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BHI-OP-00011
Rev. 01

200-BP-5 Unit #1 Pilot-Scale Groundwater Treatment System Acceptance Test/Operational Test Procedure

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Date Published
October 1994

Environmental Excellence
HANFORD

Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management

Bechtel Hanford, Inc.
Richland, Washington

NOV 1994
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200-BP-5 UNIT #1
PILOT-SCALE GROUNDWATER TREATMENT SYSTEM
ACCEPTANCE TEST/OPERATIONAL TEST PROCEDURE

Revision No. 1

Issue Date OCT 2 4 1994

Impact Level ~~A~~ QS

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BHI-OP-00011 *
REV: 01* lmw 10/24/94
OU: 200-BP-5
TSD: N/A
ERA: N/A

APPROVAL PAGE

Title of Document: 200-BP-5 Unit #1 Pilot-Scale Groundwater Treatment System Acceptance Test/Operational Test Procedure

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* Rev. 0 of this document was issued as BHI-00015, Rev. 00, same title, dated September 24, 1994.

lmw 10/24/94

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CONTENTS

FIGURES:

1.0 GENERAL

1.1 The purpose of this procedure is to outline the various steps necessary to verify the operability and completeness of the 200-BP-5 Reverse Well treatment system equipment and to verify that the system is installed in accordance with the design drawings, Figures 1 through 3.

1.2 Prior to the Functional Acceptance Test, all available instrumentation, wiring, and controls will have been installed and tested for loop integrity.

1.3 The Pilot-Scale Treatment System will commence operations by filling the influent storage tank on a 6-8 hour/day basis, eventually working up to 24 hours/day. The treatment system then processes this influent and fills the effluent surge tank for discharge of the treated influent into a disposal well. Injection into the disposal well can occur on a 24 hour/day basis because of safety interlocks built into the system. Performance of this Acceptance Test Procedure/Operational Test Procedure (ATP/OTP) will not test the Optional equipment as noted on the Process Flow Diagram, Figure 1. These optional ATP/OTP operations may be installed after it has been determined that they are required, and this procedure will be revised to provide for their testing.

1.4 The Treatment System is operated generally in a manual mode, utilizing interlocks for shutting down the system to protect equipment and prevent overflow of the Influent and Effluent Storage Tanks and other safety concerns. The interlocks are shown on the Electrical Control Ladder Diagrams, Figure 2.

1.5 The test shall be performed by at least two individuals, a test director and a verifier. The test director shall be from engineering and shall be familiar with the system. The verifier can be an individual from quality assurance, operations, or field engineering. Historically, performance of the ATP/OTP has been for training of new operators/field personnel by utilizing them as verifiers. If more than one verifier is used, they may also sign as witnessing the test. At completion of the first, or functional, part of the test (before waterflows), Quality Assurance will verify the first part of the testing for completeness. Following completion of the final portion of the test, Quality Assurance will verify testing for completeness. QA will verify completion of each section.

1.6 Acceptable and Not Acceptable as used in this ATP/OTP are defined to mean that the question asked or function check requested by the inquiry/test procedure is to verify whether a piece of equipment exists (or does not), or that function happens (or does not). For example, if the equipment exists, it is Acceptable; if not, it is Not Acceptable. If a function performs as it is supposed to do, it is Acceptable; if not, it is Not Acceptable. All Not Acceptable Items will be logged on a "Punch List" and attached to this ATP/OTP.

2.0 EQUIPMENT SETUP

Set up the Influent and Effluent pump skids and the Process System skid for performing the Acceptance and Operational Tests per the following.

2.1 Position the skids approximately as shown on the site plan and connect between the skids with quick disconnect hoses as follows:

2.1.1 Connect the extraction well pump discharge to the influent storage tank inlet.

2.1.2 Connect the influent storage tank outlet to the influent pump skid suction.

2.1.3 Connect the influent pump skid discharge to the process skid influent pipe manifold inlet.

2.1.4 Connect the process skid influent pipe manifold outlet to the first column inlet.

2.1.5 Connect the selected first ion exchange column outlet to the selected second column inlet.

2.1.6 Connect the second ion exchange column outlet to the third column inlet.

2.1.7 Connect the third column outlet to the fourth column inlet.

2.1.8 Connect the fourth column outlet to the process system skid effluent pipe manifold inlet.

2.1.9 Connect the process system skid effluent pipe manifold discharge to the Effluent Storage Tank inlet.

2.1.10 Connect the Effluent Storage Tank outlet to the Effluent Pump skid suction manifold.

2.1.11 Connect the Effluent Pump skid discharge to the disposal well.

2.2 Verify that the pressure gauges are properly installed and calibrated.

Acceptable _____ Not Acceptable_____

2.3 Verify that the flow meters and rotameters are properly installed and operable.

Acceptable _____ Not Acceptable_____

2.4 Verify that all valves, including motorized ball valves (MBV's), are properly installed and operable.

Acceptable _____ Not Acceptable_____

2.5 Verify that the influent and effluent storage tank sight gages are properly installed and operable. Sight gages will be drained and valved off during winter months when there is potential for freezing conditions.

Acceptable_____ Not Acceptable_____

2.6 Verify that all instrument cables between sensors and monitors are connected.

Acceptable_____ Not Acceptable_____

2.7 Verify that all electrical power and electrical interconnections are installed per the One-Line Diagram, Figure 3, and the Electrical Control Ladder Diagram, Figure 2.

Acceptable_____ Not Acceptable_____

2.8 Verify that filter bags are installed in influent filter housing pairs F-1 and F-2.

Acceptable_____ Not Acceptable_____

2.9 Verify that filter cartridges are installed in effluent filter housing pairs F-3 and F-4.

Acceptable_____ Not Acceptable_____

2.10 Verify that bone char is loaded in the first column(s). Verify that clinoptilolite is loaded in the second column(s). Verify that 50% bone char and 50% clinoptilolite are loaded in the third column(s). Verify that granulated activated carbon is loaded in the fourth column. Record the depths of adsorbent in each column: Column #1____, Column #2____, Column #3____, Column #4____.

Acceptable_____ Not Acceptable_____

Section 2.0 was completed as noted. QA _____ Date: _____

3.0 COMPONENT INSPECTION AND DOCUMENTATION

3.1 Mechanical

Refer to Process Flow Diagram, Figure 1. After the equipment has been set up, perform an equipment inspection and verify that all components are installed according to drawings. If the drawings do not represent the actual installation, As-Built the drawings, and after approval by engineering, attach to this procedure. Utilize the equipment listed under Section 3.2 below for equipment component check.

Acceptable_____ Not Acceptable_____

3.2 Documentation

Verify that vendor information is available for the following equipment. The Vendor Information will be placed in the Project Files.

3.2.1 Extraction Well Pump
3.2.2 Influent Pumps
3.2.3 Process Pump
3.2.4 Effluent Pumps
3.2.5 Filters, Influent and Effluent
3.2.6 Ion Exchange Columns
3.2.7 Influent/Effluent Storage Tanks
3.2.8 Process Water Tank
3.2.9 Failsafe Motor-Operated Ball Valve
3.2.10 Air Release Valves
3.2.11 Flowmeters
3.2.12 Flow Switches
3.2.13 Rotameters
3.2.14 Level Indicators/Controls
3.2.15 Pressure Gauges
3.2.16 Differential Pressure Indicator/Transmitter
3.2.17 Temperature Indicator/Transmitter
3.2.18 Dissolved Oxygen Monitor
3.2.19 Turbidity Monitor
3.2.20 pH Indicator/Transmitter
3.2.21 Flex Hose
3.2.22 Flexible Connectors
3.2.23 Adsorbent
3.2.24 Bone Char
3.2.25 Programmable Logic Controller
3.2.26 Annunciator

Acceptable_____ Not Acceptable_____

3.3 Electrical

Refer to One Line Electrical Diagram, Figure 3. Verify that electrical installation is complete. Verification includes checking for installation in accordance with the National Electrical Code (NEC).

3.3.1 Verify installation of power feed from generator to main control panel on process treatment system.

Acceptable_____ Not Acceptable_____

3.3.2 Verify installation of 480-VAC, 3-phase power feed from main control panel on Process Treatment Skid to the following pumps:

- Extraction well pump
- Influent pump station
- Process pump
- Effluent pump station

Acceptable_____ Not Acceptable_____

3.3.3 Verify 120-VAC auxiliary/control wiring from main control panel to:

- Extraction well
- Influent storage tank
- Influent pumping station
- Process treatment system
- Effluent storage tank
- Effluent pumping station
- Disposal well

Acceptable_____ Not Acceptable_____

3.3.4 Verify installation of 240-VAC, single-phase power feed from main control panel to:

- 240 V Receptacles for Air Compressor located at influent pumping station, process treatment system, and effluent pumping station.

Acceptable_____ Not Acceptable_____

3.3.5 Verify signal wiring from transmitters to main control panel.

Acceptable_____ Not Acceptable_____

3.3.6 Grounding System

- Verify that the Process Treatment System is properly grounded.

  Acceptable_____ Not Acceptable_____

- Verify that the Influent pumping station is properly grounded.

  Acceptable_____ Not Acceptable_____

- Verify that the Influent storage tanks are properly grounded.

  Acceptable_____ Not Acceptable_____

- Verify that the Process water tank is properly grounded (if applicable).

  Acceptable_____ Not Acceptable_____

- Verify that the Effluent pumping station is properly grounded.

  Acceptable_____ Not Acceptable_____

- Verify that the Effluent storage tanks are properly grounded.

  Acceptable_____ Not Acceptable_____

- Verify that the power generator(s) is properly grounded

  Acceptable_____ Not Acceptable_____

3.3.7 Power Source Check, Generator - Verify that the generator output is 480 VAC, 3 phase, 60 HZ to ensure compatibility with load.

Acceptable_____ Not Acceptable_____

3.3.8 Instrument panel - Test annunciators, alarms, and reset for proper operation.

Acceptable_____ Not Acceptable_____

3.3.9 Check pump motors, Influent Pumps (P-2A, P-2B), Process Pump

(P-3), Effluent Pumps (P-5A, P-5B) for proper rotation. Briefly activate each pump pushbutton to bump the motors and visually verify proper rotation as noted by movement of motor fan in direction of rotational arrow.

Acceptable_____ Not Acceptable_____

Section 3.0 was completed as noted. QA _____ Date: ___

4.0 ACCEPTANCE TEST PROCEDURE (ATP)

This portion of the test procedure will establish flow of clean water through process components to verify operability of pumps, verify interlocks and their shutdown capabilities, test failsafe motor-operated valves for closure on power failure, and test emergency shutdown switch.

4.1 Pumps

4.1.1 Extraction Well Pump

- Open motor-operated ball valve, **MBV-1.**
- Open ball valves **BV-1, BV-2, BV-4, BV-7, BV-8, BV-10, and BV-18.**
- Start Extraction Well Pump.
- Watch for flow at FIT-1 AND FI-1.

Acceptable_____ Not Acceptable_____

4.1.2 Influent Pumps (Note: The Influent Storage Tank must have liquid in the tank for this test). Ensure pump is primed.

