1972

Systems Plan
for
Remediation Area 1, Phase II

FDF Project No: 20712
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Revision 0
Design Review

Environmental Remedial Action Project
Fernald Environmental Management Project
Fernald, Ohio
FDF Subcontract No. 98PC001322
Task Order P-012

PARSONS

4055 Executive Park Drive
Cincinnati, Ohio 45241

INFORMATION ONLY

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Systems Plan for Groundwater Collection and Transfer
Remediation Area 1, Phase II

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LIST OF ACRONYMS AND ABBREVIATIONS

FDF	Fluor Daniel Fernald, Inc.
FEMP	Fernald Environmental Management Project
HDPE	High Density Polyethylene
kVA	Kilo Volt Amperes
LCS	Leachate Conveyance System
MWI	Maintenance Work Instructions
O&M	Operations and Maintenance
OSDF	On-Site Disposal Facility
PLS	Permanent Lift Station
STP	Sewage Treatment Plant
V	Volts

1.0 INTRODUCTION

The Fernald Environmental Management Project (FEMP) is a 1,050-acre facility located in southwestern Ohio approximately 18 miles northwest of downtown Cincinnati. The mission of the facility was to provide high-purity uranium metal products to support United States defense programs. Production operations were discontinued in 1989. Subsequently, the Department of Energy decided to decontaminate and dismantle the facility and began environmental remediation of the site.

To facilitate management of the environmental remediation activities, the site was divided into various remediation areas. Several of these areas will be remediated in phases. Area 1 is subdivided into two major phases (Phase I and Phase II). Remediation of Area 1, Phase I was completed in March 1997.

Area 1, Phase II, encompasses approximately 153 acres and is located in the southeastern part of the FEMP. It is bordered on the east and south by the FEMP boundary; on the west by the South Access Road, an unnamed stream and former production area; and on the north by Area 1, Phase I, and the On-Site Disposal Facility. The terrain in the project area is rolling pasture. The Sewage Treatment Plant (STP) and Phase I of the North Entrance Road are either partially or completely located in this area. A former trap shooting range is also located in the area. The remediation activities within the Area 1, Phase II project will include: demolition of below grade structures, removal of subsurface utility lines, and excavation at the STP; demolition of concrete pads, and excavation of lead contaminated soils at the former Trap Range Area; surface stripping around the STP excavation area (see Construction Drawings for location); and miscellaneous activities including removal of agricultural drain tiles, and removal of sediments from existing sediment basins used during the Area 1, Phase I remedial activities.

1.1 Purpose of Systems Plan

This systems plan describes the STP Water Handling System and its performance requirements. The selected Contractor will prepare a Systems Implementation Manual that presents the processes, methods, and details to implement their portion of this plan.

2.0 SYSTEM DESCRIPTION AND INTENDED PERFORMANCE

The STP Water Handling System (see construction drawings and specifications for detailed information) includes the following:

1) Pumps: Three pumps will be used for the STP Water Handling System. The Dewatering Pump (PMP-1) will pump water from the STP area into the transfer line. Two other Excavation Pumps (PMP-2 and PMP-3) will be more portable and will be used to pump water from excavation areas to the area of PMP-1 (for subsequent pumping into the transfer line).

2) Transfer Line: Water collected in the primary Excavation Sump will be pumped via a 3-inch High Density Polyethylene (HDPE) pipeline to the OSDF Leachate Conveyance System (LCS).

3) Control System: An automatic control system will be installed to control the Dewatering Pump (PMP-1) and transfer line. The Dewatering Pump will not pump water into the transfer line when the LCS is receiving significant flow from the OSDF.

The STP Water Handling System will be used to collect, store, and transfer surface water, groundwater, and wash water collected in the STP excavations.

