. No system or operational changes were needed. The shakedown period determined that the NEPCS was ready for continuous, long-term operation.

1.2.4 Normal O&M

Normal O&M has been initiated as described in Section 2. Operational changes will be made during the normal O&M period as necessary.

1.3 OPERATOR TRAINING

Personnel training activities regarding operational work instructions were completed and documented during the system start-up period. General training requirements regarding health and safety and PGDP requirements for work on-site are listed in the NEPCS Health and Safety Plan (HSP) (Appendix A). Training requirements are outlined in the NEPCS Reference Manual in the "NWPGS/NEPCS Training Matrix."

2. DESCRIPTION OF NORMAL O&M

2.1 O&M

This section provides operating guidelines and references for the NEPCS and support laboratory. Overviews are presented for conduct of operations (Section 2.2), treatment technology (Section 2.3), operating procedures (Section 2.4), operator checks (Section 2.5), system maintenance and calibration (Section 2.6), communication (Section 2.7), and waste management (Section 2.8). The organizational chart outlined in Figure 2.1 defines the relationship between the Department of Energy (DOE) and NEPCS operations.

2.2 OVERVIEW OF OPERATIONAL STRATEGY, SYSTEM CONTROL, AND CONDUCT OF OPERATIONS

2.2.1 Operational Objectives

As discussed in Section 1, the objective of the NEPCS is to retard the migration of the highest concentration volume of TCE in the NE Plume. The initial system flow rate has been set at 170 gpm. Based on system, extraction well, and monitoring well data, NEPCS flow rates will be adjusted to optimize system performance in meeting the Interim Remedial Action (IRA) objectives. The NEPCS can be operated with a minimum flow of 45 gpm from one extraction well. During operation of only one well (with a flow rate less than 100 gpm), the transfer pump cycles on and off as needed to control the water level in the EQ tank. The 100 gpm flow is the rate below which system components (transfer pump) could be damaged. The maximum system rate is 260 gpm.

2.2.2 Overall System Control

The NEPCS is an automated system with failure alarms and interlocks that will shut down the system when required by certain alarm conditions (refer to Section 3). During normal operations, the system has the capability to operate with minimal operational support. General control of the NEPCS is maintained by locally mounted instruments and controls for each major process operation. Key process variables and controls are linked to a main system control panel. The system is controlled through the local main control panel and a remote access computer located at the Northwest Plume Groundwater System (NWPGS).

2.2.3 Conduct of Operations

Conduct of operations is described in Sections 2.3 through 2.8. In addition, the Northwest/Northeast Conduct of Operations Applicability Matrix has been developed and is maintained in the NEPCS Reference Manual.

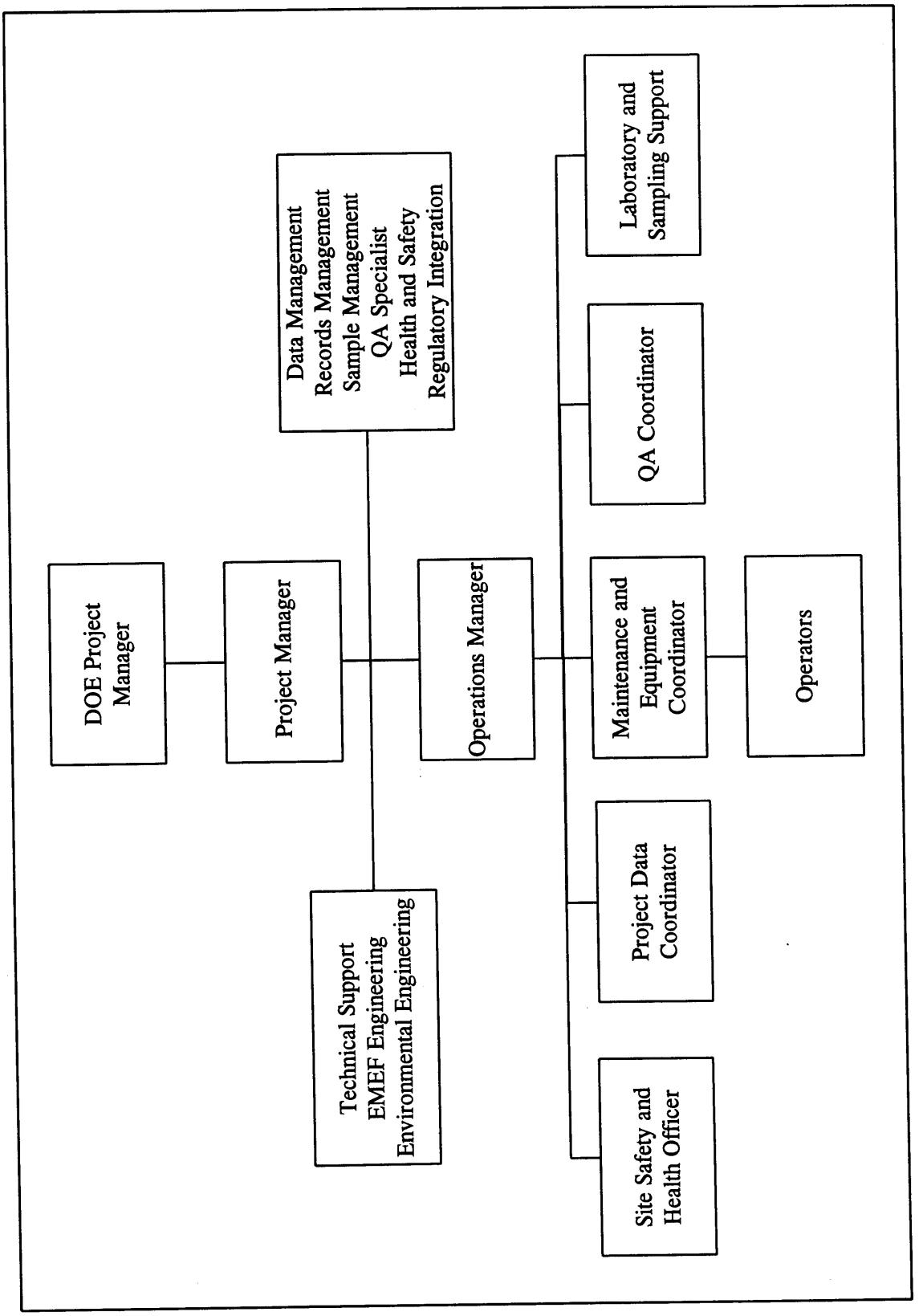

Figure 2.1. DOE and NEPCS management relationship.