4.1.2.1 Pump P-2A

- Open MBV-2 (outlet from the Influent Storage Tank).
- Open ball valves **BV-11, BV-19, BV-30, BV-32, BV-33, BV-44, BV-50, BV-51, BV-55B, BV-56, BV-59, BV-62B, BV-64G, BV-64, BV-69, BV-64C, BV-64D, BV-64H, BV-64I, BV-64J, BV-64K, BV-70, BV-71, and BV-80.**
- Start Influent Pump P-2A.
- Watch for flow at FIT-2.

Acceptable_____ Not Acceptable_____

4.1.2.2 Pump P-2B

- Open MBV-2 (outlet from the Influent Storage Tank).
- Open ball valves **BV-11, BV-19, BV-30, BV-34, BV-35, BV-44,**

BV-50, BV-51, BV-55B, BV-56, BV-59, BV-62B, BV-64G, BV-64, BV-69, BV-64D, BV-64H, BV-64I, BV-64K, BV-70, BV-71, and BV-80.

- Start Influent Pump P-2B.
- Watch for flow at FIT-2.

Acceptable_____ Not Acceptable_____

4.1.3 Process Pump, P-3 (Note: This pump is used for backwashing the columns and as a sump pump as required).

- Connect hose from the Process Water Tank (noting that there is water in the Process Water Tank) to the suction of P-3, and hose from the pump discharge to the Effluent surge Tank.
- Open **BV-41** and **BV-42.**
- Start Pump P-3.
- Watch for makeup of FS-4.

Acceptable_____ Not Acceptable_____

4.1.4 Effluent Pumps (Note: The Effluent Storage Tank must have liquid in the tank for this test).

4.1.4.1 Pump P-5A (Effluent Pump)

- Open ball valves **MBV-6** (if applicable), **BV-72, BV-81, BV-87, BV-90, BV-92, BV-93, BV-98, BV-99, BV-102, BV-103, BV-110, BV-111, and BV-112.**
- Start Effluent Pump P-5A.
- Watch for flow at FIT-5.

Acceptable_____ Not Acceptable_____

4.1.4.2 Pump P-5B (Effluent Pump)

- Open ball valves **MBV-6** (if applicable), **BV-72, BV-81, BV-87, BV-90, BV-94, BV-95, BV-98, BV-99, BV-102, BV-103, BV-110, BV-111, and BV-112.**
- Start Effluent Pump P-5B.
- Watch for flow at FIT-5.

Acceptable_____ Not Acceptable_____

4.2 Level Switches

The level switches will be functionally checked by shorting out the input to the level control relay and checking for the proper diagnostic and

annunciation of alarms that will indicate actuation of the appropriate level control relay.

4.2.1 Open the probe circuits to simulate a low level for the following level switches and verify that both the diagnostic and annunciator lights actuate:

	Accept	Not Accept
LSL-1 (Extraction Well, Low)	_____	_____
LSL-2 (Influent Tank, Low)	_____	_____
LSL-5 (Effluent Tank, Low)	_____	_____

4.2.2 Short the probe circuits to simulate a high level for the following level switches and verify that both the diagnostic and annunciator lights actuate:

	Accept	Not Accept
LSH-1 (Influent Tank, High)	_____	_____
LSHH-1 (Influent Tank, High-High)	_____	_____
LSH-2 (Effluent Tank, High)	_____	_____
LSHH-2 (Effluent Tank, High-High	_____	_____
LSH-3 (Disposal Well, High)	_____	_____

4.3 Flow Switches

The flow switches will be functionally tested by manually retracting the paddle to simulate a flowing condition and checking for proper annunciator light actuation that will indicate flow.

	Accept	Not Accept
FS-1	_____	_____
FS-2	_____	_____
FS-3	_____	_____
FS-4	_____	_____
FS-5	_____	_____
FS-6	_____	_____

4.4 Differential Pressure Indicating Transmitters, DPITs

For this test, each Filter and Column will be isolated by closing upstream and downstream valves to allow pressurizing (with air) the DPT's to a pressure higher than the calibrated pressure differential. The differential pressure transmitters will be functionally checked by disconnecting the low pressure side tubing to the differential pressure cell, allowing it to reference atmospheric pressure. Check for the appropriate annunciation and audible alarm indicating high differential pressure.

4.4.1 Influent Filters

- Remove backwash hose from **BV-44**, plug **BV-44** and set 3 way valve
  plugged arm.
- Close **BV-30**.
- Set air compressor at 30 psi, connect air hose to **BV-49**
- Open ball valves **BV-10, BV-38, BV-39, BV-40, BV-41, BV-42, BV-43, BV-45, BV-46, BV-47, BV-48**.
- Start air compressor and allow piping to pressurize to 30 psi.
- Disconnect low pressure side of differential pressure transmitter PDIT-1. Verify actuation of high differential pressure alarm annunciator. Reconnect the tubing to the transmitter before continuing.

	Accept	Not Accept
PDIT-1	_____	_____

4.4.2 Columns

- Close inlet and outlet valve to the first column (**BV-50 and BV-55B**).
- Set air compressor at 30 psi, connect air hose to AC-8.
- Open ball valve AC-3.
- Start air compressor and allow column to pressurize to 30 psi.
- Disconnect low pressure side of differential pressure transmitter PDIT-2. Verify actuation of high differential pressure alarm annunciator. Reconnect the tubing to the transmitter before continuing.
- Repeat this procedure for the remaining columns, closing and opening appropriate ball valves, and connecting to appropriate air connections, and verifying appropriate annunciation of differential pressure alarms.

	Accept	Not Accept
PDIT-2	_____	_____

PDIT-3	_____	_____
PDIT-4	_____	_____

4.4.3 Effluent Filters

- Close **BV-90, 99, 103.**
- Set air compressor at 30 psi, connect air hose to AC-9.
- Open ball valves: **BV-92, BV-93, BV-94, BV-95, BV-98, BV-100, BV-101, BV-102.**
- Verify that hose from Effluent Pump manifold to Disposal Well manifold (location of AC-9) is connected.
- Start air compressor and allow piping to pressurize to 30 psi.
- Disconnect low pressure side of differential pressure transmitter PDIT-5. Verify actuation of high differential pressure alarm annunciator. Reconnect the tubing to the transmitter before continuing.

	Accept	Not Accept
PDIT-5	_____	_____

Section 4 completed as noted. QA _____ Date: _____

5.0 OPERATIONAL TEST PROCEDURE

In this portion of the test procedure, the process treatment system will be configured and flow of potable water established to verify operability. Align valves to allow establishing flow from the Extraction Well Pump to the Influent Storage Tank, then from either of the Influent Pumps through either of the Filters and two to four Columns in series flow and on to the Effluent Storage Tank. When the Effluent Storage Tank contains sufficient water, establish flow via the Effluent Pumps to the Disposal Well.

NOTE: Flow will be established by manually aligning valves, starting pumps. Storage tank levels will be monitored via level indicators with the sight glasses as a backup. Differential pressures of the filters and Columns will be monitored via differential pressure indicators/transmitters as well as pressure gages.

5.1 Starting Extraction Well Pump

5.1.1 Open Motorized Ball Valve, **MBV-1** in "Open" mode.

5.1.2 Open ball valves **BV-1, BV-2, BV-4, (BV-6 or, BV-7 & BV-8), BV-9, BV-10, and BV-18.**

5.1.3 Start the Extraction Well Pump by holding in the "Start" pushbutton until flow is established. Watch for flow on FIT-1 and makeup of Flow Switch FS-1, then release the pushbutton.

Acceptable_____ Not Acceptable_____

5.1.4 Verify that the following annunciator and diagnostic lights are not illuminated:

Influent Surge Tank Level High, LSH-1
Extraction Well Level Low,LSL-1
No Flow From Extraction Well Pump, FS-1
Influent Surge Tank Level High-High, LSHH-1

Acceptable_____ Not Acceptable_____

5.1.5 Set MBV-1 selector switch to "Auto." Stop Extraction Well Pump P-1 by pushing the "Stop" pushbutton. Verify MBV-1 closes.

Acceptable_____ Not Acceptable_____

5.2 Establishing Flow from the Influent Storage Tank

5.2.1 When the Influent Storage Tank is at an appropriate level, open **MBV-2** in the "Open" mode.

5.2.2 Open ball valves **BV-11, BV-19, BV-30, BV-34, BV-35, BV-38, BV-39, BV-40, BV-41, BV-45, BV-46, BV-47, BV-48, BV-44, BV-50, BV-51, BV-55B, BV-56, BV-59, BV-62B, BV-64G, BV-64, BV-69, BV-64C, BV-64D, BV-64H, BV-64I, BV-64J, BV-64K, BV-66, BV-70, BV-71, and BV-80.**

5.2.3 Start either Influent Pump P-2B by holding in the "Start" pushbutton until flow is established. Watch for flow on FIT-2 and makeup of FS-2, FS-3, and FS-4.

Acceptable_____ Not Acceptable_____

5.2.4 Verify that the following annunciator and diagnostic lights are not illuminated.

No Flow to Influent Pumps, FS-2
Loss of Flow in Hose to Pipe Manifold, FS-3
Loss of Flow in Hose to Effluent Surge Tank, FS-4
Influent Surge Tank Level Low, LSL-2
Effluent Surge Tank Level High, LSH-2
Effluent Surge Tank Level High-High, LSHH-2

Acceptable_____ Not Acceptable_____

5.2.5 When flow has been established through the system and is at steady state, take readings of flow, pressure, and pressure differential on filters and Columns.

Flow Readings:_____

Pressure Readings:_____

Differential Pressure Readings:

DPIT 1	_____	Influent filters
DPIT 2	_____	Tnk-3
DPIT 3	_____	Tnk-4
DPIT 4	_____	Tnk-5
DPIT 5	_____	Effluent filters

_____

Acceptable_____ Not Acceptable_____

5.2.6 Set MBV-2 selector switch to "Auto." Stop Influent Pump P-2B by pushing the "Stop" pushbutton. Verify MBV-2 closes.

Acceptable_____ Not Acceptable_____

5.3 Starting Effluent Pump

5.3.1 Open ball valves **BV-72, BV-81, BV-87, BV-90, (BV-92 & BV-93, or BV-94 and BV-95), BV-98, BV-99, BV-102, BV-103, BV-110, BV-111, and BV-112.**

5.3.2 Start either Pump P-5A or 5B by holding in the "Start" pushbutton until flow is established. Watch for flow on FIT-3 and makeup of FS-5 and FS-6.

5.3.3 Verify that the following annunciator lights on the annunciator panel are not illuminated:

Disposal Well Level High-High, LSHH-3
Effluent Surge Tank Level Low, LSL-3
No Flow to Effluent Pumps, FS-5
No Flow to Disposal Well, FS-6

5.3.4 When flow has been established though the system and is at steady

state, take readings of flow, pressure, and pressure differential on the filters.

Flow Readings:_____

Pressure Readings:_____

Differential Pressure Readings:_____

_____

Acceptable_____ Not Acceptable_____

Section 5 was completed as noted. QA _____ Date: _____

6.0 INSTRUMENT AND PROCESS CONTROL TEST

6.1 This portion of the test procedure will test the control system interlocks.

6.2 Each interlock will be tested by shorting out the appropriate level relays or by filling and emptying tanks with water (if available), and verifying that each will stop the appropriate pump or close the appropriate motor operated valve.