3.0 OPERATION

3.1 Description of Equipment

A 480 volt, three-phase, power will be supplied for the required services from a switchgear breaker at substation N18-2, now serving the Dissolved Oxygen Building. The power will be provided via an overhead cable. A tap off that cable will be made to the Dewatering Pump combination starter and local transformer/panel combination, located on a rack at the pole near the Radiation Control Facility. All electrical equipment enclosures are rated type 3R or 4, according to National Electrical Manufacturers Association 250. A 15 kVA, 480-120/240V, single-phase transformer/panel combination will be provided, with a primary 60 amp, 480 volt breaker, three 20 amp branch circuits and seventeen spaces for single pole breakers for future heat tracing, and an 80 amp secondary main breaker (rated 240 volts). These provide 120 volt power for instrumentation, outdoor lighting, and a local duplex receptacle. The Dewatering Pump will be served from this starter via overhead cable to a disconnect switch on the pole at the fence, and then to the pump via interlocked armor cable. Motor overloads in the combination starter will protect the motor.

The Dewatering Pump and the Excavation Pumps are each a portable, submersible, electric motor-driven, centrifugal pump with a cast iron impeller, cast iron housing, carbon steel shaft, and mechanical seals. Valves are the manually operated type. A run-time meter at the STP and a flow indicating light at both the STP and Leachate Conveyance System (LCS) area are provided for the Dewatering Pump. Excavation pumps are started manually and stop automatically by means of the level switch. The Dewatering Pump operation is automatic by means of the level switch.

Local starters for the Excavation Pumps will be provided, also on the pole at the fence, from a tap to the 480 V aerial line.

A tap to the 480 V aerial line will serve a 480 - 120/208 dry type transformer and the 480 V loads in the Radiological Control Facility. Another tap will be made to a fused disconnect switch for the Contractor's construction trailer.

Submersible power and control cables will be furnished by the Contractor with the submersible pumps. Cable entry seals are designed to be watertight for submersible use.

3.2 Pre-Startup

The Contractor shall install, test and check the system in accordance with the construction drawings and specifications. Before the system is started, the following checks will be performed by Fluor Daniel Fernald, Inc. (FDF).

1) Check the construction acceptance documents to ensure that every component is constructed according to the plans and specifications and acknowledge acceptance.

2) Check the accuracy of the documents for all applicable and relevant functional technical tests (shop or field) for the electrical and mechanical equipment and acknowledge acceptance.

3) Make sure that all relevant site-specific procedural requirements, permits, and coordinations are complete.

Pre-startup tests shall be performed in the following order: (1) electrical and (2) mechanical. The Contractor shall install and test the system to ensure it is functional.

3.2.1 Electrical Pre-Startup Tests and Inspections

1) Close main 480 Volt circuit breaker no. 2 at Unit Substation N18-2.

2) Check voltage at the main disconnect switch, STP Pump Control Panel, and the Mini-Power Zone panel main circuit breakers. Voltage should measure a minimum of 475 volts between phases.

For each starter:

a) Visually inspect the interior of the starter for completion of installation, including fuses, control power transformer, lights, run-time meter, and switch. Verify installation of motor overload heaters sized in accordance with the pump manufacturer's instructions.

b) Throw the circuit breaker to the "ON" position to supply power to the starter.

c) Switch on the distribution panel main circuit breaker, secondary main breaker, and branch circuit breakers for the instrumentation, lighting, and receptacle. Verify 120 volts available at receptacle, with correct polarity and grounding. Verify operation of Ground Fault Circuit Interrupter circuit breaker.

d) Open the main circuit breakers at the completion of the electrical pre-startup test.

3.2.2 Mechanical Pre-Startup Tests and Inspections

1) Visually inspect the mechanical installation and equipment, noting completion of construction.

2) Open manual discharge valves V100 and V102.

3) Make sure that the PMP-1 discharge hose is connected to the steel pipe and ensure that pumps, PMP-2 and 3 have discharge hoses connected and routed to an appropriate discharge point.

3.3 Startup

The following are the steps needed for startup of the STP Water Handling System. The steps should be followed in the order listed. The following procedures are written for pump PMP-1. Start-up for pumps PMP-2 and 3 should be performed in a similar manner, except that discharge flow will not be to the LCS.

3.3.1 Electrical

The FDF lockout/tagout procedures shall be followed during the testing phases of construction to safeguard personnel from electrical hazards. Construction acceptance testing will be witnessed and documented by the FDF Quality Assurance/Quality Control Department.

NOTE: To prevent operation of the pumps during the following tests 1 through 3, temporarily disconnect power leads to the pump motors at the contactor terminals, remove overload heaters, or open local disconnect switch.