2.3 OVERVIEW OF TREATMENT TECHNOLOGY (PROCESS THEORY)

The extracted NE Plume groundwater contaminated with volatile organic compounds (VOCs) is treated using air stripping by passing the contaminated groundwater through the C-637-2A Cooling Tower. Air stripping is a proven technology for the removal of VOCs from contaminated groundwater through liquid-gas mass transfer.

Specifically, extracted groundwater is transferred to the C-637-2A Cooling Tower header, mixed with cooling tower water, and discharged at the top of the tower. Similar to conventional air stripping towers, air is drawn upward through the tower as hot water (100-120°F) and flows downward through the system. The countercurrent flow of air and water along with the high water temperature causes the VOCs to be stripped from the water and transferred to the air stream.

2.4 OPERATING PROCEDURES

The NEPCS is operated in accordance with approved work instructions, equipment manuals, and sound engineering practices. Operation of the NEPCS is chiefly controlled by four existing work instructions. These work instructions list the required steps to:

- Conduct start-up and normal operations (WI-NEP-0001).
- Conduct normal and emergency shutdown (WI-NEP-0002).
- Conduct water sampling (WI-NEP-0003).
- Conduct data logger downloads (WI-NEP-0004).

Additional work instructions and procedures will be developed, as necessary, for operation of the NEPCS.

2.5 OPERATOR CHECKS

O&M of the NEPCS is subcontracted. The subcontractor conducts equipment inspections and system checks of key process variables to record system operational data and ensure effective and safe system operation. As stated in Section 2.2.2, process information can be accessed locally by the main system control panel or remotely by a computer located at the NWPGS. Such information includes system flow rates, alarm conditions, tank levels, and pump status. Various system component set points may also be adjusted locally or remotely. Other information such as pressure readings, flow totals, and other data can only be acquired at the C-614 location. Detailed information on required operator checks and frequency of execution are included in the NEPCS Operational Data Collection Sheets.

2.6 SYSTEM MAINTENANCE AND CALIBRATION

NEPCS maintenance (corrective and preventive) and calibration are performed in accordance with equipment manufacturer's recommendations and sound engineering practices. Every five years of operation, a precision test will be conducted on the underground EQ tank and a hydrostatic test will be conducted on the system pipeline to verify their integrity. If unacceptable conditions are found during maintenance and calibration activities, an evaluation of potential corrective measures will be conducted with involvement of the appropriate regulatory agencies. Every six months, the backflow preventer at the C-637-2A cooling tower tie-in is cleaned and tested. Additional information on maintenance and calibration is detailed in the *Maintenance and Calibration Plan* in the NEPCS Reference Manual and in the *Lockheed Martin Energy Systems, Inc., Northeast Plume Containment System Operations and Maintenance Quality Assurance Plan and Data Management Plan*, KY/EM-184 (LMES 1997a).

2.7 COMMUNICATION

Existing NWPGS communications equipment is co-utilized for both NEPCS and NWPGS operations. Shared communications equipment are as follows:

- Pagers
- Cellular telephones
- Telephone system
- Radio communications (PGDP)

The NEPCS contains a dedicated automatic telephone dialer (autodialer) for calling designated on-call personnel when system alarm conditions occur.

Autodialer

Abnormal operating conditions trigger alarms to the main system control panel. The autodialer, upon receipt of an alarm signal from the programmable logic controller (PLC), dials on-call personnel and, upon answering, delivers an alarm message. The individual who acknowledges the alarm notifies the NEPCS Project Manager. If the autodialer is not answered or if the alarm is not properly acknowledged, it continues to dial the programmed numbers in succession until the alarm is properly acknowledged. The autodialer operates over standard telephone equipment.

2.8 WASTE MANAGEMENT

The NEPCS system generates minimal waste, primarily protective clothing associated with sampling. Waste is handled and disposed of in accordance with site procedures. Waste management plans are developed as needed in accordance with procedure ERWM/ER-P2101.

3. DESCRIPTION OF POTENTIAL OPERATING PROBLEMS

This section describes the activities that address the primary shutdown and operational emergency conditions. This section is limited to the major shutdown and operational emergency conditions related to NEPCS and is not all-inclusive.

3.1 CAUSES FOR NEPCS SHUTDOWN

The NEPCS will shut down automatically as a result of system alarms or when initiated by an operator.

Automatic shutdown of the NEPCS components will occur when certain alarm conditions exist. Table 3.1 lists probable system condition(s) related to each alarm condition.

Table 3.1. Alarm conditions and system response

	Alarm condition	Probable system condition
1.	Low flow to EQ tank	Extraction well pump(s) may have shut off on low or high pressure.
2.	Low flow from EQ tank	Transfer pump may have shut off on high pressure or fault condition.
3.	Low pressure at cooling tower	System has shut down due to low pressure in the transfer line.
4.	EQ tank level high	Transfer pump may have shut down or the flow rate may be inadequate to maintain preset level in EQ tank. Extraction well pumps will shut off automatically.

Note: Only the low pressure switch at the cooling tower and emergency shutoff buttons at the PLC and cooling tower will shut down the entire system. Shutdown of individual components may lead to system shutdown.

Operator-initiated shutdowns may be performed during situations such as routine maintenance, severe weather, personnel injury, and fire. The system will shut down automatically due to adverse conditions such as electrical failure. The NEPCS Project Manager will be notified of any shutdown events.

3.2 RESPONSE AND NOTIFICATION PROCEDURE FOR NEPCS SHUTDOWN

To troubleshoot and correct system problems, personnel will follow appropriate procedures, manufacturer's equipment manuals, and seek any necessary outside technical assistance. NEPCS operators will record events, actions taken, and other pertinent information. The operator will notify the NEPCS Project Manager who will, in turn, report required information to the appropriate personnel and/or government agencies.

4. DESCRIPTION OF ROUTINE MONITORING AND LABORATORY TESTING

4.1 INTRODUCTION

Groundwater and process monitoring is conducted to ensure proper facility operation and compliance with the *Record of Decision for Interim Remedial Action at the Northeast Plume, Paducah Gaseous Diffusion Plant, Paducah, Kentucky* DOE/OR/06-1356&D2 (DOE 1995).

The data quality objective (DQO) process was used by the NEPCS team to ensure collection of data of appropriate quality and quantity to meet the NEPCS objective.