6.3 Start extraction well pump; restart after each test.

- LSL-1 (Low Level, Extraction Well), Action: Stop P-1

  Acceptable_____ Not Acceptable_____

- LSH-1 (High Level, Influent Tank), Action: Alarm (check this)

  Acceptable_____ Not Acceptable_____

- LSHH-1 (Hi-Hi Level, Influent Tank), Action: Stop P-1

  Acceptable_____ Not Acceptable_____

- FS-1 (No Flow, hose to Influent Tank), Action: Stop P-1

  Acceptable_____ Not Acceptable_____

6.4 Start Influent Pump P-2A or P-2B, restart after each test.

- LSL-2 (Low Level, Influent Tank), Action: Stop P-2A/B

Acceptable_____ Not Acceptable_____

- LSH-2 (High Level, Effluent Tank), Action: Alarm (check this)

Acceptable_____ Not Acceptable_____

- LSHH-2 (High-High Level, Effluent Tank), Action: Stop P-2A/B

Acceptable_____ Not Acceptable_____

- FS-2 (No Flow, to Influent Pumps), Action: Stop P-2A/B

Acceptable_____ Not Acceptable_____

- FS-3 (No Flow, Hose to Process Skid), Action: Stop P-2A/B

Acceptable_____ Not Acceptable_____

- FS-4 (No Flow, Hose to Effluent Tank), Action: Stop P-2A/B

Acceptable_____ Not Acceptable_____

6.5 Start Effluent Pump P-5A or P-5B, restart after each test.

- LSL-3 (Low Level, Effluent Tank), Action: Stop P-5A/B

Acceptable_____ Not Acceptable_____

- LSH-3 (High Level, Disposal Well), Action: Stop P-5A/B

Acceptable_____ Not Acceptable_____

- FS-5 (No Flow, Hose to Effluent Skid), Action: Stop P-5A/B

Acceptable_____ Not Acceptable_____

- FS-6 (No Flow, Hose to Well), Action: Stop P-5A/B

Acceptable_____ Not Acceptable_____

Section 6 was completed as noted. QA _____ Date: _____

7.0 FAILSAFE MOTOR-OPERATED VALVES

The Failsafe Motor-Operated Ball Valves will be tested to verify the capability of closing on loss of power and for the ability to be actuated via the battery pack after

a power failure. The battery pack consists of a 24-VDC battery that is the backup power source for the 24-VDC motor that operates the valve and has a charger that keeps the battery charged when normal power (120 VAC) is on. At the present time, only the Influent Storage Tank has been fitted with the Failsafe Motor-Operated Valves. MBV-1 and MBV-2. When MBV-5 and MBV-6 are installed, this procedure will be revised to provide for testing them according to this procedure.

7.1 The failsafe feature of Motor-Operated Ball Valves MBV-1 and MBV-2 will be tested for closure on loss of power. These valves are located at the influent tank and are to prevent spilling of tank contents to the ground in the event of a power failure. These valves will be checked in the manual and automatic modes.

7.2 MBV-1, Manual Mode

7.2.1 Set MBV-1 "Auto-Open-Close" switch to "Open" to open valve.
7.2.2 Verify that valve is open.

Acceptable_____ Not Acceptable_____

7.3 MBV-1, Automatic Mode

7.3.1 Set MBV-1 "Auto-Open-Close" switch to "Auto."
7.3.2 Start Pump P-1 (Well Pump) and watch for valve to open.
7.3.3 Open the panelboard circuit for MBV-1 by turning off the 120 VAC power to failsafe unit and verify closure of valve on loss of power.
7.3.4 Close panelboard circuit by reapplying 120 VAC to failsafe unit to open valve, then shut off Well Pump P-1 and verify that valve closes when P-1 shuts down.

Acceptable_____ Not Acceptable_____

7.4 MBV-2, Manual Mode

7.4.1 Set MBV-2 "Auto-Open-Close" switch to "Open" to open valve.
7.4.2 Verify that valve is open.

Acceptable_____ Not Acceptable_____

7.5 MBV-2, Automatic Mode

7.5.1 Set MBV-2 "Auto-Open-Close" switch to "Auto."
7.5.2 Start Influent Pump P-2A, or P-2B and watch for valve to open. (Note: Pumps are wired so that both cannot be started at the same time.
7.5.3 Open panelboard circuit for MBV-2 by turning off the 120 VAC to

failsafe unit and verify closure of valve on loss of power.

7.5.4 Close panelboard circuit by reapplying 120 VAC to failsafe unit to open valve, then shut off whichever pump is running (P-2A or P-2B) and verify that valve closes when pump shuts down.

Acceptable_____ Not Acceptable_____

Section 7 was completed as noted. QA _____ Date: _____

8.0 EMERGENCY SHUTDOWN SWITCHES

8.1 The emergency shutdown switch (or switches) will shut down the Treatment System in case of an emergency. Items included in this emergency shutdown include the Well Pump, Influent Pumps, Effluent Pumps, and Failsafe Motor Operated Valves.

8.2 Verify system is operating: Well Pump P-1, Influent Pump (P-2A or 2B), and Effluent Pump (P-5A or 5B) are operating, and that Failsafe Motor Operated Valves are open.

8.3 Actuate Emergency Shutdown Switch(es) and verify shutdown of pumps and closure of valves.

	Acceptable	Not Acceptable
P-1	_____	_____
P-2A/2B	_____	_____
P-5A/5B	_____	_____
MBV-1	_____	_____
MBV-2	_____	_____

Section 8 was completed as noted. QA _____ Date: _____

APPENDIX

FIGURES

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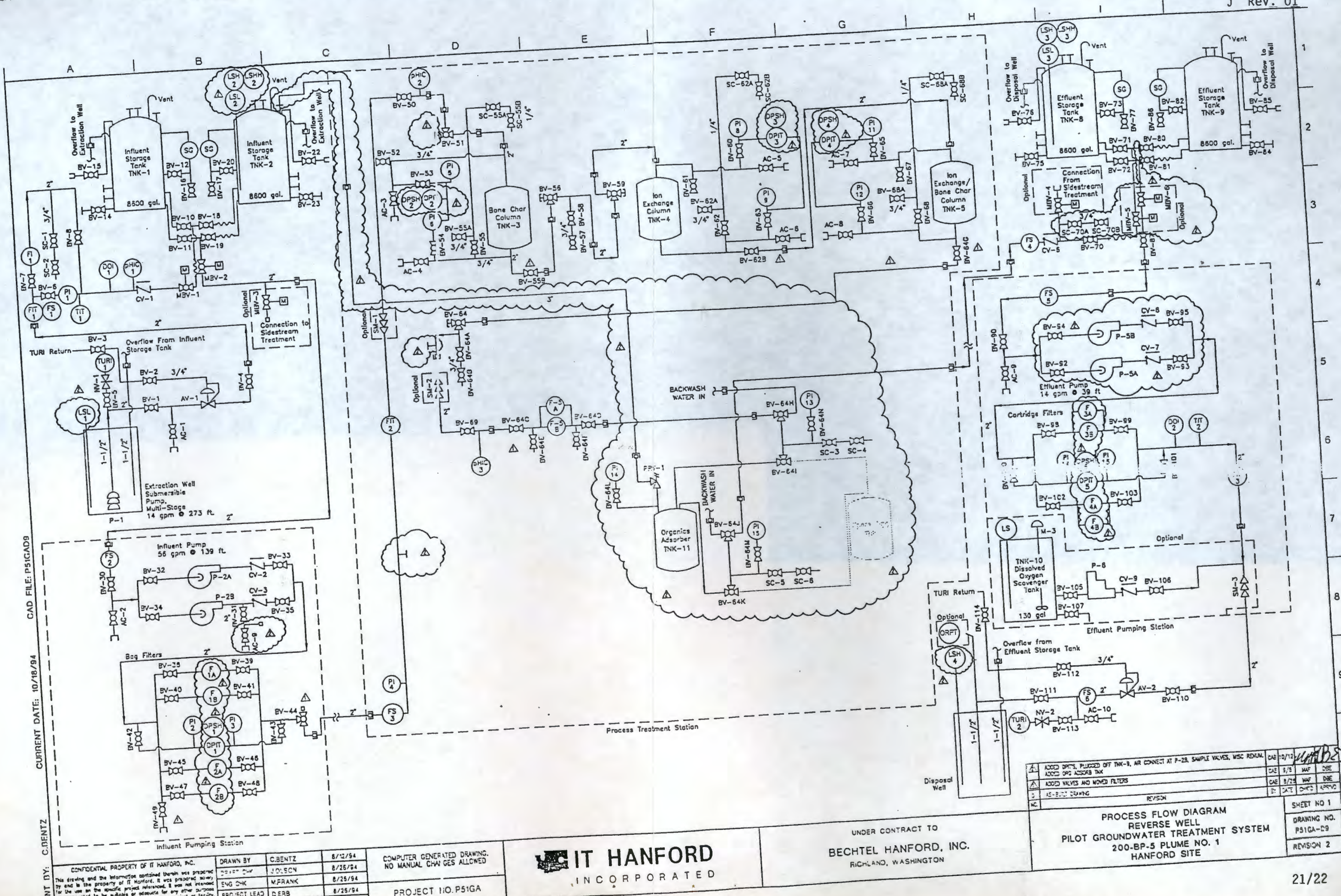

4	ADDED DRAIN, PLUGGED OFF TNK-9, AIR CONNECT AT P-2B, SAMPLE VALVES, MISC REVISN.	DAE	10/12
3	ADDED ORG ADSORB TNK	DAE	8/9
2	ADDED VALVES AND MOVED FILTERS	DAE	8/25
1	AS-BUILT DRAWING	BY	DATE
NO.	REVISION	DRWG	APPVD

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DESIGN CHK	J.OLSON	8/25/94
ENG CHK	M.FRANK	8/25/94
PROJECT LEAD	D.ERB	8/25/94
BHI REVIEW		8/29/94