1) Throw the starter and lighting panel circuit breaker to the "ON" position, applying power to the starter and associated control circuits. Verify that the correct voltage is present.

2) Place the selector switch to "HAND" (momentary). Verify that the main contactor energizes.

3) Disconnect the power by opening the circuit breakers, check for voltage on the load side of breaker; if no voltage then reinstall the motor wiring or heater elements for normal operation of the pumps. If voltage is present, open circuit breaker at N18-2 unit substation and replace circuit breaker.

3.3.2 Mechanical/Instrumentation

1) Fill portion of the STP Excavation Sump with clean water.

2) Place the selector switch to "HAND" (momentary) and observe the following:
   (1) Check the pump for normal operation.
   (2) Check for leakage.
   (3) Check for green "RUNNING" indicating light on the Dewatering Pump control panel and at the LCS PLS pump control panel.

3) Release the selector switch to "OFF" if any unusual conditions are observed. Correct any problems encountered before proceeding further with the startup.

4) Place the selector switch to "AUTO". Continue filling the Excavation Sump until the level switch actuates and starts the pump. Ensure that level switch actuates at the proper setting. Also ensure that the flow switch actuates, indicated by the flow indicating light at the local control panel and the LCS PLS pump control panel.

5) Visually verify flow to the LCS PLS.

6) Continue monitoring the level in the sump. Ensure that the pump stops at the proper low level setting and the flow indicating light goes off.

7) Perform acceptance operating test to demonstrate the ability of the pump to meet operating point as shown on pump curve.

3.3.3 Shutdown

At the successful completion of the above tests and checks, place the selector switch to "OFF".

3.4 System Procedures

During remediation, the Dewatering Pump will start and stop automatically. The Excavation Pumps will be manual start and auto stop. Operations of the pumps are indicated by green "run" indicating lights at the pump control panel and at the LCS PLS for the Dewatering Pump only.

3.5 Potential Problems

1) Description and Remedy:
Caution: Comply with current FDF lockout/tagout procedures before attempting a remedy.

Problem	Result	Remedy
Pump fails to start	No Flow	1) Refer to vendor Operations and Maintenance (O&M) Manual. 2) Check if 480 volt power is energized. 3) Check operation of level switch. 4) Check for tripped overload relay. 5) Check continuity of motor internal protection circuits (repair motor).
Pump fails to stop	Pump runs dry	1) Refer to vendor O&M Manual. 2) Check operation of level switch. 3) Check/repair contactor for welded contacts.
Pipeline plugs	1) No flow	1) Determine where plug is located. Drain water to a tank truck and transport for treatment.
	2) Pump deadheads	2) Clean out pipeline.
Flow Light fails to operate with pump running (Dewatering Pump only)	Unable to verify system flow	1) Push-to-test lamp to see if bulb is blown. 2) Check to see if 120 volt power is at light. 3) Refer to vendor O&M Manual for flow switch. 4) Check operation of flow switch.

3.6 Maintenance

1) Valve: Follow procedures given in current applicable maintenance work instructions.
2) Pump: Refer to pump vendor O&M manuals and current applicable maintenance work instructions.
3) Drain the system prior to freezing weather conditions.
4) Perform the maintenance activities described in Table 4-2.

4.0 ACTIVITIES, RECORDS, AND REPORTS

Table 4-1 provides a list of activities, records, and reports associated with the STP Water Handling System. The frequency of each activity is also included in the table. Further details on maintenance and calibration frequencies associated with system equipment are provided in Table 4-2.

Table 4-1 - Summary of Records and Reports

Report	Frequency
MAINTENANCE AND CALIBRATION	
Pump Inspection Report	Annually
Piping Inspection Report	Annually
Valve System Inspection Report	Annually

Table 4-2 - Equipment Maintenance and Calibration Schedule

Item	Maintenance Schedule
Main Disconnect Switch and Starter	Inspect monthly for moisture
Local Disconnect Switch	Monthly
Flow Switch	Semi-annually
Water Level Switch Calibration	Semi-annually
Pump Motor Run Time Meter	Semi-annually
Motor Starter and Controls	Annually
Pump	Inspect annually per FDF MWI PCP100