4.2 DATA QUALITY OBJECTIVES

4.2.1 Problem Statement

The NEPCS pumps TCE-contaminated groundwater to the C-637-2A Cooling Tower where the TCE is stripped. Effluent water ultimately discharges into Kentucky Pollutant Discharge Elimination System (KPDES) Outfall 001. The NE Plume groundwater does not contain detectable levels of technetium-99 (^{99}Tc). However, monitoring well data are collected to ensure that ^{99}Tc does not migrate from PGDP to the NEPCS. The objective of the NEPCS is to retard the migration of the highest concentration volume of TCE in the NE Plume and to meet the objectives stated in the Record of Decision (ROD).

4.2.2 Principal Study Questions, Decision Rules, and Data Needs

Table 4.1 outlines the principal study questions, decision rules, and data needs required to effectively monitor the operation of the NEPCS and meet the objectives stated in the ROD.

4.3 EVALUATION OF EXTRACTION FIELD EFFECTIVENESS

As part of the system start-up, water levels were measured in associated monitoring wells, piezometers, and extraction wells to determine the local potentiometric surface. Monitoring wells used for modeling and/or early prediction of ^{99}Tc migration from PGDP to the NE Plume are listed in Appendix B. In addition, water levels are measured concurrently in adjacent monitoring wells not associated with the system. The water level data are used to tie the NE Plume local information into the potentiometric information for the regional area. Colloidal borescope measurements were taken in each of the wells in the extraction field to document the local baseline groundwater flow directions and velocities. Groundwater samples are collected from each of the monitoring wells and analyzed for TCE to confirm initial contaminant distributions in the extraction field. Groundwater data (water levels, colloidal borescope measurements, and contaminant levels from the wells listed in Appendix B) collected before NEPCS continuous operations is serving as a baseline.

Table 4.1. Principal study questions, decision rules, and data needs

	Question/Goal	Decision rule	Data needs
1.	Is there ^{99}Tc in the plume within the extraction well field? No ^{99}Tc must reach the cooling towers.	If ^{99}Tc is detected at levels >50 pCi/L in the extraction wells, then operation of the system will be suspended until appropriate actions can be taken. If ^{99}Tc is detected at levels >50 pCi/L in any of the monitoring wells, then the source and impact of the ^{99}Tc will be evaluated and appropriate actions taken. Otherwise, the operation of the system will continue as outlined.	Samples will be collected from groundwater monitoring wells.[a]
2.	Are we retarding the migration of the highest concentration volume of the plume?	If field data[a] collected from the monitoring well network at the extraction field and mathematical modeling of the plume indicate that the extraction wells are not effectively retarding the migration of the highest concentration volume of the plume, then operation of the extraction field will be reevaluated and adjustments made as necessary. Otherwise, operation of the extraction field will continue at existing levels.	TCE and ^{99}Tc samples will be collected from monitoring and extraction wells. An aquifer test will be performed to determine the hydraulic conductivity of the aquifer. Water level data and pumping rates will be recorded for the extraction wells. Water level data will be collected for the monitoring wells.
3.	Are we effectively stripping the TCE?	If the comparison of TCE levels in the water from the shower nearest the No. 6 riser at the cooling tower and in the water from the EQ tank does not show a 95 percent efficiency of removal, then operational conditions will be investigated and appropriate adjustments made as necessary. Otherwise, operation of the system will continue as outlined.	TCE samples will be collected at the water shower nearest the No. 6 riser and close to the basin and at the EQ tank effluent
4.	Are we affecting environmental performance at KPDES Outfall 001?	If TCE levels observed in KPDES Outfall 001 show a statistically significant upward trend based on the routine samples, then the possible contribution to that trend by the NEPCS will be investigated and operations will be altered or suspended as necessary. Otherwise, operation of the system will continue as outlined.	Data from KPDES Outfall 001 will be evaluated.
5.	Will the water coming into the cooling tower system affect the system chemistry and operation?	If analytes[b] from the NEPCS exceed acceptable operating parameters for the C-637 recirculating cooling water (RCW) system, then system performance will be evaluated and appropriate actions taken. Otherwise, operation of the NEPCS will continue as outlined.	Samples will be collected from the EQ tank effluent.[b]

Table 4.1. Principal study questions, decision rules, and data needs (Continued)

Question/Goal	Decision rule	Data needs
6. What levels of TCE are being discharged into the atmosphere?	If air emissions of TCE from the NEPCS, as a single source or as a contributor to site emissions, exceed the regulatory guidelines, then the operating status will be reviewed and revised as necessary. Otherwise, operation of the system will continue as outlined.	Emissions will be calculated based on TCE samples taken from the extraction wells and evaluating associated pump rates.
7. How have the contaminant levels changed from those used before operation?	If TCE or ^{99}Tc levels exceed the levels used in assumptions serving as the basis for safety, environmental, or operating limiting conditions, then system operation will be suspended until the impacts can be evaluated and appropriate operating conditions can be reestablished. Otherwise, operation of the system will continue as outlined.	TCE and ^{99}Tc samples will be taken from monitoring wells, extraction wells, and EQ tank.
8. Is the system running efficiently in terms of O&M?	If system components are not operating within the manufacturer's specified performance criteria, then system operation will be evaluated. Otherwise, operation of the NEPCS will continue as outlined.	Operational data will be recorded to include flow rates from pumps; pressure readings; EQ tank level; maintenance data; and pipeline and system integrity.

[a] Monitoring well groundwater sampling will be performed under the Groundwater Monitoring Program. Frequencies and analytes are as follows:
Every sampling event—depth to water, dissolved oxygen, pH, specific conductance, and temperature.
Quarterly parameters—volatile scan; ^{99}Tc; and gross alpha and beta.
Annual parameters—total uranium, total metals: Al, Ag, As, Ba, Be, Cd, Cr, Co, Cu, Fe, Pb, Hg, Mb, Mn, Ni, Sb, Se, and Zn (dissolved to be run only if a Resource Conservation and Recovery Act metal exceeds a maximum contaminant level or as requested or otherwise specified), turbidity, silica, calcium hardness, potassium, magnesium, sodium, chloride, fluoride, nitrate-nitrogen, phosphate-phosphorous, sulfate, alkalinity, total organic carbon, and total suspended solids.

[b] Analytes of concern include pH, alkalinity, calcium hardness, magnesium (Mg), silica (Si), total iron (Fe), total manganese (Mn), total copper (Cu), chlorides, sulfates, total dissolved solids (TDS), and TCE. Analytes will be analyzed by standard EPA methods.