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PROJECT NO. P51GA

IT HANFORD INCORPORATED

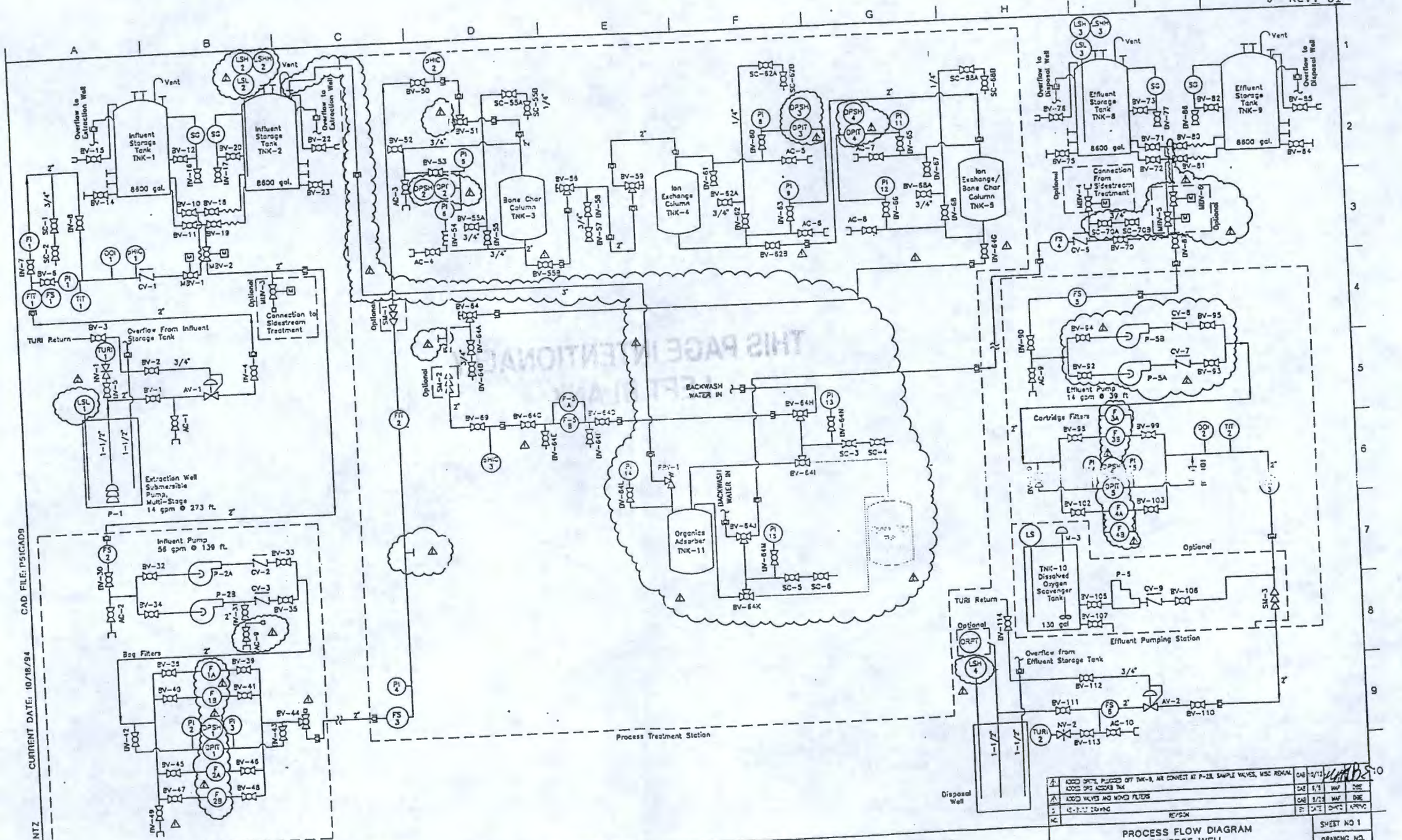
UNDER CONTRACT TO
BECHTEL HANFORD, INC.
RICHLAND, WASHINGTON

PROCESS FLOW DIAGRAM
REVERSE WELL
PILOT GROUNDWATER TREATMENT SYSTEM
200-BP-5 PLUME NO. 1
HANFORD SITE

SHEET NO 1
DRAWING NO. P51GA-D9
REVISION 2

21/22

CAD FILE: P51GAD9
CURRENT DATE: 10/18/94
CURRENT BY: C.BENTZ



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UNDER CONTRACT TO
BECHTEL HANFORD, INC.
RICHLAND, WASHINGTON

NO	REVISION	BY	DATE	CHKD	APPVD
4	ADDED DRFT, PLUGGED OFF TNK-9, AIR CONNECT AT P-2B, SAMPLE VALVES, MISC REMOVAL	DAE	10/13		
3	ADDED SM2 ACCESS TNK	DAE	9/9	MAF	DBE
2	ADDED VALVES AND MOVED FILTERS	DAE	8/25	MAF	DBE
1	AS-BUILT DRAWING	JH	DATE	CHKD	APPVD

PROCESS FLOW DIAGRAM
REVERSE WELL
PILOT GROUNDWATER TREATMENT SYSTEM
200-BP-5 PLUME NO. 1
HANFORD SITE

SHEET NO 1
DRAWING NO. P51GA-09
REVISION 2

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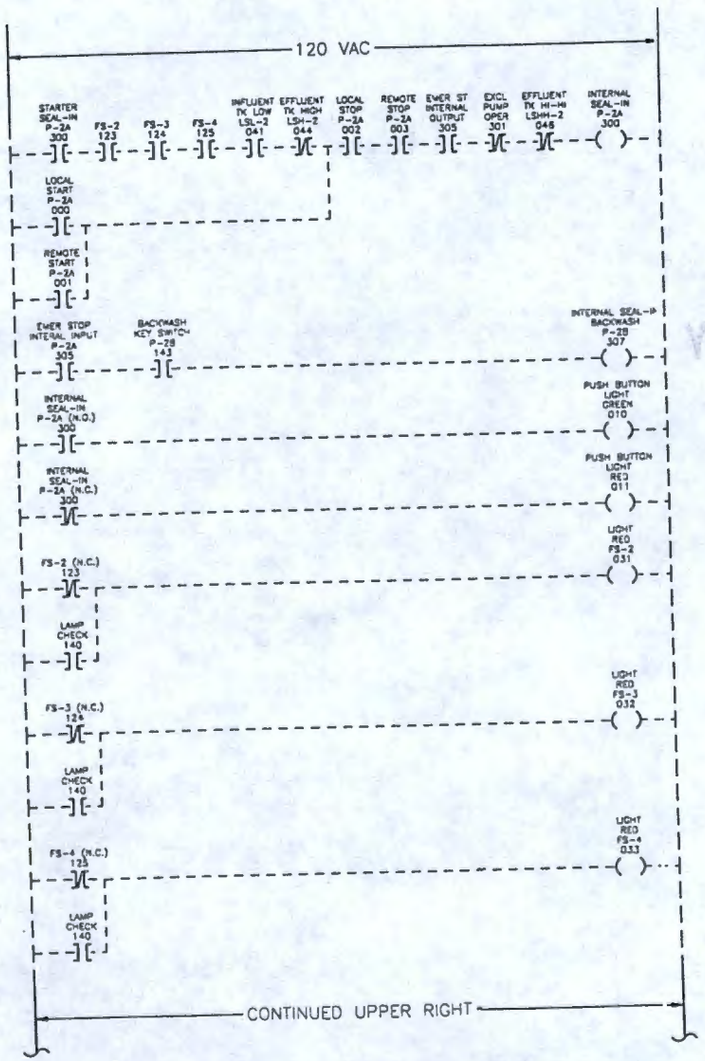

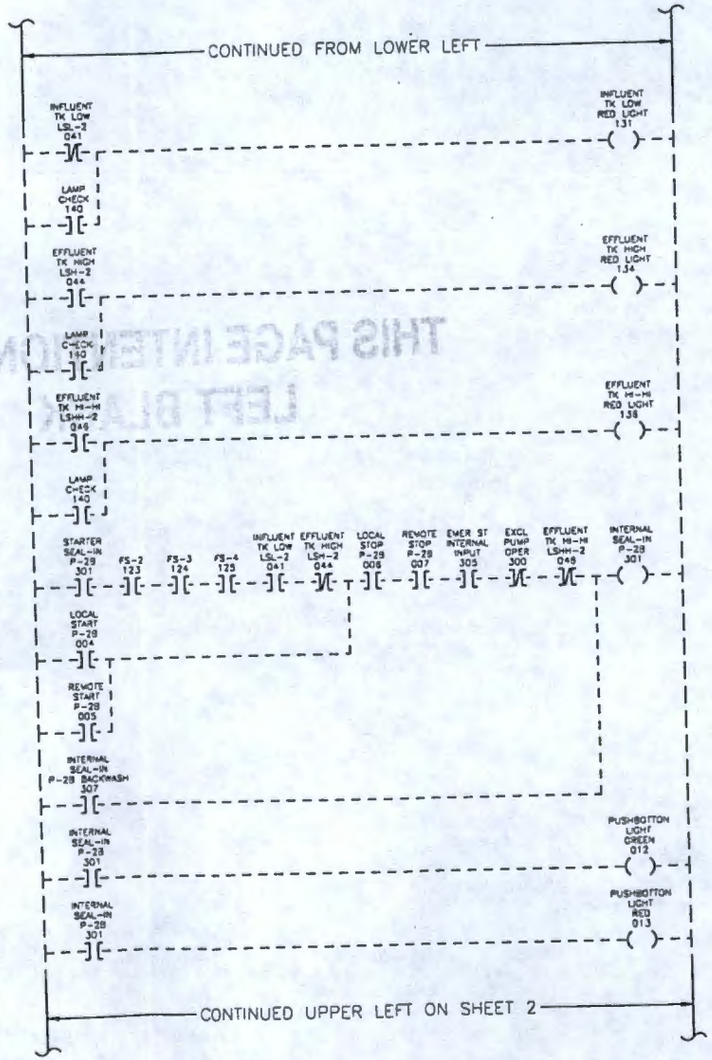

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NOTES

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3	10-20-94	X					

SCALE 1" = XX'

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DOE FIELD OFFICE, RICHLAND
HANFORD ENVIRONMENTAL RESTORATION PROGRAM

BECHTEL HANFORD INC. RICHLAND, WASHINGTON	IT HANFORD INC. RICHLAND, WASHINGTON

200-BP-5 REVERSE WELL
PROGRAMMABLE LOGIC CONTROLLER
LADDER LOGIC DIAGRAM

BECHTEL JOB NO.	DOE CONTRACT NO.	CADD FILENAME
22192	DE-AC06-93RL12367	PLC-BPL1

DRAWING NO.
200-BP-5

Sheet 1 of 4

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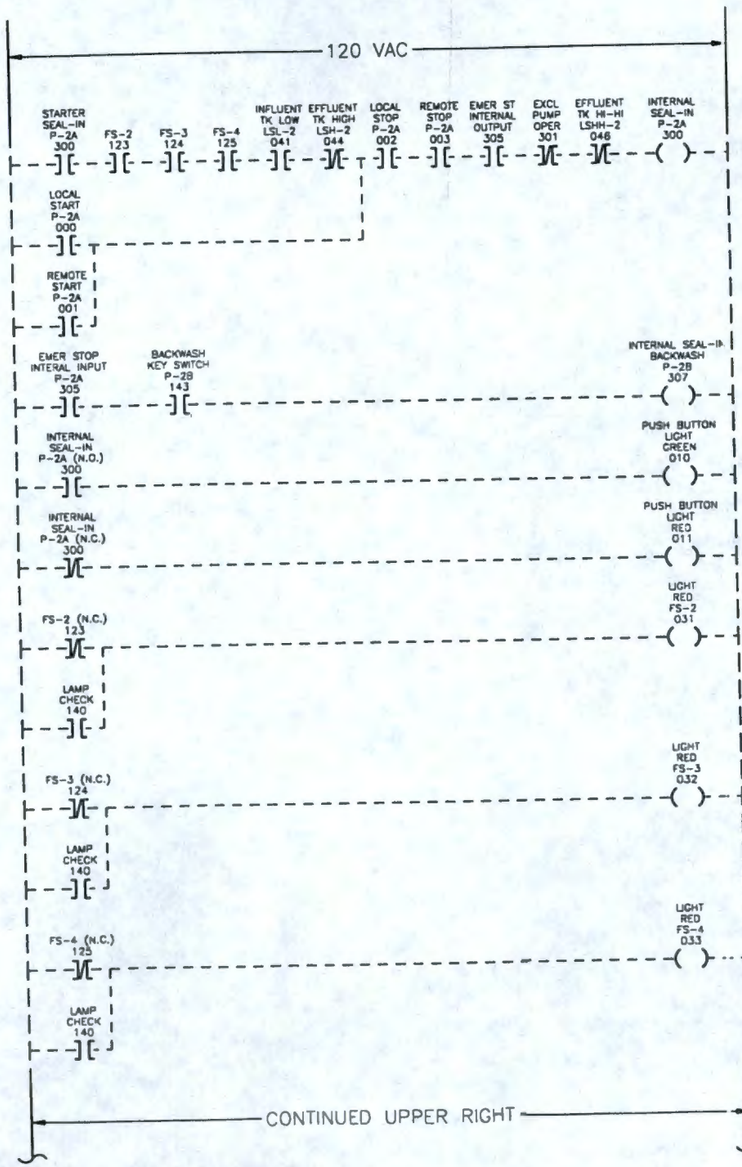

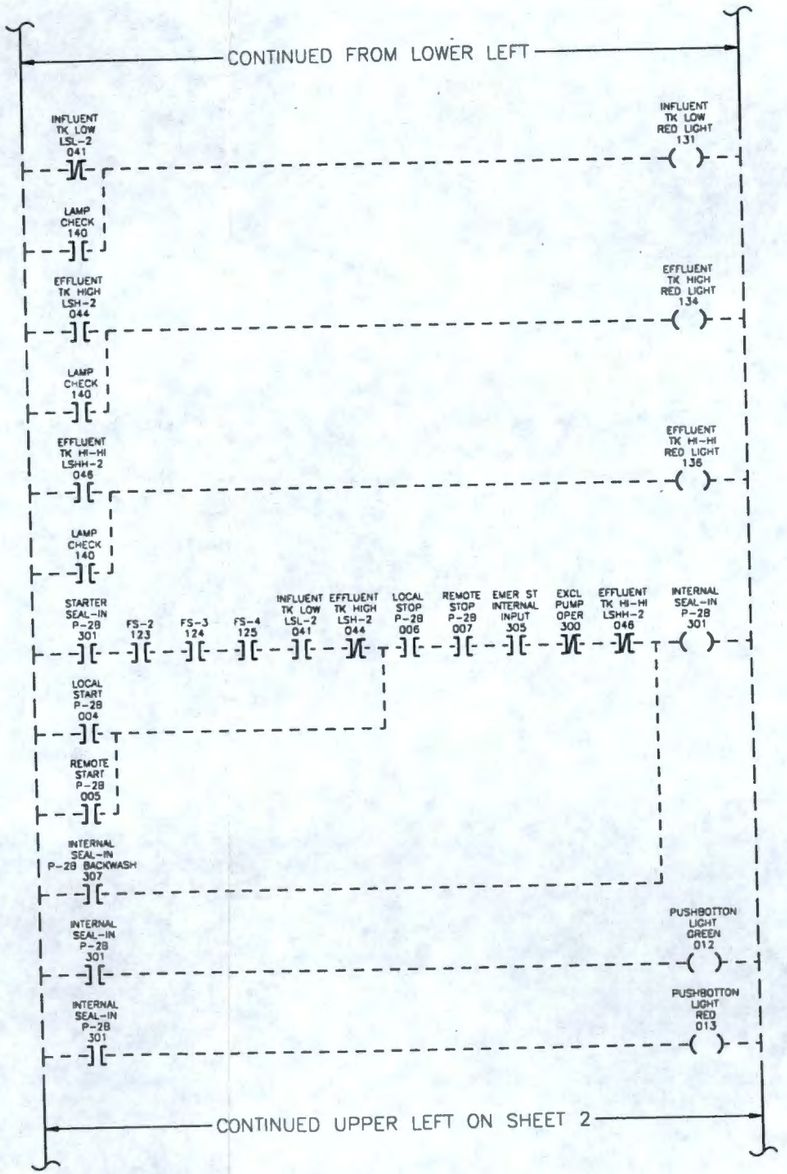

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PROGRAMMABLE LOGIC CONTROLLER
LADDER LOGIC DIAGRAM

BECHTEL JOB NO.	DOE CONTRACT NO.	CADD FILENAME
22192	DE-AC06-93RL12367	PLC-BPL1

DRAWING NO.
200-BP-5

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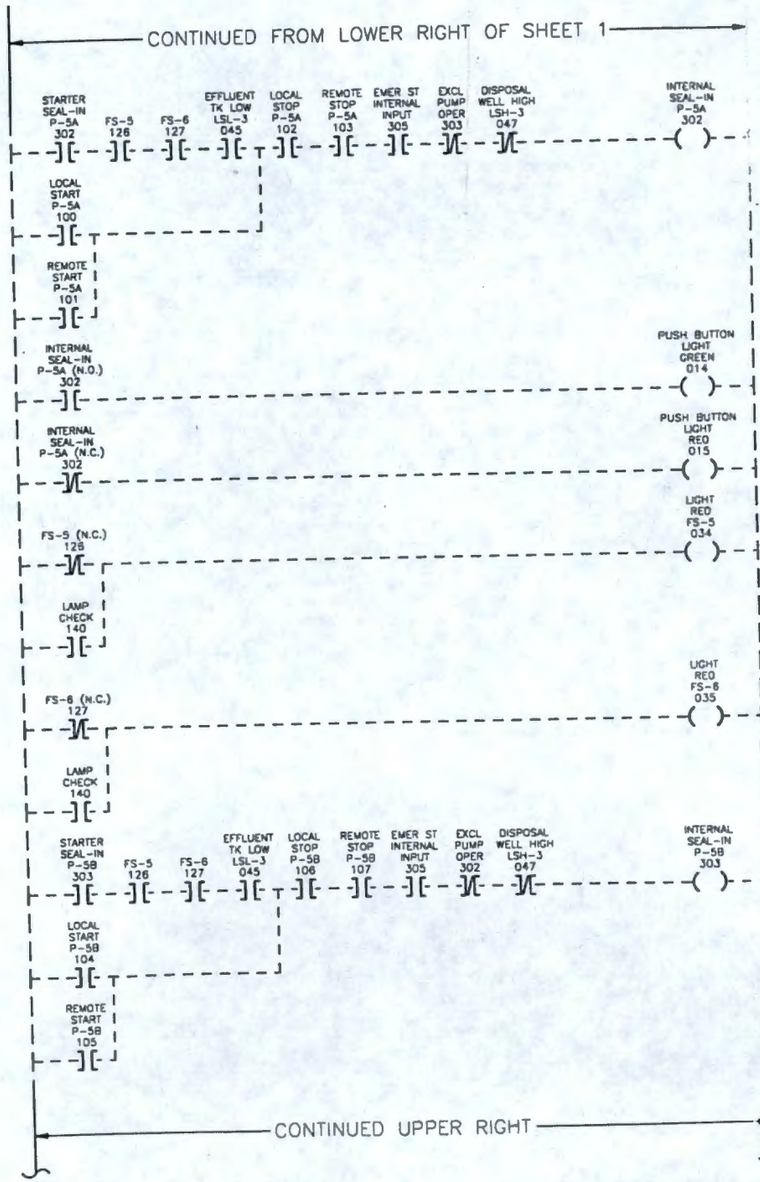