Within six months from the initial sampling event, DQOs will be reevaluated and data collection and analysis revised as necessary.

4.4 NORTHEAST PLUME GROUNDWATER MONITORING

Table 4.2 provides the sampling and analysis plan required to meet the stated DQOs. Sampling will begin following the completion of the flow rate

Table 4.2. Sampling and analysis plan

Start-up (first 2 months)			Routine O&M		
Sample point	**Parameters**	**Frequency**	**Parameters**	**Frequency[a]**	**Decision rule**
EW-331, EW-332	Pump rates	Daily	Pump rates	Daily	#2, #6
	Water levels	Monthly	Water levels	Monthly	#2
	TCE	Monthly	TCE	Quarterly	#2, #6, #7
	^{99}Tc	Monthly	^{99}Tc	Quarterly	#2, #7
EQ Tank	Dissolved Cu, Fe, and Mn; TDS; TSS; calcium hardness	Daily samples for 1 week, then weekly for the first 2 months	Total Fe, total Cu, total Mn, and Ca hardness	Monthly	#5
	See footnote b, Table 4.1	Monthly	pH, alkalinity, Mg, Si, Sulfates, chlorides, and TDS	Quarterly	#5
	Uranium, chromium, phosphate	1 sample during start-up	Uranium, chromium, phosphate	Annually	#5
	TCE, ^{99}Tc	1 sample every 2 weeks	TCE, ^{99}Tc	Monthly	#3, #5, #7
Monitoring wells[b]	Routine groundwater monitoring parameters[c]	Quarterly	Routine groundwater monitoring parameters[c]	Quarterly	#1, #2, #7
C-637-2A Cooling Tower water shower at riser No. 6	TCE	1 sample every 2 weeks	TCE	Monthly	#3
KPDES Outfall 001[d]	KPDES Permit List	Monthly	KPDES Permit List	Monthly	#4

The Project Manager may temporarily increase sampling to support operational troubleshooting. Sampling will be temporarily suspended when the facility is shut down or other operational conditions exist that would make sampling impractical.

[a] Daily samples—Daily refers to normally manned operations excluding weekends, holidays, or days when the facility is shut down.
Monthly—One sample per calendar month.
Quarterly—One sample every three months not to exceed 4 months/sample.
[b] The samples are collected and analyzed by the Groundwater Monitoring Program. A list of monitoring wells is provided in Appendix B.
[c] See footnote "a" in Table 4.1 for a list of analytes.
[d] The samples will be collected and analyzed by Lockheed Martin Utility Services, Inc. (LMUS).

4.4.1 Quality Assurance

Information pertaining to quality assurance/quality control (QA/QC), such as equipment calibration and maintenance for the field and laboratory, specific sampling and analytical procedures, change control, personnel responsibilities, training, and corrective actions, are discussed in the *Paducah Gaseous Diffusion Plant Environmental Management and Enrichment Facilities Quality Assurance Program Plan,* KY/EM-185 (LMES 1996c); the *Northwest and Northeast Plume Quality Assurance Plan and Data Management Plan,* KY/EM-184, Rev. 1 (LMES 1997); *Lockheed Martin Utility Services, Inc., Analytical Laboratory Quality Assurance Program Description,* KY/L-1622 (LMUS 1995); applicable procedures; and *Field Laboratory Quality Assurance Plan,* KY/EM-110 (LMES 1996b).

4.4.2 Sampling and Analysis

Analytical data consists of both field screening data (previously QC Level II) and definitive data (previously QC Level III), based on data needs determined in the project-specific DQOs. TCE analyses and analysis of all other analytes to satisfy decision rule No. 5 (see Table 4.1) are performed using the approved EPA SW-846 methods as described in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* SW-846 (EPA 1986). ^{99}Tc analyses are performed using a liquid scintillation counter.

Specific QC samples are collected to monitor the effectiveness of the sampling procedures and laboratory methods. QC samples are collected as needed for this project. They include field blanks, duplicates, equipment rinseates, and trip blanks.

4.4.3 Data Review

The data review process consists of the verification, validation, and assessment of environmental measurements data and analytical results received from laboratory and field measurements taken. Data verification is used to determine if the number of samples; analytical and field methods; parameters; and other requirements are met and are performed on all analytical data. The data validation process determines whether proper QC methods are used and whether the results meet established QC criteria. Validation is performed in accordance with procedures at a target frequency of a minimum of 5 percent (1 out of every 20 data packages). Data assessment will be performed by the project team after the first six months of system operation. Data assessment consists of a review of DQOs and the sampling and analysis plan. Any problems found during the review process will be documented and resolved.

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5. DESCRIPTION OF ALTERNATE O&M

The simplicity of the NEPCS does not lend itself to an alternate O&M plan. Shutdowns of the NEPCS will be handled in the quickest possible manner to ensure minimum downtime and prevent adverse effects on equipment. The system is designed so that continuous operation is possible when only one of the two extraction wells is functional.

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6. SAFETY PLAN

An HSP was developed for the NEPCS using pertinent information about the site; potential contaminants and hazards that may be encountered; and hazards inherent to routine activities performed during NEPCS operations. The HSP is provided in Appendix A.

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7. DESCRIPTION OF EQUIPMENT

7.1 EQUIPMENT AND PROCESS DESCRIPTION

7.1.1 Plant-Specific Operations

This section provides the process description, design criteria, modes of operation, instrumentation description, and process control for the major components of the NEPCS. A system process flow diagram for the NEPCS is presented in Figure 7.1. Detailed information on system configurations and equipment specifications can be found in the system's "as-built" drawings and manufacturer's equipment manuals.

7.1.2 Groundwater Extraction Wells and Associated Equipment

The location of the two extraction wells and associated NEPCS equipment relative to PGDP are presented in Figure 7.2. The system consists of two extraction wells: EW-331 with a minimum flow rate of 75 gpm and a maximum flow rate of 150 gpm, and EW-332 with a minimum flow rate of 45 gpm and a maximum flow rate of 110 gpm. The groundwater extraction wells supply influent groundwater to the NEPCS. The extraction wells are constructed of 8-inch diameter polyvinyl chloride well casing above the standing water level and stainless steel casing at and below the standing water level. Each well contains a stainless steel screen and a stainless steel pitless adaptor. The pitless adaptor is a device that attaches directly to the well casing and extends the casing above the ground surface. It provides a watertight subsurface connection for buried pump discharge. The discharge piping from the pitless adaptor to the equipment vault and the below-grade piping from the equipment vault to the EQ tank is constructed of high-density polyethylene (HDPE). Piping inside the equipment vault is constructed of stainless steel. Each extraction well contains an electric-driven, centrifugal submersible well pump that pumps groundwater through the discharge piping to an underground EQ tank. The wellhead piping; sample tap; pressure gauge; high and low pressure switches; manual flow control valve; and flowmeter are located below grade in a secured equipment vault at each well location.

Each groundwater extraction well pump operates continuous in either an ON or AUTO mode. When a well pump is ON, it supplies water continually to the NEPCS until the pump is manually shut down by switching it to OFF. When a well pump is in AUTO, it operates automatically on signals issued from the system PLC.

7.1.3 Control/Instrumentation Description

Main power to the extraction well pumps is supplied from a local overhead line that supplies power to power distribution panel boards. Each well pump has a local control panel. The local control panel has no-load and overload protection, a selector switch, an overload reset push-button, and indicator lights.

Each pump has a flowmeter/totalizer, pressure gauge, and HIGH and LOW pressure switches. The pressure switches cause the PLC to shut down the pump at preset pressures.

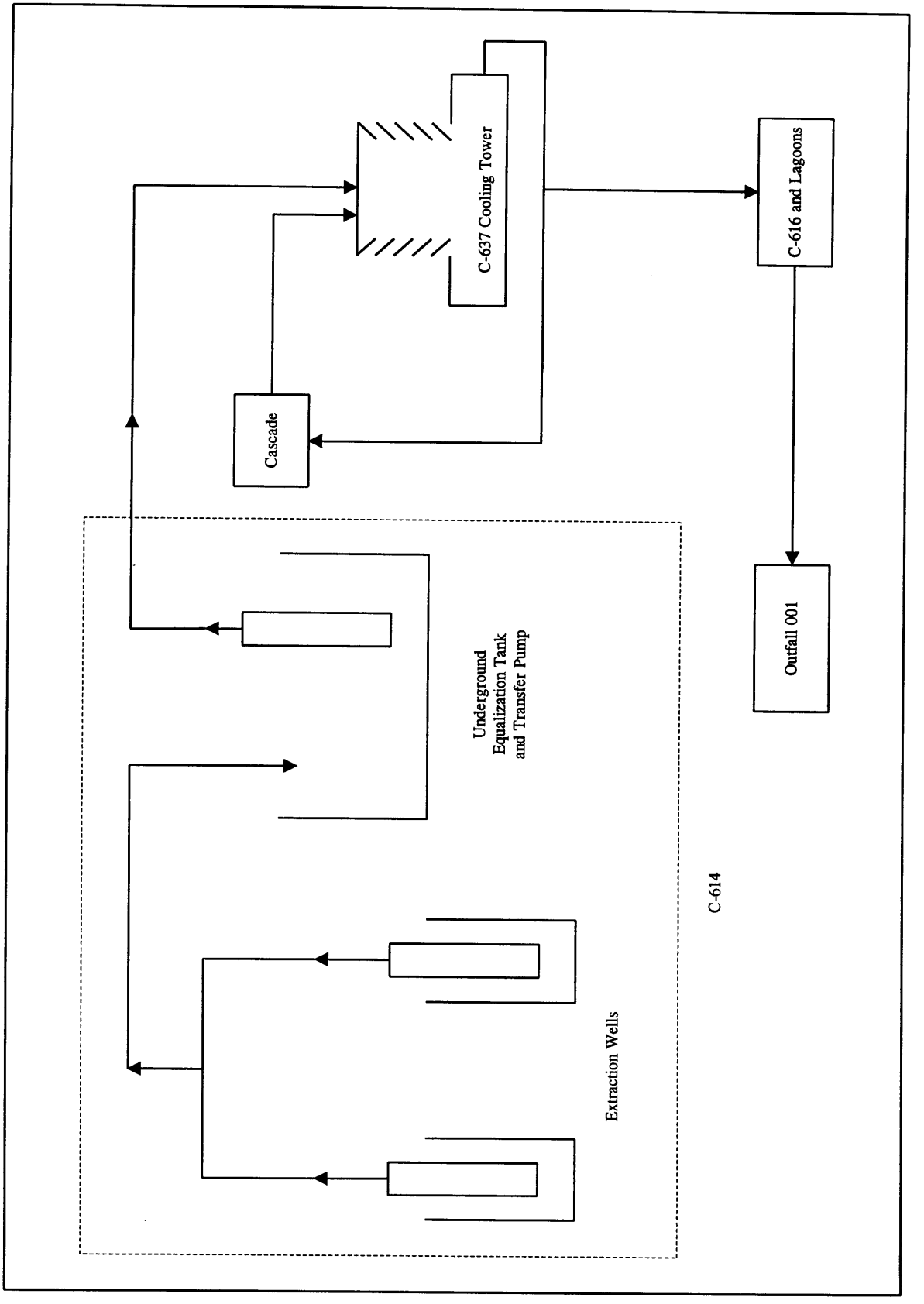

Figure 7.1. Complete system process flow diagram for NEPCS.

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Additionally, the PLC shuts down the pump when issued direction to do so by an operator. After shutdown, the pump(s) are restarted at the PLC panel.

The system main control panel has a system descriptive message display (MessageView), an operator interface unit, a PLC, and a modem used with an autodialer for notifying NEPCS personnel of system shutdown. The MessageView reveals the status of system components. System status can also be monitored through a remote access computer located at the NWPGS (refer to Section 2.5).

7.1.4 Process Control

Process control of the groundwater extraction well flow rates are determined by the system's effects on the site hydrogeology. Groundwater monitoring wells near the extraction wells are monitored for water level and routinely sampled for contaminant parameters. The proposed frequency of well monitoring (includes sampling and other modeling parameters) is addressed in Section 4. As the results of this monitoring are assessed, the pumping rates from the groundwater extraction wells may be modified to reflect changes in the site hydrogeology.

The flow from each groundwater extraction well is adjusted by manually throttling the pump discharge valve and referring to the local flowmeter for confirmation of flow. The flow rate is adjusted to operate within the minimum and maximum design flow for each extraction well pump. Changes to extraction well flow rates must be made slowly so that the high pressure switches in the pump discharge lines are not inadvertently activated.