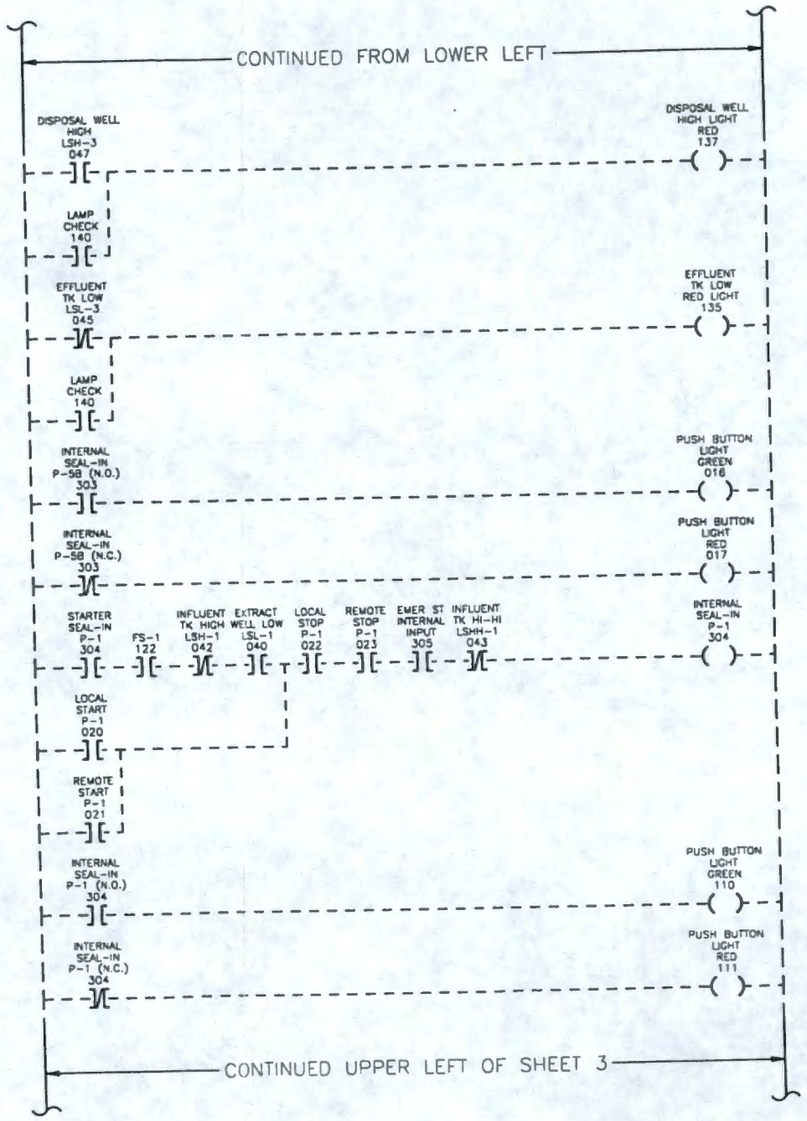

NOTES

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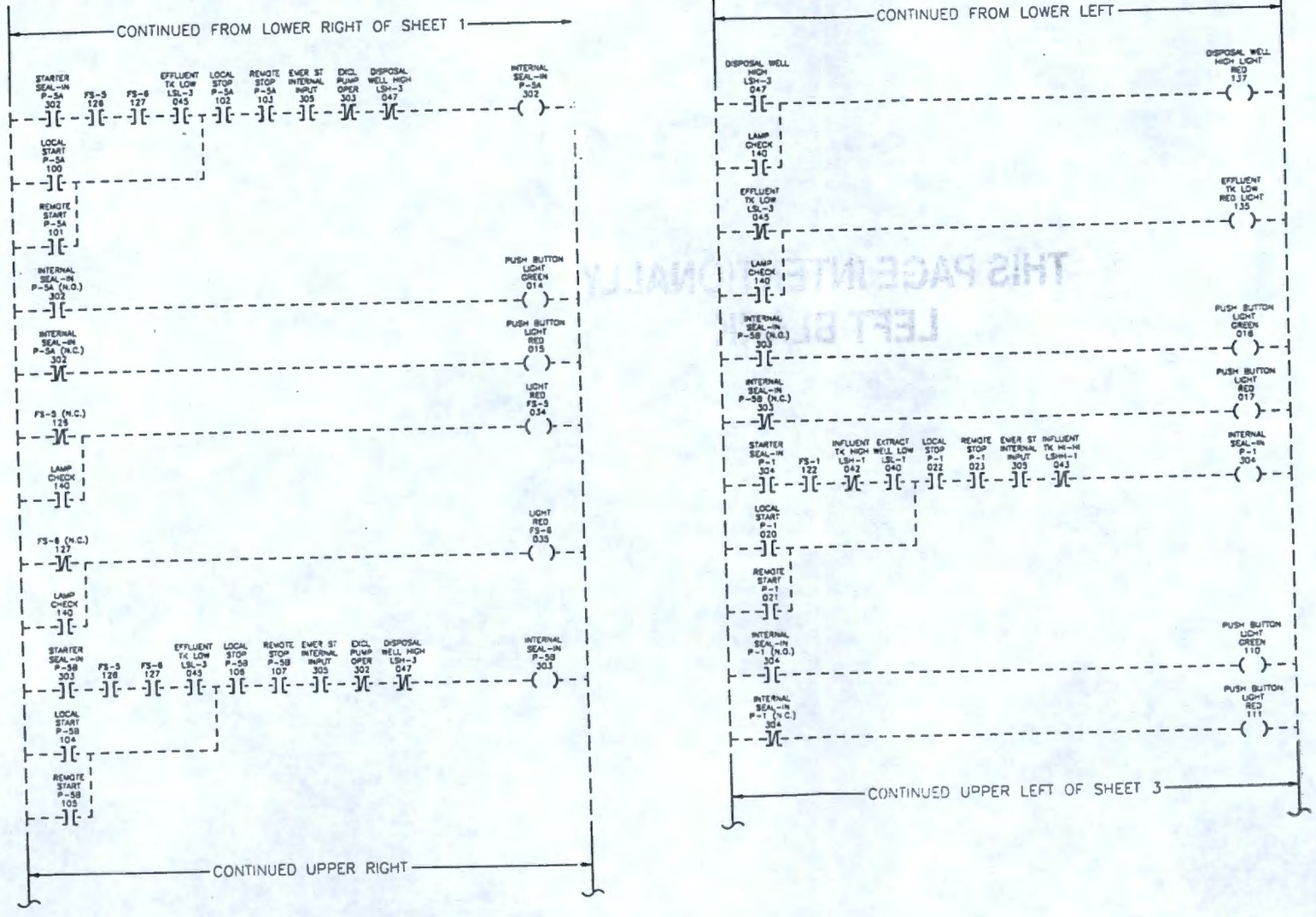
200-BP-5 REVERSE WELL
PROGRAMMABLE LOGIC CONTROLLER
LADDER LOGIC DIAGRAM

BECHTEL JOB NO.	DOE CONTRACT NO.	CADD FILENAME
22192	DE-AC06-93RL12367	PLC-BPL2

DRAWING NO.
200-BP-5

Sheet 2 of 4



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BECHTEL HANFORD INC. RICHLAND, WASHINGTON	IT HANFORD INC. RICHLAND, WASHINGTON

200-BP-5 REVERSE WELL
PROGRAMMABLE LOGIC CONTROLLER
LADDER LOGIC DIAGRAM

BECHTEL JOB NO.	DOE CONTRACT NO.	CADD FILENAME
22192	DE-AC06-93RL12367	PLC-BPL2

DRAWING NO.
200-BP-5

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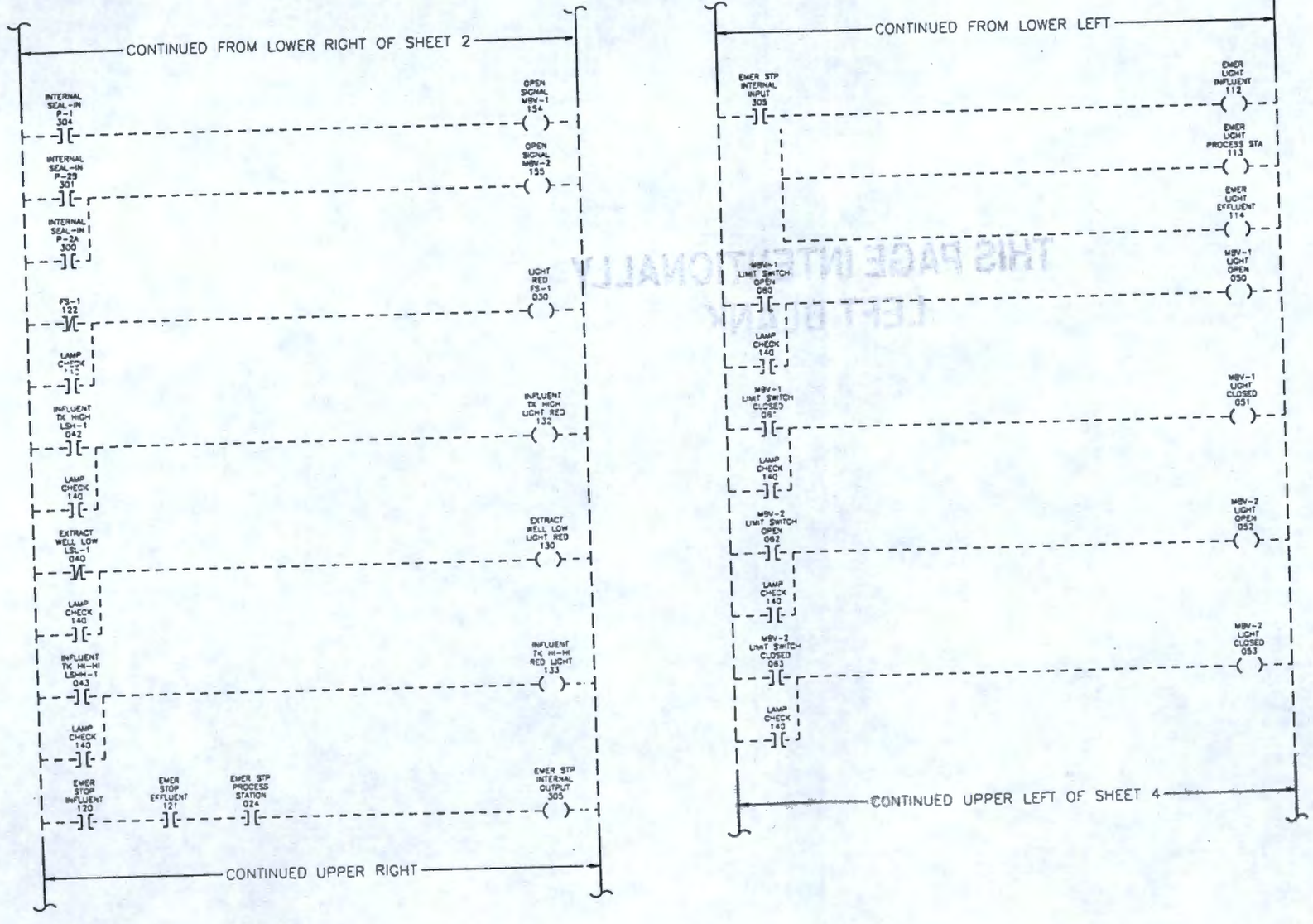

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22192	DE-AC06-93RL12367	PLC-BPL3

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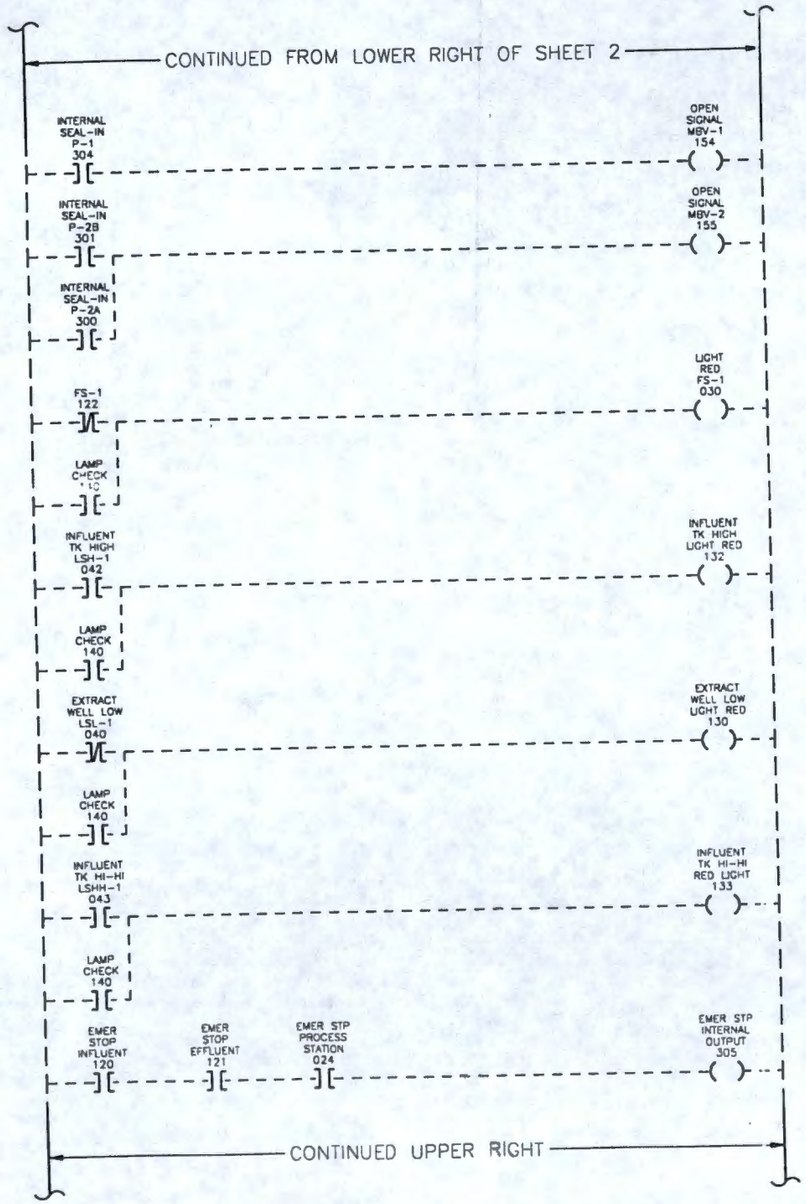