7.1.5 Underground EQ Tank, Transfer Pump, and Transfer Piping

The 20,000-gallon EQ tank is constructed of fiberglass-reinforced plastic. The tank is located underground and backfilled with crushed rock in accordance with the tank manufacturer's instructions.

The transfer pump is a submersible pump mounted inside the EQ tank through a 24-inch manway and transfers the combined groundwater from the extraction wells to the C-637-2A Cooling Tower.

The underground transfer piping (from the EQ tank to the cooling tower) is approximately 5500 linear feet and is constructed primarily of 6-inch diameter HDPE. The 6-inch HDPE ties into 6-inch aboveground stainless steel piping at the C-637-2A Cooling Tower. The transfer piping terminates at the cooling tower 20-inch riser pipe.

7.1.6 Cooling Tower

As described in Section 2, the C-637-2A Cooling Tower at PGDP will be used to treat contaminated groundwater from the NE Plume. The cooling tower basin water is transferred to C-616 through a process known as blowdown. Blowdown is conducted on an as-needed basis and is dependent on the calcium hardness and buildup of dissolved solids in the water. The water is transferred by an underground pipeline to C-616 where lime is added to adjust the pH and ferrous sulfate is added as a flocculent. After settling in the clarifier, the sludges from the bottom of the clarifier are pumped to the C-616-E lagoon. The C-616-E

lagoon overflow enters the E-616-F lagoon. The water from the top of the clarifier is pumped to the C-616-F full-flow lagoon. The discharge of the C-616-F lagoon enters the ditch upstream of where Outfall 001 is located.

7.2 MONITORING COMPONENTS

A mechanical flow rate/totalizer is located in each equipment vault for EW-331 and EW-332 for recording flow rates and total gallons pumped. Also, two magnetic flowmeters are located before and after the EQ tank for measuring the influent flow rate to the EQ tank and the effluent flow rate to the C-637-2A Cooling Tower.

7.3 REPLACEMENT SCHEDULE FOR EQUIPMENT

Equipment replacement, calibration, and maintenance are performed in accordance with the manufacturer's recommendations.

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8. RECORDS AND REPORTING

8.1 LOGBOOKS AND LABORATORY RECORDS

Records are maintained by NEPCS operators documenting significant information involved with the NEPCS. Information includes routine operation, unusual occurrences, equipment malfunctions, spills, sampling events, visitors on-site, etc. Operational data records, maintenance records, and training records are also kept. Laboratory records are kept, as required, in the appropriate laboratory logbooks.

8.2 DATA MANAGEMENT

To meet the regulatory requirements for the acquisition of technically and legally defensible data, a completely traceable audit trail is established from the development of sampling through the archiving of information. This necessitates that each step or variation of the sampling and analytical process is documented. Standardized formats for electronic transfer and reporting are performed according to Intersite Procedure EM&EF/EF-P2214, "Environmental Data Entry, Transfer, and Transformation Verification." To meet this requirement, the appropriate management process is followed throughout the collection, management, storage, and analysis of the site environmental characterization data (ES/ER/TM-88/R1, LMES 1996d). Additional information concerning data management can be found in KY/EM-184, *Northeast Plume Containment System Operations and Maintenance Quality Assurance Plan and Data Management Plan.*

8.3 PROGRAM REPORTING REQUIREMENTS

Routine O&M of the NEPCS and the monitoring wells includes preparation of various operations and progress reports for submittal to EPA Region IV and the Kentucky Division of Waste Management (KDWM) by DOE. In addition, various components of the NEPCS operation may require preparation of special work plans or reports. Informal reporting to LMUS and the United States Enrichment Corporation are conducted to facilitate various reporting requirements. This section provides a description of major reporting requirements and an estimated schedule for report submission.

8.3.1 NEPCS O&M Plan

This O&M Plan provides the NEPCS operators with background information, program organization, reporting requirements, and O&M requirements and guidelines. It also includes references to plans and procedures that aid in maintaining compliance with DOE, federal, and Commonwealth of Kentucky policies and statutes. Training requirements and PGDP emergency response and operating procedures are also referenced. It should be emphasized that the O&M Plan is a dynamic document. Modifications and improvements to NEPCS operational procedures and this manual will continue as methods are identified that improve the overall performance and efficiency of system operations.

This O&M Plan includes resolutions to comments received by the EPA and KDWM. No modifications were needed as a result of completing the ITP and shakedown phases of the project.

8.3.2 Quarterly Reports

Quarterly reports will be prepared and issued to DOE within 30 days of the end of the quarter summarizing the data generated by the NEPCS, including associated monitoring wells. DOE will subsequently submit quarterly progress reports to KDWM and EPA. The quarterly reports will include, but not be limited to, summaries of the following information:

1. Work performed during the reporting period (include summaries of findings and any deviations from the work plan).

2. Schedules of activities to be performed during the upcoming quarter (including projected work/crucial phases of construction).

3. Assigned tasks of DOE contractors for work to be performed for this project.

4. Statement of the manner and extent to which the requirements and time schedules are being met.

5. Primary/secondary document tracking system

    a. Documents under review and/or preparation for the previous quarter.

    b. Due dates for completion of review/modification tasks.

6. Anticipated problems/delays (provide summary of problems, schedule to resolve, reason for delay, and actions taken to prevent or mitigate delay).

7. Summary of all contacts with local community, public interest groups, or state government.

8. Changes in relevant personnel.

9. Actual cost for O&M, if appropriate.

8.4 EMERGENCY PROCEDURES AND NOTIFICATIONS

The *C-612 & C-614 Groundwater Treatment Systems Emergency Plan* (LMES 1997) was developed and implemented before the commencement of NEPCS operations at PGDP. The plan will be reviewed annually and made available for inspection by employees, their supervisors, health and safety personnel, and other government agencies having relevant responsibilities. The plan addresses:

- Pre-emergency planning.
- Personnel roles, lines of authority, and communication.
- Emergency recognition and prevention.
- Safe distances and places of refuge.
- Site security and control.
- Evacuation routes and procedures.
- Emergency medical treatment and first aid.
- Emergency alerting and response procedures.
- Critique of response and follow-up.
- Personal protective equipment and emergency equipment.

8.4.1 Existing Programs

The PGDP has a comprehensive program for emergency response. The NEPCS Operations Manager will ensure that personnel are trained to use the site program. In the area of emergency response procedures, the NEPCS is considered a part of PGDP. A memorandum of understanding between the Facility Manager and LMUS dictates that PGDP emergency response personnel will handle requests for assistance from the NEPCS. NEPCS personnel will cooperate with emergency response personnel and the SSHO. They may be asked to provide assistance in accounting for personnel, gathering at the safe refuge point, and reporting the status of the incident.

The SSHO will possess a two-way radio to maintain communication with the NEPCS Operations Manager during emergency response situations. The SSHO is responsible for management of emergency response activities until the PGDP Emergency Squad arrives on-site.

The SSHO will be knowledgeable of the PGDP emergency reporting procedures. The SSHO will seek immediate medical attention and notify the NEPCS Project Manager in the case of an accident or medical emergency. The SSHO will also assist the NEPCS Project Manager in investigating and documenting accidents.

8.4.2 Accident/Incident Reporting

NEPCS personnel are required to immediately report any injury, regardless of severity, to their supervisor in accordance with the *C-612 & C-614 Groundwater Treatment Systems Emergency Plan* (LMES 1997). Once informed, the supervisor will report the incident to the SSHO, who will make necessary notifications. In the event of a serious injury, personnel may seek immediate emergency medical assistance before notifying their supervisor.

8.4.3 Emergencies

Personnel are trained during the PGDP site training to report emergencies. Emergencies are to be immediately reported to the Plant Shift Superintendent's Office, located at C-300, using the fastest route possible. This could be a telephone call (333 or 334 on the BELL System; 555 or 556 on the PAX System), a radio network call, or an emergency call box activation (if possible, person will remain in the area to direct the responders).

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9. O&M COST ESTIMATE

The estimated annual operating cost of the NEPCS for Fiscal Year 1998 is $679,000. This cost is a total project cost which includes, but is not limited to, O&M of the system, sampling, laboratory analysis, data validation, preparation of progress reports, and financial reporting on the project. Also included are costs associated with the DOE Technical Support contractor for fate and transport modeling of plume containment evaluation and regulatory document preparation.

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10. REFERENCES

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APPENDIX A

HEALTH AND SAFETY PLAN

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HEALTH AND SAFETY PLAN

1.0 INTRODUCTION

This Health and Safety Plan (HSP) was developed for the Paducah Gaseous Diffusion Plant (PGDP) Northeast (NE) Plume Interim Remedial Action Operations and Maintenance (O&M) Plan, using general information about the site, potential contaminants and hazards that may be encountered at the site, and hazards inherent to routine procedures to be used during Northeast Plume Groundwater System (NEPGS) operation. This HSP covers health and safety-related issues pertaining to the NEPGS facility.

If conditions exist such that a revision is necessary, revisions will be made by the Site Safety and Health Officer (SSHO) and approved by the Health and Safety Manager.

1.1 HAZARD COMMUNICATION AND TRAINING

1.1.1 Hazard Communication

Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.1200, "Hazard Communication Standard," requires that employees handling or using materials that may be hazardous, be advised and informed as to the hazard potential associated with those materials. A copy of the Hazard Communication Program is available at the Command Media Center located in C-612-T-02. This training will be documented and additional information will be conveyed through the following:

Material Safety Data Sheets (MSDS). An MSDS is an information sheet that provides specific material identification information; ingredients and hazards; physical data; fire and explosion information; reactivity data; health hazard information; spill, risk, and disposal procedures; special protection information; and special precautions required for materials manufactured for use. It is the manufacturers' responsibility to provide this information for any materials that contain hazardous or potentially hazardous ingredients.

Copies of MSDSs for materials expected to be used or encountered during project work are to be available at the Command Media Center located in C-612-T-02. Each employee is to be made aware that these MSDSs exist and are available.

Labels. It is the responsibility of the SSHO to ensure that potentially hazardous materials brought to the NWPGS are properly labeled as to the contents of the container and the appropriate hazard warnings in accordance with OSHA 24 CFR 1910.1200.

1.1.2 Chemical Inventory

Chemicals will be placed in the chemical staging area at C-612-T-01 before use if they have not been approved. However, the chemical is already considered approved if its MSDS is in the chemical inventory records. Chemical inventories are conducted monthly.

1.1.3 Training

Hazardous Waste Worker Training. NEPCS operator personnel will be required to have successfully completed at least the initial OSHA 24-hour Hazardous Waste Site Operations training, including required annual updates.

First Aid/CPR. NEPCS operator personnel will have at least one individual trained in first aid/CPR assigned to activities being performed at the project site.

PGDP Required Training. NEPCS operators will be required to attend the following PGDP site-specific training provided by the Facility Manager and their required updates.

- General Employee Radiological Training—Identifies the radiological hazards present at PGDP and proper emergency alarms and procedures that should be followed in the event of a radiological emergency.

- General Employee Training—Gives a general description of the five main plant sites and defines the role of PGDP. Discusses a general description of the facilities at PGDP and topics such as security, safety, environmental protection, emergency preparedness, Quality Assurance, and conduct of operations.

- Fire Watch—Is required only for personnel performing fire watch duties during hot work activities.

- Lockout/tagout—Explains the need for a lockout/tagout system and the proper lockout and tagout procedures to follow when maintenance or repair is being performed on electrically energized systems or those with other forms of energy. Describes and discusses electric work permits and safety and health work permits.

- Safety and health work permit—Identifies the need for safety and health work permits and describes how they are used.

- Security orientation—Defines security policies at PGDP. Describes the different levels of clearance, vehicle inspection/registration, and escorting policies. The security module is required for employees to receive the site access badge.

- Waste generator—Describes procedures for waste segregation, containment, storage/disposal, and proper container labeling and documentation. Defines the different types of waste and waste storage areas. The waste generator module is required for employees to receive the site access badge.

The Facility Manager will identify additional training requirements as required.

1.2 MEDICAL SURVEILLANCE

Employees who are or may be exposed to hazardous substances or health hazards at or above the OSHA permissible exposure limit (PEL), or employees who wear a respirator, will receive a medical examination before assignment, and at least once every 12 months thereafter (unless a longer interval not to exceed biannually is deemed appropriate by the attending physician), and at termination of employment or reassignment. Employees who develop signs or symptoms indicating exposure or who are injured or exposed above the PEL in an emergency situation will be medically examined as soon as possible following the incident.

1.3 SPILL CONTAINMENT

In the event of a spill during the off-shift or the potential of a spill leaving the treatment system area, on-site personnel will immediately contact the PGDP Shift Superintendent followed by the SSHO. On-site personnel will then locate the source and stop the spillage if it can be done safely and will begin containment and recovery of spilled material.