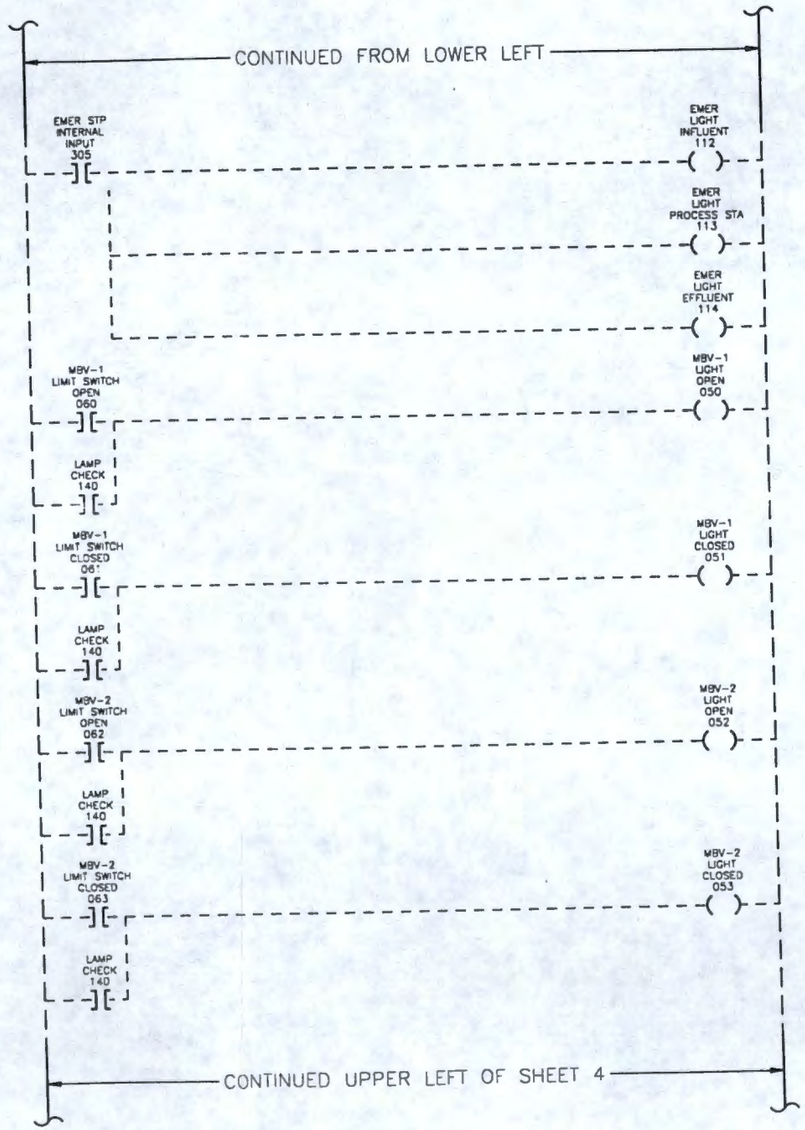

NOTES

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8	10-20-94	X					

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PROGRAMMABLE LOGIC CONTROLLER
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BECHTEL JOB NO.	DOE CONTRACT NO.	CADD FILENAME
22192	DE-AC06-93RL12367	PLC-BPL3

DRAWING NO.
200-BP-5

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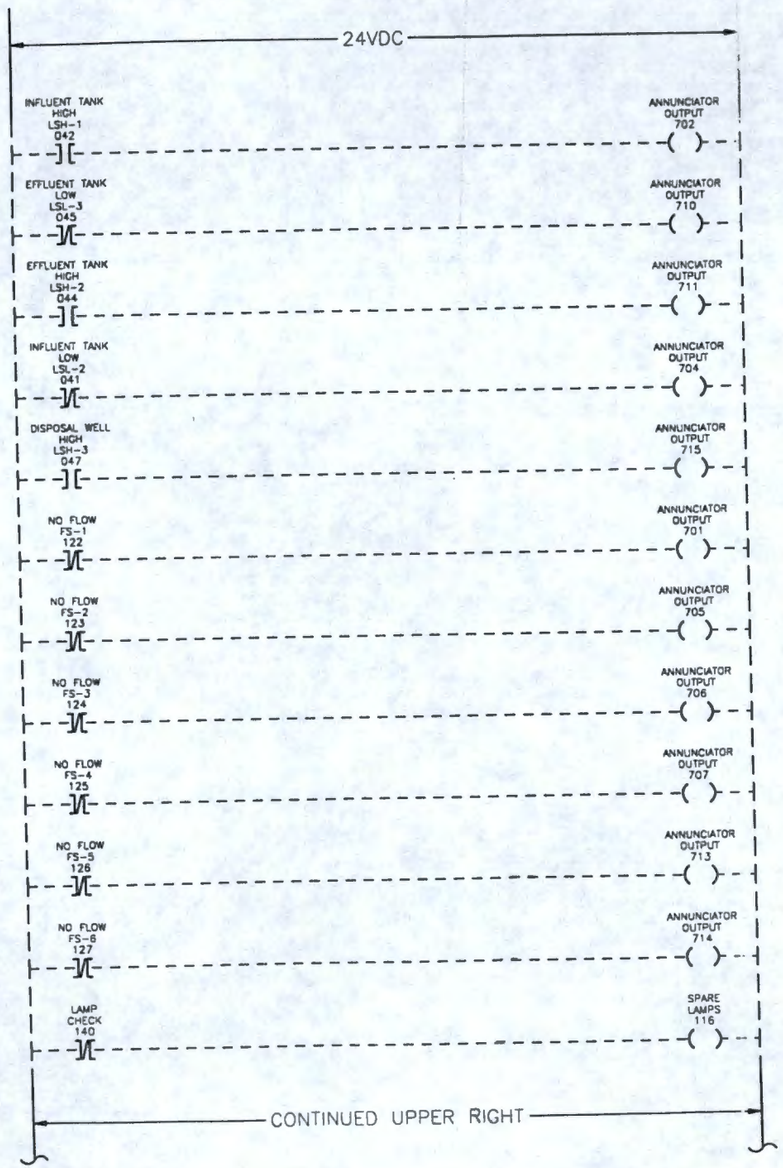

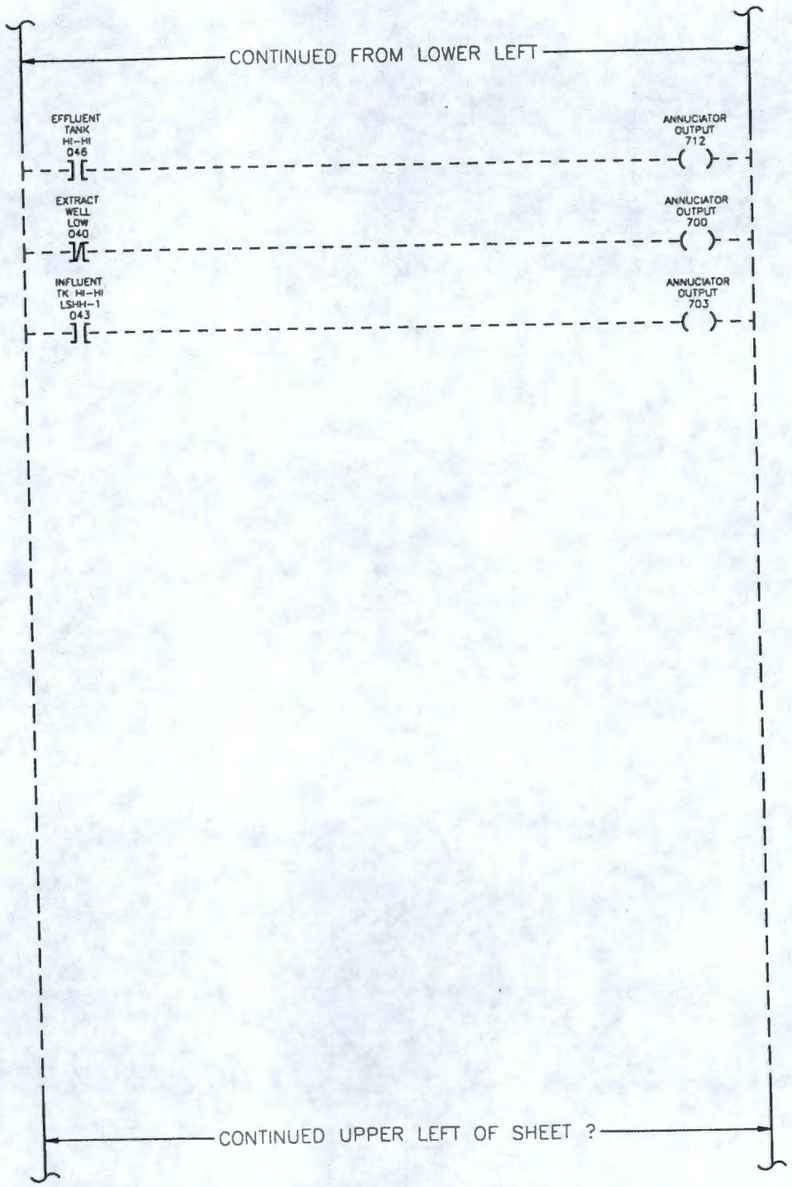

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200-BP-5 REVERSE WELL
PROGRAMMABLE LOGIC CONTROLLER
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BECHTEL JOB NO.	DOE CONTRACT NO.	CADD FILENAME
22192	DE-AC06-93RL12367	PLC-BPL4

DRAWING NO.
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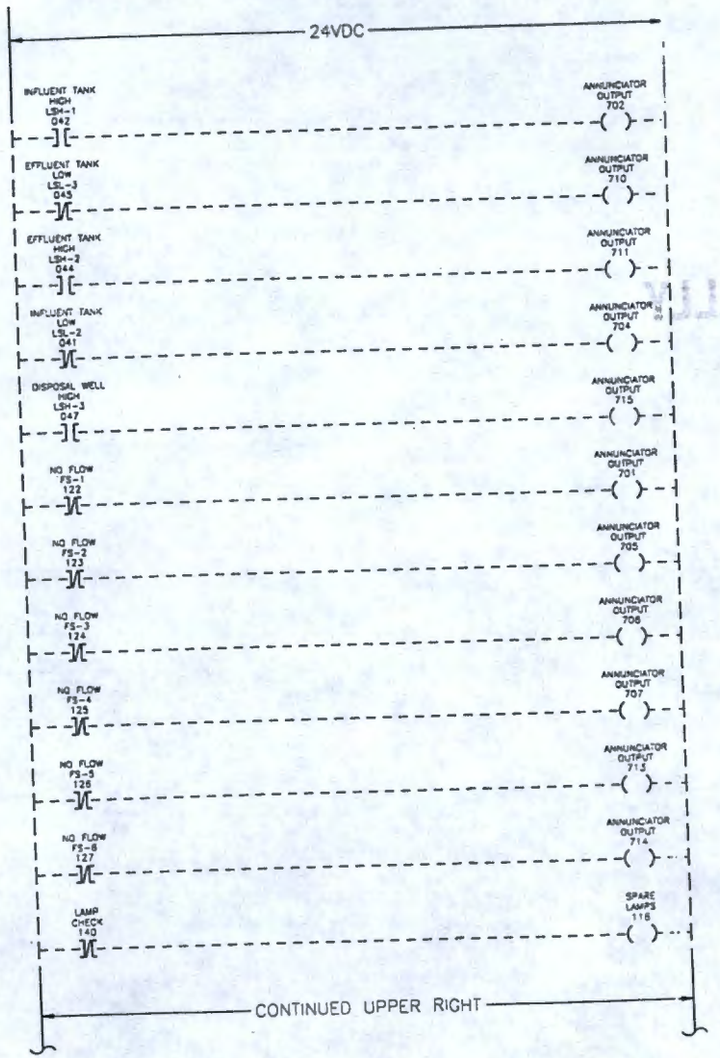