Plant and Local Emergency Signals. Plant and local emergency signals and their descriptions are shown in Table 1. Personnel should be familiar with these signals and know the proper action to take. The Fire and Emergency Response Plan for PGDP has been provided to the local fire department and other emergency response agencies.

1.4 HEAT/COLD STRESS

The most common types of stress that affect field personnel are heat stress and cold stress. In light of this, employees will understand the signs and symptoms of potential injuries associated with working in temperature extremes.

1.5 WORKING SURFACES/AERIAL LIFTS

1.5.1 Working Surfaces

Work areas will be kept clean, orderly, and in a sanitary condition and will be maintained in a dry condition.

1.5.2 Aerial Lifts

1. Aerial lifts will not be modified for uses other than those intended by the manufacturer, unless the modification has been certified in writing by the manufacturer.

2. Aerial lift operators will be trained to the manufacturer's operating instructions.

Table 1. Plant and local emergency signals

THE ATTACK WARNING	Intermittent 2-second blast on plant horns	This sound means an air attack or tornado is imminent. When hearing this sound, take cover at the nearest shelter area.
THE ALERT SIGNAL	Continuous blast on plant horns	The alert signal means that possible emergency conditions exist. Evacuate the building and follow directions given over the plant public address system.
THE EMERGENCY RADIATION SIGNAL	Continuous blast on special high-pitched whistle	Upon hearing this sound, rapidly leave the area and report immediately to your designated assembly point.
CASCADE BUILDINGS LOCAL ALARMS	Three blasts on building horns or howlers	Upon hearing three blasts on building horns, contact or report to your designated control room.
BUILDING EVACUATION C-100, C-360, C-710, AND C-720	Continuous blast on building horns	This sound means evacuate the building and follow instructions of the plant emergency director as given over the plant public address system.
THE C-720 LOCAL EMERGENCY SQUAD	One 10-second blast on building siren	This sound calls for the assembly of the C-720 local emergency squad.
THE COMMUNITY WARNING SIREN	Continuous wail on off-site sirens	This sound indicates a condition at this facility that may affect both the plant and surrounding community. It currently means to shelter in-place and listen to your Emergency Broadcast System for further instructions.

3. The manufacturer's recommended checkout instructions (or equivalent) will be completed daily by the operator before use.

4. Personnel will remain in the platform or bucket at all times and will not use the platform to gain access to a work location.

5. The load limits specified by the manufacturer will be posted on the equipment and will not be exceeded.

6. An aerial lift will not be used as a material hoist.

7. A full body harness must be worn with a shock absorbing lanyard attached to the platform anchorage point while in the platform or bucket.

1.5.3 Training

Personnel who may be exposed to a fall hazard during their work duties will be trained in fall protection, fall prevention, and associated personal protective equipment (PPE) before starting those duties on-site.

1.6 HOISTING/RIGGING PRACTICES

In order to ensure that personnel and equipment are not injured or damaged during hoisting and rigging operations, safe working guidelines will be enforced for trained personnel.

Hoisting and rigging activities will be reviewed by the SSHO to determine their classification and hoisting and rigging activities will comply with the DOE Hoisting and Rigging Manual.

Rigging equipment for material handling will be visually inspected before use on each shift by the SSHO and as necessary during its use to ensure that it is safe. Defective rigging equipment will be removed from service and repaired and/or destroyed. Rigging will comply with the DOE Hoisting and Rigging Manual.

1.7 CONFINED SPACE ENTRY

Confined space entries will follow 29 CFR 1910.146, DOE Orders, and the PGDP site procedure. The most current edition of the site confined space procedure will be available in the NWPGS command media center located in the NWPGS office. In addition, applicable permits, communication methods, monitoring requirements, training, and other requirements outlined in this procedure must be met before any confined space entry.

1.8 LOCKOUT/TAGOUT

To ensure the safety of personnel working on equipment or systems, PGDP safe practices and procedures will be followed for lockout/tagout. The purpose of these procedures is to prevent the release of potentially hazardous energy during maintenance or service activities. Lockout/tagout procedures apply to energy sources that could cause injury to personnel from the unexpected energization or release of stored energy while participating in such activities as—but not limited to—installing, constructing, repairing, adjusting, inspecting, testing, or maintaining systems or equipment. The procedures apply to all forms of potentially hazardous energy, both latent and residual, including electrical, hydraulic, pneumatic, mechanical, chemical, and radioactive. These procedures will apply to O&M activities conducted in association with the NEPCS.

1.8.1 Responsibilities

The SSHO will be responsible for reviewing needed maintenance or service job requirements and for recognizing the type and magnitude of potentially hazardous energy available in the NEPCS and associated equipment. The SSHO or any other person performing services associated with O&M of the NEPCS is responsible for shutdown of equipment according to PGDP procedures to maintain a safe working area. The SSHO must be notified immediately of any equipment that has been shut down by other personnel. Documentation of lockout/tagout activities will be maintained in the project file.

1.8.2 Out-of-Service Tags

Out-of-service tags are **not for** use as **employee protection** devices. These tags are for equipment protection or equipment that is inoperable.

1.9 EQUIPMENT INSPECTIONS

Power equipment that is brought to the NEPCS will need to undergo a staging area inspection unless the equipment is from the C-612 facility. This includes both rented equipment and equipment obtained from LMUS. This inspection will be conducted by the SSHO or designee. Additionally, equipment and tools will be examined before use.

1.10 COMMUNICATIONS

Two forms of communication will be available, and the "buddy system" will be used.

1.11 OPERATOR'S HEALTH AND SAFETY PLAN FORM

The form will be used by field personnel as a reference guide to health and safety. The operator's HSP form is located in the NEPGS Reference Manual and describes health and safety related issues pertaining to the NEPGS, including the following:

- general descriptions of the site, tasks, contaminants, and concentrations;
- primary and contingency personal protection;
- monitoring equipment and action levels;
- personnel and equipment decontamination; and
- emergency contacts.

If conditions exist such that a revision is necessary, revisions will be made by the SSHO and approved by the Health and Safety Manager.

APPENDIX B

LIST OF NEPCS WELLS AND PIEZOMETERS

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LIST OF NEPCS WELLS AND PIEZOMETERS

Monitoring Wells:	MW-124, MW-126, MW-145, MW-255, MW-256, MW-258, MW-283, MW-284, MW-288, MW-291, MW-292, MW-293, and MW-294
Extraction Wells:	EW-331 and EW-332
Piezometers:	PZ-287, PZ-289, and PZ-290

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