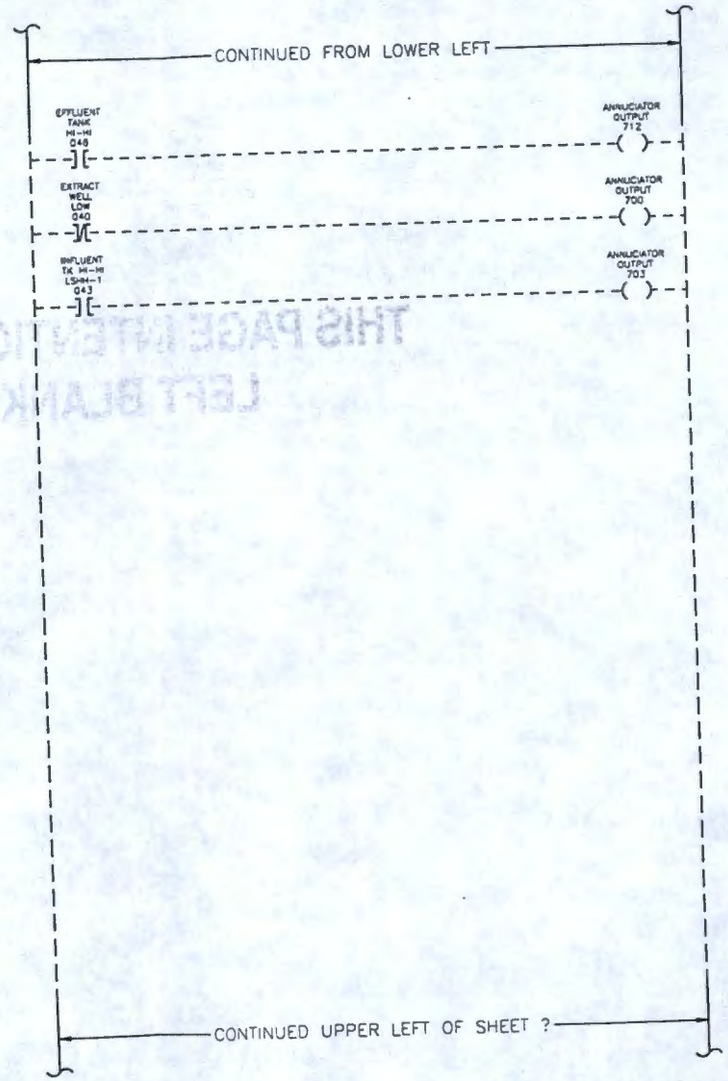

NOTES

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HANFORD ENVIRONMENTAL RESTORATION PROGRAM

BECHTEL HANFORD INC. RICHLAND, WASHINGTON	IT HANFORD INC. RICHLAND, WASHINGTON

200-BP-5 REVERSE WELL
PROGRAMMABLE LOGIC CONTROLLER
LADDER LOGIC DIAGRAM

BECHTEL JOB NO.	DOE CONTRACT NO.	CADD FILENAME
22192	DE-AC06-93RL12367	PLC-BPL4

DRAWING NO.
200-BP-5

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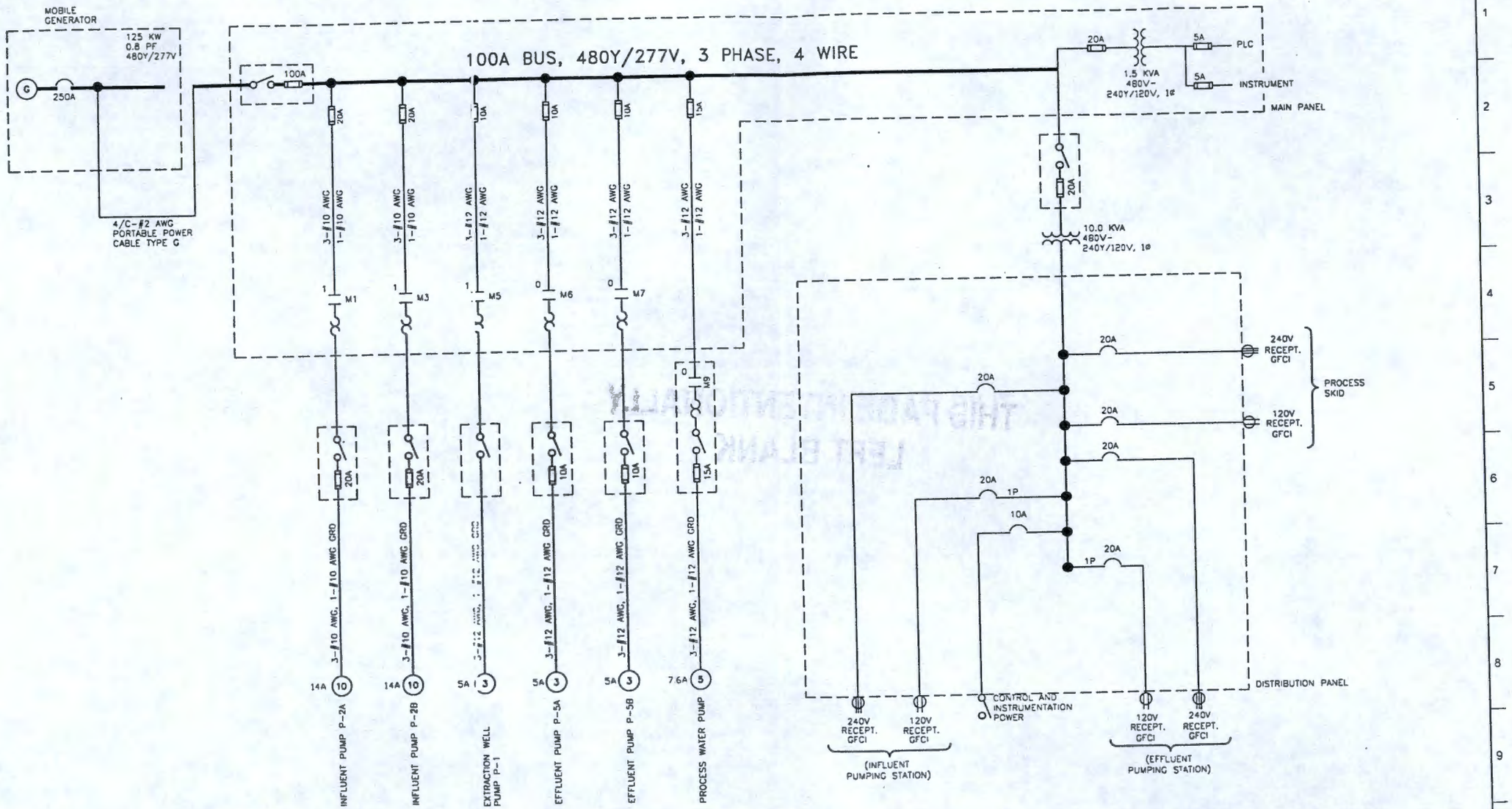

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PROJECT NO. P51GA

IT HANFORD INCORPORATED

UNDER CONTRACT TO
BECHTEL HANFORD, INC.
RICHLAND, WASHINGTON

ONE LINE ELECTRICAL DIAGRAM
REVERSE WELL
PILOT GROUNDWATER TREATMENT SYSTEM
200-BP-5 PLUME NO.1
HANFORD SITE

SHEET NO 1
DRAWING NO. P51GA-D8
REVISION C

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MOBILE GENERATOR
125 KW
0.8 PF
480Y/277V
G
250A
4/C-#2 AWG
PORTABLE POWER
CABLE TYPE G

100A BUS, 480Y/277V, 3 PHASE, 4 WIRE

100A

20A 3-#10 AWG 1-#10 AWG 1 M1 — 20A — 20A — 14A (10) — INFLUENT PUMP P-2A
20A 3-#10 AWG 1-#10 AWG 1 M3 — 20A — 20A — 14A (10) — INFLUENT PUMP P-2B
10A 3-#12 AWG 1-#12 AWG 1 M5 — 10A — 10A — 5A (3) — EXTRACTION WELL PUMP P-1
10A 3-#12 AWG 1-#12 AWG 0 M6 — 10A — 10A — 5A (3) — EFFLUENT PUMP P-5A
10A 3-#12 AWG 1-#12 AWG 0 M7 — 10A — 10A — 5A (3) — EFFLUENT PUMP P-5B
15A 3-#12 AWG 1-#12 AWG 0 M9 — 15A — 15A — 7.6A (5) — PROCESS WATER PUMP

3-#10 AWG, 1-#10 AWG GRD
3-#12 AWG, 1-#12 AWG GRD

20A — 1.5 KVA 480V-240Y/120V, 1ø — 5A PLC, 5A INSTRUMENT — MAIN PANEL

20A — 10.0 KVA 480V-240Y/120V, 1ø

20A — 240V RECEPT. GFCI
20A — 120V RECEPT. GFCI
20A — PROCESS SKID

20A — 1P — 10A — 20A — 1P

240V RECEPT. GFCI
120V RECEPT. GFCI
(INFLUENT PUMPING STATION)

CONTROL AND INSTRUMENTATION POWER

120V RECEPT. GFCI
240V RECEPT. GFCI
(EFFLUENT PUMPING STATION)

DISTRIBUTION PANEL

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B	FOR INTERNAL REVIEW	CAB	8/29		

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DRAFT CHK		
ENG CHK		
PROJECT LEAD		
BHI REVIEW		

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PROJECT NO. P51GA

IT HANFORD INCORPORATED

UNDER CONTRACT TO
BECHTEL HANFORD, INC.
RICHLAND, WASHINGTON

ONE LINE ELECTRICAL DIAGRAM
REVERSE WELL
PILOT GROUNDWATER TREATMENT SYSTEM
200-BP-5 PLUME NO.1
HANFORD SITE

SHEET NO 1
DRAWING NO. P51GA-D8
REVISION C

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Bechtel Hanford, Inc.	TRANSMITTAL FOR CONTROLLED PROCEDURES	
EPIC 19 H6-08	Transmittal No. TR-OP-17	Date 10-25-94
	Document No./Title of Manual BHI-OP-00011	

The procedure(s) listed below are being issued by BHI Procedures Coordination as new or revised procedures.

PROCEDURE NO.	REV. NO.	TITLE
BHI-OP-00011	1	200-BP-5 Unit #1 Pilot-Scale Groundwater Treatment System Acceptance Test/Operational Test Procedure
		NOTE: Rev. 0 of this document was previously issued as BHI-00015,
		same title, dated 09/24/94. (BHI-OP-00011 supersedes rev. 0)

Receipt Acknowledgment

I acknowledge receipt of the procedure(s) listed above. These procedures have been appropriately inserted and the superseded material removed and disposed of.

Signature: Jo Ann Riley Date: 11-22-94

New address if different than listed above _____

PLEASE RETURN THIS SIGNED TRANSMITTAL WITHIN TEN WORKING DAYS TO

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372-9555
H4-79

BHI-DC-001 (8/94)

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